

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

MARIANO MARTINI¹, OMAR SIMONETTI², DAVIDE ORSINI³,
EMANUELE ARMOCIDA⁴, ALESSANDRA PARODI ZIMMERMANN⁵

¹Department of Health Sciences University of Genoa, Genoa, Italy; ²Hospital of Trieste, Trieste, Italy;

³University Museum System of Siena (Simus), History of Medicine, University of Siena, Siena, Italy; ⁴University of Parma, Italy;

⁵Institut für Geschichte und Ethik der Medizin, Medizinische Fakultät, Universität Heidelberg, Heidelberg, Germany

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Summary

World War I hit Italy from different perspectives. The one here described under an historical point of view regards the health of military and civil population, with a special focus on infective diseases. The 20th Century was the fuse of degeneration and eugenics theories; which grew in the melée of war and technological innovation. Indeed, war is interestingly depicted as an entity capable of emphasizing the differences between those who wore a uniform and those who did not. As a matter of fact, some infections spared the civilian population while others felt with greater vengeance

on this subgroup. Moreover, the incidence of different feared diseases was brought back to the rates of the late 19th Century. Thanks to a statistician, Giorgio Mortara (1885-1967) the impact of infective diseases in World War I on Italian demography is well established. Moreover, different military and civilian sources contribute to enrich the picture of the consequences of war. In conclusion World War I could be considered as a litmus paper. The litmus paper of successes and failures of Italian public health management to face new medical challenges exacerbated by the crisis.

Introduction: the litmus-paper war and the "degeneration discourse"

World War I was an extreme trial for the drafted generations [1]. In Italy, like in all other involved countries, the Great War (1914-1918) made structural health and hygiene problems visible and had years-lasting effects both on the health of the military and on the health of the general population. The neurologist and social medicine activist Ettore Levi (1880-1932) stated in 1921: "The war is a litmus paper: it has abruptly highlighted and multiplied the infinite misery dormant in individuals and in social masses. Because of the war, multitudes of tuberculosis sufferers, psychopaths, crippled and maimed men are now living at the expense of the State. The State was thus suddenly obliged to realize the huge moral and economic importance of public health in time of peace" [2].

Italy, which was at war from May 24th 1915 until November 4th 1918, was mostly a traditional agricultural country. The war made structural problems of the Public Health organization evident, e.g. the strong inequality between urban environment and rural regions. Another specific war-related inequality was the one between the military and the civil population: while the former had access to better food resources, the latter suffered from a curtailed production and distribution of food. This provoked protests and played without doubt a role

in the general health conditions of the Italian civilians. On the academic (and literary) level, at the time of the outbreak of World War I a *degeneration* discourse was ongoing and for some authors the war could work as a medicine against it (The futurist literary movement, initiated by Filippo T. Marinetti, used the metaphor of "war as hygiene") [3]. The idea of degeneration was influential in Europe starting in the Enlightenment – both Georges – Louis Buffon (1707-1788) and Jean Baptiste Lamarck (1744-1829) believed in the inheritability of acquired traits among the living beings in general. The *Traité des dégénérescences* (Paris 1857) by the French-austrian psychiatrist Bénédict Morel (1809-1873) was influential for its strong moral underground because he maintained, following Buffon and Lamarck, that habits (particularly negative ones) are inheritable.

According to Morel, behaviors like drinking, and conditions like syphilis, are inheritable and lead to familiar degeneration, which occurs at the psychological-moral and at the physical level. This idea of a biological *worsening* of humans began to circulate strongly during the complex phenomena subsiding under the name industrial revolution and urbanization.

Growing numbers of people moved to the cities from the beginning of the nineteenth century and showed increasing rates of infections due to overcrowding and poor sanitary resources.

Alcohol addiction and crime, which rose as urban phenomena, contributed to the spreading of the

degeneration discourse about the risks and negative sides of industrialization and economic progress. Another trait of the degeneration discourse was the sinking birth rate in urban environments in countries like England and France. Morel's *Traité des dégénérescences* was paralleled by the discussion of the concept of eugenics by Francis Galton (1822-1911). In 1883 Galton defined eugenics as "the cultivation of race" [4], meaning that positive characteristic in a population must be cultivated, in analogy to the improving of livestock or plants. In Italy the degeneration and eugenics discourse began half a century later, primarily in two 1898 and 1889 publications by the anthropologist Giuseppe Sergi (1841-1936) [5] and by the forensic pathologist Angelo Zuccarelli (1854-1927) [6]. Both proposed the sterilization of habitual criminals, though, it was never practised in Italy. Eugenics as a discipline became an academic subject in 1912, when the first professorship for *Eugenica sociale* was created at the University of Genoa, and in 1913 a *Comitato Italiano per gli studi di eugenica* was founded [7]. During World War I the army surgeon and psychiatrist Placido Consiglio (1877-1959), another supporter of sterilization, pleaded for using the war as an instrument of selection in a particular way: "There is no other way in science: we have to clean the army from the not-normal by gathering them in special units and assigning them possibly to particularly dangerous tasks. Thus we can practice a fatal, beneficial selection" [8]. This radical, paradoxical approach did not gain a foothold, but, again, the idea of war as a sort of "litmus paper" for the biological characteristics of populations and nations spread, on the background of the degeneration-eugenics ideas.

In the war years there were new tendencies on the demographic level as well. On the eve of World War I (1914) Italy had 37,255 million inhabitants, 1919 they were 37,195 million. This decline does not look particularly dramatic, but let us take into consideration the birth and the death rate. The birth rate (the number of live births per thousand of population) was 30,51 in 1914, had dropped to 19,35 in 1917 and to 18,2 in 1918. The death rate of 1914 was 18,04 and 35,29 in 1918. That is to say, during the war the birth rate in Italy had nearly halved and the death rate had doubled. This is even more visible in absolute numbers: in 1914 there were 1,145,000 births and 677,000 deaths, in 1918 676,000 births and 1,324,000 deaths [9].

The data on the pre-war years: the pivotal role of Giorgio Mortara

Giorgio Mortara (Mantova 1885 - Rio de Janeiro 1967), the statistician and demographer who illustrated the demographic and public-health consequences of war in 1925 [10], had earned a degree in Law at the University of Naples in 1905 and had worked in Berlin on "Probability Theory". He was professor in Messina, Rome and Milan until 1938, when he immigrated to Brazil due to the anti-Semitic laws of fascist Italy. He

worked in Rio de Janeiro as a statistician and after World War II he taught again at the faculty of Statistics in Rome, but he remained Brazil-centered [11]. His analysis of the Great War was conceived from the perspective of a civil servant who had pleaded for the intervention of Italy in war and had fought in it. Demographic research was for Mortara at the service of the national interests [12].

But his view on war was devoid of triumphal considerations, in contrast to the view of the influential Italian futurists, who had enthusiastically taken part in it. He characterized war as follows: "War, this avid eater of lives, has always deeply modified the demography of the countries involved in its dismal game. Carnage of fighters, epidemics in the armies and from them in the civil population, drought and famine, devastation of territories, oppression and flight of populations, destruction of families, hindrance of marriage, all of these are concomitant phenomena of every war between peoples. Human history is entwined with the horrors of myriads of wars and they mark the stages of what we call, ironically, the path of progress" [10].

Mortara collected and elaborated data about deaths and disease from the Army and from civilian institutions [13] and on the death causes in the year immediately preceding the war. The question for Mortara was "To which modification of the intensity of single causes can we ascribe the diminution of the death causes? We ought to answer to this question if we want to adequately understand how the war has contributed to modify the preexisting trends toward the increase or decrease of the mortality rate from certain diseases" [10].

In the years before the war, between 1889 and 1913, the yearly death rate in the Reign of Italy had dropped from 27 to 19.43‰. This was due both to medical and hygienic advances such as water supply (which e.g. reduced the cases of cholera), wide vaccination practice (reduction of smallpox) and combinations of hygienic and therapeutic innovations (e.g. the measures against malaria and diphtheria). Particularly, in the three years 1887-1889 all the infectious diseases (typhoid fever, typhus, malaria, smallpox, measles, scarlet fever, pertussis, diphtheria, flu, cholera, erysipelas, dysentery, leper, mumps) were cause of 4,648 deaths of a million inhabitants a year, whereas in the three-year-period 1911-1913 the rate number was 1,300 [10]. For example, meningitis as a death cause decreased, while circulatory, gastric and kidney diseases remained constant as a death cause or even rose, due to the aging population. Respiratory diseases and diarrhea, in their turn, decreased due to "better hygiene and clothing", and puerperal fever, which caused 7 deaths of thousand births in 1889, sank to 3 in 1913 [10].

Tuberculosis occupied a special place among the infectious diseases, because its decrease, more than in the case of other infectious diseases, was due to the "improved economic situation and [...] a less low living standard" [10] in the country. In the three-years-period 1887-1889 there were an average of 2,128 deaths of a million inhabitants a year from all form of tuberculosis (lung tuberculosis, tubercular meningitis and other

types). In the period 1911-1913 the rate sank to an average of 1,567 a year. Notwithstanding this progress, in Italy there was a lot to do to improve the hygienic conditions, particularly in the rural regions. In 1916, for example, the roman professor Gherardo Ferreri (1856-1929) stated “cemeteries, sewers, hospices and houses are prehistorical” [14].

Giorgio Mortara's data on the war years

According to Mortara, during the war 651,000 of the 5,600,000 drafted Italian soldiers died: 378,000 were killed in action or died subsequently from the wounds, 200,000 lost their lives from diseases (80,000 of them in captivity). Further 87,000 died after the war, between the 12th November 1918 and the 30th April 1920, from war-related conditions and most of all from the Spanish flu; the 30th April 1920 was conventionally the last death day that the Commission for War Reparation considered suitable for paying a war pension to the families of the fallen [10]. When we take into account that the military were men born in the years between 1874 and 1899, and the death rate for this age group in the years preceding the war (1911-1913) was 70,000/75,000 a year, it results an excess of 525,000/530,000 deaths [10].

The deaths among civilians, too, significantly exceeded the death rate of the previous years. In the years 1911-1913 the general death rate was 681,000 a year, while in the four years 1915-1918 the deaths among civilians were 3,277,963 in total. The absolute numbers were as in Table I.

Civilians and army, in conclusion, showed a similar death toll in the war years.

Leaving other death causes besides, from what infectious diseases did soldiers and civilians die in excess, in comparison with the previous years?

In general, infectious diseases were responsible as a group (see above) for an increasing number of deaths both in the army and among the civilians, as the absolute figures show.

In 1914 there were 32,744 (out of a population of 37,255 million) and 1919 there were 74,373 deaths due to infectious disease out of a population of 37,195 million. In 1918, the year of the Spanish flu, the death from infectious diseases in general had increased to 314,762 (only 40,721 deaths were due to other infectious diseases, i.e., more than 270,000 were Spanish flu-deaths). Only in 1921 the deaths from this group of diseases came back to the pre-war figures with 34,299 deaths [10]. Having stated that the Spanish flu was the main death cause,

Tab. I. Absolute numbers of deaths 1915-18[10]

Deaths	Year
732,421	1915
708,544	1916
688,463	1917
1,148,000	1918

These data represent a total excess of about 600.000 deaths in the four years [10].

Fig. 1. The cartoon by Giuseppe Scalarini (1873-1948) showing a napoleonesque flu agent appeared in the Milanese edition of the Socialist newspaper *L'Avanti* on 13th October 1918, p. 1 (Public Domain - https://www.google.de/url?sa=i&url=http%3A%2F%2Fwww.scalarini.it%2Fit%2Fopera-artistica%2Fdisegni%2Fpubblicazioni%2Favanti%2521%3Fpage%3D14&psig=AOvVaw1M4UQlItbFTXe7Q5Z_DFWc&ust=1635780963373000&source=images&cd=vfe&ved=0CAsQjRxqFwoTCODrwy399PMCFQAAAAAAdAAAAABab).



and well knowing that data on death causes other than wounds from the military were incomplete, Mortara analyzed the frequency of some diseases in order to find out different factors playing a role in the army and in the population. A relevant factor of the incomplete recording was the lack of doctors in the civilian population. The Italian military medicine cared for more than two million soldiers during the war years; in 1916 there were 8,000 military doctors at the front in the region of the rivers Isonzo and Piave and 6,000 in the zone behind, at the end of the war there were 18,000, included the 1,200 from the Red Cross. Generally, an *infirmary* consisted of an officer, one or two officer candidates and 30 nurses and stretcher-bearers and provided for immediate care (bandaging etc). These infirmaries were at the front. In the zone behind were the *ospedaletti da campo*, in which the wounds were disinfected and operated, and bigger *ospedali da campo* for men needing a long permanence because of infectious diseases and for the most seriously wounded [15] (Fig. 1).

Infectious diseases

Mortara reported that it was difficult to obtain complete data on the infectious morbidity in the army, but he could

collect a good amount of data on some principal infectious diseases. Regarding typhoid fever (the Salmonella-caused, fecal-oral transmitted condition with symptoms like fever and abdominal pain, in Italian *febbre tifoide* or *tifo addominale*, also called *paratifo*), the registered cases in the army 1915 were 18,655 and in 1918 they had decreased to 5,992. The decrease correlated clearly with the vaccination, broadly practiced in the army since 1917 and in case of local outbreaks since 1915 [10].

Typhus (in Italian *tifo esantematico* or *tifo petecchiale*), which other than typhoid fever is caused by Rickettsia and spread by lice, came to Italy, according to Mortara, through Austrian-Hungarian troops and through war prisoners (who were detained overall in Italy) and spread mostly after the end of the war among ex-soldiers and civilians. In 1919, 5,736 cases were reported among Italian ex-soldiers and prisoners (5,416 among the prisoners and 320 among the soldiers). Mortara estimated the number of cases in the civilian population at 3,150, although the official reports said only on tenth. According to Mortara's calculations, the deaths from typhus in 1919 were one fifth of the total figure and he insisted that the number of the unknown cases must be high [10].

The 25 years infantry officer Antonio Ferrara, on a march in the region of Udine, wrote on September 27, 1915 in his diary about an outbreak of typhoid (which he named *tifo* and put wrongly in relation with lice): "We are surprised to see here and there yellow flags. Our medical officer, Fantozzi, says they indicate cholera or some other infectious disease. The worst thing is that we are all full of lice and it takes a huge amount of patience to get rid of them. There is a rumor that there have been cases of typhus. As a precaution, a vaccination is ordered for the whole regimental sector and, as officers, we have to set an example for the soldiers. To our comfort, we are given 48 hours rest in our tents" [16].

Ferrara's record shows that even officers were not always informed about the sanitary situation and that the practice of the typhoid-vaccination at this stage was experimental.

Another soldier noted his experience as typhus-sufferer (here typhus is meant). The disease began suddenly and was regarded as typical for the infantry: "As I was eating noodles, I felt a stroke in my back and fainted. As I recovered consciousness I heard a loud noise, I had 42 degrees fever. They took me to the military surgeon and he told me: 'It is our disease, typhus in the head! After fifty-two day in hospital I felt recovered'" [17].

The case of malaria shows the interdependence of health and environment: in the agricultural regions near the war zone most fields were abandoned and new swamps had formed. As a result, at the end of 1918 more than 85,000 malaria cases were reported in the army (they were 12,000 at the beginning of 1918) [10]. Smallpox showed a difference between the army, in which the vaccination was diligently practiced, and the civilians: in the army there were 79 cases in 1915 and 329 in 1918, in the civilian population in 1915 626 cases were registered, which increased to 4,519 in 1918 [10].

For scarlet fever, measles, and diphtheria, too, the data

form the population were poorer than the data from the army. The Spanish flu was the main death cause from an infectious disease in the wartime worldwide. Up to 50 million died (3% of the world population), one third of the world population was probably infected [18]. In the army, following Mortara, in the period May 1918 - April 1919 the cases were 122,829 and the deaths 10,854 (one death out of 11/12 cases). In the whole country, some 500,000 people died and there were 5 to 6 million cases; one inhabitant out of seven was probably infected. The death toll was dramatic due to a combination of factors: not only there were no antibiotics, but most doctors were drafted and it was difficult to transport the ill to hospitals, due to a lack of vehicles and to the poor network of communications. Therefore, people in the rural regions had no or scarce access to medical care, to say nothing of hygienic housing. Moreover, in the first weeks of the pandemics (the news came in Spanish newspapers at the beginning of May 1918) it was forbidden to write about it in the belligerent countries, and that resulted in a waste of time. Finally, most people in the civilian population were weakened by the food rationing more than the soldier were. Being a civilian, particularly on the country, meant to be more at risk to die because of the war, even if not directly *in war*. The sublieutenant Renato Rossi died from Spanish flu on December, 4th 1918. The caplan Giovanni Dal Santo wrote to his father and gave a brief medical-religious description of the last moments of his life: "Sublieutenant Rossi was admitted to field hospital in the afternoon of November 30th due to Spanish flu and bronchopneumonia. On December 3rd he got worse. He piously became the last rites. The good Rossi was conscious of his approaching death. On Dec. 3rd he started to call for his mother and kept saying: - Mother, mother, I will come to see you soon, and he often repeated these words on the 3rd and the 4th. He did not undergo death struggle, as it often happens in such cases; he was suffocated by the blood coming out of his mouth. I stood by him until his last breath, he died putting himself in God's and the Virgin Mary's hands at 6 pm on December 4th 1918" [19].

In the civilian population the spanish flu was the bigger trauma of the wartime. Vincenzo Rabito, who was among the youngest generation drafted in Italy (1899) and whose diary was posthumously published in 2007, described the flu epidemics in his small Sicilian village: In Chiaramonte more of 20 people a day died from spanish flu. The police ordered the families to bring them soon to the graveyard, because the stench of the dead killed the living people ("... a Chiaramonte con la spagnola ne morevino più di 20 al corno [...] Li muorte nelle famiglie, come morevino, subito le guardie stavino pronte, e li carabinieri ce li facevino portare subito al cimitero, perché con la puzza facevino morire a quelle vive") [20].

We do not know whether the archaic idea of disease transmission through stench was spread by the police to accelerate burials, or it was Rabito's own conviction. In any case, it expressed the ubiquity of the menace and the atmosphere of fear in which the population lived.

Cristina Robaldo told her experience of the Spanish flu to Nuto Revelli; Nuto Revelli (1919-2004) was a soldier and a partisan who wrote about the retreat of the Italian army in Russia in 1943 through the memories of fellow soldiers [21]. Later he devoted himself, although not having a formal historical education, to the oral history of the piedmontese region of Cuneo and published two books: “Il mondo dei vinti, in 1977, the work, emigration and war memories of 85 people from the valley around Cuneo, and *L’anello forte*, 1985, in which he interviewed only women”. The author of seminal books on Piedmontese oral history wrote: “After the war of 1914 we all got the spanish flu, everyone, only my father did not get sick. We had no money to fetch drugs, we all had forty-one or forty-two degrees fever. We took only quinine and nobody came to look after us, because many people died” [22]. Quinine-therapy and lack of doctors were the two main traits of the Spanish flu epidemics. As Eugenia Tognotti noted, there was no consensus in the medicine about a therapeutic strategy. Quinine was employed as an antipyretic, typically in the treatment of malaria and as a symptomatic therapy for the spanish flu, and a vaccination was looked for, without success. Physicians were totally helpless, patients too [23]. The flu was correctly perceived as a major death cause in war, even when the people did not have statistical data, like a man and a woman from two Piedmontese villages stated in their oral memories: “I didn’t fight in the war of 1915, I was too young. Three men from Pragudin died in that war, but more people died from the Spanish flu than at war. In 1918 my father died from the flu, too. When the doctor came, the people were already dead” [24].

“My family was poor, we had two acres of land and we were eleven siblings. But three died as they were infants, they died in 1919 from the Spanish flu. Everyone was in bed, my father, my mother, I was the one keeping working, I was the one who did not get the flu. One night three of my siblings died, and I had to bury them” [25] (Fig. 2). Cholera was declining in Italy in the years before the war (see above), but in 1915 a new epidemic wave broke out. According to Mortara, this epidemics was imported Italy by the Austrian Army in 1915 and spread through the war regions in northern Italy. Among the military there were in 1915 15,744 registered cases with 4,229 deaths; among the civilians 731 cases and 324 deaths, i.e., about ¼ of the ill died [10]. Some units of the army were decimated by the cholera epidemics, particularly the infantry units. This is not surprising, taking into account the hygienic conditions in the trenches. In the trenches it was not only more probable to get the infection, but it was more difficult to promptly isolate the ill. Moreover, most units were continually dislocated from one war theatre to another, thus spreading the disease. A vaccination was administered from the winter 1915 onward in the army and clearly contributed to the decline of the cases: in 1916 only 283 cases and 93 deaths were registered in the army [10]. The terrible symptoms of cholera and the quick death that often followed are recurring subjects in diaries, letters and oral reports. Some literate soldiers described cholera outbreaks in impressive way, like the driver and

Fig. 2. As medicine was helpless against the Spanish flu, a beer or a cognac therapy were recommended in this ad (Public domain - <http://www.castelbolognese.org/fatti-storici/xx-secolo/prima-guerra-mondiale/la-chiamarono-spagnola-ma-venne-dal-mare>).

ALFABETTO

E' ormai accertato che le bevande al-
cooliche - se consumate in misura limi-
tata - sono fra i migliori *rimedi preven-
tivi* contro la

grippe spagnuola

Durante questi giorni di gran caldo,
tutti preferiranno ai poco gustosi specifici
farmaceutici una cura primaverile a base di

birra fresca

o
vero cognac francese
di primissima qualità.

Troverete tutti e due alla rinomata

BIRRARIA GAMBRINUS
in Piazza Riforma.

soldier Gastone Bassi in his diary on July 29, 1915: “A terrible stench poisoned the air. The unfortunate sick lay in a sort of cellar, it was large, low, dark, nauseating. Few of them were dressed, some had just a shirt or bags were naked. There were some centuries of them [...]. These poor men were emaciated and yellow, they had bluish bags and misty eyes. Some were dead and some were dying. We loaded them on the cars like infected rags and they complained: – Water, water, thirst! – And they twisted violently, stiffened with visceral pain. According to the instructions, we gave them some bits of lemon and some water with iodine drops. I strived to swallow lemon juice and furiously smoked cigarettes. We had to wander from hospital to hospital to find a place for those poor living human remains. At the end, we left them in the isolation hospital of Visco. One had died during the trip” [26]. Lemons and isolation were the therapy in another case of cholera outbreak, according to the diary of the soldier Giuseppe Battistel, who fought in the Austria-controlled port of Valona, Albania, in 1916 (the record was written on March 15th, 1916): “After a month the cholera began to rage and in the two companies we were almost all sick, because of the fear and because of the filthy water we were drinking. Then the command ordered us to work five hours a day. The seriously sick were isolated, one man in one tent, and they became lemons. Ten days later, thanks our medical officers, the danger was warded off but we had the first victims and they were buried near the camp. These were the first victims of the 56. Infantry” [27]. Measures against cholera, as noted above, were difficult to implement in the war situation. The soldier Emanuele Di Stefano wrote about causes and insufficient countermeasures: “Cholera spread fast

as a lightning and cut down for five months the teams of the Bergamo Brigade. What were the causes of the epidemics? Undoubtedly many factors played a role in its the beginning and diffusion: filthy water, absence of hygiene, the organic decay of the troops [...]. The soldiers were dying at a worrying rate but they had nevertheless to keep working hard. Every morning an officer let special teams clean the camp accurately, but these measures were inadequate” [28].

Tuberculosis was the main endemic disease of united Italy. In the four-year period 1911-1915, according to official data, there were in total 274,117 deaths from tuberculosis (the trend was decreasing: in the preceding four-year period the deaths were 282,901). In the following four years (1916-1920) the total figure was 317,531 [29]. In the army, according to the paradigmatic study of Tommaso Detti, tuberculosis was responsible for one tenth of the deaths in general and for one fifth of the death from disease [30].

It is difficult to evaluate the number of the soldiers who contacted tuberculosis in war.

Mortara estimated, admitting the vagueness, that they were 50,000 to 100,000 [10].

During the war years the medical officer Antonio Fagioli stated that the war situation, particularly the trench situation, was a possible factor for the outbreak of latent forms of tuberculosis, i.e., soldiers who were already latent infected at the moment of the drafting developed the disease in the war zone through a “autoinfection” mechanism.

These, in their turn, communicated the disease to their fellows, particularly to those who were predisposed through fatigue or preceding illnesses. How could such infections be avoided? Fagioli stated that the military doctors were responsible of declaring ill men fit for service, because in war the bulk of the army was relevant and because they meant that soldiers tended to the simulation of diseases and to draft evasion. Moreover, Fagioli quoted cases of draftees who, knowing to be tuberculosis sufferers, denied their condition to be able to serve their country [31]. As a conclusion, Fagioli suggested including tuberculosis specialists (*tisiologi*) in the drafting commissions, in order to avoid future infection herds by excluding suspect cases from war service, even when they were willing to serve [31]. However, tuberculosis was perceived as a war consequence: “We won that war, but we lost it. Statistics say that the tuberculosis cases were more than the war casualties. I was wounded from mustard gas on the Montello and when I was back home I had only one day to celebrate, soon I got sick with pneumonia and suffered for two years” [32].

Two war-specific, war-symbolic conditions

Apart from wounds, sepsis, and infectious diseases, some conditions were in a way epidemic in the trenches: trench foot and self-injury. The reign of Italy entered in war in May, 1915. In the first war winter the cold temperatures and the trench situation contributed to

the emergence of the trench foot condition, caused by long standing in the water that gathered in the trenches. The feet became numb and capillaries were destroyed. Infections or gangrene could follow, and amputation was sometimes the only life saving measure. Prevention was possible, though: wool socks were a good solution to keep feet dry and warm and they were used instead of the puttees (in Italian *fasce mollettiera*) during the first year of war, but during the winter it was difficult to find wool on the market and they were therefore very expensive. An alternative solution was rubbing the feet with fat [33]. Officers became a small handbook with instructions to avoid trench feet in their troops [34]. This nine-page booklet invited the poorly equipped soldiers to “protect themselves from the cold” (p. 3), to envelope their feet with “sheets of paper (newspapers)” (p. 4) and keep their feet so clean and the trenches so dry as possible (p. 5). Most of this was mere wishful thinking and trench foot was common. It has been estimated that between 100.000 and 300.000 Italian soldiers suffered from it. The range is wide because this condition was confounded and summed up with frostbite, although frostbite occurs only under zero degrees, while trench foot can occur even in water at warmer temperatures [35]. In fact, continuous rain could be a cause of trench foot “epidemics”: “Last news: cholera cases begin. On one day there were six, quite serious cases. Moreover, soldiers who stay constantly in rainy trenches develop a new foot disease (skin oedema). They have strong pain and absolutely cannot walk. Every day many go to the hospital, some 40 or 50” [36] (Fig. 3).

Not always did the soldier follow officers’ recommendation to grease their feet, as the above-mentioned Vincenzo Rabito noted: “Our feet froze and a group of orderlies had the task to grease the soldiers’ feet to prevent them from freezing. The captain used to come and see if we had greased our feet and if we refused to do it, they punished us by not giving us our rations. Even if we did grease them, every day four or five soldiers ended up in the infirmary with frozen feet. Some naughty soldiers washed their feet with snow after having greased them or walked in the snow because they did not want to fight” [37].

Trench foot was sometimes, as we have seen, a self-inflicted condition that could lead to a welcome convalescence. Other forms of self-injury were practiced before the drafting and during the war; sometimes self-injury or disease were only “dreamed of”, as we can read in some memories. A register of self-injuries does not exist, but they deserve a mention among the health-relevant factors and facts in World War I. Self-injury, nevertheless, should have been quite common: on July 26th 1915, only two months into the war, 46 soldiers were accused of self-injury (typically, they shot themselves in one hand or foot) and 27 of them were sentenced to 20 years prison. After the battle of Caporetto on October 27, 1917, self-injurers risked a death penalty [38]. Among the men Nuto Revelli interviewed quite many talked about self injury at home, a desperate decision they took when they received the draft notification in

Fig. 3. Misure Preventive contro le congelazioni. Istruzioni per gli ufficiali (Fonte: Intendenza Generale dell'Esercito. Public domain - https://www.idrometra.it/6444-large_default/intendenza-generale-esercito-misure-preventive-contro-le-congelazionicongelazioni.jpg).



the war years. The injuries were mostly planned to have only temporary consequence, but sometimes the plan did not work out, like in the cases of these three soldiers: “Some men spoiled their health not to go to war. They took tobacco tea or put strange things in their ears. Some of my comrades killed themselves at the front, when it became dangerous” [39].

“One of my brothers pulled his teeth by himself, some other from Margarita have their teeth pulled, their teeth were already foul. A man from Fossano poisoned himself with lead and died. Another one, a Southerner, got a petrol injection in his backbone, turned crooked and later ended up in jail” [40].

“Then I was drafted, but before the medical examination I drank twelve glasses grappa and ate half a cigar. I didn’t feel like to be a soldier. As soon as doctor Abrate saw me, he asked: – What did you do? – and I said: – Nothing –. He understood, I was pale like a ghost, but he declared me fit. Many weren’t fit, some because of asthma or some heart condition or because of the poor nutrition, ultimately because their hard life” [32].

In some cases, other soldiers or ranks suggested to recur to self-injury: “The major teaches me: – Put the cigars in a glass of water, be clever and get a tachycardia – Then I started to go on sick call: I ate a cigar and drank a glass of water. Thus I was granted six month convalescence leave” [17].

“I was told to pour gunpowder in the broth. I poured the powder of six bullets in it and drank. It was known that it would cause a high temperature and one could go to the hospital and avoid the charge, which was due for the next three days [...] but the powder did not produce any effect” [41].

Others used the weapons to injure themselves: “We ran to the place of the shooting and find the sentry sitting on a carriage and moaning. His rifle was lying on the ground, the bayonet had be put aside. The rifle was still warm. The soldier was Felice Bisceglia and his knee was perforated. From the interrogation emerged that he had an extravagant character and had injured himself to avoid military service. They brought him to the hospital of Saletto” [42].

Diseases and wounds were sometimes hoped for as a lucky chance. In the following records jaundice and pneumonia are considered as means to avoid combat, at least for a while [43-45]. This attitude is found in among soldiers and officers as well. The infantry soldier Agostino Tonetto wrote on December 5th, 1916: “Dear wife, I have a piece of news that could be a half luck for me: today I will be admitted to hospital with jaundice, because a couple of day ago the jaundice broke out in me, but without fever. It would be better for me to have fever, at least some twenty days, so maybe I could have twenty days convalescence” [46].

We do not know the origin of this case of jaundice; fever was undoubtedly perceived as not serious nor invalidating. It had only to come at the right moment. Even serious illnesses could represent an opportunity, as described by Umberto Della Scala in a diary entry of November, 17th 1917: “Today I went on sick call and had 39 degrees fever. The doctor wrote the note for me and sent me to the hospital. Around nine o’clock I left from our camp and happily I found a wagon of machine gunners, otherwise I should have walked all the way. Anyway, I walked 6 or 7 km before that and I do not know how I managed it. I felt like drunk, and it was snowing. At last, at six we arrived at the hospital N. 119. Today the doctor came and said that my pneumonia is resolved and that he, too, would like to get it. I told him that he wouldn’t have said that three or four days ago and he said sure, no, you were really sick. But he came to see me four or five times a day when I was really sick” [47].

The fear of death and, even more, to be wounded in battle made of serious diseases something desirable. This was the terrible paradox of the perception of health in such extreme conditions (Fig. 4).

Conclusions

The war, displacing people and modifying the landscape, causing a lack of food supplies and of doctors, was something *new*: *new* conditions like trench foot or self-injury spread as if they were an infection; and the new infection came, the Spanish flu [48]. But World War I acted as a revelator and a multiplier of *old* conditions too, such as tuberculosis or malaria.

In fact, the Italians, between the end of the nineteenth century and the beginning of the twentieth century had many diseases, often accentuated by poverty and lack of hygiene but also by unhealthy behavior. During that period important health policies began to change this difficult situation and in the years immediately preceding the start of the war, good results were starting to be achieved, due to both health and social interventions.

These positive results were completely undermined by the war effort. During the war years and in the following years, the incidence of many diseases returned to values of the late nineteenth century. In the conclusion of his 1925 book Giorgio Mortara underlined, like Ettore Levi, that the consequences of World War I on the health

Fig. 4. The cartoon “Il carro della Vittoria” by Giuseppe Scalarni (1873-1948) was published in the Milanese edition of *L'Avanti* on August 1st, 1919, p. 1. It shows the consequences of the war: 4,060 insane, 3,260 dumb, 74,620 maimed, and 507,193 dead (Public domain).



conditions of the Italian population were to reach beyond the war years. The war had repelled Italy back.

“How many people die even today from tuberculosis or malaria contracted in war! And how many die from the consequences of other diseases contracted in war, or from war injuries? Even if we, today, could reach the malaria or tuberculosis mortality of 1913, we would admit that, without the war, the mortality would be lower” [49].

WWI was nevertheless not only a litmus paper but also a teacher and its teachings were at the origin of many prevention measures in the following years, most macroscopically, as it is known, during the fascism. Vaccinations (e.g. the above-mentioned typhoid and smallpox vaccination) proved themselves useful. The role of swamps in the diffusion of malaria was confirmed (and the fascist land reclamation became ideologically central during the regime). Tuberculosis, in its turn, proved itself a lasting danger and was, too, heavily targeted at in fascism. The fascist obsession with health, which is not subject of this paper, originated mostly in the pathogenic role of WWI.

In conclusion, we recall the words of Serafino Patellani, the first professor to hold a chair in social Eugenics in Italy in 1912 at the University of Genoa: “War is the only social phenomenon in which all people are clearly at a loss. The loser are not the ones who lose the war, but the ones who are most damaged at the eugenic level, even if they are the winners at the military level” [50].

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Conflict of interest statement

The authors declare no conflict of interest.

Authors' contributions

MM and APZ designed the study, conceived the study and drafted the manuscript; MM, OS, DO and EA revised the manuscript. MM, DO and APZ 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.

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Correspondence: Mariano Martini, Department of Health Sciences, largo R. Benzi n. 10 Pad 3, University of Genoa, Genoa, Italy - E-mail: mariano.yy@gmail.com - mr.martini@unige.it

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