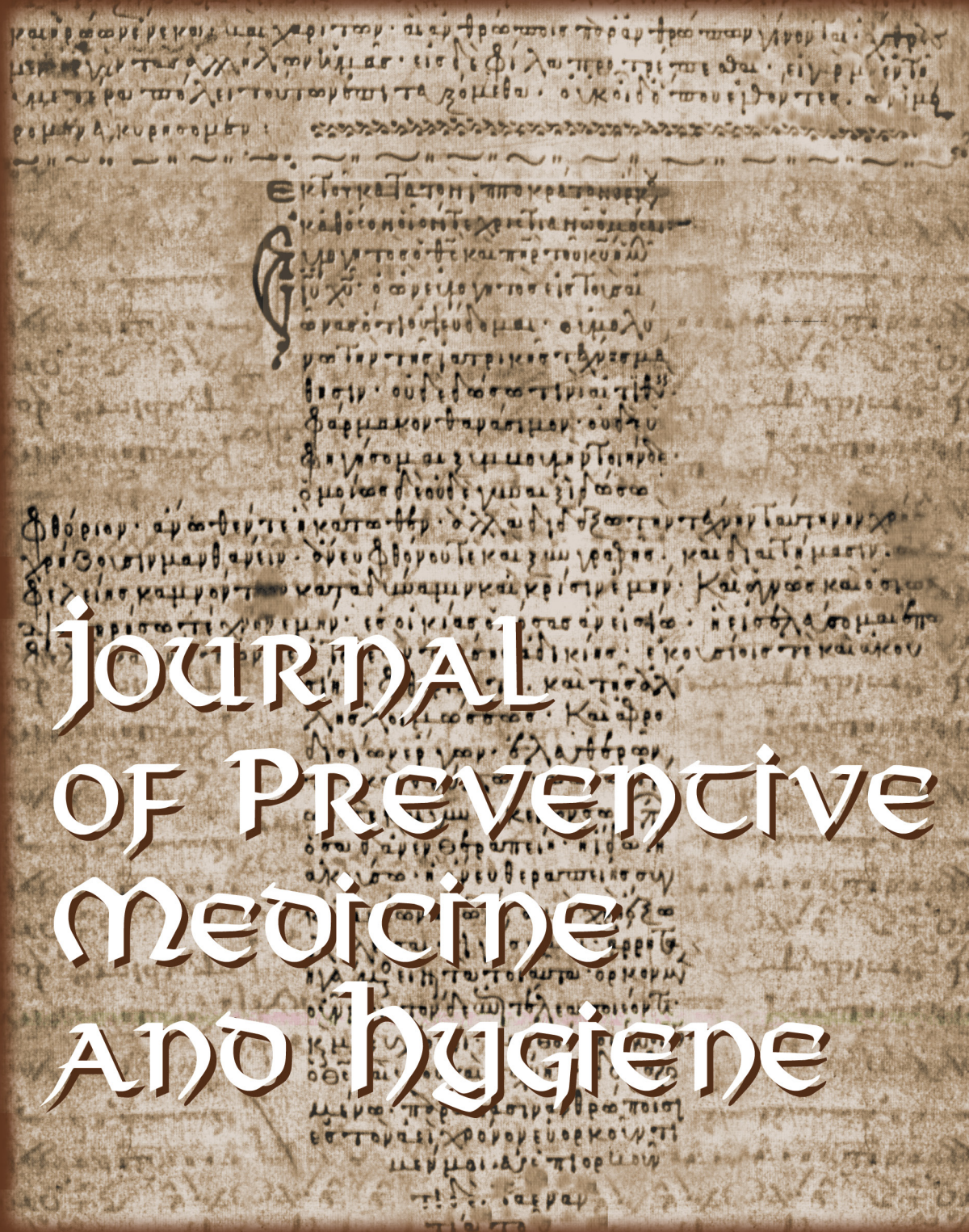


vol. n.
64/1

Cited in Index Medicus / Medline
NLM ID 921440 (Pub-Med)

March
2023



the original document of HIPPOCRATES' OATH



SItH

The Journal has been Accredited,
on occasion of the 17th December
2004 Meeting of the Executive
And Scientific SItH Councils, by the
Italian Society of Hygiene, Preventive
Medicine And Public Health

PACINI
EDITORE
MEDICINA

JOURNAL OF PREVENTIVE medicine AND hygiene

Editors

Roberto Gasparini

Full Professor of Hygiene and Preventive Medicine

Giancarlo Icardi

Full Professor of Hygiene and Preventive Medicine Department of Health

Sciences, University of Genoa, Italy

Interuniversity Research Centre on Influenza and other infections (CIRI-IT),

University of Genoa, Italy

International Board

Daniela Amicizia

Department of Health Sciences, University of Genoa, Italy

Interuniversity Research Centre on Influenza and Other Infections (CIRI-IT),

University of Genoa, Italy

Roy Anderson

FRS FMedSci, London Centre for Neglected Tropical Disease Research, London,

United Kingdom

Department of Infectious Disease Epidemiology, School of Public Health Faculty

of Medicine, London, United Kingdom

MRC Centre for Global infectious Disease Analysis

Italo Francesco Angelillo

Department of Experimental Medicine, University of Campania "Luigi Vanvitelli",

Naples, Italy

Filippo Ansaldi

Department of Health Sciences, University of Genoa, Italy

Interuniversity Research Centre on Influenza and Other Infections (CIRI-IT),

University of Genoa, Italy

Novita Intan Arovah

Department of Sports Science, Faculty of Sports Science, Yogyakarta State

University, Yogyakarta, Indonesia

Mario Alberto Battaglia

Department of Life Sciences, University of Siena, Italy

Paolo Bonanni

Department of Health Sciences, University of Florence, Italy

Maria Luisa Cristina

Department of Health Sciences, University of Genoa, Italy

Francesco D'Agostini

Department of Health Sciences, University of Genoa, Italy

Àngela Domínguez

Department of Medicine, University of Barcelona, Spain

Consortium for Biomedical Research in Epidemiology Public Health (CIBERESP),

Madrid, Spain

Alexander Domnich

Hygiene Unit, IRCCS Ospedale Policlinico San Martino, Genoa, Italy

Paolo Durando

Department of Health Sciences, University of Genoa, Italy

Giovanni Gabutti

Full Professor of Hygiene and Preventive Medicine

Arti Gupta

Department of Community and Family Medicine, All India Institute of Medical

Sciences Mangalagiri, Andhra Pradesh, India

Alberto Izzotti

Department of Health Sciences, University of Genoa, Italy

Pablo Francisco Martina

Department of Biology Sciences, University of Misiones, Argentina

Emanuele Montomoli

Department of Molecular and Developmental Medicine, University of Siena, Italy

Nicola Nante

Department of Molecular and Developmental Medicine, University of Siena, Italy

Andrea Orsi

Department of Health Sciences, University of Genoa, Italy

Interuniversity Research Centre on Influenza and Other Infections (CIRI-IT),

University of Genoa, Italy

Donatella Panatto

Department of Health Sciences, University of Genoa, Italy

Interuniversity Research Centre on Influenza and Other Infections (CIRI-IT),

University of Genoa, Italy

Vana Papaevangelou

Pediatric Infectious Diseases Third Department of Pediatrics General University

Hospital Attikon, Athens, Greece

Bettina Fuzne Piko

Department of Behavioral Sciences, University of Szeged, Hungary

Mario Ramirez

Instituto de Microbiologia Faculdade de Medicina, University of Lisboa, Portugal

Rino Rappuoli

Fondazione Biotechnopolo di Siena, Siena, Italy

Linda Sanftenberg

Institute of General Practice and Family Medicine, University Hospital, LMU

Munich, Germany

Laura Sticchi

Department of Health Sciences, University of Genoa, Italy

Interuniversity Research Centre on Influenza and Other Infections (CIRI-IT),

University of Genoa, Italy

Fiona Timmins

School of Nursing and Midwifery, Trinity College, Dublin, Ireland

Pierre Van Damme

Center for Health Economics Research and Modeling Infectious Diseases, Vaccine

and Infectious Disease Institute, University of Antwerp, Belgium

Editorial Board

Daniela Amicizia

Department of Health Sciences, University of Genoa, Italy

Interuniversity Research Centre on Influenza and Other Infections (CIRI-IT),

University of Genoa, Italy

Piero Luigi Lai

Department of Health Sciences, University of Genoa, Italy

Interuniversity Research Centre on Influenza and Other Infections (CIRI-IT),

University of Genoa, Italy

Donatella Panatto

Department of Health Sciences, University of Genoa, Italy

Interuniversity Research Centre on Influenza and Other Infections (CIRI-IT),

University of Genoa, Italy

© Copyright by Pacini Editore Srl, Pisa, Italy

Managing Editor: Patrizia Alma Pacini

Publisher: Pacini Editore Srl, Via Gherardesca 1, 56121 Pisa, Italy

Tel. +39 050 313011 - Fax +39 050 3130300

info@pacinieditore.it - www.pacinimedicina.it

Published online May 2023

Authorization Tribunal of Genoa, Italy n. 507 - 10/6/1960

Journal registered at "Registro pubblico degli Operatori della Comunicazione" (Pacini Editore srl registration n. 6269 - 29/8/2001).

Volume 64 - Issue 1 March 2023

www.jpmmh.org

Contents

Results of COVID-19 screening in a dermatologic clinic in Northern Italy <i>Martina Burlando, Samuele Boldrin, Ilaria Salvi, Emanuele Cozzani, Aurora Parodi</i>	1
Clinical characteristics and risk factors associated with COVID-19 mortality in a non-Intensive Care Unit <i>Pierfrancesco Grima, Marcello Guido, Antonella Zizza</i>	3
Risk perception, knowledge about SARS-CoV-2, and perception towards preventive measures in Italy: a nationwide cross-sectional study <i>Giuseppina Lo Moro, Giacomo Scaioli, Simone Nicolino, Tiziana Sinigaglia, Elisabetta De Vito, Fabrizio Bert, Roberta Siliquini</i>	9
Knowledge and attitude towards monkeypox among the Lebanese population and their attitude towards vaccination <i>Youssef Jamaledine, Asem Abou El Ezz, Mahmoud Mahmoud, Omar Ismail, Ahmad Saifan, Zaid Mayta, Abdallah Saab, Pascale Salameh</i>	13
The insidious return of cholera in the Eastern Mediterranean Region, Lebanon and Syria: a worrying signal! Past, present, and future forthcoming <i>Orsini Davide, Mariano Martini</i>	27
Demographic and clinical characteristics associated with tobacco smoking and alcohol use disorder among heterosexual people living with HIV in West Papua, Indonesia <i>Mirna Widiyanti, Mustika Pramestiyani, Setyo Adiningsih, Juntima Nawamawat</i>	34
Does moral sensitivity contribute to patient satisfaction? A cross-sectional survey in educational hospitals <i>Majid Taheri, Mahmoud Abbasi, Mohammad Tavakol, Amir Almasi-Hashiani, Mehri Mohammadi, Ali Arash Anoshirvani, Mehran Akbari, Seidamir Pasha Tabaeian</i>	40
Relationship between health literacy skills and walking behavior to prevent osteoporosis among health volunteers <i>Rahman Panahi, Nooshin Hosseini, Saba Yavari, Keyhan Javanmardi, Mohiadin Amjadian</i>	48
Development of indicators to measure quality of life for pregnant women (QOL-PW) <i>Nunik Puspitasari</i>	55
Institutional delivery knowledge, attitude, and practice among mothers of childbearing age with one or more children, Ethiopia <i>Kaleab Tesfaye Tegegne, Tadele Kassahun Wudu, Bacha Guta Abdisa, Eleni Tesfaye Tegegne, Mekibib Kassa Tessema</i>	67
Impact of dental caries and periodontal disease on oral health-related quality of life among the Karnataka State Reserve Police Personnel in Belagavi, India <i>Varkey Nadakkavukaran Santhosh, Anil Ankola, Roopali Sankeshwari, Sagar Jalihal, Anu Sara Varghese, Prajakta Chavan, Mehul Ajit Shah</i>	78
Spring, it's time to ROSC <i>Giuseppe Stirparo, Aida Andreassi, Giuseppe Maria Sechi, Carlo Signorelli</i>	87
Critical pathways for continuous quality improvement: a multicentric analysis on the management of patients with lung cancer in Italian best performing hospitals <i>Antonio Giulio De Belvis, Maria Chiara Catalani, Alisha Morsella, Giorgio Sessa, Amelia Palinuro, Gabriele Giubbini, Florence Watteble, Carmen Angioletti</i>	92
One hundred years after the death of the writer and novelist Giovanni Verga (1922) and his relationship with public health: a glimpse of the past in the era of the SARS-CoV-2 (COVID-19) pandemic <i>Mariano Martini, Donatella Lippi</i>	101
Analysis and evolution of health policies in Iran through policy triangle framework during the last thirty years: a systematic review of the historical period from 1994 to 2021 <i>Leila Doshmangir, Meysam Behzadifar, Ali Shahverdi, Mariano Martini, Seyed Jafar Ehsanzadeh, Samad Azari, Ahad Bakhtiari, Saeed Shahabi, Nicola Luigi Bragazzi, Masoud Behzadifar</i>	107
Errata corrige	118



COVID-19

Results of COVID-19 screening in a dermatologic clinic in Northern Italy

MARTINA BURLANDO, SAMUELE BOLDRIN, ILARIA SALVI, EMANUELE COZZANI, AURORA PARODI
Section of Dermatology, DISSAL, University of Genoa, Ospedale-Policlinico San Martino, IRCCS, Genova, Italy

Keywords

COVID-19 • Testing • Screening • Dermatology • Prevention

Dear Editor,

The COVID-19 pandemic has been a social, economic and sanitary challenge, which has taken a great toll on all Health Systems [1]. Dermatology clinics were not spared by the pandemic, suffering a dramatic slowdown in most activities, including prevention, follow-up, non-essential procedures and education [2].

With the reopening of outpatient services, a new challenge was posed by the risk of SARS-CoV-2 transmission from asymptomatic or newly infected individuals, which are known to be still able to spread the virus [3]. However, it appeared that the benefit of resuming routine clinical activities would outweigh the risk of potential infections.

Between January and March 2021, our dermatologic clinic promoted a screening campaign directed to both patients and healthcare personnel based on rapid antigen-testing ICov-502. Compared to the real-time RT-PCR test, rapid antigen-testing offers advantages in terms of time and cost, while still guaranteeing high specificity (relative specificity 98.3%) and high sensitivity (relative sensitivity 85.0%), as stated by the manufacturer Citest Diagnostics Inc.

A triage area was instituted, in which patients were tested and waited for the time needed to process the samples. Appropriate social distancing and correct use of face masks were enforced in the triage area. After a negative test result, patients were allowed in the consulting rooms upstairs. Preventative measures were still adopted in the entire clinic.

The study has been approved by the ethics committee (protocol DERM SARS-CoV-2, 25 January 2021). Informed consent was obtained by all participants.

A total of 635 subjects were recruited, of whom 356 (56.1%) were females and 279 (43.9%) were males. The average age was 54. A total of 514 subjects, 299 females (58.2%) and 215 males (41.8%), agreed to be enrolled in the study. The average age was 54. A total of 121 subjects, 57 females (47.1%) and 64 males (52.9%) refused to be enrolled and were not tested. The average age was 53.

Only 1 of the 514 tests was positive for COVID-19. The COVID-19 positive patient was immediately dismissed from the clinic and referred to the local health department. The patient's family members were preventatively isolated and subsequently tested negative.

The incidence of COVID-19 infection among the tested subjects was thus very low (0.002%). This confirms the findings of other studies [4, 5].

However, 19.1% of the recruited subjects refused to be tested. This data reflects the relatively widespread hesitancy towards testing already documented among the general public [6].

Many of those who declined the test justified their refusal with fear of testing positive. This is clearly an attempt to avoid the consequences of a positive result and, considering the average age of the subjects, it is likely that such consequences may be related to work and finance. Moreover, we found that male patients were more likely to refuse to be tested ($p = 0.0324$). In accordance to the previous observations, this might be justified by the fact that 32.4% of Italian families with children have a man as the sole breadwinner [7].

In conclusion, widespread testing may be a useful tool to lower the risk of virus spreading and to rapidly uncover and control COVID-19 outbreaks in outpatient clinics. However, the effectiveness of screening campaigns may be limited by testing hesitancy.

Acknowledgments

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of interest statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Authors' contributions

MB contributed to project administration, data collection and writing; SB contributed to data collection and writing; IS contributed to data collection and writing; EC contributed to manuscript revising and supervision; AP contributed to conceptualization, manuscript revising and supervision.

References

- [1] Autrán-Gómez AM, Favorito LA. The Social, Economic and Sanitary Impact of COVID-19 Pandemic. *Int Braz J Urol* 2020;46(Suppl 1):3-5. <https://doi.org/10.1590/S1677-5538.IBJU.2020.S1ED2>
- [2] Bhat YJ, Aslam A, Hassan I, Dogra S. Impact of COVID-19 Pandemic on Dermatologists and Dermatology Practice. *Indian Dermatol Online J* 2020;11:328-32. https://doi.org/10.4103/idoj.IDOJ_180_20
- [3] Gao Z, Xu Y, Sun C, Wang X, Guo Y, Qiu S, Ma K. A systematic review of asymptomatic infections with COVID-19. *J Microbiol Immunol Infect* 2021;54:12-6. <https://doi.org/10.1016/j.jmii.2020.05.001>
- [4] Bowyer B, Thukral C, Patel S, Dovalovsky K, Bowyer SG, Ford J, Fox T, Ringler E. Outcomes of symptom screening and universal COVID-19 reverse transcriptase polymerase chain reaction testing before endoscopy in a community-based ambulatory surgery center. *Gastrointest Endosc* 2021;93:1060-4.e1. <https://doi.org/10.1016/j.gie.2020.10.001>
- [5] Gutman MJ, Patel MS, Vannello C, Lazarus MD, Parvizi J, Vaccaro AR, Namdari S. What was the Prevalence of COVID-19 in Asymptomatic Patients Undergoing Orthopaedic Surgery in One Large United States City Mid-pandemic? *Clin Orthop Relat Res* 2021;479:1691-9. <https://doi.org/10.1097/CORR.0000000000001697>
- [6] Lin L, Song Y, Wang Q, Pu J, Sun FY, Zhang Y, Zhou X, Larson HJ, Hou Z. Public Attitudes and Factors of COVID-19 Testing Hesitancy in the United Kingdom and China: Comparative Infodemiology Study. *JMIR Infodemiology* 2021;1:e26895. <https://doi.org/10.2196/26895>
- [7] Istituto Nazionale di Statistica (ISTAT). Available at: <https://www.istat.it/it/archivio/231058> (Accessed on: 28 April 2023).

Received on March 17, 2022. Accepted on March 7, 2023.

Correspondence: Martina Burlando, Largo Rosanna Benzi 10, 16132, Genova, Italy. Tel. +39 3491029766 - E-mail: martina.burlando@unige.it

How to cite this article: Burlando M, Boldrin S, Salvi I, Cozzani E, Parodi A. Results of COVID-19 screening in a dermatologic clinic in Northern Italy. *J Prev Med Hyg* 2022;63:E1-E2. <https://doi.org/10.15167/2421-4248/jpmh2023.64.1.2544>

© Copyright by Pacini Editore Srl, Pisa, Italy

This is an open access article distributed in accordance with the CC-BY-NC-ND (Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International) license. The article can be used by giving appropriate credit and mentioning the license, but only for non-commercial purposes and only in the original version. For further information: <https://creativecommons.org/licenses/by-nc-nd/4.0/deed.en>



COVID-19

Clinical characteristics and risk factors associated with COVID-19 mortality in a non-Intensive Care Unit

PIERFRANCESCO GRIMA¹, MARCELLO GUIDO², ANTONELLA ZIZZA³¹ Infectious Diseases Unit, Vito Fazzi Hospital, Lecce, Italy; ² Laboratory of Hygiene, Department of Biological and Environmental Sciences and Technologies, Faculty of Sciences, University of Salento, Lecce, Italy;³ Institute of Clinical Physiology (IFC), National Research Council (CNR), Lecce, Italy

Keywords

COVID-19 • SARS-CoV-2 • Risk factors • Mortality

Summary

Introduction. The Coronavirus disease 2019 caused by a new Coronavirus (SARS-CoV-2) throughout the pandemic period has been characterised by a wide spectrum of clinical manifestations, courses, and outcomes. In particular, most patients with severe or critical symptoms re-quired hospitalization. The demographic and clinical characteristics of patients upon admission to the hospital, as well as pre-existing medical conditions, seem to have affected the clinical out-come. Predictive factors of inauspicious outcome in non-Intensive Care Unit hospitalized patients were investigated.

Methods. A retrospective, single-centre, observational study of 239 patients with confirmed COVID-19 disease admitted during the first waves of the pandemic to the Infectious Disease Operative Unit of a hospital in Southern Italy was conducted. Demographic characteristics, under-lying diseases, and clinical, laboratory, and radiological findings were collected from the patient's medical records. Information about in-hospital medications, days of admission, and out-come were also considered. Inferential statistical analysis was performed to evaluate the association between

patients' characteristics upon hospital admission and during in-hospital length of stay and death.

Results. Mean age was 67.8 ± 15.8 years; 137/239 (57.3%) patients were males, and 176 (73.6%) had at least one comorbidity. More than half of patients (55.3%) suffered from hypertension. The length of stay in hospital was 16.5 ± 9.9 days and mortality rate of 12.55%. In multivariable logistic regression analysis, predictors of mortality of COVID-19 patients included age (OR, 1.09; CI, 1.04-1.15), Chronic Kidney Disease (OR, 4.04; CI, 1.38-11.85), and need of High Flow Oxygen therapy (OR, 18.23; CI, 5.06-65.64).

Conclusions. Patients who died in the hospital had shorter length of stay than that of the surviving patients. Older age, pre-existent chronic renal disease and need of supplemental oxygen represented independent predictors of mortality in patients hospitalized in non-Intensive Care Unit with COVID-19. The determination of these factors allows retrospectively a greater understanding of the disease also in comparison with the successive epidemic waves.

Introduction

The novel Coronavirus (2019-nCoV), known as Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), responsible for Coronavirus Disease 2019 (COVID-19), originated in Wuhan, Hubei province, in China at the end of 2019 [1]. COVID-19 rapidly spread around the world and, on March 11, 2020, the World Health Organization (WHO) declared this disease pandemic [2].

The clinical spectrum of infection can be seen in COVID-19 patients ranging from asymptomatic to severe disease with pneumonia, respiratory failure, acute respiratory distress syndrome (ARDS), and sepsis [3, 4]. The pandemic has caused the death of more than 6.7 million people out of approximately 664 million infected as of 25 January 2023 [5].

Most patients with severe or critical symptoms require hospitalization. Substantial differences in length of stay (LoS) in the hospital and the mortality of patients with COVID-19 have been reported worldwide; the results of a recent systematic review showed that the mean LoS in hospital was 14.49 days, with 13 days as the median

and minimum and maximum hospital LoS reported of 3.5 and 53.8 respectively [6]. Another study showed that among Intensive Care Unit (ICU) admissions, the median stay ranged from 5 to 19 days. Furthermore, the LoS of patients discharged alive was longer than those who died in the hospital [7].

However, the duration varies depending on several factors such as the patient's age, comorbidities, availability, and accessibility to health services [6, 7].

The global mortality rate among hospitalized COVID-19 patients was around 18%, although with notable differences between countries [8, 9]. The mortality risk among ICU admitted patients was higher than that among non-ICU patients [9].

Chronic conditions such as hypertension, cardiovascular disease, type-2 diabetes, respiratory disease, cancer, and renal disease were the most prevalent underlying causes among hospitalized patients with COVID-19 [10, 11].

Since the first reports on COVID-19, older age, and comorbidity were identified as risk factors for death among COVID-19 patients [12-15]. Some investigations have reported that pre-existing chronic conditions, such as type-2 diabetes, Chronic Obstructive Pulmonary

Disease (COPD), heart, liver, and kidney disease, hypertension, obesity, cancers have been associated with ICU admission and death, as well as high serum levels of Interleukin-6 (IL-6), C-Reactive Protein (CRP), and D-Dimer have also been identified as independent factors for predicting COVID-19 severity, and in-hospital mortality [16-19].

This study aimed to describe the demographics and clinical features in a cohort of hospitalized COVID-19 patients in a non-ICU Unit and identify the risk factors associated with mortality.

Information about in-hospital medications and laboratory findings were also considered and the risk factors associated with COVID-19 related death in this group of non-ICU hospitalized patients were evaluated.

Methods

STUDY POPULATION

In this retrospective, single-center, observational study, patients with SARS-CoV2 infection admitted to the Infectious Disease Operative Unit (OU) of Vito Fazzi Hospital, Lecce, Italy, between March 1, 2020, and December 31, 2020, were considered. Diagnosis of COVID-19 was established by real-time Reverse Transcriptase-Polymerase Chain Reaction (RT-PCR) assay on nasopharyngeal swabs. Demographic characteristics, underlying diseases, and clinical, laboratory and radiological findings were collected from the patients' medical records upon admission to the OU. Obesity, type 2 diabetes, hypertension, heart disease, Chronic Kidney Disease (CKD), dialysis and cancer were the pre-existing comorbidities investigated. The following laboratory data were recorded: Arterial partial pressure of oxygen (PO₂): Fraction of inspired oxygen (FiO₂) ratio, IL-6, CRP, D-Dimer and Glomerular Filtration Rate (GFR). Data on medications, high-flow oxygen therapy, LoS in hospital and outcome were also collected.

This research was approved by the Ethics Committee of the Health Local Unit of Lecce (Report n. 57 of 22, January 2021) and conducted in accordance with the Helsinki declaration. The informed consent was retrospectively obtained from participants if possible.

STATISTICAL ANALYSIS

Continuous variables were expressed as mean $\pm$ standard deviation (SD) and categorical variables as frequency and percentage. Comparison between continuous variables was performed using independent samples t test and between categorical variables using chi-square test or fisher exact test, as needed.

Univariate and multivariate logistic regression analyses were performed to determine the independent risk factors associated with mortality. Variables emerging from univariate analysis with p-value < 0.05 were included in the multivariate analysis. Statistical calculations were performed by MedCalc software, version 14.8.1 (MedCalc Software Ltd, Ostend, Belgium).

Results

A total of 239 consecutive patients diagnosed with COVID-19 were admitted to the Infectious Disease Unit of "Vito Fazzi" Hospital, Lecce, Italy, between March 1, 2020, and December 31, 2020. Clinical characteristics and outcome of patients are described. Mean age was 67.8 ± 15.8 years; 137/239 (57.3%) patients were males, and 176 (73.6%) had at least one chronic comorbidity. More than half of patients (55.3%) were suffered by hypertension.

The majority of patients (81%) did not need high flow oxygen therapy and, 164/239 (68.6%) patients had interstitial pneumonia with ground glass patterns.

The mean LoS in the hospital was 16.5 ± 9.9 days and the overall in-hospital mortality rate was 12.55% (30/239).

Almost all patients, 225/239 (94.1%) received Low-Molecular Weight Heparin (LMWH) and a total of 191/239 (79%) patients received combination therapy with dexamethasone (DEX) and UFH. On the basis on clinical judgment and high IL-6 levels, five patients were treated with tocilizumab (TL) double dose. 48/239 (20.1%) patients received remdesivir (RDV) (Tab. I).

From the comparison between Survivors and Non-Survivors patients, those who died were older, with significant difference between the two groups ($p < 0.0001$) and more likely to have a history of CKD ($p < 0.0001$) or dialysis ($p = 0.044$).

Concerning the laboratory findings, the 36.7% of Non-Survivors patients had $PO_2/FiO_2 < 200$ compared to the 17.7% of Survivors, with a significant difference ($p = 0.029$) between the two groups.

Kidney function assessed as GFR was also significantly different ($p < 0.0001$) between the two groups; with a lower value (39.9 ± 21.3 mL/min) among dead patients compared to those discharged alive from the hospital (68.9 ± 23.1 mL/min).

Finally, the mean LoS in the hospital of patients who died was 10.5 ± 7.7 days and of those survived 17.4 ± 9.8 days, with a significant difference ($p = 0.0003$) between the two categories (Tab. I).

Univariate logistic regression analysis, shown in Table II, revealed a significant association between in-hospital mortality and age of patients, CKD ($p < 0.0001$), $PO_2/FiO_2 < 200$ ($p < 0.05$), high flow oxygen therapy ($p < 0.0001$) and more than two comorbidities ($p < 0.001$). Using multivariate logistic regression, we found that age (OR 1.09, 95% CI 1.04-1.5; $p < 0.001$), CKD (OR 4.04, 95% CI 1.38-11.82; $p = 0.01$) and high-flow oxygen therapy (OR 18.23, 95% CI 5.06-65.64; $p < 0.0001$) were significant predictors of in-hospital mortality (Tab. II).

Discussion

This retrospective study described the demographic characteristics and clinical presentation of a cohort of COVID-19 patients hospitalized during the first waves of the pandemic in an Infectious Diseases UO, who were

Tab. I. Demographic and clinical characteristics of 239 patients with COVID-19 admitted to the Infectious Disease Operative Unit.

Characteristics	Total (n = 239)	Survivors (n = 209)	Non-survivors (n = 30)	P-value
Age, years (mean ± SD)	67.8 ± 15.8	65.8 ± 15.6	81.7 ± 8.6	< 0.0001 ^a
Sex, male N (%)	137 (57.3)	121 (57.9)	16 (53.3)	0.783 ^b
Age group, years				
20-29 N (%)	2 (0.8)	2 (0.96)	0 (0.0)	
30-39 N (%)	13 (5.4)	13 (6.2)	0 (0.0)	
40-49 N (%)	13 (5.4)	13 (6.2)	0 (0.0)	
50-59 N (%)	41 (17.1)	40 (19.1)	1 (3.3)	
60-69 N (%)	48 (20.8)	47 (17.1)	1 (3.3)	
70-79 N (%)	60 (25.1)	53 (25.4)	7 (23.3)	
80-89 N (%)	52 (21.8)	33 (15.8)	19 (63.3)	
≥ 90 N (%)	10 (4.2)	8 (3.8)	2 (6.7)	< 0.0001 ^b
No. of comorbidities				
None N (%)	63 (26.4)	57 (27.3)	6 (20.0)	
1 N (%)	52 (21.8)	51 (24.4)	1 (3.3)	
2 N (%)	62 (25.9)	54 (25.8)	8 (26.7)	
3 N (%)	43 (18.0)	35 (16.7)	8 (26.7)	
> 3 N (%)	19 (7.9)	12 (5.8)	7 (23.3)	0.0015 ^b
Comorbidities				
Obesity N (%)	50 (20.9)	45 (21.5)	5 (16.7)	0.619 ^b
Type 2 diabetes N (%)	57 (23.8)	47 (22.5)	10 (33.3)	0.756 ^b
Hypertension N (%)	132 (55.2)	117 (56.0)	15 (50.0)	0.675 ^b
Heart disease N (%)	79 (33.1)	64 (30.6)	15 (50.0)	0.087 ^b
Chronic kidney disease N (%)	63 (26.4)	43 (20.6)	20 (66.7)	< 0.0001 ^b
Dialysis N (%)	7 (2.9)	4 (1.9)	3 (10.0)	0.044 ^c
Cancer N (%)	13 (5.4)	11 (5.3)	2 (6.7)	0.670 ^c
Pneumonia N (%)	164 (68.6)	140 (67.0)	24 (80.0)	0.220 ^b
LoS (d ± SD)	16.5 ± 9.9	17.4 ± 9.8	10.5 ± 7.7	0.0003 ^a
Laboratory panel				
PO ₂ /FiO ₂ ratio (mmHg), (mean ± SD)	297.9 ± 105.4	303.5 ± 104.1	259.1 ± 107.6	0.031 ^a
PO ₂ /FiO ₂ < 200 N (%)	48 (20.1)	37 (17.7)	11 (36.7)	0.029 ^b
IL-6 (pg/ml), (mean ± SD)	40.7 ± 117.2	37.9 ± 114.2	65.9 ± 141.3	0.277 ^a
D-Dimer (mg/ml), (mean ± SD)	2782.6 ± 6048.9	2734.7 ± 6246.8	3140.0 ± 4364.3	0.666 ^a
CRP (mg/dl), (mean ± SD)	51.8 ± 50.5	49.0 ± 48.0	72.5 ± 63.7	0.070 ^a
GFR (mL/min), (mean ± SD)	65.3 ± 24.8	68.9 ± 23.1	39.9 ± 21.3	< 0.0001 ^a
Respiratory support				
None N (%)	192 (81.0)	181 (87.0)	11 (37.9)	
High flow oxygen therapy N (%)	45 (19.0)	27 (13.0)	18 (62.1)	< 0.0001 ^b
Treatment				
HCQ N (%)	59 (24.7)	51 (24.4)	8 (26.7)	0.966 ^b
LPV N (%)	42 (17.6)	36 (17.2)	6 (20.0)	0.008 ^b
UFH N (%)	225 (94.1)	197 (94.3)	28 (93.3)	0.831 ^b
DEX N (%)	194 (81.2)	171 (81.8)	23 (76.7)	0.671 ^b
TL N (%)	5 (2.1)	5 (2.4)	0 (0.0)	1.000 ^c
RDV N (%)	49 (20.6)	46 (22.1)	3 (10.0)	0.152 ^c
HCQ + LMWE + LPV N (%)	40 (16.7)	34 (16.3)	6 (20.0)	0.604 ^b
DEX + LMWE N (%)	191 (79.9)	169 (80.9)	22 (73.3)	0.376 ^b
DEX + LMWE + RDV N (%)	48 (20.1)	46 (22.0)	2 (6.7)	0.053 ^c

^aIndependent samples t-test; ^bChi-square test; ^cFisher's exact test.LoS: length of hospital stay; PO₂: partial pressure of oxygen; FiO₂: fraction of inspired oxygen; IL-6: interleukin 6; CRP: C-reactive protein; GFR: glomerular filtration rate; HCQ: Hydroxychloroquine; LPV: Lopinavir; LMWE: Low-Molecular Weight Heparin; DEX: Dexamethasone; TL: Tocilizumab; RDV: Remdesivir.

not admitted to the ICU. Large proportion of patients did not require high flow oxygen therapy.

We found that in-hospital mortality rate among patients diagnosed with COVID-19 was 12.55% with a mean LoS in the hospital of 16.5 ± 9.9 days for all patients.

Patients who died in the hospital had shorted LoS than that of the surviving patients. This confirms the evidence of other studies, in which LoS of patients discharged alive was between 4 and 53 days compared to 4 and 21 days of patients who died [7].

Tab. II. Univariate e multivariate analysis of risk factors associated with mortality in COVID-19 patients.

Variable	Univariate analysis		Multivariate analysis	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Age (years)	1.10 (1.06-1.15)	< 0.0001	1.09 (1.04-1.15)	0.000
PO ₂ /FiO ₂ < 200	2.69 (1.18-6.13)	0.018	0.42 (0.11-1.66)	0.217
Comorbidities > 2	3.45 (1.57-7.56)	0.002	1.31 (0.47-3.62)	0.607
Chronic kidney disease	7.72 (3.37-17.70)	< 0.0001	4.04 (1.38-11.85)	0.011
High flow oxygen therapy	10.97 (4.68-25.72)	< 0.0001	18.23 (5.06-65.64)	< 0.0001

OR: odds ratio; 95% CI: 95% confidence interval; PO₂: partial pressure of oxygen; FiO₂: fraction of inspired oxygen.

The death count in our population is consistent with that reported in an Italian multicenter study involving 26 hospitals representative of national population sample, in which the mortality rate was 11.8% [13].

By the multivariate logistic regression analysis, we observed that age, high flow oxygen therapy and pre-existing CKD were independent predictors of in-hospital mortality.

Age is prominent in the literature as a frequently reported independent factors associated with in-hospital mortality [20].

Our results are similar to data of a cohort of over 17 million NHS patients that demonstrated that patients with reduced kidney function had a very high risk of COVID-19 mortality [21], even higher than that of other high-risk factors. In several other international studies, it was observed that CKD patients have a higher risk of intubation and death [13, 22, 23]. A possible explanation is that patients with CKD have alteration of the immune system [24] and increased concentrations of pro-inflammatory cytokines [25] with a possible increase in lung inflammation.

Finally, the need of high flow oxygen therapy was found to be the last independent predictor of mortality in our cohort, although few patients in our hospital ward had used respiratory support. It has been showed that respiratory failure and a PaO₂/FiO₂ < 200 mmHg at admission were factors independently associated with a higher mortality rate [26].

Xie et colleagues demonstrated that patients with oxygen saturation lower than 90% had high risk to die respect patient with oxygen saturation more than 90% [27].

Studies comparing the prognosis of patients with PaO₂/FiO₂ < 200 requiring mechanical ventilation during different waves document that in-hospital mortality did not improve during subsequent epidemic waves [28, 29]. This study has several limitations. It is a retrospective study from a single center in a limited sample and the findings may not be generalizable to other populations. The data are related to the first pandemic waves that present peculiar characteristics compared to subsequent epidemic periods due to the lack of knowledge of the etiological agent and of the clinical manifestations of the disease.

Despite limitations, our results illustrate the effect of baseline morbidity factors such as increasing age and chronic pathology, particularly chronic kidney disease, dialysis, and, more than two comorbidities on the mortality of patients with COVID-19.

The differences between the different epidemic waves should be the subject of a thorough analysis. The comparison between the characteristics of the patients treated in the same center in the first and subsequent epidemiological waves will be the subject of a subsequent study by the same authors.

Conclusions

We identified demographic factors and baseline comorbidities as independent predictors of mortality in non-ICU hospitalized COVID-19 patients during the first epidemic waves when knowledge of the SARS-CoV-2 was still limited and the outcome associated with the risk factors in COVID-19 patients was still partially unknown. Several chronic comorbidities, complications, and demographic variables for COVID-19 mortality were recognized. A better understanding of all the factors associated with a serious evolution of the disease can help to define more effective programs in the clinical management and prevention of the disease.

Financial support

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of interest statement

The authors declare no conflict of interest.

Authors' contributions

PG acquired data; MG and AZ carried out the analysis of data. All authors conceived the study and contributed to the preparation of the manuscript related to their sections and approved the final version to be submitted.

References

- [1] Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, Zhang L, Fan G, Xu J, Gu X, Cheng Z, Yu T, Xia J, Wei Y, Wu W, Xie X, Yin W, Li H, Liu M, Xiao Y, Gao H, Guo L, Xie J, Wang G, Jiang R, Gao Z, Jin Q, Wang J, Cao B. Clinical features of

- patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet* 2020;395:497-506. [https://doi.org/10.1016/S0140-6736\(20\)30183-5](https://doi.org/10.1016/S0140-6736(20)30183-5)
- [2] World Health Organization. Director-General's opening remarks at the media briefing on COVID-19 – 11 March 2020. Available at: <https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020> (Accessed on: 11/3/2020).
 - [3] Mehta OP, Bhandari P, Raut A, Kacimi SEO, Huy NT. Coronavirus Disease (COVID-19): comprehensive review of clinical presentation. *Front Public Health* 2021;8:582932. <https://doi.org/10.3389/fpubh.2020.582932>
 - [4] Zizza A, Recchia V, Aloisi A, Guido M. Clinical features of COVID-19 and SARS epidemics. A literature review. *J Prev Med Hyg* 2021;62:E13-E24. <https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1680>
 - [5] World Health Organization. WHO Coronavirus (COVID-19) Dashboard. Available at: <https://covid19.who.int/> (Accessed on: 25/1/2023).
 - [6] Alimohamadi Y, Yekta EM, Sepandi M, Sharafoddin M, Ahadi M, Hesari E. Hospital length of stay for COVID-19 patients: a systematic review and meta-analysis. *Multidiscip Respir Med* 2022;17:856. <https://doi.org/10.4081/mrm.2022.856>
 - [7] Rees EM, Nightingale ES, Jafari Y, Waterlow NR, Clifford S, B Pearson CA, Group CW, Jombart T, Procter SR, Knight GM. COVID-19 length of hospital stay: a systematic review and data synthesis. *BMC Med* 2020;18:270. <https://doi.org/10.1186/s12916-020-01726-3>
 - [8] Dessie ZG, Zewotir T. Mortality-related risk factors of COVID-19: a systematic review and meta-analysis of 42 studies and 423,117 patients. *BMC Infect Dis* 2021;21:855. <https://doi.org/10.1186/s12879-021-06536-3>
 - [9] Noor FM, Islam MM. Prevalence and Associated Risk Factors of Mortality Among COVID-19 Patients: A Meta-Analysis. *J Community Health* 2020;45:1270-82. <https://doi.org/10.1007/s10900-020-00920-x>
 - [10] Emami A, Javanmardi F, Pirbonyeh N, Akbari A. Prevalence of Underlying Diseases in Hospitalized Patients with COVID-19: a Systematic Review and Meta-Analysis. *Arch Acad Emerg Med* 2020;8:e35.
 - [11] Vardavas CI, Mathioudakis AG, Nikitara K, Stamatelopoulou K, Georgiopoulos G, Phalkey R, Leonardi-Bee J, Fernandez E, Carnicer-Pont D, Vestbo J, Semenza JC, Deogan C, Suk JE, Kramarz P, Lamb F, Penttinen P. Prognostic factors for mortality, intensive care unit and hospital admission due to SARS-CoV-2: a systematic review and meta-analysis of cohort studies in Europe. *Eur Respir Rev* 2022;31:220098. <https://doi.org/10.1183/16000617.0098-2022>
 - [12] Grasselli G, Greco M, Zanella A, Albano G, Antonelli M, Bellani G, Bonanomi E, Cabrini L, Carlesso E, Castelli G, Cattaneo S, Cereda D, Colombo S, Coluccello A, Crescini G, Forastieri Molinari A, Foti G, Fumagalli R, Iotti GA, Langer T, Latronico N, Lorini FL, Mojoli F, Natalini G, Pessina CM, Ranieri VM, Rech R, Scudeller L, Rosano A, Storti E, Thompson BT, Tirani M, Villani PG, Pesenti A, Cecconi M; COVID-19 Lombardy ICU Network. Risk factors associated with mortality among patients with COVID-19 in Intensive Care Units in Lombardy, Italy. *JAMA Intern Med* 2020;180:1345-55. <https://doi.org/10.1001/jamainternmed.2020.3539>
 - [13] Iaccarino G, Grassi G, Borghi C, Ferri C, Salvetti M, Volpe M, SARS-RAS Investigators. Age and Multimorbidity Predict Death Among COVID-19 Patients: Results of the SARS-RAS Study of the Italian Society of Hypertension. *Hypertension* 2020;76:366-72. <https://doi.org/10.1161/HYPERTENSIONA-120.15324>
 - [14] Imam Z, Odish F, Gill I, O'Connor D, Armstrong J, Vanood A, Ibranke O, Hanna A, Ranski A, Halalau A. Older age and comorbidity are independent mortality predictors in a large cohort of 1305 COVID-19 patients in Michigan, United States. *J Intern Med* 2020;288:469-76. <https://doi.org/10.1111/joim.13119>
 - [15] Wu C, Chen X, Cai Y, Xia J, Zhou X, Xu S, Huang H, Zhang L, Zhou X, Du C, Zhang Y, Song J, Wang S, Chao Y, Yang Z, Xu J, Zhou X, Chen D, Xiong W, Xu L, Zhou F, Jiang J, Bai C, Zheng J, Song Y. Risk Factors Associated With Acute Respiratory Distress Syndrome and Death in Patients With Coronavirus Disease 2019 Pneumonia in Wuhan, China. *JAMA Intern Med* 2020;180:934-43. <https://doi.org/10.1001/jamainternmed.2020.0994>
 - [16] Bhargava A, Fukushima EA, Levine M, Zhao W, Tanveer F, Szpunar SM, Saravolatz L. Predictors for Severe COVID-19 Infection. *Clin Infect Dis* 2020;71:1962-8. <https://doi.org/10.1093/cid/ciaa674>
 - [17] Gao YD, Ding M, Dong X, Zhang JJ, Kursat Azkur A, Azkur D, Gan H, Sun YL, Fu W, Li W, Liang HL, Cao YY, Yan Q, Cao C, Gao HY, Brüggem MC, van de Veen W, Sokolowska M, Akdis M, Akdis CA. Risk factors for severe and critically ill COVID-19 patients: A review. *Allergy* 2021;76:428-55. <https://doi.org/10.1111/all.14657>
 - [18] Liu F, Li L, Xu M, Wu J, Luo D, Zhu Y, Li B, Song X, Zhou X. Prognostic value of interleukin-6, C-reactive protein, and procalcitonin in patients with COVID-19. *J Clin Virol* 2020;127:104370. <https://doi.org/10.1016/j.jcv.2020.104370>
 - [19] Trecarichi EM, Mazzitelli M, Serapide F, Pelle MC, Tassone B, Arrighi E, Perri G, Fusco P, Scaglione V, Davoli C, Lionello R, La Gamba V, Marrazzo G, Busceti MT, Giudice A, Ricchio M, Cancelliere A, Lio E, Procopio G, Costanzo FS, Foti DP, Matera G, Torti C; IDTM UMG COVID-19 Group. Clinical characteristics and predictors of mortality associated with COVID-19 in elderly patients from a long-term care facility. *Sci Rep* 2020;10:20834. <https://doi.org/10.1038/s41598-020-77641-7>
 - [20] Khamis F, Memish Z, Bahrani MA, Dowaiqi SA, Pandak N, Bolushi ZA, Salmi IA, Al-Zakwani I. Prevalence and predictors of in-hospital mortality of patients hospitalized with COVID-19 infection. *J Infect Public Health* 2021;14:759-65. <https://doi.org/10.1016/j.jiph.2021.03.016>
 - [21] Williamson EJ, Walker AJ, Bhaskaran K, Bacon S, Bates C, Morton CE, Curtis HJ, Mehrkar A, Evans D, Inglesby P, Cockburn J, McDonald HI, MacKenna B, Tomlinson L, Douglas IJ, Rentsch CT, Mathur R, Wong AYS, Grieve R, Harrison D, Forbes H, Schultze A, Croker R, Parry J, Hester F, Harper S, Perera R, Evans SJW, Smeeth L, Goldacre B. Factors associated with COVID-19-related death using OpenSAFELY. *Nature* 2020;584:430-6. <https://doi.org/10.1038/s41586-020-2521-4>
 - [22] Yamada T, Mikami T, Chopra N, Miyashita H, Chernyavsky S, Miyashita S. Patients with chronic kidney disease have a poorer prognosis of coronavirus disease 2019 (COVID-19): an experience in New York City. *Int Urol Nephrol* 2020;52:1405-6. <https://doi.org/10.1007/s11255-020-02494-y>
 - [23] Ozturk S, Turgutalp K, Arici M, Odabas AR, Altiparmak MR, Aydin Z, Cebeci E, Basturk T, Soypacaci Z, Sahin G, Elif Ozler T, Kara E, Dheir H, Eren N, Suleymanlar G, Islam M, Ogutmen MB, Sengul E, Ayar Y, Dolarslan ME, Bakirdogen S, Safak S, Gungor O, Sahin I, Mentese IB, Merhametsiz O, Oguz EG, Genek DG, Alpay N, Aktas N, Duranay M, Alagoz S, Colak H, Adibelli Z, Pembegul I, Hur E, Azak A, Taymez DG, Tatar E, Kazancioglu R, Oruc A, Yuksel E, Onan E, Turkmen K, Hasbal NB, Gurel A, Yelken B, Sahutoglu T, Gok M, Seyahi N, Sevinc M, Ozkurt S, Sipahi S, Bek SG, Bora F, Demirelli B, Oto OA, Altunoren O, Tuglular SZ, Demir ME, Ayli MD, Huddam B, Tanrisev M, Bozaci I, Gursu M, Bakar B, Tokgoz B, Tonbul HZ, Yildiz A, Sezer S, Ates K. Mortality analysis of COVID-19 infection in chronic kidney disease, haemodialysis and renal transplant patients compared with patients without kidney disease: a nationwide analysis from Turkey. *Nephrol Dial Transplant* 2020;35:2083-95. <https://doi.org/10.1093/ndt/gfaa271>
 - [24] Betjes MG. Immune cell dysfunction and inflammation in end-stage renal disease. *Nat Rev Nephrol* 2013;9:255-65. <https://doi.org/10.1038/nrneph.2013.44>

- [25] Heine GH, Ortiz A, Massy ZA, Lindholm B, Wiecek A, Martínez-Castelao A, Covic A, Goldsmith D, Süleymanlar G, London GM, Parati G, Sicari R, Zoccali C, Fliser D; European Renal and Cardiovascular Medicine (EURECA-m) working group of the European Renal Association-European Dialysis and Transplant Association (ERA-EDTA). Monocyte subpopulations and cardiovascular risk in chronic kidney disease. *Nat Rev Nephrol* 2012;8:362-9. <https://doi.org/10.1038/nrneph.2012.41>
- [26] Santus P, Radovanovic D, Saderi L, Marino P, Cogliati C, De Filippis G, Rizzi M, Franceschi E, Pini S, Giuliani F, Del Medico M, Nucera G, Valenti V, Tursi F, Sotgiu G. Severity of respiratory failure at admission and in-hospital mortality in patients with COVID-19: a prospective observational multicentre study. *BMJ Open* 2020;10:e043651. <https://doi.org/10.1136/bmjopen-2020-043651>
- [27] Xie J, Covassin N, Fan Z, Singh P, Gao W, Li G, Kara T, Somers VK. Association Between Hypoxemia and Mortality in Patients With COVID-19. *Mayo Clin Proc* 2020;95:1138-47. <https://doi.org/10.1016/j.mayocp.2020.04.006>
- [28] Begum H, Neto AS, Alliegro P, Broadley T, Trapani T, Campbell LT, Cheng AC, Cheung W, Cooper DJ, Erickson SJ, French CJ, Litton E, McAllister R, Nichol A, Palermo A, Plummer MP, Rotherham H, Ramanan M, Reddi B, Reynolds C, Webb SA, Udy AA, Burrell A. People in intensive care with COVID-19: demographic and clinical features during the first, second, and third pandemic waves in Australia. *Med J Aust* 2022;217:352-60. <https://doi.org/10.5694/mja2.51590>
- [29] Carbonell R, Urgelés S, Rodríguez A, Bodí M, Martín-Loeches I, Solé-Violán J, Díaz E, Gómez J, Treffer S, Vallverdú M, Murcia J, Albaya A, Loza A, Socías L, Ballesteros JC, Papiol E, Viña L, Sancho S, Nieto M, Lorente MDC, Badallo O, Fraile V, Arméstar F, Estella A, Sanchez L, Sancho I, Margarit A, Moreno G; COVID-19 SEMICYUC Working Group. Mortality comparison between the first and second/third waves among 3,795 critical COVID-19 patients with pneumonia admitted to the ICU: A multicentre retrospective cohort study. *Lancet Reg Health Eur* 2021;11:100243. <https://doi.org/10.1016/j.lanepe.2021.100243>

Received on December 22, 2022. Accepted on February 6, 2023.

Correspondence: Marcello Guido, Laboratory of Hygiene, Department of Biological and Environmental Sciences and Technologies, Faculty of Sciences, University of Salento, 73100 Lecce, Italy. Tel. +39 0832 298686 - Fax +39 0832 298626 - E-mail: marcello.guido@unisalento.it

How to cite this article: Grima P, Guido M, Zizza A. Clinical characteristics and risk factors associated with COVID-19 mortality in a non-Intensive Care Unit. *J Prev Med Hyg* 2023;64:E3-E8. <https://doi.org/10.15167/2421-4248/jpmh2023.64.1.2828>

© Copyright by Pacini Editore Srl, Pisa, Italy

This is an open access article distributed in accordance with the CC-BY-NC-ND (Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International) license. The article can be used by giving appropriate credit and mentioning the license, but only for non-commercial purposes and only in the original version. For further information: <https://creativecommons.org/licenses/by-nc-nd/4.0/deed.en>



COVID-19

Risk perception, knowledge about SARS-CoV-2, and perception towards preventive measures in Italy: a nationwide cross-sectional study

GIUSEPPINA LO MORO¹, GIACOMO SCAIOLI^{1,2}, SIMONE NICOLINO¹, TIZIANA SINIGAGLIA¹, ELISABETTA DE VITO³, FABRIZIO BERT^{1,2}, ROBERTA SILIQUINI^{1,4}

¹ Department of Public Health Sciences, University of Turin, Turin, Italy; ² Infection Control Unit, ASL TO3, Turin, Italy;

³ Department of Human, Social and Health Sciences, University of Cassino and Southern Lazio, Cassino, Italy;

⁴ AOU City of Health and Science of Turin, Turin, Italy

Keywords

SARS-CoV-2 • Risk perception • Knowledge • Preventive measures

Summary

Introduction. After COVID-19 outbreak, governments adopted several containment measures. Risk perception and knowledge may play a crucial role since they can affect compliance with preventive measures. This study aimed to explore the extent and the associated factors of risk perception, knowledge regarding SARS-CoV2, and perception towards preventive measures among the Italian population.

Methods. A nationwide cross-sectional study involving adults was conducted in April-May 2021: an online survey was distributed through social media. The outcomes were: Knowledge Score (KS) (0 to 100%: higher scores correspond to higher COVID-19 related knowledge); Risk Perception Score (RPS) (1 to 4: higher values indicate higher concern); Preventive measures Perception Score (PPS) (1 to 4: higher values indicate higher confidence). Multivariable regression models were performed.

Results. A total of 1120 participants were included. Median KS was

79.5% (IQR = 72.7%-86.4%). Lower education and poor economic conditions were negatively associated with the KS. Median RPS was 2.8 (IQR = 2.4-3.2). Female gender, sharing house with a fragile person, suffering from a chronic disease, having a family member/close friend who contracted SARS-CoV-2 infection were positively associated with the RPS. Median PPS was 3.1 (IQR = 2.8-3.4). Lower educational level was negatively associated with the PPS. Vaccine hesitancy was negatively associated with all three outcomes. The three scores were positively associated with each other.

Conclusions. Fair levels of knowledge, risk perception and perception towards preventive measures were reported. Reciprocal relationships between the outcomes and a relevant relationship with vaccine hesitancy were highlighted. Further investigations should be focused on studying underlying determinants and consequences.

Introduction

Worldwide, the need to contain the COVID-19 pandemic has led to several measures implemented by the governments to control the spread, ranging from simple recommendations to forced lockdown measures, as done in Italy. Whatever the degree of stringency adopted by the various governments, these measures differ widely from usual habits.

Risk perception, knowledge of COVID-19 features, and trust in authorities' decisions may play a crucial role in the progression of the disease since they can affect the compliance with preventive measures [1, 2]. Evaluating the risk perception of the general population is fundamental to direct future policy and research about disease outbreaks [3]. Thus, this study aimed to explore the extent and the associated factors of risk perception, knowledge regarding SARS-CoV2, and perception towards adopted preventive measures among the Italian population one year after the beginning of the pandemic.

Methods

Between April and May 2021, a cross-sectional study was

performed among a convenience sample of adults resident throughout Italy. The survey was distributed through social media and informed consent was obtained from all participants. The Ethics Committee of the University of Turin approved the protocol. Participants were anonymous and received no compensation.

The questionnaire, developed by the researchers based on relevant literature [4, 5], was composed of four sections. In the first part, sociodemographic characteristics (e.g. gender, age, occupation, living condition), health condition and COVID-19 experience (e.g. having contracted SARS-CoV-2, COVID-19 vaccine hesitancy) were collected.

The second part explored the knowledge about SARS-CoV-2 through 44 specific questions about transmission, possible symptoms and preventive measures to be implemented. The Knowledge Score (KS) was calculated considering the percentage of right answers and could assume values ranging from 0 to 100%. Higher scores correspond to higher knowledge of proposed themes.

The third part measured risk perception: participants were asked to express their own worry about contracting and transmitting the virus, having severe symptoms and having a positive subject between close contacts using

a 4-point Likert scale (from 1 = “not worried at all” to 4 = “very worried”).

The last section explored the perception of preventive measures through a 4-point Likert scale (from 1 = “not useful at all” to 4 = “very useful”): participants were asked to express their own opinion regarding the effectiveness and usefulness of measures proposed by the Italian Health Ministry to prevent the transmission. Such measures included several actions: from recommendations of cleaning surfaces, washing hands and staying at home if symptomatic to implementation of lockdown measures. Both Risk Perception Score (RPS) and Preventive measures Perception Score (PPS) were calculated considering mean scores obtained through the 4-point Likert scale. Values could range from 1 to 4: higher values indicate higher concern and higher confidence in preventive measures effectiveness, respectively.

STATISTICAL ANALYSIS

The KS, RPS, and PPS were the outcomes of the present study, considered as continuous variables.

Multivariable linear regressions were conducted to assess the potential role of sociodemographic, health-related and COVID-19 experience variables. The covariates to be included in the model were selected using a stepwise forward selection process, with a univariable p -value < 0.250 as the main criterion [6]. Results of regressions were expressed as adjusted Coefficients (adjCoef.) with a 95% Confidence Interval (CI).

For all analyses, Stata software (version 16) was used and a p -value < 0.05 was considered statistically significant.

Results

A total of 1120 questionnaires were completed and included in the present paper. The median age was 41 (IQR = 28-54), females were 77% and the majority of the sample had a high school diploma or lower educational grade (55.1%). Over half of the sample had an occupation involving contact with other people (59.0%), 24.7% declared to be a healthcare worker/student and 37.4% had a family member/close friend working as healthcare professionals. Considering professional/education sectors other than healthcare, 9.5% declared to work/study in Information and Communication Technologies (ICT) and 1.4% in journalism. A total of 21.1% declared their household economic situation was insufficient/poor.

A small part of the sample declared to suffer from chronic disease (18.9%) or live with/be a caregiver of a fragile person (21.7%). Only 15.0% contracted the SARS-CoV2 infection and 25.0% had a family member/close friend who contracted the SARS-CoV-2 infection. Finally, 28.5% received at least one dose of vaccine while 11.6% of respondents were vaccine hesitant, i.e. they had not received any dose and had no intention to undergo vaccination.

The median KS was 79.5% (IQR = 72.7-86.4%). It was differently distributed across the following subgroups: lower education (median 77.3%, IQR = 70.5-84.1) vs higher (81.2%, IQR = 77.3-88.6) ($p < 0.001$); healthcare

field (84.1%, IQR = 77.3-88.6) vs ICT (77.3%, IQR = 70.4-84.1) vs journalism (79.5%, IQR = 68.2-84.1) vs other sectors (79.5%, IQR = 70.4-84.1) ($p < 0.001$); excellent/adequate household situation (81.8%, IQR = 72.7-86.4) vs insufficient/poor (77.3%, IQR = 68.2-84.1) ($p < 0.001$); family member working as an healthcare professional (81.8%, IQR = 72.7-86.4) vs no (79.5%, IQR = 70.5-84.1) ($p < 0.001$); COVID-19 vaccine hesitant people (72.7%, IQR = 65.9-79.5) vs non-hesitant participants (79.5%, IQR = 70.5-84.1) ($p < 0.001$).

The median RPS was 2.8 (IQR = 2.4-3.2). Its distribution was different across the following categories: women (median 3, IQR = 2.6-3.2) vs men (2.8, IQR = 2.4-3.2) ($p < 0.001$); participants suffering from a chronic disease (3, IQR = 2.6-3.2) vs those who did not (2.8, IQR = 2.4-3.2) ($p = 0.007$); participants who lived with/were caregivers of a fragile person (3, IQR = 2.6-3.4) vs those who did not (2.8; IQR = 2.4-3.2) ($p < 0.001$).

The median PPS was 3.1 (IQR = 2.8-3.4). It was differently distributed across the following subgroups: women (median 3.2, IQR = 2.8-3.4) vs men (3, IQR = 2.7-3.4) ($p = 0.007$); participants suffering from a chronic disease (3.3, IQR = 2.9-3.6) vs those who did not (3.1, IQR = 2.8-3.4) ($p < 0.001$); participants who lived with/were caregivers of a fragile person (3.2, IQR = 2.8-3.5) vs those who did not (3.1; IQR = 2.8-3.4) ($p = 0.010$); COVID-19 vaccine hesitant people (3.1, IQR = 2.8-3.4) vs non-hesitant participants (3.2, IQR = 2.9-3.5) ($p < 0.001$).

Table I shows the multivariable models.

Female gender, ICT and other background, being a caregiver or sharing house with a fragile person, suffering from a chronic disease, having a family member/close friend who contracted SARS-CoV-2 infection were positively associated with the RPS. Vaccine hesitancy and age were negatively associated with the RPS.

Lower educational level and vaccine hesitancy were negatively associated with the PPS. Age was positively associated with PPS. Considering the relationships between the outcomes, the three scores were positively associated.

Discussion

This work aimed to assess risk perception, knowledge about SARS-CoV2, and perception towards preventive measures and potentially associated characteristics.

Overall, the level of perception and knowledge was good, consistently with relevant reviews focused on general public knowledge and perceptions [2, 7]. In addition, our findings confirmed the research on the relationship between risk perception and gender, health status, and experience of COVID-19 [1, 7], as well as the relationship between knowledge and educational level or economic situation [7]. Interestingly, the scientific literature has been reporting conflicting results about the role of age and being a healthcare professional [1, 7], thus suggesting that more robust research is needed to investigate these issues. Remarkably, vaccine hesitancy was associated with all our

Tab. I. Multivariable regression models for: Knowledge Score, Risk Perception Score and Preventive Perception Score.

Variable	Knowledge Score		Risk Perception Score		Preventive Perception Score	
	adjCoef. (95% CI)	p-value	adjCoef. (95% CI)	p-value	adjCoef. (95% CI)	p-value
Age	0.023 (-0.017; 0.062)	0.266	-0.006 (-0.001; -0.005)	< 0.001	0.009 (0.007; 0.010)	< 0.001
Gender						
Man	Ref.		Ref.		Ref.	
Woman	1.027 (-0.285; 2.34)	0.125	0.110 (0.040; 0.181)	0.002	0.043 (-0.015; 0.101)	0.142
Education						
University or higher	Ref.		-	-	Ref.	
High school or lower	-2.250 (-3.395; -1.105)	< 0.001	-	-	-0.053 (-0.103; -0.002)	0.041
Main occupation involves contact with other people						
Yes	Ref.		-	-	Ref.	
No	0.609 (-0.529; 1.747)	0.294	-	-	-0.049 (-0.099; 0.001)	0.054
Household economic situation						
Excellent/adequate	Ref.		-	-	-	-
Insufficient/poor	-2.122 (-3.507; -0.743)	0.003	-	-	-	-
Family member or close people working as healthcare professional						
No	Ref.		-	-	-	-
Yes	0.803 (-0.355; 1.961)	0.174	-	-	-	-
Sharing a house or taking care of a fragile person						
No	Ref.		Ref.		Ref.	
Yes	0.102 (-1.220; 1.43)	0.880	0.105 (0.034; 0.177)	0.004	0.010 (-0.049; 0.069)	0.746
Vaccine hesitancy						
No	Ref.		Ref.		Ref.	
Yes	-4.494 (-6.325; -2.662)	< 0.001	-0.232 (-0.329; -0.134)	< 0.001	-0.261 (-0.340; -0.181)	< 0.001
Suffering from chronic conditions						
No	Ref.		Ref.		Ref.	
Yes	0.112 (-1.323; 1.550)	0.879	0.096 (0.019; 0.173)	0.015	0.028 (-0.035; 0.092)	0.380
Professional sector/education						
Health Care	Ref.		Ref.		Ref.	
Information and Communication Technologies	-5.052 (-7.223; -2.881)	< 0.001	0.210 (0.097; 0.324)	< 0.001	-0.061 (-0.157; 0.035)	0.214
Journalism	-7.060 (-11.819; -2.301)	0.004	0.157 (-0.099; 0.415)	0.229	-0.064 (-0.275; 0.147)	0.551
Other	-4.583 (-5.956; -3.215)	< 0.001	0.164 (0.092; 0.236)	< 0.001	-0.066 (-0.126; -0.006)	0.032
Having family members/friends who contracted SARS-CoV-2 infection						
No	-	-	Ref.		-	-
Yes	-	-	0.075 (0.007; 0.144)	0.031	-	-
Having contracted SARS-CoV-2 infection						
No	-	-	-	-	Ref.	
Yes	-	-	-	-	-0.019 (-0.086; 0.048)	0.582
Knowledge Score	-	-	0.003 (0.000004; 0.006)	0.050	0.003 (0.0004; 0.005)	0.021
Preventive Perception Score	1.548 (0.253; 2.842)	0.019	0.442 (0.377; 0.507)	< 0.001	-	-
Risk Perception Score	1.148 (0.088; 2.209)	0.034	-	-	0.298 (0.254; 0.342)	< 0.001

adjCoef.: adjusted Coefficient; CI: Confidence Interval. Lower educational level, worst economic conditions, vaccine hesitancy, and non-healthcare professional sector/education were negatively associated with the KS.

outcomes. Previous studies also reported higher levels of knowledge and risk awareness have been related to a higher willingness to be vaccinated against COVID-19 [1, 8]. Moreover, especially during the pandemic, the relationship between vaccination intention and trust in government, which can influence the perception towards the preventive measures, has also been highlighted as significant [8]. It should be noted that knowledge, risk perception, and perception towards measures were associated with each other, underling that they may have common determinants and consequences (in addition to the

above-mentioned reflections on vaccine hesitancy). Also these findings are in line with recent works that showed that COVID-knowledge, risk perception and positive attitudes toward risk reduction rules were linked [1, 9]. Overall, we argue that trust towards authorities may have a major role in determining perceptions of population [1], especially in this context of crisis, and future studies should focus on this relationship to identify potentially modifiable factors and develop interventions that can have a substantial impact on such factors. The monitoring of these issues should be

continuous as both the risk perception and the trust have been reported to change during the pandemic [1, 10]. It should be acknowledged that the present study had some relevant limitations, such as the cross-sectional design, the convenience sampling, and the exclusively online data collection.

Conclusions

Our study reported good levels of knowledge, risk perception and perception towards preventive measures. It also highlighted several associations between these issues and sociodemographic characteristics, in addition to a relevant relationship with vaccine hesitancy and reciprocal relationships between the considered outcomes. Therefore, further investigations should be focused on studying underlying determinants and consequences in order to plan and implement effective interventions addressed to subgroups of population that have low knowledge and altered perceptions.

Acknowledgments

The authors would like to thank Dr. Gianluca Colli for his contribution.

Conflict of interest statement

The authors declare no conflict of interest.

Funding

This research received no external funding.

Authors' contributions

RS, FB, EDV, TS, GLM: conceptualization. FB, GS, TS, GLM: methodology. TS, GS: formal analysis. SN, TS: investigation. GLM, TS, GS, SN: data curation. GLM, TS: writing, original draft preparation and visualization. GLM, FB, GS: writing, review and editing. RS, FB, EDV: supervision and project administration. All authors have read and agreed to the published version of the manuscript.

References

- [1] Cipolletta S, Andreghetti GR, Mioni G. Risk Perception towards COVID-19: A Systematic Review and Qualitative Synthesis. *Int J Environ Res Public Health* 2022;19:4649. <https://doi.org/10.3390/ijerph19084649>
- [2] AlAmodi AA, Al-Kattan K, Shareef MA. The current global perspective of the knowledge-attitude-behavior of the general public towards the corona virus disease -19 pandemic: Systematic review and meta-analysis on 67,143 participants. *PLoS One* 2021;16:e0260240. <https://doi.org/10.1371/journal.pone.0260240>
- [3] Moran C, Campbell DJT, Campbell TS, Roach P, Bourassa L, Collins Z, Stasiewicz M, McLane P. Predictors of attitudes and adherence to COVID-19 public health guidelines in Western countries: a rapid review of the emerging literature. *J Public Health* 2021;43:739-753. <https://doi.org/10.1093/pubmed/fdab070>
- [4] World Health Organization, Regional Office for Europe. Survey tool and guidance. Rapid, simple, flexible behavioural insights on COVID-19. Monitoring knowledge, risk perceptions, preventive behaviours and trust to inform pandemic outbreak response. Document number: WHO/EURO:2020-696-40431-54222. 29 July 2020. <https://apps.who.int/iris/bitstream/handle/10665/333549/WHO-EURO-2020-696-40431-54222-eng.pdf?sequence=1&isAllowed=y> (Accessed on: March 2021).
- [5] ECOM (Effective Communication in Outbreak Management for Europe). Standard questionnaire on risk perception of an infectious disease outbreak. Version November 2015. Available at: <http://ecomeu.info/wp-content/uploads/2015/11/Standard-questionnaire-risk-perception-ECOM-november-2015.pdf> (Accessed on: March 2021).
- [6] Hosmer D, Lemeshow S. *Applied Logistic Regression*. Hoboken, NJ: John Wiley & Sons, Inc. 1989.
- [7] Clavel N, Badr J, Gautier L, Lavoie-Tremblay M, Paquette J. Risk Perceptions, Knowledge and Behaviors of General and High-Risk Adult Populations Towards COVID-19: A Systematic Scoping Review. *Public Health Rev* 2021;42. <https://doi.org/10.3389/phrs.2021.1603979>
- [8] Russo S, Bani M, Ardenghi S, Rampoldi G, Strepparava MG. Waiting for the COVID-19 vaccine: vaccine intention, trust in authorities and information needs in an Italian sample. *Psychol Health Med* 2022 Jul 28;1-18. <https://doi.org/10.1080/13548506.2022.2105913>
- [9] Loretto L, Mastrangelo G, Stepien J, Grabowski J, Meloni R, Piu D, Michalski T, Waszak PM, Bellizzi S, Cegolon L. Attitudes and Perceptions of Health Protection Measures Against the Spread of COVID-19 in Italy and Poland. *Front Psychol* 2021;12:805790. <https://doi.org/10.3389/fpsyg.2021.805790>
- [10] Gualano MR, Lo Moro G, Voglino G, Bert F, Siliquini R. Is the pandemic leading to a crisis of trust? Insights from an Italian nationwide study. *Public Health* 2022;202:32-4. <https://doi.org/10.1016/j.puhe.2021.10.015>

Received on November 29, 2022. Accepted on March, 23, 2023.

Correspondence: Tiziana Sinigaglia, Department of Public Health Sciences and Pediatrics, University of Turin, Via Santena 5 bis, 10126, Turin, Italy. Tel. +390116705882 - Fax +390116705816 - E-mail: tiziana.sinigaglia@unito.it

How to cite this article: Lo Moro G, Scaioli G, Nicolino S, Sinigaglia T, De Vito E, Bert F, Siliquini R. Risk perception, knowledge about SARS-CoV-2, and perception towards preventive measures in Italy: a nationwide cross-sectional study. *J Prev Med Hyg* 2023;64:E9-E12. <https://doi.org/10.15167/2421-4248/jpmh2023.64.1.2815>

© Copyright by Pacini Editore Srl, Pisa, Italy

This is an open access article distributed in accordance with the CC-BY-NC-ND (Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International) license. The article can be used by giving appropriate credit and mentioning the license, but only for non-commercial purposes and only in the original version. For further information: <https://creativecommons.org/licenses/by-nc-nd/4.0/deed.en>



INFECTIOUS DISEASES

Knowledge and attitude towards monkeypox among the Lebanese population and their attitude towards vaccination

YOUSSEF JAMALEDDINE^{1,2}, ASEM ABU EL EZZ³, MAHMOUD MAHMOUD³, OMAR ISMAIL⁴, AHMAD SAIFAN⁵, ZAID MAYTA⁶, ABDALLAH SAAB⁶, PASCALE SALAMEH^{2,5,7,8}

¹ Medical Research Center, Faculty of medical sciences, Lebanese University, Hadath, Lebanon;

² Gilbert and Rose Marie Chagoury School of Medicine, Lebanese American University, Byblos, Lebanon;

³ Neuroscience Research Center, Faculty of Medical Sciences, Lebanese University, Hadath, Lebanon;

⁴ Faculty of Medical Sciences, Université Saint Joseph, Beirut, Lebanon; ⁵ Faculty of Medical Sciences, Lebanese University, Hadath, Lebanon; ⁶ Faculty of Medicine, Beirut Arab University, Beirut, Lebanon; ⁷ Institut National de Santé Publique, Epidémiologie Clinique et Toxicologie (INSPECT-LB), Lebanon; ⁸ University of Nicosia Medical School, Nicosia, Cyprus

Keywords

Monkeypox • Attitude • Knowledge • Practice • Virus • Lebanon

Summary

Introduction. Monkeypox is a currently re-emerging disease in the world and several cases have been detected in Lebanon. For this reason, an assessment of the knowledge and attitude of the Lebanese population towards monkeypox and smallpox or monkeypox vaccines had to be done.

Methods. A cross-sectional study was conducted using a questionnaire developed from previous literature among a sample of Lebanese residents. It recorded the sociodemographic characteristics and comorbidities of the participants and analyzed the patterns of knowledge and attitudes in Lebanon.

Results. Among 493 participants, it was found that there is a generally low knowledge of and an average attitude toward monkeypox. However, knowledge is better with higher educa-

tional levels, COVID-19 vaccination, and residency in the south of Lebanon and poorer with marriage and residency in Beirut. Attitude is better in females but poorer with higher educational levels. Several other effectors have been devised too. As for vaccination, taking the smallpox vaccine as a proactive measure is predicted with previous COVID-19 vaccination and better attitude but not in the residents of the north of Lebanon and married Lebanese residents. Higher educational levels and a better attitude were positive predictions of taking the monkeypox vaccine whenever it is developed.

Conclusion. This study revealed low level of knowledge and attitude towards monkeypox and its vaccines, which can be a rich resource when proactive measures are developed.

Introduction

As early as 1958, monkeypox virus (MPXV) was isolated and identified in monkeys suffering from a vesicular disease during their transportation from Singapore to Denmark for research purposes [1]. The first case of human monkeypox (MPX) was identified during the smallpox eradication campaign in the 1970s in a 9-year-old child suspected of having smallpox [2] and, since then, MPX human cases were identified in 11 African countries [3, 4] with several thousands of cases to date [5], and, hence, these countries are recognized as an endemic source of MPX. This led to the emergence of two distinct clades of monkeypox virus (MPXV): the West African and the Congo Basin, with viruses of the latter being the most virulent [6].

MPXV belongs to the genus Orthopoxvirus as it is a lipoprotein membrane enveloped double helix DNA virus [3, 4, 7]. It is similar to other viruses of orthopoxviruses genus in terms of human infection: variola major virus (smallpox virus), cowpox virus (vaccinia), and variola minor virus (Variola alastrim) [7]. The original source of this virus is wild animals and

transmission to humans can occur in two pathways: animal-to-human pathway (zoonotic transmission in endemic countries) and human-to-human pathway (in both, endemic and non-endemic countries) [7].

Clinically, MPX is similar to smallpox [8, 9] but rather more moderate [10]. They are differentiated from each other by swollen lymph nodes in 90% of MPX cases [7], specifically in the neck, the groin and submandibular areas [7]. The case fatality ratio of monkeypox has historically ranged from 0 to 11% in the general population and has been higher among young children. In recent times, the case fatality ratio has been around 3-6%. [3, 7], mostly within the second week of infection [9]. However, infections with the West African type of MPXV, in this current outbreak, are rarely fatal and over 99% of infected people are likely to survive [10]. The incubation period of MPXV, during which symptoms start to appear, is between 5 to 21 days [7] and symptoms last from 2 weeks to 4 weeks. Most of the early symptoms are rather non-specific ranging between shivers, headaches, fainting, backaches, and myodynia, and later to rash, fever, restlessness, and lymphadenopathy [7, 9]. Until now.

Smallpox vaccine has been used against MPX due to the similarities between their viruses and the likelihood of some effect [11].

Confirmed in May 6, 2022, the first cluster of MPX outbreak in a non-endemic country was identified in the United Kingdom, originated from a British resident coming back from an endemic country suggesting a cluster of transmission that has gone unnoticed in endemic countries [12]. Later in May 21, this disease spread into 13 non-endemic countries and to 15 in May 22 [13]. As of 8th of June, 2022, there was a total of 23,276 cases of MPX in countries with no reports of previous encounters and only 344 cases in endemic countries [14], and on the 7th of February, 2023, there has been detected 85,645 confirmed cases in 110 countries [15]. The majority of these cases belong to young men between 25 and 35 years old, many of which identify themselves as homosexual or bisexual [16, 17]. This global outbreak is one of the largest in history with large transmission chains from endemic to non-endemic countries. 26 cases have been reported in Lebanon according to the Centers for Disease Control and Prevention (CDC) statistics [14].

Within the coming months, the magnitude of the global outbreak will be clarified. This urges a quick and proactive action against the monkeypox outbreak, and the most important measure to start with is a knowledge and attitude (KA) assessment in Lebanon before an outbreak emerges as in the United Kingdom.

Materials and methods

STUDY DESIGN AND POPULATION

A cross-sectional study was carried out among the Lebanese population between the 6th of September, 2022, and the 20th of that same month. Anyone who was a resident in any of Lebanon's six governorates and above the age of 18 was eligible to be a part of this study.

ETHICAL CONSIDERATION

The study protocol was reviewed and approved by the institutional review board of Sahel General Hospital, Beirut Lebanon (Reference number: 4/2022). The study was conducted in accordance with the Declaration of Helsinki. Participants agreed to an informed consent and had to answer a yes/no question to confirm their willingness to participate in this study with guarantees that their anonymity would be preserved.

SAMPLE SIZE CALCULATION

The minimal sample size required was calculated through an online platform called "Raosoft" which is a sample size calculator specifically for population surveys. Using the population of Lebanon, the required sample size was estimated to be 385 for a confidence level of 95% and a 5% margin of error. A total of 518 responses were collected for this study in which data collection was closed September 20, 2022; this would allow taking missing values into account.

DATA COLLECTION

The questionnaire was designed and developed after an extensive search throughout the literature for significant background information and with the use of previous similar surveys. The Google Forms platform was utilized for the generation of the survey which was in the Arabic language as it is the native language of the Lebanese people. The questionnaire was then shared online through a link to reach as many people as possible many in which it included brief background information, study objectives, declarations of confidentiality and anonymity, and instructions on how to follow through with the questionnaire. The final questionnaire, after editing and revision, was divided into the following sections:

1. sociodemographic characteristics such as age, gender, marital status, residency address (governorate), level of education, smoking status, family income, crowding index, health status, and comorbidities among several other characteristics;
2. the knowledge section was made up of 10 questions that would assess the extent of the participant's knowledge of the monkeypox disease. In the absence of specific validated scales, it included questions on the mode of transmission, symptoms, duration between infection and the onset of symptoms, duration of symptoms as well as management methods in case of an infection. The questions consisted of multiple-choice answers with some having more than one correct choice. Each correct answer was designated a single point and incorrect/don't know answers were not designated any point. As such, the highest knowledge index possible was 26, ranging from 0 to 26 with a higher index indicating better knowledge. Participants were also asked to provide their main sources of information regarding monkeypox;
3. the attitude section consisted of 4 questions including the extent of the participant's concern about getting infected, if they think monkeypox will affect their daily life, if they consider it to be a serious disease, and their perception on the chances of getting infected. The scoring was based on a 5-point Likert scale (i.e., 1 = strongly disagree, 2 = disagree, 3 = neither disagree nor agree, 4 = agree, and 5 = strongly agree) with a range of 4 to a maximum of 20. A higher index indicated a better attitude toward monkeypox;
4. the practice section included 4 questions specifically aimed at the willingness of the participants to receive the smallpox vaccine if it was proven effective against monkeypox, the willingness to receive a new monkeypox vaccine if it was available and how much were they willing to pay for both types of vaccines. In addition to that, participants were asked if they were previously vaccinated against smallpox and COVID-19. The willingness to receive a smallpox or a new monkeypox vaccine served as a dependent variable for bivariate and multivariate analysis in order to assess which factors can affect that willingness.

STATISTICAL ANALYSIS

Statistical analysis was performed through the software

program SPSS (Statistical Package for Social Sciences) version 25.0. Descriptive statistics were reported using frequencies and percentages for categorical variables and means and standard deviations (SD) for continuous variables. Bivariate analysis was performed to assess the factors associated with knowledge, attitude, and willingness to receive a vaccine. Multivariate regression was also used to identify the factors that can impact knowledge and attitude indexes as well as the factors that impact the willingness to receive a vaccine as the dependent variable. Unstandardized B coefficients and their 95% confidence intervals (CI) were reported. For all the statistical tests, a p-value < 0.05 was considered to be significant.

Results

SOCIODEMOGRAPHIC CHARACTERISTICS AND COMORBIDITIES OF THE PARTICIPANTS

Socio-demographics

Out of the 518 responses collected, only 493 were included in the analysis as they have passed the preliminary requirements of the inclusion criteria. Females represented 75.9% of the participants compared to only 24.1% male participants. The mean age was 24.4 ± 8.44 in which this largest number of participants belonged to the age group of 21 to 25 years with 238 participants representing 48.3% of the analysed responses. The majority were single (86%) and belonged to the educational level of bachelor's as either undergraduates or degree holders (41.8%). Almost two-thirds (64.9%) were unemployed with only 16.4% were employees specialized in the healthcare system out which 55.6% identified as medical doctors. Family-wise measurements showed a high crowding index in about half of the participants (49.5%) and a low (0 to 150 US dollars) to slightly better (150 to 300 US dollars) total income in 54.8% participants. Table I summarizes all of the socio-demographic characteristics of the participants.

Health status and comorbidities

The majority of participants were shown to have followed healthy lifestyles. Smoking and drinking were only observed in 15% and 8.9% of the participants, respectively. Furthermore, only 7.8% identified themselves as obese individuals. The presence of chronic diseases was shown to be fairly uncommon with the most frequent one being chronic lung diseases was only marked in 3.4% of respondents. Table II includes details these measurements.

KNOWLEDGE AND ATTITUDE TOWARDS MONKEYPOX

Description of knowledge and attitude indexes

Knowledge towards monkeypox

Overall, poor knowledge was discovered among the participants with a mean index of 12.72 ± 4.83 in which the maximum index that could have been achieved was

Tab. I. Socio-demographic characteristics of the study participants (N = 493).

		Frequency	Percent
Gender	Male	119	24.1
	Female	374	75.9
Age (in years)	Mean (SD)	24.4 (8.44)	
	Median	22	
	Min - Max	18-65	
Age	18-20 years	155	31.4
	21-25 years	238	48.3
	> 25 years	100	20.3
Marital status	Not married	424	86.0
	Married	69	14.0
Governorate	Beirut	26	5.3
	Mount Lebanon	164	33.3
	North Lebanon/Akkar	185	37.5
	South Lebanon/ Nabatiyeh	55	11.2
	Beqaa/Baalbeck	63	12.8
Educational level	Elementary school	5	1.0
	Baccalaureate	76	15.4
	Bachelor degree	206	41.8
	Master degree	116	23.5
	Doctorate/PHD/ Medical degree	90	18.3
Crowding index	Low	142	28.8
	Moderate	107	21.7
	High	244	49.5
Family total income	0 to 150 US dollars	166	33.7
	150 to 300 US dollars	104	21.1
	300 to 450 US dollars	62	12.6
	450 to 600 US dollars	53	10.8
	600 to 750 US dollars	13	2.6
	750 to 900 US dollars	31	6.3
	More than 900 US dollars	64	13.0
Employment status	I don't work	320	64.9
	I am specialized in health care	81	16.4
	I work but not in health care	92	18.7
Specialty in health care	Doctor	45	55.6
	Nurse	12	14.8
	Pharmacist	4	4.9
	Dentist	4	4.9
	Physiotherapist	2	2.5
	Other	14	17.3

26. About 50% of the responders had an index less than 12, 25% had an index between 12 and 16, and 25% had an index higher than 16.

Table III describes the participants responses to the 9 items that contributed to the analysis of the knowledge towards monkeypox. Asterisks indicated that the answers were positive contributors in the calculation of the knowledge index. Most of the participants showcased good knowledge concerning the origin of this disease spreading as a virus (74.8%) and concerning the common continent in which

Tab. II. Health status and comorbidities of the study participants (N = 493).

		Frequency	Percent
Smoking	No	412	83.6
	Ex-smoker	7	1.4
	Smoker	74	15.0
Obesity	No	454	92.1
	Yes	39	7.9
Do you drink alcohol?	No	449	91.1
	Yes, occasionally	42	8.5
	Yes, regularly	2	0.4
Chronic disease	Hypertension	11	2.2
	Cardiovascular diseases other than hypertension (ex: heart failure, coronary artery disease...)	3	0.6
	Cancer	2	0.4
	Chronic Lung Disease (ex: Chronic obstructive pulmonary disease, asthma...)	17	3.4
	Renal failure	3	0.6
	Other diseases	47	9.5

monkeypox was most spread prior to 2022 and that being in Africa (58.6). However, a huge gap of knowledge was prominent in the symptoms of monkeypox; 80.1% have agreed on fever as one of the symptoms while concerning the other symptoms, the participants were not so sure about their responses as the percentages have varied. Poor knowledge was also discovered regarding the incubation period with only 17% responding correctly and regarding the self-limitation of this disease with 36.9% responding correctly on its natural elimination after 2-4 weeks. A similar pattern to the knowledge about symptoms is recognized in transmission and treatment. Regarding transmission, 77.5% were aware the virus spreads through direct contact with infectious rash and liquid, while they were progressively less aware of the other transmission methods. As for treatment of monkeypox, only 60% agreed on the obvious treatment of providing patients with fluids and nutrition then the numbers decrease to nearly 40% awareness on some of the approved treatments. Knowledge of prevention factors was fairly decent with more than 60% of the participants agreeing on all factors; however, more than half of the participants did not know about the effectiveness of smallpox vaccine against monkeypox. Table III details the participants' answers. The most frequent source of information the participants relied on regarding monkeypox was discovered to be social media (52.9%) while more credible sources were relied on by a considerably much less percentage of participants: World Health Organization (27.2%), Ministry of Health (20.7%), Center for Diseases Control and Prevention (16.6%) (Tab. IV).

Attitude index

The attitude towards monkeypox demonstrated a

slightly-higher-than-average mean of 11.78 ± 2.63 in which a maximum index of 20 was obtainable. About 50% of the participants obtained an index of 12 or less. Of the 493 participants, only 34.9% showcased concerns about getting infected monkeypox, 52% think it affected or will have affected their daily lives and 42.6% considered it to be a serious disease. However, more than half of the participants estimated their chances of getting infected as low (50.5%) and 18.5% considered it to be too low (Tab. V).

Bivariate analysis of the factors associated with monkeypox-concerned knowledge and attitude

Knowledge

Although the mean total knowledge index is generally found to be low, there were some significant differences in knowledge based on certain demographic characteristics. The results of the bivariate analysis have shown a statistically significant difference in mean knowledge indexes based on different age groups (p -value = 0.007) in which a higher mean knowledge index was found in the age group 21-25 (13.38 ± 4.78) compared to the other age groups. Married participants were found to have had a significantly lower mean index (13.08 ± 4.81 ; p -value < 0.0001) compared to those unmarried. As for the place of residence, knowledge towards monkeypox showcases a statistically significant difference in some governorates. Others that showcased a statistically significant higher mean knowledge index included, holders of PhD or MD degrees (15.29 ± 5.12 ; p -value < 0.0001), those with a family total income higher than 300 US dollars (13.34 ± 5.23 ; p -value = 0.01), healthcare specialists (15.74 ± 4.77 ; p -value < 0.0001), and finally, participants vaccinated against COVID-19 (13.09 ± 4.84 ; p -value = 0.001). A significantly lower mean knowledge index was found in Beirut residents (10.81 ± 3.35 ; p -value = 0.037) and North Lebanon/Akkar residents (11.97 ± 4.54 ; p -value = 0.007) when compared with residents of other governorates. Table VI (Appendix) details the sociodemographic factors' association with knowledge indexes of the study respondents.

Attitude

As for attitude towards monkeypox, a significantly higher attitude mean index was found in females (12.02 ± 2.7 ; p -value < 0.0001) and holders of the baccalaureate degree (12.2 ± 2.37 ; p -value < 0.0001). Table VI (Appendix) includes further details on the relationship between sociodemographic characteristics and attitude indexes of participants.

Determinants of monkeypox knowledge and attitude

Knowledge

A multiple linear regression model was revised with the mean knowledge as the dependent variable. The results showed that higher educational level (unstandardized $B = 1.132$), residing in South Lebanon/Nabatiyeh

Tab. III. Monkeypox knowledge among the study participants.

		Frequency	Percent
Monkeypox is the result of infectious	Bacteria	47	9.5
	Virus*	369	74.8
	I don't know	77	15.6
Before 2022, monkeypox was common in which continent	Asia	19	3.9
	Africa*	289	58.6
	Europe	5	1.0
	North America	3	0.6
	South America	4	0.8
	Oceania (Australia)	1	0.2
	I don't know	172	34.9
The symptoms of the disease are	Fever*	395	80.1
	Headache*	239	48.5
	Muscle aches and back pain*	163	33.1
	Chills*	123	24.9
	Fatigue*	222	45.0
	Swollen lymph nodes*	147	29.8
	Respiratory symptoms as sore throat, nasal congestions, and cough*	126	25.6
The duration between infection and onset of symptoms is	Skin rash*	436	88.4
	In 3 days	184	37.3
	In 3 weeks*	84	17.0
	In 6 weeks	2	0.4
	In 3 months	1	0.2
The duration of monkeypox disease, that is, how long the symptoms last for in humans	I don't know	222	45.0
	Less than 2 weeks	85	17.2
	2 to 4 weeks*	182	36.9
	4 to 8 weeks	17	3.4
	More than 8 weeks	3	0.6
How does monkeypox spread?	I don't know	206	41.8
	Direct contact with the rash or infectious bodily fluids*	382	77.5
	Respiratory secretions during direct contact: face-to-face or during intimate physical contact as in kissing, cuddling, or sex*	181	36.7
	Touching things like clothing or linens that have previously been in contact with a rash or bodily fluids*	203	41.2
	To the fetus through the placenta in pregnant women*	68	13.8
The cure of monkeypox:	From infected animals: either through scratches or biting by animals or through preparing or eating meat or using products of infected animals*	221	44.8
	Provide patients with appropriate fluids and food to maintain their good nutritional statuses*	296	60.0
	Treat secondary bacterial inflammations as prescribed*	211	42.8
Is the vaccination against smallpox effective against monkeypox?	Treat with tecovirimat medication*	190	38.5
	It is effective*	185	37.5
	It is not effective	38	7.7
Prevention factors against monkeypox:	I don't know	270	54.8
	Avoiding skin-to-skin contact with infected people with a monkeypox-like rash*	423	85.8
	Avoiding touching or contact with the bedding, towels, or clothing of a person infected with monkeypox*	320	64.9
	Wash your hands often with soap and water or use alcohol-based hand sanitizers*	309	62.7
Do you think that monkeypox is more common among the homosexual individuals?	In Central and West Africa, avoid contact with animals that can spread monkeypox virus, which usually are rodents and primates. Also, avoid sick or dead animals, as a well as the bedding or other items that it could've touched it*	287	58.2
	No	70	14.2
	Yes*	222	45.0
	I don't know	201	40.8

* Correct answer.

Tab. IV. Sources of information utilized by the participants regarding the monkeypox disease.

	Frequency	Percent
Friends/Family	80	16.2
Social Media	261	52.9
CDC (Centers for Disease Control and Prevention)	82	16.6
Ministry of Health Website	102	20.7
World Health Organization Website	134	27.2
Other websites/the internet	152	30.8
TV or other broadcast media types	111	22.5
Other sources	45	9.1
I heard about the disease but did not follow up on it or ask about it	102	20.7

Tab. V. Monkeypox attitude among the study participants.

		Frequency	Percent
Are you concerned about getting monkeypox?	I strongly disagree	46	9.3
	I disagree	72	14.6
	Neither disagree nor agree	203	41.2
	I agree	140	28.4
	I strongly agree	32	6.5
Do you think that monkeypox is affecting or will affect your daily life?	I strongly disagree	27	5.5
	I disagree	77	15.6
	Neither disagree nor agree	133	27.0
	I agree	208	42.2
	I strongly agree	48	9.7
Do you consider monkeypox a serious disease?	I strongly disagree	16	3.2
	I disagree	108	21.9
	Neither disagree nor agree	159	32.3
	I agree	182	36.9
	I strongly agree	28	5.7
You consider your chances to get infected with monkeypox	Too low	91	18.5
	Low	249	50.5
	Moderate	142	28.8
	High	8	1.6
	Too high	3	0.6

(unstandardized $B = 1.445$), and having a previous vaccination to COVID-19 (unstandardized $B = 1.296$) were significantly associated with greater knowledge towards monkeypox. On the other hand, marriage (unstandardized $B = -2.004$) and residing in Beirut (unstandardized $B = -2.3$) were associated with a poorer knowledge (Tab. VII).

Attitude

In a multiple linear regression model with attitude towards monkeypox as the dependent variable, females (unstandardized $B = 0.854$) were significantly associated with higher attitude index while a higher education level is significantly associated with lower attitude indexes (Tab. VIII).

Pearson's Correlation between attitude and knowledge showed no significant correlation between the two with a coefficient of 0.023 (p -value = 0.613).

Vaccination as a practice against monkeypox

Vaccination willingness among participants

In our study of 493 participants, 58.4% have been previously vaccinated against smallpox and 79.5% have received at least one shot of the COVID-19 vaccine. When informed that smallpox vaccine was proved to be efficient against monkeypox, 69.4% showed willingness to take the vaccine, and 58.8% would only take it if it was available for free. In case a monkeypox vaccine is developed, 56.4% have agreed to take it and only 25% were willing to pay for it (Tab. IX).

Bivariate analysis of the factors associated with vaccination against monkeypox

The results of the bivariate analysis showed that a statistically significant higher percentage of participants were willing to receive the smallpox vaccine as a proactive measure against monkeypox in North Lebanon/Akkar residents (60%; p -value < 0.0001), Beqaa/Baalbek residents (81%; p -value = 0.033), those with a family total income higher than 300 US dollars (74%; p -value = 0.043), obese and non-obese participants (53.8% and 70.7%, respectively; p -value = 0.028), and in previously vaccinated participants against smallpox (75.7%; p -value < 0.0001) and COVID-19 (75.8%; p -value < 0.0001) (Tab. X, Appendix).

Furthermore, in case a monkeypox specific vaccine was developed, bivariate analysis showed that a higher percentage of participants were willing to receive it in Mount Lebanon residents (62.8%; p -value = 0.049) and in previously vaccinated individuals against smallpox (62.2%; p -value = 0.003) and COVID-19 (64.3%; p -value < 0.001). On the other hand, a significantly lower percentage were willing to receive the vaccine in North Lebanon/Akkar residents (47%; p -value = 0.001) (Tab. X, Appendix).

Those with a higher mean attitude index were found to be more willing to get the smallpox vaccine (12.06 ± 2.51 ; p -value = 0.001) and the monkeypox vaccine (12.16 ± 2.49 ; p -value < 0.0001) compared to those with a lower mean attitude (Tab. X, Appendix).

Multivariate analysis on the factors associated with the willingness to take the vaccine

A multivariate linear regression model was revised with the willingness to take the smallpox vaccine if proven efficient against monkeypox as the dependent variable. It was determined that previously vaccinated participants against COVID-19 and participants with higher attitude indexes are 3.58 and 1.157 times more likely to take the vaccine, respectively (unstandardized $B = 1.275$, OR = 3.58; unstandardized $B = 0.146$, OR = 1.157).

Meanwhile, married participants and residents of North Lebanon/Akkar are 0.51 and 0.605 less likely to take the vaccine compared to unmarried and residents of the other governorates, respectively (unstandardized $B = -0.674$, OR = 0.51; unstandardized $B = -0.503$, OR = 0.605) (Tab. XI).

Tab. VII. Results of linear regression analysis on factors significantly associated with knowledge towards monkeypox.

Model		Unstandardized coefficients	Standardized coefficients	Sig.	95.0% Confidence Interval for B	
		B	Beta		Lower bound	Upper bound
5	(Constant)	10.060		0.000	7.852	12.267
	Educational level	1.132	0.232	0.000	0.712	1.552
	Marital status	-2.004	-0.144	0.001	-3.182	-0.826
	South Lebanon/Nabatiyeh	1.445	0.094	0.028	0.157	2.732
	Beirut	-2.300	-0.107	0.013	-4.108	-0.492
	Are you vaccinated against COVID-19?	1.296	0.108	0.013	0.277	2.315
a. Dependent Variable: Knowledge. Variable(s) entered 1. Educational level (Elementary school, Baccalaureate, Bachelor degree, Master, PhD/Doctorate) 2. Marital status (Not married/married) 3. South Lebanon/Nabatiyeh (No/Yes) 4. Beirut (No/Yes) 5. Are you vaccinated against COVID-19? (No/Yes)						

Tab. VIII. Results of linear regression analysis on factors significantly associated with 276 attitude towards monkeypox.

Model		Unstandardized coefficients	Standardized coefficients	Sig.	95.0% Confidence Interval for B	
		B	Beta		Lower bound	Upper bound
2	(Constant)	11.485		0.000	10.131	12.839
	Sex	0.854	0.139	0.002	0.313	1.394
	Educational level	-0.351	-0.132	0.003	-0.585	-0.117
	Knowledge	0.034	0.025	0.178	-0.015	0.083
Dependent: Attitude (index) Variable(s) entered: 1. Educational level (Elementary school, Baccalaureate, Bachelor degree, Master, PhD/Doctorate) 2. Sex (Male/Female)						

A second multivariate linear regression model was generated but this time taking into account the willingness to take the monkeypox vaccine, if developed, as the dependent variable. Participants in higher educational levels and those with higher attitude indexes are 1.241 and 1.152 times more likely to take the vaccine, respectively (unstandardized B = 0.216, OR = 0.142; unstandardized B = 0.142, OR = 1.152) (Tab. XII).

Discussion

Several infectious diseases have been recently emerging in Lebanon and the world in the past couple of years including COVID-19, monkeypox, and cholera. We have opted in this study to focus on the monkeypox disease as its reemergence has been quite recent. As of February 2023, 26 cases have been recorded in Lebanon so far; all of which were of unknown origin. This re-emergence should urge the Lebanese community to propose a well-adjusted set of measures to control and prevent the spread of monkeypox any further. One of the efficient ways is to assess the knowledge and attitude of the general community before any endemic pushes us to extreme caution.

DISSECTION OF THE KNOWLEDGE AND ATTITUDE INDEXES

One of the challenges in the prevention of monkeypox from re-emerging and spreading is the lack of knowledge in the community. In Lebanon, the knowledge level is generally low and it state is attributed to the fact that monkeypox is uncommon in the region and is currently re-emerging, which is exactly why several countries have reported poorer knowledge among their communities such as in the United Arab Emirates [18], Saudi Arabia's general population [19] and physicians [20], Jordanian college students [21], Italian physicians [22], Indonesian general practitioners [23] and internal medicine practitioners [24], and Bangladesh population [25]. A high percentage of our participants reported adequate knowledge of the source of this disease, which is why 80.1% agreed on fever as a symptom, but the answers to the other items representing symptoms as incubation period, transmission, treatment, and vaccination were shown to be poor-to-average. Indonesian internal medicine residents have reported a similar pattern which was elaborated by the debatable state of these topics in a re-emerging disease [24]. For preventative measures, most people figured out most of them mainly because such measures follow the common sense, which was adjusted lately in the COVID-19 pandemic.

Tab. IX. Vaccination perception by the study participants as a preventative measure against monkeypox.

		Frequency	Percent
Are you vaccinated against smallpox previously?	No	92	18.7
	I don't know/remember	113	22.9
	Yes	288	58.4
Are you vaccinated against COVID-19?	No	101	20.5
	Yes, one shot	16	3.2
	Yes, two shots	266	54.0
	Yes, three shots	100	20.3
	Yes, four shots	10	2.0
If it was proved that the smallpox vaccine is effective against monkeypox, are you willing to take the smallpox vaccine, regardless if you were vaccinated or not?	I strongly disagree	19	3.9
	I disagree	50	10.1
	Neither disagree nor agree	82	16.6
	I agree	245	49.7
	I strongly agree	97	19.7
In case a smallpox vaccine becomes available, are you willing to pay for it? How much are you willing to pay for it?	I will not pay as I do not want it	77	15.6
	I will not pay as it has to be available for free	290	58.8
	I will pay between 1 and 10 US dollars, i.e., less than 10 US dollars)	62	12.6
	I will pay between 10 and 20 US dollars	30	6.1
	I will pay between 30 and 40 US dollars	14	2.8
	I will pay more than 30 US dollars	20	4.1
In case a new vaccine specifically for the monkeypox becomes available, are you willing to get the vaccine?	I strongly disagree	26	5.3
	I disagree	62	12.6
	Neither disagree nor agree	126	25.6
	I agree	219	44.4
	I strongly agree	60	12.2
In case a new vaccine specifically for the monkeypox becomes available, are you willing to pay for it? How much are you willing to pay for it?	I will not pay as I do not want it	87	17.6
	I will not pay as it has to be available for free	283	57.4
	I will pay between 1 and 10 US dollars, i.e., less than 10 US dollars)	57	11.6
	I will pay between 10 and 20 US dollars	30	6.1
	I will pay between 30 and 40 US dollars	14	2.8
	I will pay more than 30 US dollars	22	4.5
	Total	493	100.0

The prevailing beliefs towards the monkeypox re-emergence show a rather average attitude. This can be due to the easily tracked transmission patterns and the uniqueness of the symptoms of monkeypox when compared to those of COVID-19, which is why the concern about monkeypox infection was found to be generally low. Moreover, the participants showcased a moderately better attitude towards the seriousness of the disease and its effect on their daily lives. These mediocre indexes in the Lebanese community can be attributed to the source of their information – social media accounted for 52.9% and other official websites accounted for 30.8%; these platforms might have included a lot of false or misleading information causing a negative attitude toward monkeypox especially with all the peoples' misconceptions and exaggerations.

Social media is also a platform known to harbor a lot of conspiracy theories, which was the case for SARS-COV-2 of COVID-19. This can partially explain the generally poor knowledge in the Lebanese community which is in line with what was found in the Saudi Arabia community [19] and Jordanian college students [21].

EFFECTORS AND PREDICTORS OF MONKEYPOX KNOWLEDGE IN LEBANON

Several factors have been found to affect the diversity of knowledge in the general community, which is not in line with what was found by Indonesian general practitioners; this is mainly because of the studied population: With general practitioners, there is a common pattern with re-emerging and uncommon outbreaks. This pattern is the uniformity of low knowledge regardless of any variable [23].

As for age, knowledge was higher than average in the age group of 21 to 25 years compared to other groups which is probably due to better access to accurate information and curiosity during this period of one's college life. This was in line with a study on Indonesian general practitioners [23] and on Pakistani population [26], however, it was not the case for the United Arab Emirates [18] and Saudi Arabia's population [19] as they have reported greater knowledge in older participants [19] with the exception of Saudi Arabia's physicians only in which knowledge is poorer with older age [20]. Other studies reported no effect of age on monkeypox knowledge at all as in Bangladesh [25].

Unmarried participants showed a higher knowledge index possibly due to more available time to educate one's self, raising a concern for married couples in which their safety, as well as their children's safety, can be in jeopardy. In fact, marriage was found to be a predictor of poor knowledge in the Lebanese community. This finding contradicts what was found in Saudi Arabia general population where married participants reported better knowledge [19] but was still in line with its physicians [20].

Furthermore, in the economic aspect of the Lebanese individuals, when the family's total income was found to be higher than \$300, the knowledge index was higher than the average suggesting that a comfortable lifestyle opens

Tab. XI. Linear regression analysis on the factors significantly associated with the willingness to take the smallpox vaccine

If it was proved that the smallpox vaccine is effective against monkeypox, are you willing to take the smallpox vaccine, regardless if you were vaccinated or not? (No/Yes)	B	S.E.	P-value	OR	95% CI for OR	
					Lower	Upper
Marital status	-0.674	0.283	0.017	0.510	0.292	0.888
North Lebanon/Akkar	-0.503	0.215	0.019	0.605	0.396	0.922
Are you vaccinated against COVID-19?	1.275	0.244	0.000	3.580	2.220	5.775
Attitude	0.146	0.040	0.000	1.157	1.070	1.252
Knowledge	0.006	0.024	0.807	1.006	0.960	1.054
Constant	-0.870	0.585	0.137	0.419		
Dependent: If it was proved that the smallpox vaccine is effective against monkeypox, are you willing to take the smallpox vaccine, regardless if you were vaccinated or not? (No/Yes)						
Variable(s) entered						
1. Are you vaccinated against COVID-19? (No/Yes)						
2. Attitude (index)						
3. Marital status (Not married/married)						
4. North Lebanon/Akkar (No/Yes)						

Tab. XII. Linear regression analysis on the factors significantly associated with the willingness to take the monkeypox vaccine if developed.

In case a new vaccine specifically for the monkeypox becomes available, are you willing to get the vaccine? (No/Yes)	B	S.E.	P-value	OR	95% CI for OR	
					Lower	Upper
Educational level	0.216	0.095	0.023	1.241	1.030	1.497
Attitude	0.142	0.037	0.000	1.152	1.073	1.238
Knowledge	0.026	0.020	0.203	1.026	0.986	1.068
Constant	-2.135	0.589	0.000	0.118		
Dependent: In case a new vaccine specifically for the monkeypox becomes available, are you willing to get the vaccine? (No / Yes)						
Variable(s) entered:						
1. Educational level						
2. Attitude (index)						

access to better and more reliable sources of information. Even the Saudi population had a similar finding [19], however, in China [27] and in Indonesian general practitioners [23], income had no effect whatsoever. Knowledge indexes were found to be higher than average in Mount Lebanon, probably since it is more urbanized than other governorates as other studies reported [19], and in South Lebanon and Nabatiyeh. In fact, the mean knowledge index in South Lebanon and Nabatiyeh residents was even higher than that of Mount Lebanon residents and residency in the former governorates is a predictor of greater knowledge, both of which entails a further look into it to understand the reasons behind it. Beirut participants are the lowest in number in our study, which could have accounted for the low knowledge index. Despite of this, Beirut residency was found to be a predictor of poor knowledge in the Lebanese community contrasting another study in Saudi Arabia [19]. A study on Bangladesh showed no effect of the urban setting on monkeypox knowledge [25]. Higher educational levels, specifically postgraduate levels, including master's students, and doctorate and medical students reported a higher-than-average knowledge index even though monkeypox could not have been a part of their curriculums. This can reflect how education and maturity have influenced their knowledge and their curiosity to search for reliable information.

In line with this study, a similar finding was reported in Bangladesh [25], America [28], the United Arab Emirates [18] and in Saudi Arabia's general populations [19] where higher education is associated with better knowledge, and lower educational levels, as with Jordanian college students, are associated with worse knowledge [21]. Educational level was found to predict higher levels of knowledge. Studies have also focused on how knowledge could've been better if monkeypox was implemented into their curriculums [18, 28]. Healthcare workers reported a high level of knowledge, which is to be expected from professionals in the field and can set a calmer environment when things might run out of control. However, physicians and general practitioners in Italy [22] and Indonesia [23, 24] have shown poorer levels of knowledge but Bangladesh workers [25] and Saudi Arabia healthcare workers [19, 20] showed a similar finding. Finally, vaccinated participants against COVID-19 reported a higher level of knowledge as a similar pattern of awareness and was, in fact, found to be a predictor of better knowledge. Other factors as gender show a controversy about its effect on monkeypox knowledge, suggesting a setting-related condition rather than a general rule that fits a lot of countries. Bangladesh [25] and Indonesian general practitioners [23] have reported no effect of gender, while

Saudi Arabia physicians and United Arab Emirates [18] showcased better knowledge in females.

EFFECTORS AND PREDICTORS OF ATTITUDE TOWARDS MONKEYPOX

Attitude of the Lebanese towards the spreading of monkeypox showcase an average level towards measures of its spreading. Few factors have shown attributes in this issue and even fewer studies have tackled attitude in monkeypox. Higher than mean attitude was discovered in females possibly due to the laxity of males. In fact, this laxity showcases a negative predictor of worst attitude and females predict better attitude. In an opposite pattern to knowledge levels, age and educational level showcase an effect on attitude; better attitude was reported in older age group and the age group 18-20 years and in lower educational levels - doctorate students specifically showed a lower attitude than other educational levels. Higher educational level is in fact a predictor of worse attitude towards monkeypox measures. The opposite pattern of attitude with regards to knowledge is possible since no correlation was found between the two parameters. However, the better attitude in lower educational levels and their corresponding younger ages needs to be investigated with more stratifications; but one explanation of this issue relates their more free time to participation in awareness workshops. Older people usually have a better common sense to not get infected with monkeypox.

PREDICTORS OF VACCINATION WILLINGNESS

Vaccination is an important proactive measure to be taken when available, especially after such preventative measure has been proven to be efficient in the face of the COVID-19 pandemic. Against monkeypox, the already developed smallpox vaccine has been proven efficient to some extent (16) and countries are already considering distributing this vaccine until a reliable monkeypox vaccine is developed. For this reason, both vaccines, smallpox and the potential monkeypox vaccine were included as part of the practice against monkeypox in the analysis of this study.

More than two-thirds of the participants expressed their willingness to receive the smallpox vaccine when informed the smallpox vaccine is efficient against monkeypox and more than half were willing to receive a monkeypox vaccine if ever developed. This shows that the majority of this community is capable of and willing to practice the appropriate protective measures, however, this doesn't line with Italian physicians as they insist of receiving it for free [22]. When asked if the participant were willing to receive the smallpox vaccine as a protective measure against monkeypox: Married participants were less likely to take the smallpox vaccine. This can be attributed to the worse knowledge found with respect to unmarried participants and can be due to the great possibility that they and their children have already received the vaccine previously. North Lebanon and Akkar residents are less likely to take the vaccine which cannot be attributed to a low level of knowledge

or attitude and needs a further look into it, other studies suggest that the type of residency whether urban or rural has no effect on vaccination willingness [22, 27]. Previous vaccination against COVID-19 enhances the probability of taking the smallpox vaccine by a huge factor of 3.58 which is quite reasonable and can be due to adequate awareness that was previously spread in the Lebanese community, this is also true in America [29], and in France and Belgium [30]. Finally, attitude reports an increase in the likability to take the smallpox vaccine as found in this study and others [22, 28], however, if smallpox vaccine was previously taken, it interplays as a negative effector in one's willingness [22].

When asked if the participants were willing to take the monkeypox vaccine if developed in the next few years, only two factors have been positively linked to taking the vaccine: higher educational levels and better attitude towards. Although this may contradict the relationship between educational levels and attitude, it can be explained by the implementation of vaccination in the educational curriculums so it can enhance this practice but not the attitude towards the disease itself. Attitude showcases a consistency in its positive effect on vaccination in other studies [22, 28], but education was reported to have no effect in China [27] and among Indonesians [31].

Gender showcases an almost consistent results in several studies where it is reported to have no effect [22, 27, 30, 31], however, Americans report an increase in the willingness to get vaccinated in men [29]. This study agrees with previous findings outside America.

LIMITATIONS

While this study is among the first to assess KA concerning monkeypox, several limitations to this study were noticed. Random sampling for this study was not revised and a selection bias was present especially with the under-sampling of Beirut residents (26 participants). Although the minimal sample size required was met, the findings may not be representative of the whole Lebanese community. Information bias should also be highlighted as some participants may overestimate or underestimate their responses or they may provide answers that do not reflect their actual opinions. Certain groups could have over-sampled themselves due to their familiarity with the way this survey was conducted. The identification of the association between the dependent and independent variables is more limited in such a cross-sectional study in which causality could not have been demonstrated.

Conclusion

A monkeypox outbreak in Lebanon could lead to devastating effects with the low levels of knowledge and average attitudes of the Lebanese residents. There is an urge to promote public health awareness in general for the transmission of viruses and other bacterial infections, and from this point onwards, educate deeper

and proactively against any outbreak in the globe before it reaches Lebanon.

Ethical approval and consent to participate

Electronic informed consents were obtained from all participants prior to data collection. An institutional review board approval was sought and received from Sahel General Hospital (Reference number: 4/2022). All methods were carried out in accordance with relevant guidelines and regulations of Declaration of Helsinki.

Availability of data and materials

All data generated or analyzed during this study are included in this published article.

Acknowledgments

Not applicable.

Conflict of interest statement

The author declares no conflict of interest.

Funding

This work was not funded.

Authors' contributions

YJ developed the study concept, designed the study, and developed the questionnaire. OI, YJ and AA conducted the survey distribution and data collection. AS, AS and ZM prepared the results. MM and AA wrote the manuscript; YJ and AA reviewed and edited it. PS supervised the study. All authors have read and approved the submitted version of the manuscript.

References

- [1] Magnus PV, Andersen EK, Petersen KB, Birch-Andersen A. A pox-like disease in cynomolgus monkeys. *Acta Pathol Microbiol Scand* 1959;46:156-76. <https://doi.org/10.1111/j.1699-0463.1959.tb00328.x>
- [2] Doty JB, Malekani JM, Kalemba LN, Stanley WT, Monroe BP, Nakazawa YU, Mauldin MR, Bakambana TL, Liyandja Dja Liyandja T, Braden ZH, Wallace RM, Malekani DV, McColium AM, Gallardo-Romero N, Kondas A, Peterson AT, Osorio JE, Roche TE, Karem KL, Emerson GL, Carroll DS. Assessing Monkeypox Virus Prevalence in Small Mammals at the Human-Animal Interface in the Democratic Republic of the Congo. *Viruses* 2017;9(10). <https://doi.org/10.3390/v9100283>
- [3] World Health Organization. Mpox (monkeypox). Available at: <https://www.who.int/news-room/fact-sheets/detail/monkeypox> (Accessed on: 9/2/2023).
- [4] Moore MJ, Rathish B, Zahra F. Mpox (Monkeypox) [Updated 2022 Nov 30]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing 2023 Jan. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK574519/>
- [5] Reed KD, Melski JW, Graham MB, Regnery RL, Sotir MJ, Wegner MV, Kazmierczak JJ, Stratman EJ, Li Y, Fairley JA, Swain GR, Olson VA, Sargent EK, Kehl SC, Frace MA, Kline R, Foldy SL, Davis JP, Damon IK. The detection of monkeypox in humans in the Western Hemisphere. *New Engl J Med* 2004;350:342-50. <https://doi.org/10.1056/NEJMoa032299>
- [6] Likos AM, Sammons SA, Olson VA, Frace AM, Li Y, Olsen-Rasmussen M, Davidson W, Galloway R, Khristova ML, Reynolds MG, Zhao H, Carroll DS, Curns A, Formenty P, Esposito JJ, Regnery RL, Damon IK. A tale of two clades: monkeypox viruses. *J Gen Virol* 2005;86:2661-72. <https://doi.org/10.1099/vir.0.81215-0>
- [7] Petersen E, Kantele A, Koopmans M, Asogun D, Yinka-Ogunleye A, Ihekweazu C, Zumla A. Human Monkeypox: Epidemiologic and Clinical Characteristics, Diagnosis, and Prevention. *Infect Dis Clin North Am* 2019;33:1027-43. <https://doi.org/10.1016/j.idc.2019.03.001>
- [8] Breman JG, Kalisa R, Steniowski MV, Zanotto E, Gromyko AI, Arita I. Human monkeypox, 1970-79. *Bull World Health Organ* 1980;58:165-82.
- [9] Nalca A, Rimoin AW, Bavari S, Whitehouse CA. Reemergence of monkeypox: prevalence, diagnostics, and countermeasures. *Clin Infect Dis* 2005;41:1765-71. <https://doi.org/10.1086/498155>
- [10] Centers for Disease Control and Prevention. Monkeypox. Available at: <https://www.cdc.gov/poxvirus/mpox/index.html> (Accessed on: 9/2/2023).
- [11] Titanji BK, Tegomoh B, Nematollahi S, Konomos M, Kulkarni PA. Monkeypox: A Contemporary Review for Healthcare Professionals. *Open Forum Infect Dis* 2022;9:ofac310. <https://doi.org/10.1093/ofid/ofac310>
- [12] World Health Organization. Disease Outbreak News; Monkeypox – United Kingdom of Great Britain and Northern Ireland. Available at: <https://www.who.int/emergencies/disease-outbreak-news/item/2022-DON381> (Accessed on: 9/2/2023).
- [13] World Health Organization. Disease Outbreak News; Multi-country monkeypox outbreak in non-endemic countries. Available at: <https://www.who.int/emergencies/disease-outbreak-news/item/2022-DON385> (Accessed on: 9/2/2023).
- [14] Centers for Disease Control and Prevention. 2022 Monkeypox Outbreak Global Map. Available at: <https://www.cdc.gov/poxvirus/monkeypox/response/2022/world-map.html> (Accessed on: 9/2/2023).
- [15] World Health Organization. 2022 Mpox Outbreak: Global Trends. Available at: https://worldhealthorg.shinyapps.io/mpox_global/ (Accessed on: 9/2/2023).
- [16] European Centre for Disease Prevention and Control. Epidemiological update: Monkeypox outbreak. Available at: <https://www.ecdc.europa.eu/en/news-events/epidemiological-update-monkeypox-outbreak> (Accessed on: 9/2/2023).
- [17] World Health Organization. Multi-country monkeypox outbreak: situation update. Available at: <https://www.who.int/emergencies/disease-outbreak-news/item/2022-DON392> (Accessed on: 9/2/2023).
- [18] Jairoun AA, Al-Hemyari SS, Abdulla NM, El-Dahiyat F, Shahwan M, Hassan N, Jairoun OD, Alyousef NG, Sharif S, Jaber AAS. Awareness and preparedness of human monkeypox outbreak among university student: Time to worry or one to ignore? *J Infect Public Health* 2022;15:1065-71. <https://doi.org/10.1016/j.jiph.2022.08.015>

- [19] Alshahrani NZ, Alzahrani F, Alarifi AM, Algethami MR, Alhumam MN, Ayied HAM, Awan AZ, Almutairi AF, Bamakhrama SA, Almushari BS, Sah R. Assessment of Knowledge of Monkeypox Viral Infection among the General Population in Saudi Arabia. *Pathogens* (Basel, Switzerland) 2022;11(8). <https://doi.org/10.3390/pathogens11080904>
- [20] Alshahrani NZ, Algethami MR, Alarifi AM, Alzahrani F, Alshehri EA, Alshehri AM, Sheerah HA, Abdelaal A, Sah R, Rodriguez-Morales AJ. Knowledge and Attitude Regarding Monkeypox Virus among Physicians in Saudi Arabia: A Cross-Sectional Study. *Vaccines* 2022;10:2099. <https://doi.org/10.3390/vaccines10122099>
- [21] Sallam M, Al-Mahzoum K, Dardas LA, Al-Tammemi AB, Al-Majali L, Al-Naimat H, Jardaneh L, AlHadidi F, Al-Salahat K, Al-Ajlouni E, AlHadidi NM, Bakri FG, Mahafzah A, Harapan H. Knowledge of Human Monkeypox and Its Relation to Conspiracy Beliefs among Students in Jordanian Health Schools: Filling the Knowledge Gap on Emerging Zoonotic Viruses. *Medicina* (Kaunas) 2022;58:924. <https://doi.org/10.3390/medicina58070924>
- [22] Riccò M, Ferraro P, Camisa V, Satta E, Zaniboni A, Ranzieri S, Baldassarre A, Zaffina S, Marchesi F. When a Neglected Tropical Disease Goes Global: Knowledge, Attitudes and Practices of Italian Physicians towards Monkeypox, Preliminary Results. *Trop Med Infect Dis* 2022;7:135. <https://doi.org/10.3390/tropicalmed7070135>
- [23] Harapan H, Setiawan AM, Yufika A, Anwar S, Wahyuni S, Asrizal FW, Sufri MR, Putra RP, Wijayanti NP, Salwiyadi S, Maulana R, Khusna A, Nusrina I, Shidiq M, Fitriani D, Muharrir M, Husna CA, Yusri F, Maulana R, Andalas M, Wagner AL, Mudatsir M. Knowledge of human monkeypox viral infection among general practitioners: a cross-sectional study in Indonesia. *Pathog Glob Health* 2020;114:68-75. <https://doi.org/10.1080/020477724.2020.1743037>
- [24] Salim NA, Septadina IS, Permata M, Hudari H. Knowledge, attitude, and perception of anticipating 2022 global human monkeypox infection among internal medicine residents at Palembang Indonesia: An online survey. *J Kedokt dan Kesehat Publ Ilm Fak Kedokt Univ Sriwij* 2022;9:253-62. <https://doi.org/10.32539/JKK.V9I3.18799>
- [25] Nath SD, Islam AMK, Majumder K, Rimti FH, Das J, Tabassum MN, Oishee AN, Mahmood T, Paul M, Akhter M, Bhadra AB, Rimu FH, Chakraborty S, Shom P, Nosaibah SM, Rahman A, Khan AS, Anjum A, Khan S, Hossain MM, Hawlader MDH. Assessment of Knowledge on Human Monkeypox Virus among General Population in Bangladesh: A Nationwide Cross-sectional Study. *medRxiv* 2022.08.31.22279445. <https://doi.org/10.1101/2022.08.31.22279445>
- [26] Kumar N, Ahmed F, Raza MS, Rajpoot PL, Rehman W, Khatri SA, Mohammed M, Muhammad S, Ahmad R. Monkeypox Cross-Sectional Survey of Knowledge, Attitudes, Practices, and Willingness to Vaccinate among University Students in Pakistan. *Vaccines* (Basel) 2022;11:97. <https://doi.org/10.3390/vaccines11010097>
- [27] Hong J, Pan B, Jiang HJ, Zhang QM, Xu XW, Jiang H, Ye JE, Cui Y, Yan XJ, Zhai XF, Yu Q. The willingness of Chinese healthcare workers to receive monkeypox vaccine and its independent predictors: A cross-sectional survey. *J Med Virol* 2023;95:e28294. <https://doi.org/10.1002/jmv.28294>
- [28] Bates BR, Grijalva MJ. Knowledge, attitudes, and practices towards monkeypox during the 2022 outbreak: An online cross-sectional survey among clinicians in Ohio, USA. *J Infect Public Health* 2022;15:1459-65. <https://doi.org/10.1016/j.jiph.2022.11.004>
- [29] Winters M, Malik AA, Omer SB. Attitudes towards Monkeypox vaccination and predictors of vaccination intentions among the US general public. *PloS one* 2022;17:e0278622. <https://doi.org/10.1371/journal.pone.0278622>
- [30] Gagneux-Brunon A, Dauby N, Launay O, Botelho-Nevers E. Attitudes towards monkeypox vaccination among healthcare workers in France and Belgium: an element of complacency? *J Hosp Infect* 2022;130:144-5. <https://doi.org/10.1016/j.jhin.2022.09.010>
- [31] Harapan H, Wagner AL, Yufika A, Setiawan AM, Anwar S, Wahyuni S, Asrizal FW, Sufri MR, Putra RP, Wijayanti NP, Salwiyadi S, Maulana R, Khusna A, Nusrina I, Shidiq M, Fitriani D, Muharrir M, Husna CA, Yusri F, Maulana R, Rajamoorthy Y, Groneberg DA, Müller R, Mudatsir M. Acceptance and willingness to pay for a hypothetical vaccine against monkeypox viral infection among frontline physicians: A cross-sectional study in Indonesia. *Vaccine* 2020;38:6800-6. <https://doi.org/10.1016/j.vaccine.2020.08.034>

Received on March 29, 2023. Accepted on April 18, 2023.

Correspondence: Youssef Jamaledine, Medical Research Center, Faculty of medical sciences, Lebanese University, Hadath, Lebanon. Tel. +961 81650657 - E-mail: youssefjd@outlook.com

How to cite this article: Jamaledine Y, Abou El Ezz A, Mahmoud M, Ismail O, Saifan A, Mayta Z, Saab A, Salameh P. Knowledge and attitude towards monkeypox among the lebanese population and their attitude towards vaccination. *J Prev Med Hyg* 2023;64:E13-E26. <https://doi.org/10.15167/2421-4248/jpmh2023.64.1.2903>

© Copyright by Pacini Editore Srl, Pisa, Italy

This is an open access article distributed in accordance with the CC-BY-NC-ND (Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International) license. The article can be used by giving appropriate credit and mentioning the license, but only for non-commercial purposes and only in the original version. For further information: <https://creativecommons.org/licenses/by-nc-nd/4.0/deed.en>

Appendix

Supplementary tables.

Tab. VI. Association between sociodemographic characteristics and knowledge and attitude indexes.						
	Knowledge			Attitude		
		n	Mean (SD)	P-value	Mean (SD)	P-value
Sex	Male	119	12.65 (5.13)	0.842	11.04 (2.70)	0.000
	Female	374	12.75 (4.74)		12.02 (2.57)	
Age	18-20 years	155	12.41 (4.56)	0.007	11.94 (2.36)	0.069
	21 - 25 years	238	13.38 (4.78)		11.52 (2.79)	
	> 25 years	100	11.66 (5.14)		12.19 (2.60)	
Marital status	Not married	424	13.08 (4.81)	0.000	11.72 (2.62)	0.155
	Married	69	10.55 (4.36)		12.20 (2.70)	
Beirut	No	467	12.83 (4.88)	0.037	11.78 (2.66)	0.843
	Yes	26	10.81 (3.35)		11.88 (2.18)	
Mount Lebanon	No	329	12.39 (4.56)	0.030	11.76 (2.54)	0.792
	Yes	164	13.39 (5.28)		11.83 (2.82)	
North Lebanon/Akkar	No	308	13.18 (4.95)	0.007	11.73 (2.62)	0.554
	Yes	185	11.97 (4.54)		11.88 (2.67)	
South Lebanon/Nabatiyeh	No	438	12.53 (4.87)	0.014	11.81 (2.67)	0.619
	Yes	55	14.24 (4.25)		11.62 (2.34)	
Beqaa/Baalbeck	No	430	12.73 (4.82)	0.920	11.83 (2.65)	0.372
	Yes	63	12.67 (4.91)		11.51 (2.49)	
Educational level	Elementary school	5	7.00 (2.00)	0.000	11.60 (4.04)	0.000
	Baccalaureate	76	11.33 (4.56)		12.20 (2.37)	
	Bachelor degree	206	12.20 (4.76)		11.96 (2.51)	
	Master degree	116	12.83 (4.12)		12.09 (2.74)	
	Doctorate/PHD/Medical degree	90	15.29 (5.12)		10.66 (2.65)	
Smoking	No	419	12.78 (4.85)	0.556	11.74 (2.66)	0.341
	Yes	74	12.42 (4.72)		12.05 (2.47)	
Crowding Index	Low	142	13.46 (5.06)	0.055	11.80 (2.75)	0.879
	Moderate	107	12.85 (4.83)		11.89 (2.45)	
	High	244	12.24 (4.65)		11.73 (2.65)	
Family total income	< 300 US dollars	270	12.21 (4.42)	0.010	11.92 (2.72)	0.216
	> 300 US dollars	223	13.34 (5.23)		11.62 (2.52)	
Obesity	No	454	12.78 (4.85)	0.403	11.74 (2.58)	0.197
	Yes	39	12.10 (4.63)		12.31 (3.14)	
Chronic diseases	No	421	12.88 (4.81)	0.090	11.76 (2.66)	0.682
	Yes	72	11.83 (4.85)		11.90 (2.47)	
Are you vaccinated against smallpox previously?	No	205	12.30 (4.75)	0.102	11.71 (2.84)	0.581
	Yes	288	13.02 (4.87)		11.84 (2.48)	
Are you vaccinated against COVID-19?	No	101	11.29 (4.54)	0.001	11.66 (2.50)	0.603
	Yes	392	13.09 (4.84)		11.82 (2.67)	
Employment status	I don't work	320	12.44 (4.72)	0.000	11.82 (2.51)	0.158
	I am specialized in health care	81	15.74 (4.77)		11.32 (3.11)	
	I work but not in health care	92	11.04 (4.09)		12.08 (2.57)	

Tab. X. Association between sociodemographic factors and the willingness to receive the smallpox vaccine and the monkeypox vaccine in case it was available.

		Population (N = 493)	If it was proved that the smallpox vaccine is effective against Monkeypox, are you willing to take the smallpox vaccine, regardless if you were vaccinated or not?		P-value	In case a new vaccine specifically for the Monkeypox becomes available, are you willing to get the vaccine?		P-value
			No	Yes		No	Yes	
Sex	Male	119 (24.1%)	37 (31.1%)	82 (68.9%)	0.900	48 (40.3%)	71 (59.7%)	0.438
	Female	374 (75.9%)	114 (30.5%)	260 (69.5%)		166 (44.4%)	208 (55.6%)	
Age	18 - 20 years	155 (31.4%)	48 (31.0%)	107 (69.0%)	0.150	74 (47.7%)	81 (52.3%)	0.291
	21 - 25 years	238 (48.3%)	65 (27.3%)	173 (72.7%)		95 (39.9%)	143 (60.1%)	
	> 25 years	100 (20.3%)	38 (38.0%)	62 (62.0%)		45 (45.0%)	55 (55.0%)	
Marital status	Not married	424 (86.0%)	123 (29.0%)	301 (71.0%)	0.053	184 (43.4%)	240 (56.6%)	0.990
	Married	69 (14.0%)	28 (40.6%)	41 (59.4%)		30 (43.5%)	39 (56.5%)	
Beirut	No	467 (94.7%)	143 (30.6%)	324 (69.4%)	0.987	201 (43.0%)	266 (57.0%)	0.486
	Yes	26 (5.3%)	8 (30.8%)	18 (69.2%)		13 (50.0%)	13 (50.0%)	
Mount Lebanon	No	329 (66.7%)	107 (32.5%)	222 (67.5%)	0.196	153 (46.5%)	176 (53.5%)	0.049
	Yes	164 (33.3%)	44 (26.8%)	120 (73.2%)		61 (37.2%)	103 (62.8%)	
North Lebanon/ Akkar	No	308 (62.5%)	77 (25.0%)	231 (75.0%)	0.000	116 (37.7%)	192 (62.3%)	0.001
	Yes	185 (37.5%)	74 (40.0%)	111 (60.0%)		98 (53.0%)	87 (47.0%)	
South Lebanon/ Nabatiyeh	No	438 (88.8%)	138 (31.5%)	300 (68.5%)	0.233	194 (44.3%)	244 (55.7%)	0.263
	Yes	55 (11.2%)	13 (23.6%)	42 (76.4%)		20 (36.4%)	35 (63.6%)	
Beqaa/ Baalbeck	No	430 (87.2%)	139 (32.3%)	291 (67.7%)	0.033	192 (44.7%)	238 (55.3%)	0.146
	Yes	63 (12.8%)	12 (19.0%)	51 (81.0%)		22 (34.9%)	41 (65.1%)	
Educational level	Elementary school	5 (1.0%)	0 (0.0%)	5 (100.0%)	0.179	0 (0.0%)	5 (100.0%)	0.051
	Baccalaureate	76 (15.4%)	27 (35.5%)	49 (64.5%)		37 (48.7%)	39 (51.3%)	
	Bachelor degree	206 (41.8%)	70 (34.0%)	136 (66.0%)		99 (48.1%)	107 (51.9%)	
	Master degree	116 (23.5%)	32 (27.6%)	84 (72.4%)		46 (39.7%)	70 (60.3%)	
	Doctorate/PHD/ Medical degree	90 (18.3%)	22 (24.4%)	68 (75.6%)		32 (35.6%)	58 (64.4%)	
Smoking	No	419 (85.0%)	135 (32.2%)	284 (67.8%)	0.068	188 (44.9%)	231 (55.1%)	0.119
	Yes	74 (15.0%)	16 (21.6%)	58 (78.4%)		26 (35.1%)	48 (64.9%)	
Crowding Index	Low	142 (28.8%)	41 (28.9%)	101 (71.1%)	0.583	61 (43.0%)	81 (57.0%)	0.819
	Moderate	107 (21.7%)	30 (28.0%)	77 (72.0%)		44 (41.1%)	63 (58.9%)	
	High	244 (49.5%)	80 (32.8%)	164 (67.2%)		109 (44.7%)	135 (55.3%)	
Family total income	< 300 US dollars	270 (54.8%)	93 (34.4%)	177 (65.6%)	0.043	127 (47.0%)	143 (53.0%)	0.074
	> 300 US dollars	223 (45.2%)	58 (26.0%)	165 (74.0%)		87 (39.0%)	136 (61.0%)	
Obesity	No	454 (92.1%)	133 (29.3%)	321 (70.7%)	0.028	196 (43.2%)	258 (56.8%)	0.718
	Yes	39 (7.9%)	18 (46.2%)	21 (53.8%)		18 (46.2%)	21 (53.8%)	
Chronic diseases	No	421 (85.4%)	124 (29.5%)	297 (70.5%)	0.171	176 (41.8%)	245 (58.2%)	0.083
	Yes	72 (14.6%)	27 (37.5%)	45 (62.5%)		38 (52.8%)	34 (47.2%)	
Are you vaccinated against smallpox previously?	No	205 (41.6%)	81 (39.5%)	124 (60.5%)	0.000	105 (51.2%)	100 (48.8%)	0.003
	Yes	288 (58.4%)	70 (24.3%)	218 (75.7%)		109 (37.8%)	179 (62.2%)	
Are you vaccinated against COVID-19?	No	101 (20.5%)	56 (55.4%)	45 (44.6%)	0.000	74 (73.3%)	27 (26.7%)	0.000
	Yes	392 (79.5%)	95 (24.2%)	297 (75.8%)		140 (35.7%)	252 (64.3%)	
What is your job?	I don't work	320 (64.9%)	99 (30.9%)	221 (69.1%)	0.108	142 (44.4%)	178 (55.6%)	0.295
	I am specialized in health care	81 (16.4%)	18 (22.2%)	63 (77.8%)		29 (35.8%)	52 (64.2%)	
	I work but not in health care	92 (18.7%)	34 (37.0%)	58 (63.0%)		43 (46.7%)	49 (53.3%)	
Knowledge	Mean (SD)	12.72 (4.83)	12.09 (4.77)	13.01 (4.84)	0.051	12.27 (4.63)	13.08 (4.96)	0.065
Attitude	Mean (SD)	11.78 (2.63)	11.17 (2.81)	12.06 (2.51)	0.001	11.29 (2.73)	12.16 (2.49)	0.000



INFECTIOUS DISEASES

The insidious return of cholera in the Eastern Mediterranean Region, Lebanon and Syria: a worrying signal! Past, present, and future forthcoming

ORSINI DAVIDE¹, MARIANO MARTINI^{2,3,4}¹ University Museum System of Siena (SIMUS), History of Medicine, University of Siena, Italy;² Department of Health Sciences, University of Genoa, Italy;³ UNESCO Chair “Anthropology of Health - Biosphere and Healing System, University of Genoa, Italy;⁴ Interuniversity Research Center on Influenza and Other Transmissible Infections (CIRI-IT), Genoa, Italy

Keywords

History of public health • Cholera • Eastern Mediterranean Region • Outbreaks • Epidemiology • Infectious diseases • History of hygiene

Summary

Introduction. War, hunger, and disease continue to decimate the populations of many countries in the world. Owing to conflicts, environmental instability and natural disasters, many people, especially the poorest, fall victim to epidemic diseases. One such disease, cholera, began to spread again in 2022, striking Lebanon and Syria, countries that have experienced serious social troubles for years. The return of cholera immediately alarmed the scientific community, which is now making every effort, most notably by implementing a major vaccination campaign, to prevent this disease from becoming endemic in these two countries, thus making them a reservoir for its potential spread in the Eastern Mediterranean Region.

Discussion. Cholera is a disease that draws its strength from poor hygiene, primitive sanitation and the consumption of contami-

nated water and food. From the 19th Century onwards, its spread was facilitated by overcrowded housing and lack of hygiene, which became commonplace features of urban life.

Method. In outlining the spread of cholera in Lebanon and Syria, the authors raise the question of the possible resurgence of epidemic cholera, especially in the light of the consequences of the devastating earthquake that hit the border area between Turkey and Syria last February.

Conclusion. These events have had a devastating effect on the population, destroying, among other things, the few existing health facilities and aggravating the already difficult living conditions of millions of people who, owing to the ongoing war, have been living for years in makeshift settlements, bereft of water, sanitation and any form of health care.

Introduction

Last autumn, on 6 October 2022, the Lebanese Ministry of Public Health reported a cholera epidemic to the World Health Organization; within a few weeks, significant numbers of people had been affected, especially children under the age of 5 years [1]. In the same period, cholera also reappeared in Syria.

This situation is in line with data showing that the global number of cholera outbreaks in the last 5 years has increased significantly, from an average of 20 per year in the period 2017-2021 to 29 in 2022 [2].

The epidemic is also particularly serious in the WHO African Region. “Between 1 January and 13 March 2023, 40 563 suspected cholera cases were reported from 13 countries, with 818 deaths (case fatality ratio [CFR] = 2.0%). Malawi accounts for 57.5% (23308) of all reported cases in 2023, followed by Mozambique with 15% (6082) and the Democratic Republic of the Congo with 13% (5284). Of the deaths reported in 2023, Malawi accounts for 78% (638), followed by Mozambique at 5% (45) and Kenya with 5.1% (42) [3]”.

Among the countries where cholera is endemic there are also Yemen and Haiti, which is experiencing a resurgence of cholera, with the outbreak initially reported on 2 October 2022 [4, 5].

Before 2022, the cholera epidemic hit Haiti from October 2010 to February 2019: it was the world’s deadliest of the last 25 years.

In October 2010, cholera occurred in Haiti for the first time in a century, ten months after a devastating earthquake. This earthquake destroyed the fragile buildings of local population and the main infrastructures, people and children stranded in the camps or overcrowded in refugee camps [6].

The number of the population in these poor conditions was really very high, hundreds of thousands of people. It was really a terrible and devastating earthquake and one of the worst of recent history with more than 700,000 cases (820,000) and 9,000 deaths (reported deaths 9,792) [7].

The last cholera case in Haiti was recorded in January 2019, and in February 2022 [8].

The recent outbreak in Lebanon and Syria has greatly

alarmed the scientific community, as cholera is not endemic in these two countries, which last experienced an epidemic 30 and 20 years ago, respectively. The severe economic and political crisis afflicting Lebanon and the war in Syria [9] have impoverished the population and displaced masses of people, disrupting sanitation and waste management systems. The vulnerability of the Lebanese population is compounded by the difficult economic conditions and limited access to clean water and adequate sanitation. The Syrian people, after 12 years of war, destruction, displacement, and hunger, are now faced with a new horror: cholera; owing to the consumption of contaminated food and water, the disease has spread to several parts of the country in recent months and has already claimed lives. The WHO risk assessments have noted that the re-emergence of cholera in Syria and Lebanon is alarming, as it increases the risk of cholera outbreaks in other countries in the WHO Eastern Mediterranean Region (EMR) [10].

Cholera, a disease carried by contaminated water

Cholera is an acute enteric infection caused by the bacterium *Vibrio cholera* (Fig. 1). It was identified for the first time in 1854 by the Italian anatomist Filippo Pacini (1812-1883), who during the cholera epidemic broke out in Florence demonstrated the presence, in the intestinal mucosa of people died of cholera, of millions of elements that he called vibrios. He argued that the contagion was due to the human-to-human transmission of this microorganism, laying the foundations of infectiology [11, 12].

The bacterium was subsequently isolated in culture and studied in detail in 1884 in Egypt by the German physician Robert Koch (1843-1910).

Transmission of the bacterium is closely linked to the unavailability of clean water, the consumption of

contaminated food and, in general, poor sanitation and the deficient management of sewage and drinking water systems.

The incubation period of the disease usually ranges from 24 to 72 hours; in exceptional cases, however, it may vary between 2 hours and 5 days, depending on the number of bacteria ingested. In 75% of cases, infected subjects do not experience any symptoms, and of those who do, only a small proportion develop a severe form of the disease [13]. The main symptom is acute watery diarrhea, causing severe dehydration; if untreated, this can lead to shock, which in severe cases can rapidly be fatal.

The treatment of cholera is relatively simple; in 90% of cases, oral rehydration is enough to reintegrate the fluids and salts lost through diarrhea and vomiting. In severe cases, however, intravenous fluid replacement is required. With adequate rehydration, only 1% of patients die, and the disease usually resolves spontaneously. In order to shorten the course of the disease, and especially in the most severe forms and in at-risk patients, antibiotics are used, usually tetracyclines or ciprofloxacin.

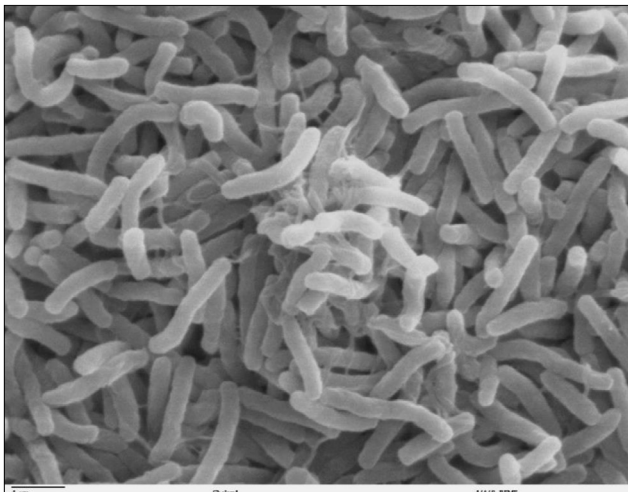
To prevent cholera, it is essential to guarantee the safety of food and water and improve hygiene. This also involves educating people to respect hygiene measures during the preparation and consumption of food, such as washing hands with soap before starting to cook or eat; indeed, cholera vibrios are sensitive to the action of common detergents and disinfectants. Vaccines are also available.

The “new disease” that appeared in the 19th Century

Cholera was localized in Asia until 1817, when a first pandemic spread from India to several other regions of the world [14]. It appeared in Europe in the first half of the 19th Century (Tab. I). Endemic in Asia, and particularly in the delta of the Ganges (India), it remained confined to that geographical area until the beginning of the 1800s. It first emerged from the Sundarbans Forest of the Bay of Bengal, in the Ganges delta, where the bacterium *Vibrio cholera* had probably been mutating for millennia. The organism is found naturally in the environment in some coastal area, wastewater, and brackish waters, where shellfish often carry the infection [15].

It subsequently reached the Mediterranean and Europe as new trade routes were opened up between East and West. In the early 1800s in fact the British were opening up new trade routes in India and moving troops across the subcontinent, did cholera begin to move out of its home territory. At the beginning across India and then across the world in a devastation and massive pandemics. Its migration began in India in 1817, a very difficult period for the Indian subcontinent, which was hit by floods and frequent famines. Indeed, it was precisely the movement of large numbers of people from the affected areas that upset the environmental balance, leading to the spread of the cholera bacterium outside its natural

Fig. 1. Scanning electron microscope image of *Vibrio cholera* (Public domain photo).



habitat. It is also very likely that the situation was exacerbated by the appearance of a more virulent variant of the disease, which inexorably struck the multitudes of fugitives who hoped to leave hunger behind; instead, increasingly malnourished and in poor conditions of health and hygiene, these refugees fell victim to cholera. Just in the summer of 1817 there were some really alarming and worrying dates: in August the British Government received a report of a “*malignant disorder*” in the Sundarbans. It killed 20/30 people a day and only after a few weeks, ten thousand people died. From then the disease spread through the countries and regions both in the east and west to: Nepal, Afghanistan, Iran, Iraq, Oman, Thailand, Burma, China and Japan. While this first pandemic (1817-1823) affected Europe only partially, being limited to the eastern Mediterranean and the disease began to decrease and to regress, the second pandemic, which broke out in 1826, involved the whole continent, taking a heavy toll among the poorest and most defenseless sectors of the population [16]. Its exotic origin, the rapidity of its spread and its almost instantaneous lethal impact seared the collective imagination, fueling anxiety and terror, not completely unlike the psychological effect [17] of the COVID-19 pandemic on many people [18].

Again, the origin was the river Ganges Delta area, and again the disease spread with a particular speed, hitting places to hang out and meeting places but also even further, to United States, Europe, and Egypt. It was estimated that only in Cairo and Alexandria died 33,000 people and just a few years later a cholera epidemic hit Moscow; it had heavily decreased the population of the big and crucial commercial city of Astrakhan. It reached St Petersburg, crossing the borders of Asia and headed towards Poland, Bulgaria, Latvia and Germany. When cholera first appeared in Europe at the end of the 1820s, the advanced world began to realize and understand better the importance of the disease. Scientists and doctors of the largest developed countries

such as Russia, France, Britain began to study the disease with strong priority and the Russian government offered a prize for the best essay on the subject. Faced with the disconcerting spread of the disease, scholars of the time took two different positions: for and against the transmissibility of cholera. The English physician John Snow (1813-1858), pioneer in hygiene studies, not only firmly stated that cholera was a communicable disease, but identified water as the main vehicle through which it spread [19].

Various waves of cholera also scourged Asia and Europe in the 20th Century.

The pandemic that persisted from 1902 to 1926 also severely affected troops during the First World War [20]. In Italy, it made its return in 1909. The government of the day immediately commissioned the hygienist Achille Sclavo to coordinate all necessary actions to stamp out cholera, or at least curb the spread of the disease, which had hit southern Italy, particularly Puglia and Sicily [21, 22].

In 1961, a pandemic broke out in southern Asia, spreading to Africa in 1971 and reaching America in 1991; it is still ongoing (moreover, the disease remains endemic in many countries and the bacterium that causes it has not yet been eliminated from the environment).

During the 1990s, the pattern of spread of cholera changed markedly; the disease reappeared in Central and South America, where it had been absent for over 100 years.

- In the period 1991-1994, an extensive epidemic (*V. cholerae* O1, toxigenic, Inaba serotype, El Tor biotype) hit many Latin American countries, from Peru to Mexico, wreaking devastating consequences: 1,400,000 people were infected and over 10,000 died [23].
- In the same period (1993-94) an epidemic strain (*V. cholerae* O139 Bengal) appeared in the Indian subcontinent and other Asian countries [24], and in Madras (India) 13,275 were hospitalized and 437 died. The O139 serotype has a greater potential for diffusion, as it is endowed with greater transmissibility (secondary infection).
- A severe epidemic of El Tor biotype cholera broke out among refugees in Ghana and Zaire, causing 70,000 cases of disease and 12,000 deaths, a much higher lethality rate (15%) than that recorded in Central and South America (1%) and there was also a revival of *V. cholerae* O139 in Bangladesh [25].
- In the United States, 61 cases of cholera were reported between 1995 and 2000, all caused by *V. cholerae* O1 [26]. One death was recorded, and 35 patients were hospitalized (57%); 37 (61%) infections had been acquired outside the United States; 14 (23%) had been acquired through uncooked foods consumed in the USA; 2 (3%) through the consumption of slices watermelon contaminated by the hands of an asymptomatic infected subject, and in 8 (13%) cases the source of infection was not identified. (Figs. 2-4).

Tab. I. The historical cholera pandemics between the Nineteenth and Mid-Twentieth Centuries.

The historical cholera pandemics between the Nineteenth and Mid-Twentieth Centuries with regions and countries where it has hit the most in order of time
1817-1823: The first major pandemic India, Tibet, Middle East Asia.
1828-1838: The second pandemic Bengal, Europe, Canada, US
1841-1856: The third pandemic India, Russia, Europe
1864-1874: The fourth pandemic Singapore, Sumatra, Afghanistan, Persia, Arabia, Egypt, Turkey, Italy
1884-1886: The fifth pandemic Vietnam, China, France, Italy, South America
1892-93: The sixth pandemic Russia, Europe
1902-1926: The seventh pandemic Far East Asia, Persia, Arabia, Russia, Europe

Fig. 2. Gun syringe cholera vaccination, 1973 (Public domain photo).



The road map toward ending cholera

Today, as in the past, “the risk factors for cholera are inadequate or poor water and sanitation infrastructure, the impact of climate change, natural disasters, the effects of humanitarian emergencies which precipitate population movements, overcrowding, and inadequate access to healthcare services, clean water, sanitation and hygiene (WASH) facilities” [1, 27].

The severe floods in Pakistan [28], the earthquakes and drought that have hit Afghanistan and the severe drought in Somalia are significantly increasing the number of cholera cases in these countries (Fig. 5). For this reason, every effort must be made to comply with the provisions of the 2017 “Ending Cholera Road Map”. “Ending Cholera-A Global Roadmap to 2030 operationalizes the new global strategy for cholera control at the country level and provides a concrete path toward a world in which cholera is no longer a threat to public health.

By implementing the strategy between now and 2030, the Global Task Force on Cholera Control (GTFCC) partners will support countries to reduce cholera deaths by 90 percent. With the commitment of cholera-affected countries, technical partners, and donors, as many as 20 countries could eliminate disease transmission by 2030” [29].

Efforts must focus on improving access to clean water and adequate sanitation, raising public awareness, strengthening surveillance systems for the early detection of cases, and supporting coordinated and timely responses. Moreover, in 2022, the World Health Organization (WHO) also supported the rollout of the oral cholera vaccine (OCV) in Lebanon, Pakistan, Somalia and Syria in 2022.

Indeed, it is essential that the disease does not become endemic in countries such as Lebanon and Syria, despite the difficult conditions they are experiencing.

Several factors could be linked to the recent cholera outbreak in Lebanon. Indeed, as cholera is a sign of a country’s state of development, this outbreak can be ascribed, at least in part, to the consequences of the country’s humanitarian crisis. This has resulted in the disruption of water and sanitation systems and the displacement of populations to overcrowded camps with inadequate access to clean water and sanitation, with a subsequent increased risk of cholera transmission. In addition, the Lebanese healthcare system has been hard hit by a three-year financial crisis and an explosion at the port of Beirut in August 2020, which destroyed essential medical infrastructure in the capital. In this context, a cholera outbreak may overwhelm the response capability of the country’s already fragile health system [30].

Fig. 3. Number of cholera cases in the world reported to WHO (2012-2021).

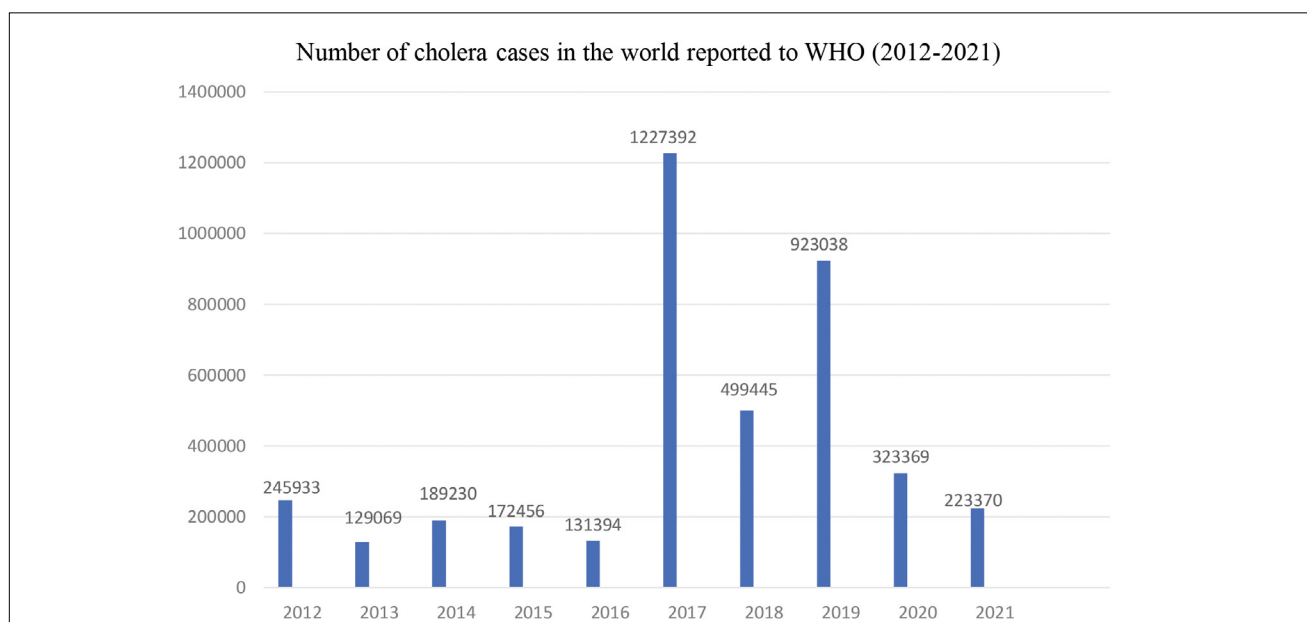
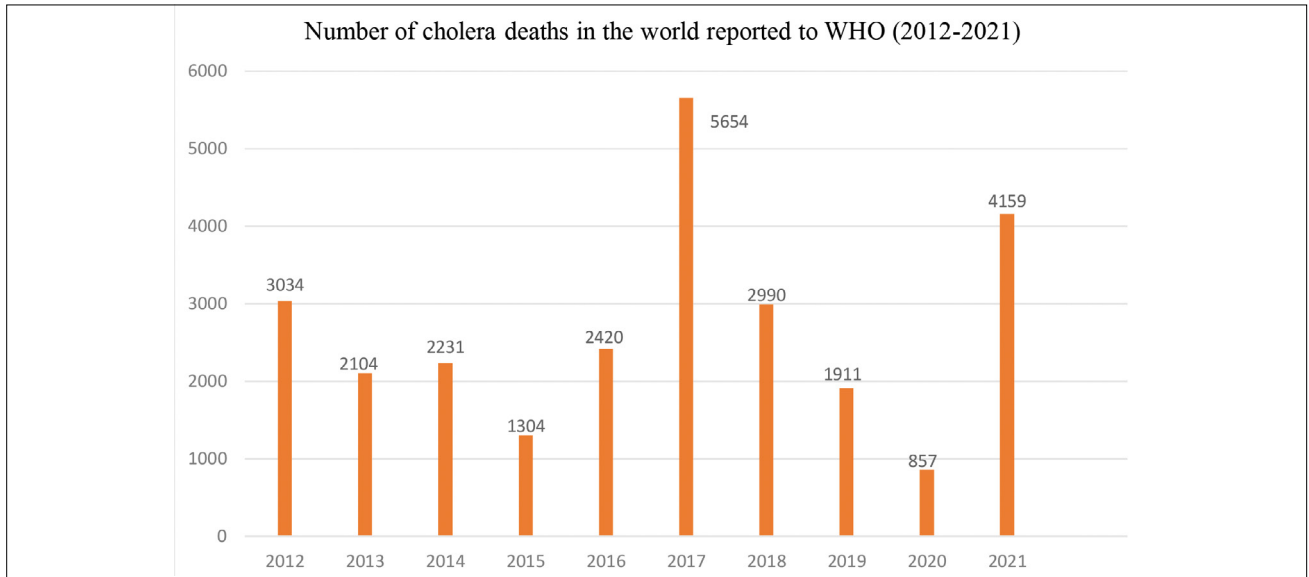
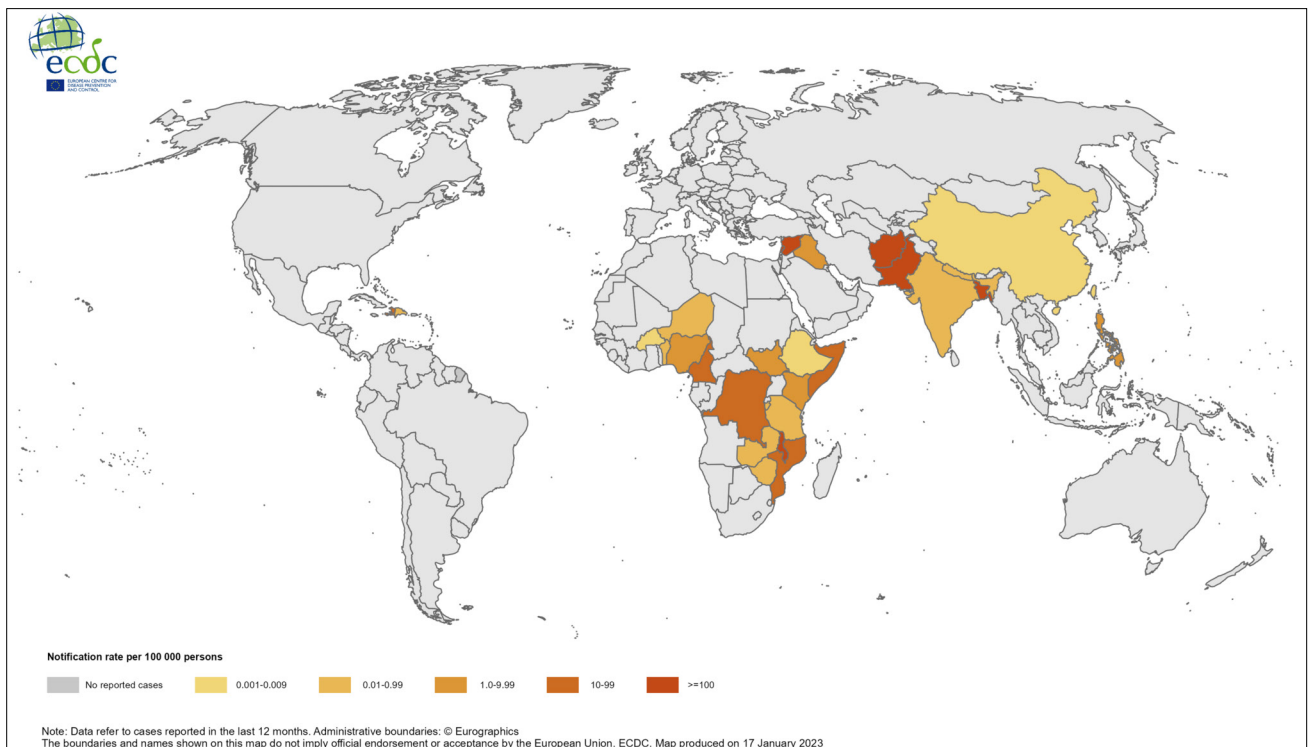


Fig. 4. Number of cholera deaths in the world reported to WHO (2012-2021).

Can the nightmare of a cholera epidemic come from a Syria devastated by war and earthquake?

For 12 years, Syria has been in the throes of a bloody war. This has displaced large masses of the population, who now live in refugee camps where the hygiene situation is totally out of control [31]. Added to this are poverty and hunger, the return of the wild polio virus [32] and

several cases of cholera [33, 34]. In this context, we can only speculate as to the current and future impact of the consequences of the devastating earthquake that struck the territory on the border between Turkey and Syria on 6 February, causing thousands of deaths, injuries and displaced persons. The most dramatic situation can be seen in north-western Syria, where the earthquake hit both government-controlled areas and areas controlled by the rebels fighting the regime of President Bashar al

Fig. 5. Geographical distribution of cholera cases reported worldwide from January 2022 to January 2023 (Data: ECDC - European Centre for Disease Prevention and Control - © ECDC [2005-2022]. <https://www.ecdc.europa.eu/en/all-topics-z/cholera/surveillance-and-disease-data/cholera-monthly>).

Assad. Owing to the civil war, which has been going on since 2011, these regions are inhabited by about 4 million people, including refugees from other parts of the country, who often live in makeshift settlements without any kind of health care. “The healthcare system was already overwhelmed and, after the earthquakes, is at risk of complete collapse in some affected areas, as are certain life-saving departments and services. Disease surveillance teams detect in shelters suspected cases of cholera, diarrhea, scabies, lice, hepatitis A, COVID-19, measles and leishmaniasis” [35].

The earthquake has therefore further strained the Syrian health system, with at least 55 healthcare facilities in north-western Syria having been partially or completely damaged. All this is happening at the same time as Syrian communities are suffering an ongoing cholera epidemic. “As of 24 February 2023, more than 50,000 suspected cholera cases, and 21 associated deaths have been reported in northwest Syria. Forty-four percent of suspected cases are children aged four years old or younger” [36].

Starting March 7, an anti-cholera vaccination campaign was launched in the earthquake-stricken north-western area of Syria, led by the World Health Organization and UNICEF, in coordination with health authorities, the Syria Immunization Group (SIG) and the Global Alliance for Vaccines (GAVI). In the space of 10 days about 1.7 million people were vaccinated in northwest Syria. As of 27 March 2023, 584 cholera cases have been lab-confirmed [37].

It is therefore essential, in a land devastated by a seemingly endless war and a catastrophic earthquake, to make every effort quickly and in a coordinated manner to prevent further victims of a disease which can be prevented through the contribution of all concerned.

Conclusion and future forth coming

The World Health Organization (WHO) aims to reduce cholera deaths: a global roadmap to 2030, with a target to reduce cholera deaths by 90% was launched in 2017. Researchers have estimated that each year there are 1.3 to 4.0 million cases of cholera, and 21 000 to 143 000 deaths worldwide due to cholera [38].

The main approach to controlling the disease is still decent sanitation and the strategy includes, first of all specialist treatment centers and better access to clean water, then effective sanitation and waste management, good hygiene and food safety practices and counselling.

Oral cholera vaccines should be used in conjunction with improvements in water and sanitation to control cholera outbreaks and for prevention in areas known to be high risk for cholera [39].

Meanwhile, the WHO classifies cholera not only a global threat to public health but also as a crucial indicator of lack of social development.

Acknowledgments

Funding sources: this research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of interest statement

The authors declare no conflict of interest.

Authors' contributions

DO and MM designed the study, conceived, and drafted the manuscript; the authors revised the manuscript, performed a search of the literature. All authors critically revised the manuscript. All authors have read and approved the latest version of the paper for publication.

References

- [1] Al Mandhari A, Hajjeh R, Abubakar A, Buliva E, Brennan R. Mitigating the resurgence of cholera in the Eastern Mediterranean Region. *East Mediterr Health J* 2023;29:3-5. <https://doi.org/10.26719/2023.29.1.3>
- [2] Reda A, Sah R, Abdelaal A, Shrestha S, Rodriguez-Morales AJ. The emergence of cholera in multiple countries amidst current COVID-19 pandemic: Situation and implications for public health and travel medicine. *Travel Med Infect Dis*.2022;49:102423. <https://doi.org/10.1016/j.tmaid.2022.102423>
- [3] World Health Organization. Cholera in the WHO African Region: Weekly Regional Cholera Bulletin: 15 March 2023. 2023. Available at: <https://www.afro.who.int/publications/cholera-who-african-region-weekly-regional-cholera-bulletin-8-march-2023-cloned> (Accessed on: 07/04/2023).
- [4] Piarroux R, Moore S, Rebaudet S. Cholera in Haiti. *Presse Med* 2022;51:104136. <https://doi.org/10.1016/j.lpm.2022.104136>
- [5] Burki T. Cholera re-emerges in Haiti. *Lancet Infect Dis* 2023;23:288-9. [https://doi.org/10.1016/S1473-3099\(23\)00077-4](https://doi.org/10.1016/S1473-3099(23)00077-4)
- [6] Hempel S. The atlas of Disease. London: White Lion Publishing 2018.
- [7] World Health Organization. Cholera - Haiti: 12 October 2022. 2022 Available at: <https://www.who.int/emergencies/disease-outbreak-news/item/2022-DON415> (Accessed on: 07/04/2023).
- [8] Rubin DHF, Zingl FG, Leitner DR, Ternier R, Compere V, Marseille S, Slater D, Harris JB, Chowdhury F, Qadri F, Boncy J, Ivers LC, Waldor MK. Reemergence of Cholera in Haiti. *N Engl J Med* 2022;387:2387-9. <https://doi.org/10.1056/NEJMc2213908>
- [9] Devi S. War driving cholera in Syria. *Lancet* 2022;400:986. [https://doi.org/10.1016/S0140-6736\(22\)01836-0](https://doi.org/10.1016/S0140-6736(22)01836-0)
- [10] World Health Organization. Cholera - global situation. Disease Outbreak News, 2022. Available at: <https://www.who.int/emergencies/disease-outbreak-news/item/2022-DON426> (Accessed on: 31/03/2023).
- [11] Barcat JA. Filippo Pacini y el cólera, 1854 [Filippo Pacini and cholera, 1854]. *Medicina (B Aires)* 2014;74:77-9.
- [12] Subba Rao M, Howard-Jones N. Original observations of Filippo Pacini on vibrio cholera. *Bull Indian Inst Hist Med Hyderabad* 1978;8:32-8.
- [13] Istituto Superiore di Sanità. EpiCentro - L'epidemiologia per la sanità pubblica. Colera. Available at: <https://www.epicentro.iss.it/colera/> (Accessed on: 31/03/2023).

- [14] Lippi D, Gotuzzo E, Caini S. Cholera. *Microbiol Spectr* 2016;4(4). <https://doi.org/10.1128/microbiolspec.PoH-0012-2015>
- [15] Hempel S. *The atlas of Disease*. London: White Lion Publishing 2018, pp. 94-5.
- [16] Tognotti E. Storia dell'arrivo del colera negli anni Trenta dell'Ottocento. Lo shock e la cesura tra il "prima" e il "dopo". *Storicamente* 2021;7. <https://doi.org/10.52056/9788833138732/15>
- [17] Rosselli R, Martini M, Bragazzi NL, Watad A. The Public Health Impact of the So-Called "Fluad Effect" on the 2014/2015 Influenza Vaccination Campaign in Italy: Ethical Implications for Health-Care Workers and Health Communication Practitioners. *Adv Exp Med Biol* 2017;973:125-34. https://doi.org/10.1007/5584_2017_39
- [18] Orsini D., Bianucci R, Galassi FM, Lippi D, Martini M. Vaccine hesitancy, misinformation in the era of Covid-19: Lessons from the past. *Ethics, Medicine and Public Health* 2022;24:100812 <https://doi.org/10.1016/j.jemep.2022.100812>
- [19] Snow J. *Cattive acque. Sul modo di trasmissione del colera (traduz. a cura di Jefferson T)*. Roma: Il Pensiero scientifico 2017.
- [20] Martini M, Simonetti O, Orsini D, Armocida E, Zimmermann AP. The avid eaters of lives. New and old infectious diseases in Italy at the time of World War I: a historical overview of military medicine and public health. *J Prev Med Hyg* 2022;62:E972-80. <https://doi.org/10.15167/2421-4248/jpmh2021.62.4.2240>
- [21] Martini M, Orsini D. Achille Sclavo (1861-1930) and His Innovative Contributions to Italian Preventive Medicine and Healthcare Policy. *Adv Exp Med Biol.* 2022;1369:107-16. https://doi.org/10.1007/5584_2021_673. Erratum in: *Adv Exp Med Biol* 2022;1369:131-3.
- [22] Orsini D, Martini M. The history of vaccinology and hygiene through Achille Sclavo and the cultural patrimony conserved in the archives and museums: the key role of medical museology. *J Prev Med Hyg* 2022;63:E476-81. <https://doi.org/10.15167/2421-4248/jpmh2022.63.3.2622>
- [23] Bartolozzi G. *Vaccini e vaccinazioni*. III ed. Milano: Elsevier 2012, pp. 209-300.
- [24] Albert MJ. *Vibrio cholerae O139 Bengal*. *J Clin Microbiol* 1994;32:2345-9. <https://doi.org/10.1128/jcm.32.10.2345-2349.1994>
- [25] Faruque SM, Chowdhury N, Kamruzzaman M, Ahmad QS, Faruque AS, Salam MA, Ramamurthy T, Nair GB, Weintraub A, Sack DA. Reemergence of epidemic *Vibrio cholerae* O139, Bangladesh. *Emerg Infect Dis* 2003;9:1116-22. <https://doi.org/10.3201/eid0909.020443>
- [26] Steinberg EB, Greene KD, Bopp CA, Cameron DN, Wells JG, Mintz ED. Cholera in the United States, 1995-2000: trends at the end of the Twentieth Century. *J Infect Dis* 2001;184:799-802. <https://doi.org/10.1086/322989>
- [27] Bragazzi NL, Martini M. The Never-Ending Legacy of Mahatma Gandhi in the Field of Medicine 150 Years After His Birth. *Isr Med Assoc J* 2019;21:641-3.
- [28] Khan HA, Masood W, Siddiqui A, Ahmad S, Salman Y, Essar MY. The Cholera outbreak in Karachi, Pakistan: Challenges, efforts and recommendations. *Ann Med Surg (Lond)* 2022;78:103873. <https://doi.org/10.1016/j.amsu.2022.103873>
- [29] Global Task Force on Cholera Control - GTFCC. Ending Cholera: A Global Roadmap to 2030. Geneva: World Health Organization. Available at: <https://www.who.int/cholera/publications/global-roadmap.pdf> (Accessed on: 31/03/2023).
- [30] Cfr. Malaeb D, Sallam M, Younes S, Mourad N, Sarray El Dine A, Obeid S, Hallit S, Hallit R. Knowledge, Attitude, and Practice in a Sample of the Lebanese Population Regarding Cholera. *Int J Environ Res Public Health* 2022;19:16243. <https://doi.org/10.3390/ijerph192316243>
- [31] Brennan R, Hajjeh R, Al-Mandhari A. Responding to health emergencies in the Eastern Mediterranean region in times of conflict. *Lancet* 2022;399:e20-2. [https://doi.org/10.1016/S0140-6736\(20\)30069-6](https://doi.org/10.1016/S0140-6736(20)30069-6)
- [32] Martini M, Orsini D. Armed conflict in the world threatens the eradication of Poliomyelitis: risks of humanitarian crises. *Pathog Glob Health* 2022;116:267-8. <https://doi.org/10.1080/20477724.2022.2081785>
- [33] Al-Abdulla O, Alaref M. The forgotten threat of cholera in Syria. *J Water Health* 2022;20:1755-60. <https://doi.org/10.2166/wh.2022.262>
- [34] Al-Tammemi AB, Sallam M. The current cholera menace amid the war crisis in Syria and the economic crisis in Lebanon: A time for global solidarity. *New Microbes New Infect* 2022;51:101069. <https://doi.org/10.1016/j.nmni.2022.101069>
- [35] OCHA Office for the Coordination of Humanitarian Affairs. Syrian Arab Republic: Earthquakes - Situation Report No. 4, as of 16 March 2023. 19 March 2023. Available at: <https://reliefweb.int/report/syrian-arab-republic/syrian-arab-republic-earthquakes-situation-report-no-4-16-march-2023> (Accessed on: 31/03/2023).
- [36] OCHA Office for the Coordination of Humanitarian Affairs. Syrian Arab Republic: Earthquakes - Syria Situational Updates - As of 1 March 2023. 1 March 2023. Available at: <https://reliefweb.int/report/syrian-arab-republic/syrian-arab-republic-earthquakes-syria-situational-updates-1-march-2023> (Accessed on: 31/03/2023).
- [37] OCHA Office for the Coordination of Humanitarian Affairs. Syrian Arab Republic: North-West Syria Situation Report. Last updated: 31 Mar 2023. Available at: <https://unocha.org/syria> (Accessed ON: 02/04/2023).
- [38] Ali M, Nelson AR, Lopez AL, Sack D. *PLoS Negl Trop Dis* 2015;9:e0003832. <https://doi.org/10.1371/journal.pntd.0003832>
- [39] World Health Organization. Cholera vaccines: WHO position paper - August 2017 Weekly epidemiological record. 2017. Available at: <https://www.who.int/publications/i/item/who-wer9234-477-500> (Accessed on: 07/04/2023).

Received on April 2, 2023. Accepted on April 11, 2023.

Correspondence: Davide Orsini, University Museum System of Siena (SIMUS), History of Medicine, University of Siena, Siena, Italy. E-mail: davide.orsini@unisi.it

How to cite this article: Orsini D, Martini M. The insidious return of cholera in the Eastern Mediterranean Region, Lebanon and Syria: a worrying signal! Past, present, and future forthcoming. *J Prev Med Hyg* 2023;64:E27-E33. <https://doi.org/10.15167/2421-4248/jpmh2023.64.1.2910>

© Copyright by Pacini Editore Srl, Pisa, Italy

This is an open access article distributed in accordance with the CC-BY-NC-ND (Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International) license. The article can be used by giving appropriate credit and mentioning the license, but only for non-commercial purposes and only in the original version. For further information: <https://creativecommons.org/licenses/by-nc-nd/4.0/deed.en>

Demographic and clinical characteristics associated with tobacco smoking and alcohol use disorder among heterosexual people living with HIV in West Papua, Indonesia

MIRNA WIDIYANTI¹, MUSTIKA PRAMESTIYANI², SETYO ADININGSIH³, JUNTIMA NAWAMAWAT⁴

¹ Research Center for Public Health and Nutrition, National Research and Innovation Agency Cibinong Science Center, Cibinong, West Java, Indonesia; ² Department of Midwifery, Jayapura Health Polytechnic, Ministry of Health, Jayapura City of Papua, Indonesia;

³ Center for Biomedical Research, National Research and Innovation Agency, Cibinong Science Center, Cibinong, West Java, Indonesia; ⁴ Department of Community nursing, Boromarajonani College of Nursing, Sawanpracharak Nakhonsawan,

Faculty of Nursing, Praboromarajchanok Institute, Thailand

Keywords

Tobacco • Smoking • Alcohol use • Heterosexual • HIV

Summary

Introduction. Tobacco smoking and Alcohol use disorder (AUD) are common among people living with the human immunodeficiency virus (PLHIV), and therefore are linked to increased mortality and morbidity. This study aimed to determine the prevalence of tobacco smoking and AUD, as well as to examine the factors associated with tobacco smoking and AUD among heterosexual PLHIV in West Papua.

Methods. A cross-sectional study was conducted among PLHIV on antiretroviral therapy (ART) at the voluntary counselling and testing (VCT) clinics in Manokwari, Sorong City, and Fakfak district. Data were gathered through interviews with 237 PLHIV who were chosen using a consecutive sampling technique. A binary logistic regression analysis was used to determine the prevalence and estimate the factors associated with current tobacco smoking and AUD.

Results. The prevalence of tobacco smoking and AUD among

PLHIV was 30.8% and 34.6%, respectively. There were statistically significant associated between tobacco smoking and gender (OR = 2.881, CI = 2.201-3.772), occupation (OR = 1.375, CI = 1.116-1.622), CD4+ count (OR = 1.865, CI = 1.865, CI = 1.068-3.259) and opportunistic infections (OR = 1.348, CI = 1.054-1.7240). There were also statistically significant associated between AUD and gender (OR = 2.951, CI = 2.16-3.930), occupation (OR = 1.392, CI = 1.178-1.645), CD4+ count (OR = 1.769, CI = 1.031-3.073), and opportunistic infections (OR = 1.445, CI = 1.134-1.842).

Conclusions. Gender, occupation, CD4+ count levels, and opportunistic infection were associated to tobacco smoking and AUD among heterosexual PLHIV in West Papua. These findings emphasize the critical need for an effective cigarette and alcohol use control program for people living with HIV in developing countries such as Indonesia, particularly West Papua.

Introduction

Tobacco use causes health problems as well as social, economic, and environmental issues, not only for smokers but also for non-smokers. Overall, current tobacco use and smoking prevalence did not change significantly between 2011 and 2021. The prevalence of current tobacco use in 2011 and 2021 were 36.1% and 34.5%, respectively; and the prevalence of current tobacco smoking in 2011 and 2021 were 34.8% and 33.5%, respectively. However, tobacco smoking is still prevalent among men in Indonesia. More than half of men did smoke [1]. Current smokers were more likely to have a higher risk of all-cause death (hazard ratio = 1.48, 95% confidence interval = 1.11 to 1.98) than non-current smokers [2].

Tobacco smoking is a bad activity, it harms almost all organs of the body, causes many diseases, and affects the health of smokers in general. Serious health risks are much higher in People living with HIV (PLHIV). PLHIV who smoke is more likely to get HIV-related

infections including oral candidiasis, hairy leukoplakia, bacterial pneumonia, and pneumocystis pneumonia. However, they also got other serious illnesses such as the chronic obstructive pulmonary disease (COPD), heart disease and stroke, lung cancer, head and neck cancer, cervical cancer, and anal cancer than non-smokers with HIV. These illnesses can make them too sick to work or even lead to an early death [3]. The use of antiretroviral therapy (ART) reduces morbidity and mortality, as well as increases the life expectancy of PLHIV [4]. As a result, comorbidities not related to AIDS, such as cardiovascular disease (CVD), are becoming increasingly important in the management of long-term HIV infection. This is of particular concern because PLHIV are prone to developing coronary heart disease, myocardial infarction and other CVD events as a consequence of a combination of aging, other traditional CVD risk factors, and HIV-related risk factors, such as chronic inflammation and ART use [5]. Patients retained after five years on ART, subsequently died rate 0.56/100 person-years. Increased mortality was associated with age, HIV

exposure through injecting drug use, HIV viral load, drug regimen, HBV co-infection, fasting plasma, and estimated glomerular filtration rate. Decreased mortality was associated with transmission through male-to-male sexual contact compared to heterosexual transmission and higher CD4 count [6].

Smoking can alter the immune response and viral development leading to the susceptibility of PLHIV to opportunistic infections such as tuberculosis, as well as their tendency to have low ART adherence [7]. Smoking and heavy smoking rates amongst PLWH were significantly higher even in subjects who reported diabetes, hypertension and extreme obesity [8]. The use of tobacco products by PLHIV is associated with higher mortality compared to those infected with HIV alone [9]. Based on a study, several factors affect significantly the use of tobacco cigarettes among PLHIV, including unemployment, Alcohol use disorder (AUD) and illegal drugs, low ART adherence, low social support, low education, and decreased CD4+ count as well as stigma and discrimination [10].

AUD or alcoholism among PLWHA was higher than the reported prevalence of AUD among the general population of the globe (29.80%) [11] and increased among PLHIV who smoke tobacco and had sexual contact with sex workers [12]. Alcohol use disorder results in short and long term impacts on the physical, mental and socio-economic aspects of individual life [13]. AUD has been associated with interruptions in all steps of the HIV care continuum, including lower adherence to ART. [14]. Previous studies summarized the factors that are associated significantly with AUD among PLHIV include low adherence to ART, the loss of durable viral suppression, increased risk of viral rebound, and increased mortality [15]. In addition, AUD is associated with deviant sexual behaviour which increases the risk of HIV transmission. It is important to consider the trajectories of substance use and sexual risk behaviours concurrently in order to decrease the transmission of HIV [16]. The HIV epidemic is still high in developing countries like Indonesia, especially in West Papua Province. Health risks related to tobacco smoking and AUD among PLHIV have not been studied much. There are very few studies in Indonesia, especially in West Papua regarding the problem of tobacco smoking and AUD among PLHIV. This study aimed to determine the prevalence of tobacco smoking and AUD, and also assess the factors associated with tobacco smoking and AUD among heterosexual PLHIV in West Papua, Indonesia.

Methods

STUDY DESIGN AND SAMPLING

This was a cross-sectional study conducted in 2019, involving 237 PLHIV who received ART at the Voluntary counselling and testing (VCT) clinic at Manokwari Hospital, Sele Be Solu Sorong City Hospital, and Fak-Fak Hospital in West Papua Province.

The sample study as the subject study was PLHIV aged more than 18 years old and fulfilled the inclusion criteria. The sample size uses a 95% confidence level formula, with a margin of error of 10%, and the number of samples obtained is 270. Due to incomplete data variables, the number of samples is reduced to 237.

STUDY VARIABLES AND DATA COLLECTION

The dependent variables were tobacco smoking and alcohol use disorder (AUD). The dependent variables were demographic and clinical factors. Demographic variables include gender, age, education, occupation, marital status, ethnicity, and risk factors for HIV transmission. Demographic variables were obtained through interviews and medical records. Clinical variables include CD4+ levels, WHO clinical stage of HIV infection, body mass index, opportunistic infections, and viral load. CD4+ levels were measured using PIMA (CD4+ counter), viral load measurement using qPCR, and body mass index is determined by measuring body height and body weight using standard instruments. Opportunistic infection data were obtained from medical records.

STATISTICAL ANALYSIS

Microsoft Excel is used for data entry. Completeness and accuracy of data were checked before and after the data entry process. SPSS software is used to estimate and calculate the proportion of variables to be assessed. Logistic regression was used to determine the most influential demographic and clinical factors with tobacco smoking and AUD. The p-value < 0.05 indicates the level of significance with a 95% confidence level.

ETHICS STATEMENT

Interviews were conducted in separate rooms and were confidential using a structured questionnaire. The explanation before consent was read to each patient before signing the consent to participate. The ethical approval was obtained from the Ethics Committee of the National Institute of Health Research and Development, Ministry of Health of the Republic of Indonesia with the number: LB.02.01/2/KE.008/2019.

Results

DEMOGRAPHIC AND CLINICAL CHARACTERISTICS OF STUDY PARTICIPANTS

Characterization of demographic and clinical variables among PLHIV described that most of them were females (55.7%), aged > 35 years old (54.5%), Senior high school-university in education (72.6%), employment (66.7%), married (78.9%), heterosexual (96.6%), CD4+count more than 350 cell/mm³ (53.2%), stadium III&IV (68.4%), suffer from tuberculosis as an opportunistic infection (50.6%), and smoking rate (30.8%).

PREVALENCE OF TOBACCO SMOKING BY DEMOGRAPHIC AND CLINICAL CHARACTERISTICS OF STUDY PARTICIPANTS

Results showed that gender, occupation status, CD4+ counts, and opportunistic infection were statistically significantly associated with tobacco smoking among PLHIV. PLHIV who were female had smoked more than males (OR 2.88, 95% CI 2.20-3.77), employed more than unemployed (OR 1.37, 95% CI 1.17-1.62), CD4 $\geq$ 350 cell/mm³ more than others (OR 1.86, 95% CI 1.07-3.26), and got tuberculosis more than non-tuberculosis (OR 1.35, 95% CI 1.05-1.72) (Tab. I).

PREVALENCE OF ALCOHOL USE DISORDER BY DEMOGRAPHIC AND CLINICAL CHARACTERISTICS OF STUDY PARTICIPANTS

Results showed that gender, occupation status, CD4+ counts, and opportunistic infection were statistically significantly associated with alcohol use among PLHIV. PLHIV who were female had smoked more than males (OR 2.95, 95% CI 2.22-3.93), employed more than unemployed (OR 1.39, 95% CI 1.18-1.64), CD4 $\geq$ 350 cell/mm³ more than others (OR 1.77, 95% CI 1.03-3.07), and got tuberculosis more than non-tuberculosis (OR 1.44, 95% CI 1.13-1.84). (Tab. II).

Discussion

The prevalence of tobacco smoking among PLHIV was higher than among the common population. Our study found the tobacco smoking proportion among

PLHIV was high (30.8%). Gender factor as male was associated significantly with tobacco smoking activity ($p < 0.05$). The relationship between gender and tobacco smoking is complex, originating in culture. To this day, gender differences in the relationship between smokers and tobacco products persist. Nicotine plays a more prominent role in smoking patterns in men [17] and found a higher prevalence in HIV-positive women of any tobacco smoking than in HIV-negative women [10]. Tobacco smoking has become the second leading risk factor for premature death and disability in recent years, globally [18]. Smoking is a major factor associated with cardiovascular disease, cancer, and chronic respiratory disease among men and women [19]. Our study found the proportion of AUD among PLHIV in West Papua was also quite high (34.6%). Drinking alcohol was associated with tobacco smoking among PLHIV. In our study, male PLHIV, apart from smoking, also consumed alcohol. We found around 64 males (78%) drank alcohol, while the rest were 18 females (22%) who consumed alcohol. Another study revealed that tobacco smoking rates among PLHIV were higher when those PLHIV smoked concurrently with alcohol consumption [12]. In addition, AUD is consistently correlated with the risk of HIV transmission through decreased adherence to ART and increased susceptibility to HIV infection. People who consumed alcohol were 1.5-2.0 times more likely to be infected with HIV than individuals who did not consume alcohol [20].

Tobacco smoking and AUD were also positively correlated with occupation among PLHIV in our study, where the most types of their occupation were private and farmers. People with occupations outside the home area

Tab. I. The estimated prevalence of tobacco smoking by demographic and clinical characteristics among PLHIV (n = 237).

Variable	Smoking (n = 73)	No smoking (n = 164)	OR	P	95% CI
Gender			2.88	0.000*	2.20-3.77
Male	59	46			
Female	14	118			
Age group			0.82	0.507	0.49-1.39
15-35 years old	41	66			
> 35 years old	57	73			
Occupation			1.37	0.001*	1.17-1.62
Unemployment	13	66			
Employment	60	98			
Risk factor			0.99	0.704	0.94-1.04
Heterosexual	70	159			
Other	3	5			
CD4+ counts			1.86	0.030*	1.07-3.26
< 350 cell/mm ³	42	69			
$\geq$ 350 cell/mm ³	31	95			
WHO clinical stage			0.99	0.551	0.66-1.49
Stadium I & II	23	52			
Stadium III & IV	50	112			
Opportunistic infection			1.35	0.025*	1.05-1.72
Non-tuberculosis	28	89			
Tuberculosis	45	75			

* Significance level with p-value < 0.05.

Tab. II. The estimated prevalence of AUD by demographic and clinical characteristics among PLHIV (n = 237).

Variable	Alcohol (n = 82)	No alcohol (n = 155)	OR	P	95% CI
Gender			2.95	0.000*	2.22-3.93
Male	64	41			
Female	18	114			
Age group			0.64	0.107	0.37-1.09
15-35 years old	34	73			
> 35 years old	54	76			
Occupation			1.39	0.000*	1.18-1.64
Unemployment	15	61			
Employment	67	86			
Risk factor			0.63	0.718	0.13-1.06
Heterosexual	80	149			
Other	2	6			
CD4+ counts			1.77	0.041*	1.03-3.07
< 350 cell/mm ³	46	65			
≥ 350 cell/mm ³	36	90			
WHO clinical stage			0.78	0.304	0.52-1.19
Stadium I & II	22	53			
Stadium III & IV	69	102			
Opportunistic infection			1.44	0.006*	1.13-1.84
Non-Tuberculosis	30	87			
Tuberculosis	52	68			

* Significance level with p-value < 0.05.

would tend to behave tobacco smoking because of the influence of the environment with high population-level smoking prevalence may increase likelihood of smoking and impede quitting [21]. In addition, people usually smoke to relax while taking a break from their daily work. Smoking is also influenced by extrinsic factors which include the influence of family, the surrounding environment, the influence of peers, and the influence of cigarette advertising [22].

Our study found that employment and consume alcohol among PLHIV were also higher than among those who were unemployed. This indicated that AUD was closely related to work status. Another study reported that the high level of alcohol consumption among workers is due to the easy opportunity to get alcoholic beverages, especially when joining colleagues for drinking together. Moreover, people who lower income was significantly associated with a lower risk of non-problematic heavy drinking, but not of problem drinking, compared with the highest income [23].

We found that CD4+ counts were positively correlated with tobacco smoking and AUD among PLHIV in this study. PLHIV who had tobacco smoking and drinking alcohol tend to have CD4+ levels < 350 cells/mm³. A study reported that tobacco smoking was associated significantly with CD4+ counts and viral load in blood among PLHIV [24]. Evidence that tobacco smoking increases viral load demonstrates the importance of smoking cessation medication as part of HIV care. Another study stated the explanation that described the decline in immunological function among PLHIV who smoke, i.e. tobacco smoking was associated with lower adherence to antiretroviral therapy and substance use

such as cocaine and alcohol was associated with the development and acceleration of HIV severity among them [25]. Another study also reported that AUD was associated with reduced adherence to combination antiretroviral therapy, decreased viral suppression, and increased mortality among PLHIV [26].

Our study found that tobacco smoking and AUD among PLHIV were positively correlated with opportunistic infections of tuberculosis. PLHIV who smoked tobacco and consumed alcohol were more at risk of developing opportunistic tuberculosis infection. A study reports that smoking and tuberculosis are the biggest health problems in the world. Smoking and alcohol intake significantly affected for the development of tuberculosis in HIV-positive patients under treatment [27]. Furthermore, smoking had a strong influence on TB and was a major barrier towards treatment success. In multivariate analysis, treatment completion, death rate, defaulters and treatment interruption showed significant associations with smoking habit. The chances of treatment success rate were less for smokers [28]. While alcohol intake was significant risk factors for MDR-TB development [29].

Tobacco smoking and AUD were associated significantly with gender, occupation, CD4+ levels, and tuberculosis opportunistic infections among heterosexual PLHIV in West Papua. The need for intervention programs to stop tobacco smoking and AUD through Voluntary counselling and testing clinics to support PLHIV to comply with antiretroviral therapy and have a better quality of life.

Conclusion

This study demonstrated the prevalence of tobacco smoking and AUD, and the factors associated with tobacco smoking and AUD among heterosexual PLHIV in West Papua, Indonesia. Female, employed, and CD4 ≥ 350 cell/mm³ had higher prevalence of tobacco smoking and AUD than others. Gender, occupation status, CD4+ counts, and opportunistic infection were associated with tobacco smoking and alcohol use among PLHIV. These findings suggest that heterosexual PLHIVs are a heterogeneous group that needs further differentiation in studies and should be included in behavioural health assessments as part of clinical care and research. Moreover, this result emphasise the critical need for an efficient cigarette and alcohol use control program for PLHIV in developing countries such as Indonesia.

Acknowledgments

We would like to thank all PLHIVs participated in this study. We also would like to thank all who contributed to the recording and filling data as well as to preparing and sending it to the researcher at the Institute of health research and development for Papua. Finally, we would like to thank the National Institute of Health Research and Development, Ministry of the Health Republic of Indonesia which subsidized funding for our study.

Conflict of interest statement

The authors have no conflicts of interest associated with the material presented in this paper.

Authors' contributions

MW and SA: conceptualization, completed the data, design methodology, and writing the original draft. MP and MW: Formal analysis, and funding acquisition. JN and MW managed the whole project and visualization. MW, MP, SA, and JN: writing – review & editing and prepared the manuscript to publish.

References

- [1] World Health Organization. Global adult tobacco survey: comparison factsheet Indonesian 2011 & 2021. Available at: https://cdn.who.int/media/docs/default-source/ncds/ncd-surveillance/data-reporting/indonesia/indonesia-national-2021----2011-comparison-factsheet.pdf?sfvrsn=46869411_1 (Accessed on: 10/6/2022).
- [2] Holipah H, Sulistomo HW, Maharani A. Tobacco smoking and risk of all-cause mortality in Indonesia. *PLoS One* 2020;15:e0242558. <https://doi.org/10.1371/journal.pone.0242558>
- [3] Centers for Disease Control and Prevention. Smoking and HIV. Available at: <https://www.cdc.gov/tobacco/campaign/tips/diseases/smoking-and-hiv.html> (Accessed on: 27/5/2022).
- [4] National Institutes of Health. HIV treatment: the basics. Available at: <https://hivinfo.nih.gov/understanding-hiv/fact-sheets/hiv-treatment-basics> (Accessed on: 27/5/2022).
- [5] Bijker R, Jiamsakul A, Uy E, Kumarasamy N, Ditango R, Chaiwarith R, Wong WW, Avihingsanon A, Sun LP, Yunihas-tuti E, Pujari S, Do CD, Merati TP, Kantipong P, Nguyen KV, Kamarulzaman A, Zhang F, Lee MP, Choi JY, Tanuma J, Ng OT, Sim B, Ross J, Kiertiburanakul S; TREAT Asia HIV Observational Database (TAHOD) of IeDEA Asia-Pacific. Cardiovascular disease-related mortality and factors associated with cardiovascular events in the TREAT Asia HIV Observational Database (TAHOD). *HIV Med* 2019;20:183-91. <https://doi.org/10.1111/hiv.12687>
- [6] Bijker R, Kiertiburanakul S, Kumarasamy N, Pujari S, Sun LP, Ng OT, Lee MP, Choi JY, Nguyen KV, Chan YJ, Merati TP, Cuong DD, Ross J, Jiamsakul A; IeDEA Asia-Pacific. Survival after long-term ART exposure: findings from an Asian patient population retained in care beyond 5 years on ART. *Antivir Ther* 2020;25:131-42. <https://doi.org/10.3851/IMP3358>
- [7] Sisay MM, Ayele TA, Gelaw YA, Tsegaye AT, Gelaye KA, Melak MF. Incidence and risk factors of first-line antiretroviral treatment failure among human immunodeficiency virus-infected children in Amhara regional state, Ethiopia: a retrospective follow-up study. *BMJ Open* 2018;8:e019181. <https://doi.org/10.1136/bmjopen-2017-019181>
- [8] De Socio GV, Pasqualini M, Ricci E, Maggi P, Orofino G, Squillace N, Menzaghi B, Madeddu G, Taramasso L, Francisci D, Bonfanti P, Vichi F, dell'Omo M, Pieroni L; CISAI study group. Smoking habits in HIV-infected people compared with the general population in Italy: a cross-sectional study. *BMC Public Health* 2020;20:734. <https://doi.org/10.1186/s12889-020-08862-8>
- [9] Murphy JD, Liu B, Parascandola M. Smoking and HIV in Sub-Saharan Africa: A 25-Country Analysis of the Demographic Health Surveys. *Nicotine Tob Res* 2019;21:1093-102. <https://doi.org/10.1093/ntr/nty176>
- [10] Mdege ND, Shah S, Ayo-Yusuf OA, Hakim J, Siddiqi K. Tobacco use among people living with HIV: analysis of data from Demographic and Health Surveys from 28 low-income and middle-income countries. *Lancet Glob Health* 2017;5:e578-92. [https://doi.org/10.1016/S2214-109X\(17\)30170-5](https://doi.org/10.1016/S2214-109X(17)30170-5)
- [11] Duko B, Ayalew M, Ayano G. The prevalence of alcohol use disorders among people living with HIV/AIDS: a systematic review and meta-analysis. *Subst Abuse Treat Prev Policy* 2019;14:52. <https://doi.org/https://doi.org/10.1186/s13011-019-0240-3>
- [12] Bhatta DN, Subedi A, Sharma N. Tobacco smoking and alcohol drinking among HIV infected people using antiretroviral therapy. *Tob Induc Dis* 2018;16:16. <https://doi.org/10.18332/tid/86716>
- [13] Probst C, Parry CDH, Rehm J. HIV/AIDS mortality attributable to alcohol use in South Africa: a comparative risk assessment by socioeconomic status. *BMJ Open* 2018;8:e017955. <https://doi.org/10.1136/bmjopen-2017-017955>
- [14] Williams EC, McGinnis KA, Edelman EJ, Matson TE, Gordon AJ, Marshall BDL, Bryant KJ, Rubinsky AD, Lapham GT, Satre DD, Richards JE, Catz SL, Fiellin DA, Justice AC, Bradley KA. Level of Alcohol Use Associated with HIV Care Continuum Targets in a National U.S. Sample of Persons Living with HIV Receiving Healthcare. *AIDS Behav* 2019;23:140-51. <https://doi.org/10.1007/s10461-018-2210-6>
- [15] National Institutes of Health. Substance Use Disorders and HIV. Available at: <https://clinicalinfo.hiv.gov/en/guidelines/hiv-clinical-guidelines-adult-and-adolescent-arv/substance-use-disorders-and-hiv> (Accessed on: 9/5/2022).

- [16] Newville H, Sorensen JL, Hatch-Maillette M, Calsyn DA. Temporal Relationship of Sex Risk Behaviors and Substance Use Severity Among Men in Substance Use Treatment. *J Sex Res* 2018;55:1056-64. <https://doi.org/10.1080/00224499.2017.1321101>
- [17] Mdege ND, Makumbi FE, Ssenyonga R, Thirlway F, Matovu JKB, Ratschen E, Siddiqi K, Nyamurungi Namusisi K. Tobacco Smoking and Associated Factors Among People Living With HIV in Uganda. *Nicotine Tob Res* 2021;23:1208-16. <https://doi.org/10.1093/ntr/ntaa262>
- [18] Xu W, Tang W, Zhang J, Shi X, Zheng Y, Kaufman MR. Cigarette Smoking and Its Associations with Substance Use and HIV-Related Sexual Risks among Chinese Men Who Have Sex with Men. *Int J Environ Res Public Health* 2020;17:1653. <https://doi.org/10.3390/ijerph17051653>
- [19] GBD 2015 Tobacco Collaborators. Smoking prevalence and attributable disease burden in 195 countries and territories, 1990-2015: a systematic analysis from the Global Burden of Disease Study 2015. *Lancet* 2017;389:1885-906. [https://doi.org/10.1016/S0140-6736\(17\)30819-X](https://doi.org/10.1016/S0140-6736(17)30819-X)
- [20] Woolf-King SE, Fatch R, Cheng DM, Muyindike W, Ngabirano C, Kekibiina A, Emenyonu N, Hahn JA. Alcohol Use and Unprotected Sex Among HIV-Infected Ugandan Adults: Findings from an Event-Level Study. *Arch Sex Behav* 2018;47:1937-48. <https://doi.org/10.1007/s10508-017-1131-1>
- [21] Dunbar MS, Nicosia N, Kilmer B. Exposure to new smoking environments and individual-level cigarette smoking behavior: Insights from exogenous assignment of military personnel. *Soc Sci Med* 2021;280:113983. <https://doi.org/10.1016/j.socsci-med.2021.113983>
- [22] Yanti DE, Aprilia A, Jaya A, Pratama RY, Candesa NB. Relationship between work and smoking behavior in the working area of Bumi Emas Public Health Center, East Lampung. *Jurnal Dunia Kesmas* 2021;10:51-5. <http://ejurnalmalahayati.ac.id/index.php/duniakesmas/index>
- [23] Murakami K, Hashimoto H. Associations of education and income with heavy drinking and problem drinking among men: evidence from a population-based study in Japan. *BMC Public Health* 2019;19:420. <http://doi.org/10.1186/s12889-019-6790-5>
- [24] Belay DM, Bayisa B, Abera M. Association of Substance Use with Immunological Response to Antiretroviral Therapy in HIV-Positive Patients from Southwest Ethiopia: A Prospective Observational Study. *Int J Gen Med* 2022;15:8437-50. <http://doi.org/10.2147/IJGM.S389010>
- [25] Winhusen T, Feaster DJ, Duan R, Brown JL, Daar ES, Mandler R, Metsch LR. Baseline Cigarette Smoking Status as a Predictor of Virologic Suppression and CD4 Cell Count During One-Year Follow-Up in Substance Users with Uncontrolled HIV Infection. *AIDS Behav* 2018;22:2026-32. <http://doi.org/10.1007/s10461-017-1928-x>
- [26] Bensley KM, Fortney J, Chan G, Dombrowski JC, Ornelas I, Rubinsky AD, Lapham GT, Glass JE, Williams EC. Differences in Receipt of Alcohol-Related Care Across Rurality Among VA Patients Living With HIV With Unhealthy Alcohol Use. *J Rural Health* 2019;35:341-53. <http://doi.org/10.1111/jrh.12345>
- [27] Tegegne AS, Minwagaw MT. Risk Factors for the Development of Tuberculosis Among HIV-Positive Adults Under Highly Active Antiretroviral Therapy at Government Hospitals in Amhara Region, Ethiopia. *Int J Gen Med* 2022;15:3031-41. <http://doi.org/10.2147/IJGM.S358517>
- [28] Khan AH, Sulaiman SAS, Hassali MA, Khan KU, Ming LC, Mateen O, Ullah MO. Effect of smoking on treatment outcome among tuberculosis patients in Malaysia; a multicenter study. *BMC Public Health* 2020;20:854. <http://doi.org/https://doi.org/10.1186/s12889-020-08856-6>
- [29] Yaghi AR, Shaheed HS, Harun SN, Hyder Ali IA, Khan AH. Survival trend of tuberculosis patients and risk factors associated with mortality and developing drug-resistant tuberculosis in hospital Pulau Pinang, Malaysia: a retrospective study. *Adv Respir Med* 2022;90:467-82. <https://doi.org/10.3390/arm90060054>

Received on September 9, 2022. Accepted on March 24, 2023.

Correspondence: Juntima Nawamawat, Pak Nam Pho, Mueang, Nakhon Sawan, Atthakawi Road 45, Thailand, 60000. Tel. +66 0964239914 - E-mail: juntima@bcnsprnw.ac.th

How to cite this article: Widiyanti M, Pramestiyani M, Adiningsih S, Nawamawat J. Demographic and clinical characteristics associated with tobacco smoking and alcohol use disorder among heterosexual people living with HIV in West Papua, Indonesia. *J Prev Med Hyg* 2022;63:E34-E39. <https://doi.org/10.15167/2421-4248/jpmh2023.64.1.2711>

© Copyright by Pacini Editore Srl, Pisa, Italy

This is an open access article distributed in accordance with the CC-BY-NC-ND (Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International) license. The article can be used by giving appropriate credit and mentioning the license, but only for non-commercial purposes and only in the original version. For further information: <https://creativecommons.org/licenses/by-nc-nd/4.0/deed.en>

HEALTH PROMOTION

Does moral sensitivity contribute to patient satisfaction? A cross-sectional survey in educational hospitals

MAJID TAHERI^{1,2}, MAHMOUD ABBASI¹, MOHAMMAD TAVAKOL³, AMIR ALMASI-HASHIANI⁴, MEHRI MOHAMMADI², ALI ARASH ANOSHIRVANI⁵, MEHRAN AKBARI⁶, SEIDAMIR PASHA TABAEIAN⁷

¹ Medical Ethics, and Law Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran;

² Infectious Diseases Research Center (IDRC), Arak University of medical sciences, Arak, Iran;

³ Sociology Department, School of Social Sciences, University of Tehran, Tehran, Iran;

⁴ Department of Epidemiology, School of Health, Arak University of Medical Sciences, Arak, Iran;

⁵ Department of Internal Medicine, School of Medicine, Iran University of Medical Sciences, Tehran, Iran;

⁶ Department of Nursing, Khomein University of Medical Sciences, Khomein, Iran;

⁷ Colorectal Research Center, Iran University of Medical Sciences, Tehran, Iran

Keywords

Ethics • Patient Satisfaction • Quality of Health Care • Physician-Patient Relations • Physicians

Summary

Introduction. Our study aims to assess interactions between the moral sensitivity of physicians and the satisfaction of patients.

Methods. This is a cross-sectional study. Data were collected by a standard questionnaire of the physicians' moral sensitivity about decision-making and a researcher-made patient satisfaction questionnaire. The physicians were selected through the census method, and patients were selected using quota sampling to equal the selection of each physician from each work shift. All information was analyzed by SPSS statistical software version 23.

Results. The mean score for physicians' moral sensitivity was

91.6 ± 0.63 which shows a high level of moral sensitivity. The average patient satisfaction was 61.97 ± 3.55 out of the total score (23-115) which shows a moderate level of satisfaction with the highest scores in the domain of "professionalism" and the lowest scores were related to the domain of "Technical Quality of Care".

Conclusion. For improving patient satisfaction, adopting appropriate strategies like performing the periodic evaluation of this phenomenon and providing some codified training in this regard are required to increase the level of moral sensitivity of physicians and provide high-quality care.

Introduction

Sensitivity to moral subjects is considered one of the professional qualifying criteria for physicians [1, 2]. Physicians also need to apply morals, reasoning, moral sensitivity, and an appropriate understanding of moral subjects ideally. It gives them the ability to accurately and timely diagnose moral status and make a decision accordingly to prepare the situation for improving the quality of moral behaviors [3]. Patient care is a key concept in the medical profession and physicians that provide these services need to have personal, social, and moral abilities because they interact with the patients and face different moral subjects that make the decision-making process difficult [4]. One of the subjects that play an important role in the process of making moral decisions is moral sensitivity [5]. Moral sensitivity not only sensitizes physicians to the moral subjects of her professional environment but also helps him/her to make moral decisions for their patients.

Identifying a moral conflict, apprehending a patient's susceptible situation contextually and intuitively, and being aware of the ethical consequences of decisions

made are at the core of moral sensitivity [6]. The literature review highlights moral sensitivity as an effective factor in the ethical decision-making process [7].

Moral sensitivity introduces moral judgment, moral stimulation, and moral function, and is intertwined with moral care. One of the results of moral sensitivity is its effect on the satisfaction of patients [8].

Moral sensitivity as the basis of medical ethics provides a basis for physicians to take care of patients morally and efficiently, which results in increased patients' satisfaction. As an index of the quality of care, researchers are attaching tremendous importance to patient satisfaction regarding healthcare and treatment [9, 10]. A common feature of recent studies focusing on the assessment of treatment outcomes is patient satisfaction [11, 12]. Patient satisfaction by definition is fulfilling a patient's needs and wishes satisfactorily in a manner that he/she attaches tremendous importance to his/her satisfaction [13, 14]. Clinical outcomes, patient retention, and patient-doctor relationships are influenced by patient satisfaction. Satisfied patients play a key role in their treatment process and are more probable to complete the medical treatment; they cooperate fully and foster a deeper and lasting relationship with

the medical staff boosting compliance. Moreover, they keep using health services, cultivate a relationship with a specific physician, and recommend the doctor to others [14, 15]. It is believed that there is a link between deeper satisfaction and measures of healthcare outcomes due to compliance with treatment and keeping up with appointments. Patient satisfaction studies are conducted globally in health care services [16-19].

Moral sensitivity is considered as knowledge and attention to moral values. On the other hand moral sensitivity is the ability to diagnose moral issues and select the best response for them. It is expressed in a study that reducing moral sensitivity causes nurses to be inattentive to these issues, and moral sensitivity play important role in the decision-making of medical personnel [20]. Attention to moral issues is cause for more moral sensitivity and moral behavior in a decision-making situation in medical staff. According to the results of another study, there is a significant correlation between moral sensitivity and respect for patients' rights [21].

Hospitals or health care systems could benefit from the research on patient satisfaction. First, patient satisfaction sheds light on the ways the services are delivered and it helps the management and medical staff to have access to the information as part of quality improvement efforts. These studies aim to discover the optimum practices and direct the solutions toward solving similar problems they come across in their institutions [22, 23]. Second, increasing performance transparency is what the hospitals and the health care system are trying to achieve. Patients' views on how health care services are running are integrated by patients' satisfaction studies [24]. It has been shown that patients attach tremendous importance to physician-related factors, chiefly those concerning communication ability, interpersonal and technical skills, and accessibility [25, 26].

Objectives

As far as we know, there was not any similar study previously conducted to explore the examination of the relationship between the patients' satisfaction and physicians' moral sensitivity. Given the significance of characteristics of physicians' moral sensitivity and patients' satisfaction and the finite number of studies in this regard, the present study tries to shed light on the relationship between the moral sensitivity of physicians and the satisfaction of patients. Early diagnoses and treatment could be achieved by outpatient healthcare services. Yet, this field needs to be explored more precisely. Studies show that outpatient clinics are the main point of contact with the patient and if patient satisfaction is achieved, the patients are more likely to follow particular medical regimens and treatment protocols. This research aimed to determine the effect of physicians' moral sensitivity on patients' satisfaction.

Methods

STUDY DRAFTING

This study was cross-sectional research conducted among outpatients and physicians working in hospitals dependent on Shahid Beheshti University of Medical Sciences (SBMU) in 2018 and 2019, Iran. This study set consisted of outpatient clinics in four selected hospitals. The survey lasted for five weeks.

PARTICIPANTS

The participants of this study were two groups:

1. the first group consisted of all the working physicians that work in Shahid Beheshti University of Medical Sciences of four educational hospitals in Tehran, Iran. The physicians were selected through the census method. The number of physicians working in the aforementioned outpatient clinics was 106, which decreased to 100 because of the reluctance of 6 physicians to participate in the research. We included all 100 patients in the analysis.

Inclusion criteria for physicians were as follows: work experience at a clinic at least for 3 months, experiencing at least a full working shift in the target ward, willingness to participate in the study, and completing the questionnaire. Exclusion criteria included having less than three months of experience, lack of cooperation, and satisfaction to participate in the study. As mentioned, just six physicians were not included in the study because they did not meet the inclusion criteria;

2. 400 patients took part in the study. Patients were selected using quota sampling to equal selecting of each physician from each work shift. Inclusion criteria for patients were as follows: age range of 15 to 65, willingness to participate in the study and complete the questionnaire, verbal communication ability with the researcher, and not being a member of the medical staff. At the beginning of each physician shift, a moral sensitivity questionnaire has been completed. Then, interviewers completed the questionnaire for 4-5 patients of each physician. Selecting 4-5 patients of each physician was done by systematic random sampling (one out of each 5 patients) because the patient's list was ready at the beginning of their shift. Therefore; we randomly selected one patient out of each 5 patients on the list.

DATA GATHERING TOOLS

Demographic variables such as gender, age, degree, marital status, employment type, job history, and working shift were gathered by a form. The data are compiled by Lutzen's Corrected Moral Sensitivity Questionnaire (CMSQ) which includes 25 items. Likert score-based scoring with a point from 0-5 from "completely dissatisfied" to "completely satisfied" with the lowest and highest score of 0 and 100 respectively [27]. The minimum and maximum scores are 0 and 100, respectively. Scores of 0 to 50 indicate

low Moral sensitivity, 50-75 indicates moderate Moral sensitivity and 75-100 indicates high Moral sensitivity. This questionnaire was developed by Lutzen et al. In Sweden [27, 28]. The reliability of this questionnaire is estimated to be 0.76 in the United States [29] and 0.78 in Korea [30]. In Iran, Hassanpour et al. Translated the questionnaire from English to fluent Persian according to the criteria of the World Health Organization (translation of the questionnaires) and according to the cultural conditions of Iran. The same translation is then returned to the original language and matched to the original text. After collecting and examining the internal consistency of the questionnaire with Cronbach's alpha coefficient, it was calculated that the number 0.81 was obtained and confirmed [31].

To assess patient satisfaction, a researcher-made questionnaire was used. To check the validity of that questionnaire, the Content Validity Ratio (CVR) and Content Validity Index (CVI) were carefully examined and the necessary corrections were made. Ten health management experts were asked about the items. The Content Validity Ratio and the Content Validity Index were 0.83 and 0.69, respectively. The reliability of the instrument was also evaluated using Cronbach's alpha coefficient which was 0.872. The questionnaire included 23 items (such as "Your waiting time after admission to the doctor's office" or "Your attitude toward hospital staff") and its subscales are related to three general competencies, including interpersonal and communication skills, professionalism, and technical quality of care provided by the physician. Each item was scored using a Likert scale from 1-5 points for completely dissatisfied, dissatisfied, moderate, satisfied, and completely satisfied, respectively. Here, positive and negative tools are used to evaluate the points, and given that the points in the negative modes are estimated in reverse. The total score of satisfaction for each respondent ranged from 23 (dissatisfied) to 115 (completely satisfied). Scores below 54 indicate dissatisfaction, between 54 and 85 indicate moderate satisfaction, and above 85 indicate complete satisfaction.

DATA GATHERING

After obtaining the legal and moral approval from Shahid Beheshti University of Medical Sciences and delivering, the researcher visited four relevant hospitals and obtained research permits from the hospital manager, and informed the managers of the outpatient clinic setting after the letter of introduction from Shahid Beheshti University of Medical Sciences Ethics Committee.

After providing explanations about the purposes of this research, the researchers handed over the questionnaires to the participants. The physicians completed the Self-report questionnaires at their suitable time and place and returned them. They were reminded of the secrecy of their information and general analysis. The participants were allowed to leave at will. At the beginning of the meeting, the participants signed the informed consent form.

ETHICAL APPROVAL

The Shahid Beheshti University of Medical Sciences Ethics Committee, Thran, Iran, approved this study (Ethics code IR.SBMU.RAM.REC.1394.341) and legal permissions were obtained before data accumulation. Participants were informed of the voluntary nature of their participation in this study and were provided with all the essential information on this study objective and how to complete the questionnaires. Besides, participants were asked not to write their names on questionnaires. The informed consent form was filled out by the samples of the study. The information about the nature of the research was also available in an introductory letter attached to each questionnaire. The participants were able to see the results of the research at will.

DATA ANALYSIS METHOD

Information was analyzed by SPSS version 23. Descriptive statistics including percentage, standard deviation (SD), and mean were used to portray patient satisfaction levels and moral sensitivity. Shapiro-Wilk test was used to certify the normal distribution of data and the Spearman correlation coefficients, Pearson, and one-way analysis of variance (ANOVA) were used at the degree of significance of $p < 0.05$ for compare variables.

Results

Characteristics of the physician and the relationship of their demographic factors with moral sensitivity are shown in Table I. According to these results, there was only a significant relationship between the level of physicians' education and moral sensitivity ($p = 0.049$). In other words, residents have more moral sensitivity than others (general practitioners and specialists).

Characteristics of patients and the relationship of their demographic factors with satisfaction are shown in Table II. According to these results, there was only a relationship of significant between the supplementary insurance and the satisfaction of patients ($p = 0.000$). In other words, patients with more supplementary insurance have more satisfaction compared to others. The mean score of physicians' moral sensitivity was 91.6 ± 0.63 , which shows a high level of moral sensitivity. The mean scores of moral sensitivity sub-scales are presented in Table III. As shown, among all levels of moral sensitivity that including "honesty and benevolence" had the highest mean score (26.54 ± 3.08), while "The level of career knowledge" had the lowest (3.73 ± 1.64) one. The results show that there is a correlation between different levels of sensitivity and the total score of moral sensitivity, and then awareness and honesty have the highest correlation with the total score. Furthermore, among all the levels of patient satisfaction, "professionalism" had the highest mean score (27.97 ± 3.55), while "Technical Quality of Care" had the lowest (16.41 ± 1.28). Overall, satisfaction was also moderate (61.97 ± 3.55). Besides, there is a

Tab. I. Relationship between physicians' demographic factors and moral sensitivity.

Characteristics	Classification	Moral sensitivity		Chi-square	P-value
		Middle	High		
Age	< 30	7 (77.78)	2 (22.22)	0.32	0.995
	30-40	37 (74.00)	13 (26.0)		
	40-50	27 (77.14)	8 (22.86)		
	> 50	5 (83.33)	1 (16.67)		
Gender	Male	36 (78.26)	10 (21.74)	0.29	0.588
	Female	39 (73.58)	14 (26.42)		
Marital status	Single	23 (82.14)	5 (17.86)	4.26	0.234
	Married	49 (75.38)	16 (24.62)		
	Divorced	1 (33.33)	2 (66.67)		
	Widow	2 (100.0)	0 (0.00)		
Education	General	15 (62.50)	9 (37.50)	6.47	0.049*
	Resident	15 (82.33)	3 (16.67)		
	Specialist	44 (80.00)	11 (20.00)		
Employment	Official	18 (78.26)	5 (21.74)	0.61	0.734
	Contractual	25 (71.43)	10 (28.57)		
	Other	33 (78.57)	9 (21.43)		
Experience	< 10 year	41 (75.93)	13 (24.07)	0.007	0.996
	10-20 year	25 (75.76)	8 (24.24)		
	> 20 year	10 (76.92)	3 (23.08)		
Shift	Morning	8 (61.54)	5 (38.46)	1.73	0.420
	Afternoon	3 (75.00)	1 (25.00)		
	Night	65 (78.31)	18 (21.69)		

Tab. II. Relationship between patients' demographic factors and satisfaction.

Characteristics	Classification	Moral sensitivity		Chi-square	P-value
		Middle	High		
Age	< 30	18 (14.06)	110 (85.94)	2.34	0.505
	30-40	32 (17.20)	154 (82.80)		
	40-50	15 (20.83)	57 (79.17)		
	> 50	3 (27.27)	8 (72.73)		
Gender	Male	36 (18.09)	163 (81.91)	0.65	0.419
	Female	30 (15.08)	169 (84.92)		
Marital status	Single	18 (19.57)	74 (80.43)	5.99	0.112
	Married	30 (12.99)	201 (87.01)		
	Divorced	14 (22.95)	47 (77.05)		
	Widow	4 (28.57)	10 (71.43)		
Education	Illiterate/Primary	7 (25.00)	21 (75.00)	1.77	0.412
	Highs school	25 (14.97)	142 (85.03)		
	Academic	35 (17.24)	168 (82.76)		
Employment	Student	8 (22.86)	27 (77.14)	7.09	0.131
	Housewife	15 (14.42)	89 (85.58)		
	Retired	6 (37.50)	10 (62.50)		
	Unemployment	5 (11.36)	39 (88.64)		
	Other	34 (16.92)	167 (83.08)		
Supplementary insurance	Yes	20 (9.80)	184 (90.20)	14.58	0.001*
	No	47 (24.10)	148 (75.90)		

correlation between all levels of satisfaction and total satisfaction score, and at the professional level, this correlation is stronger.

The correlation between the physician's moral sensitivity and patient satisfaction is shown in Table IV. Based on these results, there is a positive relationship between the total score of moral sensitivity and satisfaction. Also, there is a correlation between all levels of moral sensitivity and the total score of satisfaction and vice versa. However, the correlation between the experience

of moral problems and tensions and the total score of satisfaction is stronger. Also, there is a strong correlation between the total score of moral sensitivity and professionalism.

Discussion

According to the results of the present study, most physicians were highly sensitive in terms of moral

Tab. III. Mean of levels and total score of the physician's moral sensitivity and patient's satisfaction.

Questionnaire	Levels	Mean (SD)	R*	P
Moral sensitivity of physician	The level of respect for client independence	10.35 (1.97)	0.51	0.005
	The awareness level of physicians' communication with patients	22.07 (3.15)	0.75	< 0.001
	The level of career knowledge	3.73 (1.64)	0.05	0.781
	The experience of moral problems and tensions	10.24 (1.91)	0.19	0.086
	Using ethical concepts to make moral decisions	18.67 (2.72)	0.26	0.072
	Honesty and benevolence	26.54 (3.08)	0.64	< 0.001
	Total	91.06 (0.63)		
Satisfaction of patient	Interpersonal and communication skills	17.63 (1.43)	0.68	< 0.001
	Professionalism	27.92 (1.98)	0.82	< 0.001
	Technical quality of care	16.41 (1.28)	0.73	< 0.001
	Total	61.97 (3.55)		

* Pearson correlation.

Tab. IV. Correlation of levels and total of physician's moral sensitivity with patient's satisfaction.

Moral sensitivity of physician	The satisfaction of patients (p-value)			
	Interpersonal and communication skills	Professionalism	Technical quality of care	Total
The level of respect to the client independence	0.550 (0.002)	0.441 (0.005)	0.520 (0.002)	0.486 (0.004)
The awareness level of physicians' communication with patients	0.480 (0.004)	0.782 (0.000)	0.503 (0.002)	0.515 (0.002)
The level of career knowledge	0.493 (0.002)	0.545 (0.002)	0.562 (0.001)	0.584 (0.001)
The experience of moral problems and tensions	0.696 (0.000)	0.826 (0.000)	0.911 (0.000)	0.897 (< 0.001)
Using ethical concepts in moral decision making	0.536 (0.001)	0.669 (0.000)	0.772 (0.000)	0.768 (0.000)
Honesty and benevolence	0.544 (0.001)	0.701 (0.000)	0.515 (0.001)	0.579 (0.001)
Total	0.553 (0.001)	0.937 (0.000)	0.442 (0.003)	0.611 (0.001)

values. This finding is in agreement with other results in this field [27, 32]. Also, findings showed that the level of physicians' moral sensitivity and demographic variables, including gender, marital status, and professional experience were not correlated significantly. To the best of our knowledge, no study has been conducted and published on the effect of moral sensitivity in physicians on patient satisfaction.

In our study, there was a significant relationship between moral sensitivity and the educational level of physicians. Moral sensitivity was mostly reported in the residents. In a study to investigate the effect of ethical education on medical students, it was found that education affects students' professional aspects [33]. In a study in India, patients' satisfaction levels were measured based on the quality of services received and their insurance status. It was found that insurance does not affect patient satisfaction [34]. Contrary to these results, in our study, there was a strong and significant relationship between supplementary insurance and patient satisfaction. This relationship can be associated with the fact that those with supplementary insurance receive more health care compared to others. These supplementary services can improve the treatment of people and boost their satisfaction consequently. Considering the results of this research and the percentages expressed (dissatisfied and relatively satisfied), it seems that appropriate measures should be taken by the authorities to improve the quality of health insurance services to reach the desired level of customer satisfaction. Also according

to the characteristics of individuals. Satisfied with these services to those who were dissatisfied or relatively satisfied (fast and complete fulfillment of insurance service needs, commitments, etc.) Serious attention of officials to make arrangements for customer satisfaction can be very helpful.

Of all the levels of moral sensitivity, "honesty and benevolence" and "the level of career knowledge" received the highest and the lowest scores, respectively. "Benevolence and Honesty" points to such concepts as honesty, trust between patients and physicians, the patients' reactions to care, and the insight of patients and insight about their disease. According to these findings from our study, "exposition benevolence" also has gotten the highest score in a study conducted by the study of Abdou et al. [35]. Studies have examined only the aspect of moral sensitivity and have not studied the consequences of this aspect. Patient satisfaction can be considered an important consequence of moral sensitivity in physicians, which has been measured in our study.

In Lutzen et al. research, levels of applying ethical concepts and respecting the care seeker's independence and the levels of being honest and benevolent received the highest and lowest scores, respectively [7]. Because the physicians are still in apprenticeship, they become greater sensitive to "benevolence and honesty" and thus pay more consideration to theoretic topics and their usage in the clinical wards. "The level of career knowledge" is a level of sensitivity to morals that is

related to the topics about the intentions that going to be made without the participation of the patient. This level gained the lowest score in our study, which Indicates that physicians still have impediments in this context and so they don't have the correct attitude toward it. In other words, they don't pay attention to the patients' participation in their therapeutic care decisions. The fact that patients have no specified role in making decisions about their therapeutic care and the bulk of decisions are made by the healthcare members including physicians may be ascribed to the paternalistic viewpoint that is still overbearing in the Iranian healthcare system [36, 37].

Results indicated a positive relationship between the moral sensitivity of physicians and patient satisfaction, but we could not find studies in the available literature on the correlation between the physicians' moral sensitivity and patients' satisfaction. Studies on sensitivity and ethical challenges have suggested that ethical sensitivity is an effective factor for ethical performance and can lead to proper ethical performance [27, 38]. Noh et al. [39], in their study, believed that the role and importance of moral sensitivity and adherence to ethical and legal principles in the care environment require awareness and sensitivity of these principles and it can guarantee the correct implementation of care [39]. The findings of the present study showed that the patients were moderately satisfied.

The results showed that the quality of services is far from the desired level. In the research conducted by Makarem et al., 50.8% of participants reported deep satisfaction with care services [40] and this finding was inconsistent with our findings. Previous studies revealed that in addition to ethical skills, different factors influence patients' satisfaction such as educating patients [41], responding to questions and requests of patients [41-43], communication skills, culture, previous experiences, personal and social valencies, and patients' sobriety of their rights [44, 45].

"Technical Quality of Care" was a level of patient satisfaction focused on patients' perceptions of the physician's professional knowledge and expertise. This level received the lowest score in this present study. It seems that physicians pay less attention to the role of caring due to the high workload and high load referral of patients. The important role of healthcare providers has been shown in previous studies [46-49]. Re-evaluation of medical care quality standards, especially in communication dimensions with a patient-centered approach, is necessary to increase the appropriate communication between patient and physician and to pay attention to patients' needs in different dimensions. Of all the levels of patient satisfaction, "professionalism" received the highest score in the present study. It can be said that promoting different aspects of professionalism such as moral sensitivity could boost physicians' performance by influencing their mindset and behavior, thus patients' satisfaction will be boosted. To improve and promote patient satisfaction, the patient-centered care approach must be widely taught and implemented in the country. For this to be operational, the influencing factors

must be identified. Placing the title of patient-centered in the level of the academic education course of the medical course, placing patient-centered care in the accreditation criteria of hospitals, and implementing patient-centered care methods in medical centers can help the general implementation of patient-centered care in the country. In this study, demographic variables and patients' satisfaction were not correlated. A study reported that variables such as age and gender do not influence the patients' satisfaction significantly [50].

STRENGTHS AND LIMITATIONS

The present study has several limitations. This was a cross-sectional study and therefore does not allow causal inference. Second, Sampling was done by the conventional method and eventually, the assessment of self-reported behavior rather than measuring objective behavior was another limitation of the study. Finally, the study was conducted in one city in Iran and hence cannot be generalized to the entire population; replication is recommended in other regions or nationwide.

However, the study has several strengths. According to the searches, this is the only study that has been done on the relationship between the moral sensitivity of physicians and patient satisfaction in Iran, and the findings of the present study can be a basis for future research. The response rate was high. Although data were based on self-report, this method is often necessary to collect data on moral sensitivity and patient satisfaction.

Conclusion

Our research was expressive that there is a correlation between the satisfaction rate of patients and the level of physicians' moral sensitivity to patients; in other words, physicians' increased level of moral sensitivity will increase the satisfaction rate of patients. As there is not adequate scientific evidence about this subject, our results could be a starting point for more assessments. Since there is a direct interaction between moral sensitivity and satisfaction rate, physicians are required to improve their level of moral sensitivity for taking care of patients. The healthcare system administrators could use the results of the present study to highlight the importance of moral sensitivity in making moral decisions in the work environment, and prevent irreparably and imposed damages due to the failure to observe the principles of professional ethics in the healthcare system. Boosting associations between physicians and patients lead to meeting patients' rights and improving the efficiency of healthcare centers.

Recommendations

Regarding the limitations of the present study, it should be mentioned that although a cross-sectional study was used to investigate the relationship between predicting variables and outcome at a specific point in time,

longitudinal predictions could not be made in this study. Therefore, it is suggested that longitudinal research studies be designed and implemented to investigate causal relationships in this field.

Acknowledgments

We would like to thank the Vice-chancellor of Shahid Beheshti University of Medical Sciences for approval and financial support of this study.

Conflict of interest statement

The authors have no conflicts of interest.

Authors' contributions

TM, AM: Design. TM, TM, AM, TAP: Writing. TM, MM: Data Collection and/or Processing. A-HA, MM: Analysis and/or Interpretation. AAA, TAP, TM: Critical Review. All authors have read and agreed to the published version of the manuscript.

References

- [1] Manson H. The need for medical ethics education in family medicine training. *Fam Med* 2008;40:658-64.
- [2] Roberts LW, Warner TD, Hammond KA, Geppert CM, Heinrich T. Becoming a good doctor: perceived need for ethics training focused on practical and professional development topics. *Academic Psychiatry* 2005;29:301-9. <https://doi.org/10.1176/appi.ap.29.3.301>
- [3] Grace NA, Yanshiyi DY, Victoria ON, Abubakar KM, Istifanus JA, Kwaru MI. Current level of knowledge, perception and practice of medical law and ethics among Nigerian medical practitioners. *Med Law* 2016;35:633-48. <https://doi.org/10.4103/0300-1652.107600>
- [4] Cunningham DE, Mohanna K, Wills P. Handbook of primary care ethics. *Education for Primary Care* 2018;29:246. <https://doi.org/10.1080/14739879.2018.1467214>
- [5] Shah ND, Mehta RY, Dave KR. Sensitising intern doctors to ethical issues in a doctor-patient relationship. *Indian J Med Ethics* 2017;2:141-6. <https://doi.org/10.20529/IJME.2017.040>
- [6] Christen M, Katsarov J. Moral sensitivity as a precondition of moral distress. *Am J Bioeth* 2016;16:19-21. <https://doi.org/10.1080/15265161.2016.1239787>
- [7] Lützen K, Johansson A, Nordström G. Moral sensitivity: Some differences between nurses and physicians. *Nurs Ethics* 2000;7:520-30. <https://doi.org/10.1177/096973300000700607>
- [8] Rushton CH, Penticuff JH. A framework for analysis of ethical dilemmas in critical care nursing. *Adv Crit Care* 2007;18:323-8. <https://doi.org/10.4037/15597768-2007-3012>
- [9] Stefanovska VV, Petkovska MS. Patient satisfaction in outpatient healthcare services at secondary level vs. tertiary level. *Srp Arh Celok Lek* 2014;142:579-85. <https://doi.org/10.2298/SARH1410579V>
- [10] Mitropoulos P, Vasileiou K, Mitropoulos I. Understanding quality and satisfaction in public hospital services: A nationwide in-patient survey in Greece. *J Retail Consum Serv* 2018;40:270-5. <https://doi.org/10.1016/j.jretconser.2017.03.004>
- [11] Graham B. Defining and measuring patient satisfaction. *The Journal of hand surgery* 2016;41:929-31. <https://doi.org/10.1016/j.jhsa.2016.07.109>
- [12] Taheri M, Tavakol M, Samadi S, Amini S, Abbasi M. The Influence of Physicians Social Capital on Patients Satisfaction. *Int J Pharm Res* 2020;12:1079-86. <https://doi.org/10.31838/ijpr/2020.12.03.010>
- [13] Crow R, Gage H, Hampson S, Hart J, Kimber A, Storey L, Thomas H. The measurement of satisfaction with healthcare: implications for practice from a systematic review of the literature. *Health Technol Assess* 2002;6:1-244. <https://doi.org/10.3310/hta6320>
- [14] Hekkert KD, Cihangir S, Kleefstra SM, Van Den Berg B, Kool RB. Patient satisfaction revisited: a multilevel approach. *Soc Sci Med* 2009;69:68-75. <https://doi.org/10.1016/j.socscimed.2009.04.016>
- [15] Xiong C, Chen X, Zhao X, Liu C. Patient satisfaction and gender composition of physicians – a cross-sectional study of community health services in Hubei, China. *BMC Health Serv Res* 2018;18:217. <https://doi.org/10.1186/s12913-018-3011-3>
- [16] Consuegra-Sánchez L, Martínez JA, Costa ÁF, Arcos FS, Moreno JA. Measuring Patient Satisfaction in a Cardiology Service Using Associative Maps. *A New Method. Rev Esp Cardiol (English Edition)* 2018;72:587-8. <https://doi.org/10.1016/j.rec.2018.06.008>
- [17] Forbes DR, Nolan D. Factors associated with patient-satisfaction in student-led physiotherapy clinics: A qualitative study. *Physiother Theory Pract* 2018;34:705-13. <https://doi.org/10.1080/09593985.2018.1423592>
- [18] Meyerhoefer CD, Sherer SA, Deily ME, Chou SY, Guo X, Chen J, Sheinberg M, Levick D. Provider and patient satisfaction with the integration of ambulatory and hospital EHR systems. *J Am Med Inform Assoc* 2018;25:1054-63. <https://doi.org/10.1093/jamia/ocy048>
- [19] Pozdnyakova A, Laiteerapong N, Volerman A, Feld LD, Wan W, Burnet DL, Lee WW. Impact of medical scribes on physician and patient satisfaction in primary care. *J Gen Intern Med* 2018;33:1109-115. <https://doi.org/10.1007/s11606-018-4434-6>
- [20] Borhani F, Keshtgar M, Abbaszadeh A. Moral self-concept and moral sensitivity in Iranian nurses. *J Med Ethics Hist Med* 2015;8:4.
- [21] Mahdiyoun SA, Pooshgan Z, Imanipour M, Razaghi Z. Correlation between the Nurses, Moral Sensitivity and the Observance of Patients' Rights in ICUs. *Med Ethics J* 2017;11:7-14. <https://doi.org/10.21859/mej-11407>
- [22] Drachman DA. Benchmarking patient satisfaction at academic health centers. *Jt Comm J Qual Improv* 1996;22:359-67. [https://doi.org/10.1016/S1070-3241\(16\)30239-5](https://doi.org/10.1016/S1070-3241(16)30239-5)
- [23] Vogus TJ, McClelland LE. When the customer is the patient: Lessons from healthcare research on patient satisfaction and service quality ratings. *Hum Resour Manag Rev* 2016;26:37-49. <https://doi.org/10.1016/j.hrmr.2015.09.005>
- [24] Mpinga EK, Chastonay P. Satisfaction of patients: a right to health indicator? *Health Policy* 2011;100:144-50. <https://doi.org/10.1016/j.healthpol.2010.11.001>
- [25] Boquiren VM, Hack TF, Beaver K, Williamson S. What do measures of patient satisfaction with the doctor tell us? *Patient Educ Couns* 2015;98:1465-73. <https://doi.org/10.1016/j.pec.2015.05.020>
- [26] Marcinowicz L, Chlabicz S, Grebowski R. Understanding patient satisfaction with family doctor care. *J Eval Clin Pract* 2010;16:712-5. <https://doi.org/10.1111/j.1365-2753.2009.01180.x>
- [27] Lützen K, Dahlqvist V, Eriksson S, Norberg A. Developing the concept of moral sensitivity in health care practice. *Nurs ethics* 2006;13:187-96. <https://doi.org/10.1191/0969733006ne837>
- [28] Lützen K, Blom T, Ewalds-Kvist B, Winch S. Moral stress, moral climate and moral sensitivity among psy-

- chiatric professionals. *Nurs Ethics* 2010;17:213-24. <https://doi.org/10.1177/0969733009351>
- [29] Comrie RW. An analysis of undergraduate and graduate student nurses' moral sensitivity. *Nurs ethics* 2012;19:116-27. <https://doi.org/10.1177/096973301141139>
- [30] Han SS, Kim J, Kim YS, Ahn S. Validation of a Korean version of the Moral Sensitivity Questionnaire. *Nurs Ethics* 2010;17:99-105. <https://doi.org/10.1177/0969733009349>
- [31] Hassanpoor M, Hosseini M, Fallahi Khoshknab M, Abbaszadeh A. Evaluation of the impact of teaching nursing ethics on nurses' decision making in Kerman social welfare hospitals in 1389. *J Med Ethics Hist Med* 2011;4:58-64.
- [32] Nejadsharvari N, Abbasi M, Borhani F, Ebrahimi A, Rasooli H, Motamedi MH, Kiani M, Bazmi S. Relationship of moral sensitivity and distress among physicians. *Trauma Mon* 2015; 20:e26075. <https://doi.org/10.5812/traumamon.26075>
- [33] AlMahmoud T, Hashim MJ, Elzubeir MA, Branicki F. Ethics teaching in a medical education environment: preferences for diversity of learning and assessment methods. *Med Educ Online* 2017;22:1328257. <https://doi.org/10.1080/10872981.2017.1328257>
- [34] Devadasan N, Criel B, Van Damme W, Lefevre P, Manoharan S, Van der Stuyft P. Community health insurance schemes & patient satisfaction-evidence from India. *Indian J Med Res* 2011;133:40.
- [35] Abdou H, Baddar F, Alkorashy H. The relationship between work environment and moral sensitivity among the nursing faculty assistants. *World Appl Sci J* 2010;11:1375-87.
- [36] Borhani F, Jalali T, Abbaszadeh A, Haghdoost A. Nurses' perception of ethical climate and organizational commitment. *Nurs Ethics* 2014;21:278-88. <https://doi.org/10.1177/09697330134932>
- [37] Gjerberg E, Lillemoen L, Førde R, Pedersen R. End-of-life care communications and shared decision-making in Norwegian nursing homes – experiences and perspectives of patients and relatives. *BMC Geriatrics* 2015;15:103. <https://doi.org/10.1186/s12877-015-0096-y>
- [38] Schluter J, Winch S, Holzhauser K, Henderson A. Nurses' moral sensitivity and hospital ethical climate: A literature review. *Nurs Ethics* 2008;15:304-21. <https://doi.org/10.1177/096973300708835>
- [39] Noh D, Kim S, Kim S. Moral distress, moral sensitivity and ethical climate of nurses working in psychiatric wards. *J Korean Acad Psychiatr Ment Health Nurs* 2013;22:307-19. <https://doi.org/10.12934/jkpmhn.2013.22.4.307>
- [40] Makarem J, Larijani B, Joodaki K, Ghaderi S, Nayeri F, Mohammadpoor M. Patients' satisfaction with inpatient services provided in hospitals affiliated to Tehran University of Medical Sciences, Iran, during 2011-2013. *J Med Ethics Hist Med* 2016;9.
- [41] Joolae S, Givari A, Taavoni S, Bahrani N, Reza PR. Patients' satisfaction with provided nursing care. *Iran J Nurs Res* 2008;2:37-44.
- [42] Kalroozi F, Dadgari F, Zareian A. Patients' satisfaction with patient's bill of right observance. *Iranian Journal of Military Medicine* Fall 2010;12:143-8.
- [43] Nasiripour A, Saeedzadeh Z. Correlation between nurses' communication skills and inpatient service quality in the hospitals of Kashan University of Medical Sciences. *JHPM* 2012;1:45-54.
- [44] Özlü ZK, Uzun Ö. Evaluation of satisfaction with nursing care of patients hospitalized in surgical clinics of different hospitals. *Int J Caring Sci* 2015;8:19-24.
- [45] Sultana A. Level of Satisfaction of Admitted Patients. *JRMC* 2016;20:59-62.
- [46] Boffeli TJ, Thongvanh KL, Evans SJ, Ahrens CR. Patient experience and physician productivity: debunking the mythical divide at HealthPartners clinics. *Perm J* 2012;16:19. <https://doi.org/10.7812/tpp/12-049>
- [47] Cleary PD, McNeil BJ. Patient satisfaction as an indicator of quality care. *Inquiry* 1988, pp. 25-36.
- [48] Hall JA, Irish JT, Roter DL, Ehrlich CM, Miller LH. Satisfaction, gender, and communication in medical visits. *Med Care* 1994;32:1216-31. <https://doi.org/10.1097/00005650-199412000-00005>
- [49] Tucker FG, Tucker JB. An evaluation of patient satisfaction and level of physician training. *J Health Care Mark* 1985;5:31-8.
- [50] Hall MF, Press I. Keys to patient satisfaction in the emergency department: results of a multiple facility study. *Hosp Health Serv Adm* 1996;41:515-32.

Received on May 18, 2021. Accepted on March 1, 2023.

Correspondence: Seidamir Pasha Tabaeian, Colorectal Research Center, Iran University of Medical Sciences, Tehran, Iran. E-mail: tabaeian.a@iums.ac.ir

How to cite this article: Taheri M, Abbasi M, Tavakol M, Almasi-Hashiani A, Mohammadi M, Anoshirvani AA, Akbari M, Tabaeian SP. Does moral sensitivity contribute to patient satisfaction? A cross-sectional survey in educational hospitals. *J Prev Med Hyg* 2022;63:E40-E47. <https://doi.org/10.15167/2421-4248/jpmh2023.64.1.2163>

© Copyright by Pacini Editore Srl, Pisa, Italy

This is an open access article distributed in accordance with the CC-BY-NC-ND (Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International) license. The article can be used by giving appropriate credit and mentioning the license, but only for non-commercial purposes and only in the original version. For further information: <https://creativecommons.org/licenses/by-nc-nd/4.0/deed.en>

Relationship between health literacy skills and walking behavior to prevent osteoporosis among health volunteers

RAHMAN PANAH¹, NOOSHIN HOSSEINI², SABA YAVARI¹, KEYHAN JAVANMARD³, MOHIADIN AMJADIAN⁴

¹ Research Center for Social Determinants of Health, Research Institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran; ² MS.C. in Health Education, School of Medical Sciences, Ahvaz University of Medical Science, Ahvaz, Iran;

³ MS.C. in Clinical Psychology, Faculty of Psychology, Kordistan University, Sanandaj, Iran; ⁴ Assistant Professor of English Language Department, School of Medicine, Medical Sciences University of Kurdistan, Sanandaj, Iran

Keywords

Osteoporosis • Walking behavior • Adopting walking behavior • Health literacy skills

Summary

Background. Considering the effect of exercise and health literacy in preventing osteoporosis, the effect of health literacy in adopting preventive behaviors, and the role of health volunteers in transferring health messages to the community, this study aimed to determine the relationship between health literacy skills and adopting walking behavior to prevent osteoporosis in women health volunteers.

Methods. In a cross-sectional study, 290 health volunteers referring to Qazvin health centers in 2020 were selected through Multi-stage random sampling. Data were collected using a health literacy questionnaire (HELIA) and a questionnaire for the adoption of walking behaviors for the prevention of osteoporosis, and they were analyzed using descriptive statistics and logistic regression in SPSS software version 23.

Results. The adoption of walking behaviors to prevent osteoporosis was at an average level. Age ($P = 0.034$, $OR = 1.098$), decision-making and application of health information

($P < 0.001$, $OR = 1.135$), understanding ($P = 0.031$, $OR = 1.054$), and evaluation skills ($P = 0.018$, $OR = 1.049$) were factors affecting the adoption of this behavior so that by increasing one score to these variables, the chance of adopting the behavior increased 1.098, 1.135, 1.054 and 1.049 respectively. Also, the level of education was another effective variable in adopting this behavior, so having a favorable level of adoption of this behavior in health volunteers with a diploma degree ($P = 0.017$, $OR = 0.736$) and below diploma ($P = 0.011$, $OR = 0.960$), were 0.736 and 0.960 times of those with university degrees respectively.

Conclusion. The adoption of walking behaviors to prevent osteoporosis among health volunteers – who have lower age, education, and decision-making skills and the use of health information, understanding, and evaluation – was less. Therefore, it is necessary to pay more attention to them when designing educational health programs.

Background

Osteoporosis is one of the most influential chronic diseases in women's lives in a community [1, 2]. More than 200 million women have osteoporosis worldwide [3, 4], and approximately one in 3 women and one in 12 men have osteoporosis [5, 6]. Epidemiologically about 8 million women and 2 million men have osteoporosis in the United States [3]. According to the Tehran Rheumatology Research Center, over 6 million Iranians have osteoporosis [7, 8]. The main cause of this disease is not yet known. Age, gender, genetic characteristics, smoking, diet, low physical activity, long-term Glucocorticoid intake, inadequate calcium intake, vitamin D deficiency, and estrogen levels are considered factors associated with bone density changes [4, 8]. Although osteoporosis can be prevented and treated, it is irreversible and can disable the patient. In addition to physical problems, it also imposes a lot of costs on these individuals and the health care systems in society [6, 9]. Prevention of osteoporosis has several aspects, including

nutrition, sports, lifestyle, and initial screening. World Health Organization (WHO) believes that women should be aware of a balanced diet such as vitamin D, calcium, and regular exercise exercises to prevent osteoporosis [10].

Although many people are aware of the benefits of physical activity for physical and psychological health, unfortunately, physical activity has decreased in recent years. Physical activity is an effective factor in the incidence of some chronic diseases such as Osteoporosis, Diabetes, Hypertension, Cardiovascular Disease, Obesity, and Overweight [11]. According to the WHO, more than 60 percent of adults do not have enough physical activity to maintain their health [12]. Health literacy can affect levels of physical activity and is also one of the effective factors in preventing osteoporosis among women [13]. Health literacy is a set of skills, abilities, and capacities in various dimensions. These skills and capacities are sometimes manifested in obtaining, sometimes in reading, sometimes in understanding, sometimes in processing and interpreting [14], and sometimes in decision-making and

application of medical and health information, and they can affect the adoption of preventive behaviors in this way [15]. In Panahi et al., decision-making and the use of health information and evaluation skills were associated with the adoption of preventive behaviors [16]. Also, the results of Martin et al., showed that the skills of perception and use of health information were effective in the decision of individuals to adopt healthy and appropriate behavior [17]. One study also showed that the skill of using health information could predict the adoption of osteoporosis-prevention behavior among female adolescents [18].

Women's participation is one of the important factors in the success of health programs, which means total involvement of women in decision-making and implementation in health matters relating to the community. Accordingly, the "health volunteers" program was designed and implemented. The purpose of this plan, in addition to teaching the materials and skills necessary, is the transfer of health messages [13]. The health volunteers are housewives or employed women who volunteered to provide a variety of services, including health education, screening, and referral of individuals to health centers at the community level [17]. They have an important role in identifying risk factors, supporting and educating individuals to decrease their risky behaviors, and adopting proper lifestyles [18]. They act as bridges between individuals and health centers, and their knowledge and behavior can affect the health of households and ultimately the whole of society [19]. Despite numerous studies on the impact of health literacy in adopting different levels of exercise, most individuals ignore its role in adopting physical activity, especially walking behavior. Therefore, due to the important role of exercise in preventing osteoporosis, the role of health literacy in adopting different levels of exercise [11, 20, 21], adopting preventive behaviors [19-25] and preventing osteoporosis [26, 24], and the role of health volunteers in the transfer of health messages to the community [13] and the daily increase in of osteoporosis [27], this study aimed to determine the relationship between health literacy skills and adopting walking behavior to prevent osteoporosis in the women health volunteers.

Methods

STUDY DESIGN AND SAMPLING

This was a cross-sectional study conducted among active health volunteers referring to health centers in Qazvin in 2020. Multi-stage random sampling was used so that the list of health centers in Qazvin was prepared and then it was divided into two parts of north and south. Then, two health centers were randomly selected in each section. Finally, health volunteers were randomly selected through a lottery in each health center.

According to the results of the pilot study in 30 health volunteers ($r = 0.15$ for the correlation between the adoption of walking behaviors to prevent osteoporosis and health literacy) as well as the sample size table

for correlation studies, the minimum sample size was estimated to be 175 [28]. The sample size was estimated to be 263 considering *design effect* = 1.5. Finally, considering the possibility of a 10% drop in samples, 290 people were included in the study.

The inclusion criteria of the study were reading and writing literacy, Iranian citizenship, 18 to 65 years old, active as a health volunteer during the study, active presence in weekly or monthly volunteers' meetings in Health Centers, and informed written consent. Exclusion criteria were no unwillingness to continue the study and incomplete questionnaires.

DATA COLLECTION INSTRUMENTS

The data collection instrument consisted of three parts:

- A. demographic and background information questionnaire including items about age, marital status, education level, address, weight, height, number of delivery, number of lactation, number of family members, and monthly family income;
- B. to measure health literacy and its skills, the health literacy questionnaire for the urban population between 18-65 years old (HELIA) was used [28, 29]. This questionnaire included 5 main skills (reading, access, understanding, evaluation, decision-making, and use of health information), and 33 items are used to measure these skills. The scoring scale was based on a 5-score Likert, so that 5, 4, 3, 2, and 1 were given to quite easy, easy, not easy and not hard, hard, and completely hard items about reading skills respectively [29]. In the other four health literacy skills, 5, 4, 3, 2, and 1 were given to always, quite often, sometimes, rarely, and never respectively. To score the questionnaire, the raw score for each individual in each skill was obtained by the sum of his scores. Then, to convert this score to a zero to one hundred range, the raw scores minus the minimum possible raw score were divided by the maximum possible score minus the minimum possible score. Finally, to calculate the total score, scores of all skills (based on a range of zero to 100) were added and it was divided by the number of skills (number 5), so that 0 to 50, 50.1 to 66, 66.1 to 84, 84.1 to 100 were considered as inadequate health literacy, adequate health literacy, sufficient health literacy, and excellent health literacy respectively. The questionnaire had a favorable validity and acceptable reliability (The alpha Cronbach between 72 to 89%) [29]. In the present study, it was first studied as a pilot among 30 health volunteers and the alpha Cronbach coefficients were calculated between 0.76 and 0.85;
- C. part three included measuring the adoption of walking behaviors to prevent osteoporosis. This section included 7 items and it measured the time spent walking over the past week. To score this part, zero, one, two, and three were given to no walking, light walking, average walking, and heavy walking respectively. Thus, the range of scores was between zero and 21. The validity of this part was more than 0.7 in the study of John and colleagues,

and its reliability was above 0.79 by Cronbach's alpha coefficient (30, 27). It was also pilot-studied in 30 of the health volunteers and its alpha Cronbach coefficient was 0.81. The rate of preventive behaviors was classified into three levels: poor (scores less than 50% of the total score), moderate (scores of 75-50% of the total score), and good (scores above 75% of the total score) [31]. Also, the preventive behaviors were classified into two levels: poor (scores less than 50% of the total score) and good (scores between 100-50% of the total score) [25, 32], and they were used in the logistic regression in the study.

ETHICAL CONSIDERATIONS

The research number was received from the Deputy of Research and Technology of Qazvin University of Medical Sciences (Ethics code: IR.QUMS.REC.1398.380) in coordination with selected health centers. The purpose of the study was explained for the health volunteers to get their written consent. The questionnaires were self-reported, and all health volunteers were asked to complete the questionnaires honestly. They were also assured that all the information requested would be secret and without the names of the individuals.

STATISTICAL ANALYSIS

Data were analyzed using descriptive statistics and logistic regression in SPSS version 23, and the significant level was less than 0.05.

Results

GENERAL CHARACTERISTICS OF PARTICIPANTS

After completing the questionnaire, 10 cases were excluded from the study due to incomplete questionnaires, and 280 were included in the final analysis (response rate of 96.5%). The mean and standard deviation of the participant's age, height, and weight were 41.71 ± 3.57 years, 160.51 ± 6.27 cm, and 65.58 ± 5.89 Kg respectively. 25% (70) had a university education, 55% (154) had diplomas and 20% (56) were under diploma degrees. The monthly income of the participants' families was at an average level. Also, the mean and standard deviation for the number of delivery, the number of lactation, and the number of family members of the participants were 2.32 ± 1.35 and 1.85 ± 1.14 , and 3.55 ± 1.25 respectively. 71.4% (200 people) lived in the city and 28.6% (80) in villages, 20.7% (58) were single and 79.3% (222 people) were married.

ADOPTION OF PREVENTIVE BEHAVIORS

The mean and standard deviation of the adoption of preventive behaviors were 11.57 ± 1.43 out of 21 and it was moderate. The adoption of preventive behaviors was at poor, moderate, and good levels in 41.4% (116), 46.1% (129), and 12.5% (35) respectively. Also, the mean and standard deviation of health literacy score

Tab. 1. Health literacy Total and numerical indicators of its skills among the studied health workers.

Health Literacy Total and its Skills	Mean	Standard Deviation
Access	69.44	14.66
Reading	65.87	14.37
Understanding	75.17	15.14
Evaluation	66.28	13.74
Decision Making and health information Application	54.89	14.55
Health Literacy Total	65.47	12.54

was 65.47 ± 12.54 out of 100 which was at a moderate level. Table I showed the mean and standard deviation of the five skills scores of health literacy and the total health literacy score in the health volunteers. The results showed that among the five skills of health literacy, understanding and accessing had the highest, and decision-making and reading, and applying the health information had the lowest mean scores. (Tab. I).

FACTORS AFFECTING THE ADOPTION OF WALKING BEHAVIORS TO PREVENT OSTEOPOROSIS

Table II showed the results of logistic regression to determine the factors affecting the adoption of walking behaviors to prevent osteoporosis in the health volunteers. The results showed that age, level of education and decision-making skills and use of health information, understanding, and evaluating were the effective factors in adopting walking behaviors.

Moreover, the education level did not have a significant relationship with the adoption of walking behavior; so the chances of having a favorable level of adopting preventive behaviors in health volunteers with diploma ($P = 0.016$, $OR = 0.736$) and below diploma degrees ($P = 0.012$, $OR = 0.960$) were 0.736 and 0.960 respectively which were the same as those with university degrees. Also, the age ($P = 0.034$, 1.098), decision-making and health information application ($P < 0.001$), understanding ($P = 0.031$, $OR = 1.054$), and evaluation ($P = 0.018$, $OR = 1.049$) affected the adoption of walking behaviors to prevent osteoporosis so that by increasing a score to these variables' level, the chances of adopting walking behaviors increased by 1.098, 1.135, 1.054 and 1.049 respectively. Meanwhile, other demographic and background variables and reading and access skills did not affect the adoption of walking behaviors ($P < 0.05$).

Discussion

The study aimed to determine the relationship between health literacy skills and adopting walking behaviors to prevent osteoporosis in health volunteers.

The results showed that among the five skills of health literacy, understanding, and access had the highest mean scores. These results are consistent with the results of Panahi et al. [33]. Also, in the studies of Panahi et al. [16], Khoshravesh et al. [34], and Ansari et al. [35]

Tab. II. Factors affecting the adoption of walking behaviors to prevent osteoporosis in health volunteers in the logistic regression model *.

Variable		Regression Index Estimation	Odds Ratio (OR)	Standard Error (SE)	Wald statistic	P-value	P value (0.95%)	
							The Least Value	The Most Value
Place of Residency	City	-	-	-	-	-	-	-
	Village	0.331	1.39	0.165	4.02	0.359	0.008	0.655
Education Level	University	-	-	-	-	-	-	-
	Diploma	-0.306	0.736	0.344	0.011	0.016	-0.712	0.64
	Below diploma	-0.036	0.96	0.34	0.011	0.012	-0.714	0.64
Marital Status	Single	-	-	-	-	-	-	-
	Married	-0.010	0.99	0.029	0.125	0.654	-0.067	0.047
Monthly Family Income		0.007	1.007	0.006	1.086	0.258	-0.006	0.019
Age		0.094	1.098	0.041	5.055	0.034	0.012	0.176
Number of Deliveries		-0.029	0.971	0.021	1.86	0.152	-0.071	0.013
Height		-0.049	0.95	0.147	0.113	0.687	-0.337	0.239
Weight		-0.010	0.99	0.029	0.125	0.413	-0.067	0.047
Number of lactating		-0.015	0.985	0.05	0.091	0.183	-0.115	0.084
Number of Family members		-0.044	0.956	0.035	1.581	0.254	-0.114	0.025
Reading		0.033	1.033	0.04	0.689	0.186	-0.046	0.112
Access		0.005	1.005	0.034	0.025	0.103	-0.062	0.073
Understanding		0.053	1.054	0.025	4.352	0.031	0.003	0.103
Evaluation		0.048	1.049	0.0218	4.773	0.018	0.005	0.090
Decision-Making and Application		0.127	1.135	0.031	16.514	< 0.001	0.066	0.189

* Independent variables were entered concurrently into the logistic regression model.

understanding had the highest mean score among health literacy skills. Moreover, these results are consistent with the results of the study of Mahmoudi et al. [36] in which access had the highest mean score. Since the participants in this study were health liaisons, it is possible that in addition to access, they also have more understanding of health-related issues than other people. On the other hand, decision-making and use of health information along with reading skills had the lowest scores in our study. These results are consistent with the results of ZiaPour and Kianpour [37], and the study of Panahi et al. [16] in which decision-making and health information applications had the lowest mean scores. However, these results are not consistent with the results of the study of Mahmoudi [36], in which information evaluation skills had the lowest score. The possible reasons for this inconsistency are the participants' low level of health issues evaluation compared to the health volunteers in this study, the health volunteers' low accuracy in answering reading, decision making, and applying health information items, as well as the difference in health literacy level between the two groups.

Also, the results showed that the health literacy level was moderate in the health volunteers. The results of the global study of Eftekhari and colleagues showed that the level of health literacy in health volunteers is low which is not consistent with the results of this study [38]. Considering the direct relationship between education level and health literacy [14, 39], this justification is possible. One of the possible reasons for this inconsistency is that 61.5% of the health volunteers had elementary and upper elementary degrees and had lower health literacy levels compared to the participants of this study. Another reason can be the difference in the instruments used in both studies (HELIA tool in our study and TOFHLA

tool in the study of Eftekhari). Similar to the results of this part of the present study, the study of Dehghankar and colleagues showed that the health literacy level was moderate in female students [40].

The results showed that the adoption of walking behaviors was at a moderate level. In the study of Aligol et al. [41] and Bashiri Moosavi et al. [42], physical activity level was also moderate. Considering the moderate level of health literacy in the present study, as well as the relationship between health literacy and adopting preventive behaviors [24, 32, 43, 44], It was expected that the adoption of preventive behaviors was also at a moderate level.

The moderate level of adopting walking behaviors to prevent osteoporosis could be attributed to the average levels of health literacy among the health volunteers, and also the relationship between health literacy and adopting preventive behaviors.

Moreover, age affected the adoption of walking behavior to prevent osteoporosis. Age also was one of the effective factors in adopting preventive behaviors in the study of Panahi et al. [24]. However, there was no significant relationship between age and adoption of preventive behaviors in Hosseini et al. [45], and Panahi et al. [46]. It seemed that with increasing age and increasing self-efficacy, people would have more successful experiences [47], due to the effect of self-efficacy on calcium intake and exercise [48] and the relationship between self-efficacy and health literacy [49].

Moreover, the results showed that the level of education was effective in adopting walking behaviors. These results were consistent with the results of Hernandez-rauda et al. [50]. Etehad Nezhad and colleagues' study showed that there was a relationship

between the level of women's education and the intake of calcium as preventive behavior of osteoporosis [3]. In the study of Kani Jayhooni and colleagues, there was also a relationship between women's education and adopting preventive behavior [51]. The results of this part were inconsistent with the results of Panahi et al. [2] and Hosseini et al. [46]. One of the possible reasons for this discrepancy could be the younger age and lower health literacy level of the students compared to those of the health volunteers in the present study. It seemed that the higher their level of education, the more likely they are aware of health information and more likely to adopt preventive behaviors.

The results showed that decision-making skills and the use of health information, understanding, and evaluation skills were effective factors in adopting walking behaviors to prevent osteoporosis. In the studies of Panahi et al. [33] and Martin et al. [52], decision-making skills and health information and evaluation were related to the adoption of preventive behaviors which is in line with these results. Martin et al. showed that perception and the use of information in decision-making were effective in treating behavior [52]. It can be concluded that health literacy is a set of skills, capabilities, and capacities in various dimensions. These skills and capacities emerge occasionally in obtaining medical and health information, reading, understanding, processing and interpretation, and decision-making and the use of health information [14], and they can affect the adoption of preventive behaviors [15]. In other words, in the present study, probably these skills and capacities were able to appear only in the three skills of decision-making and the use of health information, understanding and evaluation, and they had an impact on the adoption of preventive behaviors. Also, regarding the impact of decision-making skills and the use of health information on adopting behavior, it can be added that this skill is somehow the same as behavior. Meanwhile, understanding and assessment were effective in the adoption of preventive behaviors due to the activities of the health volunteers and their presence in educational meetings in the health centers, and their transferring of these pieces of training to the households.

Conclusion

The adoption of walking behaviors to prevent osteoporosis was less among health volunteers who had lower age, education, decision-making skills, and the use of health information, understanding, and evaluation. Therefore, it is necessary to pay more attention to them when designing educational health programs.

It seemed that the present study was the first study to determine the relationship between health literacy skills and adopting walking behaviors. The findings of this study should be used to design interventions to prevent osteoporosis among health professionals. Also, the target group in this study was active health workers living in Qazvin city. Therefore, the results of this study cannot be generalized to other groups of health

professionals. Therefore, it is recommended to conduct this study among the health liaisons of other cities as well as among different groups of women (in terms of education, age, and residential area).

Limitation

The most important limitation of this study was the lack of a specific instrument for measuring health literacy in osteoporosis. Moreover, ignoring other health skills related to health literacy such as self-efficacy, communication, and calculation was another limitation of this study which could study a wider and more comprehensive relationship between health literacy skills and adopting walking behaviors in osteoporosis. Ignoring cultural backgrounds and skills such as speaking, listening, and understanding basic and cultural knowledge of individuals was also another limitation of this study that should be paid attention to when measuring health literacy. They were also neglected in other instruments and studies. In addition, a relatively low number of samples, sampling at the level of health centers, a low number of related studies, and self-reported data collection were other limitations of this study.

Ethics approval and consent to participate

The ethical principles observed by the researchers included obtaining permission from the Ethics Committee of Qazvin University of Medical Sciences (Ethics code: ir.qums.rec.1398.380). In addition, written informed consent from all the participants was obtained and they were granted the right to withdraw from the study at any time. The principles of anonymity and confidentiality were applied and the participants were provided with the results upon their request.

Consent for publication

Consent was given to the participants so that their anonymity was not endangered.

Availability of data and materials

The data that support the findings of this study are available from Rahman Panahi but restrictions apply to the availability of this data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of Rahman Panahi.

Acknowledgments

This study was supported by the Department of Science and Technology of the University of Medical Sciences

(project code: 28.6.35261 dated 25.12.1398). We sincerely appreciate all Health officials and managers of health centers in Qazvin, and all the volunteers who helped us in this study.

Conflict of interest statement

The authors declare no competing interests regarding the present study.

Funding

The researchers consider it necessary to express their gratitude to the Deputy of Research and Technology and the School of Nursing and Midwifery of Qazvin University of Medical Sciences which supported this research in the form of an approved plan.

Authors' contributions

This study was designed by RP, MA, and NH. SY, LD, KJ, RP wrote the proposal, and MA and RP reviewed and modified it. MA and SY performed the simulations of blindness. All authors have read and approved the manuscript.

References

- [1] Dehghankar L, Panahi R, Hasannia E, Hemmati F, Samiei Siboni F. The Effect of an Educational Intervention on Health Literacy and the Adoption of Nutritional Preventive Behaviors Related to Osteoporosis Among Iranian Health Volunteers. *J Prev Med Public Health* 2021;54:404-11. <https://doi.org/10.3961/jpmph.21.183>
- [2] Panahi R, Dehghankar L, Hosseini N, Hasania E. Factors Related to Adoption of Osteoporosis Preventive Behaviors among Females' High School Students; a Case Study of Qazvin City. *J Educ Community Health* 2020;7:105-12. <https://doi.org/10.29252/jech.7.2.105>
- [3] Etehadnezhad S, Moradi Z, Kashfi M, Khani-jeihooni A, Khiyali Z. Predictors of Osteoporosis Preventive Behaviors among Women: An Application of the Transtheoretical Model. *J Educ Community Health* 2018;5:48-56. <https://doi.org/10.21859/jech.5.3.48>
- [4] Karimiankakolaki Z, Eslami A, Gerayllo S, Heidari F, Safari Hajataghaie S, Behzadi Goudari S. Effect of Education Using the Virtual Social Networks on Promoting Women's Self-Efficacy in Preventing Osteoporosis. *J Educ Community Health* 2018;5:57-62. <https://doi.org/10.21859/jech.5.3.57>
- [5] Shobeiri F, Hesami E, Khodakarami B, Soltanian A. Effect of Counseling on Preventive Behaviors of Osteoporosis in Women Referred to Health Centers in Hamedan, Iran in 2015. *J Educ Community Health* 2015;2:51-7. <https://doi.org/10.20286/jech-02037>
- [6] Mohammadi S, Ghofranipour F, Gholami-Fesharaki M. The Effect of Osteoporosis Prevention Education on Knowledge, Attitude and Behavior of Adolescent Female Students in Kerman-shah, Iran. *J Educ Community Health* 2015;2:47-55.
- [7] Mousaviasl S, Renani HA, Gheibizadeh M, Malehi AS. The Effect of Education Based on the Health Belief Model on Osteoporosis Prevention Behaviors in Female High School Students. *Jundishapur J Chronic Dis Care* 2016;5:e34852. <https://doi.org/10.17795/jjcdc-34852>
- [8] Malekzadeh J, Fararoei M. Preventing of osteoporosis: Applying the health belief model. *Adv Nurs Midwifery* 2015;25:15-22.
- [9] Ghaffari M, Niazi S, Ramezankhani A, Soori H. Knowledge of Female Students of Kalaleh city about Osteoporosis, calcium intake, and physical activity: An Unacceptable Status. *Iran J Nutr Sci Food Technol* 2013;7:319-27.
- [10] Panahi R, Samiei Siboni F, Kheiri M, Jahangasht Ghoozlu KH, Shafaei M, Dehghankar L. Promoting the adoption of behaviors to prevent osteoporosis using the Health Belief Model integrated with Health Literacy: a quasi-experimental intervention study. *BMC Public Health* 2021;21:2221. <https://doi.org/10.1186/s12889-021-1230>
- [11] Fathi F, Rezaei Sofi M. The Relationship between Health Literacy and Physical Activity Level of Elderly Women in the City of Urmia. *J Health Lit* 2017;2:12-21. <https://doi.org/10.22038/jhl.2017.10947>
- [12] World Health Organization. Health Education and Health Promotion Unit. Annual global move for health initiative: a concept paper. World Health Organization 2003. Available at: <https://apps.who.int/iris/handle/10665/67795> (Accessed on: 2012-06-17T00:50:38Z).
- [13] Bayat B, Mohebbi B, Tol A, Sadeghi R, Yekaninejad MS. Quality of Life Predictors Among Health Volunteers in South Tehran Health Centers. *J Sch Publ Health Inst Publ Health Res* 2018;15:377-88.
- [14] Tavousi M, Haeri Mehrizi AA, Rafiefar SH, Solimani A, Sarbandi F, Ardestani M, Hashemi A, Montazeri A. Health literacy in Iran: findings from a national study. *Payesh* 2016;15:95-102.
- [15] Mahdavi ZH, Ramezankhani A, Ghanbari SH, Khodakarim L. [Relationship between health literacy and female cancers preventive behaviors]. *Payesh* 2017;5:613-25.
- [16] Panahi R, Dehghankar L, Abdollahi F, Anbari M, Hosseini N. Health Literacy and Breast Cancer Preventive Behaviors among Students. *Payesh* 2019;18:547-57.
- [17] Bayati A, Ghanbari F, Shamsi M. Exploration of the educational needs of health educators and volunteer health care communicators: A qualitative study. *J Arak Med Univ* 2013;15:21-32.
- [18] Shojaezadeh D, Sadeghi R, Tarrahi MJ, Asadi M, Lashgarara B. Application of Health Belief Model in Prevention of Osteoporosis in Volunteers of Khorramabad City Health Centers, Iran. *J Health Syst Res* 2012;2(8).
- [19] Jorvand R, Karami B, Panahi R. The effect of healthy nutrition education on the behavior of health volunteers in Ilam Province in terms of consuming fast food. *J Health Field* 2020;8:10-6.
- [20] Geboers B, de Winter AF, Luten KA, Jansen CJ, Reijneveld SA. The association of health literacy with physical activity and nutritional behavior in older adults, and its social cognitive mediators. *J Health Commun* 2014;19(Suppl 2):61-76. <https://doi.org/10.1080/10810730.2014.934933>
- [21] Lim ML, van Schooten KS, Radford K, Delbaere K. Association between health literacy and physical activity in older people: a systematic review and meta-analysis. *Health Promot Int* 2021;1-16. <https://doi.org/10.1093/heapro/daaa072>
- [22] Panahi R, Namdar P, Siboni FS, Fallah S, Anbari M, Dehghankar L, et al. Association between health literacy and adopting preventive behaviors of breast cancer in Iran. *J Edu Health Promot* 2020;9:241. https://doi.org/10.4103/jehp.jehp_313_20
- [23] Panahi R, Ramezankhani A, Tavousi M. Health literacy and preventive behaviors. *J Res Health* 2018;8:93-4. <https://doi.org/10.29252/jrh.8.2.93>
- [24] Panahi R, Osmani F, Javanmardi K, Ramezankhani A, Dehghankar L, Amini RA, et al. The relationship between different levels of Health Literacy and smoking prevention among Medical sciences students. *Int J Prev Med* 2021;12:124. https://doi.org/10.4103/ijpvm.IJPVM_460_20. eCollection 2021
- [25] Panahi R, Ramezankhani A, Tavousi M, Niknami SH. Adding health literacy to the health belief model: effectiveness of an educational intervention on smoking preventive behaviors among university students. *Iran Red Crescent Med J* 2018;20:e13773. <https://doi.org/10.5812/ircmj.13773>

- [26] Panahi R, Kazemi SS. Health literacy: an Effective Component in Prevention of Osteoporosis in Women. *Int J Musculoskeletal Pain Prev* 2018;3:69-71.
- [27] Jeihooni AK, Hidarnia A, Kaveh MH, Hajizadeh E, Askari A. The effect of an educational program based on health belief model on preventing osteoporosis in women. *Int J Prev Med* 2015;6:115. <https://doi.org/10.4103/2008-7802.170429>
- [28] Sharifi Rad Gh, Baghani Moghaddam MH, Shamsi, Rezaian M. *Research in Health Education*. 1st Edition. Tehran, Iran: Sobhan Works Publications 2009, pp. 178-180.
- [29] Montazeri A, Tavousi M, Rakhshani F, Azin SA, Jahangiri K, Ebadi M. Health Literacy for Iranian Adults (HELIA): development and psychometric Properties. *Payesh* 2014;13:589-99.
- [30] Khani-Jeihooni A, Manouchehri M, Bahmadoost M, Khyali Z. Effect of Educational Intervention Based on the Health Belief Model on Preventive Behaviors Against Influenza A (H1N1) among Students. *J Educ Community Health* 2020;7:97-103. <https://doi.org/10.29252/jech.7.2.97>
- [31] Panahi R, Ramezankhani A, Tavousi M, Osmani F, Niknami S. Predictors of Adoption of Smoking Preventive Behaviors among University Students: Application of Health Belief Model. *J Educ Community Health* 2017;4:35-42. <https://doi.org/10.21859/jech.4.1.35>
- [32] Panahi R, Namdar P, Siboni FS, Fallah S, Anbari M, Dehghankar L, et al. Association between health literacy and adopting preventive behaviors of breast cancer in Iran. *J Edu Health Promot* 2020;9:241. https://doi.org/10.4103/jehp.jehp_313_20
- [33] Panahi R, Ramezankhani A, Tavousi M, Osmani F, Niknami SH. Relationship between health literacy skills and adoption of smoking preventive behaviors. *J Ilam Univ Med Sci* 2019;27:11-20. <https://doi.org/10.29252/sjimu.27.2.11>
- [34] Khoshravesh S, Moeini B, Rezapur-Shahkolai F, Taheri-Kharameh Z, Bandehelahi K. Health Literacy of Employees of Hamadan University of Medical Sciences and Related Demographic Factors. *J Educ Community Health* 2018;5:19-26. <https://doi.org/10.21859/jech.5.1.19>
- [35] Ansari M, Shahdadneghad E, Khaledian M, Salajegheh M. Survey of Health Literacy of People Referred to the Libraries of Public Libraries Foundation. *Health Inf Manag* 2017;14:224-7.
- [36] Mahmoudi H, Taheri A. [Relation between Information Literacy and Health Literacy of Students in the Ferdowsi University of Mashhad]. *Hum Inf Interact* 2015; 2: 31-41.
- [37] Ziapoor A, Kianpoor N. [Predicting health literacy of students in Kermanshah University of Medical Sciences in 2016: The role of demographic variables]. *J Health Lit* 2016;1:182-90.
- [38] Jahani Eftekhari M, Peyman N, Doosti H. Health Literacy and Health-promoting Lifestyle among Health Volunteers in Neyshabour. *J Ilam Univ Med Sci* 2018;26:7-15. <https://doi.org/10.29252/sjimu.26.3.7>
- [39] Sajadi FA, Sajadi HS, Panahi R. Health Literacy of University Students and its Influential Factors: A Case Study at Isfahan University. *J Educ Community Health* 2020;7:23-8. <https://doi.org/10.29252/jech.7.1.23>
- [40] Dehghankar L, Hajikarimbaba M, Panahi R. Health Literacy and Factors Related to It Among Female Students of Imam Khomeini International University in Qazvin, Iran. *sjsph* 2019;17:295-306.
- [41] Aligol M, Kazemi S S, Salim Abadi Y, Nasirzadeh M, Tayyebi Z. A Survey on Physical Activity Determinants as Osteoporosis Preventive Behavior Among Pre-university Female Students of Rafsanjan in 2017: A Descriptive Study. *J Rafsanjan Univ Med Sci* 2019;18:455-68.
- [42] Bashiri Moosavi F, Farmanbar R, Taghdisi MH, AtrkarRoshan Z. [Level of physical activity among girl high school students in Tarom county and relevant factors]. *Iran J Health Educ Health Promot* 2015;3:133-40.
- [43] Fernandez MD, Larson JL, Zikmund-Fisher BJ. Associations between health literacy and preventive health behaviors among older adults: findings from the health and retirement study. *BMC Public Health* 2016;16:596. <https://doi.org/10.1186/s12889-016-3267-7>
- [44] Izadirad H, Zareban I. The Relationship of Health Literacy with Health Status, Preventive Behaviors and Health Services Utilization in Baluchistan, Iran. *J Educ Community Health* 2016;2:43-50. <https://doi.org/10.20286/jech-02036>
- [45] Panahi R, Ramezankhani A, Anbari M, Javanmardi K. Adoption of smoking preventive behaviors and its related factors among dormitory students of Shahid Beheshti University of Medical Sciences in Tehran-2016. *J Health Field* 2020;8:22-31.
- [46] Hosseini Z, Karimi Z, Mohebi S, Sharifirad G, Rahbar A, Gharlipour Z. Nutritional preventive behavior of osteoporosis in female students: applying Health Belief Model (HBM). *Int J Pediatr* 2017;5:413744. <https://doi.org/10.22038/ijp.2016.7560>
- [47] Ozturk A, Sendir M. Evaluation of knowledge of osteoporosis and self-efficacy perception of female orthopedic patients in Turkey. *Journal of Nursing and Healthcare of Chronic Illness* 2011;3:319-28. <https://doi.org/10.1111/j.1752-9824.2011.01106.x>
- [48] Chan CY, Mohamed N, Ima-Nirwana S, Chin KY. A Review of Knowledge, Belief and Practice Regarding Osteoporosis among Adolescents and Young Adults. *Int J Environ Res Public Health* 2018;15:1727. <https://doi.org/10.3390/ijerph15081727>
- [49] Ghanbari S, Ramezankhani A, Montazeri A, Mehrabi Y. Health literacy measure for adolescents (HELMA): development and psychometric properties. *PloS One* 2016;11:e0149202. <https://doi.org/10.1371/journal.pone.0149202>
- [50] Hernandez-Rauda R, Martinez-Garcia S. Osteoporosis-related life habits and knowledge about osteoporosis among women in El Salvador: a cross-sectional study. *BMC Musculoskeletal Disord*. 2004;5:29. <https://doi.org/10.1186/1471-2474-5-29>
- [51] Khani Jeihooni A, Heidarnia AR, Kaveh MH, Hajizadeh E, Gholami T. Survey of osteoporosis preventive behaviors among women in Fasa: The application of the health belief model and social cognitive theory. *Iran South Med J* 2016;19:4862.
- [52] Martin LT, Haas A, Schonlau M, Pitkin Derosé K, Rosenfeld L, Rudd R, Buka SL. Which literacy skills are associated with smoking? *J Epidemiol Community Health* 2012;66:189-92. <https://doi.org/10.1136/jech.2011.136341>

Received on August 16, 2022. Accepted on March, 1, 2023.

Correspondence: Mohiadin Amjadian, Kurdistan University of Medical Sciences, Sanandaj, Iran. Tel. 0989183778545 - Fax: 08733664645 - E-mail: Mohiadin72@yahoo.com

How to cite this article: Panahi R, Hosseini N, Yavari S, Javanmardi K, Amjadian M. Relationship between health literacy skills and walking behavior to prevent osteoporosis among health volunteers. *J Prev Med Hyg* 2022;63:E48-E54. <https://doi.org/10.15167/2421-4248/jpmh2023.64.1.2685>

© Copyright by Pacini Editore Srl, Pisa, Italy

This is an open access article distributed in accordance with the CC-BY-NC-ND (Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International) license. The article can be used by giving appropriate credit and mentioning the license, but only for non-commercial purposes and only in the original version. For further information: <https://creativecommons.org/licenses/by-nc-nd/4.0/deed.en>



HEALTH PROMOTION

Development of indicators to measure quality of life for pregnant women (QOL-PW)

NUNIK PUSPITASARI

Department of Biostatistics and Population Study, Public Health Faculty, Universitas Airlangga, Indonesia

Keywords

Indicators • Quality of life • Pregnant women

Summary

Introduction. Ideal health assessment includes physical, mental, and social health measures that measure a person's quality of life. This study aims to develop indicators to measure the quality of life of pregnant women.

Methods. The design of this study was development research with a cross-sectional data collection. The study sites were in six PHC in Ngawi district and Blitar city, East Java Province, Indonesia. The sample size is 800 pregnant women. Data analysis used the second-order Confirmatory Factor Analysis (CFA) method.

Results. The indicators to measure the quality of life of pregnant women were all 46, consist of 21 indicators for functional and physical health factors, 6 indicators for mental health and functional factors, and 19 indicators for the social functional and

environmental factors. Health factors and physical functions consist of 21 indicators, which are divided into seven aspects. Health factors and mental functions consist of 6 indicators divided into three aspects. The social and environmental function factor consists of 19 indicators divided into six aspects.

Conclusions. The indicators of quality of life for pregnant women that are developed can represent most of the conditions of pregnant women, and if they have been validated, they are expected to be applied easily. Indicators of quality of life for pregnant women have provided a sufficient but straight forward way of calculating and cutting off points to categorize the quality of life status of pregnant women.

Introduction

World Health Organization (WHO) defines pregnancy and labor as a specific condition that is categorized as not a disease, but only biological and social processes that carry health risks [1]. Nevertheless, the fact is that pregnancy and childbirth cannot be categorized as the regular health status of the mother. During pregnancy, chemical, biological, physiological, hormonal, and anatomical changes occur in the mother's body. Emotional and physical changes also occur during pregnancy. These changes are beyond their control, and it is assumed that these changes make them vulnerable both physically and mentally, so that it often affects the overall welfare of pregnant women [2, 3]. Pregnancy is a crucial period for a mother because it poses risks not only to herself but also to the child [4].

Mothers can be physically fit during pregnancy and after delivery, but they are not necessarily mentally and socially healthy. An ideal health assessment will include physical health measures, physical, social and psychological functions, all of which are measures of a person's quality of life [5]. Quality of life must be a significant concern in the health care of pregnant women, namely, quality of life must be the central axis, from the beginning to the last day of life [6]. Quality of life during pregnancy, the most widely discussed area, is physical health. However, this does not play down the critical role of the psychological domain and social relations in quality of life pregnant women. There is an

interconnection between affected domains, or in other words, one domain reflects another domain [7].

The indicator widely used throughout the world to assess a person's physical, mental, and social health status, is quality of life. The WHO world health organization states that quality of life is 'people's assessment of their position in life in the context of culture and value systems in their homes, related to goals, a combination of physical, psychological (mental) health aspects, level of self-confidence, social relations, belief personal and their relationship with the environment [5]. The definition of quality of life, according to WHO, is a definition that is widely accepted throughout the world. The process of pregnancy affects or can decrease the quality of life from the beginning of pregnancy until delivery, even the risk of a decrease in the mother's quality of life is higher in pathological pregnancy [8]. The presence of pain, nausea and vomiting, depression, and the absence of a supportive partner can negatively affect the quality of life of pregnant women [7]. The mother's quality of life during the perinatal period can also harm the quality of life felt after delivery, such as postnatal depression, complications during labor, or abnormalities in the baby [9].

In addition to physical health problems, WHO states worldwide about 10% of pregnant women and 13% of new mothers experience mental disorders, mainly depression. This figure is even higher in developing countries, which is 15.6% during pregnancy [10] and 19.8% after giving birth. In cases of severe mental

disorders that can cause severe suffering to the mother, it can even trigger suicidal ideation. Besides, mothers with mental disorders usually cannot perform their daily functions properly. This fact shows that the health problems of pregnant and postnatal women are not only physical but also mental health and social health problems [11].

Another problem that affects the health status of the mother during pregnancy is social and environmental support. Social support from many people, both from husband, family, and friends to the mother during pregnancy, indirectly affects stress during pregnancy [12] and helps protect mothers against postpartum depression [13]. Pregnant women who get higher social support will have low stress levels, while pregnant women who lack or do not get social support will have high-stress levels [14].

The specific quality of life instruments that have been developed and validated to measure the quality of life of pregnant women currently have only one developed in Europe (Czecho-Slovakia), in addition to several generic instruments that often have been used to measure the quality of life of pregnant women. Many literature study articles state that generic instruments such as Short Form-36 (SF-36) [15], World Health Organization Quality Of Life-Bref (WHOQOL-BREF) [16, 17] and specific instruments such as The Nausea and Vomiting of Pregnancy-Specific Health-Related Quality of Life (NVP Specific HRQOL) [18, 19], The specific QOL-GRAV [20], Postpartum Quality of Life (PQOL) [21], Maternal Postpartum Quality of Life (MAPP-QoL), and Mother-Generated Index (MGI) [22] has often been used to measure Health-Related Quality of Life (HRQoL) in pregnant women.

Although several generic and specific life instruments are reliable, according to the researchers, a number of these instruments are considered less suitable for measuring the quality of life in special populations such as pregnant women [22, 19]. While these generic instruments are not sensitive enough to capture small but essential changes or effects of interventions on special populations such as pregnant women. Besides, it will potentially lose the mother's unique perspective with or without morbidity that lasts during pregnancy [23].

Therefore, to measure HRQoL of pregnant women with diverse demographic and socio-cultural backgrounds, new indicators are needed with varying pregnancy conditions. The development of new indicators and instruments will have the following advantages: provide a general HRQoL measure for various pregnancy conditions; allows comparisons between programs that handle pregnancy in different contexts; and allows evaluation of the achievement of targeted local, national, or global targets in the field of maternal and child health [22].

The purpose of this study is to develop new indicators to measure the quality of life of pregnant women with diverse socio-demographic backgrounds and varying pregnancy conditions.

Methods

This type of research is development research with the research design used is cross-sectional because data collection is done at one time.

The research location is six public health center with details of 3 public health center in Blitar City, which is an area with a high maternal mortality rate (AKI), and 3 public health center in Ngawi Regency, which is a region with a low MMR category in East Java Province, Indonesia. The data collection time is estimated from January 2019 to March 2019.

The research sample was a portion of pregnant women who had antenatal care (ANC) examinations at three Community Health Centers in Ngawi Regency and Blitar City, East Java Province. The simple random sampling formula is used to determine the sample [24]. Based on this equation, a sample size of 800 pregnant women was obtained from a total population of 25,200 pregnant women. The simple random sampling equation used is as follows:

$$n = \frac{Z_{1-\frac{\alpha}{2}}^2 P(1-P)N}{d^2(N-1) + Z_{1-\frac{\alpha}{2}}^2 P(1-P)}$$

Quality of life pregnant women who will be developed with this study consists of 3 factors:

1. functional and physical health factors: consisting of 7 variables (aspects);
2. functional and mental health factors: consisting of 5 variables (aspects);
3. social and environmental function factors: consist of 13 variables (aspects).

Interviews were conducted while pregnant women were visiting pregnancy check-up (ANC) at the health center. The interview is done once during pregnancy, regardless of gestational age.

Before arriving at the data collection stage, identification, confirmation, validation, and reduction of all variables (aspects) and all items that make up each aspect are first carried out. The process of identification, confirmation, validation, and reduction is carried out in 4 stages, namely:

1. Phase I: conduct a comprehensive and in-depth literature study to identify all domains, variables (aspects), and items that make up the quality of life indicator for pregnant women. In studying this literature, three domains, 25 aspects, and 115 indicators of quality of life have been identified. Details of the whole domain, aspects, and indicators have been explained in the conceptual framework;
2. Phase II: confirm and validate all domains, aspects, and indicators that make up the indicators of quality of life for pregnant women by conducting a preliminary study using the in-dept interview method for pregnant women in two regions, namely Ngawi Regency and Sumenep Regency;
3. Phase III: testing instruments to determine their validity and reliability so that the number of indicators is reduced to 115 variables in the end. The trial of the instrument was conducted by interview using a

questionnaire to 30 pregnant women who were doing ANC at the Mulyorejo Health Center, Surabaya;

4. Phase IV: confirm and validate all domains, aspects, and indicators that make up the quality of life indicator for pregnant women using the review method by some experts. Based on the results of the expert review, it was found that there were several inputs, including the number of items it was suggested not to be reduced by the consideration that if it were not significant, it would be wasted by itself at the time of the Confirmatory Factor Analysis (CFA) so that the number of indicators remains as before, namely 115 indicators.

Data processing and data analysis are carried out in the following stages:

1. before the questionnaire for data collection was applied to pregnant women in Ngawi Regency and Blitar City, the validity and reliability tests were first conducted by interviewing 30 pregnant women outside the study location. Then the instrument validity was analyzed using the correlation test, and the instrument reliability was analyzed alpha Cronbach;
2. after making improvements to the questionnaire based on the validity and reliability test results, the data was collected at 3 Puskesmas in Ngawi Regency and 3 Puskesmas in Blitar City;
3. if the data has been collected, then check and repair (editing) if there is data entry on the wrong or lacking questionnaire. Next, provide a code (coding) for each answer on the questionnaire that has been filled in completely;
4. it gives a score for each question item analyzed and submits the answers to some question items that make up one aspect or variable. Each question item is given two answer choices, namely yes, and no. The scoring of each question item is as follows:
 - a. score 0 if the answer is No;
 - b. score 1 if the answer is Yes;
 If the question item is negative, then the answer score is categorized as follows:
 - a. score 0 if the answer is Yes;
 - b. score 1 if the answer is No;
5. enter all responsive answer data into the data processing program on the computer, all items, and all aspects;
6. we are analyzing all variables, using the second-order Convincatory Factor Analysis (CFA) to determine significant variables in each aspect and quality of life factors of pregnant women using SmartPLS software;
7. develop an indicator model based on the results of the CFA;
8. calculates the cut of point value for each factor based on the average value () quality of life pregnant mother + Standard Deviation (SD) value;
9. categorizing the value of quality of life for pregnant women for each factor as follows:
 - a. low: if the value of quality of life for pregnant women $\leq$ SD;
 - b. medium: if $-SD < \text{value of quality of life for pregnant women} < +SD$;
 - c. high: if the value of quality of life for pregnant women $> +SD$.

This research has obtained a certificate of ethical approval from the Ethics Commission of the Faculty of Public Health, Universitas Airlangga No. 553/EA/KEPK/2018.

Results

RESULTS OF ANALYSIS OF QUALITY OF LIFE INDICATORS FOR PREGNANT WOMEN

Indicator analysis results quality of life pregnant women for functional factors and physical health (factor A) indicate aspects of daily living activities (A1), aspects of dependence on drugs or help from others (A2), aspects of energy and fatigue (compared to before pregnancy) (A3), aspects of mobility (A4), aspects of pain and discomfort (A5), sleep and rest aspects (A6) and aspects of workability (outside and at home) (A7) are significant. That result has a meaning that all aspects of functional and physical health factors play a role in the status of the quality life of pregnant women. However, not all indicators from every aspect of function factors and physical health are significant (Tab. I).

CFA results in function factors and physical health (factor A) quality of life pregnant mother, and the loading factor value of each indicator can be seen in Figure 1.

Factor values for physical function and health (factor A) quality of life for pregnant women, calculated based on the loading factor value of each indicator. Calculation of factor values for physical function and health (factor A) quality of life pregnant mother use the following equation:

$$A = (0.411 \times A1_a) + (0.41 \times A1_b) + (0.347 \times A1_c) + (0.297 \times A1_e) + (0.357 \times A1_f) + (0.365 \times A2_c) + (0.353 \times A2_d) + (0.448 \times A3_a) + (0.467 \times A3_b) + (0.416 \times A3_c) + (0.388 \times A4_a) + (0.358 \times A5_a) + (0.334 \times A5_b) + (0.337 \times A5_c) + (0.366 \times A5_d) + (0.356 \times A6_a) + (0.38 \times A6_b) + (0.413 \times A6_c) + (0.446 \times A7_a) + (0.492 \times A7_b) + (0.347 \times A7_c)$$

Based on the equation, the average value of the functional factor and physical health (factor A) is obtained quality of life pregnant mother of 5.5707 with a standard deviation of 1,36624. Categorization of functional factors and physical health (factor A) quality of life pregnant mother use the following criteria:

1. physical Function and Health < 4.20446 are categorized as low;
2. physical Functions and Health 4.204461 to 6.93694 categorized as moderate;
3. physical Health and Functions > 6.936941 are categorized high.

As many as 84.3% of pregnant women do not have problems with their physical function and health (in moderate and high conditions), but there are still 16.3% who have low physical or functional health and function conditions. A description of the results of the categorization of functional factors and physical health (factor A) quality of life pregnant mother can be seen in Table II.

Tab. I. The CFA analysis of functional factors and physical health (factor A) significant quality of life for pregnant women 2019.

Aspect	Indicator description	p	p
A1 Daily life activities	(A1_a) Mother is still cleaning the house as usual during pregnancy	0.000	0.000
	(A1_b) Mother is still washing clothes and other household equipment, during pregnancy	0.000	
A1 Daily life activities	(A1_c) Mother still cooks and prepares food for the family as usual, during pregnancy	0.000	0.000
	(A1_e) Mother is still caring for other family members (children, husband, parents) as usual, during pregnancy	0.000	
	(A1_f) Mother still does other daily activities as usual (for example work, shopping), during pregnancy	0.000	
A2 Dependence on drugs or other people's help	(A2_c) Mother has used other people's rocks to do daily activities (> one month) during pregnancy	0.000	0.000
	(A2_d) Mothers are currently using other people's rocks to carry out daily activities (> one month) during pregnancy	0.000	
A3 Energy and fatigue	(A3_a) Mothers feel slower doing daily activities during pregnancy	0.000	0.000
	(A3_b) Mothers find it harder to carry out daily activities during pregnancy	0.000	
	(A3_c) Mother feels tired easily doing daily activities during pregnancy	0.000	
A4 Mobility	(A4_a) Mothers still find it easy to walk in daily activities, during pregnancy	0.000	0.000
A5 Pain and discomfort	(A5_a) Mother feels healthy during pregnancy	0.000	0.000
	(A5_b) Mothers feel more easily ill during pregnancy	0.000	
	(A5_c) Mother feels physically comfortable during pregnancy	0.000	
	(A5_d) Mother feels uncomfortable (aching, nausea, cramps, heavy body) during pregnancy	0.000	
A6 Sleep and rest	(A6_a) Mother often experience sleep disorders (often wake up during sleep, nightmares, delirious, and can not breathe comfortably) during pregnancy	0.000	0.000
	(A6_b) Mothers often experience difficulty falling asleep during pregnancy	0.000	
	(A6_c) Mothers often cannot rest comfortably during pregnancy	0.000	
A7 Ability to work (outside and at home)	(A7_a) Mother feels the amount of work that can be done every day becomes less during pregnancy	0.000	0.000
	(A7_b) Mother feels the type or type of daily work that can be done to be reduced during pregnancy	0.000	
	(A7_c) Mother feels the results of daily work is not as expected during pregnancy	0.000	

FUNCTIONAL AND MENTAL HEALTH FACTORS (FACTOR B)

The analysis of quality of life indicators for pregnant women as a whole for functional factors and mental health (factor B) shows that not all significant factors play a role in assessing the quality of life status of pregnant women. There are three significant aspects, namely aspects of self-perception and appearance (B1), aspects of dependence on drugs or help from others (B3), aspects of spirituality, religion, and beliefs (B4), meaning that all three aspects of the function and mental health factors play a role or contribute on the quality of life status of pregnant women (Tab. III).

CFA results in function factors and mental health (factor B) quality of life pregnant mother, as well as the loading factor value of each indicator, can be seen in Figure 2.

Factor values for function and mental health (factor B) quality of life for pregnant women, calculated based on the loading factor value of each indicator. Calculation of factor values for function and mental health (factor B) quality of life pregnant mother use the following equation:

$$B = (0.344 \times B1_e) + (0.35 \times B1_f) + (0.312 \times B3_b) + (0.251 \times B4_a) + (0.188 \times B4_d) + (0.213 \times B4_e)$$

Based on these equations, the average value of functional factors and mental health (factor B) is obtained quality of life pregnant mother of 0.9981 with a standard deviation of 0.46151. Categorization of functional factors and mental health (factor B) quality of life pregnant mother uses the following criteria:

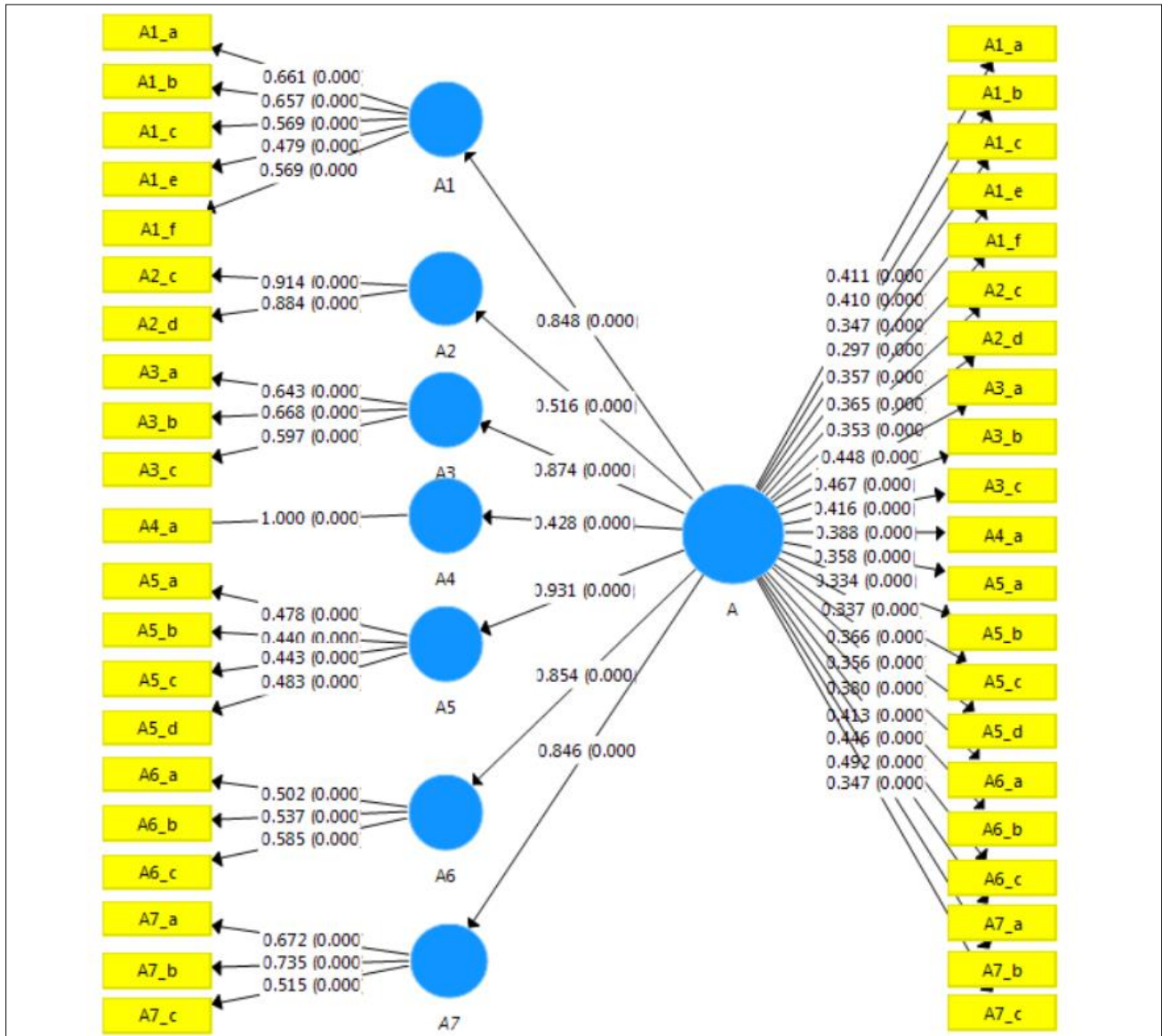
1. function and Mental Health < 0.53659 categorized as low;
2. function and Mental Health 0.536591 to 1.45961 categorized as moderate;
3. function and Mental Health > 1.459611 is categorized high.

By category for function and mental health factors (factor B) quality of life, pregnant women are known to have a mental function and low health category of 14.2%. At the same time, 85.8% of pregnant women have moderate and high mental health functions and categories. A description of the categorization of mental health and function factors (factor B) quality of life pregnant women can be seen in Table IV.

SOCIAL AND ENVIRONMENTAL FUNCTION FACTORS (FACTOR C)

The results of the analysis of overall quality of life indicators for pregnant women for social and environmental function factors (factor C) show that not all significant factors play

Fig. 1. CFA results from physical function and health factors (factor A) quality of life pregnant women 2019.



Tab. II. Results of analysis of Physical Function and Health categories (factor A) quality of life pregnant mother 2019.

Physical Function and Health Categories	n	Percentage (%)
Low	126	15.8
Moderate	544	68.0
High	130	16.3
total	800	100.0

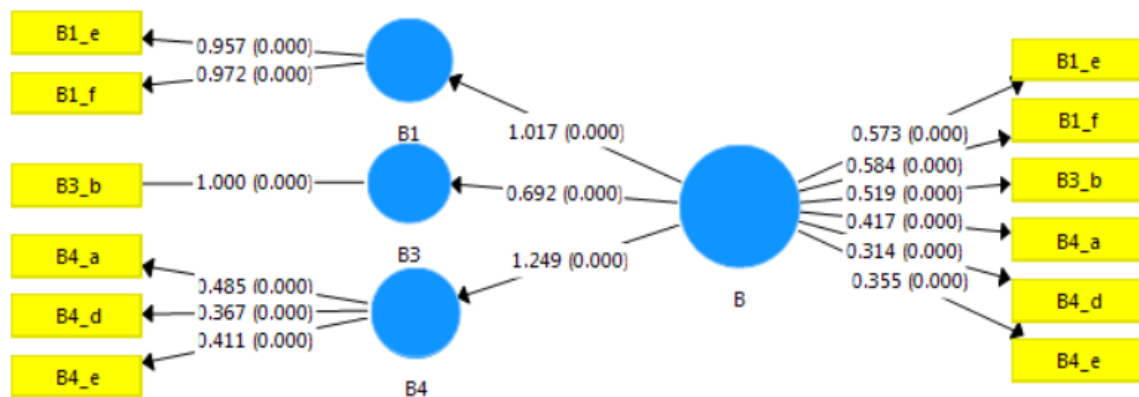
a role in assessing the quality of life status of pregnant women. There are five significant aspects, namely aspects of support from other family members (C2), aspects of support from others (C3), aspect of freedom, physical safety and security (C7), aspects of the home environment (C9), aspects of opportunities for obtaining pregnancy information (C10). That result has the meaning that these five aspects of social and environmental function factors play a role or contribute to the quality of life status of pregnant women (Tab. V).

CFA results from social and environmental function factors (factor C) quality of life pregnant mother, as well as the loading factor value for each indicator shown in Figure 3.

Value factors for social and environmental functions (factor C) quality of life for pregnant women, calculated based on the loading factor value of each indicator. Calculation of factor values for social and environmental functions (factor C) quality of life pregnant mother use the following equation:

Tab. III. CFA analysis results in functional factors and mental health (factor B) quality of life pregnant mother which is significant in 2019.

Aspect	Indicator description	p	p
B1 Self-perception and appearance	(B1_e) Mother feels this pregnancy changes the value of the mother as a woman	0.000	0.000
	(B1_f) Mother feels this pregnancy changes the value of the mother as a wife	0.000	
B3 Positive feelings in pregnancy	(B3_b) Mother feels be exclusive or special because of this pregnancy	0.000	0.000
B4 Spirituality, religion, and belief	(B4_a) Mother feels this pregnancy is a special or extraordinary event	0.000	0.000
	(B4_d) Mother performs religious services for this pregnancy	0.000	
	(B4_e) Mother performs certain cultural events or rituals for this pregnancy	0.000	

Fig 2. CFA results from physical function and health factors (factor B) quality of life pregnant women 2019.**Tab. IV.** Results of the analysis of categories of mental function and health factors (factor B) quality of life for pregnant women 2019.

Mental Health and Function Category	n	Percentage (%)
Low	144	14.2
Moderate	538	67.3
High	148	18.5
Total	800	100.0

$$C = (0.363 \times C1_a) + (0.331 \times C1_d) + (0.282 \times C1_e) + (0.319 \times C1_g) + (0.319 \times C1_h) + (0.426 \times C1_j) + (0.302 \times C1_l) + (0.41 \times C2_a) + (0.457 \times C2_e) + (0.397 \times C3_a) + (0.507 \times C3_b) + (0.478 \times C3_c) + (0.324 \times C6_a) + (0.345 \times C6_d) + (0.3 \times C9_c) + (0.269 \times C9_d) + (0.483 \times C10_a) + (0.499 \times C10_b) + (0.452 \times C10_c)$$

Based on these equations, the average value of social and environmental function factors (factor C) is obtained quality of life pregnant mother of 6.7559 with a standard deviation of 0, 76678. The categorization of social and environmental function factors (factor C) quality of life pregnant mother use the following criteria:

1. social and environmental function factors < 5.98912 are categorized as low;
2. social and environmental function factors of 5.989121 to 7.52268 are categorized as moderate;
3. social and environmental function factors > 7.522681 are categorized high.

By category for social and environmental function factors (factor C) quality of life, pregnant women in Table VI are known to have social and environmental functions low

category of 13.3%. At the same time, 86.8% of pregnant women have moderate social and environmental functions (factor C). There are no pregnant women who have high social and environmental function categories.

RESULTS OF ANALYSIS OF INDICATORS OF QUALITY OF LIFE FOR PREGNANT WOMEN

The results of the analysis of quality of life indicators for pregnant women on physical health and function factors (factor A) show all aspects (7 aspects) of physical health and function factors (factor A) play a role or contribute to the quality of life status of pregnant women.

Significant aspects of the function factor and physical health (factor A) are 1) aspects of daily living activities (A1), 2) aspects of dependence on drugs or help from others (A2), 3) aspects of energy and fatigue (compared to before pregnancy) (A3), 4) aspects of mobility (A4), 5) aspects of pain and discomfort (A5), 6) aspects of sleep and rest (A6), and 7) aspects of the ability to work (outside and at home) (A7).

The results of the analysis of quality of life indicators for pregnant women on the function factor and mental health (factor B), showed four significant aspects of the

Tab. V. CFA analysis results from social and environmental function factors (factor C) quality of life pregnant mother which is significant in 2019.

Aspect	Indicator description	p	p
C1 Support from husband	(C1_a) The husband pays more attention than usual to the mother during pregnancy	0.000	0.000
	(C1_d) The husband provides sufficient money and materials for necessities during pregnancy	0.000	
	(C1_e) The husband delivers when the mother leaves the house during pregnancy	0.000	
C1 Support from husband	(C1_g) The husband advises, comforts and soothes the mother's heart during pregnancy	0.000	0.000
	(C1_h) Husband often mentions mother and fetus in the womb, during pregnancy	0.000	
	(C1_j) The husband always asks the condition of the mother during pregnancy	0.000	
	(C1_l) The husband invites the fetus to communicate during pregnancy	0.000	
C2 Support from other family members	(C2_a) Other family members pay much attention to the mother, during pregnancy	0.000	0.000
	(C2_e) Other family members also provide information about pregnancy during pregnancy	0.000	
C3 Support from others	(C3_a) Some neighbors or friends have asked about the condition of the mother and fetus during pregnancy	0.000	0.000
	(C3_b) Some neighbors or friends advise, comfort and calm the heart of the mother, during pregnancy	0.000	
	(C3_c) Some neighbors or friends provide information about pregnancy, during pregnancy	0.000	
C6 Financial resources	(C6_a) The financial condition of the family is sufficient to meet the needs of the pregnancy	0.000	0.000
	(C6_d) Mother already has a reserve or savings for labor	0.000	
C9 Home environment	(C9_c) Mothers can easily ask for help from their closest relatives in an emergency or emergency related to pregnancy	0.000	0.000
	(C9_d) Mothers easily ask for help from neighbors in urgent or emergency conditions related to pregnancy	0.000	
C10 Opportunity obtain pregnancy information	(C10_a) The family also gets information about the condition of the mother's pregnancy	0.000	0.000
	(C10_b) The family understands the condition of the mother's pregnancy	0.000	
	(C10_c) Information about the condition of the mother's pregnancy is beneficial for the mother's family	0.000	

function factor and mental health (factor B), namely 1) aspects of self-perception and appearance (B1), 2) aspects of feeling positive in pregnancy (B3), and 3) aspects of spirituality, religion, and beliefs (B4).

Indicator analysis results quality of life pregnant women on social and environmental function factors (factor C), showed significant aspects, namely aspects of support from the husband (C1), 2) aspects of support from other family members (C2), 3) aspects of support from others (C3), 4) aspects of financial resources (C6), 5) aspects of the home environment (C9), and 6) aspects of opportunities for obtaining pregnancy information (C10) (Tab. VII).

Discussion

FUNCTIONAL AND PHYSICAL HEALTH FACTORS (FACTOR A)

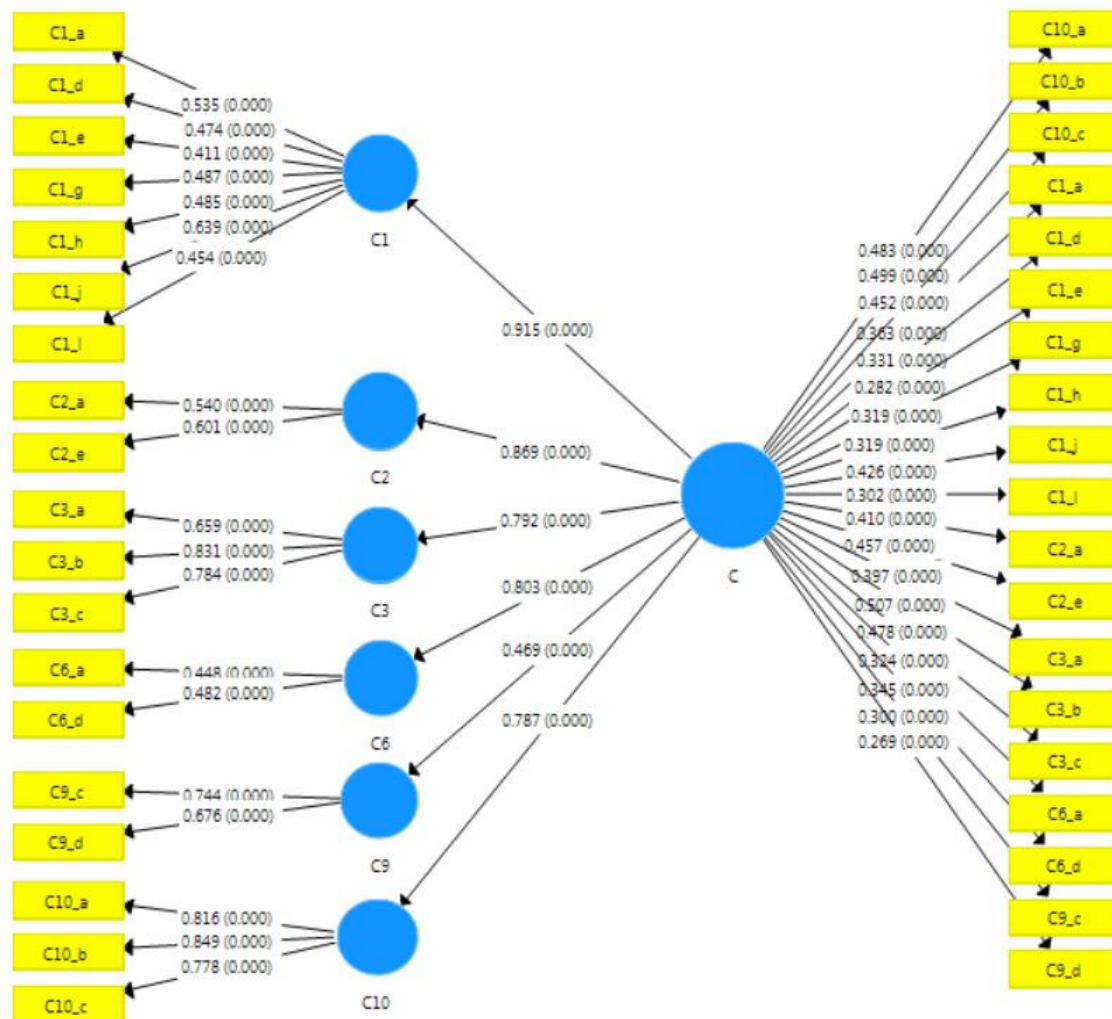
Indicator development quality of life pregnant women are based on the understanding of the concept of healthy WHO, a person is called healthy if physically, mentally, and socially healthy [21]. The number of quality of life indicators for pregnant women for functional factors and physical health (factor A) is 25 indicators. The indicator is divided into seven aspects, including aspects of the ability to carry out daily life activities, aspects of dependency on the assistance of others, aspects of energy and fatigue, aspects of mobility, aspects of pain

and discomfort, aspects of sleep and rest, and aspects of workability.

The study results are following the study, which states the limitations of physical activity during pregnancy are the risk of a low quality of life during pregnancy [26]. The women who value their quality of life are higher in this domain, they declare higher energy expenditures when doing daily activities, work, and exercising [27].

The second significant aspect that determines the value of functional factors and physical health (factor A) quality of life for pregnant women is the dependence of pregnant women on others' help to do daily activities. This study's results indicate that pregnant women who need help from others to carry out their daily activities have a lower quality of life than those who are still able to do daily activities without the help of others. Factors influencing the quality of life of pregnant women are having family and friends. Family (including husband or partner) and friends can be sources of physical, mental, and economic assistance and support, but the opposite can also be a burden for pregnant women [28].

The third significant aspect that determines the value of functional factors and physical health (factor A) quality of life for pregnant women is the mother's energy and fatigue during her pregnancy. This study's results indicate that mothers who lack energy and experience fatigue during pregnancy have a lower quality of life value than pregnant women who do not experience a

Fig 3. CFA results from social and environmental function factors (factor C) quality of life pregnant women 2019.

lack of energy and fatigue. The level of physical activity decreases during pregnancy, and the lack of physical activity contributes to the decrease in the quality of life of pregnant women, including increased anxiety, depression, and symptoms of fatigue [29].

The fourth aspect that is significant in determining the value of functional factors and physical health (factor A) quality of life for pregnant women is the mobility a mother can carry out during pregnancy. The results of this study indicate that mothers who feel they can still do mobility and do not experience mobility difficulties during pregnancy have a better quality of life value than pregnant women who find it challenging to do mobility during pregnancy. Research result in Netherlands states that the Pregnancy Mobility Index (IMK) score increases during pregnancy and decreases after delivery. A higher IMK score means that pregnant women have lower mobility abilities. It was also mentioned that women with back or pelvic pain problems scored higher in the Pregnancy Mobility Index domain than women without back or pelvic pain [30].

The fifth significant aspect that determines the value of the physical function and health factors (factor A) quality

of life for pregnant women is the pain and discomfort felt by the mother during her pregnancy. The results of this study indicate that mothers who do not feel sick and remain comfortable during their pregnancy have a better quality of life values than pregnant women who feel sick and uncomfortable during their pregnancy. This result follows research in France, which states there are significant differences in quality of life between pregnant women with low back pain and those without lower back pain in the dimensions of mental health, physical health, and social relations. Lower back pain also decreases physical and psychosocial health during pregnancy [31]. The sixth aspect that significantly determines the value of functional factors and physical health (factor A) quality of life for pregnant women is the condition of pregnant women to be able to sleep and rest during pregnancy. The results of this study indicate that mothers who can sleep and rest during pregnancy have a better quality of life values than pregnant women who are unable to sleep and rest during pregnancy. Research results in Turkey stated that sleep quality and quality of life of pregnant women were significantly worse than those of non-pregnant women.

Tab. VI. Results of analysis of categories of social and environmental function factors (factor C) quality of life pregnant mother 2019.

Social and Environmental Function Category	n	Percentage (%)
Low	106	13.3
Moderate	694	86.8
High	0	0.0
Total	800	100.0

Tab. VII. Summary of the number of aspects and indicators of quality of life for pregnant women in East Java in 2019.

Factor	Aspects and indicators	Early	Significant
A. Physical Function and Health	Aspect	7	7
	Indicator	28	21
B. Function and Mental Health	Aspect	5	3
	Indicator	32	6
C. Social and Environmental Functions	Aspect	13	6
	Indicator	55	19
Total	Aspect	25	16
	Indicator	115	46

The results of the analysis in the study showed that the risk of poor sleep quality increased 2.11-fold in the second trimester compared to the first trimester, and 1.86-fold in the third trimester compared to the first trimester [32].

The seventh aspect that significantly determines the value of the function factor and physical health (factor A) quality of life for pregnant women is the ability of pregnant women to work during their pregnancy. The results of this study indicate that mothers who can work at home and outside the home during pregnancy, have a better quality of life values than pregnant women who are not or less able to work during their pregnancy. The results of this study are in line with the research using longitudinal data from China, Mexico, and Tanzania, to find out the relationship between pregnancy and time use in the past week on 1) housework, 2) providing care, 3) agricultural work, and 4) non-agricultural independent work, stated that they did not find significantly different time-use patterns between pregnant and non-pregnant women. The study found that women in several developing countries are known not to reduce the volume, number, and type of work during pregnancy [33].

FUNCTIONAL AND MENTAL HEALTH FACTORS (FACTOR B)

The number of quality of life indicators for pregnant women for function and mental health factors (factor B) for East Java is six indicators. The indicator is divided into three aspects: aspects of self-perception and appearance, aspects of positive feelings in pregnancy, and aspects of spirituality, religion, and beliefs. The number of indicators for functional and mental health factors (factor B) is more comprehensive when compared to the specific QOL-GRAV mental health indicators which consist of 2 indicators: 1) psychological changes related to pregnancy do not allow the mother to do what she needs, and 2) satisfaction mother in arranging to adapt to her pregnancy [20].

The first significant aspect determining the value of mental health and function factors (factor B) quality of life for pregnant women is the aspect of self-perception and appearance. This study indicates that pregnant women who have good self-perception and appearance will have a higher quality of life value than pregnant women who do not have good self-perception and appearance. The study results are following the study in Tokat, Turkey, which uses the Body Image Perception Scale instrument. The results showed that non-pregnant women (controls) had the highest Body Image Perception scores, while the 3rd-trimester pregnant women group had the lowest Body Image Perception scores [34].

The second significant aspect that determines the value of mental health and function factors (factor B) quality of life for pregnant women is the aspect of positive feelings in pregnancy. This study's results indicate that pregnant women who have positive feelings in pregnancy will have a higher quality of life value than pregnant women who do not have positive feelings in pregnancy. The aspect of positive feelings in pregnancy is feeling to be someone special or individual because of the pregnancy. This study's results are following the same research that pregnant women who feel happy and optimistic about their pregnancy [28].

The third aspect that significantly determines the value of the function factor and mental health (factor B) quality of life for pregnant women is spirituality, religion, and belief. This study's results indicate that pregnant women who have spirituality, religion, and reasonable beliefs have a higher quality of life value than pregnant women who lack spirituality, religion, and reasonable beliefs. Research result in the Northeast of Brazil shows that the happiness of being a mother is the area with the most considerable positive influence on the quality of life of pregnant women related to health [35].

SOCIAL AND ENVIRONMENTAL FUNCTION FACTORS (FACTOR C)

The number of quality of life indicators for pregnant women for social and environmental function factors (factor C) for East Java is 19 indicators. The indicator is divided into six, namely aspects of support from the husband, aspects of support from other family members, aspects of support from others, aspects of financial resources, aspects of the home environment, and aspects of family opportunities to obtain pregnancy information. The number of indicators for social and environmental function factors (factor C) is more comprehensive when compared to the indicators of social relations and the specific QOL-GRAV which consists of 2 indicators: 1) maternal satisfaction with current partners, and 2) maternal satisfaction with social life now [20].

The first significant aspect determining the value of social and environmental function factors (factor C) quality of life for pregnant women is the aspect of support from the husband. The husband or partner should be the first person who is the closest and most reliable mother when pregnant. However, the various problems and circumstances often cause pregnant women to put their husbands are not always the first person to rely on pregnant women. Research result in the Ogun state, Nigeria found that husbands generally supported their pregnant wives, but very few were directly involved in the care of their wife's labor because her husband accompanied only 42% of pregnant women during antenatal visits [36].

The second significant aspect that determines the value of social and environmental function factors (factor C) quality of life for pregnant women is the aspect of support from other family members. This study's results indicate that pregnant women who get support from other family members have a higher quality of life value than pregnant women who do not get support from other family members. The results of this study are following the study in urban areas of India that says some people are needed by pregnant women to get close to them and provide support, namely mothers, relatives and female friends, husbands, and other family members [37].

Research states that life satisfaction is significantly correlated with social support. Social support can positively and significantly improve the relationship between spiritual well-being and quality of life in pregnant women [38]. Other studies in Iran, the social support scores of families felt by pregnant women have a direct impact on maternal welfare scores [39].

The third significant aspect determining the value of social and environmental function factors (factor C) quality of life for pregnant women is the aspect of support from others, in this case, support from neighbors or friends. The results of this study indicate that pregnant women who get support from others have a better quality of life value than pregnant women who do not get support from others. The results of this study are following the study which states that support in the form of tangible assistance such as household affairs, financial resources, or intangible assistance such as psychological support

from relatives, and friends directly determine the value of quality of life for pregnant women [40].

The fourth aspect that significantly determines the value of social and environmental function factors (factor C) quality of life for pregnant women is the aspect of financial resources. This study indicates that pregnant women who have adequate family financial conditions during pregnancy and who have additional costs or savings for labor have a better quality of life. Insecure family economic problems can be a source of stress for pregnant women. This study's results are consistent with the review, which states one of the main factors associated with a better quality of life for pregnant women is the absence of social and economic problems the family [28]. The fifth aspect that significantly determines the value of social and environmental function factors (factor C) quality of life for pregnant women is the home environment aspect. The results of this study indicate that pregnant women who have a comfortable and secure home environment to ask for help if there is an emergency, have a better quality of life value than pregnant women who have a less comfortable home environment and are not easy to ask for help when there is an emergency. This study's results are following the study in rural areas of Egypt, which states that pregnant women receive considerable support from family members living together, their family of origin, and their neighbors assist pregnant women in seeking health services [41]. Other studies in rural areas of Sri Lanka mention almost the same thing, that social support obtained by pregnant women is limited to support from close family (family of origin), friends and community health midwives [42].

The sixth aspect that significantly determines the value of social and environmental function factors (factor C) quality of life for pregnant women is the aspect of family opportunity to obtain pregnancy information. This study indicates that pregnant women who have family chances of getting pregnancy information have a better quality of life values than pregnant women who do not have family chances of getting pregnancy information. Research result [43] stated that young mothers, ethnic minorities, and women from low socioeconomic groups showed the greatest desire to get more information about pregnancy and birth. In comparison, the results of research [44] stated that there was a significant relationship between family support and the number of pregnancies and pregnancy complications. This relationship causes the mother to have more pregnancies and pregnancy complications, get lower social support.

Conclusions

The indicators to measure the quality of life of pregnant women in East Java consist of 46 indicators which are divided into three factors, namely 1) health and physical function factors, 2) health and mental function factors, and 3) social and environmental function factors, with details as following: the function and physical health factor (factor A) are 1) aspects of daily living activities (A1), 2) aspects of dependence on drugs or help from

others (A2), 3) aspects of energy and fatigue (compared to before pregnancy) (A3), 4) aspects of mobility (A4), 5) aspects of pain and discomfort (A5), 6) aspects of sleep and rest (A6), and 7) aspects of the ability to work (outside and at home) (A7). The the function and mental health factor (factor B) are 1) aspects of self-perception and appearance (B1), 2) aspects of feeling positive in pregnancy (B3), and 3) aspects of spirituality, religion, and beliefs (B4). The social and environmental function factors (factor C) are aspects of support from the husband (C1), 2) aspects of support from other family members (C2), 3) aspects of support from others (C3), 4) aspects of financial resources (C6), 5) aspects of the home environment (C9), and 6) aspects of opportunities for obtaining pregnancy information (C10). Indicators of quality of life for pregnant women have high suitability to be used to measure the quality of life for pregnant women. Measurement of quality of life in pregnant women using indicators of quality of life for pregnant women can be one of the preventions efforts to reduce morbidity in pregnant women.

Acknowledgments

The research team sincerely thanks to Ngawi Regency Government, Head of Ngawi Regency Health Office, Head of Sine Community Health Center, Head of Walikukun Community Health Center, Head of Gemarang Community Health Center in Ngawi Regency. The researcher also expressed his gratitude to the Blitar City Government, Head of Blitar City Health Service, Head of Kepanjen Kidul Community Health Center, Head of Sukorejo Community Health Center, Head of Sanan Wetan Community Health Center in Blitar City.

Authors' contributions

NP contributed to the development of ideas, research design and all the work of the authors for the selection and conduct of the research process. NP as the sole author wrote the entire section and completed the manuscript.

Conflict of interest statement

There is no conflict of interest to declare.

References

- World Health Organization. Women and Health: Today's Evidence Tomorrow's Agenda 2009.
- Abedi G, Babamiri F, Rostami F. Pregnant Women Life Quality Concept & Phenomenology. *Int J Collab Res Intern Med Public Heal* 2012;4:1412-8.
- Förger F, Østensen M, Schumacher A, Villiger PM. Impact of Pregnancy on Health Related Quality of Life Evaluated Prospectively in Pregnant Women with Rheumatic Diseases by The SF-36 Health Survey. *Ann Rheum Dis* 2005;64:1494-9. <https://doi.org/10.1136/ard.2004.033019>
- Naseem K, Khurshid S, Khan SF, et al. Health Related Quality of Life in Pregnant Women : A Comparison Between Urban and Rural Populations. *J Pak Med Assoc* 2011;61:308-12.
- The WHOQOL Group. The World Health Organization Quality Of Life Assessment (WHOQOL): Development and General Psychometric Properties. *Soc Sci Med* 1998;46:1569-85. [https://doi.org/10.1016/s0277-9536\(98\)0009-4](https://doi.org/10.1016/s0277-9536(98)0009-4)
- Oliveira SX, Oliveira MB, Silva RAR da, Davim RMB. Characteristics Of The Domains Of Quality of Life In Pregnant Women Of The Family Health Strategy. *J Nurs UFPE line*. 2013;7:7007-16. <https://doi.org/10.5205/reuol.4767-42136-1-ED.0712esp201307>
- Calou CGP, Pinheiro AKB, Castro RCMB, Oliveira MF De, Aquino P de S, Antezana FJ. Health Related Quality of Life of Pregnant Women and Associated Factors: An Integrative Review. *Health (Irvine Calif)*. 2014;6:2375-87. <https://doi.org/10.4236/health.2014.618273>
- Morin M, Claris O, Dussart C, Frelat A, de Place A, Molinier L, Matillon Y, Elhinger V, Vayssi re C. Health-related quality of life during pregnancy: A repeated measures study of changes from the first trimester to birth. *Acta Obstet Gynecol Scand* 2019;98:1282-1291. <https://doi.org/10.1111/aogs.13624>
- Martin CR, Jomeen J. Assessment of Quality of Life During Pregnancy and in the Postnatal Period. In: Preedy VR, Watson RR, eds. *Handbook of Disease Burdens and Quality of Life Measures*. New York, NY: Springer 2010, pp. 2411-22.
- Mortazavi F, Mousavi SA, Chaman R, Khosravi A. Maternal Quality of Life During The Transition to Motherhood. *Iran Red Crescent Med J* 2014;16:e8443. <https://doi.org/10.5812/ircmj.8443>
- World Health Organization. Maternal Mental Health 2015. Available at: http://www.who.int/mental_health/maternal-child/maternal_mental_health/en/ (Accessed on: 11/02/2015).
- Shishehgar S, Mahmoodi A, Dolatian M, Mahmoodi Z, Bakhtiary M, Alavi Majd H. The Relationship of Social Support and Quality of Life with the Level of Stress in Pregnant Women Using the PATH Model. *Iran Red Crescent Med J* 2013;15:560-5. <https://doi.org/10.5812/ircmj.12174>
- Morikawa M, Okada T, Ando M, Aleksic B, Kunimoto S, Nakamura Y, Kubota C, Uno Y, Tamaji A, Hayakawa N, Furumura K, Shiino T, Morita T, Ishikawa N, Ohoka H, Usui H, Banno N, Murase S, Goto S, Kanai A, Masuda T, Ozaki N. Relationship between social support during pregnancy and postpartum depressive state: a prospective cohort study. *Sci Rep* 2015;5:1-9. <https://doi.org/10.1038/srep10520>
- Iranzad I, Bani S, Hasanpour S, Mohammadalizadeh S, Mirghafourvand M. Perceived Social Support and Stress among Pregnant Women at Health Centers of Iran-Tabriz. *J Caring Sci*. 2014;3:287-95. <https://doi.org/10.5681/jcs.2014.031>
- Ware JE, Gandek B. Overview of the SF-36 Health Survey and the International Quality of Life Assessment (IQOLA) Project. *J Clin Epidemiol* 1998;51:903-12. [https://doi.org/10.1016/s0895-4356\(98\)00081-x](https://doi.org/10.1016/s0895-4356(98)00081-x)
- WHOQOL Group. The World Health Organization Quality of Life Assessment (WHOQOL): Development and General Psychometric Properties the Whoqol Group. *Soc Sci Med* 1998;46:1569-85. [https://doi.org/10.1016/S0277-9536\(98\)00009-4](https://doi.org/10.1016/S0277-9536(98)00009-4)
- Skevington SM, Lotfy M, O'Connell KA. The World Health Organization's WHOQOL-BREF quality of life assessment: Psychometric properties and results of the international field trial a Report from the WHOQOL Group. *Qual Life Res* 2004;13:299-310. <https://doi.org/10.1023/B:QURE.0000018486.91360.00>
- Magee LA, Chandra K, Mazzotta P, Stewar D, Koren G, Guyatt GH. Development of a health-related quality of life instrument for nausea and vomiting of pregnancy. *Am J Obstet Gynecol* 2002;186:S232-8. <https://doi.org/10.1067/mob.2002.122604>
- Kazemi F, Nahidi F, Kariman N. Assessment Scales, Associated Factors and the Quality of Life Score in Pregnant Women in Iran. *Glob J Health Sci* 2016;8:127-39. <https://doi.org/10.5539/gjhs.v8n11p127>

- [20] Vachkova E, Jezek S, Mares J, Moravcova M. The Evaluation of The Psychometric Properties of A Specific Quality of Life Questionnaire for Physiological Pregnancy. *Health Qual Life Outcomes* 2013;11:214. <https://doi.org/10.1186/1477-7525-11-214>
- [21] Zhou SZ, Wang XL, Wang Y. Design of a questionnaire for evaluating the quality of life of postpartum women (PQOL) in China. *Qual Life Res* 2009;18:497-508. <https://doi.org/10.1007/s11136-009-9466-2>
- [22] Mogos MF, August EM, Salinas-Miranda AA, Sultan DH, Salihu HM. A Systematic Review of Quality of Life Measures in Pregnant and Postpartum Mothers. *Appl Res Qual Life* 2013;8:219-50. <https://doi.org/10.1007/s11482-012-9188-4>
- [23] Chen T, Li L, Kochen MM. A systematic review: How to choose appropriate health-related quality of life (HRQOL) measures in routine general practice? *J Zhejiang Univ Sci* 2005;6B:936-40. <https://doi.org/10.1631/jzus.2005.B0936>
- [24] Lemeshow S, Hosmer Jr DW, Klar J, Lwanga SK. Adequacy of Sample Size in Health Studies. World Health Organization. West Sussex, England: John Wiley & Sons Ltd. 1990, p. 247.
- [25] World Health Organization. The constitutional mission of the World Health Organization. *Basic Documents* 2006, pp. 1-20.
- [26] Mazúchová L, Kelčková S, Dubovická Z. Measuring women's quality of life during pregnancy. *Kontakt* 2017;20:e31-6. <https://doi.org/10.1016/j.kontakt.2017.11.004>
- [27] Krzepota J, Sadowska D. Relationships between Physical Activity and Quality of Life in Pregnant Women in the Second and Third Trimester. *Int J Environ Res Public Health* 2018;15:2745. <https://doi.org/10.3390/ijerph15122745>
- [28] Lagadec N, Steinecker M, Kapassi A, Magnier AM, Chastang J, Robert S, Gaouaou N, Ibanez G. Factors influencing the quality of life of pregnant women : a systematic review. *BMC Pregnancy Childbirth* 2018;4:1-14. <https://doi.org/10.1186/s12884-018-2087-4>
- [29] Poudevigne MS, O'Connor PJ, Johnson KE, Araujo JB De, Ward-Ritacco CL. Effect of resistance training on fatigue-related domains of quality of life and mood during pregnancy: A randomized trial in pregnant women with back pain. *Psychosom Med* 2019;80:327-32. <https://doi.org/10.1097/PSY.0000000000000559>
- [30] Van De Pol G, De Leeuw RJ, Van Brummen HJ, Bruinse HW, Heintz APM, Vaart CH Van Der. The Pregnancy Mobility Index: a mobility scale during and after pregnancy. *Acta Obstet Gynecol* 2006;85:786-91. <https://doi.org/10.1080/00016340500456373>
- [31] Ibanez G, Khaled A, Jf R, Rohani S, Nizard J, Baiz N, Robert S, Chastang J et al. Back Pain during Pregnancy and Quality of Life of Pregnant Women. *Prim Heal Care* 2017;7:1-6. <https://doi.org/10.1186/s12884-018-2087-4>
- [32] Sut HK, Asci O, Topac N. Sleep Quality and Health-Related Quality. *J Perinat Neonat Nurs* 2016;34:302-9. <https://doi.org/10.1097/JPN.0000000000000181>
- [33] Peterman A, Ng SW, Palermo T, Lee I-HE. Managing the double burden: Effects of pregnancy on labor-intensive time use in rural China, Mexico and Tanzania. *Stud Fam Plann* 2013;44:411-30. <https://doi.org/10.1111/j.1728-4465.2013.00367.x>
- [34] Inanir S, Cakmak B, Nacar MC, Guler AE, Inanir A. Body Image Perception and Self-esteem During Pregnancy. *Int J Women's Heal Reprod Sci* 2015;3:196-200. <https://doi.org/10.15296/ijwhr.2015.41>
- [35] Calou CGP, Oliveira MF de, Carvalho FHC, Soares PRAL, Bezerra RA, Lima SKM de, Antezana FJ, Aquino P de S, Castro RCMB, Pinheiro AKB. Maternal predictors related to quality of life in pregnant women in the Northeast of Brazil. *Health Qual Life Outcomes* 2018;16:1-10. <https://doi.org/10.1186/s12955-018-0917-8>
- [36] Sokoya M, Farotimi A, Ojewole F. Women's perception of husbands' support during pregnancy, labour and delivery. *J Nurs Heal Sci* 2014;3:45-50. <https://doi.org/10.9790/1959-03314550>
- [37] Raman S, Srinivasan K, Kurpad A, Dwarkanath P, Ritchie J, Worth H. 'My Mother... My Sisters... and My Friends': Sources of maternal support in the perinatal period in urban India. *Midwifery* 2014;30:130-7. <https://doi.org/10.1016/j.midw.2013.03.003>
- [38] Niaghiha M, Baglooei MM, Mafi M, Taherpour M. Spiritual Well-Being and Life Satisfaction in Pregnant Women: The Mediating Role of Social Support. *Soc Heal Behav* 2019;2:83-8. https://doi.org/10.4103/SHB.SHB_11_19
- [39] Abdollahpour S, Keramat A. The Impact of Perceived Social Support from Family and Empowerment on Maternal Well-being in the Postpartum Period. *J Midwifery Reprod Heal* 2016;4:779-87. <https://doi.org/10.22038/jmrh.2016.7612>
- [40] Emmanuel E, John WS, Sun J. Relationship between Social Support and Quality of Life in Childbearing Women during the Perinatal Period. *J Obstet Gynecol Neonatal Nurs* 2012;41:E62-9. <https://doi.org/10.1111/j.1552-6909.2012.01400.x>
- [41] Ohashi A, Higuchi M, Labeeb SA, Mohamed AG, Chiang C, Aoyama A. Family Support for Women's Health-Seeking Behavior: A Qualitative Study in Rural Southern Egypt (Upper Egypt). *Nagoya J Med Sci* 2014;76:17-25.
- [42] Agampodi TC, Rheinländer T, Agampodi SB, Glozier N, Siribaddana S. Social capital and health during pregnancy: an in-depth exploration from rural Sri Lanka. *Reprod Health* 2017;14:1-19. <https://doi.org/10.1186/s12978-017-0349-7>
- [43] Singh D, Newburn M, Smith N, Wiggins M. The information needs of rst-time pregnant mothers. *Br J Midwifery* 2013;10. <https://doi.org/10.12968/bjom.2002.10.1.10054>
- [44] Abdollahpour S, Ramezani S, Khosravi A. Perceived Social Support among Family in Pregnant Women. *Int J Pediatr* 2015;3:879-88. <https://doi.org/10.22038/ijp.2015.4703>

Received on September 15, 2020. Accepted on February 21, 2023.

Correspondence: Nunik Puspitasari, Department of Biostatistics and Population Study, Public Health Faculty, Universitas Airlangga, Indonesia, Jl. Mulyorejo Campus C of Universitas Airlangga, Surabaya-60115, Indonesia. Tel. +62-81333453979 - E-mail: nunik-p@fkm.unair.ac.id

How to cite this article: Puspitasari N. Development of indicators to measure quality of life for pregnant women (QOL-PW). *J Prev Med Hyg* 2023;64:E55-E66. <https://doi.org/10.15167/2421-4248/jpmh2023.64.1.1777>

© Copyright by Pacini Editore Srl, Pisa, Italy

This is an open access article distributed in accordance with the CC-BY-NC-ND (Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International) license. The article can be used by giving appropriate credit and mentioning the license, but only for non-commercial purposes and only in the original version. For further information: <https://creativecommons.org/licenses/by-nc-nd/4.0/deed.en>



HEALTH PROMOTION

Institutional delivery knowledge, attitude, and practice among mothers of childbearing age with one or more children, Ethiopia

KALEAB TESFAYE TEGEGNE¹, TADELE KASSAHUN WUDU², BACHA GUTA ABDISA³, ELENI TESFAYE TEGEGNE⁴, MEKIBIB KASSA TESSEMA⁵

¹ Department of Public Health, College of Health Science, Debarq University, Debarq, Ethiopia; ² Department of Statistics, Debarq University, Debarq, Ethiopia; ³ Department of Public Health, Madda Walabu University, Madda Walabu, Ethiopia;

⁴ School of Nursing, College of Medicine and Health Science, University of Gondar, Gondar, Ethiopia;

⁵ Leshmania Research And Treatment Center, University Of Gondar, Gondar, Ethiopia

Keywords

Maternal mortality • Health service utilization • Maternal Health

Summary

Background. Institutional delivery is Giving birth in medical institution under the care and Supervision of trained health care providers which promotes newborn survival and reduces maternal mortality. The objective of the study was to assess Knowledge, Attitude and Practice towards institutional delivery among mothers of child bearing age who have one or more child and visit MCH clinic Adaba health center, West Arsi zone, South East Ethiopia.

Methods. Institutional based cross sectional study design was conducted. The study was conducted starting from May 1-30, 2021 at Adaba health center, West Arsi zone, South East Ethiopia. Our study sample size is 250 mothers who have at least one birth and visiting MCH at Adaba health center. Systematic random sampling was used to select mothers, Data was collected by using structured questionnaire. Finally, data was analyzed by SPSS version 21.

Results. Out of 250 women during our data collection time 246 (98.4%) were our respondents and 4 (1.6%) were non respondents. Among 246 women 213 (86.6%) had good knowledge and 33 (13.4%) had poor knowledge. While 212 (86.2%) had good attitude and 34(13.8%) had poor attitude and 179 (72.8%) had good practice but 67 (27.2%) had poor practice.

Conclusion. Increasing knowledge, attitude and practice of mothers towards institutional delivery plays a key role in reducing maternal mortality and morbidity. However, the prevailing level of KAP towards institutional delivery is not satisfactory. Increasing utilization of institutional delivery by increasing awareness of each community through health information dissemination on importance of institutional delivery is needed.

Background

Institutional delivery means giving birth under the help of trained health professionals under safe and sterile procedures [1].

Early and regular checkups by health professionals are essential in assessing the physical status of women during labor & delivery. In spite of the global and national efforts to reduce maternal morbidity and mortality through the safe mother hood initiative, institutional delivery of babies continues to decrease [2].

According to the most recent statistics published in a study by United Nations (UN) agencies today, a woman dies during pregnancy or childbirth every two minutes. Maternal deaths have either grown or stalled in almost all parts of the world in recent years, according to this report on trends in maternal mortality, which shows significant setbacks for women's health. Maternal deaths continue to be disproportionately prevalent in the world's poorest regions and in nations that are experiencing conflict. Sub-Saharan Africa accounted for almost 70% of all maternal fatalities in 2020 [3].

Almost 800 women die every day from pregnancy-related complications worldwide, where roughly half of all

pregnancies are still unwanted. Because of population expansion, there are still a growing number of women who lack access to contraception. By 2030, Goal 3 of the Sustainable Development Goals aims to lower maternal death rates worldwide to fewer than 70 per 100,000 live births [4].

In Ethiopia the proportions of birth attended by skilled personnel are very much lower than Sub-Saharan Africa. Even for women who access to the services the proportions of birth acquiring in health facility is very low. Only 6% of birth was delivered in health facilities, there is no significant different proportion of delivery service utilization between EDHS 2000, and 2005. However, this figure is moderately increased to 10% in EDHS 2011 [5].

The international safe mother hood initiative made maternal mortality and international priority by way of access to basic maternity care during pregnancy and delivery to all human. However, discrepancies continue to exist in access to maternal health care between the more developed and developing countries world, the richer and poor, urban and rural, educated and uneducated societies [6].

The great majority of women (92 percent) with a live birth

in the preceding five years did not receive a postnatal checkup. Among women who received a postnatal checkup, 4 percent were examined within 4 hours of delivery, 2 percent within 4-23 hours, 1 percent within 1-2 days, and 2 percent within 3-41 days of delivery. In total, 7 percent of women received postnatal care within two days, as recommended [7].

In Africa study shows birth (38/1000), death (15/1000), Infant mortality rate (84/1000 live births), Total fertility rate (5.7 average number of children born to women during reproductive age). Whereas in Ethiopia births shows (34.5/1000), death (15/1000), Infant mortality rate (59/1000 live births), Total fertility rate (4.8 average number of children born to women during reproductive age) [8].

79.8% of rural and 33.5% of urban women had transport facility problem for using health institution services. Whereas Addis Ababa is the least affected (28.5%) and Somali is the most affected region (82.6%) [9]. Study conducted at Munisa woreda, Arsi zone showed that out of the total women, 510 (59.6%) had good attitude, while 325 (40.4%) had poor attitude toward institutional delivery service [10].

The study conducted at Tigray region showed that out of 1113 women 145 (13.02%) of them had delivered one child, 448 (40.25%) had delivered 2-4 children & 520 (46.7%) had delivered ≥ 5 children [11]. The study conducted at Woldia, Amhara region shows that out of 471 women 132 (28%) did not know whether that health facility provide delivery service or not [12].

Whereas study done at Dodota woreda, Oromia regional state out of 506 women, 340 (82%) of them had Antenatal care follow up during their last pregnancy [13]. According to the study done at Sekela District, North West Ethiopia out of 371 women only 45 (12%) of them gave birth at health institution during their last delivery [14].

Different studies conducted in Ethiopia and in other 3rd world developing countries identify determinants that limit the use of maternity health services. Not unexpectedly, the woman's low educational level, the lack of empowerment among women, poor access to maternal health care services was identified [6].

Ethiopia is one of the developing countries in the world. The individual average income per year is estimated to be less than 130 US\$. Because of the economic level of the country the health service provision insufficient. For insufficiency of the health services, the knowledge, attitude & practice toward health institution visit affect the society in various ways.

An estimate 34% of pregnant women receives Antenatal care, among those only 54% delivery was at health institutions and only 3.5% of these receive Post natal care. The proportion of receiving ANC is very low when compared with neighboring countries like Kenya (90%), Sudan (40%), Djibouti (75%). Health facilities are not often equipped with sufficient supplies of emergency medicine, and essential equipment, lack of medical protocols to guide health care providers and effective supervision [5].

For the above mentioned problems, we are interested

to conduct our study. We would like to recommend the whole concerned body as they take possible action to increase institutional delivery practice which is essential for development of our country both directly and indirectly.

Women comprises of a large proportion of a given society, still many women in developing countries are at greater disadvantage. A large number of women are needlessly dying due to factors related to pregnancy and child birth. Experiences from developed and some developing country showed that maternal death could be prevented if women had access to basic maternal health services

Accordingly, the Ministry of Health (MOH) Ethiopia report in 2007 the antenatal and delivery care coverage in Oromia region was 39.7% and 12.1% respectively, which was below national target [5] Based on the result of previous research, there is a need to assess KAP towards institutional delivery among mother of child bearing age who have one or more child.

The result of research helps the communities to increase institutional delivery, to decrease infant and maternal mortality and morbidity rates and to reduce child hood illnesses and post natal complications.

Methods

STUDY AREA AND STUDY PERIOD

The 2007 national census reported a total population of this woreda of 138,717 of whom 68,775 were men and 69,942 were women. The majority of the inhabitants were Muslims 84.39%, while 14.46% orthodox Christianity and 1.15% were Protestants [15]. Our study was conducted from May 1-May 30, 2021.

STUDY DESIGN

Institutional based cross-sectional study design was carried out to assess KAP of institutional delivery at Adaba health center, West Arsi Zone South East Ethiopia.

SOURCE POPULATION

Source population was mothers visiting at Adaba health center, who have at least one birth.

STUDY POPULATION

Study population was mothers visiting MCH clinic at Adaba health center, who have at least one birth and selected by systematic random sampling method and meet inclusion criteria.

INCLUSION CRITERIA

Our inclusion criteria is women age 15-49 who experienced birth in present place and live at the area at least 6 months.

EXCLUSION CRITERIA

Our exclusion criteria is mothers who were not potential to be study subject like; having mental problem, can't speak and hear.

SAMPLE SIZE DETERMINATION AND SAMPLING TECHNIQUES

- Sample size determination
The sample size was calculated using single population proportion formula [16].
 $P = \text{prevalence of institutional delivery } 18.2\%$
 $(P = 0.182)$ [13].
Let us assume non respondent rate 10%
 $100\% = 227, 10\% = x,$
then $x = (227)10\%/100\% = 22.7 \approx 23$.
So our study sampling size would be $227 + 23 = 250$.
- Sampling technique
Systematic random sampling were used to select women who visit MCH clinic at Adaba Health Center. The total number of mothers who visit MCH clinic at Adaba health center for one month was 764. So to collect our data we first calculate the constant K^{th} value. That is $k = N/n \rightarrow 764/250 = 3.05 \approx 3$ that means every 3 mothers was selected.

Data collection technique and instruments

The questionnaire consists of four parts, composed of socio-demographic, knowledge, attitude and practice. It consists of both open ended and closed ended questions. It is prepared in English version and translated into their own mother tongue *i.e.* Afan Oromo and Amharic during data collection. Data was collected by using structured questionnaire adapted by reviewing literatures. Data was collected by all members of our research team after having common understanding of how to collect data by discussion. Mothers who answered knowledge related questions correctly and scored more than or equal to the mean score value (≥ 7) regarding institutional delivery categorize as having Good knowledge (Tab. II). Mothers who answered attitude related questions correctly and scored more than or equal to the mean score value (≥ 4) regarding institutional delivery categorize as having Good attitude (Fig. 1).

VARIABLES

Dependent variables

- Knowledge.
- Attitude.
- Practice.

Independent variable

- Age.
- Gravidity.
- Marital status.
- Parity.
- Educational status.
- Occupational level.
- Ethnicity.
- Religion.
- House hold income.

DATA PROCESSING AND ANALYSIS

Data was analyzed using SPSS version 21. We entered variable view and data view, then we were categorized, code and summarize data. According to our variables which used in frequency, percentages, checked and re-checked for completeness and consistency. Then cross tabulation was performed.

DATA QUALITY MANAGEMENT

Before actual data collection, pre-test was done outside of study area to check respondent ability to answer the question, time taken for interview and then amendment was made accordingly. After completion of data collection consistency of the questionnaire was checked.

ETHICAL CONSIDERATION

Permission was secured from Madda Walabu University Institutional Research Ethics Review Board. The purpose of study was explained to the respondents. We were asking permission to interview them. No obligation was made for those who have not willingness to give information. The name of the respondent was not written in any form of the questionnaire.

Results

RESPONDENTS SOCIO-DEMOGRAPHIC CHARACTERISTICS

We have taken a total of 250 mothers of reproductive age, among this mothers 246 (98.4%) were our respondents and 4 (1.6%) were non-respondent mothers. Among our respondent mothers 15-19 years were 19 (7.7%), 20-24 were 72 (29.3%), 25-29 years were 94 (38.2%), those 30-34 years were 33 (13.4%), 35-39 years were 17 (6.9%) while mothers of 40-44 years were 9 (3.7%) and mothers of 45-49 were 2 (0.8%).

The marital status of our respondents was mainly married that is 223 (90.7%), divorced 11 (4.5%), widowed 5 (2.0%) and single 7 (2.8%). Out of 246 mothers 171 (69.5%) were Muslims, Orthodox 58 (23.6%), Protestants were 15 (6.1%), and others (wakefata) are 2 (0.8%).

Most of them were Oromo 216 (87.8%), Amhara 20 (8.1%), Tigre 2 (0.8%), Somali 1 (0.4%) and others (Guraghe, Wolayita and Hadiya) were 7 (2.8%). According to our study the educational status of respondents those unable to read and write were 63 (25.6%), primary school 107 (43.5%), secondary school 41 (16.7%), preparatory were 9 (3.7%), diploma 12 (4.9%) and 14 (5.7%) were Degree and above.

The occupational status of mothers was mainly house wife 115 (46.7%), private 100 (40.7%), daily labour 6 (2.4%), government workers were 25 (10.2%).

The household income in Ethiopian birr, who have less than 500 were 15 (6.1%), 30 (12.2%) earn 500-999 ETB, 81 (32.9%) earn 1000-1499 ETB per month while 50 (20.3%) earn 1500-1999 ETB, 32 (13.0%) earn 2000-2499 ETB and 38 (15.4%) of the respondents earn ≥ 2500 ETB per month.

The socio-demographic characteristics of mothers (n = 246) were summarized in the Table I.

KNOWLEDGE RELATED

Among 246 women 216 (87.8%) knew the advantage of institutional delivery but 30 (12.2%) of mothers did not know the advantage of delivering at institutional level and 213 (86.6%) had good knowledge and 33 (13.4%) had poor knowledge towards institutional delivery. Among 246 women 238 (96.7%) knew as health facility give delivery services. Among 239 (97.2%) knew the problems can be faced during delivery, among which 237 (99.2%) did know the women can face excessive vaginal bleeding during delivery but 2 (0.8%) of them

did not know. 224 (93.7%) of them knew prolonged labor and 15 (6.3%) of them did not know, 218 (91.2%) said women can face IUFD during delivery and 21 (8.8%) did not know, 220 (92.1%) said women can die during delivery 19 (7.9%) did not know. 215 (90%) of them knew that problems can result from absence of institutional delivery can be prevented by delivering at health institutions and 24 (10%) did not know.

ATTITUDE RELATED

Our study showed that out of 246 women 221 (89.8%) agree that institutional delivery has useful effect for mother but 2 (0.8%) disagree and 23 (9.4%) were neutral. 216 (87.8%) agree that mothers should give birth

Tab. I. The socio-demographic characteristics of mothers who visit MCH at Adaba Health Center West Arsi Zone, South East Ethiopia, May, 2021 (n = 246).

Variables	Characteristics	Frequency	Percent
Age	15-19	19	7.7
	20-24	72	29.3
	25-29	94	38.2
	30-34	33	13.4
	35-39	17	6.9
	40-44	9	3.7
	45-49	2	0.8
	Total	246	100.0
Marital status	Married	223	90.7
	Divorced	11	4.5
	Widowed	5	2.0
	Single	7	2.8
	Total	246	100.0
Religion	Muslim	171	69.5
	Orthodox	58	23.6
	Protestant	15	6.1
	Catholic	0	0
	Other	2	0.8
	Total	246	100.0
Ethnicity	Oromo	216	87.8
	Amhara	20	8.1
	Tigre	2	0.8
	Somale	1	0.4
	Other	7	2.8
	Total	246	100.0
Educational Status	Unable to read and write	63	25.6
	Primary School	107	43.5
	Secondary School	41	16.7
	Preparatory School	9	3.7
	Diploma	12	4.9
	Degree and above	14	5.7
	Total	246	100.0
Occupation	House Wife	115	46.7
	Private	100	40.7
	Daily labour	6	2.4
	Governmental Worker	25	10.2
	Other	0	0
	Total	246	100.0
Monthly income in ETB	< 500	15	6.1
	500-999	30	12.2
	1000-1499	81	32.9
	1500-1999	50	20.3
	2000-2499	32	13.0
	≥ 2500	38	15.5
	Total	246	100.0

Tab. II. Knowledge Of mothers towards institutional delivery who visit MCH at Adaba Health Center, West Arsi Zone, South East Ethiopia – May 2021 (n = 246).

Variables	Answer	Frequency	Percent
Advantage of institutional delivery	Yes	216	87.8
	No	30	12.2
	Total	246	100.0
Health facility gives delivery service	Yes	238	96.7
	No	8	3.3
	Total	246	100.0
Women can face problem during delivery	Yes	239	97.2
	No	7	2.8
	Total	246	100.0
Women face excessive vaginal bleeding during delivery	Yes	237	99.2
	No	2	0.8
	Total	239	100.0
Women can face prolonged labor	Yes	224	93.7
	No	15	6.3
	Total	239	100.0
Women can face IUFD during delivery	Yes	218	91.2
	No	21	8.8
	Total	239	100.0
Women can die during delivery	Yes	220	92.1
	No	19	7.9
	Total	239	100.0
Problems can be prevented by delivering at health institution	Yes	215	90.0
	No	24	10.0
	Total	239	100.0

in health institution but 2 (0.8%) and 28 (11.4%) were neutral.

Among our respondents 6 (2.4%) mother agree that mothers should not expected to deliver at health institution, but 206 (83.8%) disagree and 34 (13.8%) were neutral.

At the same time 218 (88.6%) of mothers agree health institutional delivery was safe for mother and the child, but

27 (11%) were disagree and the rest 1 (0.4%) were no idea. 224 (91.1%) of mothers agree that their husband should decide to deliver at health institutions while 3 (1.2%) disagree and 19 (7.7%) of them said no idea (neutral).

3 (1.2%) of them agree that home delivery is better than institutional delivery while 213 (86.6%) disagree and 30 (12.2%) had no idea. 212 (86.2%) had good attitude but 34 (13.8%) had poor attitude (Fig. 1).

Fig. 1. Showing Attitudes of mothers towards institutional delivery who visiting MCH at Adaba Health Center, West Arsi Zone, South East Ethiopia, May, 2021 (n = 246).

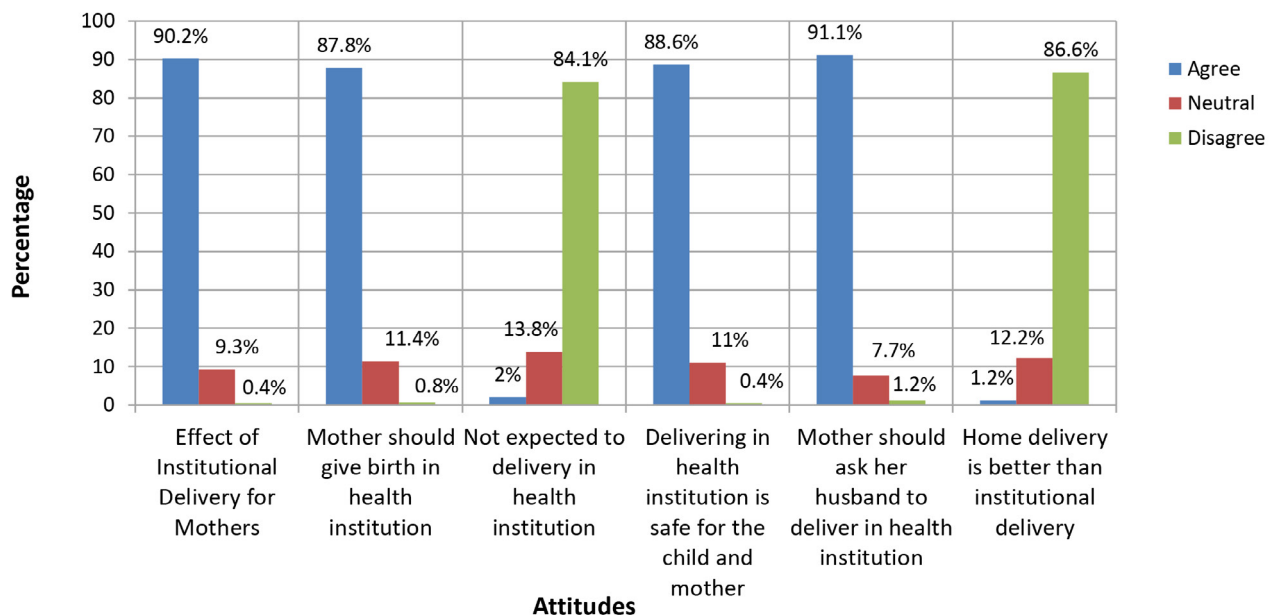
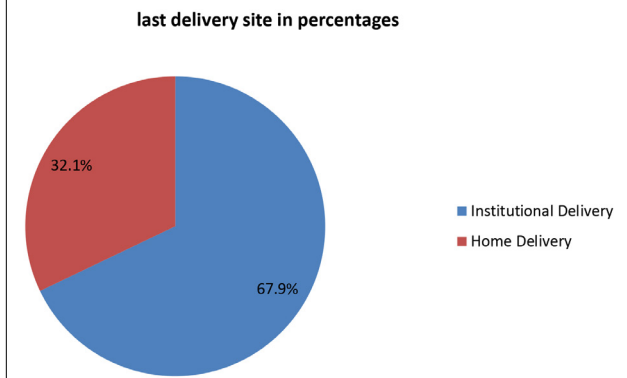


Fig. 2. Showing last delivery site of mothers who visiting MCH at Adaba Health Center West Arsi Zone, South East Ethiopia, May, 2021 (n = 246).



PRACTICE RELATED

The study showed that out of 246 respondents 64 (26%) of them had delivered 1 child, 146 (59.4%) had delivered 2-4 children and the rest 36 (14.6%) had delivered ≥ 5 children.

Out of 246 mothers, 179 (72.8%) had ANC follow up during their last pregnancy. Among 167 (67.9%) women who were delivered at health institution 147 (59.8%) has delivered 1-2 children, 27 (11%) of them delivered 3-4 children and 5 (2%) delivered ≥ 5 children.

Among who delivered at home 78 (31.7%) of them had delivered 1-2 children, 42 (17.1%) on average had delivered 3-4 children and 18 (7.3%) of mothers had delivered at home were ≥ 5 children. Out of 246 mothers last deliveries were institution, 167 (67.9%) and 79 (32.1%) gave their last birth at home (Fig. 2).

Among 246 mothers 179 (72.8%) had good practice and 67 (27.2%) had poor practice. Among last home deliveries 79 (32.1%), 44 (55.7%) were assisted by UTTBA, 8 (10.1%) were by TBA, 27 (34.2%) were assisted by family members and relatives. Among those delivered at home, 4 (5.1%) faced prolonged labor, 20 (25.3%) faced excessive bleeding, 8 (10.1%) fetal death, 3 (3.8%) faced retained placenta and 44 (55.7%) had not faced problem. Reasons for home deliveries of mothers were 38 (48.1%) due to lack of awareness, 3 (3.8%) cultural influence, 7 (8.9%) were due to financial problem and 31 (39.2%) of them were due to sudden onset of labor, while reasons for health institutional delivery 67 (39.9%) were due to personal choice, 98 (58.3%) were informed by health professionals and 3 (1.8%) were due to previous bad outcome of home deliveries.

The final decision makers on place of delivery were mothers themselves 44 (17.9%), 25 (10.2%) were by their husband, both 142 (69.9%) and 5 (2.0%) by health professionals.

Discussion

Knowledge, attitude and practice towards institutional delivery play a key role in reducing maternal morbidity and mortality.

This study revealed that about 87.8% know advantage of institutional delivery but 12.2% of them did not know the advantage of delivering at health institution, the study also showed that 96.7% know as health facility give delivery service.

While a study conducted at Woldia, Amhara region showed 82% did know as health facility provides delivery service which is lower than our study finding [12]. The difference might be due to minimal awareness about knowledge of institutional delivery and low educational status of mothers comparing to our study.

This study also showed that 97.2% did know as the problem could be faced during delivery, among which 96.3% could mention excessive vaginal bleeding, 93.7% prolonged labor, 91.2% said fetal death, 92.1% mentioned women can die during delivery. While a study at Woldia, Amhara region showed that 82% knew the problem can be faced during delivery, among which 68% said prolonged labor, 83.4% mentioned excessive vaginal bleeding, 39.6% and 12.7% mentioned IUFD and maternal death respectively [12]. This difference might due to time gap, when research done and better accessibility and utilization of institutional delivery during our study.

Our study also showed that 86.6% had good knowledge but 13.4% had poor knowledge. While study done at Sekela district, North West Ethiopia, Aug. 2010 showed that 56.6% had good knowledge [14]. The difference might be due to time gap and educational level of mothers comparing to our study.

This study showed that 86.2% of mothers had good attitude towards institutional delivery service and 13.8% of them had poor attitude towards institutional delivery service. While a study done at Munisa woreda, Arsi zone showed that 59.6% had good attitude while 83.4% had bad attitude toward institutional service [10]. This difference might be due to high government concern to achieve MDG5 and mothers' awareness (KAP towards institutional delivery increased by health education than before) while our study.

This study showed that 26% of mothers had delivered one child, 59.4% of them had delivered 2-4 children and the rest 14.6% had delivered on average ≥ 5 children. While a study conducted at Tigray region showed that 13.02% of them had delivered one child, 40.25% had delivered 2-4 children and 46.7% had delivered ≥ 5 children [11]. This difference might be due to better knowledge and practice of mothers towards health services.

This research also showed that 72.8% of mothers had ANC follow up during their last pregnancy. The research done at Sekela district North West Ethiopia is 66.8% had ANC follow up during their last pregnancy [14]. The difference may be due to community based but our study was institutional based.

This study indicated that 67.9% of mother's last deliveries were at health institution and 32.1% of their last deliveries were at home. Out of home deliveries, 55.7% were assisted by UTTBA, 10.1% by TTBA and, while family and relatives assisted 34.2%. While a study done Woldia, Amhara region showed that 48.3% gave

Tab. III. Practice of mothers towards institutional delivery who visit MCH at Adaba Health Center, West Arsi Zone, South East Ethiopia May, 2021 (n = 246).

Variables	Response	Frequency	Percent (%)
Number of birth throughout their life	1	64	26
	2	69	28
	3	50	20.3
	4	27	11
	≥ 5	36	14.6
	Total	246	100.0
Number of children delivered at institution	1	87	48.6
	2	60	33.5
	3	18	10.1
	4	9	5.0
	≥ 5	5	2.8
	Total	179	100.0
ANC follow up during last pregnancy	Yes	179	72.8
	No	67	27.2
	Total	246	100.0
Last delivery site	Institution	167	67.9
	Home	79	32.1
	Total	246	100.0
Reason of home delivery	Lack of awerness	38	48.1
	Cultural influence	3	3.8
	Financial problem	7	8.9
	Sudden onset of labor	31	39.2
	Total	79	100.0
Attendants of delivery at home	UTTBA	44	55.7
	TBA	8	10.1
	Family members	27	34.2
	Total	79	100.0
Problems faced at home delivery	No problem	44	55.7
	Retained placenta	3	3.8
	Excessive vaginal bleeding	20	25.3
	Neonatal death	8	10.1
	Prolonged labor	7	5.1
	Total	79	100.0
Reason for health institutional delivery	Personal choice	67	40.1
	Informed by health worker	98	58.7
	Previous bad outcomes of home delivery	2	1.2
	Total	167	100.0
Number of birth throughout their life	1	64	26
	2	69	28
	3	50	20.3
	4	27	11
	≥ 5	36	14.6
	Total	246	100.0
Number of children delivered at institution	1	87	48.6
	2	60	33.5
	3	18	10.1
	4	9	5.0
	≥ 5	5	2.8
	Total	179	100.0
ANC follow up during last pregnancy	Yes	179	72.8
	No	67	32.1
	Total	246	100.0
Last delivery site	Institution	167	67.9
	Home	79	32.1
	Total	246	100.0
Reason of home delivery	Lack of awerness	38	48.1
	Cultural influence	3	3.8
	Financial problem	7	8.9
	Sudden onset of labor	31	39.2
	Total	79	100.0
Attendants of delivery at home	UTTBA	44	55.7
	TBA	8	10.1
	Family members	27	34.2
	Total	79	100.0

continues ►

Tab. III. (follows).

Variables	Response	Frequency	Percent (%)
Problems faced at home delivery	No problem	44	55.7
	Retained placenta	3	3.8
	Excessive vaginal bleeding	20	25.3
	Neonatal death	8	10.1
	Prolonged labor	4	5.1
	Total	79	100.0
Reason for health institutional delivery	Personal choice	67	40.1
	Informed by health worker	98	58.7
	Previous bad outcomes of home delivery	2	1.2
	Total	167	100.0

their last birth at health institution and 51.8% at home. Out of these home deliveries, family members assisted 59.7% and relatives, 22.5% were by UTTBA, 10.2% and 41.9% were by TTBA and themselves respectively [12]. The difference might be due to low level of knowledge and Practice towards institutional delivery at that time.

Our study showed that among home delivery 5.1% faced prolonged labor, 25.3% faced excessive vaginal bleeding, 10.1% fetal death and 3.8% retained placenta and 55.7% faced, no problem. The study done at Woldia, Ethiopia, 39.4% faced retained placenta, 27.3% prolonged labor, and 27.3% excessive vaginal bleeding and 12% faced loss of consciousness [12]. This difference might be due to increasing utilization of institutional deliveries and decreasing problems during delivery.

This study also revealed that the final decision makers on place of delivery, 17.9% were by mothers themselves, 10.2% by husband 69.9% jointly and the rest 2% were informed by health professionals. While a study conducted at Tigray region, showed that 74% of them decided site of delivery by themselves, 18% jointly and the rest 8% had decided by health professionals [11]. The difference might be from urban and rural settings.

LIMITATION OF THE STUDY

This study had not made association for some variables related to KAP of mothers towards institutional delivery and small sample size of the study affect generalizability of findings and Strength of study is there is no previous research done in study area about institutional delivery knowledge, attitude, and practice among mothers of childbearing age with one or more children.

Conclusion

Increasing knowledge, attitude and practice of mothers towards institutional delivery plays a key role in reducing maternal mortality and morbidity. However, the prevailing level of KAP towards institutional delivery is not satisfactory.

Increasing utilization of institutional delivery by increasing awareness of each community through health information dissemination on importance of institutional delivery. Health professionals; health extension workers and community health agents are primary task takers for this action.

Ethics approval

Permission was secured from Madda Walabu University Institutional Research Ethics Review Board. The purpose of study was explained to the respondents. We were asking permission to interview them. No obligation was made for those who have not willingness to give information. The name of the respondent was not written in any form of the questionnaire.

Availability of data and materials

All data are included in the study.

Funding

There was no financing available for this project.

Conflict of interest statement

There are no conflicts of interests stated by the authors.

Authors' contributions

KTT was responsible for conceptualization, methodology, analysis, supervision, and report writing, TKW, ETT and MKT was responsible for analysis, report writing and methodology and, LB was responsible for methodology, and report writing.

References

- [1] Hagos S, Shaweno D, Assegid M, Mekonnen A, Afework MF, Ahmed S. Utilization of institutional delivery service at Wukro and Butajera districts in the Northern and South Central Ethiopia. *BMC Pregnancy Childbirth* 2014;14:178. <https://doi.org/10.1186/1471-2393-14-178>
- [2] Abraha MW, Nigatu TH. Modeling trends of health and health related indicators in Ethiopia (1995-2008): a time-series study. *Health Res Policy Syst* 2009;7:29. <https://doi.org/10.1186/1478-4505-7-29>
- [3] Trends in maternal mortality 2000 to 2020: estimates by WHO, UNICEF, UNFPA, World Bank Group and UNDESA/Population Division. Geneva: World Health Organization 2023. Licence:

- CC BY-NC-SA 3.0 IGO. Available at: <https://www.who.int/publications/i/item/9789240068759> (Accessed on: 10/3/2023).
- [4] Nations U. The Sustainable Development Goals. 2020. Available at: <https://sdgs.un.org/goals> (Accessed on: 12/2/2021).
 - [5] Ababa A. Federal democratic republic of Ethiopia ministry of health. Ethiopia: Postnatal Care 2003.
 - [6] Weil O, Fernandez H. Is safe motherhood an orphan initiative? *Lancet* 1999;354:940-3. [https://doi.org/10.1016/S0140-6736\(99\)02369-7](https://doi.org/10.1016/S0140-6736(99)02369-7)
 - [7] Shah D, Shroff S, Sheth S. Reproductive and sexual health and safe motherhood in the developing world. *Eur J Contracept Reprod Health Care* 1999;4:217-28. <https://doi.org/10.3109/13625189909071342>
 - [8] PRB staff. World Population Highlights: Key Findings From PRB's 2010 World Population Data Sheet. *Population Bulletin* 2010;65(2).
 - [9] Mekonnen Y, Mekonnen A. Factors influencing the use of maternal healthcare services in Ethiopia. *Journal of health, population and nutrition* 2003;1:374-82.
 - [10] Amano A, Gebeyehu A, Birhanu Z. Institutional delivery service utilization in Munisa Woreda, South East Ethiopia: a community based cross-sectional study. *BMC Pregnancy Childbirth* 2012;12:105. <https://doi.org/10.1186/1471-2393-12-105>
 - [11] Tsegay Y, Gebrehiwot T, Goicolea I, Edin K, Lemma H, Sebastian MS. Determinants of antenatal and delivery care utilization in Tigray region, Ethiopia: a cross-sectional study. *Int J Equity Health* 2013;12:30. <https://doi.org/10.1186/1475-9276-12-30>
 - [12] Worku Awoke, Jemal Muhammed, Gedefaw Abeje. Institutional Delivery Service Utilization in Woldia, Ethiopia, *Science Journal of Public Health* 2013;1:18-23. <https://doi.org/10.11648/j.sjph.20130101.13>
 - [13] Fikre AA, Demissie M. Prevalence of institutional delivery and associated factors in Dodota Woreda (district), Oromia regional state, Ethiopia. *Reproductive Health* 2012;9:33. <https://doi.org/10.1186/1742-4755-9-33>
 - [14] Teferra AS, Alemu FM, Woldeyohannes SM. Institutional delivery service utilization and associated factors among mothers who gave birth in the last 12 months in Sekela District, north west of Ethiopia: a community-based cross sectional study. *BMC Pregnancy Childbirth* 2012;12:74. <https://doi.org/10.1186/1471-2393-12-74>
 - [15] Bekele S. Analysis on the quality of age and sex data collected in the two population and housing censuses of Ethiopia. *SINET: Ethiop J Sci* 2006;29:123-32.
 - [16] Israel GD. Determining sample size, PEOD6. US Department of Agriculture, Cooperative Extension Service, University of Florida, Institute of Food and Agricultural Sciences 1992.

Received on February 9, 2023. Accepted on March 27, 2023.

Correspondence: Kaleab Tesfaye Tegegne, Department of Public Health, College of Health Science, Debarik University, Debarik, Ethiopia. E-mail: Kaleabtesfaye35@gmail.com

How to cite this article: Tegegne KT, Wudu TK, Abdisa BG, Tegegne ET, Tessema MK. Institutional delivery knowledge, attitude, and practice among mothers of childbearing age with one or more children, Ethiopia. *J Prev Med Hyg* 2023;64:E67-E77. <https://doi.org/10.15167/2421-4248/jpmh2023.64.1.2864>

© Copyright by Pacini Editore Srl, Pisa, Italy

This is an open access article distributed in accordance with the CC-BY-NC-ND (Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International) license. The article can be used by giving appropriate credit and mentioning the license, but only for non-commercial purposes and only in the original version. For further information: <https://creativecommons.org/licenses/by-nc-nd/4.0/deed.en>

Appendix

Operational Definitions

Safe delivery = delivery attended by skilled birth attendants (midwifery, General Practitioner, health officer, nurse).

Attitude = idea towards institutional delivery.

Poor attitude = mothers who answered attitude related questions correctly and scored less than the mean score value (< 4) regarding institutional delivery.

Good attitude = mothers who answered attitude related questions correctly and scored more than or equal to the mean score value (≥ 4) regarding institutional delivery.

Knowledge = awareness towards institutional delivery.

Good knowledge = mothers who answered knowledge related questions correctly and scored more than or equal to the mean score value (≥ 7) regarding institutional delivery.

Poor knowledge = mothers who answered knowledge related questions correctly and scored less than the mean score value (< 7) regarding institutional delivery.

Practice = habit of utilization of health institution during child birth.

Good practice = a woman who had delivered at least one child in the health institution.

Poor practice = a woman who had never given at health institution.

Prolonged labor = labor that lasts for more than 12 hours for multigravida and more than 18 hours for primigravida.

Obstructed labor = failure to pass fetus through uterine cavity while there was adequate uterine contractions and with fully cervical dilatation.

Ante partum hemorrhage = bleeding during pregnancy from 28th weeks of gestation till delivery of the fetus.

Questionnaire

This Questionnaire was prepared by Madda Walabu University for collection of data on KAP towards institutional delivery at Adaba Town in Adaba Health Center. It is an important contribution for the health of the mothers and safe for the child. We would like to assure the respondents that the study is confidential; we will not keep a record of your name and address. At the same time she has also a full right to ask the interviewer for clarification of unclear and ambiguous questions.

Are you willing to participate in the interview?

1. Yes, go to the next page

2. No, thank them and interrupt the interview

Name of collector	Signature
Qualification	Woreda Kebele
House hold number	Date of collection
Starting time	Finishing time

Part I. Socio-demographic characteristics.

S.NO	Questions	Possible answer		Skip
1	Your age in year			
2	What is your marital status?	A. Married	C. Widowed	
		B. Divorced	D. Single	
3	What is your religion?	A. Muslim	D. Protestant	
		B. Orthodox	E. Others	
		C. Catholic		
4	What is your ethnicity?	A. Oromo	D. Sumali	
		B. Amhara	E. Other	
		C. Tigre		
5	What is your educational status?	A. Unable to read and write	D. Preparatory (11-12)	
		B. Primary school (1-8)	E. Diploma	
		C. High school (9-10)	F. Degree and above	
6	What is your occupational status?	A. House wife	D. Governmental worker	
		B. Private	E. Others (specify)	
		C. Daily labour		
7	House hold income in Ethiopian birr			

Part II. Knowledge related.

No	Questions	Possible answer	Skip	
1	Do you know that the advantage of using institutional delivery?	A. Yes	B. No	
2	Do you know that health facility give delivery service?	A. Yes	B. No	
3	Do you know that women can face problem during child birth?	A. Yes	B. No	If No, skip (4)
4	If your answer in question number (3) yes does you know that women can face excessive bleeding during delivery?	A. yes	B. No	
5	Do you know that women can face obstructed labour during child birth?	A. Yes	B. No	
6	Do you know that women can face intra uterine fetal death during delivery?	A. Yes	B. No	
7	Do you know that the mother can die during delivery?	A. Yes	B. No	
8	Do you know that problem can be prevented by institutional delivery?	A. Yes	B. No	

B. Attitude related

No	Questions	Possible answer	Skip	
1	In your opinion institutional delivery has an effect on mother?	A. Agree B. Neutral	C. Disagree	
2	In your opinion mothers should give birth in health institutions?	A. Agree B. Neutral	C. Disagree	
3	In your opinion mothers is not expected to delivery in health institution?	A. Agree B. Neutral	C. Disagree	
4	Delivering in health institution is safe for the child and mother?	A. Agree B. Neutral	C. Disagree	
5	In your opinion mother should ask her husband to deliver in health institution?	A. agree B,neutral	C. Disagree	
6	Do you think home delivery is better than institutional delivery?	A. agree B. Neutral	C. Disagree	

C. Practice related

No	Question	Possible answer	Skip
1	How many births do you have?(open)		
2	How many children delivered in health institution? (open)		
3	How many children delivered at home?(open)		
4	Have you ANC follow up in the last pregnancy?	A. Yes B. No	
5	Where was your last delivery site?	A. Health institution B. At home	If Institution skip (6, 7, 8)
6	If your answer in question number 5, at home what was your reason?	A. Lack of awareness B. Cultural influence C. Financial problem D. Others (specify)	
7	If your answer for question number 5 at home who attends the delivery?	A. Untrained B. TTBA C. Family member D. By my self E. Others	
8	If your answer for question number 5 at home, what problems did the mother face?	A. No problems B. Retained Placenta C. Excessive bleeding D. Still birth E. Obstructed labour F. Other	
9	If question umber 5 in health institution what was your reason?	A. Personal choice B. Informed by health worker C. Previously bad outcome of home delivery D. Others (specify)	
10	Who was the final decision maker on place of delivery?	A. Me B. Husband C. Health worker D. Others (specify)	

Impact of dental caries and periodontal disease on oral health-related quality of life among the Karnataka State Reserve Police Personnel in Belagavi, India

VARKEY NADAKKAVUKARAN SANTHOSH, ANIL ANKOLA, ROOPALI SANKESHWARI, SAGAR JALIHAL, ANU SARA VARGHESE, PRAJAKTA CHAVAN, MEHUL AJIT SHAH
Department of Public Health Dentistry, KLE VK Institute of Dental Sciences,
KLE Academy of Higher Education and Research (KLE University), India.

Keywords

Dental caries • Oral health • Police • Periodontal diseases • Quality of Life

Summary

Introduction. The Karnataka State Reserve Police (KSRP) is a state-level police force in India. Good Oral Health-Related Quality of Life (OHRQoL) among them is quintessential for the welfare of the society. The aim of the study was to assess the impact of dental caries and periodontal disease on the OHRQoL among the Karnataka State Reserve Police (KSRP) stationed in Belagavi, India.

Methods. A cross-sectional design was used with a total sample size of 720. The personnel were recruited by simple random sampling. The Oral Health Impact Profile 14 (OHIP 14) was used to assess OHRQoL in 7 domains. The intra-examiner reliability for World Health Organisation (WHO) oral assessment form 2013 was assessed using Kappa statistics and was found to be 0.86. Dentition and periodontal status were recorded using the same. Statistical analysis was performed using descriptive statistics,

Analysis of variance (ANOVA), Pearson's coefficient of correlation and multiple linear regression analysis.

Results. Physical pain and psychological discomfort had the highest mean scores among the seven domains of OHIP-14. Constables had higher mean OHIP-14 scores among the study population. A significant positive correlation was found between oral health parameters with the domains of OHIP-14. The highest dependence on the socio-demographic and oral health predictors were found in the domains of physical pain (44.2%), psychological discomfort (38.3%), and physical disability (30.5%).

Conclusions. The study revealed that dental caries and periodontal disease had a significant impact on OHRQoL among reserve police personnel and the OHRQoL was poor particularly among the lower ranked personnel.

Introduction

Oral health is closely linked to overall health [1]. According to World Health Organisation (WHO), nearly 3.5 billion people worldwide are affected by oral diseases, with a high prevalence in middle-income countries like India [2]. Nearly 29% of world population have dental caries in their permanent teeth, with a total of over 2 billion reported cases worldwide. Similarly, periodontal disease is also particularly common, with over 1 billion cases worldwide and a peak prevalence of 19% in adults over the age of 55 years [2]. These oral diseases can significantly impact the Quality of Life (QoL) of an individual.

Certain occupations may elevate the likelihood of oral health diseases due to the nature of the work [3]. Physical demands of certain jobs may hinder oral hygiene practices leading to poor oral health. One such strenuous occupation is policing. A police personnel's job is typically classified as a blue-collar job and involves maintaining law and order, protecting the public, and enforcing laws. Studies conducted among police personnel of Indian states have reported increased psychological distress among them [4, 5]. Long work hours, exposure to traumatic events, and public scrutiny

can contribute to post-traumatic stress and lower QoL further [6]. Due to the high stress levels associated with their job, they may tend to engage in habits such as using tobacco in various forms [7]. These habits may increase the risk of periodontal disease and oral cancer.

The concept of QoL was introduced by economist A.C. Pigou in 1920 [8]. David Locker's model considers health and QoL as multifaceted, subjective, and influenced by various factors. He emphasizes the link between overall health and oral health [9]. Oral Health-Related Quality of Life (OHRQoL) measures the impact of oral health on an individual's overall well-being and daily life [10]. Poor oral health may lower OHRQoL due to pain, difficulty in eating and speaking, and self-consciousness about appearance. Previous systematic reviews have shown that dental pain and periodontitis can negatively impact OHRQoL [11, 12]. The Oral Health Impact Profile (OHIP) by G D Slade, is a validated and widely used instrument for measuring OHRQoL and is based on Locker's model. It assesses how oral health problems affect various aspects of daily life [13].

Karnataka State Reserve Police (KSRP) is a state-level police force with fourteen battalions that supplement the regular police force as and when needed. The second battalion is located in Belagavi district consisting

of male and female personnel. They have the same training and responsibilities as regular personnel [14]. Although there have been previous studies conducted on the oral health and OHRQoL of police personnel in India, this study contributes significantly to the existing knowledge by focusing exclusively on reserve police personnel. It provides unique insights into the oral health and OHRQoL of this population, which has not been previously explored in the literature [15, 16]. This study was done to address the hypothesis that dental caries and periodontal disease have a significant impact on the OHRQoL among KSRP personnel stationed in Belagavi, India. The objectives of study this were to evaluate the OHRQoL of KSRP personnel using the OHIP-14 questionnaire. To determine if there are any significant differences in OHRQoL among the police force based on their rank. To investigate the association between oral health parameters and their OHRQoL.

Material and methods

This cross-sectional study followed STROBE recommendations and was conducted from September to December 2022 among KSRP unit in Belagavi district. Eligible participants were police personnel deployed at KSRP Belagavi unit during the study period, and those who refused informed consent were excluded.

The Institutional Research and Ethics Committee issued the ethical clearance (Ref no: 1538) and the study adhered to all the ethical requirements. Prior to the start of the study, an official permission was acquired from the office of the superintendent of police at KSRP, Belagavi unit. All participants read and signed a written informed consent document before commencing the study.

A single examiner was standardised and calibrated to ensure consistent assessment by a panel of experts prior to the start of the study. The intra-examiner reliability was assessed using Kappa statistics for WHO Oral Health Assessment Form (2013) and the Kappa coefficient value was found to be 0.86 [17]. A pilot study was carried out to estimate the prevalence of dental caries and periodontal disease among 40 police personnel. It also assessed questionnaire comprehension and response time. From the pilot study, the prevalence of dental caries and periodontal disease was estimated to be 72.1% and 83.6% respectively. Based on these findings, the minimum sample size was estimated to be 688 with type I (α) error = 0.05 and Power ($1-\beta$) = 0.95 using G*Power statistical software (Ver. 3.1.9.4). During the period of study, the list of police personnel who were deployed at the KSRP unit in Belagavi was obtained and it was used as the sampling frame. A final sample size of 720 was set and the participants were recruited by simple random sampling using the random number table method. The study involved conducting an oral examination followed by completion of a physical copy of questionnaire. The questionnaire utilized for the survey was the OHIP-14, which was made available in both English and the local language, Kannada. To ensure linguistic validity, it was translated into Kannada by

back-translation method and was verified using a language expert. An expert committee performed a cross-cultural adaptation on the translated version, which aimed to establish equivalence between the source and target versions in four areas: semantic, idiomatic, experiential, and conceptual [18]. The higher ranked personnel received the questionnaire in English while the lower ranked personnel received the questionnaire in the regional language. This approach ensured that the questionnaire was suitable for all ranks and that the results obtained were reliable. Although the OHIP-14 is a brief questionnaire, it has demonstrated strong reliability and sensitivity, with satisfactory cross-cultural consistency over other instruments such as Oral Impacts on Daily Performance (OIDP) to assess the OHRQoL [19, 20].

Demographic details like age, sex, designation, and education were recorded in the first part of the questionnaire. The second part consisted of OHIP-14 questionnaire to assess OHRQoL in seven domains [21]. Each of the seven domains had two questions, which were close ended. Responses were recorded on a 5-point Likert scale, with higher scores indicating lower OHRQoL. The total OHIP-14 score ranged from 0 to 56, with individual domain score ranging from 0 to 8 [10]. DMFT (Decayed, Missing Filled Teeth) and periodontal status (gingival bleeding, pockets, and loss of attachment) were recorded using the WHO Oral Health Assessment Form (2013). On pre-determined dates, the oral examination was carried out at the KSRP health centre, Belagavi in a designated space provided by the officials, in adherence to standardized procedures and protocols. Data was collected in batches and a type III examination carried out under natural light.

STATISTICAL ANALYSIS

IBM SPSS Statistics (Version 21.0) was used for statistical analysis. Descriptive statistics were computed using Microsoft Excel 2019, including percentages, means, and standard deviations. The Kolmogorov-Smirnov test determined data distribution normality. Analysis of Variance (ANOVA) was used to check for significant differences, while Karl Pearson coefficient of correlation and multiple linear regression were performed for study variables. Level of significance and confidence levels were set at 5% and 95%, respectively.

Results

Among the 720 study participants, majority of the participants were constables (35.6%) and head constables (24.4%), while 10.6% were inspectors. The mean age of the study participants was 39.48 ± 10.65 (Tab. I). Table II depicts the frequency distribution of responses to all OHIP-14 questions and their mean values. Among the seven domains of OHIP-14, physical pain and psychological discomfort had the highest mean scores of 3.10 ± 1.64 and 3.01 ± 1.82 respectively. The OHIP-14 scores were highest for constables (22.43 ± 4.84) and lowest for inspectors (7.71 ± 3.01) (Tab. III). The mean OHIP-14

Tab. I. Distribution of study population by gender, age and educational level.

Sociodemographic characteristics	Constables n (%)	Head Constables n (%)	Assistant Sub Inspectors n (%)	Sub Inspectors n (%)	Inspectors n (%)	Total n (%)
Gender						
Male	118 (46.1%)	137 (77.8%)	96 (82.8%)	77 (80.2%)	76 (100%)	504 (70.0%)
Female	138 (53.9%)	39 (22.2%)	20 (17.2%)	19 (19.8%)	0 (0.0%)	216 (30.0%)
Age Groups						
21-30	116 (45.3%)	39 (22.2%)	20 (17.2%)	0 (0%)	0 (0.0%)	175 (24.3%)
31-40	60 (23.4%)	59 (33.5%)	19 (16.4%)	76 (79.2%)	38 (50.0%)	252 (35.0%)
41-50	20 (7.8%)	58 (33.0%)	20 (17.2%)	20 (20.8%)	19 (25.0%)	137 (19.0%)
51-60	60 (23.4%)	20 (11.4%)	57 (49.1%)	0 (0.0%)	19 (25.0%)	156 (21.7%)
Educational Level						
Graduate	0 (0.0%)	0 (0.0%)	20 (17.2%)	57 (59.4%)	57 (75.0%)	174 (24.2%)
Diploma / Intermediate	40 (15.6%)	39 (22.2%)	57 (49.1%)	20 (20.8%)	19 (25.0%)	135 (18.8%)
High School	216 (84.4%)	137 (77.8%)	39 (33.6%)	19 (19.8%)	0 (0.0%)	411 (57.1%)
Total	256 (100%)	176 (100%)	116 (100%)	96 (100%)	76 (100%)	720 (100%)

All values are expressed as frequency with percentages (in parentheses).

Tab. II. Distribution of responses to individual OHIP-14 questions and their mean scores.

OHIP-14 Questions	5 Point Likert Scale					Mean $\pm$ SD
	Never (0)	Rarely (1)	Occasionally (2)	Frequently (3)	Very often (4)	
Have you had trouble pronouncing any words because of problems with your teeth or mouth?	134 (18.6%)	291 (40.4)	217 (30.1%)	59 (8.2%)	19 (2.6%)	1.36 $\pm$ 0.96
Have you felt that your sense of taste has worsened because of problems with your teeth or mouth?	95 (13.2%)	292 (40.6%)	274 (38.1%)	54 (7.5%)	5 (0.7%)	1.42 $\pm$ 0.84
Have you had painful aching in your mouth?	190 (26.4%)	139 (19.3%)	312 (43.3%)	76 (10.6%)	3 (0.4%)	1.39 $\pm$ 1.00
Have you found it uncomfortable to eat any foods because of problems with your teeth or mouth?	76 (10.6%)	156 (21.7%)	409 (56.8%)	59 (8.2%)	20 (2.8%)	1.71 $\pm$ 0.87
Have you been self-conscious because of your teeth or mouth?	58 (8.1%)	330 (45.8%)	214 (29.7%)	78 (10.8%)	40 (5.6%)	1.60 $\pm$ 0.98
Have you felt tense because of problems with your teeth or mouth?	211 (29.3)	216 (30%)	139 (19.3%)	97 (13.5%)	57 (7.9%)	1.41 $\pm$ 1.25
Has been your diet been unsatisfactory because of problems with your teeth of mouth?	254 (35.3%)	213 (29.6%)	155 (21.5%)	78 (10.8%)	20 (2.8%)	1.17 $\pm$ 1.11
Have you had to interrupt meals because of problems with your teeth or mouth?	175 (24.3%)	175 (24.3%)	156 (21.7%)	211 (29.3%)	3 (0.4%)	1.57 $\pm$ 1.16
Have you found it difficult to relax because of problems with your teeth or mouth?	114 (15.8%)	312 (43.3%)	140 (19.4%)	135 (18.8%)	19 (2.6%)	1.50 $\pm$ 1.06
Have you been a bit embarrassed because of problems with your teeth or mouth?	152 (21.1%)	333 (46.3%)	196 (27.2%)	37 (5.1%)	2 (0.3%)	1.17 $\pm$ 0.83
Have you been a bit embarrassed because of problems with your teeth or mouth?	135 (18.8%)	368 (51.1%)	217 (30.1%)	4 (0.6%)	1 (0.1%)	1.12 $\pm$ 0.71
Have you had difficulty doing your usual jobs because of problems with your teeth or mouth?	133 (18.5%)	350 (48.6%)	178 (24.7%)	39 (5.4%)	20 (2.8%)	1.25 $\pm$ 0.91
Have you felt that life in general was less satisfying because of problems with your teeth or mouth?	179 (24.9%)	351 (48.8%)	133 (18.5%)	55 (7.6%)	2 (0.3%)	1.10 $\pm$ 0.87
Have you been totally unable to function because of problems with your teeth or mouth?	235 (32.6%)	328 (45.6%)	99 (13.8%)	57 (7.9%)	1 (0.1%)	0.97 $\pm$ 0.89

All values are expressed as frequency with percentages (in parentheses); SD: Standard deviation.

Tab. III. Mean scores of the seven domains of OHIP-14 among the study subjects.

Domains of OHIP	Constables	Head Constables	Assistant Sub Inspectors	Sub Inspectors	Inspectors	Total
Functional limitation	3.32 ± 1.54	3.22 ± 1.39	3.02 ± 1.16	1.63 ± 1.52	1.00 ± 1.01	2.78 ± 1.61
Physical pain	3.55 ± 1.70	3.32 ± 0.82	3.70 ± 1.81	2.04 ± 1.72	1.50 ± 0.50	3.10 ± 1.64
Psychological discomfort	3.90 ± 1.64	3.87 ± 1.52	2.53 ± 1.51	1.41 ± 0.49	0.75 ± 0.44	3.01 ± 1.82
Physical disability	3.38 ± 1.80	2.99 ± 2.18	3.34 ± 2.17	1.61 ± 1.36	0.50 ± 0.87	2.74 ± 2.08
Psychological disability	3.25 ± 1.29	3.55 ± 1.27	2.34 ± 2.13	1.43 ± 1.38	0.75 ± 0.44	2.67 ± 1.70
Social disability	2.80 ± 1.53	3.01 ± 1.28	1.86 ± 1.24	1.60 ± 0.49	1.25 ± 0.83	2.38 ± 1.41
Handicap	2.23 ± 1.26	2.27 ± 1.57	2.04 ± 2.01	1.40 ± 1.12	1.96 ± 1.15	2.07 ± 1.48
Total OHIP-14 Score	22.43 ± 4.84	22.23 ± 5.18	18.82 ± 8.41	11.11 ± 5.18	7.71 ± 3.01	18.74 ± 7.69

All values are expressed in Mean ± Standard Deviation (SD).

score among the study population was 18.74 ± 7.69 and there was a statistically significant difference among the five ranks of police personnel when ANOVA test was applied ($P \leq 0.001$). The prevalence of dental caries among the study participants was 84.2%. Figure 1 illustrates the distribution of mean DMFT scores among the participants. It was observed that constables and head constables had higher mean DMFT scores of 5.62 ± 2.97 and 5.39 ± 2.96 respectively, while inspectors had a lower score of 3.66 ± 2.70 . Figure 2 illustrates the prevalence of various periodontal conditions among the population. The prevalence of gingival bleeding, periodontal pockets, and loss of attachment (LoA) were 71%, 63% and 69% respectively. Figure 3 illustrates the kernel density estimate of the OHIP-14 scores among the participants.

RELATIONSHIP BETWEEN THE DOMAINS OF OHIP-14 AND VARIOUS ORAL HEALTH PARAMETERS USING PEARSON'S COEFFICIENT OF CORRELATION

Table IV depicts the field-wise correlation data of the study variables using Pearson's coefficient of correlation. DMFT showed maximum positive correlations that were

statistically significant at $p \leq 0.001$ with four domains of OHIP-14, followed by the decayed component (DT) which were significantly correlated with two. There was a negative correlation seen between filled teeth and domain physical pain at $P \leq 0.05$. High loss of attachment (LoA) scores were positively correlated with the domain physical pain at $P \leq 0.001$. Other periodontal components also had significant positive correlations with some of the domains of OHIP-14. The missing component did not show any statistically significant correlations.

RELATIONSHIP BETWEEN THE DOMAINS OF OHIP-14 AND VARIOUS STUDY VARIABLES USING MULTIPLE LINEAR REGRESSION ANALYSIS

Table V summarizes all the multiple regression analysis models performed using the seven domains of OHIP-14 as the dependent variable and the predictors: age, education, designation of police personnel and prevalence of caries and periodontal disease. The highest dependence on these predictors were found in the domains of physical pain (44.2%), psychological

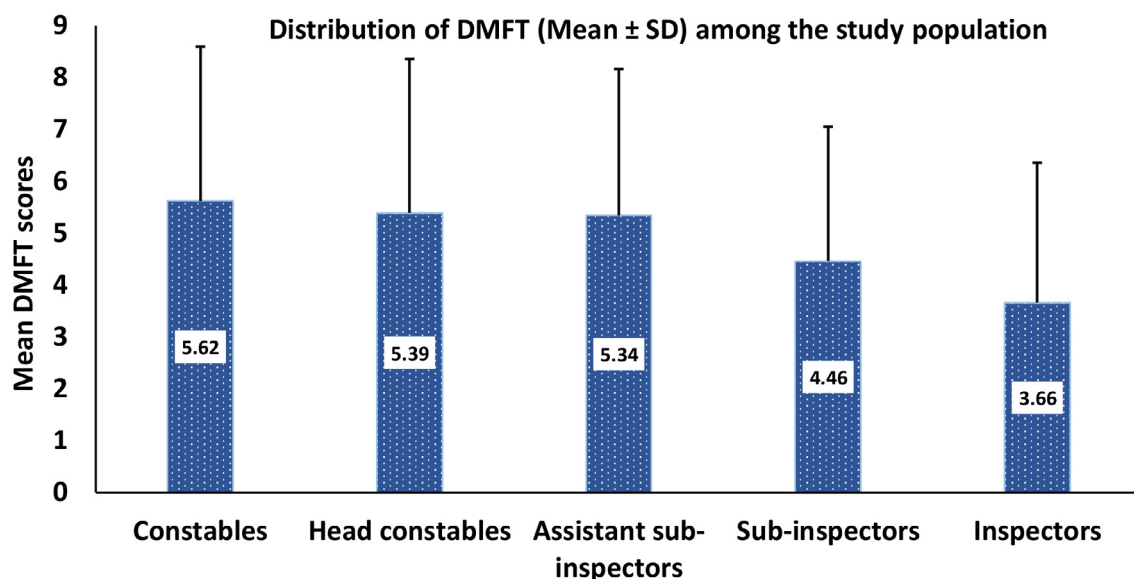
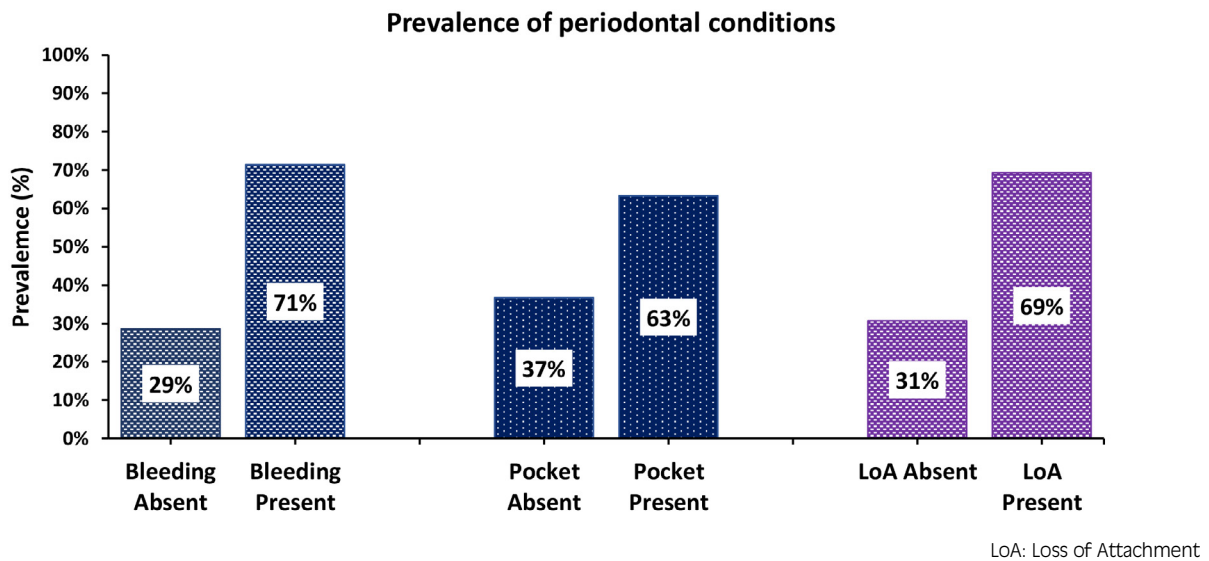
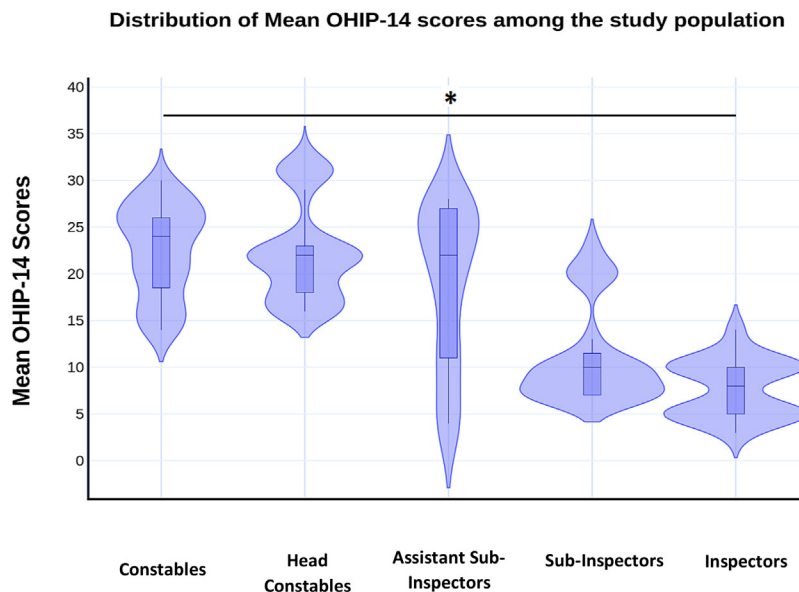
Fig. 1. Distribution of DMFT (Decayed, Missing and Filled Teeth) among the study population in Mean and SD (Standard deviation).

Fig. 2. Prevalence of periodontal conditions among the study participants;.**Fig. 3.** Violin plot showing the distribution of OHIP-14 scores among the study population. Statistical test used: Analysis of Variance (ANOVA).

discomfort (38.3%), and physical disability (30.5%), while the lowest dependence were seen with handicap (17.0%) and social disability (10.8%). Table VI presents the regression equation of all the multiple regression analysis models performed in the study.

Discussion

Oral health is an important factor in the overall QoL. India ranks 54th in the QoL Index 2023 [22]. In a recent study conducted on QoL, nearly one out of two (46.2%) Indian adults has poor QoL [23]. Good QoL among police personnel is quintessential for the welfare of the

society. The purpose of this study was to investigate if there is any impact of oral health parameters on the seven domains of QoL among the reserve police force of Belagavi district.

Blue collared jobs such as policing take a toll on an individual's health. They are prone to systemic as well as oral diseases [3, 24]. The demanding physical work and long hours can lead to poor oral hygiene habits, which can increase the risk of dental caries and periodontal disease. Previous studies conducted among police personnel in India and other parts of Southwest Asia reported that the oral health among this population were not up to the required standards [25, 26]. In this study, the prevalence of dental caries was found to be high (84.2%)

Tab. IV. Correlation between clinical variables and domains of OHIP-14.

Domains of OHIP	DT	MT	FT	DMFT	Bleeding	Deep Pockets (> 6 mm)	High LoA
Functional limitation	0.093*	0.050	-0.022	0.102**	0.044	0.032	0.009
Physical pain	0.093*	0.061	-0.083*	0.109**	0.082*	0.075*	0.139**
Psychological discomfort	0.098**	0.060	-0.006	0.118**	0.061	0.055	0.078*
Physical disability	0.080*	0.008	-0.020	0.074*	0.054	0.058	0.083*
Psychological disability	0.123**	0.073	-0.033	0.136**	0.047	0.035	0.006
Social disability	0.042	0.050	0.017	0.068	0.008	0.010	0.001
Handicap	0.072	0.015	-0.052	0.055	0.025	0.062	0.047

The statistical test used: Pearson's coefficient of correlation. * Significant at 0.05 level. ** Significant at 0.001 level. DT: Decayed teeth; MT: Missing teeth; FT: Filled teeth; LoA: Loss of attachment.

Tab. V. Association between domains of OHIP-14 as dependent variable and various study variables as predictors.

Dependent Variable	Coefficient (r)	Coefficient of determination (R ²)	F	p	Standard error of estimate
Functional limitation	0.484	0.235	43.798	< 0.001*	1.403
Physical pain	0.665	0.442	112.951	< 0.001*	1.365
Psychological discomfort	0.619	0.383	88.513	< 0.001*	1.628
Physical disability	0.553	0.305	62.797	< 0.001*	1.412
Psychological disability	0.483	0.234	43.514	< 0.001*	1.230
Social disability	0.329	0.108	17.349	< 0.001*	1.398
Handicap	0.412	0.170	29.236	< 0.001*	1.493

The statistical analysis used: Multivariate linear regression; Level of significance: * P ≤ 0.05 is considered statistically significant; Dependent Variable: Domains of OHIP-14; Predictors: (Constant), Age, Education, Designation, Caries Prevalence, Periodontal disease prevalence.

Tab. VI. Regression equation of all the models with domains of OHIP-14 as dependent variable and various study variables as predictors.

Domains of OHIP	Regression equation
Functional limitation (Y1)	Y1 = 0.788 + (0.057) X1 + (0.258) X2 + (0.650) X3 + (0.025) X4 + (0.124) X5
Physical pain (Y2)	Y2 = 1.435 + (0.316) X1 + (0.421) X2 + (0.944) X3 + (0.052) X4 + (0.234) X5
Psychological discomfort (Y3)	Y3 = 0.995 + (0.542) X1 + (1.080) X2 + (0.129) X3 + (0.030) X4 + (0.029) X5
Physical disability (Y4)	Y4 = 1.284 + (0.308) X1 + (0.109) X2 + (0.633) X3 + (0.087) X4 + (0.005) X5
Psychological disability (Y5)	Y5 = 1.182 + (0.049) X1 + (0.499) X2 + (0.620) X3 + (0.043) X4 + (0.070) X5
Social disability (Y6)	Y6 = 1.870 + (0.296) X1 + (0.246) X2 + (0.098) X3 + (0.011) X4 + (0.026) X5
Handicap (Y7)	Y7 = 2.097 + (0.218) X1 + (0.098) X2 + (0.465) X3 + (0.020) X4 + (0.085) X5

Predictors: X1 = Age; X2 = Education; X3 = Designation; X4 = Caries Prevalence; X5 = Periodontal disease prevalence.

and comparatively, the lower ranked personnel had higher DMFT scores. These findings were comparable to Maurya et al. [25] and Basavaraj et al. [27], however it was contradicting Singh et al. [28]. Dental caries is a multifactorial disease. It may be associated with factors such as poor oral hygiene, increased amounts of sugars in diet, lack of awareness and low socioeconomic status among this population. A previous study conducted by Mythri et al. [29] at KSRP unit in Tumkur district revealed that there was a significant disparity between oral health awareness and practices among the personnel. Lower-ranked police personnel may consume refreshments high in fermentable sugars during duty hours when exposed to prolonged sunlight. Dehydration under the sun can cause decreased salivary flow. This combination can increase the risk of developing dental caries. Additionally, due to their low socioeconomic status, these personnel have limited access to good oral healthcare services to maintain their oral health [30, 31]. The prevalence of periodontal diseases were also

high among them, analogous to findings reported by Rajagopalachari et al. [16] and Majeed et al. [26]. Inadequate oral hygiene practices can contribute to the build-up of bacterial plaque and calculus, which in turn can result in gingival bleeding. Due to stress and irregular work hours, there is also increased use of tobacco among them. A higher prevalence of deleterious habits such as tobacco chewing was reported among police personnel, by Dilip C.L in Karnataka [32]. These habits can affect the periodontium leading to conditions such as gingival recession, pocket formation, and bone loss. Periodontal disease, if left untreated, can lead to tooth and bone loss, and increased risk of systemic conditions [15].

The OHRQoL was assessed in seven dimensions using OHIP-14 questionnaire [19, 33]. In this study the police personnel had a lower OHRQoL, especially in the domains physical pain and psychological discomfort, as evidenced by the higher mean scores observed in these two domains. The OHRQoL worsens with the pain and discomfort caused by decayed teeth. Dental caries when

progressed deeper towards to the pulp can cause major pain affecting the OHRQoL of an individual [11]. The decayed component and DMFT showed significant positive correlations with the domains of OHIP-14, similar to findings reported by Rajagopalachari et al. [16]. These findings indicate that, as the number of decayed teeth increases the OHRQoL declines among these personnel. Educational qualifications of an individual play a key role in maintaining a good oral health [34]. In this study, it was observed that personnel with higher education had lower DMFT scores and better OHRQoL, especially the inspectors. This study also reported that, the filled component showed negative correlations with OHIP-14 domains, indicating that treating the decayed teeth has improved the OHRQoL among these personnel, by reducing their pain and associated symptoms. However, these findings were at contradiction to that of Rajagopalachari et al. [16], where no such negative correlation was reported. The pain caused by periodontal disease is milder compared to dental caries [28]. But increase in prevalence of periodontal disease among these police personnel may still affect the OHRQoL [12]. Halitosis caused by periodontal disease can also negatively impact the OHRQoL as evidenced in the systematic review by Cassiano et al. [35]. In this study, it was found that periodontal diseases showed significant correlations with physical pain and disability, and psychological discomfort.

In this study, it was seen that five domains of OHIP-14 showed significant relationship with oral health variables. Physical pain, and psychological discomfort showed the most significant correlations, followed by physical and psychological disability, and functional limitation. The mean scores for social disability and handicap were low and had no similar significant relationships with any of the oral health parameters. These findings were synonymous with studies by Rajagopalachari et al. [16] and Fotedar et al. [36]. It shows that the existence of oral disorders did not cause any significant handicap or social disadvantage among this population, however it significantly affected the physical, psychological, and functional dimensions of OHRQoL. When total OHIP-14 scores were considered, it was observed that the inspectors and other higher ranked personnel had better OHRQoL than lower ranked constables. Multiple linear regression analysis performed in this study revealed that factors such as age, education, designation, and prevalence of oral disease had a major influence on OHRQoL. These findings highlight that socioeconomic status and education play key roles in the OHRQoL of these police personnel [34]. The personnel with higher ranks had good education and better socioeconomic status due to which they could cater to their oral health needs on time, thereby having a better OHRQoL.

Some of the ways to tackle this oral health challenge are health education programs targeting police personnel on proper brushing techniques and other oral hygiene practices. This should be complemented by diet counselling and emphasizing the importance of avoiding

fermentable sugars between meals. Routine dental check-ups are required among this population, followed by preventive dental treatments such as pit and fissure sealant application and fluoride varnish, to reduce the incidence of initial enamel caries. Individual-level restorative dental treatments, particularly among lower-ranked personnel, may be beneficial in improving OHRQoL, as restoring teeth had a significant positive impact on OHRQoL. These personnel should be made aware of the different treatment modalities, such as removable and fixed prosthesis and dental implants that are available to them, to prevent disability caused by tooth loss. Additionally, tobacco counselling and education on the ill effects of tobacco are necessary interventions. Health insurance schemes, such as the one implemented in the state of Odisha, which covers systemic as well as oral diseases, should be considered to improve the QoL and working efficiency of police personnel in Karnataka [37]. Occupational health and safety standards set by the International Labor Organization can help to ensure their well-being while on the job, covering areas such as physical and psychological health, risk assessment, and emergency preparedness [38]. This study highlights a significant public health problem present in this population, and addressing it requires a comprehensive approach involving collaboration between individuals, organizations, and government agencies. This approach can address the underlying social determinants of oral health and target this vulnerable population of police personnel.

Cross-sectional studies such as this, involves studying a population at a specific point in time. The limitation of this study being the inability to establish cause and effect relationships, as seen in other cross-sectional studies. Perhaps, a longitudinal study would be beneficial in establishing that relationship among the various study variables.

Conclusion

The results of this study reveal that dental caries and periodontal disease had a significant impact on the OHRQoL of reserve police personnel in Belagavi and the OHRQoL among them was poor particularly among the lower ranked personnel. Poor oral health among them had a negative influence on their daily life experiences, including physical, emotional, and social well-being. These findings highlight the need for interventions such as regular dental check-ups, oral hygiene education and providing access to preventative and restorative dental treatments specifically targeting the lower ranked police personnel.

Acknowledgments

The authors extend their gratitude to David Coutinho, Ram Surath Kumar K, Atrey J. Pai Khot and Rhea Vas for their significant contributions to the quality of the manuscript. The authors also thank G M Sampada and

Erika Mendonca for their assistance in carrying out the study.

Conflict of interest statement

There were no conflict of interests associated with this original research.

Authors' contributions

NSV, AA: conceptualization; ASV, PC: data curation; NSV, ASV: formal analysis; NSV, ASV, PC: investigation; NSV, MAS, SJ, AA: methodology; NSV, SJ, AA: project administration; NSV, SJ, AVA: resources; MAS, SJ, AVA: software; AA, SJ, RS: supervision; AVA, SJ, RS: validation; NSV, ASV, PC, RS: writing-original draft; NSV, ASV, PC, RS, SJ, AA, MAS: writing-review & editing.

References

- [1] Swaminathan K, Ananthan V, Haridoss S, Thomas E. Correlation Between Body Mass Index and Dental Caries Among Three- to 12-Year-Old Schoolchildren in India: A Cross-Sectional Study. *Cureus* 2019;11:e5421. <https://doi.org/10.7759/cureus.5421>
- [2] Global oral health status report: towards universal health coverage for oral health by 2030. Available at: <https://www.who.int/publications-detail-redirect/9789240061484> (Accessed on: 4/1/2023).
- [3] Varkey NS, Vas R, Uppala H, Vas NV, Jalihal S, Ankola AV, Ram SKK. Dental caries, oral hygiene status and treatment needs of fishermen and non-fishermen population in South Goa, India. *Int Marit Health* 2022;73:125-32. <https://doi.org/10.5603/imh.2022.0025>
- [4] Parsekar SS, Singh MM, Bhumika TV. Occupation-related psychological distress among police constables of Udupi taluk, Karnataka: A cross-sectional study. *Indian J Occup Environ Med* 2015;19:80-3. <https://doi.org/10.4103/0019-5278.165329>
- [5] Kaur R, Chodagiri VK, Reddi NK. A Psychological Study of Stress, Personality and Coping in Police Personnel. *Indian J Psychol Med* 2013;35:141-7. <https://doi.org/10.4103/0253-7176.116240>
- [6] Oh HK, Jang CY, Ko MS. Factors influencing post-traumatic stress disorder among police officers in South Korea. *Front Public Health* 2022;10:1024284. <https://doi.org/10.3389/fpubh.2022.1024284>
- [7] Singh A, Bhambal A, Saxena S, Tiwari V, Tiwari U. Frequency of Addictive Habits and its Association with Oral Diseases Among a Cross Section of Indian Police Personnel Connotation. *J Coll Physicians Surg Pak* 2016;26:403-7.
- [8] Pigou AC. The economics of welfare. London: Macmillan & Co, Limited 1920.
- [9] Locker D. Measuring oral health: a conceptual framework. *Community Dent Health* 1988;5:3-18.
- [10] Malicka B, Skośkiewicz-Malinowska K, Kaczmarek U. The impact of socioeconomic status, general health and oral health on Health-Related Quality of Life, Oral Health-Related Quality of Life and mental health among Polish older adults. *BMC Geriatr* 2022;22:2. <https://doi.org/10.1186/s12877-021-02716-7>
- [11] Barasuol JC, Santos PS, Moccelini BS, Magno MB, Bolan M, Martins-Júnior PA, Maia LC, Cardoso M. Association between dental pain and oral health-related quality of life in children and adolescents: A systematic review and meta-analysis. *Community Dent Oral Epidemiol* 2020;48:257-63. <https://doi.org/10.1111/cdoe.12535>
- [12] Paśnik-Chwalik B, Konopka T. Impact of periodontitis on the Oral Health Impact Profile: A systematic review and meta-analysis. *Dent Med Probl* 2020;57:423-31. <https://doi.org/10.17219/dmp/125028>
- [13] Slade GD, Spencer AJ. Development and evaluation of the Oral Health Impact Profile. *Community Dent Health* 1994;11:3-11.
- [14] Karnataka State Police. Available at: <https://ksp.karnataka.gov.in/page/About%20Us/Organization/en> (Accessed on: 4/1/2023).
- [15] Abhishek KN, Jain J, Shamarao S, Khanapure SC. Impact of periodontal status on oral health-related quality of life among police personnel in Virajpet, India. *J Invest Clin Dent* 2016;7:193-7. <https://doi.org/10.1111/jicd.12139>
- [16] Rajagopalachari US, Puranik MP, Sonde L. Impact of oral health on quality of life among police personnel in Bengaluru City, India: A cross-sectional survey. *J Indian Assoc Public Health Dent* 2015;13:42-7. <https://doi.org/10.4103/2319-5932.153584>
- [17] Oral health surveys: basic methods. 5th ed. Available at: <https://www.who.int/publications-detail-redirect/9789241548649> (Accessed on: 27/1/2022).
- [18] Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine* 2000;25:3186-91. <https://doi.org/10.1097/00007632-200012150-00014>
- [19] Montero-Martín J, Bravo-Pérez M, Albaladejo-Martínez A, Hernández-Martín LA, Rosel-Gallardo EM. Validation the Oral Health Impact Profile (OHIP-14sp) for adults in Spain. *Med Oral Patol Oral Cir Bucal* 2009;14:E44-50.
- [20] Robinson PG, Gibson B, Khan FA, Birnbaum W. A comparison of OHIP 14 and OIDP as interviews and questionnaires. *Community Dent Health* 2001;18:144-9.
- [21] Slade GD. Derivation and validation of a short-form oral health impact profile. *Community Dent Oral Epidemiol* 1997;25:284-90. <https://doi.org/10.1111/j.1600-0528.1997.tb00941.x>
- [22] Quality of Life Index by Country 2023. Available at: https://www.numbeo.com/quality-of-life/rankings_by_country.jsp (Accessed on: 8/1/2023).
- [23] Nearly one in two Indian adults have poor quality of life as per a study launched during The Protein Week 2021. Danone India. Available at: <https://www.danone.in/press/nearly-one-in-two-indian-adults-have-poor-quality-of-life-as-per-a-study-launched-during-the-protein-week-2021/> (Accessed on: 8/1/2023).
- [24] Lee JH, Hwang SY, Kim EJ, Kim MJ. Comparison of risk factors between prehypertension and hypertension in Korean male industrial workers. *Public Health Nurs Boston Mass* 2006;23:314-23. <https://doi.org/10.1111/j.1525-1446.2006.00567.x>
- [25] Maurya R, Kundu D, Singh H, Mishra H. Oral Health Status, Dental Caries Experience & Treatment Needs of Population of Jammu City. *Int J Oral Health Dent* 2016;1:164-7. <https://doi.org/10.5958/2395-499x.2015.00004.0>
- [26] Majeed MM, Ahmed N, Uzair M, Ghandhi D, Bashir TF, Khalid Z. Oral Health Status and Treatment Needs of Police Personnel in Karachi. *Pak J Public Health* 2020;10:96-102. <https://doi.org/10.32413/pjph.v10i2.590>
- [27] Basavaraj P. Dental caries experience and periodontal status of police personnel in Ghaziabad city. *J Indian Assoc Public Health Dent* 2011;9:44-50.
- [28] Singh A, Bhambal A, Saxena S, Tiwari V, Tiwari U. Assessment of dentition status and treatment needs of police personnel in Bhopal city, Central India. *Int J Med Sci Public Health* 2015;4:829-34. <https://doi.org/10.5455/ijmsph.2015.11012015171>

- [29] Mythri H, Bharteesh JV. Awareness Regarding Oral Health & COTPA Act – 2003 among Karnataka State Reserve Police (KSRP) Stationed In Tumkur; a Brief Report. *Int J Health Sci Res* 2019;9:93-7.
- [30] Peršić Bukmir R, Paljević E, Pezelj-Ribarić S, Brekalo Pršo I. Association of the self-reported socioeconomic and health status with untreated dental caries and the oral hygiene level in adult patients. *Dent Med Probl* 2022;59:539-45. <https://doi.org/10.17219/dmp/138908>
- [31] Lima LJS, da Consolação Soares ME, Moreira LV, Ramos-Jorge J, Ramos-Jorge ML, Marques LS, Fernandes IB. Family income modifies the association between frequent sugar intake and dental caries. *Int J Paediatr Dent* 2023;00:1-8. <https://doi.org/10.1111/ipd.13053>
- [32] Dilip CL. Health status, treatment requirements, knowledge and attitude towards oral health of police recruits in Karnataka. *J Indian Assoc Public Health Dent* 2005;5:20-35.
- [33] Acharya S. Oral health-related quality of life and its associated factors in an Indian adult population. *Oral Health Prev Dent* 2008;6:175-84.
- [34] Costa SM, Martins CC, Bonfim M de LC, Zina LG, Paiva SM, Pordeus IA, Abreu, M. H. A systematic review of socioeconomic indicators and dental caries in adults. *Int J Environ Res Public Health* 2012;9:3540-74. <https://doi.org/10.3390/ijerph9103540>
- [35] Schertel Cassiano L, Abdullahi F, Leite FRM, López R, Peres MA, Nascimento GG. The association between halitosis and oral-health-related quality of life: A systematic review and meta-analysis. *J Clin Periodontol* 2021;48:1458-69. <https://doi.org/10.1111/jcpe.13530>
- [36] Fotedar S, Sharma KR, Fotedar V, Bhardwaj V, Chauhan A, Manchanda K. Relationship between oral health status and oral health related quality of life in adults attending H.P Government Dental College, Shimla, Himachal Pradesh--India. *Oral Health Dent Manag* 2014;13:661-5.
- [37] Odisha police plan health insurance cover for cops. *The Times of India*. Available at: <https://timesofindia.indiatimes.com/city/bhubaneswar/odisha-police-plan-health-insurance-cover-for-cops/articleshow/64321532.cms> (Accessed on: 14/1/2023).
- [38] International Labour Standards on Occupational Safety and Health. Available at: <https://www.ilo.org/global/standards/subjects-covered-by-international-labour-standards/occupational-safety-and-health/lang--en/index.htm> (Accessed on: 14/1/2023).

Received on March, 21, 2023. Accepted on April 18, 2023.

Correspondence: Varkey Nadakkavukaran Santhosh, Department of Public Health Dentistry, KLE VK Institute of Dental Sciences, KLE Academy of Higher Education and Research (KLE University), Belagavi 590010, India. Tel. +91 9108858449 - E-mail: nsvarkey29@gmail.com

How to cite this article: Santhosh VN, Ankola A, Sankeshwari R, Jalihal S, Varghese AS, Chavan P, Shah MA. Impact of dental caries and periodontal disease on oral health-related quality of life among the Karnataka State Reserve Police Personnel in Belagavi, India. *J Prev Med Hyg* 2022;63:E78-E86. <https://doi.org/10.15167/2421-4248/jpmh2023.64.1.2900>

© Copyright by Pacini Editore Srl, Pisa, Italy

This is an open access article distributed in accordance with the CC-BY-NC-ND (Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International) license. The article can be used by giving appropriate credit and mentioning the license, but only for non-commercial purposes and only in the original version. For further information: <https://creativecommons.org/licenses/by-nc-nd/4.0/deed.en>



HEALTH PROMOTION

Spring, it's time to ROSC

GIUSEPPE STIRPARO¹, AIDA ANDREASSI², GIUSEPPE MARIA SECHI², CARLO SIGNORELLI¹¹ Faculty of Medicine, School of Public Health, University of Vita-Salute San Raffaele, Milano, Italy;² Agenzia Regionale Emergenza Urgenza Headquarters (AREU HQ), Milano, Italy

Keywords

Resuscitation • Emergency medical system • Environmental pollution

Summary

Out-hospital cardiac arrest (OHCA) is a multi-factor disease. Many studies have correlated OHCA with a patient's lifestyle; unfortunately, less evidence highlights the correlation with meteorological factors. Methods: Analysis of 23959 OHCA rescue performed by the emergency medical system (EMS) of Lombardy Region, the most Italian populated region, in 2018 and 2019, the pre-pandemic era through a retrospective observational cohort study. The aim of the study consists on evaluating the probability of Return Of Spontaneous Circulation (ROSC) during months to highlight potential seasonal impact in ROSC achievement. In March and April, we highlight an increase of ROSC (OR: 1.20 95% CI 1.04-1.31; $p < 0.001$) compared to other months. During March and April, we highlight an increase of public access defibrillation (PAD) (3.5% vs 2.5%; $p < 0.001$), and a reduction

of overage time of first vehicle on scene (11.5 vs 11.8; $p < 0.001$) and age of patient (73.5 vs 74.2; $p < 0.01$). Finally, we highlight a slight reduction of cancer patient (1.6% vs 1.1%; $p = 0.01$). We didn't register significant differences in the other variables analyzed as: onset place, sex, rescue team and the patient's death before the rescue arrive. We highlight a difference in ROSC probability during the first month of spring. We register few differences in patient characteristics and EMS rescue, though just PAD use and age clinically impact OHCA patients. In this study, we are unable to fully understand the modification of the probability of ROSC in these months. Even though four variables have a statistically significant difference, they can't fully explain this modification. Different variables like meteorological and seasonal factor must be considered. We propose more research on this item.

Introduction

Out Hospital Cardiac arrest (OHCA), which is the cessation of cardiac mechanical activity in a person outside of a hospital setting, is a severe event with a high incidence (50 to 120 per 100.000 people) and a low survival rate worldwide (7%) [1]. Return of spontaneous circulation (ROSC) is correlated to many demographic variables [2, 3], like time of the Emergency medical system (EMS) rescue [4], layperson training [5, 6] and the protocol used by EMS [7, 8].

Environmental factors could modify the ROSC rate [9, 10]. Although little evidence has been published, that's why is challenging to find a clear correlation between the high number of environmental variables and OHCA.

Unfortunately, in the last three years, the research in the medical emergency was focused on Covid impact [11, 12] and the modification of EMS [11] and the collateral damage of COVID [13-17]. We highlight plenty of research focused on OHCA epidemiology, COVID [18-21] and other clinical aspects [22].

Despite some evidence correlating the meteorological factors and air pollutants with the incidence of OHCA [22-24], an increase of PM2.5 and average temperature are correlated with a rise in daily OHCA [23, 25].

Lombardy is the largest Italian region, with 9.96 million inhabitants and an area of 23 863 km². All missions are coordinated by a single Regional Agency, AREU, which coordinates the rescue through wheeled vehicles or

helicopters. AREU's techniques processed about 1 million calls in one years and in 800.000 call a vehicle was sent to rescue the patient AREU consist of 265 ambulances with a crew of 2-3 rescuers, 50 Intermediate Rescue Vehicles with a nurse, 59 Advanced Rescue Vehicles and 5 helicopters [26], nurse and doctor are trained by ACLS course [27-28]. All mission data are record in one single register, call EmMa (Emergency Management) [29].

The aim of the study consists on analyzing the impact during months of ROSC achievement, to highlight a potential seasonal link with meteorological factors.

Methods

STUDY DESIGN

The study is a retrospective observational cohort, it was conducted following the principles of the Helsinki declaration and was approved by the AREU Data Protection Officer in July 2022.

The Lombardy AREU headquarters register provided data analysis. The data analysis process was conducted employing the SAS-AREU portal. The portal contains all data regarding emergency calls, and the scenarios involving OHCA were selected.

The monthly diagnoses of OHCA in two years, from 1 January 2018 to 31 December 2019, was selected in SAS-AREU Database.

DATA

We used fourteen variables registered in the SAS-AREU database. The correlation between variables and ROSC was controlled in previous research. The variables were sex, age, timing of rescue, the onset of the event, type of rescue time and signs of death.

Data are available on AREU website. It is possible to find “OHCA” records in the SAS-AREU portal. The portal contains all the data related to emergency calls; it has been selected all the scenarios involving OHCA.

At every 118 call, performed in Lombardy Region, the EMS receiver automatically opens a record in SAS-AREU, the caller introduces the demographic characteristics and information about the main clinical problem of the patient. In case of OHCA patients, MSB (basic life support vehicle) and an MSA (advanced cardiovascular vehicle) are sent to the scene. The vehicle has a GPS tracker, and an automatic system which records the timing of rescue. During the rescue procedure, the MSB or MSA operator informs the medical director of the operation center with all other information to define the clinical status of the patient and the correct hospital. All data are correctly recorded in the SAS-AREU database. All data are necessary to identify the appropriate hospital Hub, while the GPS tracker automatically records logistic data.

STATISTICAL EVALUATION

We compared the characteristic of rescue in April and March with other months of the year in 2018 and 2019. The categorical variables are presented as numbers and percentage, and the continuous variables are presented as mean and standard deviation (SD). The categorical variables were analyzed by Z test for proportion and Odds Ratio (OR) with relative Confidence interval (CI) 95%. Continuous variables were tested for normality by means of the Kolmogorov-Smirnov test and the appropriate analysis for Z test for means. Differences were considered significant when $p < 0.05$. Otherwise, they were considered non-significant (NS). The Prism 8.0.1 statistical software (GraphPad Software LLC, San Diego, CA, USA) was used for this aim.

Results

A total of 23959 OHCA were analyzed, all event occurred in Lombardy region in the two years of analyses. 11663 (48.7%) was rescue by EMS in 2018 and 12296 (51.3%) was rescue in 2019.

Table I summarizes the comparison of rescues during March and April in 2018 and 2019 compared to all other months in 2018 and 2019. The average age (73.5 vs 74.2; $p = 0.01$) and the time of the first vehicle on scene (11.8 vs 11.5; $p = 0.0006$) in March and April were significant low than other months.

No difference was highlight in the overage time of hospital arrival.

Table II shows the analyzed ROSC variables. The significant differences are recorded for the use of the

Pads, which is greater during the spring (3.5% vs 2.5%; $p = 0.0005$), and there is also a reduction in OHCA for patients diagnosed with neoplastic disease (1.6% vs 1.1%; $p = 0.01$).

Figure 1 shows the percentage of ROSC on the total of OHCA; there is an increase in the months of March and April compared to the other months of the year. The value reaches 9.2% in March and 10.3% in April. In the two months, in the years of follow-up, the ROSC significant increased (OR: 1.20 95% CI 1.04-1.31; $p < 0.001$).

Noteworthy, four variables have a significant difference in the months of March and April. The most relevant was a major use of PAD OR 1.38 (CI 95% 1.14-1.67; $p < 0.001$) and the reduction of the average time of the first vehicle on scene (11.8 vs 11.5; $p < 0.001$), average age (73.5 vs 74.2; $p = 0.01$) and a slight reduction of cancer patient (1.6% vs 1.1%; $p = 0.01$).

Discussion

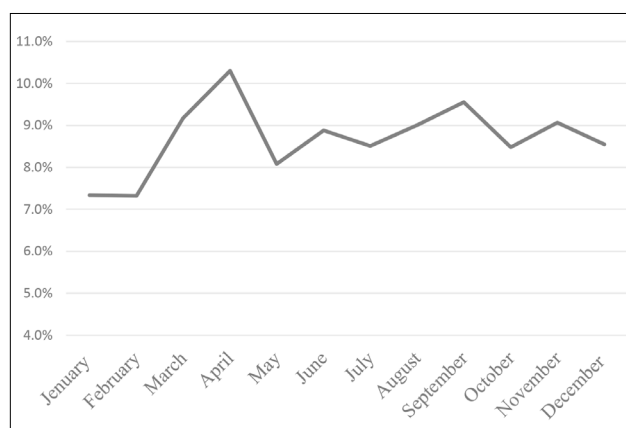
In accordance with the aim, we analyzed the ROSC in different months over the two years. We highlight an increase in ROSC during March and April in 2018 and 2019, as shown in Figure 1.

We analyzed 14 variables, all registered in AREU's database, as shown in Table I and Table II. All 14 variables, as evidenced in previous research, by McNally B. et al. [29], are correlated with the probability of ROSC.

Despite the statistical significance of the four variables, just the use of PAD and the average age of the patient have the major clinical impact, in fact, the other two variables, first ambulance on scene and percentage of oncology patients, were lightly changed, and the impact on ROSC was irrelevant.

Furthermore, could be difficult interpret as the increase of ROSC in the first month of spring. In fact, there wasn't a reason for the reduction of average age, maybe meteorological and seasonal factors could alter the epidemiology of OHCA how highlight by Kim JH et al [23], but more research must be implemented on

Fig. 1. Percentage of ROSC on total of monthly OHCA in 2018 and 2019.



Tab. I. Comparison of overage age and overage time of rescue.

	2018-2019	March-April	p-value
Age (SD)	74.2 (16.6)	73.5 (16.5)	< 0.01
Overage time of First vehicle (SD)	11.8 (6.5)	11.5 (5.3)	< 0.01
Overage Time hospital arrived (SD)	53.2 (24.3)	52.4 (22.6)	0.046

Tab. II. Demographic variables.

	2018-2019 Without March-April N (%)	2018-2019 March-April N (%)	p-value
Number of OHCA	20038 (80.4%)	3921 (19.6%)	
ROSC	1686 (8.4%)	380 (9.7%)	< 0.01
Female	7811 (39.0%)	1526 (38.9%)	0.47
RCP layperson	4320 (21.6%)	876 (22.3%)	0.14
PAD	509 (2.5%)	136 (3.5%)	< 0.001
no MSI	16991 (84.8%)	3338 (85.1%)	0.29
no MSA	7951 (39.7%)	1546 (39.4%)	0.38
Death people	2793 (13.9%)	516 (13.2%)	0.10
Workplace	914 (4.6%)	190 (4.9%)	0.22
Open place	1010 (5.0%)	203 (5.2%)	0.36
Traumatic event	1377 (6.9%)	284 (7.2%)	0.20
Neoplastic patient	313 (1.6%)	43 (1.1%)	0.01

PAD: Public access defibrillation; MSI: Vehicle with a Nurse; MSA: Vehicle with a doctor and a nurse; Death people: a person with clear sign of death (i.e. Decapitation).

this topic for coordinate new public health project to increase ROSC.

No less significant is the increase of PAD's use; in fact, during the spring season, we didn't register a modification of OHCA location, no significant modification was registered in the workplace or in a closed place area, where the number of mandatory PAD is high. This point should be the focus of future research. In fact, we must identify a reason for this phenomenon to achieve the possibility of increasing the use of Pad in OHCA.

Different factors, including environmental ones, can cause OHCA, often they are unknown, and the scientific community should reconsider those issues related to OHCA epidemiology. Great attention has been paid to COVID-19 and OHCA reports in recent years, but it is necessary to take a step back and analyze the pre-pandemic data in order to study the environmental factors that may contribute to OHCA.

This study adds two key aspects to OHCA's research. The first aspect consists in changing the focus of COVID-19 impact on OHCA epidemiology, and reconsidering the pre pandemic issues, like the influence of external factors, or the meteorological impact on the ROSC. The second aspect concerns a legislative matter. As a matter of fact, after the Italian Legislative degree (D Lgs 81/08), D Lgs 158/12 and D Lgs 116/21, the ROSC study became important to highlight the impact of this law on OHCA's patient outcome. The implication of the seasonal correlation between OHCA and ROSC should be investigated in order to highlight the possible link with pollution or other events unknown in this research. The research on OHCA during spring season might underline a difference in the rescue condition or

the clinical characteristic of the patient, which can help future policy.

Conclusion

During the first month of spring, we measured an increase in ROSC probability in the Lombardy region. This phenomenon is correlated with the increasing in Pads used by the layperson and a reduction of the arriving time of the first vehicle on scene. However, this change could not completely justify the ROSC increase. Seasonal or meteorological phenomena could influence OHCA epidemiology.

The study of the phenomenon is an important public health's concern. In fact, a deep analysis of clinical patients, or meteorological factors could highlight new variables for the ROSC achievement in patients affected by OHCA. The second study's aim is to bring attention back to the pre COVID-19 pandemic types of studies, and the impact of the environment on the development of the disease in addition to COVID-19.

Acknowledgments

The authors are sincerely grateful to Elisa Pes (elisa-pes@hotmail.it) for the language revision of the manuscript.

Conflict of interest statement

All authors declare no conflicts of interest.

Funding

The Working Group did not receive any funds.

Authors' contributions

GS, CS and GMS conceived and designed the study. GS, AA collected and analyzed the data. GS drafted the first version of the manuscript. All authors edited, revised the manuscript, and approved the final version before submission.

References

- [1] Lim ZJ, Ponnappa Reddy M, Afroz A, Billah B, Shekar K, Subramaniam A. Incidence and outcome of out-of-hospital cardiac arrests in the COVID-19 era: A systematic review and meta-analysis. *Resuscitation* 2020;157:248-58. <https://doi.org/10.1016/j.resuscitation.2020.10.025>
- [2] Lim GH, Seow E. Resuscitation for patients with out-of-hospital cardiac arrest: Singapore. *Prehosp Disaster Med* 2002;17:96-101. <https://doi.org/10.1017/s1049023x00000248>
- [3] Mayr NP, Mayr T, Tassani P, Martin K. Use of automated external defibrillators in the occupational setting in Germany: a pilot study. *J Occup Environ Med* 2012;54:789-91. <https://doi.org/10.1097/JOM.0b013e318256f65c>
- [4] Villa GF, Kette F, Balzarini F, Riccò M, Manera M, Solaro N, Pagliosa A, Zoli A, Migliori M, Sechi GM, Odone A, Signorelli C. Out-of-hospital cardiac arrest (OHCA) Survey in Lombardy: data analysis through prospective short time period assessment. *Acta Biomed* 2019;90(9-S):64-70. <https://doi.org/10.23750/abm.v90i9-S.8710>
- [5] Tay PJM, Pek PP, Fan Q, Ng YY, Leong BS, Gan HN, Mao DR, Chia MYC, Cheah SO, Doctor N, Tham LP, Ong MEH. Effectiveness of a community based out-of-hospital cardiac arrest (OHCA) interventional bundle: Results of a pilot study. *Resuscitation* 2020;146:220-8. <https://doi.org/10.1016/j.resuscitation.2019.10.015>
- [6] Lukić A, Lulić I, Lulić D, Ognjanović Z, Cerovečki D, Telebar S, Mašić I. Analysis of out-of-hospital cardiac arrest in Croatia – survival, bystander cardiopulmonary resuscitation, and impact of physician's experience on cardiac arrest management: a single center observational study. *Croat Med J* 2016;57:591-600. <https://doi.org/10.3325/cmj.2016.57.591>
- [7] Fukuda T, Ohashi-Fukuda N, Kondo Y, Hayashida K, Kukita I. Association of Prehospital Advanced Life Support by Physician With Survival After Out-of-Hospital Cardiac Arrest With Blunt Trauma Following Traffic Collisions: Japanese Registry-Based Study. *JAMA Surg* 2018;153:e180674. <https://doi.org/10.1001/jamasurg.2018.0674>
- [8] Ong MEH, Chan YH, Ang HY, Lim SH, Tan KL. Resuscitation of out-of-hospital cardiac arrest by Asian primary health-care physicians. *Resuscitation* 2005;65:191-5. <https://doi.org/10.1016/j.resuscitation.2004.11.021>
- [9] Tobaldini E, Iodice S, Bonora R, Bonzini M, Brambilla A, Sesana G, Bollati V, Montano N. Out-of-hospital cardiac arrests in a large metropolitan area: synergistic effect of exposure to air particulates and high temperature. *Eur J Prev Cardiol* 2020;513-9. <https://doi.org/10.1177/2047487319862063>
- [10] Zhao B, Johnston FH, Salimi F, Kurabayashi M, Negishi K. Short-term exposure to ambient fine particulate matter and out-of-hospital cardiac arrest: a nationwide case-crossover study in Japan. *Lancet Planet Health* 2020;4:e15-e23. [https://doi.org/10.1016/S2542-5196\(19\)30262-1](https://doi.org/10.1016/S2542-5196(19)30262-1)
- [11] Stirparo G, Ristagno G, Bellini L, Bonora R, Pagliosa A, Migliari M, Andreassi A, Signorelli C, Sechi GM, Fagoni N. Changes to the Major Trauma Pre-Hospital Emergency Medical System Network before and during the 2019 COVID-19 Pandemic. *J Clin Med* 2022;11:6748. <https://doi.org/10.3390/jcm11226748>
- [12] Signorelli C, Odone A, Stirparo G, Cereda D, Gramegna M, Trivelli M, Rezza G. SARS-CoV-2 transmission in the Lombardy Region: the increase of household contagion and its implication for containment measures. *Acta Biomed* 2020;91:e2020195. <https://doi.org/10.23750/abm.v91i4.10994>
- [13] Stirparo G, Bellini L, Fagoni N, Compatti S, Botteri M, Villa GF, Sironi S, Signorelli C, Sechi GM, Zoli A. Missed training, collateral damage from COVID-19? *Disaster Med Public Health Prep* 2022;1-8. <https://doi.org/10.1017/dmp.2022.14>
- [14] Caminiti C, Maglietta G, Meschi T, Ticinesi A, Silva M, Sverzellati N. Effects of the COVID-19 Epidemic on Hospital Admissions for Non-Communicable Diseases in a Large Italian University-Hospital: A Descriptive Case-Series Study. *J Clin Med* 2021;10:880. <https://doi.org/10.3390/jcm10040880>
- [15] Diegoli H, Magalhães PSC, Martins SCO, Moro CHC, França PHC, Safanelli J, Nagel V, Venancio VG, Liberato RB, Longo AL. Decrease in Hospital Admissions for Transient Ischemic Attack, Mild, and Moderate Stroke During the COVID-19 Era. *Stroke* 2020;51:2315-21. <https://doi.org/10.1161/STROKEA-HA.120.030481>
- [16] Fagoni N, Perone G, Villa GF, Celi S, Bera P, Sechi GM, Mare C, Zoli A, Botteri M. The Lombardy Emergency Medical System Faced with COVID-19: The Impact of Out-of-Hospital Outbreak. *Prehosp Emerg Care* 2021;25:1-7. <https://doi.org/10.1080/10903127.2020.1824051>
- [17] Stirparo G, Bellini L, Ristagno G, Bonora R, Pagliosa A, Migliari M, Andreassi A, Signorelli C, Sechi GM, Fagoni N. The Impact of COVID-19 on Lombardy Region ST-Elevation Myocardial Infarction Emergency Medical System Network – A Three-Year Study. *J Clin Med* 2022;11:5718. <https://doi.org/10.3390/jcm11195718>
- [18] Baldi E, Sechi GM, Mare C, Canevari F, Brancaglione A, Primi R, Klersy C, Palo A, Contri E, Ronchi V, Beretta G, Reali F, Parogni P, Facchin F, Bua D, Rizzi U, Bussi D, Ruggeri S, Oltrona Visconti L, Savastano S; Lombardia CARE Researchers. Out-of-Hospital Cardiac Arrest during the COVID-19 Outbreak in Italy. *N Engl J Med* 2020;383:496-8. <https://doi.org/10.1056/NEJMc2010418>
- [19] Baldi E, Sechi GM, Mare C, Canevari F, Brancaglione A, Primi R, Palo A, Contri E, Ronchi V, Beretta G, Reali F, Parogni P, Facchin F, Rizzi U, Bussi D, Ruggeri S, Oltrona Visconti L, Savastano S; all the Lombardia CARE researchers. Treatment of out-of-hospital cardiac arrest in the COVID-19 era: A 100 days experience from the Lombardy region. *PLoS One* 2020;15:e0241028. <https://doi.org/10.1371/journal.pone.0241028>
- [20] Scquizzato T, Landoni G, Paoli A, Lembo R, Fominskiy E, Kuzovlev A, Likhvantsev V, Zangrillo A. Effects of COVID-19 pandemic on out-of-hospital cardiac arrests: A systematic review. *Resuscitation* 2020;157:241-7. <https://doi.org/10.1016/j.resuscitation.2020.10.020>
- [21] Stirparo G, Fagoni N, Bellini L, Oradini-Alacreu A, Migliari M, Villa GF, Botteri M, Signorelli C, Sechi GM, Zoli A. Cardiopulmonary resuscitation missed by bystanders: Collateral damage of coronavirus disease 2019. *Acta Anaesthesiol Scand* 2022;66:1124-9. <https://doi.org/10.1111/aas.14117>
- [22] Cheng FJ, Wu KH, Hung SC, Lee KH, Lee CW, Liu KY, Hsu PC. Association between ambient air pollution and out-of-hospital cardiac arrest: are there potentially susceptible groups? *J Expo Sci Environ Epidemiol* 2020;30:641-9. <https://doi.org/10.1038/s41370-019-0140-7>
- [23] Kim JH, Hong J, Jung J, Im JS. Effect of meteorological factors and air pollutants on out-of-hospital cardiac arrests: A time se-

- ries analysis. *Heart* 2020;106:1218-27. <https://doi.org/10.1136/heartjnl-2019-316452>
- [24] Haikerwal A, Akram M, Del Monaco A, Smith K, Sim MR, Meyer M, Tonkin AM, Abramson MJ, Dennekamp M. Impact of Fine Particulate Matter (PM2.5) Exposure During Wildfires on Cardiovascular Health Outcomes. *J Am Heart Assoc* 2015;4:e001653. <https://doi.org/10.1161/JAHA.114.001653>
- [25] Gentile FR, Primi R, Baldi E, Compagnoni S, Mare C, Contri E, Reali F, Bussi D, Facchin F, Currao A, Bendotti S, Savastano S; Lombardia CARE researchers. Out-of-hospital cardiac arrest and ambient air pollution: A dose-effect relationship and an association with OHCA incidence. *PLoS One* 2021;16:e0256526. <https://doi.org/10.1371/journal.pone.0256526>
- [26] Botteri M, Celi S, Perone G, Prati E, Bera P, Villa GF, Mare C, Sechi GM, Zoli A, Fagoni N. Effectiveness of massive transfusion protocol activation in pre-hospital setting for major trauma. *Injury* 2022;53:1581-6. <https://doi.org/10.1016/j.injury.2021.12.047>
- [27] Stirparo G, Gambolò L, Bellini L, Medioli F, Bertuol M, Guasconi M, Sulla F, Artioli G, Sarli L. Satisfaction evaluation for ACLS training. *Acta Biomed* 2022;93:e2022260. <https://doi.org/10.23750/abm.v93i3.13337>
- [28] Stirparo G, Solla D, Gambolò L, Bellini L, Mantovanelli L, Trapani M, Pregliasco FE, Sarli L, Signorelli C. SIMED-New Doc course, a matter of reflection. *Acta Biomed* 2023;94:e2023035. <https://doi.org/10.23750/abm.v94i1.13959>
- [29] Stirparo G, Pireddu R, Kacerik E, Scognamiglio T, Andreassi A, Sechi GM, Zoli A, Signorelli C. Stroke and the need for immediate assistance at the place of onset: the future of mandatory training for lay people in Italy. *Ann Ig* 2022. <https://doi.org/10.7416/ai.2022.2553>

Received on November, 3, 2022. Accepted on February 20, 2023.

Correspondence: Giuseppe Stirparo, Agenzia Regionale Emergenza Urgenza Headquarters (AREU HQ), Via Campanini 6, 20124, Milano (MI), Italia. Tel. 0267129001 - E-mail: g.stirparo@areu.lombardia.it

How to cite this article: Stirparo G, Andreassi A, Sechi GM, Signorelli C. Spring, it's time to ROSC. *J Prev Med Hyg* 2023;64:E87-E91. <https://doi.org/10.15167/2421-4248/jpmh2023.64.1.2782>

© Copyright by Pacini Editore Srl, Pisa, Italy

This is an open access article distributed in accordance with the CC-BY-NC-ND (Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International) license. The article can be used by giving appropriate credit and mentioning the license, but only for non-commercial purposes and only in the original version. For further information: <https://creativecommons.org/licenses/by-nc-nd/4.0/deed.en>

Critical pathways for continuous quality improvement: a multicentric analysis on the management of patients with lung cancer in Italian best performing hospitals

ANTONIO GIULIO DE BELVISI^{1,2}, MARIA CHIARA CATALANI¹, ALISHA MORSELLA^{1,3}, GIORGIO SESSA^{1,2}, AMELIA PALINURO¹, GABRIELE GIUBBINI^{1,2}, FLORENCE WATTEBLE¹, CARMEN ANGIOLETTI¹

¹ Critical Pathways and Outcomes Evaluation Unit, Fondazione Policlinico Universitario A. Gemelli, IRCCS, Rome, Italy;

² Institute of Public Health, Section of Hygiene, Catholic University of the Sacred Heart, Rome, Italy;

³ Institute of Special Medical Pathology and Medical Semeiotics, Catholic University of the Sacred Heart, Rome, Italy

Keywords

Quality improvement • Critical pathway • Lung Cancer management

Summary

Introduction. Critical pathways (CPs) are effective change management tools used to improve quality in healthcare nationally implemented in Italy in 2015. This study aims to map the country's state-of-the-art regarding the adoption of CPs and to verify the existence of factors that determine the success of their implementation and the relative entity of their impact, by analysing the management of Lung Cancer (LC) as a case-study.

Methods. Our methodology followed the SQUIRE guidelines for quality improvement reporting (2015). Starting from the 2017 ranking table published by the National Outcome Program, we selected and included in our sample all Italian hospitals who, according to Ministerial Decree n. 70/2015, met national quality threshold for LC treatment. To investigate regional-level and hospital-level factors believed to be responsible for the success-

ful implementation of a CP, a Google Modules questionnaire was constructed and sent to the selected facilities; subsequently, a web-based research was carried out for missing data. Associations between variables were tested in STATA by means of correlation tests and a linear regression model.

Results. 41 hospitals matched our inclusion criteria. Of these, 68% defined an internal Lung Cancer Critical Pathway (LCCP). Our results confirmed the presence of critical success factors that favour the correct implementation of a LCCP.

Conclusions. Notwithstanding the availability of CPs, their adoption in routine clinical practice still lacks consistency, suggesting the necessity to resort to digital solutions, to increment the level of regional commitment and workforce commitment and to reinforce quality standards monitoring.

Introduction

The Italian National Health Service (NHS) was set up in 1978 and founded on the principle of universal coverage and organized into national, regional and local layers of control. Particularly, in recent years, it has undergone a process of strong decentralization that has attributed a greater deal of power to regions [1].

In a country characterized by growing economic constraints, aggravated by the struggle of satisfying complex needs of an ageing population, with increasing comorbidities and chronicity, it is ever more important to focus on the six dimensions of quality (Safety, Effectiveness, Patient Centredness, Timeliness, Efficiency and Equity, [2]) when providing services within the NHS. Among the preferred tools for continuous quality improvement [3], institutions are resorting to Critical Pathways (CPs), defined by the European Pathway Association as: "Complex intervention(s) and methodology for the mutual decision making and organization of predictable care processes for a well-defined group of patients during a well-defined period". Also known in literature as clinical pathways, care maps or integrated care pathways [4], these clinical management tool were first mentioned in 1985 by Zander et al. (New England Medical Center) [5, 6] as a

methodology to balance costs and quality of delivered services; subsequently, their use was spread all over the world in the early 90s when they were recognized the capacity of assuring continuity of care [7, 8].

In Italy, Ministerial Decree (MD) 70/2015 [9] nationally set patient management through Critical Pathways (CPs) as a national requisite for hospital accreditation to the NHS and, subsequently, reinforced their accountability role through Law 24/2017 (Gelli Law) [10].

Our research question stems from the doubt that, despite the efforts of Italian policymakers to issue laws that enhance their implementation at national, regional and local levels, the dissemination and actual implementation of CPs may still be inconsistent and fragmented in the country.

Several authors [11-15] have investigated the effects of CPs on care outcomes (i.e. length of stay, appropriateness of setting, infections and readmission rates), demonstrating improvements especially for acute conditions requiring hospitalization, however there is evidence that specific factors are responsible for the successful implementation of a CP, meaning that its sole existence does not, by itself, assure an effective improvement of patient management. Rotter's 2010 Cochrane review [16] pointed out the following determinants:

- the presence of multidisciplinary teams;
- the resort to evidence based tools;
- the resort to ICT in support of CPs;
- the establishment of audit and feedback mechanisms;
- the conduction of Gap analyses.

Thus, if there is a lack of these supplementary critical success factors, the adoption of CPs may be inhibited from providing their full potential of benefits.

With the aim of detecting the extent to which CPs have been adopted in Italy and, consequently, identify those organizational requirements that have made such CPs successful or those still requiring improvements and additional efforts, we have analysed the state-of-the-art of the application of CPs in the treatment of LC, which is known as Italy's Big Killer therefore chosen among all pathologies due to the significant burden it has on the country. It is, in fact, the 4th most prevalent type of cancer in Italy and is responsible for 19% of all deaths due to cancer, making it the first cause of oncological death in the country [17].

Methods

Our methodology followed the 2015 SQUIRE guidelines for quality improvement reporting (Tab. I) [18].

Initially, we consulted the 2017 league tables released by the National Outcome Program (Piano Nazionale Esiti, PNE) which lists all public and private accredited hospitals in Italy that perform surgery for malignant LC. We then applied the national quality standard set by MD n. 70/2015 [14] (according to which the minimum standard for quality is the performance of 100 Lung Cancer surgical interventions per year) as inclusion criteria to select those facilities to submit to our analysis. Starting from Rotter's 5 requisites [16], an electronic questionnaire was formulated and validated by means of the Delphi process [19, 20] conducted as follows:

1. authors scanned available international literature to capture factors believed to be determinant for the successful implementation of a CP [16];
2. face-to-face meetings aligning authors, agreeing upon a set of items to guide the development of the questionnaire;
3. a draft questionnaire was created based on Step 1 and 2;
4. two rounds of an on-line survey were completed to reach anonymous consensus; the first Delphi round sought to extract relevant domains to assess the presence of critical success factors for the implementation of a CP. Subsequently, the second round aimed at screening relevant items within the domains extracted from the results of Round 1;
5. all authors participated in a final group discussion to validate the proposed set of items and domains. Two relevant domains were included: one regional and one at hospital level. Table II shows items included for each of these domains, resulting in the inclusion of 19 questions.

The formulated electronic survey was sent out through

Google Modules to offices or units of the included facilities deemed to be responsible for the Clinical Governance and, hence, the management and the implementation of Clinical Pathways. Following, from June 2019 to September 2019, a web-based research on the included facilities was carried out to further investigate the regional-level and hospital-level variables (Tab. III) for which the response rate resulting from the electronic questionnaire was low, to improve the reliability of our findings.

Data was gathered in a comprehensive Table of Contents assembled by two authors in Microsoft Excel and divided into regional level variables and hospital level variables. It was then analysed and tested in STATA (version 14). The association among variables was then tested through a Pearson correlation (ρ) and a Tetrachoric correlation (rter) [21].

Finally, a linear regression model was set up to test the impact of the covariates on the dependent variable (i.e.: the implementation of an Internal Lung Cancer Critical Pathway (LCCP)).

The linear regression model is the following:

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$$

In this Equation, our dependent variable Y_i constitutes the presence of an Internal LCCP, β_0 is the constant term, β_1 represents the coefficients given by the test, X_i stands for the studied covariates and ε_i is the error term.

Results

Among 194 institutions listed on the PNE league table, 41 healthcare facilities met our inclusion criteria (at least 100 surgical interventions for LC per year [14]) and were utilized for our study. Of these, 14% responded to the Google Modules questionnaire and remaining data was obtained through the complementary web-based research.

Results have been analysed and presented according to the two main domains (regional level and hospital level).

DESCRIPTIVE RESULTS

The first analysis investigated general characteristics of the facilities, in order to map the context of interest. Comprehensively, 36% of the analysed facilities are Research Teaching Hospitals (RTHs), 30% are independent public hospital trusts (AOs), 22% are Research Hospitals (IRCCSs), 17% are private practices and the remaining 12% are hospitals administered by their Local Health Units (LHUs).

Overall, the facilities are distributed in 14 Italian regions (Fig. 1), therefore the descriptive statistics were observed grouping regions into three main geographical areas of Italy as follows:

1. North: Lombardy, Veneto, Liguria, Piedmont, Emilia-Romagna and Friuli Venezia Giulia;
2. Centre: Lazio, Tuscany, Marche and Umbria;
3. South: Campania, Puglia, Abruzzo, Sicily.
 - a) Regional level
 - b) For what concerns regional level observations,

Tab. I. SQUIRE 2.0 checklist, September 15th, 2015.

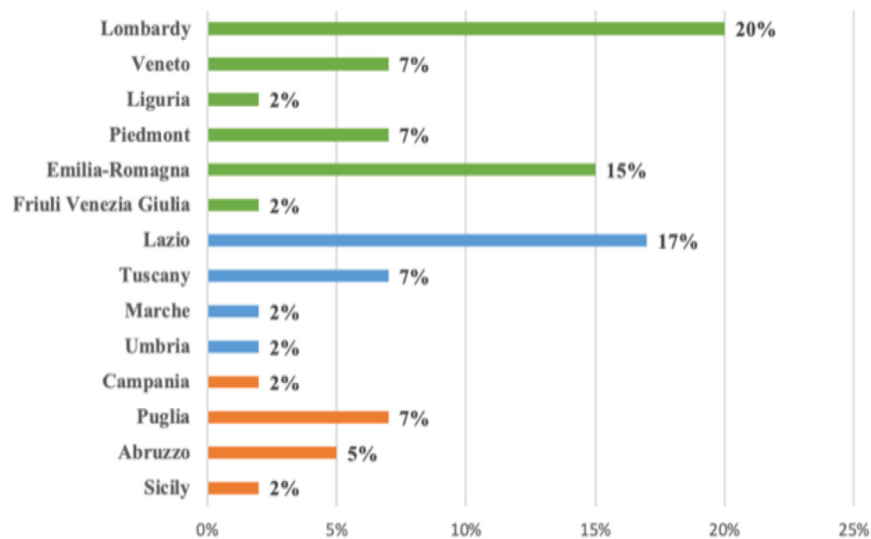
Text section and item name	Section or item description	Page number
1. Title	Indicate that the manuscript concerns an initiative to improve healthcare (broadly defined to include the quality, safety, effectiveness, patient-centeredness, timeliness, cost, efficiency, and equity of healthcare)	1
2. Abstract	a. Provide adequate information to aid in searching and indexing b. Summarize all key information from various sections of the text using the abstract format of the intended publication or a structured summary such as: background, local problem, methods, interventions, results, conclusions	2
Introduction	Why did you start?	
3. Problem Description	Nature and significance of the local problem	3
4. Available knowledge	Summary of what is currently known about the problem, including relevant previous studies	3
5. Rationale	Informal or formal frameworks, models, concepts, and/or theories used to explain the problem, any reasons or assumptions that were used to develop the intervention(s), and reasons why the intervention(s) was expected to work	3
6. Specific aims	Purpose of the project and of this report	3
Methods	What did you do?	
7. Context	Contextual elements considered important at the outset of introducing the intervention(s)	3
8. Intervention(s)	a. Description of the intervention(s) in sufficient detail that others could reproduce it b. Specifics of the team involved in the work	a. N/A – We aim to analyse the state of multiple interventions. Research methods are reproducible and detailed in page 6 b. The team is composed of the members of the Clinical Pathway and Outcome Evaluation Unit in FPG-IRCCS
9. Study of the Intervention(s)	a. Approach chosen for assessing the impact of the intervention(s) b. Approach used to establish whether the observed outcomes were due to the intervention(s).	a. 9 b. 9
10. Measures	a. Measures chosen for studying processes and outcomes of the intervention(s), including rationale for choosing them, their operational definitions, and their validity and reliability b. Description of the approach to the ongoing assessment of contextual elements that contributed to the success, failure, efficiency, and cost c. Methods employed for assessing completeness and accuracy of data	a. 6 b. 9 c. 9
11. Analysis	a. Qualitative and quantitative methods used to draw inferences from the data b. Methods for understanding variation within the data, including the effects of time as a variable	a. 9 b. N/A
12. Ethical considerations	Ethical aspects of implementing and studying the intervention(s) and how they were addressed, including, but not limited to, formal ethics review and potential conflict(s) of interest	16
Results	What did you find?	
13. Results	a. Initial steps of the intervention(s) and their evolution over time (e.g., time-line diagram, flow chart, or table), including modifications made to the intervention during the project b. Details of the process measures and outcome c. Contextual elements that interacted with the intervention(s) d. Observed associations between outcomes, interventions, and relevant contextual elements e. Unintended consequences such as unexpected benefits, problems, failures, or costs associated with the intervention(s). f. Details about missing data	a. N/A b. 10 c. 10 d. 10 e. N/A f. Web-based research allowed us to have no missing data
Discussion	What does it mean?	
14. Summary	a. Key findings, including relevance to the rationale and specific aims b. Particular strengths of the project	a. 14 b. 14

continues ►

Tab. I. (follows).

Text section and item name	Section or item description	Page number
15. Interpretation	a. Nature of the association between the intervention(s) and the outcomes b. Comparison of results with findings from other publications c. Impact of the project on people and systems d. Reasons for any differences between observed and anticipated outcomes, including the influence of context e. Costs and strategic trade-offs, including opportunity costs	a. 14 b. 14 c. 14 d. 14 e. N/A
16. Limitations	a. Limits to the generalizability of the work b. Factors that might have limited internal validity such as confounding, bias, or imprecision in the design, methods, measurement, or analysis c. Efforts made to minimize and adjust for limitations	a. 15 b. 15 c. 15
Conclusions		
17. Other information	a. Usefulness of the work b. Sustainability c. Potential for spread to other contexts d. Implications for practice and for further study in the field e. Suggested next steps	a. 15 b. 15 c. 15 d. 15 e. 15
18. Funding	Sources of funding that supported this work. Role, if any, of the funding organization in the design, implementation, interpretation, and reporting	16

Fig. 1. Facilities distribution in Italy.



results are synthesised in Table II and show that 71% of the facilities are covered by a Regional Law on CP with equal proportions in the North and in the South (both 29%). Half of the regions (50%), have structured a regional LCCP and are mostly located in the North (29%), followed by the South (14%) and lastly, the Centre (7%).

- c) We also observed that all regions with a specific law on CPs are equipped with dedicated regional office units and cancer networks, however only in 43% of regions are citizen associations present and monitoring systems adopted.
- d) Hospital level.
- e) At hospital level, our analysis showed that 68% of the facilities have implemented an internal

LCCP. Almost all facilities are equipped with dedicated staff units (93%), Tumor Boards (78%) and have formulated indicators (68%). However, percentages decrease to below half when it comes to Monitoring and Auditing systems (44% and 39%, respectively), presence of Electronic Health Records (22%) and quality certifications (JCI 15%, ISO 20%), intended as those certifications or accreditations that prove that a facility has reached a standard level of quality which is known and recognized by international and national bodies.

STATISTICAL RESULTS

We statistically analysed whether these variables are

Tab. II. Questionnaire – Google Modules.

Dimension: Regional level characteristics	
General information	In which Region is your hospital located?
Information related to the presence of a Clinical Pathway and in particular a Lung Cancer CP	Is there in your Region a law about the implementation of Clinical Pathways?
	Is there a regional office dedicated to clinical governance issues?
	Is there a specific CP dedicated to Lung Cancer?
	Is there an oncological network for patients with Lung Cancer?
	Are there any citizen associations that take part in the development of CPs?
	Is your hospital taking part in the regional monitoring system?
Dimension: Hospital level characteristics	
General characteristics	Type of facility (i.e.: IRCCS, RTH, ASL, etc.)
	Ownership (public or private)
	ISO or JCI Certification
	Use of Electronic Health Record
Information related to the presence of Clinical Pathways and, in particular, to Lung Cancer CP	Does your organizational structure have a specific hospital unit dedicated to the development of CPs?
	Has a specific LCCP been implemented?
	Have specific indicators been settled for this CP?
	Specify what the nature of the defined indicators is, which are the standards used for their calculation and to what level of assistance they are referred
	Is there a Tumor Board?
	Specify by which kind of Specialists the Tumor Board is composed
	Is there a monitoring system?
	Is there an auditing system?

Tab. III. List of investigated variables.

Regional variables	Hospital variables
- Presence of regional law on CPs - Presence of regional functions with responsibilities on CPs - Presence of regional cancer network - Presence of regional CP on lung cancer - Presence of citizens' associations - Belonging to interregional or regional monitoring systems	- Volume of Surgical Interventions for LC - Mortality at 30 days from hospitalization for LC - Number of hospital beds - Number of Oncological Beds - Ownership - Presence of specific units for CPs - Presence of internal CP for Lung Cancer - Presence of indicators - Presence of the Tumor Board - Presence of the Audit and monitoring systems - Electronic Health Records - JCI accreditation/ISO 9001 certification

correlated and whether they have an impact on the successful implementation of an internal LCCP.

CORRELATION

To identify associations between variables, we resorted to the Tetrachoric correlation test for dichotomous variables and to Pearson's correlation test for all the others, as shown in Figure 2.

a. Regional level

At regional level, we can underline first of all that in Regions that have issued a Regional Law on CPs it is more likely to find office units dedicated to the management of care maps, cancer networks and Regional LCCP.

Secondly, the presence of a Regional LCCP increases the likelihood of finding citizens' associations involved in the creation of the CP as well as dedicated regional office units.

Third, hospital facilities located in Regions with their

own monitoring systems are more likely to be aware of their own performance and additionally show larger volumes of surgical interventions compared to those located in regions lacking regional monitoring systems. Mostly located in the centre of Italy, they are also more likely to use electronic health records, to have a JCI accreditation.

b. Hospital level

At hospital level, the adoption of an Internal LCCP shows correlation with geographical location, as most of the equipped facilities are located in the North, and with the presence of certain organizational factors that enhance its implementation and spread, such as CP office units, sets of specific indicators, an internal monitoring system and Tumour Boards.

Secondly, the presence of an internal monitoring system increases the likelihood of finding a structured auditing system and, if both of these factors coexist, this also implies that the organization is equipped

Fig. 2. Pearson's and Tetrachoric correlation test results.

	Regional Law on CPs	Regional units responsible for CP	Regional Cancer Network	Regional LC CP	Citizens' association involved in LC CPs	Regional monitoring system	Volume of Operations	Adj Mortality rate	Oncological Beds	Ownership	Staff units	Adoption of Internal CP on LC	Use of Indicators	Tumor Board	Monitoring System	Auditing System	JCI	Type	Area_N	Area_C	Area_S	IRCCS	TH
Regional units	0.3799*	0.0143																					
Regional Cancer	0.4809*	0.4243*																					
Regional	0.0015	0.0057																					
Regional LC CP	0.4110*	0.4658*																					
Citizens' association	0.0076	0.0021																					
Regional monitoring	0.5062*	0.0007																					
Volume of Operations	-0.3652*	-0.2958*																					
Hospital Beds	0.0189	0.0605																					
Oncological Beds	-0.3397*	0.2651*																					
Ownership	0.0298	0.0939																					
Adoption of Internal	-0.3862*	-0.0166																					
Adoption of	-0.2893*	-0.2708*																					
Use of indicators	0.0666	0.0868																					
Tumor Board	-0.2708*	0.3267*																					
Monitoring System	0.0868	0.0371																					
Auditing System	-0.3478*	0.0868																					
EHR	0.0259	0.3717*																					
JCI	0.2630*	0.0966																					
ISO9001	0.3297*	0.0353																					
Type	0.2981*	0.0583																					
Area	-0.2981*	0.0583																					
Area_N	-0.2825*	0.0735																					
Area_C	-0.4213*	0.0061																					
Area_S	-0.3014*	0.0555																					
IRCCS	0.0583	0.0371																					
TH	0.3290*	0.0357																					
LHU	0.4309*	0.0049																					
AO	-0.2623*	0.0976																					

with a dedicated set of indicators, office staff units and multidisciplinary teams working together to improve hospital performance.

LINEAR REGRESSION

The linear regression model allowed us to identify which critical success factors enhance the probability of finding

a LCCP at hospital level. The most significant results are presented in Table IV.

The presence of a Tumour Board, the collocation in a region which has a Clinical governance dedicated units and the adoption, at hospital level, of a Regional LCCP have, indeed, a statistical effect on the presence of an internal LCCP, increasing the probability of finding a CP within a facility.

Although not statistically significant, it is also interesting to point out that there are institutional factors that, similarly, promote the presence of an internal integrated CP such as regional monitoring systems and Regional laws on CPs and the presence, within the Region, of a Regional LCCP. Hospital level variables such as the presence of indicators, of internal monitoring and auditing system, of dedicated staff units, the geographical area and presence of an ISO 9001 certification are all factors that seem to favour the successful implementation of an internal pathway.

Discussion

This study aimed to detect the extent to which CPs have been adopted in Italy and, consequently, identify those organizational requirements that have made such CPs successful alongside those still requiring improvements and additional efforts. To do this, we have analysed the state-of-the-art of the application of CPs in the treatment of LC, known as Italy's Big Killer and therefore chosen among all pathologies due to the significant burden it has on the country. It is, in fact, the 4th most prevalent type of cancer in Italy and is responsible for 19% of all deaths due to cancer, making it the first cause of oncological death in the country [17].

In literature there is evidence that implementation of a CP alone is not sufficient to assure its successful use as there is the need to set up ulterior factors that are responsible for its successful utilization. For this study, the success factors we chose to focus our attention on Rotter's five criteria [16] that make a path really effective (multidisciplinary teams, evidence based tools, ICT

solutions, audit and feedback systems and gap analyses). The same evidence emerged from BMJ article by Fulop and Ramsay (2019) [22]. They conducted a study on the US organizations with the highest and lowest 5% risk-standardized mortality rates for acute myocardial infarction in 2017 and they discovered that for both the categories of hospitals, the presence of protocols and formalized processes alone do not report associations with high or low performances, hence the differences in mortality rates are imputable to other factors such as different organizational approaches.

Starting from these evidences found in literature, and assuming that specific critical success factors for the consolidation and effectiveness [16] of CPs are needed, we explored whether these were present in Italian best performing hospitals and our findings are indeed in line with what is suggested in literature. At both Regional Level and Hospital level there is awareness about the importance of CPs, and efforts are being made to exploit their full potential through the adoption of specific organizational factors, however some areas are still lacking attention and require additional efforts.

Overall, LCCPs are not nationally disseminated or regularly implemented in Italy as, among the selected facilities, only 68% have formalized a Hospital LCCP. Among the others, 10% adopting the Regional CP while the rest to not manage the pathology through a pathway. Our statistical tests show the correlation between the adoption of an internal LCCPs and the presence of the five requisites suggested by Rotter (multidisciplinary teams, evidence based tools, ICT, audit and feedback systems and gap analyses) [16] that determine the successful utilization of a CP. Tumour Boards and Evidence Based Tools, both resulted as factors that enhance the success of internal CPs and are largely spread among Italian best performing facilities: Tumour Boards are present in 78% of them and all the Hospital CPs adopt and apply guidelines and best practices. Indicators, on the other hand, are formalized in 68% of facilities however structured and developed monitoring and auditing systems are rarely present (44% and 39%, respectively). Similarly, Electronic Health

Tab. IV. Estimated coefficients after linear regression model.

Variables	Coef.	t	Variables	Coef.	t
Hospital variables			Regional variables		
Use of Indicators	0.1176	0.70	Regional Units	0.2063*	1.82
Tumour Board	0.7614***	3.60	Adoption of Reg CP	-0.9349***	-7.69
Monitoring System	0.0801	0.65	Regional LCCP	0.1076	-1.22
Auditing System	0.0399	0.46	Cancer Network	-0.2404	-1.15
EHR	-0.0355	-0.39	Reg. Mon. System	0.0669	-0.60
JCI accreditation	-0.2890	-1.14	Regional Law on CPs	0.1185	0.65
ISO certification	0.1715	1.72			
Staff Units	0.0042	0.03			
Citizens' Associations	-0.1557	-1.35			
Ownership	-0.3118	-0.26			
Interventions	-0.0001	-0.35			
Hospital beds	-0.0000	-0.82			
Adj. Mortality Rate	-0.0757	-1.48			
Oncological beds	-0.0000	-0.02			
Type of facility	-0.0016	-0.05			
Belonging Area	0.0839	0.86			

Significance Level: *** 1%; ** 5%; * 10%.

Records and Quality certifications were detected in 22% and 17.5% of facilities. It appears that, although the relevance of such mechanisms is recognized nationwide, they are not uniformly spread or well developed. By looking at the heterogeneity of the percentages, it appears, indeed, that only some of these requisites have been given primary importance (Tumour Boards, evidence based tools and indicators). The remaining variables (monitoring and auditing systems, Electronic Health Records and gap analyses) are strictly linked to the availability of technological solutions and ICT. Literature suggests that the adoption of technology plays an important role in the management and implementation of CPs [16]; conducting a survey among more than 40 Italian facilities, it was found that the absence of indicators, monitoring and auditing systems or Electronic Health Records in the Italian context may be imputable to the lack of digital literacy [23]. Alongside what has up to now been discussed, our research also highlighted the presence of two other variables may affect the success of a LCCP: the level of Regional commitment, especially because both the geographical area and the characteristics of the Region of belonging impact the behaviour of healthcare organizations, and the presence of quality certifications (JCI, ISO etc) which, indeed, indicate which organizations pay more attention to performance outcome and, thus, are more likely to resort to Clinical Governance tools such as CPs.

LIMITATIONS OF OUR STUDY AND IMPLICATIONS FOR FUTURE RESEARCH

Obtaining data online through questionnaires and a web-based research lead to some limitations in our study. First of all, the sent questionnaires received a response rate of 14% which is below the literature standard of 30% for emails and online surveys [24]. Collecting information for all the facilities through their websites implied that the desired information was not always available or standardized and required authors to apply non uniform methods to assess the level of accuracy and up-to-dateness. Furthermore, notwithstanding the fact that a logistic regression is the model that better fits with a binary dependent variable in this case the model showed co-linearity among the variables.

Conclusions

In conclusion, we can state that hospitals included in our analysis have almost entirely fulfilled Rotter's Criteria list, especially when it comes to multidisciplinary teams and evidence based tools. Our analysis also allows us to identify additional criteria that could be playing a role in the successful implementation of a CP within the Italian healthcare system. In fact, collocation of the healthcare facilities in a Northern region and quality certifications seem to be factors promoting the likelihood of finding a LCCP. Depending on the geographical position, in particular, sensitivity and awareness of the Regional Governments varies thus, each hospital in the country should be spreading the urgency to control performances

and establish indicators, monitoring and auditing systems through CPs.

In the light of the above, it seems that the most urgent gap to bridge is the one deriving from the lack of digital literacy. One of the most successful factors that enhance the use of CPs is full knowledge on available ICT tools, especially those designed for the gathering and measurement of performance measurement indicators and create a monitoring and auditing system. Enhancing and improving the awareness of employees about the importance of a shift to digitalization and of resorting to Big Data and ICT solutions systems, should be set as priority when selecting in which direction to address efforts, especially because most of the above-listed determinants are related to ICT solutions which imply the utilization of large amounts of data, an area of expertise that still requires substantial innovation in the country.

Secondly, Regional Governments should establish regional monitoring systems for performance measurement of their facilities, to stimulate facilities and regions to be competitive and strive to obtain best ranking on the league tables.

Lastly, the National Government should request a quality certification from each facility to be sure that they are pursuing continuous quality improvement.

To truly assist Policy formulation decision making, future investigations that build on to our findings could be similarly conducted for diseases with a comparable level of complexity (i.e. other cancers) or for other countries which have founded their NHSs on the principle of Universal Coverage.

Acknowledgments

Authors thank Fabio Lo Giudice, Alessandro Maria Lomeo, Ilaria Panzini, Marco Scarci and Marcello Tiseo for their collaboration.

Conflict of interest statement

Authors declare no conflict of interest.

Ethical considerations

No relevant ethical issues stemmed from this study.

Authors' contributions

A.G.B. conceived the study, devised the project and supervised the research. A.G.B. and C.A. were in charge of overall direction and planning. The theoretical framework was developed by all authors combined whereas the data gathering Table of Contents was developed by A.M., F.W. and G.G. and then validated and filled in by all authors. A.P. and C.A. fabricated the sample. M.C.C. and C.A. designed the model and the computational framework and M.C.C. derived the statistical models and analysed the data.

Analytical methods and results were verified by A.G.B. and all authors discussed the results, providing critical feedback and helping shape the research. M.C.C. took the lead in writing the manuscript with support from A.M. and G.S.

References

- [1] Ferre F, de Belvis AG, Valerio L, Longhi S, Lazzari A, Fattore G, Ricciardi W, Maresso A. Italy: health system review. *Health Syst Transit* 2014;16:1-168.
- [2] Institute of Medicine (US) Committee on Quality of Health Care in America. *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington, DC: National Academies Press (US) 2001. <https://doi.org/10.17226/10027>
- [3] de Belvis AG, Bucci S. Come organizzare l'assistenza del paziente per percorsi cura. L'esperienza presso la Fondazione Policlinico Universitario "Agostino Gemelli". Milano: Vita e Pensiero 2018.
- [4] Kwan J, Sandercock PAG. In-hospital care pathways for stroke. *Cochrane Database Syst Rev* 2004;4:CD002924. <https://doi.org/10.1002/14651858.CD002924.pub2>
- [5] Zander K. Integrated Care Pathways: Eleven International Trends. *J Integr Care Pathw* 2002;6:101-17. <https://doi.org/10.1177/147322970200600302>
- [6] Anderson KL, Anderson L, Glanze W. *Mosby's medicine, nursing & allied health dictionary*. 4th ed. St. Louis, Missouri: Mosby 1994.
- [7] Hindle D, Yazbeck AM. Clinical pathways in 17 European Union countries: a purposive survey. *Aust Health Rev* 2005;29:94. <https://doi.org/10.1071/ah050094>
- [8] Vanhaecht K, Bollmann M, Bower K, Gallagher C, Gardini A, Guezo J, Jansen U, Massoud R, Moody K, Sermeus Walter, van Zelm R, Whittle C, Yazbeck AM, Zander K, Panella M. Prevalence and use of clinical pathways in 23 countries – An international survey by the European Pathway Association. *J Integr Care Pathw* 2006;10:28-34. <https://doi.org/10.101258/j.jicp.2006.124>
- [9] Gazzetta Ufficiale n. 127. Decreto Ministeriale 2 aprile 2015 n. 70. Regolamento recante definizione degli standard qualitativi, strutturali, tecnologici e quantitativi relativi all'assistenza ospedaliera. Available at: https://www.gazzettaufficiale.it/atto/stampa/serie_generale/originario (Accessed on: 21/7/2019).
- [10] Gazzetta Ufficiale n. 64. Legge n. 24, 8 marzo 2017. Disposizioni in materia di sicurezza delle cure e della persona assistita, nonché in materia di responsabilità professionale degli esercenti le professioni sanitarie (Legge Gelli). Available at: <https://www.gazzettaufficiale.it/eli/gu/2017/03/17/64/sg/pdf> (Accessed on: 23/7/2019).
- [11] Barbieri A, Vanhaecht K, Van Herck P, Sermeus W, Faggiano F, Marchisio S, Panella M. Effects of clinical pathways in the joint replacement: A meta-analysis. *BMC Med* 2009;7:32. <https://doi.org/10.1186/1741-7015-7-32>
- [12] Chudyk AM, Jutai JW, Petrella RJ, Speechley M. Systematic Review of Hip Fracture Rehabilitation Practices in the Elderly. *Arch Phys Med Rehabil* 2009;90:246-62. <https://doi.org/10.1016/j.apmr.2008.06.036>
- [13] Neuman MD, Archan S, Karlawish JH, Schwartz JS, Fleisher LA. The Relationship between Short-Term Mortality and Quality of Care for Hip Fracture: A Meta-Analysis of Clinical Pathways for Hip Fracture. *J Am Geriatr* 2009;57:2046-54. <https://doi.org/10.1111/j.1532-5415.2009.02492.x>
- [14] Sylvester AM, George M. Effect of a Clinical Pathway on Length of Stay and Cost of Pediatric Inpatient Asthma Admissions: An Integrative Review. *Clin Nurs Res* 2014;23: 384-401. <https://doi.org/10.1177/1054773813487373>
- [15] de Luc, K. *Developing Care Pathways: The Handbook* (1st ed.). Routledge 2001. <https://doi.org/10.4324/9781315379166>
- [16] Rotter T, Kinsman L, Machotta A, Zhao FL, van der Weijden T, Ronellenfisch U, Scott SD Clinical pathways for primary care: effects on professional practice, patient outcomes, and costs. *Cochrane Database Syst Rev* 2013;8:CD010706. <https://doi.org/10.1002/14651858.CD010706>
- [17] Associazione Italiana di Oncologia Medica. Libro Bianco VIII Edizione. La carta dei servizi dell'oncologia italiana 2017. Available at: http://media.aiom.it/userfiles/files/doc/documenti_scientifici/2017_Libro_bianco_AIOM_VIII.pdf (Accessed on: July 2019).
- [18] Ogrinc G, Mooney SE, Estrada C, Foster T, Goldmann D, Hall LW, Huizinga MM, Liu SK, Mills P, Neily J, Pronovost L, Rubenstein LV, Speroff T, Splaine M, Thomson R, Tomolo AM, Watts B. The SQUIRE (Standards for Quality Improvement Reporting Excellence) guidelines for quality improvement reporting: explanation and elaboration. *BMJ Qual Saf* 2008;17:i13-i32. <https://doi.org/10.1136/qshc.2008.029058>
- [19] Lohmeyer FM, Commers MJ, Leoncini E, Specchia ML, Boccia S, Ricciardi G, de Belvis AG. Community-based Mental Healthcare: A Case Study in a Cross-border Region of Germany and the Netherlands. *Gesundheitswesen* 2019;81:e58-e63. <https://doi.org/10.1055/a-0664-0579>
- [20] Powell C. The Delphi Technique: Myths and realities. *Methodol Issues. Nurs Res* 2003;41:376-82. <https://doi.org/10.1046/j.1365-2648.2003.02537.x>
- [21] Greene WH. *Econometric analysis*. New York, NJ: Pearson 2018.
- [22] Fulop NJ, Ramsay Angus IG. How organisations contribute to improving the quality of healthcare. *BMJ* 2019;365:l1773. <https://doi.org/10.1136/bmj.l1773>
- [23] Federazione italiana Aziende Sanitarie e Ospedaliere (FIASO). Il supporto dell'ICT ai Percorsi Diagnostico Terapeutici Assistenziali. FIASO 2014. Available at: <https://www.fiaso.it/Pubblicazioni/Il-supporto-dell-ICT-ai-Percorsi-Diagnostico-Terapeutici-Assistenziali> (Accessed on: July 2019).
- [24] Survey Anyplace 2019. Available at: <https://surveyanyplace.com/> (Accessed on: July 2019).

Received on March 29, 2020. Accepted on February 20, 2023.

Correspondence: Alisha Morsella, Fondazione Policlinico Universitario A. Gemelli, IRCCS - Catholic University of the Sacred Heart, Via Carmelo Maestrini 450, 00128 Rome (RM), Italy. Tel. +393489540212 - E mail: alisha.morsella@gmail.com

How to cite this article: De Belvis AG, Catalani MC, Morsella A, Sessa G, Palinuro A, Giubbini G, Watteble F, Angioletti C. Critical pathways for continuous quality improvement: a multicentric analysis on the management of patients with lung cancer in Italian best performing hospitals. *J Prev Med Hyg* 2023;64:E92-E100. <https://doi.org/10.15167/2421-4248/jpmh2023.64.1.1516>

© Copyright by Pacini Editore Srl, Pisa, Italy

This is an open access article distributed in accordance with the CC-BY-NC-ND (Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International) license. The article can be used by giving appropriate credit and mentioning the license, but only for non-commercial purposes and only in the original version. For further information: <https://creativecommons.org/licenses/by-nc-nd/4.0/deed.en>

One hundred years after the death of the writer and novelist Giovanni Verga (1922) and his relationship with public health: a glimpse of the past in the era of the SARS-CoV-2 (COVID-19) pandemic

MARIANO MARTINI¹, DONATELLA LIPPI²

¹ Department of Health Sciences, University of Genoa, Genoa, Italy;

² Department of Experimental and Clinical Medicine, University of Florence, Florence, Italy

Keywords

Giovanni Verga • History of public health • Hygiene and literature • Medical humanities • XIX Century • Epidemiology • Social status and class

Summary

Background. In 1922 the famous Italian novelist Giovanni Verga died in Catania (Italy). In Verga's works there are many suggestions to the world of medicine, in particular the diseases described in the poor society of southern Italy of that time. One of the most common diseases described by Verga was cholera.

Methods. The authors researched and reviewed Verga's works, detecting references to public health. These are topical issues in the current period of the COVID pandemic. In Verga's works the theme of hygiene, epidemiology, and infectious diseases occur. There are many hints related to medicine, especially as far as the typical diseases of poor society and the difficult social environments of the time are concerned. One of the most common dis-

eases described by Verga was cholera but also malaria and tuberculosis occur.

Results. It was estimated that 69,000 people died of cholera in Sicily, of whom 24,000 in Palermo. The public health situation in Italy was difficult. Verga denounces people's ignorance and the survival of past beliefs.

Conclusion. Verga describes a culturally and economically humble society, in a region characterized by large class gaps. It draws a difficult picture of the public health situation in the second half of the 19th Century and people's daily lives. The authors believe that today it is important that the centenary of Verga's death be an opportunity to read his works, also from a medical historical point of view.

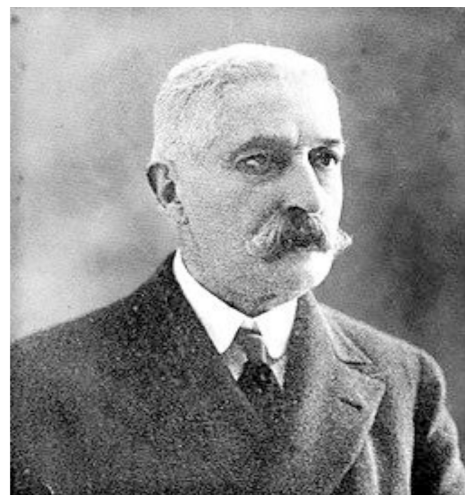
Introduction

Giovanni Verga was born in 1840 into a landowning family in the city of Catania, on the east coast of Sicily (Fig. 1). He began to write early and in 1865 he left the mainland; at first he moved to Florence (1869) and then reached Milan. A young provincial, he was excited by city delights: high society, love affairs, art, journalism, literature. Fashionable new life offered different matters for his early works as a novelist. In Milan he met several writers and intellectuals and the ideas of other writers much influenced his work. Despite of, he always kept present his native island and daily difficult life of fellow countrymen. Sicily began to be present itself into his work. Verga is known to be the most important figure of the Italian Verismo (Italian Realism), an artistic movement that developed in France in the mid-19th Century; the realist movement arose in Europe after the French Revolution and reached Italian authors particularly through the writings of Honoré de Balzac and Émile Zola and the Scapigliatura milanese ("Milanese bohemianism") group in Italy [1].

The primary interpreters of Italian Verismo (Italian Realism) were the Sicilian novelists Luigi Capuana and precisely Giovanni Verga. In particular, Italian Verismo never had the intent of social denunciation

that characterized the Naturalism in France, which was distinguished by its spirit of rebellion. Verismo's principal aim was the objective presentation of life, usually of the lower classes, using direct and simple language, with explicit descriptive and narrative detail,

Fig. 1. Portrait of Giovanni Verga (1840-1922) [Public Domain – Wikipedia Commons].



always presented in an impersonal way and realistic dialogue [1]. The new Italian writers, welcomed with great enthusiasm to the new ideas of French Realism and Naturalism exemplified by Gustave Flaubert, the Goncourts brothers, and Émile Zola. The Italian novelist Giovanni Verga died in Catania in 1922 and with this paper we remember this personality of Italian literature who started and marked a new and original style at the end of the 19th and the beginning of 20th Century.

PUBLIC HEALTH AND INFECTIOUS DISEASES IN VERGA'S WORKS

Starting with historical and patriotic novels, Verga went on to write novels in which psychological observation was combined with romantic elements, as in "Eva" (1873), "Tigre Reale" (1873); "Royal Tigress") and "Eros" (1875) turning into the most noticeable among the European novelists of the late 19th Century [2, 3].

The first translator of Verga's works was Mary Craig, who translated "I Malavoglia", with the title "The house by the medlar tree" [4], and "Mastro Don Gesualdo" with the title "Master don Gesualdo" [5].

In Verga's works there are many references to the world of medicine, in particular to diseases associated to the poor society of southern Italy at the end of the 19th Century. One of the most common diseases was cholera, an acute disease of the gastrointestinal tract caused by *Vibrio cholerae*. It was localized in Asia until 1817, when a first pandemic spread from India to several other regions of the world [6]. In 1854, a cholera outbreak in Soho, London, was investigated by the English physician John Snow (1813 to 1858). Dr Snow's revolutionary theory postulated that cholera's main route of transmission was through infected sewage finding its way into the water supply.

In particular in Verga famous literary work entitled "I Malavoglia" (Fig. 2), cholera is just as important in affecting the unfortunate family. The story tells about a family (called "Malavoglia"), who lives in a fishing village in Sicily. The whole family Malavoglia is the

main character of the book and is presented directly by the narrator at the beginning of the novel. The characters are the typical personification of the fishing family, upset by misfortunes [7]. Just as the Malavoglia family were recovering from their condition of impoverishment, while their anchovies were stacked up waiting for the right price for their sale, the epidemic broke out, the price of the anchovies fell, the character Maruzza (a housewife of the family) died, and the fate of the family took a bad turn. Verga described as Maruzza was infected: overcome by fatigue, after having been to the market, gives into the temptation to rest: "... She let herself be overcome by the temptation to rest for two minutes on those four smooth stones lined up in the shadow of the (caprificio) goat farm that is next to the chapel, before entering the town; and she did not notice, but she thought about it later, that a stranger, who also seemed tired, poor fellow, had been seated a few moments before, and had left drops of a certain filth that looked like oil on the stones. In short, she too fell for it; she took the cholera and went home she couldn't take it anymore, yellow like a vow to the Madonna, and with dark circles under her eyes" [7]. Verga describes also the steps taken to avoid the deliberately caused infection: "... But you had to beware of bad encounters, and not even accept a pinch of tobacco from someone you didn't know! Going down the street you had to walk in the middle, and away from the walls, where you ran the risk of grabbing a thousand junk; and be careful not to sit on the stones or along the walls" [7].

The cholera epidemic also becomes a focal point of another well-known literary work of Verga, entitled "Mastro don Gesualdo" as Gesualdo Motta (a parvenu) and his family take refuge in one of his country properties, which opens to all his relatives and also to the poor [8]. The story was published as a serial novel during 1888 and collected in "Nuova Antologia"; in 1889 it was published in the final draft, in a volume, after a meticulous revision of Verga, which was actually a real rewrite. The time frame covered by the novel is almost thirty years: the outbreak of the first anti-Bourbon uprisings (1820) [9] and the revolution of 1848 (at the dawn of the national process of unification). In his work, Verga illustrates the socio-economic mechanisms on which modern society is born and begins to develop, with all its problems and several contradictions, through a privileged observation point and a main character, Gesualdo.

The beginning of the tale is between 1820-1821. Verga's perseverance on the diffusion of cholera in Sicily and on the repeated poussée of the epidemic is driven by the need and desire to inform his fellow compatriots, and especially his fellow citizens who lived in the northern regions of the new Kingdom of Italy and focus on the difficult public health situation and the poor sanitation conditions of the Sicily region, the lack of sanitation facilities, sanitary standards, etc. (Fig. 3) Sicily was severely affected by the epidemic at the end of the 19th Century and it was estimated that 69,000 people died of cholera, of which only 24,000 in the city of Palermo [10]. Even the cities were in an extremely precarious hygienic

Fig. 2. Title page "I Malavoglia" by Giovanni Verga (Wikipedia commons – public domain) – (1907).



Fig. 3. Sicily – Isle (Italy) 1911 – (Public Domain).



state: there were no sewers and drinking water, but also homes, hospitals, schools and an efficient road network. In particular, the period of recession and economic stagnation had definitely worsened and two great changes and events had suddenly occurred. They were very evident and surprising: there were two cholera epidemics, which broke out in 1866 and 1867. Not only did they cause a large number of victims, but they also caused the isolation of the most important and vital centres, eliminating all trade because they were concentrated in commercial and economic centres [11]. The cholera epidemics were truly devastating events, two terrible epidemic diseases, that plunged the entire population and the local community into severe strife and deep crisis.

In 1893 there was also a severe drought and the local Sicilian newspaper “*Il Giornale di Sicilia*” described the situation in Carlentini (a little village close to Catania) as follows: “The state of the countryside is disheartening: the olives fall dried and drenched from the trees, lemon and orange trees are suffering, pasture is most rare, and the poor peasants are unemployed and bear more than anyone else the effect of such calamity. Misery is immense here, as all over the island” [12].

One of the most significant aspects of the presence of cholera in Verga’s work, however, is the recognition of the ignorance of people, who rely on popular rumours. A similar situation is repeated in the short story “*Quelli del colera*”, where some strangers “took out

their handkerchiefs, pretended to blow their noses, and dropped certain invisible powders, which whoever stepped on it to his misfortune was done!”.

This concept of “*pestis manufacta*” occurs also in “*Mastro Don Gesualdo*” (...) “The cholera was brought to Salonia by a traveler who was walking around with his saddlebag on his shoulder. These days, imagine! Some have seen him on the farm. Then all night, noises on the roof and behind the doors... And the grease spots that have been found here and there a day!... Like snail slime” [13].

Also the aristocrat don Ferdinando, Gesualdo’s brother in law, was persuaded that cholera enters through the cracks and, for this reason, he stuck strips of paper wherever there was a hole.

Verga refers to the popular riots, the climate of suspicion, the fires and the patrolling guards: people did not believe in the apothecary’s suggestions for hygiene, cleaning of stables and animal shelters, which, in reality, were the vehicle of the infection. The sewage in fact also contaminated the spaces where people lived and the infected water was the reservoir of the *Vibrio* [14].

Understanding cholera was a long and difficult process: the disease was generally attributed to miasmatic causes, but this concept was replaced, between about 1850 and 1910 by the scientifically founded germ theory of disease. For the understanding of the disease, the contributions of John Snow, Filippo Pacini, and Robert Koch were pivotal. John Snow (1813-1858) identified water as vehicle of

infection during the epidemic of 1854, Filippo Pacini (1812-1883) in the same year discovered in the intestinal mucosa of people died of cholera millions of elements, which he called Vibrions; Robert Koch (1843-1910) in 1883 isolated the Comma Bacillus in pure culture and explained its mode of transmission, solving an enigma that had lasted for centuries [14].

In the years in which Verga was writing, the debate was still very animated, but, above all, it was difficult to uproot ancient opinions, superstitions and popular beliefs in a retrograde and culturally very poor environment.

VERGA AND MALARIA

Another disease to which Verga attributed great attention was malaria, which must not be interpreted only as the disease caused by a parasite that commonly infects a certain type of mosquito, which feeds on humans, but as a general term for “fever”.

1. An entire story of the “Novelle Rusticane”, “Malaria”, is dedicated to the disease, and to its effects on certain individuals.

One of the characters of the story is an innkeeper, who was nicknamed “Wives-Killer” (Ammazzamogli), because all four of his wives had died of malaria, causing him a serious economic loss, as a wife was indispensable for the management of the tavern.

The ideology of the story provides that men, animals and objects are all involved in the slow consumption caused by malaria, which appears almost like an inexorable disease of the time [15].

It is thus emphasized that in these places, there are fertile fields where the peasants work incessantly to bring home something to eat, but they often end the ears, as they weaken until they die.

Il Biviere (brackish lake) is mentioned here at the beginning of the work and is described as a pond without a boat, with flat banks, without a tree on the shore: all this to affirm that due to the spread of the disease no fisherman can carry out his own activity. Another passage underlines the spread of the disease: “Here the shepherd is yellow with fever, white with dust and with swollen eyelids. It is that malaria enters your bones with the bread you eat and if you open your mouth to speak”.

In the story “La roba”, malaria is evoked by sleep, which makes the eyelids heavy and makes one lose awareness of things.

However, there is another important feature in the poetics of Verga, which offers highly topical insights into today’s medicine and is the very language of medicine.

In fact, e.g. in “Mastro Don Gesualdo”, Verga proposes the scene of the consultation of some doctors at the bedside of Mastro Don Gesualdo, who has been suffering for stomach-ache [8]. Mastro Don Gesualdo waits for the response and anxiously invites doctors to comment on his state of health:

“Speak, my lords!” – then exclaimed the poor man pale as a dead man – “I’m the sick one, finally! I want to know how I am.”

The doctors begin the explanation of the case, using

a terminology incomprehensible to the master: Pylori cancer, the pyrosis of the Greeks. Then they deepen the diagnosis, with technical words, difficult to understand, so much so that Mastro Don Gesualdo has a positive impression of his condition:

“This is all fine. But tell me if you can heal me, your lord. Without interest... paying you according to your merit...”

Despite the unfortunate diagnosis of a gastric carcinoma, Mastro Don Gesualdo shifts the attention to his economic possibilities, hoping to buy the expertise of the doctors with his wealth and, consequently, his recovery. One of the doctors ventures into the details of the surgery, so bloody that the women present at the scene run away crying and invoking the Virgin.

Mastro Don Gesualdo claims his autonomy, asks to be able to decide for himself, and he resigns himself to being operated on only if he has the certainty of recovery.

The doctors cannot give this certainty and they do not accept what they consider a “charlatan’s bet” and Mastro Don Gesualdo refuses the intervention [8].

2. Also in a well-known novel titled “Rosso Malpelo” [16], the author Giovanni Verga describes a culturally and economically humble society, in a region characterized by a great difference in social status [17] (Fig. 4).

The enormous demand for sulfur, a precious element used mainly in the production of gunpowder, encouraged the opening of a huge number of mines in the central area of Sicily, in which many of the region’s poor farmers went to work. They worked from 10 to 16 hours a day, pulling heavy loads of sulfur weighing 20-25 kilos (for the youngest boys) and up to 70-80 kilos for 16/18 year olds through the narrow tunnels of the mines. The fatigue to which the children were exposed often made them grow crippled or stunted and Verga represents this situation in a very detailed and realistic way.

VERGA AND TUBERCULOSIS

Another disease mentioned in Verga’s works is tuberculosis. Tuberculosis is an ancient infectious disease caused by Mycobacterium tuberculosis, isolated by Robert Koch at the end of 19th Century, when it was one of the most common diseases [18].

Tuberculosis and humans have coexisted for more than 40,000 years and is still nowadays afflicting humans all over the world [19]. A century ago, in Italy and in most other western countries, four out of every thousand people died of TB every year, and most of these deaths occurred among young adults [20].

The hygienic-sanitary situation of Sicily in the second half of the 19th Century was really hard and in particular poor people had a hard time living. Within this social context took place the above-mentioned short story entitled “Rosso Malpelo”.

This “Novella” was collected and published in 1880 along with other “Novelle” and published later in 1879-1880 in

Fig. 4. Photograph taken by Giovanni Verga – “La Sicilia rurale” (Wikipedia Commons – public domain).



“Vita dei campi” (literally Life of the fields/country life). It is the story of a poor boy called “Rosso Malpelo” (he was nicknamed this way for his red hair), a boy despised and considered bad because of a popular belief linked to people with red hair. Rosso Malpelo works in a red sand quarry and he leads a hard life. Verga describes the reality of poverty and exploitation suffered by the poor social class in Sicily at the end of the 19th Century, in the years of the formation of the kingdom of Italy (1861), a situation he knew well [21-23].

The author’s literary style is full of popular expressions and idioms. In this tale, a working boy (called Ranocchio, “Frog”), who worked as miner in the quarry was suffering from tuberculosis, as he “didn’t heal and continued to spit blood and he has the fever every day”. In “Mastro Don Gesualdo” the character called Donna Bianca was sick and spitting blood every morning; she died of consumption a few years later. Also in “Tigre reale” Verga described women suffering from tuberculosis.

Conclusions

The picture that emerges from Verga’s pages is therefore that of a culturally and economically humble society, in the Sicily of the 19th and early 20th Century large estates, where there was great inequality between rich and poor. The entire island featured levels of extreme misery and political and social unrest.

The unification of Italy had brought to light the problems

of the previous governments and the unification is seen as the umpteenth invasion of a foreign people.

From this point of view, Verga’s testimony offers an extremely difficult picture of the hygienic-sanitary situation in Sicily in the second half of the 19th Century, and the anniversary of Verga’s death is an opportunity to read his work also from a point of medical historical view.

Acknowledgments

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of interest statement

Each author declares that they have no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

Authors' contributions

DL designed the study, DL and MM conceived and drafted the manuscript; the authors revised the manuscript, performed a search of the literature. Both authors critically revised the manuscript. Both authors have read and approved the latest version of the paper for publication. Furthermore: DL: conceptualization, and MM and DL: methodology, software, validation, formal analysis, investigation, data curation, MM and DL: original draft preparation, MM: review and editing.

References

- [1] Baldini A. The liberal imagination of Giovanni Verga: verismo as moral realism, *The Italianist* 2017;37:348-68. <https://doi.org/10.1080/02614340.2017.1409313>
- [2] Fochi Caturegli A. Traduttori del Verga in lingua inglese. *Italianistica* 1982;1:35-47. Available at: <http://www.jstor.org/stable/23928640> (Accessed on: January 9, 2023).
- [3] Verga G. Masterpieces include the short stories of: *Vita dei campi* (1880) – “Life in the Fields”; *Novelle rustiche* (1883) – Little Novels of Sicily; the great novels *I Malavoglia* (1881); *Mastro don Gesualdo* (1889); *Cavalleria rusticana* (1884), a comedy that was set to music by Pietro Mascagni (1890).
- [4] Verga G. The house by the Medlar Tree. CreateSpace Independent Publishing Platform 2016 [Translated by Mary A. Craig].
- [5] Verga G. *Master Don Gesualdo*. London: Osgood & McIlvaine 1893 [Translated by Mary A. Craig].
- [6] Lippi D, Gotuzzo E, Cainsi S. *Microbiol Spectr Cholera* 2016;4. <https://doi.org/10.1128/microbiolspec.PoH-0012-2015>
- [7] Verga G. *I Malavoglia*. Torino: Einaudi 2014.
- [8] Verga G. *Mastro don Gesualdo*. Roma: Newton Compton 2015.
- [9] Martini M, Bifulco M, Orsini D. Smallpox vaccination and vaccine hesitancy in the Kingdom of the Two Sicilies (1801) and the great modernity of Ferdinand IV of Bourbon: a glimpse of

- the past in the era of the SARS-CoV-2 (COVID-19) pandemic. *Public Health* 2022;213:47e53. <https://doi.org/10.1016/j.puhe.2022.09.012>
- [10] Pinnelli A, Mancini P. Mortality peaks in Italy in the late 19th and early 20th Centuries: trends by age and sex. *Eur J Popul* 1999;14:333-65. <https://doi.org/10.1007/BF02863320>
- [11] Imperato PJ, Imperato GH, Imperato AC. The Second World Cholera Pandemic (1826-1849) in the Kingdom of the Two Sicilies with Special Reference to the Towns of San Prisco and Forio d'Ischia. *J Community Health* 2015;40:1224-86. <https://doi.org/10.1007/s10900-015-0089-y>
- [12] Acemoglu D, De Feo G, De Luca G. Weak states: causes and consequences of the sicilian mafia, Working Paper 24115. National Bureau of Economic Research, Dec 2017. Available at: <http://www.nber.org/papers/w24115> (Accessed on: January 9, 2023).
- [13] Verga G. Master-don Gesualdo. London: James R. Osgood 1893 [Translated by Mary A. Craig]. Alternatively, in: I Malavoglia: "...In Syracuse a young girl as beautiful as the Madonna, who danced with horses trained in the theater, and was spreading cholera on that pretext, had been killed by popular acclaim".
- [14] Lippi D, Gotuzzo E. The greatest steps towards the discovery of *Vibrio cholerae*. *Clin Microbiol Infect* 2014;20:191-5. <https://doi.org/10.1111/1469-0691.12390>
- [15] Martini M, Angheben A, Riccardi N, Orsini D. Fifty years after the eradication of Malaria in Italy. The long pathway toward this great goal and the current health risks of imported malaria. *Pathog Glob Health* 2021;115:215-23. <https://doi.org/10.1080/20477724.2021.1894394>
- [16] Verga G, Cecchetti G. *The She-Wolf and Other Stories*. Berkeley, California: University of California Press 1972, p. 65.
- [17] Malta R. Zolfare di Sicilia: le tematiche della ricerca. *Med Secoli* 2010;22:489-507.
- [18] Martini M, Besozzi G, Barberis I. The never-ending story of the fight against tuberculosis: From Koch's bacillus to global control programs. *J Prev Med and Hyg* 2018;59:E241-7.
- [19] Canetti D, Riccardi N, Martini M, Villa S, Di Biagio A, Codecasa L, Castagna A, Barberis I, Gazzaniga I, Besozzi G. HIV and tuberculosis: The paradox of dual illnesses and the challenges of their fighting in the history. *Tuberculosis (Edinb)* 2020;122:101921. <https://doi.org/10.1016/j.tube.2020.101921>
- [20] Martini M, Gazzaniga V, Behzadifar M, Bragazzi NL, Barberis I. The history of tuberculosis: The social role of sanatoria for the treatment of tuberculosis in Italy between the end of the 19th Century and the middle of the 20th. *J Prev Med Hyg* 2018;59:E323-7. <https://doi.org/10.15167/2421-4248/jpmh2018.59.4.1103>
- [21] Malta R. Zolfare di Sicilia: le tematiche della ricerca. *Med Secoli* 2010;22:489-507.
- [22] Malta R. Cercavano la luce. Storia sanitaria delle zolfare di Sicilia. Bagheria, Italia: Plumelia 2012.
- [23] Martini M, Barberis I, Bragazzi NL, Paluan F. The fight against tuberculosis in the Mid-Nineteenth Century: The pivotal contribution of Edoardo Maragliano (1849-1940). *Adv Exp Med and Biol* 2017;1057:95. https://doi.org/10.1007/5584_2017_125

Received on January 11, 2023. Accepted on February 27, 2023.

Correspondence: Mariano Martini, Department of Health Sciences, largo R. Benzi 10, 16132 Genoa, Italy. E-mail: mariano.yy@gmail.com; mariano.martini@unige.it

How to cite this article: Martini M, Lippi D. One hundred years after the death of the writer and novelist Giovanni Verga (1922) and his relationship with public health: a glimpse of the past in the era of the SARS-CoV-2 (COVID-19) pandemic. *J Prev Med Hyg* 2022;63:E101-E106. <https://doi.org/10.15167/2421-4248/jpmh2023.64.1.2839>

© Copyright by Pacini Editore Srl, Pisa, Italy

This is an open access article distributed in accordance with the CC-BY-NC-ND (Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International) license. The article can be used by giving appropriate credit and mentioning the license, but only for non-commercial purposes and only in the original version. For further information: <https://creativecommons.org/licenses/by-nc-nd/4.0/deed.en>



Analysis and evolution of health policies in Iran through policy triangle framework during the last thirty years: a systematic review of the historical period from 1994 to 2021

LEILA DOSHMANGIR¹, MEYSAM BEHZADIFAR², ALI SHAHVERDI², MARIANO MARTINI³,
SEYED JAFAR EHSANZADEH⁴, SAMAD AZARI⁵, AHAD BAKHTIARI⁶, SAEED SHAHABI⁷,
NICOLA LUIGI BRAGAZZI⁸, MASOUD BEHZADIFAR²

¹Department of Health Policy & Management Research Center, School of Management and Medical Informatics, Tabriz University of Medical Sciences, Tabriz, Iran; ²Social Determinants of Health Research Center, Lorestan University of Medical Sciences, Khorramabad, Iran.; ³Department of Health Sciences, University of Genoa, Genoa, Italy; ⁴Department of English Language, School of Health Management and Information Sciences, Iran University of Medical Sciences, Tehran, Iran; ⁵Research Center for Emergency and Disaster Resilience, Red Crescent Society of the Islamic Republic of Iran, Tehran, Iran; ⁶Health Equity Research Center (HERC), Tehran University of Medical Sciences, Tehran, Iran; ⁷Health Policy Research Center, Institute of Health, Shiraz University of Medical Sciences, Shiraz, Iran; ⁸Laboratory for Industrial and Applied Mathematics (LIAM), Department of Mathematics and Statistics, York University, Toronto, ON, Canada

Keywords

Health policy • Policy analysis • Health policy triangle • Iran • Time frame lasting 20 years • systematic review

Summary

Background. *Health policy analysis as a multi-disciplinary approach to public policy illustrates the need for interventions that highlight and address important policy issues, improve the policy formulation and implementation process and lead to better health outcomes. Various theories and frameworks have been contributed as the foundation for the analysis of policy in various studies. This study aimed to analyze health policies during the historical period of the almost last 30 years in Iran using policy triangle framework.*
Method. *To conduct the systematic review international databases (PubMed / Medline, Scopus, Web of Sciences, CINAHL, PsycINFO, Embase, the Cochran Library) and Iranian databases from January 1994 to January 2021 using relevant keywords. A thematic qualitative analysis approach was used for the synthesis and analysis of data. The Critical Appraisal Skills Programme for Qualitative Studies Checklist (CASP) was conducted.*

Results. *Out of 731 articles, 25 articles were selected and analyzed. Studies used health policy triangle framework to analyze policies in the Iranian health sector has been published since 2014. All the included studies were retrospective. The main focus of most of studies for the analysis was on the context and process of policies as the elements of the policy triangle.*

Conclusion. *The main focus of health policy analysis studies in Iran over the last thirty years was on the context and process of policies. Although range of actors within and outside the Iran government influence health policies but in many policy processes the power and the role of all actors or players involved in the policy are not recognized carefully. Also, Iran's health sector suffers from lack of a proper framework for evaluating various implemented policies.*

Introduction

Health policies and their potential outcomes are of critical importance since they can affect every individual citizen [1]. Health policy analysis provides valuable evidence for how a policy is put on the agenda, how it is formulated, and how it is implemented and evaluated [2]. Meanwhile, it can provide us with a sound understanding of health sector decisions, programs, and activities. With this respect, knowledge of the strengths and weaknesses of health policies can be obtained through a policy analysis whose results might greatly help policymakers make appropriate decisions. Policy analysis is also a powerful process showing that any policy is subject to controversy over implementation [3]. In this regard, there are a number of factors that influence the health policy formulation and implementation [4].

Researchers and other stakeholders in health sector can analyze a policy using quantitative and qualitative approaches [1]. Policy analysis will help identify potential ways to achieve the best policy. Also, it encourages health professionals and stakeholders to conduct more in-depth researches. In addition, policy analysis can be used to assess the potential role of stakeholders on a policy and understand the interaction among them [5]. This will subsequently help us to decide whether implement a particular policy or not. Given the problems and new challenges in health sector such as new diseases like Covid-19, it is necessary to pursue effective policies to use various resources properly [6, 7]. This should be taken into account in developing countries due to a lack of sufficient financial resources, political opposition to any changes in government, and increasing demand for health services [8].

Developed countries make extensive use of policy analysis to advance their programs in the health sector and the results were satisfactorily in many cases [1]. Through conducting such analyses, they have been able to identify weaknesses of their health policies in order to make a more effective plan [9]. Along the same line, developing countries have also made efforts in recent years to use policy analysis to improve their programs [10]. Although health policies in developing countries are very different from those in developed ones, using the experiences of developed countries might be useful for policymakers in developing countries [11]. Given the complexities of the health system, policymakers and planners should find ways to facilitate the relationships that govern between policy selection and implementation [12]. The use of approaches, models, concepts and patterns of analysis can be very helpful in understanding a policy [13]. Also, it provides a good platform for evaluating evidence and a practical way to understand, explain and plan activities designed to improve health programs. Meanwhile, adopting a framework can make policy analysis easier and more practical [1, 14].

HEALTH POLICY TRIANGLE

One of the most widely used frameworks in health that has been used in different countries is the Health Policy Triangle. In 1994, the framework was designed and introduced by two leading researchers (Walt and Gilson) [15]. This framework has four elements (context, content, actors, and process) related to policy making. In many countries with various health system structures, the framework has been used retrospectively and futuristically to analyze health issues [16-19]. The four elements related to the framework have been defined as follows in Table I.

This framework provides a simple platform for understanding a complex set of relationships and processes in the form of four elements.

Like many developing countries, Iran's health sector has made extensive efforts to implement various activities to promote community health. Meanwhile, policy analysis in Iran has been used for several years and decision makers, researchers, and some stakeholders have been trying to use appropriate analysis to challenge health system programs in order to implement more convenient and cost-effective health programs [20]. In recent years, Iranian researchers have also used the policy triangle framework to analyze health sector policies. In this review study, we investigate health-related issues

in Iran that have been analyzed using Health policy triangle [21]. By reviewing the most relevant papers, we throw new light on the application of different elements of the framework [22]. Meanwhile, results might reveal strengths and weaknesses of using the framework.

AIM

This study aimed to investigate the framework of the health policy triangle in studies published in Iran that have examined health policies. The findings of this study could also make decision-makers more aware of the scientific evidence in the field and encourage them to minimize barriers to implementing health-related programs through past and future analysis. Given the importance of achieving universal health coverage (UHC) across all countries, policy-making aligned with its objectives can prove to be immensely valuable.

Method

In this study, we followed Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [23].

LITERATURE SEARCH

Two authors of this study (MB, MKG) independently searched international databases (PubMed / Medline, Scopus, Web of Sciences, CINAHL, PsycINFO, Embase, The Cochran Library) and Iranian databases (MagIran, Elmnet, Scientific Information Database (SID)) from January 1994 to January 2021. Search strategy using related keywords was used in the following databases.

“Policy analysis” OR “policy process” OR “health politics” OR “health policy” OR “policy” OR “public policy” OR “agenda setting” OR “document analysis” OR “health advocacy” OR “analysis” OR “stakeholder analysis” AND “health policy triangle framework” OR “health policy triangle model” OR “health policy triangle theory” OR “Walt AND Gilson framework” OR “Walt AND Gilson model” OR “Walt AND Gilson theory” OR “policy triangle framework” OR “policy triangle model” OR “policy triangle theory” OR “framework” OR “theory” OR “model” OR “health policy analysis” OR “policy framework” OR “concept” AND “Iran”.

Also, we searched the list of references of the retrieved papers to find potentially related articles. Google

Tab. I. The four elements related to the framework.

Item	Definition
Context	Context refers to social, systemic, economic, political, cultural, and other environmental factors. These issues are being addressed nationally and internationally, which may affect health policies
Content	Content addresses issues such as policy objectives, policy-related action plans, regulations, rules and guidelines
Actors	Actors refer to influential national and international individuals, groups, and organizations
Process	Process refers to the ways in which policy is initiated, formulated, negotiated, communicated, implemented, and evaluated

Scholar and Directory of Open Access Journals (DOAJ) were also searched to ensure a comprehensive search of all possible sources. Meanwhile, we contacted experts in the field to identify additional research and grey literature. Any disagreement between the two authors was resolved through discussion and referring to a third person (SJE) as the judge.

INCLUSION AND EXCLUSION CRITERIA

Inclusion criteria

The inclusion criteria in this study are as follows:

- articles that used the triangle framework to analyze health policies in the Iranian health sector;
- articles published in Persian and English language;
- articles published in peer-reviewed journals;
- articles whose full texts were available;
- articles whose methodologies were valid and well-described;
- studies published between January, 1994 and January, 2021.

Exclusion criteria

We excluded studies according to the following criteria:

- articles that did not fully utilize the four elements of the framework of the Health policy triangle;
- abstract of articles in congresses and seminars.

DATA EXTRACTION

After selecting the studies, two authors independently extracted the data, including first author name, year of publication, the language of the article, study population, data analysis, subject of analysis, place of study, methods of collecting studies, and the most important findings of the studies based on the elements of the framework (context, content, actors, and process). Any disagreement between the two authors was again resolved through discussion and referring to a third person (NLB) as the judge.

QUALITY APPRAISAL OF INCLUDED STUDIES

The Critical Appraisal Skills Programme for Qualitative Studies Checklist (CASP) was conducted by three authors in this study (MB, LD and SA) to measure the quality of studies [24]. The CASP contains ten questions, each question with three alternatives (Yes, No, and Unclear). For the answer Yes, score 1 and for the answer No, score 0 were awarded.

ANALYSIS

Three authors in this study conducted the analysis of the included studies using the framework of Health policy triangle. The full texts of the articles were studied and classified based on the elements of the framework. We used a thematic qualitative analysis approach for the synthesis of data [25]. Thematic qualitative were coded from the findings of the elements of the framework. Each of the four elements was examined separately by three authors. Disagreements among them were resolved through discussion.

Results

SEARCH RESULTS

The selection process for the studies is in Figure 1. Based on the search strategy, a total of 731 articles were identified and 269 duplicates were removed. After that, 462 titles were reviewed and 283 unrelated articles were removed. After reviewing the titles and abstracts of 179 articles, 155 articles did not meet our criteria. Finally, 25 articles were selected and analyzed [26-50].

CHARACTERISTICS OF INCLUDED STUDIES

Since 2014, the health policy triangle framework has been used in Iran to analyze policies in the Iranian health sector. The characteristics of 25 studies included are summarised in Table I. 23 studies used document review and interviews and 2 studies used only document review to collect data. For data analysis, all studies used a qualitative method. All studies included were retrospective.

QUALITY ASSESSMENT

Using the CASP checklist, the quality of the studies included methodology was assessed. The scores of 25 studies included are in Table II.

MAIN FINDING

Based on the health policy triangle framework, the main finding studies included findings are summarised in Appendix 1.

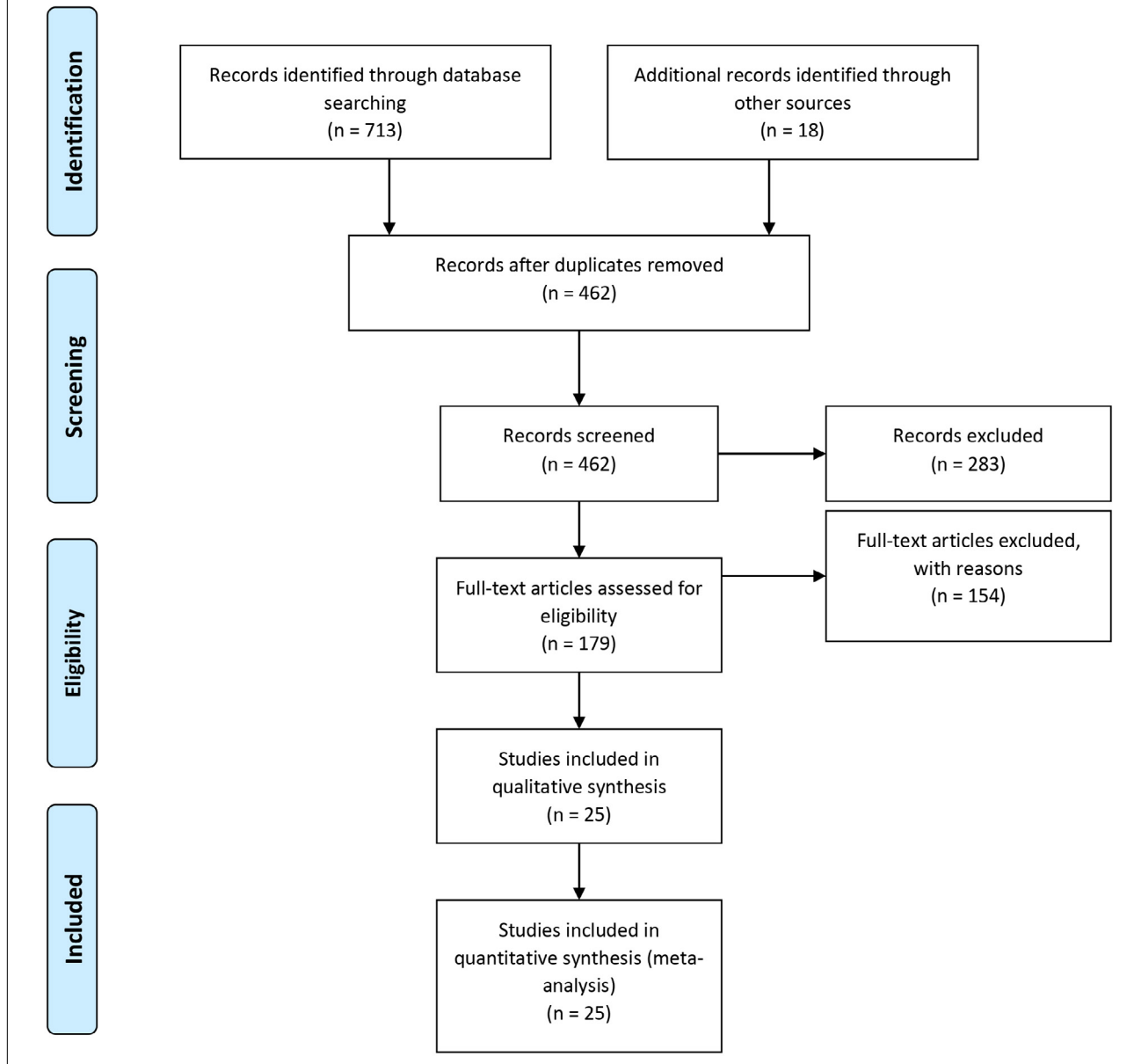
With respect to context, the health system is under the influence of economic, social, political, cultural, and international issues. Also, these issues have a role in formulating and implementing the health policies. In a number of published studies on policy issues, the role of context in policy decisions has not been fully explored. In this regard, WHO is the most important international organization that has had a great impact on Iran's health programs.

Regarding the policy process, in the studies selected for this systematic review, the researchers provided information on the creation and implementation of various policies. They outlined a set of complex actions and decisions to formulate and implement the policies they analyzed.

In general, in relation to the content of policies in these studies, researchers recorded the rules and regulations that have been adopted for a policy at different times, and to show that there are concerns about these rules made by policy makers. Also, they attempted to keep the policies up to date and based on the needs of the community.

Regarding the actors, in the selected studies, a wide range of actors within and outside the government was introduced who could influence policies. Most studies have identified the Iran's Ministry of Health and Medical Education as the most important player in health policy. In relation to the policies analyzed in these studies, most were government actors with a great financial and legal effect.

Fig. 1. PRISMA flow diagram of the study selection process.



Discussion

The findings of our study are discussed in four main dimensions including context, content, process and actors.

CONTEXT

The use of appropriate and scientific evidence can justify the choice of a policy issue, but in some selected studies, the choice of the issue was based solely on the recommendations of the WHO. Although international organizations, including the WHO, report health issues, concerns, and recommendations to various countries, the recommendations should be based on the country context and on issues that challenge their system [18].

Evidence implies that contextual factors significantly influence the health policy process and health [51]. In some studies, there is little or no evidence that a policy issue is on the policy agenda. Most of the selected policy topics were related to diseases; in this regard, one of the most basic foundations for needed for analyzing a topic is knowing their epidemiological status [52]. It seems that one of the major problems in the Iranian health system, as in many developing and less developed countries, is lack of epidemiological studies conducted in the general population. One of the challenges mentioned in several studies was lack of access to national data by researchers, and lack of appropriate data related to various health issues [10].

Paying attention to economic issues, and the impact they have on the health sector is emphasized in every country;

Tab. II. The characteristics of the included studies.

First author	Year of publication	Health policy filed	Data collection	Participants	Study design
Markazi-Moghaddam	2014	Establishment of autonomous hospitals and the barriers	Interviews and document review	Key informants (n = 23)	Qualitative
Faraji	2015	Prevention and control of diabetes	Document review	All related documents	Qualitative
Akrami	2016	Iranian children play as a social determinant of health	Interviews and document review	Key informants (n = 21)	Qualitative
Goshtaei	2016	Nutrition policy process challenges	Interviews and document review	Key informants (n = 59)	Qualitative
Moshiri	2016	The formation of primary health care in rural Iran	Interviews and document review	Key informants (n = 35)	Qualitative
Abolhassani	2017	The establishment of the Drug Naming	Interviews and document review	Key informants (n = 31)	Qualitative
Azami-Aghdash	2017	Road traffic injury prevention	Interviews and document review	Key informants (n = 42)	Qualitative
Yousefinezhadi	2017	Hospital accreditation policy	Interviews and document review	Key informants (n = 30)	Qualitative
Ansari	2018	Palliative Care	Interviews	Key informants (n = 22)	Qualitative
Mehtarpour	2018	Family physician plan and referral system	Interviews and document review	Key informants (n = 6)	Qualitative
Mohamadi	2018	Health insurance benefit package	Interviews and document review	Key informants (n = 42)	Qualitative
Sajadi	2018	Iran's health transformation plan in therapeutic services	Interviews and document review	Key informants (n = 38)	Qualitative
Al-Ansari	2019	Alcohol policy in Iran	Document review	All related documents	Qualitative
Doshmangir	2019	The Iranian health transformation plan in primary healthcare	Interviews and document review	Key informants (n = 23)	Qualitative
Edalati	2019	Nutrition labeling	Interviews and document review	Key informants (n = 10)	Qualitative
Gharaee	2019	Public-private partnership in providing primary health care policy	Interviews and document review	Key informants (n = 21)	Qualitative
Khodayari-Zarnaq	2019	HIV/AIDS	Interviews and document review	Key informants (n = 39)	Qualitative
Loloee	2019	Salt reduction in bread	Interviews and document review	Key informants (n = 37)	Qualitative
Mohseni	2019	Malnutrition among children under 5 years old	Interviews and document review	Key informants (n = 23)	Qualitative
Behzadifar	2020	The hepatitis C	Interviews and document review	Key informants (n = 21)	Qualitative
Doshmangir	2020	Setting health care services tariffs	Interviews and document review	Key informants (n = 22)	Qualitative
Ramazanzadeh	2020	Natural childbirth promotion	Interviews and document review	Key informants (n = 20)	Qualitative
Raoofi	2020	COVID-19	Document review	All related documents	Qualitative
Heidari	2020	The national phenylketonuria screening program	Interviews and document review	Key informants (n = 38)	Qualitative
Kabiri	2021	Gastrointestinal cancer prevention	Interviews and document review	Key informants (n = 22)	Qualitative

however, the implementation of many health policies has been faced with several problems due to limited financial resources [53]. With regard to the Iranian health sector, in selected studies, the role of financial issues on selected topics has not been addressed. Incomplete or unsuccessful implementation of many of the issues proposed by the policy makers is due to the financial problems of the health sector in Iran [42]. An important

issue in this regard that has had a great impact on the health sector is the international sanctions imposed on Iran in recent years that have led to less resources being allocated to the health sector. Researchers need to seriously consider the role of financial issues in policy making and policy analysis; however, international economic aid has also been declined by Iran policy makers [31]. Due to lack of financial resources, Iranian

health policy makers are unable to implement many of their programs fully and effectively. Cooperation with neighboring countries and regional organizations has also received less attention [46].

Another issue that needs to be considered with respect to context is the political issues; in the selected studies, the researchers had placed the greatest emphasis on the political support of governments in implementing some policies; however, in several studies, how political issues are formed and their role in the health sector were not emphasized. In fact, the political nature of the Iranian government has been less analyzed compared to other governments [15]. One of the major political issues is the interest that various governments showed in implementing their plans. Meanwhile, in selected studies, political changes of governments have been noted as an important influential factor [48].

Social issues have a significant effect on health in any society [14]. Social determinants of health such as income, level of education, occupation, nutrition, and social class are more likely to cause diseases compared to biological factors [54]. In this regard, the social conditions in which people grow up, live, and work affect their health status. Inequality in these conditions leads to health inequalities [52]. Success in improving health and reducing these injustices depends on paying attention to the underlying social causes [54]. Thus, achieving health justice is almost impossible without considering social determinants [55]. In selected studies in this systematic review, the role of social issues was underestimated. The various diseases that were analyzed were the result of social effects; however, a sound analysis of their effects was not seen in the studies.

One of the influential issues in the context of the Iranian health sector is the diversity of cultures in various provinces in Iran. The role of religious diversity and different ethnicities in Iran has been investigated in fewer studies [2, 56]. In order to prevent several diseases, the health culture and people's attitudes toward cultural issues in health should be considered. The implementation of various programs in the health sector is also closely related to cultural trends; thus, cultural thoughts on a health-related issue should be identified, and effective mechanisms should be used in order to promote or correct cultural beliefs [16, 57].

THE ROLE OF INTERNATIONAL ISSUES

Iran's location in the Middle East and its proximity to war-torn countries with underdeveloped health systems poses some challenges on the country such as the transmission of some diseases into the country [18, 44]. In recent years, international aid to Iran has declined, and researchers have paid less attention to the role of international affairs. Situational factors must be considered in the context of the policy triangle. War, earthquake, drought, or other natural disasters can affect different parts of a country. Iran is a country that experiences many natural disasters every year, however, none of the selected articles addressed the impact of situational factors [41].

Regarding structural factors, the researchers of the selected studies paid less attention to issues related to the Iranian political system, and the role of open or closed political opportunities. Also, civil society participation was not examined in the selected studies [11]. In terms of demographic characteristics of Iran due to its young age, except in a few studies such as HIV and hepatitis C, less attention was paid to structural factors [42, 46]. Also, the structure of the MoHMe in Iran has received less attention. The structural problems that exist in the body of this ministry have in some cases made it difficult to implement health policies [50]. In Iranian society, there is a great deal of ethnic and linguistic diversity that may influence health policies. Although the health system has attempted to ensure justice in health services for all people. Unfortunately, the diversity of people's needs has not been taken seriously, and it is necessary to highlight these issues for policy makers and decision makers in policy analysis [43].

CONTENT

Our study showed that in the Iranian health system, policy makers had considered the initial programs and laws that could play an effective role in their implementation; however, they have not deeply analyzed and pathologized past programs and policies. In this regard, the existence of rules and guidelines is also essential for the implementation of health policies and strengthens regulatory capacity in order to implement policies and programs more effectively [26]. Existence of health-related regulations obliges governments to pay attention to various health events and diseases and to implement various programs and policies in order to prevent, control, and promote health. Although, attempts have been made to use national and international evidences to formulate appropriate policies, the effectiveness of policies adopted in the past has not been comprehensively and accurately considered [58]. Thus, policy makers should pay more attention to health-related organizations and groups. However, little attention has been paid to the integration of laws and health programs, and their alignment with the upstream goals [18].

PROCESS

The process of a policy indicates how a policy turns into the policy agenda, its formulation, implementation and evaluation. Inherently, the formulation of health policies is complex and this complexity includes various social, political, ethical, and financial considerations [39]. There are many different influential aspects at this stage that make it more difficult to clarify a policy. An analyst must pay attention to these complexities and be able to make a logical connection between them and politics in order to provide an appropriate view of the challenges and problems in the course of politics [59]. In general, the findings of our study showed that the Iranian health sector is facing with major weaknesses; thus, it is necessary to have up-to-date knowledge about policy implementation which should also be in line with the global challenges of implementation science [35].

PROBLEM IDENTIFICATION AND ISSUE RECOGNITION

The findings of our study showed that most studies on the inclusion of a policy in the policy makers' agenda used the Kingdon framework. Only the outbreak of a disease that had caused concern in a society was cited as the main reason for policy makers to pay attention to a policy, and it was influential in prioritizing activities in response to the problems [42]. While a set of evidence must be considered to prioritize a policy, the formulation of policies was based solely on the concerns of a group or group of actors rather than the will of society [43]. The main challenge of policy analysis studies in Iran was lack of a precise statement of the impact of the issue being analyzed [28]. In this regard, the analyst must clearly state its impact on society in the absence of appropriate policy implementation for a health problem; however, knowing the impact that policy challenges have on people's health is the first step in the policy development process [34].

POLICY FORMULATION

In the selected studies, not much detail was mentioned about the formulation of the policies they analyzed [46]. Different decision making strategies were mentioned in some policies. In connection with the formulation of policies in the health sector of Iran, less attention was paid to the role and importance of the parliament and other legislatures in all policies. Political actors in terms of power and their great influence on policies must be considered and properly analyzed. In relation to policy formulation, there are various actors who have formal and informal powers, and can influence the details of policy content [20, 47, 58]. How they affect this part of the policy process was not fully explored in the reviewed studies in which researchers attempted to identify all those involved in policy making, however, some of them were not fully identified due to their shadowy nature. In the case of some policies, the mechanisms for how these policies were made were not clearly stated [29]. Meanwhile, there was no comprehensive information on the agreement between all those who should be influential at this stage. In most policies, the Iran Ministry of Health played a key role in communicating among the policy makers [26]. In studies conducted in Iran, researchers have not established a proper relationship with policy development; they have only considered this stage very simply and systematically, while in the real world this stage may be from a logical flow [20]. Usually, various policy options should be identified and introduced by policy makers and analysts. However, the reviewed studies did not mention many different options in their analysis and also limited the policy-related options. The development of health policies often reflects a choice between different options and priorities that must be clearly articulated in policy analysis [41].

POLICY IMPLEMENTATION

Policy formulation alone is not enough to change policy. Implementing policies selected from different options is the process of turning policy into the action. In policy

implementation, the content of a policy is conducted through different strategies and programs [30]. In this regard, the most forgotten stage of policy analysis is the implementation of the policy, which is considered separately from the previous stages. In the analysis of policy analysis in Iran, there was a great emphasis on the introduction of implementation stage; however, there were not enough explanations for the complexities of implementing the policies [22]. Also, these complexities were underestimated in the reviewed studies because of lack of proper knowledge about the implementation of the policy and the political, administrative, and financial dimensions that caused these complexities [33].

Most health policy analysis studies in Iran indicate that the policy implementation process is top-down [44]. Most decisions are also made at the macro level, and in most cases without consultation with lower levels, especially street-level bureaucrats. In this regard, several studies also showed that the adopted policies have followed a top-down approach [37].

POLICY EVALUATION

The last step in the policy development process is the evaluation of health policies. At this stage, a systematic review of running programs should be performed based on predetermined goals [17]. Lack of appropriate criteria for evaluating policies was mentioned in selected papers in this study. The success or failure of implementing a policy for different people can have different meanings, but what we noticed in these studies is that a little or no attention was paid to policy evaluation [33]. In some studies, instead of fixing the policy implementation issues, policy makers sought to change the policy, and had little faith in policy evaluation [49]. We believe that a very important point that has been forgotten in the Iranian health system is the correct evaluation of policies [37]. Analysts, decision makers, and policy makers need to know that evaluating a policy is not about determining its failure or success, rather is about identifying the strengths and weaknesses of the policy. Iran's health sector suffers from lack of a proper framework for evaluating various policies and programs. Iranian policy makers are somewhat afraid of evaluating policies; they have to understand that evaluation is not a sign of policy maker weakness in policy implementation [15].

ACTORS

Some independent groups or non-governmental organizations were also effective in policy making; however, they were also under the influence of government as a main actor. In the published studies on policy analysis in Iran, there were not many names of pressure groups that could be clearly explained in the policy and its implementation, but the role of Iranian parliament in some policies was prominent, however, health policy makers have attempted to interact well with all actors and somehow attract their attention [30]. Meanwhile, the role of organizations and groups outside the government is not clear, and their connections with various policies have received less attention. Lobbying

Tab. III. The Quality assessment of the included studies.

First author	Year of publication	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Score
Markazi-Moghaddam	2014	1	1	1	1	1	1	1	1	1	1	10
Faraji	2015	1	1	1	1	1	1	0	1	1	1	9
Akrami	2016	1	1	1	1	1	1	1	1	1	1	10
Goshtaei	2016	1	1	1	0	1	1	1	1	1	1	9
Moshiri	2016	1	1	1	1	1	1	1	1	1	1	10
Abolhassani	2017	1	1	1	0	1	1	1	1	1	1	9
Azami-Aghdash	2017	1	1	1	1	1	1	1	1	1	1	10
Yousefinezhadi	2017	1	1	1	1	1	1	1	1	1	1	10
Ansari	2018	1	0	1	1	1	1	1	1	1	1	9
Mehtarpour	2018	1	0	1	1	1	1	1	1	1	1	9
Mohamadi	2018	1	1	1	1	1	1	1	1	1	1	10
Sajadi	2018	1	1	1	1	1	1	1	1	1	1	10
Al-Ansari	2019	1	1	1	1	1	1	1	1	0	1	9
Doshmangir	2019	1	1	1	1	1	1	1	1	1	1	10
Edalati	2019	1	1	1	1	1	1	1	1	1	1	10
Gharaee	2019	1	1	1	1	1	1	0	1	0	1	8
Khodayari-Zarnaq	2019	1	0	1	1	1	1	1	1	1	1	9
Loloei	2019	1	1	1	0	1	1	1	1	1	1	9
Mohseni	2019	1	1	1	1	1	0	1	1	1	1	9
Al-Ansari	2020	1	1	1	1	1	1	1	1	1	1	10
Behzadifar	2020	1	1	1	1	1	1	1	1	0	1	9
Doshmangir	2020	1	1	1	1	1	1	0	1	1	1	9
Ramazanzadeh	2020	1	1	1	0	1	0	1	1	1	1	8
Raofi	2020	1	1	1	0	1	1	1	1	1	1	9
Heidari	2020	1	0	1	1	1	1	0	1	1	1	8

among different actors is another issue that did not attract the attention of researchers in health policy analysis in Iran, lobbying was not mentioned at all in policy analysis in Iran. In some studies, the social network of the actors was investigated, which can play an important role in creating a correct view of the relationships among the actors [16]. In the context of the policy triangle, the main element is the actors who are the heartbeat of the policy process [60]. Given their role and position, a proper understanding of them must be obtained. In this regard, we need to determine where the actors get their power from, and how they exercise it [36]. In political analysis studies in Iran, the factor of power was seen only in the political dimension, and how power was exercised by different actors was not given much attention. In selected papers we reviewed in our study, actors were considered as a separate item, and their role in the various dimensions of the framework was less analyzed [26]. Actors can, directly and indirectly, affect other dimensions, and their relationship to other dimensions must be considered [15, 61]. In Iran like other countries the ministries of health and state health departments are at the heart of governance of the health system [62].

Conclusion

Studies on use of the policy analysis triangle framework

have been published since 2014. All these studies were retrospective policy analysis and have been reported characteristics, quality and standards of various policies based on the context, content, actors and process of policy. The main focus of health policy analysis studies in Iran was on the context and process of policies. Analysis of stakeholders relates to a policy decision or action has not been considered comprehensively and the power and the role of all actors or players involved in the policy are not recognized carefully. MoHME was the main actor of Iran's policies. Evaluation is the neglected circle in the process of Iran policies. Overall, Iran's health sector suffers from lack of a proper framework for evaluating various implemented policies. Given the importance of achieving UHC across all countries, policy-making aligned with its objectives can prove to be immensely valuable.

Conflict of interest statement

The authors declare that they have no competing interests.

Funding

Not applicable.

Ethics approval and consent to participate

The study received required approvals from the Lorestan University of Medical Sciences (Protocol ID: IR.LUMS.REC.1400.025).

Authors' contributions

Conceptualization: MB, SS, SA, AB, LD. Data collection: MB, LD, AB, MB. Formal analysis: MB, LD, SA, AB, MB, AS. Investigation: MS, LD. Methodology: MB, LD, MM, NLB. Project administration: MB, LD, SS. Validation: MB, SA, LD. Writing – original draft: MB, SJE, NLB, LD. Writing – review & editing: MB, SJE, NLB, LD, SA, AB, SS.

References

- [1] Gilson L, Raphaely N. The terrain of health policy analysis in low and middle income countries: a review of published literature 1994-2007. *Health Policy Plan* 2008;23:294-307. <https://doi.org/10.1093/heapol/czn019>
- [2] Balane MA, Palafox B, Palileo-Villanueva LM, McKee M, Balabanova D. Enhancing the use of stakeholder analysis for policy implementation research: towards a novel framing and operationalised measures. *BMJ Glob Health* 2020;5:e002661. <https://doi.org/10.1136/bmjgh-2020-002661>
- [3] Koduah A, Agyepong IA, van Dijk H. Towards an explanatory framework for national level maternal health policy agenda item evolution in Ghana: an embedded case study. *Health Res Policy Syst* 2018;16:76. <https://doi.org/10.1186/s12961-018-0354-5>
- [4] Allen P, Pilar M, Walsh-Bailey C, Hooley C, Mazzucca S, Lewis CC, Mettert KD, Dorsey CN, Purtle J, Kepper MM, Baumann AA, Brownson RC. Quantitative measures of health policy implementation determinants and outcomes: a systematic review. *Implement Sci* 2020;15:47. <https://doi.org/10.1186/s13012-020-01007-w>
- [5] Browne J, Coffey B, Cook K, Meiklejohn S, Palermo C. A guide to policy analysis as a research method. *Health Promot Int* 2019;34:1032-44. <https://doi.org/10.1093/heapro/day052>
- [6] Lowe M, Hooper P, Jordan H, Bowen K, Butterworth I, Giles-Corti B. Evidence-Informed Planning for Healthy Liveable Cities: How Can Policy Frameworks Be Used to Strengthen Research Translation? *Curr Environ Health Rep* 2019;6:127-36. <https://doi.org/10.1007/s40572-019-00236-6>
- [7] Kavaliunas A, Ocaya P, Mumper J, Lindfeldt I, Kyhlstedt M. Swedish policy analysis for Covid-19. *Health Policy Technol* 2020;9:598-612. <https://doi.org/10.1016/j.hlpt.2020.08.009>
- [8] Cheung KK, Mirzaei M, Leeder S. Health policy analysis: a tool to evaluate in policy documents the alignment between policy statements and intended outcomes. *Aust Health Rev* 2010;34:405-13. <https://doi.org/10.1071/AH09767>
- [9] Casey M, Rohde D, Brady AM, Fealy G, Hegarty J, Kennedy C, McNamara M, Nicholson E, O'Connell R, O'Connor L, O'Leary D, O'Reilly P, Stokes D. Developing a new health-related policy analysis tool: An action research cooperative inquiry approach. *J Nurs Manag* 2019;27:1233-41. <https://doi.org/10.1111/jonm.12804>
- [10] Uneke CJ, Sombie I, Johnson E, Uneke BI, Okolo S. Promoting the use of evidence in health policymaking in the ECOWAS region: the development and contextualization of an evidence-based policymaking guidance. *Global Health* 2020;16:73. <https://doi.org/10.1186/s12992-020-00605-z>
- [11] Defor S, Kwamie A, Agyepong IA. Understanding the state of health policy and systems research in West Africa and capacity strengthening needs: scoping of peer-reviewed publications trends and patterns 1990-2015. *Health Res Policy Syst* 2017;15(Suppl 1):55. <https://doi.org/10.1186/s12961-017-0215-7>
- [12] Uneke CJ, Sombie I, Keita N, Lokossou V, Johnson E, Ongolo-Zogo P. An assessment of policymakers' engagement initiatives to promote evidence informed health policy making in Nigeria. *Pan Afr Med J* 2017;27:57. <https://doi.org/10.11604/pamj.2017.27.57.9844>
- [13] Montenegro Martínez G, Carmona Montoya A, Franco-Giraldo Á. Modelos para el análisis de políticas públicas en salud reportados en publicaciones científicas [Models for public health policy analysis reported in scientific publications]. *Gac Sanit* 2021;35:270-81. <https://doi.org/10.1016/j.gaceta.2019.11.007>
- [14] Jones CM, Gautier L, Ridde V. A scoping review of theories and conceptual frameworks used to analyse health financing policy processes in sub-Saharan Africa. *Health Policy Plan* 2021;czaa173. <https://doi.org/10.1093/heapol/czaa173>
- [15] Walt G GL. Reforming the health sector in developing countries: the central role of policy analysis. *Health Policy Plan* 1994;9:353-70. <https://doi.org/10.1093/heapol/9.4.353>
- [16] Mokitimi S, Schneider M, de Vries PJ. Child and adolescent mental health policy in South Africa: history, current policy development and implementation, and policy analysis. *Int J Ment Health Syst* 2018;12:36. <https://doi.org/10.1186/s13033-018-0213-3>
- [17] Zaidi S, Mayhew SH, Cleland J, Green AT. Context matters in NGO-government contracting for health service delivery: a case study from Pakistan. *Health Policy Plan* 2012;27:570-81. <https://doi.org/10.1093/heapol/czr081>
- [18] El-Jardali F, Bou-Karroum L, Ataya N, El-Ghali HA, Hammoud R. A retrospective health policy analysis of the development and implementation of the voluntary health insurance system in Lebanon: learning from failure. *Soc Sci Med* 2014;123:45-54. <https://doi.org/10.1016/j.socscimed.2014.10.044>
- [19] Haq Z, Hafeez A, Zafar S, Ghaffar A. Dynamics of evidence-informed health policy making in Pakistan. *Health Policy Plan* 2017;32:1449-56. <https://doi.org/10.1093/heapol/czx128>
- [20] Doshmangir L, Bazyar M, Majdzadeh R, Takian A. So Near, So Far: Four Decades of Health Policy Reforms in Iran, Achievements and Challenges. *Arch Iran Med* 2019;22:592-605.
- [21] Rahimi SA, Alizadeh M, Légaré F. Shared decision making in Iran: Current and future trends. *Z Evid Fortbild Qual Gesundheitswes* 2017;123-124:52-5. <https://doi.org/10.1016/j.zefq.2017.05.018>
- [22] Sajadi HS, Majdzadeh R, Yazdizadeh B, Mohtasham F, Mohseni M, Doshmangir L, Lavis J. A roadmap for strengthening evidence-informed health policy-making in Iran: protocol for a research programme. *Health Res Policy Syst* 2019;17:50. <https://doi.org/10.1186/s12961-019-0455-9>
- [23] Moher D, Liberati A, Tetzlaff J, Altman DG. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *BMJ* 2009;339:b2535. <https://doi.org/10.1371/journal.pmed.1000097>
- [24] Harrison JK, Reid J, Quinn TJ, Shenkin SD. Using quality assessment tools to critically appraise ageing research: a guide for clinicians. *Age Ageing* 2017;46:359-65. <https://doi.org/10.1093/ageing/afw223>
- [25] Thomas J, Harden A. Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Med Res Methodol* 2008;8:45. <https://doi.org/10.1186/1471-2288-8-45>
- [26] Markazi-Moghaddam N, Aryankhesal A, Arab M. The first stages of liberalization of public hospitals in Iran: establishment of autonomous hospitals and the barriers. *Iran J Public Health* 2014;43:1640-50.

- [27] Faraji O, Etemad K, Akbari Sari A, Ravaghi H. Policies and programs for prevention and control of diabetes in Iran: A document analysis. *Glob J Health Sci* 2015;7:187-97. <https://doi.org/10.5539/gjhs.v7n6p187>
- [28] Akrami F, Damari B, EB. The Policy Analysis of Iranian Children Play as A "Social Determinant of Health". *Hakim Health Sys Res* 2016;19:89-99.
- [29] Goshtaei M, Ravaghi H, Sari AA, Abdollahi Z. Nutrition policy process challenges in Iran. *Electron Physician* 2016;8:1865-73. <https://doi.org/10.19082/1865>
- [30] Moshiri E, Rashidian A, Arab M, Khosravi A. Using an analytical framework to explain the formation of primary health care in rural Iran in the 1980s. *Arch Iran Med* 2016;19:16-22.
- [31] Abolhassani N, Akbari Sari A, Rashidian A, Rastegarpanah M. The establishment of the drug naming committee to restrict look-alike medication names in Iran: a qualitative study. *Int J Risk Saf Med* 2017;29:69-79. <https://doi.org/10.3233/JRS-170740>
- [32] Azami-Aghdash S, Gorji HA, Shabaninejad H, Sadeghi-Bazargani H. Policy analysis of road traffic injury prevention in Iran. *Electron Physician* 2017;9:3630-8. <https://doi.org/10.19082/3630>
- [33] Yousefinezhadi T, Mosadeghrad AM, Arab M, Ramezani M, Sari AA. An Analysis of hospital accreditation policy in Iran. *Iran J Public Health* 2017;46:1347-58.
- [34] Ansari M, Rassouli M, Akbari ME, Abbaszadeh A, Akbarisari A. Palliative care policy analysis in Iran: a conceptual model. *Indian J Palliat Care* 2018;24:51-7. https://doi.org/10.4103/IJPC.IJPC_142_17
- [35] Mehtarpour M, Tajvar M. Policy analysis of family physician plan and referral system in Iran using policy analysis triangle framework. *Journal of Health Based Research* 2018;4:31-49.
- [36] Mohamadi E, Olyaeemanesh AR, Rashidian A, Hasanazadeh A, Razavi M. Policy Analysis, Problem Identification and Proposing Policy Options for Health Insurance Benefit Package in Iran. *Hakim Health Sys Res* 2018;21:153-72.
- [37] Sajadi HS, Hosseini M, Dehghani A, Khodayari R, Zandiyan H, Hosseini SS. The Policy analysis of Iran's health transformation plan in therapeutic services. *Hakim Health Sys Res* 2018;21:71-88.
- [38] Al-Ansari B, Thow AM, Mirzaie M, Day CA, Conigrave KM. Alcohol policy in Iran: policy content analysis. *Int J Drug Policy* 2019;73:185-98. <https://doi.org/10.1016/j.drugpo.2019.07.032>
- [39] Doshmangir L, Moshiri E, Mostafavi H, Sakha MA, Assan A. Policy analysis of the Iranian Health Transformation Plan in primary healthcare. *BMC Health Serv Res* 2019;19:670. <https://doi.org/10.1186/s12913-019-4505-3>
- [40] Edalati S, Omidvar N, Haghighian Roudsari A, Ghodsi D, Zargaraan A. Development and implementation of nutrition labeling in Iran: A retrospective policy analysis. *Int J Health Plann Manage* 2019;1-17. <https://doi.org/10.1002/hpm.2924>
- [41] Gharaee H, Tabrizi JS, Azami-Aghdash S, Farahbakhsh M, Karamouz M, Nosratnejad S. Analysis of public-private partnership in providing primary health care policy: an experience from Iran. *J Prim Care Community Health* 2019;10:2150132719881507. <https://doi.org/10.1177/2150132719881507>
- [42] Khodayari-Zarnaq R, Mosaddeghrad AM, Nadrian H, Kabiri N, Ravaghi H. Comprehensive analysis of the HIV/AIDS policy-making process in Iran. *Health Res Policy Syst* 2019;17:69. <https://doi.org/10.1186/s12961-019-0466-6>
- [43] Loloei S, Pouraram H, Majdzadeh R, Takian A, Goshtaei M, Djazayeri A. Policy analysis of salt reduction in bread in Iran. *AIMS Public Health* 2019;6:534-45. <https://doi.org/10.3934/publichealth.2019.4.534>
- [44] Mohseni M, Aryankhesal A, Kalantari N. Prevention of malnutrition among children under 5 years old in Iran: a policy analysis. *PLoS One* 2019;14:e0213136. <https://doi.org/10.1371/journal.pone.0213136>
- [45] Al-Ansari B, Noroozi A, Thow AM, Day CA, Mirzaie M, Conigrave KM. Alcohol treatment systems in Muslim majority countries: Case study of alcohol treatment policy in Iran. *Int J Drug Policy* 2020;80:102753. <https://doi.org/10.1016/j.drugpo.2020.102753>
- [46] Behzadifar M, Azari S, Gorji HA, Martini M, Bragazzi NL. The hepatitis C virus in Iran: health policy, historical, ethical issues and future challenges. *J Prev Med Hyg* 2020;61:E109-E18. <https://doi.org/10.15167/2421-4248/jpmh2020.61.1.1438>
- [47] Doshmangir, Rashidian A, Kouhi F, Sergeevich Gordeev V. Setting health care services tariffs in Iran: half a century quest for a window of opportunity. *Int J Equity Health* 2020;19:112. <https://doi.org/10.1186/s12939-020-01224-1>
- [48] Ramazanadeh N, Azami- Aghdash S, Eskandari M, Alizadeh S. Policy Analysis of Natural Childbirth Promotion in Iran. *Hakim Health Sys Res* 2020;23:23-32.
- [49] Raoofi A, Takian A, Akbari Sari A, Olyaeemanesh A, Haghighi H, Aarabi M. COVID-19 pandemic and comparative health policy learning in Iran. *Arch Iran Med* 2020;23:220-34.
- [50] Heidari A, Arab M, Damari B. A policy analysis of the national phenylketonuria screening program in Iran. *BMC Health Serv Res* 2021;21:120. <https://doi.org/10.1186/s12913-021-06116-w>
- [51] Khan MM, Van den Heuvel W. The impact of political context upon the health policy process in Pakistan. *Public Health* 2007;121:278-86. <https://doi.org/10.1016/j.puhe.2006.09.015>
- [52] Onwujekwe O, Uguru N, Russo G, Etiaba E, Mbachu C, Mirzoev T, Uzochukwu B. Role and use of evidence in policymaking: an analysis of case studies from the health sector in Nigeria. *Health Res Policy Syst* 2015;13:46. <https://doi.org/10.1186/s12961-015-0049-0>
- [53] Bakhtiari A, Takian A, Majdzadeh R, Haghdooost AA. Assessment and prioritization of the WHO "best buys" and other recommended interventions for the prevention and control of non-communicable diseases in Iran. *BMC Public Health* 2020;20:333. <https://doi.org/10.1186/s12889-020-8446-x>
- [54] Thornton RL, Glover CM, Cené CW, Glik DC, Henderson JA, Williams DR. Evaluating Strategies For Reducing Health Disparities By Addressing The Social Determinants Of Health. *Health Aff (Millwood)* 2016;35:1416-23. <https://doi.org/10.1377/hlthaff.2015.1357>
- [55] Jackson SF, Birn AE, Fawcett SB, Poland B, Schultz JA. Synergy for health equity: integrating health promotion and social determinants of health approaches in and beyond the Americas. *Rev Panam Salud Publica* 2013;34:473-80.
- [56] Williams DR, Costa MV, Odunlami AO, Mohammed SA. Moving upstream: how interventions that address the social determinants of health can improve health and reduce disparities. *J Public Health Manag Pract* 2008;14:S8-S17. <https://doi.org/10.1097/01.PHH.0000338382.36695.42>
- [57] Watt S, Sword W, Krueger P. Implementation of a health care policy: an analysis of barriers and facilitators to practice change. *BMC Health Serv Res* 2005;5:53. <https://doi.org/10.1186/1472-6963-5-53>
- [58] Doshmangir L, Bazyar M, Najafi B, Haghparsat-Bidgoli H. Health Financing Consequences of Implementing Health Transformation Plan in Iran: Achievements and Challenges. *Int J Health Policy Manag* 2019;8:384-6. <https://doi.org/10.15171/ijhpm.2019.18>
- [59] Behzadifar M, Shahabi S, Zeinali M, Ghanbari MK, Martini M, Bragazzi NL. A policy analysis of agenda-setting of Brucellosis in Iran using a multiple-stream framework: health policy and historical implications. *J Prev Med Hyg* 2021;62:E544-E51. <https://doi.org/10.15167/2421-4248/jpmh2021.62.2.2041>
- [60] Koduah A, van Dijk H, Agepong IA. The role of policy actors and contextual factors in policy agenda setting and formulation: maternal fee exemption policies in Ghana over four and a half decades. *Health Res Policy Syst* 2015;13:27. <https://doi.org/10.1186/s12961-015-0016-9>

- [61] Rosselli R, Martini M, Bragazzi NL, Watad A. The Public Health Impact of the So-Called “Fluad Effect” on the 2014/2015 Influenza Vaccination Campaign in Italy: Ethical Implications for Health-Care Workers and Health Communication Practitioners. *Advances Experim Med Biol* 2017;973:125-34. https://doi.org/10.1007/5584_2017_39
- [62] Siddiqi S, Masud TI, Nishtar S, Peters DH, Sabri B, Bile KM, Jama MA. Framework for assessing governance of the health system in developing countries: gateway to good governance. *Health Policy* 2009;90:13-25. <https://doi.org/10.1016/j.healthpol.2008.08.005>

Received on February 23, 2023. Accepted on March 21, 2023.

Correspondence: Masoud Behzadifar, Social Determinants of Health Research Center, Lorestan University of Medical Sciences, Anooshirvan Rezaei Square, Khorramabad, Iran. Tel. +98-066-33302033 - E-mail: masoudbehzadifar@gmail.com; Behzadifar@lums.ac.ir

How to cite this article: Doshmangir L, Behzadifar M, Shahverdi A, Martini M, Ehsanzadeh SJ, Azari S, Bakhtiari A, Shahabi S, Bragazzi NL, Behzadifar M. Analysis and evolution of health policies in Iran through policy triangle framework during the last thirty years: a systematic review of the historical period from 1994 to 2021. *J Prev Med Hyg* 2023;64:E107-E117. <https://doi.org/10.15167/2421-4248/jpmh2023.64.1.2878>

© Copyright by Pacini Editore Srl, Pisa, Italy

This is an open access article distributed in accordance with the CC-BY-NC-ND (Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International) license. The article can be used by giving appropriate credit and mentioning the license, but only for non-commercial purposes and only in the original version. For further information: <https://creativecommons.org/licenses/by-nc-nd/4.0/deed.en>

ERRATA CORRIGE

Pubblichiamo di seguito due Abstract che per un disguido non sono stati inseriti negli Atti del 55° Congresso Nazionale SItI (Padova, 28 settembre - 1 ottobre, 2022) - J Prev Med Hyg 2022; 63 (Suppl. 1): E1-E443

COMUNICAZIONI ORALI

INFEZIONI CORRELATE ALL'ASSISTENZA E ANTIBIOTICO-RESISTENZA

Abstract Code: SIT16205-94

Progetto "Strategie di miglioramento dell'appropriatezza d'uso degli antimicrobici" presso l'Azienda Ospedaliero- Universitaria Careggi

V. GALLINORO¹, M. GRAZZINI², D. PAOLINI², B. DANNAOU³,
A. FARESE⁴, E. MANTENGOLI⁴, A. IPPONI⁵, F. PIERALLI⁶,
G. BONACCORSI⁷, F. NICCOLINI²

¹ Scuola di Specializzazione in Igiene e Medicina Preventiva, Università degli Studi di Firenze, Firenze; ² Direzione Sanitaria, AOU Careggi, Firenze; ³ Informatizzazione dei Processi Sanitari, AOU Careggi, Firenze; ⁴ Malattie Infettive e Tropicali, AOU Careggi, Firenze; ⁵ Farmaceutica Ospedaliera e Politiche del Farmaco, AOU Careggi, Firenze; ⁶ Medicina Interna ad Alta Intensità di Cura, AOU Careggi, Firenze; ⁷ Dipartimento di Scienze della Salute, Università degli Studi di Firenze, Firenze

INTRODUZIONE

Nel corso degli ultimi anni l'utilizzo dei farmaci antimicrobici ha contribuito notevolmente a ridurre la mortalità dei pazienti con infezioni; tuttavia, parte delle prescrizioni risulta spesso inappropriata o non necessaria al punto da contribuire allo sviluppo di germi resistenti agli antibiotici. L'Azienda Ospedaliero-Universitaria Careggi (AOU) è un ospedale di terzo livello con circa 1.200 posti letto, che dal 2015 è impegnato nell'applicazione dei programmi di *antimicrobial stewardship* (AMS). Ciononostante, negli ultimi anni il consumo di carbapenemi (CAR) si è mantenuto a livelli superiori alla media nazionale e regionale; per tale ragione è stato avviato un progetto volto a migliorarne l'appropriatezza d'uso.

MATERIALI E METODI

Il progetto è stato avviato ad ottobre 2021 ed ha coinvolto 10 reparti identificati come maggiori prescrittori di CAR. La strategia di approccio è stata pianificata da un gruppo multidisciplinare e multiprofessionale di esperti (infettivologi, microbiologi clinici, farmacisti, medici di direzione sanitaria) che ha individuato come elemento centrale la creazione di funzioni informatiche di supporto all'interno della cartella clinica elettronica quali:

1. algoritmi diagnostico-terapeutici interattivi e personalizzabili per il singolo paziente, a supporto della terapia antibiotica empirica e mirata;
2. cruscotti informatici che consentono al personale di reparto e ai medici infettivologi consulenti di monitorare e rivalutare le prescrizioni di CAR;

3. alert di time-out che suggeriscono al medico prescrittore la rivalutazione della terapia antimicrobica dopo 72 h dalla prescrizione alla luce di eventuali nuovi dati clinici/microbiologici.

Parallelamente sono stati realizzati corsi formativi per il personale medico volti a presentare le funzioni informatiche di supporto implementate e a promuovere il corretto uso degli antimicrobici.

RISULTATI

A distanza di 6 mesi dall'inizio del progetto è stata registrata una complessiva riduzione del consumo di CAR: da 6,2 DDD/100 giorni di degenza nel trimestre luglio-settembre 2021 a 4,9 DDD/100 giorni di degenza nel trimestre gennaio-marzo 2022.

CONCLUSIONI

I programmi di AMS fanno ricorso a diverse tipologie di intervento al fine di influenzare il comportamento dei prescrittori indirizzandoli verso un utilizzo più corretto degli antimicrobici. I sistemi informatici rappresentano un utile strumento per realizzare un programma di AMS.

Abstract Code: SIT16306-96

Sorveglianza nazionale del consumo di soluzione idroalcolica per l'igiene delle mani (CSIA) in ambito ospedaliero: risultati preliminari su dati 2020 e 2021

A. CARAMIA¹, S. SISTI², M.F. VESCIO³, G. FADDA³, J. IERA³,
A. GROSSI³, C. ISONNE³, L. BANDINI³, A. MAMMONE⁴, L. LIA⁵,
L. ARNOLDO⁶, M. BARCHITTA⁷, A. PAN⁸, E. RICCHIZZI⁹,
F. D'ANCONA³

¹ Università degli Studi di Foggia, Foggia; Dipartimento di Malattie Infettive, Istituto Superiore di Sanità, Roma; ² Università degli Studi di Foggia, Foggia; Dipartimento di prevenzione di Arezzo, Azienda USL Toscana Sud-Est, Arezzo; ³ Dipartimento di Malattie infettive, Istituto Superiore di Sanità, Roma; ⁴ Ufficio 5 Direzione Generale della Prevenzione Sanitaria, Ministero della Salute, Roma; ⁵ ASL Roma 1, Roma; ⁶ Dipartimento di Area Medica, Università degli Studi di Udine, Udine; ⁷ Università degli Studi di Catania, Catania; ⁸ Azienda Socio-Sanitaria Territoriale di Cremona, Cremona; ⁹ Agenzia Sanitaria e Sociale Regionale della Emilia-Romagna, Bologna

INTRODUZIONE

L'igiene delle mani in ambito ospedaliero riveste un ruolo fondamentale nella prevenzione e riduzione delle infezioni correlate all'assistenza e dell'antimicrobico-resistenza. La sorveglianza del consumo di soluzione idroalcolica (CSIA) rappresenta un importante indicatore indiretto dell'adesione del personale sanitario alle procedure d'igiene delle mani, attraverso una raccolta dati semplice ed economica. Lo standard dell'Organizzazione Mondiale della Sanità prevede nelle aree di degenza un consumo minimo di 20L/1000 giornate di degenza ordinaria (GDO). Essendo questa sorveglianza prevista dal PNCAR e dal PNP, nel 2021 l'Istituto Superiore di

Sanità ha implementato, con il supporto del CCM/Ministero della Salute, la sorveglianza nazionale definendo un protocollo standard per la raccolta di dati che consenta il confronto di tali consumi (Circolare MdS 02/12/2021).

MATERIALI E METODI

Nel 2022 l'ISS ha richiesto, tramite la compilazione di un form elettronico, a Regioni/PP.AA. i dati sui consumi e sulle GDO per il 2020 e 2021 con 3 possibili livelli di dettaglio in base alla disponibilità locale: intera struttura, solo aree degenza, specifiche aree di degenza. I risultati sono espressi in L/1000GDO.

RISULTATI

I risultati preliminari indicano che 9 Regioni/PP.AA. nel 2020 e 8 nel 2021 hanno inviato i dati, rispettivamente relativi a 165 e 284 strutture. I dati di CSIA sono stati recuperati localmente principalmente attraverso i consumi dalle farmacie (61% delle strutture nel 2020 e 70% nel 2021) e delle GDO attraverso le SDO (84% nel 2020 e 76% nel 2021).

Il consumo medio nazionale per le aree degenza nel 2020 è di 41 L/1000GDO, nel 2021 di 25 L/1000GDO.

Nelle strutture partecipanti il range del CSIA riferito alle aree degenza è di 2-155 (mediana 28) per il 2020 e di 1-295 (mediana 20) per il 2021.

CONCLUSIONI

I dati preliminari non coprono ancora l'intero territorio nazionale, ma per il 2022 è attesa una maggiore partecipazione essendo la sorveglianza del CSIA molto recente e comunque richiesta alle Regioni/PP.AA. dal PNCAR e dal PNP. I consumi del 2020 sono elevati, probabilmente perché correlati alla pandemia di COVID-19; mentre nel 2021, nonostante altre ondate pandemiche, si osserva una diminuzione e, per alcuni ospedali, valori anche al di sotto dello standard OMS. Si riscontrano: ampia variabilità tra le diverse aree di degenza di ospedali di una stessa regione e tra diverse regioni, problematiche di qualità del dato per molte strutture e difficoltà per alcune strutture a fornire il dato riferito per lo meno alle sole aree di degenza così come richiesto dalla sorveglianza.

