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The Struggle Against Infant Scrofula in Siena Between the Nineteenth and Twentieth Centuries

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Abstract

Poverty, high population density and unhealthy dwellings in Siena's historic district accounted for the spread of tuberculosis in its various forms between the mid-nineteenth century and the first three decades of the twentieth century. In this paper, the author relies on statistical data relating to a time span between 1898 and 1935 to discuss the high incidence of scrofula, or tuberculosis of the lymphatic glands, among Siena's infant population.

The result is a description of the most important actions implemented at city level to prevent tuberculosis and to assist and treat sick children: stays in seaside hospices promoted by Carlo Livi in order prevent and treat poor and malnourished children, the establishment of a Preventorium to accommodate children from families that included members infected with pulmonary tuberculosis, the realization of activities in the green areas of the Fortress on advice of Achille Sclavo. Furthermore, the author recalls the work of great hygienist Sclavo to raise awareness of the hygienic practices among Siena's population, which was fundamental in the prevention of epidemic diseases such as tuberculosis.

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Keywords

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1 Introduction

In the Unification years, Italy's sanitary and hygienic conditions were extremely precarious and challenging, as described by Carlo Maggiorani (1800–1885), a doctor and Senator of the Kingdom of Italy, in the speech he delivered in the Senate on March 12, 1873: "Phthisis, scrofula and rickets are more rampant than ever before; pellagra is becoming more widespread; and malaria, with its sad effects, afflicts much of the peninsula. [. . .] Syphilis unruly meanders among citizens and in particular among militias" (Atti parlamentari 1873).

Together with poverty, ignorance and hunger, scarce knowledge of the etiology of the most widespread epidemic diseases, the danger of contagion and insufficient notions of hygiene yielded a picture of alarming severity.

Among all contemporary endemic diseases, tuberculosis, in its many forms, was the most pernicious and responsible for a very high number of deaths, especially among the poor and children.

And precisely because it mostly affected certain age groups, the tuberculosis epidemic produced serious effects also from a social point of view.

In Siena, between the end of the nineteenth century and the first decades of the twentieth

century this slow and silent disease had a very high morbidity rate due to the poor hygienic-sanitary conditions of the entire residential area within the ancient city walls, as well as the high population density of some districts and unhealthy dwellings inhabited by the poorest classes. It is easy to grasp the severity of the situation if one takes into account that a modern aqueduct was built in the city only in 1914, and that the sewerage system would not be ready until the end of WWI. The ease of contagion dissemination was matched by a very high mortality rate, which, at some junctures, reached levels recorded in Italy's largest cities, to the point that in 1929 Giorgio Alberto Chiurco (1895–1975), politician and director of the Institute of Surgical Pathology of the University of Siena, "referring to the serious disease that afflicts the land of Siena in an impressive manner" lamented that the city "according to statistics, ranks second for tuberculosis-induced mortality" (Chiurco 1928).

And if the lung form was the main cause of deaths in the age groups between 15 and 30 years the infant population was mostly affected by scrofula, which caused swollen suppurating lymph glands in the neck.

2 Etiology and Clinical Characteristics of Scrofula

The origins of scrofula represented a much-debated topic in the second half of the nineteenth century.

For some "it is a disease in the blood, dyscrasia, in which broken matter, through blood circulation, eventually deposited itself in some parts of the body, triggering its rotting". According to others, "it is a group of diseases that affect weak people and because of such weakness, the diseases become more malignant and more difficult to cure". Yet, for others, "it is vicious overnutrition of parts of the body: skin, mucous membranes, bones and especially lymphatic glands" (Livi 1873).

In reality, scrofula, or tuberculous lymphadenitis, is an infection of lymph nodes of the neck generated by mycobacteria.

Although it was originally considered a childhood disease, it is widely represented in the 20–40 age group. In adult population, it is caused by Mycobacterium tuberculosis, responsible for pulmonary tuberculosis, which penetrates the lymphatic circulation and affects some lymph nodes, and, in particular, those below the jaw. In children – topic of this research paper – this disease is caused by other "atypical or non-tuberculous" mycobacteria, such as the Non-tuberculous mycobacteria.

Scrofula presents disproportionate enlargement of the glands in the neck, especially those at the base of the jaw. It is characterized by the absence of phenomena typical of the inflammatory process, such as redness and increased skin temperature, resulting in characteristic swelling called "cold abscess". It is often accompanied by fever, chills and malaise.

The impairment of the lymph nodes does not cause pain but, if left untreated, makes lymph nodes hard-elastic, with swelling of or exceeding 2 cm in diameter (lymphadenomegaly).

The affected lymph nodes, in particular those that merge into masses of considerable size, sometimes cause the rupture of overlying skin and the explosion of the abscess (fistula) with abundant pus leakage and subsequent formation of retractile, deforming and permanent scars.

In addition to damage to glands in the neck, there are lesions of ocular, nasal and lip (peribuccal) mucosa, eczema of the face and scalp, and swelling of nose and upper lip. These deformations, associated with the formation of enlarged lymph node aggregates, gives the sick (especially children) the typical appearance of a pig (facies scrofola), hence the name of the disease.

3 Siena's Poor Scrofulous Children

Particularly significant is the description by Carlo Livi (1823–1877) in 1873, at that time the director of Siena's San Niccolò asylum, who was very committed to assisting scrofulous children: "Poor children with twisted and deformed legs; with

bloody eyes and a neck gnarled with swollen glands and disfigured by sores and scars. [. . .] But the spectacle will be even sadder if you venture through the filthy, damp and dark alleys of the Districts of the Wave, the Tower and the Caterpillar. There, scrofula and rickets have long taken residence, and are inflicting miserable torment upon innocent flesh" (Livi 1873).

We can obtain precise data on tuberculosis mortality in children aged between birth and 15 years from three different studies carried out at the time by Filippo Neri, Health Officer of the Municipality of Siena and assistant of Achille Sclavo (1861–1930) at the Institute of Hygiene of the Siena University, and Aristide Londini, Neri's successor in the municipal office.

In the first period into consideration, namely, from the end of the nineteenth century to 1913, mortality from tuberculosis in Siena in the 1–5 year age group reached 64.7 deaths per 10,000 inhabitants; it dropped to 44.1 in the 6–10 year range to rise to 61.4 for the 11 to 15 year range (Neri 1915).

In the subsequent period, 1914–1920, the subject of the second study, tuberculosis mortality dropped significantly in response to the implementation of preventive actions, amounting to 42.96 deaths for every 10,000 inhabitants in the 1–5 year age group; 35.80 in the 6–10 year group; and 70.11 in the 11–15 year group (Neri 1921).

In the last period taken into consideration, from 1921 to 1935, it is notable that tuberculosis-induced mortality among Siena's infant population decreased still: 39.53 deaths per 10,000 inhabitants in the 1–5 year age group; 19.78 in the 6–10 year age group; and 41.07 in the 11–15 year group (Londini 1937).

These values, though lower than those of the 15–30 year age group, were high nonetheless and an indication of very challenging sanitary conditions.

4 Sun and Sea: "Great Drugs" for Scrofulous Children

As early as the mid-nineteenth century, given the lack of drugs capable of treating tuberculosis, actions aimed at children and young people looked, in particular, to thalassotherapy, both for preventive and curative purposes.

Among the proponents of seaside hospices there was Giuseppe Barellai (1813–1884), a doctor at the Hospital of Santa Maria Novella in Florence and scholar of tuberculosis prophylaxis (Carnevale and Diana 2014), who, in 1853, claimed that there was no "medicine better than air and sea water" (Barellai 1853) to cure childhood scrofula and rickets. Three years after the publication of his book, a first seaside hospice was built in Viareggio and Barellai, spurred by this positive experience, urged the establishment of other similar structures on the Tuscan coast.

In Siena his plea was heeded by Carlo Livi, who in 1864 founded the Popular Association for Scrofulous Children.

His experience in this field led him to define the causes of tuberculosis: among these, "hereditariness", that is, hereditary disposition to the disease; unhealthy dwellings; poor hygiene, drinking water "contaminated with putrid materials" and unhealthy air. Indeed, he understood the importance of studying the relationships between illness and social status, imagining an evolution of medical science towards a form of preventive social medicine addressed to the community as a whole. And in support of his ideas, he exhorted taking a look at medical texts: "You will not find one that does not tell you that, aside from hereditary disposition, unhealthy, damp, cold and poorly illuminated dwellings, which can hardly be aired out and are supplied with dirty and infected water are the most powerful causes of two fatal diseases: scrofula and rickets" (Livi 1873).

For this reason, Carlo Livi endeavored to keep children away from environments where diseases thrived, offering them better nutrition and life outdoors, in the sun and pure air. It was essential for Livi to remove children from environments where contagion lurked, and place them in healthy environments, and especially seaside, "plunging them into air, light and water baths, which give children their color back, replenishing and regenerating them" (Livi 1873).

In the five-year period from 1867 to 1871, Siena's scrofulous children were sent to seaside hospices in Viareggio: Paolo Funaioli

(1848–1911), a student of Livi's, published a medical report with statistical data. Of 75 children, between 8 and 14 years, who spent a month seaside, 16 were healed, 36 improved their general conditions, 36 improved their general conditions and local disease manifestations, and 7 showed no improvement (Funaioli 1874). On the basis of such positive results, Funaioli asserted that: "Medicine has no other remedy to fight scrofula than the sea", though, arguing, at the same time, that even better results could be achieved and more children could be healed if only they could stay by the sea for longer stretches of time.

The seaside hospice of Porto Santo Stefano was inaugurated in 1872; upon Livi's suggestion became the reference point for thalassotherapy administered to Siena's children. The facility was built on the Argentario coast. In a letter sent by Barellai to Livi in 1869, we can read as follows: "The air surrounding Monte Argentario is so oxygenated and pure that when you breathe it, especially as you face the gulf, you feel that your lungs become more elastic and let in vigor and health [. . .]. Seaside hospices and the resulting natural baths offered by these facilities would find therefore in Porto Santo Stefano the most suitable, rewarding, beautiful and economical solution" (Carnevale and Diana 2014).

Over the years, results became more and more evident. Indeed, the Health Report on Siena's scrofulous children sent to the Porto Santo Stefano seaside hospice, published in 1878 by Flaminio Tassi, indicated that of about 55 children (32 girls and 23 boys) between the age of 5 and 14 years, who stayed at the hospice in the summer of 1877, most of the children, except for 6 of them, showed significant improvement or were cured of scrofula. "In conclusion – stated Tassi – the results achieved after seaside care, as the statistical reports show, are of indisputable utility, and in some cases the successes have been so brilliant as to appear almost prodigious. The sea is responsible for such wonders. [. . .] Now, faced with these facts, is it still possible to question the beneficial action of the sea on scrofula?". "The sea is therefore a great drug for scrofulous children" (Tassi 1878).

The institution of seaside hospices can therefore be considered works of civilization and progress; they led to the involvement of Public Administrations and generous citizens alike. The latter's donations, in particular, afforded needy children the benefit of seaside stays.

Crediting Barellai the successful intuition of seaside hospices for scrofulous childhood, Livi remembered his colleague with these words: "Heart can be highly inspired the same way brilliance is; and it was a great heart that propelled the modest Florentine physician to pursue the hygienic, civil and Christian idea of opening free seaside hospices for the craftsman's children stricken with scrofula. [. . .] Every year the beneficial [. . .] sea opens its great arms to welcome infirm, emaciated, hunched children and youngsters, seemingly blinded by scrofula, sending them back to their homes healthy, energetic, robust and cheerful" (Livi 1873).

Despite these important results, a sick childhood in the late nineteenth and early twentieth century Siena was still a serious problem until very strong choices were implemented in the sanitary field, thus finding solutions for what for decades had been singled out as the causes of the high mortality rate in the center of Siena: population density and unhealthy dwellings. In 1928, work began to demolish the district of Salicotto, one of the most affected by tuberculosis. In this area, in the heart of Siena, as late as the first half of the twentieth century, poor families often cohabited with tuberculosis patients in dwellings located below street level, consisting of one or, at most, two dark rooms that received air from the stairs. "These poor children are held by coughing old men, made to sleep together with TB patients, sit in front of the fireplace alongside sick individuals who, without any medical guidance, are allowed to sow bacilli left and right, infecting infants" (Chiurco 1928).

Over the years, other preventive actions were also implemented: starting in 1919, a summer camp was held inside the Fortress, welcoming about 100 children, 3–12 years of age, who were placed under the care of health personnel also during the year; it was also created an outpatient heliotherapy center – with 14 beds – inside

the garden of the Hospital *Santa Maria della Scala.* This center followed the guidelines set by Dr. Auguste Rollier (Corsini 1942). Therefore, for decades, before antibiotics became available, sun exposure played a fundamental role in the prevention and treatment of tuberculosis.

Furthermore, at the end of the 1920s, the *Podestà* of Siena, Fabio Bargagli Petrucci (1875–1939), supported by the positive opinion of Achille Sclavo, though not without challenges, arranged for the construction of a Preventorium on the premises of the monastery of Santa Maria Maddalena, designed to accommodate up to 60 children removed from families exposed to the danger of contagion by infected people within the family (Comune di Siena 1934).

In the words of Antonio Cammarata, in order to avoid exposure to tuberculosis, it was fundamental "to remove healthy children from an infected family environment, and to place them in a healthy environment, either by dispatching separately to other families (family placement) or collectively in specialized institutions (collective placement)" (Cammarata 1925).

Removal from an environment that led to contagion, better nutrition, outdoor living in the sun and pure air were fundamental remedies at a time when no drugs were available to treat TB.

5 "Hygiene and How to Implement It"

To be sure, Achille Sclavo, who endeavored to raise awareness of the culture of hygiene by every means at his disposal, surely gave a fundamental contribution to the prevention of epidemic diseases, such as tuberculosis.

In 1904 Sclavo, Professor of Hygiene at the University of Siena, founded in the city the *Istituto Sieroterapico Vaccinogeno Toscano*, after closely studying and understanding epidemic diseases. In so doing he realized that, in many cases, these diseases could be avoided by following simple hygiene rules that were useful to reduce contagion.

He became persuaded of the need for hygienic propaganda to engender a true "inner revolution" among people, in order to promote hygiene and a healthy respect for human life.

For this reason Sclavo, who was one of the first to held university courses in Hygiene, decided to turn to attentive audiences: soldiers, priests, doctors, people working within the public services, and even ordinary people.

However, he soon realized that the sound hygienic awareness could only arise out of a slow learning process that could certainly not be harbored within the domestic environment, due to the misery, ignorance and prejudices of parents. It was therefore necessary to turn to schools, teachers and above all, young people, who were free from the mistaken beliefs of adults and, thus, more open to change.

To be effective, teaching hygiene had to be devoid of its purely theoretical character, to be delivered hands-on.

Hence, Sclavo's writings dedicated to challenges in the educational environments: *Igiene ed edilizia scolastica* (1914), in which he denounced the disconcerting state of school buildings, proposing solutions to the most widespread health problems. Noteworthy are also writings in which he prescribed proper nutrition, outdoor education and physical activity for the healthy development of young people: *Per l'educazione fisica* (1914); *Diamo aria ai nostri polmoni* (1915) a manifesto of the anti-tubercular struggle in favor of sun and pure air; *Sull'alimentazione umana. 5 lezioni tenute in Firenze alle infermiere della Croce Rossa italiana* (1917); and *Per l'igiene sociale* (1918).

In this way, Sclavo placed great hope in the so-called "ascending education", resting on the axiom that young people were to become spokespersons for good practices among adults (parents and relatives) who, in turn, would end up appreciating their importance and recognizing their usefulness.

In his *Il Decalogo dell'Igiene*, we read: "Love sunlight, which gives you everything together with health to your body. Love fresh air and store plenty of it in your home, keeping windows open as long as you can" (Sclavo 1924).

This precept, fundamental in the prevention and treatment of Siena's children affected by

forms of tuberculosis, was consistently reaffirmed by Sclavo during his life. It is within this frames that we must understand his tirade against unhealthy dwellings in the historic center of Siena: "it has not yet been possible to build dwellings in which, in addition to protection from harmful external influences, the enjoyment of pure air and sunlight is guaranteed" (Sclavo 1924). And again, when he described schools: classrooms, even when they are in old buildings, must be renewed by "flooding them with air and light, without forgetting that, weather permitting, lectures should be delivered outdoors, under trees" (Sclavo 1924). Indeed, he promoted outdoor schools, building one on the bastions of the Fortress of Siena, as well as heliotherapy camps, with the intent of removing children from the unhealthy conditions of so many city districts, albeit for part of the day.

Let the sun flood homes became one of the topics discussed at school: "The healthiness of a house greatly depends on the amount of sunlight reaches into it. Let us take a brick to represent a house and orient it so that one of the major façades faces north, the opposite face will face south and the two warheads will face east and west, respectively. Children must be shown that in such conditions the brick will never receive the sun on the north façade; that the eastern head will be illuminated throughout the morning, until midday; that the west end will be exposed to sun from midday until sunset; and that throughout the day the sun will be on the south façade" (Sclavo 1924).

Sclavo did not lecture but conversed with pupils to make them reflect and reason, through concrete scientific examples, and sometimes even complex ones.

With the same approach, with simple language and lots of examples, Sclavo also discussed tuberculosis, "one of the most serious diseases afflicting humanity" (Sclavo 1924). In his book *Per la propaganda igienica. Scuola ed igiene*, he concisely summarized useful information "that is most necessary to disseminate among the public through school" (Sclavo 1924). He explained causes and forms of tuberculosis, putting to rest false beliefs, such as whether tuberculosis was hereditary, or that it did not affect the elderly. And he gave a series of important hygienic precepts: avoid spitting because tuberculosis bacilli were in saliva, and cover your mouth with a handkerchief when sneezing. He explained that it is very likely to find tuberculosis bacilli in cow's milk which could infect humans, hence he recommended boiling milk before drinking it.

"Crockery, cutlery and glasses used at home by tuberculosis patients must be disinfected and, to this end, be kept for fifteen minutes in water and ash, at boiling temperature". Clothes and linen used by the sick must be aired out for a long time, often under the sun, since "direct sunlight kills the Koch's bacilli". "Tuberculosis patients must refrain from kissing other people, and especially children, and it is very important that they sleep alone in a separate room" (Sclavo 1924).

He ended with a recommendation to all children and teenagers: "To make the human body strong, to neutralize the tuberculosis infection before it becomes manifest, and to recover from the disease it is necessary to live according to hygienic rules, which among other things, prescribe to stay long outdoors; keep the house clean and ventilate it often by opening windows; eat in a suitable and sufficient manner; and ensure thorough cleaning of the body and adequate physical activity" (Sclavo 1924).

6 Conclusion

Between the second half of the nineteenth century and the first three decades of the twentieth century, tuberculosis, mainly in its non-pulmonary form, as scrofula, was one of the most pernicious disease in Siena due to its high rate of morbidity in children.

Despite the lack of drugs available to treat this disease, significant results were achieved in the preventive and curative fields through seaside stays and exposure to sun and fresh air, which, as great hygienist Achilles Sclavo recommended, should always occur in conjunction with the application of the most basic hygiene standards.

It is interesting to highlight that at the time the interaction between sun and vitamin D and the treatment of tuberculosis was still unknown. For decades, before the discovery of antibiotics, TB patients were sent to sunny places to undergo heliotherapy treatments, without knowing the reason of the recovery.

In recent years, a study of the Queen Mary University in London brought to light that high-dose of vitamin D, given in addition to antibiotic therapy, may result in a quicker recovery of patients thanks to a better immune response.

At the Queen Mary University, 95 patients affected by tuberculosis underwent a standard antibiotic therapy. Forty-four of them were also treated with high-dose vitamin D, while the remaining 51 were given a placebo. The TB bacterium disappeared much quicker in the patients treated with vitamin D than the others: 23 days the first ones, 36 days the others.

This "study represents the most detailed characterization of the effects of antituberculous therapy on the immune response conducted to date, and is unique in being a clinical investigation in to the immunomodulatory actions of in vivo vitamin D supplementation during treatment of an infectious disease" (Coussens et al. 2012).

This is further supported by a recent study carried out by Danilo Buonsenso and some colleagues of his: "Fifty-seven children were included: 24.6% active TB, 28.1% LTBI (latent TB infection), 22.8% NPTB (non-TB pneumonia) and 24.6% healthy controls. 36.8% of all children tested had an insufficient or deficient vitamin D level. Vitamin D level was significantly lower in active TB compared to other groups ($p=0.004$)" (Buonsenso et al. 2018). In conclusion, this study also showed a clear correlation between hypovitaminosis D and active pulmonary TB.

Consequently, these researches have confirmed that, by metabolising vitamin D, the sun increases the body's immune power and it contributes to eradicate tuberculosis infection.

In the light of these results, it is clearly evident the importance of Barellai and Sclavo's intuition.

If the results achieved through the seaside hospices didn't change considerably the TB morbidity and mortality rates within the child population, it was only because it was impossible to extend these treatments to a significant number of children. The lack of drugs was also highly decisive along with the very characteristics of the disease which is still today one of the 10 main causes of death in the world.

"Globally, an estimated 10.0 million (range, 9.0–11.1 million) people fell ill with TB in 2018, a number that has been relatively stable in recent years. The burden of disease varies enormously among countries, from fewer than five to more than 500 new cases per 100.000 population per year, with the global average being around 130. [. . .] TB affects people of both sexes in all age groups but the highest burden is in men (aged $\geq$15 years), who accounted for 57% of all TB cases in 2018. By comparison, women accounted for 32% and children (aged<15 years) for 11%" (WHO 2019).

It is extremely important the data concerning the child population because it keeps on increasing: it was at 6% in 2013, it increased at 11% in 2018. Anna Galli's studies have shown that "over the last decades, TB has also emerged in the pediatric population" and "epidemiologic data on childhood TB are still limited". And "Childhood TB is considered as a sentinel of disease spreading throughout the community" (Galli et al. 2016).

The percentage of forms of tuberculosis is really significant in children, mainly in its non-pulmonaryform: especially lymphonodal TB.

In conclusion, taking up the words of the 2018 Global Tuberculosis Report of the World Health Organization, "Tuberculosis is an old disease that was once a death sentence. Effective drug treatments first became available in the 1940s, and in combination with social and economic development they allowed countries in western Europe, North America and some other parts of the world to reduce their burden of TB disease to very low levels. For most countries, however, the end of TB as an epidemic and major public health problem remains an aspiration rather than a reality" (WHO 2018).

"Leaders of all UN Member States have committed to 'ending the global TB epidemic' by 2030, backed up by concrete milestones and targets. Progress is being made. Global indicators

for reductions in TB cases and deaths, improved access to TB prevention and care and increased financing are moving in the right direction. [. . .] Nonetheless, the pace of progress worldwide and in most regions and countries is not yet fast enough" (WHO 2019).

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