Non comunicable disease

Impact of gender and education on cervical cancer knowledge amongst students: implications for health policies and public health strategies in Wiesbaden, Germany

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Keywords

Cervical cancer • Human papillomavirus (HPV) • Screening • Health policies

Summary

Introduction. *Cervical cancer is a global health concern primarily caused by human papillomavirus (HPV). It has a significant impact in Germany, with thousands of new diagnoses and deaths annually. Despite advancements in screening and treatment leading to improved survival rates of 65% for invasive cervical tumors, the financial burden remains substantial.*
Aims. *The study aims to assess the impact of gender and education of Wiesbaden students towards cervical cancer and its associated health policies. Data was collected through an online questionnaire distributed with 54 students in Wiesbaden, Germany participating in the study. Statistical analysis was performed using SPSS, including one-way ANOVA, t-tests, Kruskal-Wallis, and chi-square tests. The respondents' average age was 28.24 years, with a higher female participation.*
Results. *Education level did not significantly influence perceptions of ideal vaccination age ($p < 0.581$). Females and males perceived a lower number of vaccine doses (< 3) required compared to the standard. Education level showed a moderate association with knowledge of long-term complications, and gender had a moderate correlation with information sources ($rho = 27$, $p = 0.090$).*
Conclusion. *Gender disparities did not significantly impact knowledge of cervical cancer. Public health programs should consider education levels and tailor interventions to all age groups and genders.*

Introduction

Cervical cancer is a significant global health concern characterized by the abnormal growth of cells in the cervix. The primary risk factor associated with its development is the human papillomavirus (HPV), mainly transmitted through sexual contact [1]. Moreover, HPV and its associated diseases impact both males and females, manifesting frequently in males as warts on various organs, including the penis and oropharyngeal tract [2]. Less commonly, HPV can lead to cancers of the penis, anus, and oral cavity [2]. The role of HPV in causing cervical cancer is attributed to dysplasia, an uncontrolled proliferation of cells surrounding the cervix [1]. Among the various HPV strains, HPV 16 and HPV 18 account for 70% of cervical malignancies [1, 3]. Several other factors also contribute to the risk of cervical cancer, including a history of multiple sexual partners, a family history of the disease, smoking, and early initiation of sexual activity, among others [4]. However, the early stages of cervical cancer often present without noticeable symptoms, making it challenging to detect. As the disease progresses and metastasizes, visible symptoms such as vaginal bleeding and changes in vaginal discharge become more apparent [5].
To combat the spread of HPV and facilitate early detection, various screening techniques are employed, including the Pap smear, Visual Inspection with Acetic Acid (VIA), and HPV-DNA [6]. The Pap smear has been widely used for screening purposes, particularly in Germany [7]. Additionally, HPV vaccinations are available and recommended, with higher effectiveness demonstrated when administered at an earlier age [8].
Despite advancements in screening and treatment, cervical cancer remains a significant global health burden, with approximately 529,800 new cases and 275,100 deaths reported each year [9]. Importantly, there is a considerable disparity in incidence rates between industrialized and developing countries. Developed nations have witnessed a gradual decline in cervical cancer incidence and mortality rates due to effective screening programs and HPV vaccination campaigns [9]. In Germany, cervical cancer screening has undergone changes over the years. From 1971 to 2019, annual opportunistic Pap test screenings were supported by the statutory health insurance system for women aged 20 and above. Since January 1, 2020, a coordinated screening program has been implemented, involving annual Pap testing for women aged 20-34 and co-testing (Pap test + HPV test) every three years for women aged 35 and older [10].
The impact of cervical cancer in Germany is profound, with thousands of new diagnoses and deaths annually. However, advancements in screening and treatment have

led to improved survival rates, with a relative 5-year survival rate of 65% for invasive cervical tumors [11]. Nonetheless, the financial burden of cervical cancer remains substantial, with costs ranging from 1,055 euros to over 10,000 euros, depending on the stage of the disease [12]. There is therefore the need to assess how sociodemographic background like gender and education affects policies implemented to tackle the disease.

The study aims to assess the impact of gender and education of Wiesbaden students towards cervical cancer and its associated health policies. This will aid to contribute to the development of cost-effective strategies for public health budgets and inform the evaluation of essential elements for an effective public health policy for the Hessen state in Germany.

Methods

Study design

The study was a cross-sectional survey. Data was collected through an online questionnaire hosted on "SurveyPlanet." To ensure the questionnaire's comprehensibility and effectiveness, a trial sample of 5 questionnaires was initially tested among potential participants. Following adjustments based on feedback, the final questionnaire was distributed, consisting of 21 questions grouped into three categories: demographic background, cervical cancer awareness, and knowledge of treatment and screening programs. The online survey was active for a duration of 30 days, from July 4, 2022.

Study population and area

The study involved 54 participants from 12 to 38 years old. The study targeted students in Wiesbaden, located in the German state of Hessen. To comprehensively assess knowledge disparities, the study refrained from imposing limitations based on other demographic parameters, such as age and gender.

Data entry and analysis

Data analysis was performed using IBM Statistical Package for the Social Sciences (SPSS) version 28. To address the research questions and test hypotheses, various statistical tests were employed, including one-way ANOVA, one-sample t-test, Kruskal-Wallis, and chi-square tests. These tests were used to assess associations and determine statistical significance, with a significance level set at $p < 0.05$.

Ethical consideration

Participants were voluntary and provided informed consent. The purpose and processes of the study were explained on the first page of the questionnaire. Participants remained anonymous, ensuring confidentiality, and their data could not be linked to individual submissions. The study posed no social risk to participants.

Results

The average age of respondents (N = 54) who took part in the survey was 28.24 years (SD = 4.73) with the age ranging from 12 years to a maximum of 51 years. Of the population, half of the population's age was less than 27 years, and the other half was more than 27 years. The distribution of the age wasn't normally distributed with skewness of -0.18 (SE = 0.33) and kurtosis of 1.596 (SE = 0.12). With regards to gender, there were more female respondents (n = 34) than that of male respondents (n = 20). The male respondents had an average age of about 28 years (SD = 5.88) which was similar to that of the females average age of 28 years (SD = 4.00). The most occurring age for males was 1 year lesser (25 years) than that of the female respondents (26 years) as seen in Table I.

As highlighted in Figure 1 below, a one-way analysis of variance (ANOVA) shows that there was no significant difference in terms of respondents' level of education and perception of ideal age one should start taking the HPV vaccine. With respondents with high school education (n = 5) choosing an average of 20 years (SD = 17.49), respondents with bachelors (n = 22) choosing an average age of 17 years (SD = 5) and respondents with a postgraduate (n = 25) choosing an average of 19 years (SD = 8.39), $F(2,49) = 0.55$, $p < 0.581$.

In comparison to the recommended 3 doses of the HPV vaccine, there was a significant difference in the perception of the number of doses amongst females and males as shown in Figure 2. Female respondents (n = 32), on average, chose 2.6 doses (SD = 0.62), $t(31) = 3.74$, $p < 0.001$, $d = 0.66$. Similarly, among male respondents (n = 22), there was a significant difference in their perception of the number of doses required compared to the standard of 3. Male respondents chose an average of 2.4 doses (SD = 0.68), $t(18) = 4.03$, $p < 0.001$, $d = 0.92$. A Kruskal Wallis test indicates that there is no significant difference between respondents' level of education and their response to how often one should take a pap smear screening df = 1, p = 0.173 (two-tailed), Kruskal-Wallis H = 3.51. A chi-square test statistic indicates that for females, there was no difference between their response to which gender cervical cancer affects and the body

Tab. I. Age distribution of respondents.

Participants	Description	Statistic	Std. Error
All respondents	Mean (years)	28.24 (SD = 4.73)	0.64
	Minimum(years)	12.00	
	Maximum (years)	38.00	
	Mean (years)	28.35 (SD = 3.99)	0.69
Females	Minimum(years)	22.00	
	Maximum (years)	38.00	
	Mean (years)	28.05 (SD = 5.88)	1.32
Male	Minimum(years)	12.00	
	Maximum (years)	38.00	

Fig. 1. Bar chart showing educational level of participants and their average response to vaccination age.

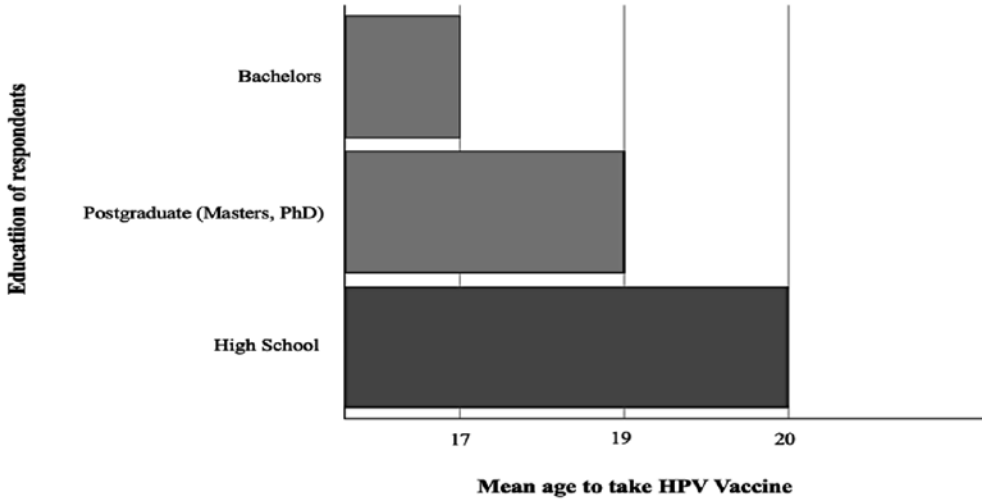
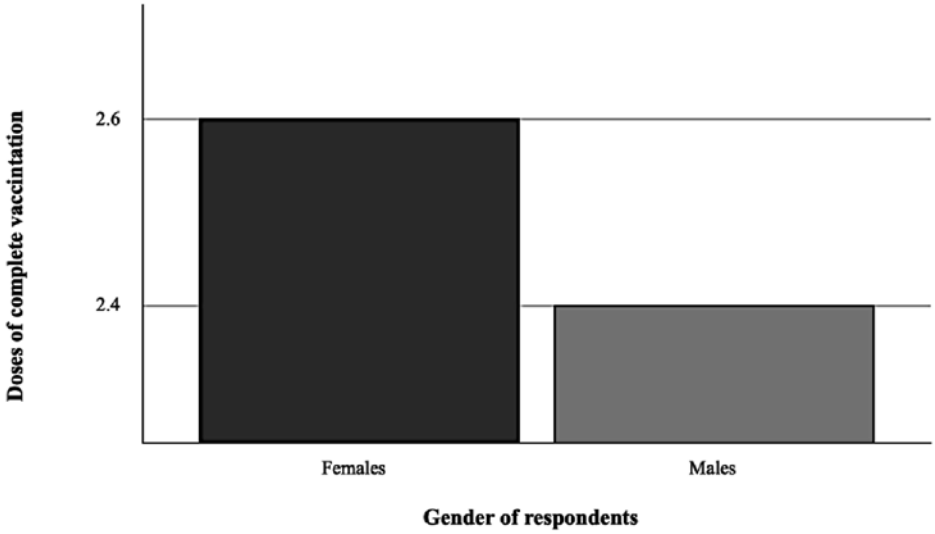


Fig. 2. Histogram of gender and their average response to doses to complete vaccination.



part it affects (X2(1, N = 34) = 0.14, p = 0.711). Similar significance of difference was also observed for males (X2(1, N = 20) = 1.25, p = 0.264).

There was also an observed moderate association between respondents' level of education and their knowledge of the long-term complications of cervical cancer, Spearman's Rho (53) = -0.27, p = 0.090. Similarly, for gender, there was a moderate correlation between their response on where they heard of cervical cancer, Contingency Coefficient (53) = 0.32, p = 0.439. Although with regards to gender, most males and females chose health personnel as their source of knowledge, there were differences with regards to the other sources of information (shown in Tab. II). In response to knowledge on age one is supposed to take the HPV vaccine, the study showed a weak positive association of respondent's knowledge on age for HPV vaccination and their age, Pearson's R (53) = 0.20, p = 0.144.

Tab. II. Respondents source of information on learning about cervical cancer.

Source of Information	Female	Male	Total
Health Personnel (HP)	8	8	16
Tv Programs (TV)	4	1	5
Internet (IT)	3	3	6
Friends/Relatives (FR)	5	3	8
2 of either HP, TV, IT,FR	4	2	6
3 of either the HP, TV, IT,FR	6	0	6
All of HP, TV, IT,FR	4	2	6
Total	34	19	53

IT: Internet; HP: Health Personnel; TV: Television; FR: Friends/Relative.

Discussion

The observation that more women than men responded to the survey suggests that women exhibit a greater concern for cervical cancer and related issues. This finding aligns

with other studies that reported a similar observation regarding women's higher interest in reproductive health [13]. Consequently, it is important to design campaigns aimed at improving reproductive health in a way that also addresses men's interests, thus increasing their participation in reproductive health surveys. This inclusive approach will help inform governmental policymaking to reflect the diverse gender groups.

The tests of significance revealed that there was no significant difference between respondents' education level and their beliefs regarding the appropriate age for vaccination and awareness of routine pap smear screening. This indicates that when developing public health programs focused on education, lower levels of education should be taken into consideration. It is noteworthy that vaccination knowledge does not vary significantly with education level. Therefore, HPV vaccination programs' education and sensitization in Wiesbaden should encompass all tiers of education.

Despite the German government efforts to promote HPV vaccination through mass education campaigns and absorbing the vaccination cost for state insurers, the study revealed a significant difference between genders, in terms of the perception of the maximum number of vaccine doses, which is three [14]. This finding suggests that men and women hold differing views on the recommended dosage for HPV vaccination. Additionally, a weak relationship was found between respondents' age and their knowledge about the age for cervical cancer vaccination. The implications of this disparity are crucial for designing targeted public health initiatives to ensure comprehensive vaccine understanding and uptake across all genders and age groups.

The study found no significant difference in gender with regards to general knowledge about cervical cancer, including understanding of the gender at risk and the affected biological body part. This indicates that gender has no impact on the assimilation of cervical cancer information. In Wiesbaden, Germany, public health initiatives for awareness seem to effectively reach various gender subgroups of the student community.

Lastly, the study highlighted that health personnel are the most common source of information for both males and females. This highlights the effectiveness of providing health personnel with enhanced cervical cancer education materials. Furthermore, the study indicated that other sources of information, such as television programs and the internet, are underutilized, resulting in lower promotion rates. Therefore, additional campaigns utilizing these sources should be employed to increase their effectiveness in disseminating knowledge about cervical cancer.

Limitations of the study include the relatively small sample size of 54 participants from a specific student population in Wiesbaden limits the generalizability of the results to a broader context. Additionally, the voluntary nature of participation might introduce selection bias, as participants with a higher interest or awareness of cervical cancer could have been more likely to respond. Furthermore, the self-reported nature of data collection through an online questionnaire may lead to recall bias and social desirability bias.

Conclusions

The study found that disparities in various subgroups, such as gender, do not make a significant difference in students' knowledge of cervical cancer in Wiesbaden, Germany. This is also true for educational level and age. According to the findings of the study, student disparities are not a major factor in knowledge and awareness barriers. As a result, promotional materials should always be curated to be representative of all subgroups in society. In terms of effective promotion sources, health personnel are the most effective source of public health promotion on cervical cancer. Other sources of information, such as the internet and television programs, are currently underutilized. In the long-term, education and other public health promotion interventions should be tailored to various societal subgroups. Furthermore, such promotions should use other sources, such as the internet and television programs, to accommodate changes in societal trends.

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Data availability/supplemental material

The data presented in this study are from the responses in the questionnaire. To access questionnaire, click here.

Conflict of interest statement

The author declares no conflict of interest.

Authors' contributions

GGH: contributed to the conceptualization and design of the study, development of the questionnaire, methodology design, data analysis, and writing of the manuscript.

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