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Pellagra in Late Nineteenth Century Italy: Effects of a Deficiency Disease

Pellagra, a nutritional deficiency disease linked to a deficit in vitamin B3 (niacin), affected – and until recently continued to affect – poor populations whose diet consisted almost exclusively of maize (corn) for prolonged periods. It appeared in the eighteenth century, and up to the early twentieth it was still found in parts of Italy, Spain, Portugal, Eastern Europe and the United States. In the twentieth century, pellagra was present in Egypt and some eastern and southern African countries, including South Africa. In this article, which focuses on nineteenth-century Italy and particularly the Veneto, the most severely affected Italian region, Monica GINNAIO *reviews the history and epidemiology of the disease, then analyses differences in prevalence and mortality by region, occupational status, age group and sex. She shows the predominance of the disease among the most disadvantaged social groups and women of reproductive age, though no massive impact on fertility has been detected.*

The main purpose of this study is to identify why the disease known as pellagra, endemic in Italy in the late nineteenth century, was strongly selective by place of residence, occupational category, age and sex. Pellagra is a vitamin deficiency disease caused by a diet consisting almost exclusively of maize (corn), and was particularly severe among farming families in Veneto and Lombardy from the late eighteenth century to the interwar period. To better understand the social "preferences" of pellagra, this study adopts several analytic perspectives – epidemiology, history, history of medicine, gender studies and social history – thereby bringing to light the connections between the cultural, social and epidemiological factors that led to this selection, a selection that was not without demographic consequences.

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In addition to medical and literary sources, two types of data were used to measure the main demographic effects of this nutritional deficiency, the first being the results of health and agricultural surveys conducted by Italy's Ministry of the Interior and Ministry of Agriculture from 1879 to 1900. These surveys covered all Italian regions affected by the disease and were designed to estimate the incidence of pellagra in terms of morbidity and mortality, and to describe the living conditions of the farming population. The purpose of the first survey, launched on 1 September 1879 by the agriculture department (part of the Interior Ministry at the time), was to "study the *pellagrosi* [the Italian term for pellagra sufferers] and the condition of the farming classes" (Annali d'Agricoltura, 1880; Interior Ministry archives). The second survey, conducted in response to a proposal by the parliamentary deputy Stefano Jacini, concerned the situation of the peasantry throughout Italy, focusing on the presence of *pellagrosi* in the affected territories (Jacini survey, 1882). In 1890, a survey on the health conditions of "persons who work the land" that included a section on pellagra was organized by Agostino Bertani, followed ten years later by another national survey that also covered the measures taken to combat the disease (Inchiesta sulla pellagra nel Regno, 1900). All these studies, despite their obvious utility, are hard to exploit because of severe underestimation. A person in the early stages of pellagra can easily conceal the disease, and many "ashamed" *pellagrosi*,(1) whose numbers are difficult to estimate, did not declare their condition to the health authorities when counts were organized for fear of losing their employment or their home, or of being driven off the land they leased.

The second set of information analysed for this study comprises the data series from Italy's Statistics Institute (ISTAT) produced from the time of Italian unification (1861). They relate to censuses (taken every 10 years from 1861 to the present, but excluding the years 1891 and 1941 when the censuses were cancelled) and population change.(2) The method used at the time was to collect data from municipalities and transmit them to Rome for aggregation. Data are generally available for provincial capitals (in some cases for municipalities) and by region. Mortality statistics are compromised by the fact that declaring all causes of death did not become obligatory until quite late in the nineteenth century. Whereas provincial capitals were subject to this constraint from 1881, it was not until 1888 that the rule was applied to all Italian municipalities, urban and rural. Since pellagra was much more likely to affect the rural world and small urban centres, pre-1888 statistics are not reliable and must be used with caution. Furthermore, even when cause of death was indicated, pellagra

(1) Despite their extreme poverty which made it impossible for them to regain their health by changing their diet, many *pellagrosi* hid their symptoms and refused to declare the disease, thus receiving no nutritional or hospital treatment.

(2) Documents available for consultation in the ISTAT archives.

mortality was usually underestimated: these deaths were often registered under another cause, notably suicide.

The present article deliberately leaves aside some aspects of the disease, such as prevention methods or treatment of *pellagrosi*, focusing instead on the social and demographic impact of this serious vitamin deficiency disease that ravaged the three regions of Veneto, Lombardy and Emilia in the last decades of the nineteenth century.

We first review the aetiological hypotheses put forward by the earliest pellagra specialists, the political and medical measures implemented in response to the problem, and the symptoms and epidemiology of the disease. We then examine the biological, social and economic reasons for the high prevalence of pellagra in Italy and elsewhere, measuring the demographic effects and discussing them in comparison with findings from earlier studies. This article focuses on the history of the disease; specifically, the social, economic and political conditions that led to the development of pellagra, and the differing aetiological interpretations put forward at the time, closely linked to the dominant political view of the social and nutritional situation of rural populations. Recent studies on pellagra epidemiology allow for a better understanding of the severity and diversity of pellagra symptoms and confirm the pertinence of analysing the disease's selectivity by age category, occupation and sex.

I. The "sickness of the poor"

Every year, "around the time the sun comes into the sign of Aries" (Marchant, 1847), the farmer notices a round, dark red, pruriginous spot on the back of his hand that gradually fades and disappears, leaving a patch of gleaming skin. The following year, when the fine weather returns, the patch is larger and the pigmentation darker. These marks then spread to the legs and feet, while the hand skin scales off and the small fissures become cracks. The disorder then spreads to the mouth: gums bleed, teeth go black, break, and fall out. The farmer weakens, is taken with nausea, has no appetite. His pulse slackens, head spins, his mind becomes confused. He grows delirious and death ensues. This is the "sickness of the poor".

This "grim disease, so aptly named the scourge and shame of Italy" (Messedaglia, 1927), only came to the attention of Italian physicians and political authorities in the late eighteenth century, but within a few decades it became one of united Italy's major health and demographic problems. At first called "sunburn" (*pellarina*, *scottatura di sole*), "hot liver" (*calore del fegato*) since the first observers thought it was a liver disorder, "the boss's sickness" (*mal del padrone*), i.e. caused by the boss, or "the red sickness" (*mal rosso*), the disease finally acquired the name "pellagra" in the first decades of the nineteenth century. The name is from Bergamo dialect – *pel* (skin) and *agra* (sour, rough, sour or acidic-smelling) – and was never replaced by a scientific term.

Throughout the nineteenth century and well beyond, the aetiology of pellagra remained a mystery. Early Italian "pellagrology" established a link between pellagra, scurvy and leprosy. The dermatological signs of pellagra do resemble those of scurvy, and the first pellagra specialists thus correlated two of the three most serious vitamin deficiency diseases.(3) The link between pellagra and leprosy was more complex, and implied social exclusion of the kind specific to diseases that visibly affect the skin. Other aetiological theories claimed that pellagra was an animal disease that could be transmitted to humans (Marchant, 1847), a sickness caused by dust that "gets incrusted into the skin" (Le Fers, 1907), by the rays of the sun or by contaminated water. Others postulated inter-human contagion, and still others (Bassi, 1846) the effects of a parasite. Specialists also associated the "plague of corn" (Brenton, 2000) with poor living conditions, alcohol consumption, or a lack of salt.

As happens with all new diseases, once pellagra came to awareness in the late eighteenth century, experiments and scientific writings on it flourished (Allioni, 1795). Italian pellagra specialists were led to observe a relationship between the disease and a diet consisting almost exclusively of ground maize (cornmeal). From this point on, two major theories emerged: the "deficiency" theory and the "toxin" theory. Proponents of the first attributed the disease to a monotonous cornmeal diet. Despite the accuracy of this interpretation, specialists in nutritional deficiencies were rare, and they did not understand the real aetiology: vitamins would only be discovered in 1922 (by Casimir Funk).

Alongside the deficiency theory was the "toxin" doctrine, affirming that the disease was more likely to be due to consumption of maize contaminated by fungus or mould. The most fervent proponent of this theory was the socialist physician and anthropologist Cesare Lombroso.

> Pellagra is not caused by poverty but rather by a virus contained in spoiled corn; however, that virus is more virulent in an organism debilitated by poverty. Therefore the two terms "pellagra" and "poverty" *are* linked, but not by a cause-effect relationship. If we eliminate poverty, we reduce pellagra's field of action, but we cannot thereby eliminate the virus in rotten corn that causes the disease. If, on the contrary, we destroy all rotten corn, poverty will not disappear but the disease will. This means that advising peasants to eat and drink better to protect themselves from pellagra is meaningful, but it is a useless truth, a cruel irony that may even be harmful to farmers. The poor man whom we, pellagrologists, sitting in our comfortable chairs, so counsel can never follow our advice, and if he could, he would not have waited for us to speak before implementing this recommendation. Therefore, this idea can only do great harm, for it causes these miserable souls to turn away from the only path possible for preventing the ill, and once they are

(3) The third is beriberi. One effect of scurvy, or vitamin C deficiency, is to inhibit collagen hydroxylation, engendering blood vessel and tissue breakdown that can lead to hemorrhaging and death.

> sick they give up all idea of being cured, for they think that the only way out, through food, is beyond their reach. (Lombroso, 1882)

The administrative authorities in Italy accepted the toxin hypothesis for strategic reasons; in that way the disease, which did after all weigh on bourgeois, capitalist and Catholic consciences, became an ordinary case of food poisoning for which the farmers themselves, and not the state, were entirely responsible. A battle against spoiled corn was declared. In 1902, the Italian parliament passed the "Law against pellagra" calling for crop diversity as well as sanctions for producers and consumers of spoiled corn, the setting up of communal ovens to bake bread, distribution of salt to the destitute, rabbit breeding, and the obligation for parents with pellagra to send their children to eat in school canteens. Other primarily local initiatives, such as winter food support for persons in the early stages of the disease, helped eradicate pellagra in northern Italian rural areas. Long hospital stays were also contemplated. In 1883, the Gris de Mogliano Veneto pellagra ward was founded in the province of Treviso and began medical and nutritional treatment of *pellagrosi* living in the Veneto; it remained in operation until the 1940s (Vanzetto, 1985).

II. Epidemiology of pellagra

Pellagra is a form of avitaminosis caused in most cases, notably in Italy,[4] by an exclusive, prolonged diet of boiled maize meal (cornmeal) called polenta. In view of its adverse effects on health, it can also be considered as a serious metabolic disease. Niacin or vitamin B3 (also known as vitamin PP for *pellagra preventis*), the vitamin whose deficiency causes pellagra, was identified in 1937 by Joseph Goldberger. Niacin is the main component of two nucleotide coenzymes that assist in and accelerate more than 200 metabolic functions, and is therefore of crucial importance. Most nucleotide coenzymes are not synthesized by the body but made available through food and growth factors such as vitamins. In fact, niacin itself need not be considered absolutely necessary in the diet because it can also be produced from the amino acid tryptophan, though that metabolic pathway can only work in the presence of vitamins B2 and B6,[5] iron (Oduho et al., 1994) and zinc (Hankes et al., 1971); if these nutrients are lacking, the conversion rate is compromised (Krieger and Statter, 1987). Tryptophan in turn regulates appetite, sexuality, mood and sleep. It is a precursor to the neurotransmitter serotonin, the lack of which produces many

(4) Pellagra in India in the mid-twentieth century was due to an exclusive diet of sorghum, a food containing the amino acid leucine, a tryptophan antagonist that induces the pellagra deficiency syndrome by inhibiting tryptophan metabolism.

(5) Vitamin B6 deficiency engenders pellagra-like symptoms such as peripheral neuropathies, neuro-psychic and dermatologic disorders, and bone matrix deterioration (vitamin B6 is a cofactor in the oxidation of lysine residues, essential to the production of bone tissue).

disorders, including depression and anxiety. Hence, the neuro-psychiatric manifestations of pellagra are also due to lowered serotonin levels.(6)

The body's niacin requirement increases with physical activity, so the first symptoms of pellagra in peasants appeared at the start of summer, with the resumption of the farming season. Their maize diet contained no niacin at all. Though maize does initially contain PP, the vitamin is lost when cobs and grains are stored, when maize is ground into meal, and when it is boiled or preserved as dry polenta. The first cause of pellagra among Veneto and Lombard peasants in the late nineteenth century was their exclusive cornmeal diet, although the full clinical profile of the disease is produced by generalized deficiency. In a diet with little or no tryptophan or vitamin B3, the organism first works to maintain vitamin levels by drawing on its own stocks of these vitamins. At the end of this phase, which may last several months, enzyme activity begins to deteriorate and the effects of the deficiency become visible. The severity of pellagra lesions reflects the stage of the disease, called "the disease of the four Ds" after its four most striking manifestations: dermatosis, diarrhoea, dementia and death. The standard progression of the disease comprises four distinct phases:

• *Phase 1: dermatological symptoms*. The skin of pellagra victims is abnormally sensitive to sunlight; rashes, oedema and redness (Gillmann, 1951) appear on parts of the body exposed to the sun, together with sensations of heat, "baking" and itching. Blisters and scabs appear, followed by epidermal desquamation. When these lesions heal, the skin remains smooth and shiny. After several relapses, it becomes thin, deeply pigmented and scaly (Licha, 1986). These lesions, often painless, resemble those of leprosy; even today, they can readily be confused with leprosy or secondary syphilis and can only be distinguished through laboratory testing. In this first stage, mucous membranes are also affected, notably inside the mouth: glossitis, stomatitis, mouth sores, palate pain, swollen gums, tooth cavities, and drooling (ptyalism) primarily define the nosological profile of this phase. Some *pellagrosi* did not develop further symptoms, as the skin and mucous membranes healed when their diet became more varied in summer; the symptoms then reappeared towards the end of the following winter.

• *Phase 2: digestive disorders*, which may also appear alongside skin lesions at the outset of the disease. Persons with pellagra may suffer from anorexia, vomiting, upper abdominal pain, achlorhydria and weight loss. Patients may experience alternating phases of diarrhoea – watery, slimy and in some cases bloody – and severe constipation. According to early sources (Bonfigli, 1881; Marie, 1908; Gris, 1908), digestive disorders practically always occurred in relapsed patients or those who had eaten nothing but maize for more than

(6) Biochemists at the Upton Laboratory in New York hypothesized that pellagra-induced dementia was due to overly high levels of tryptophan being converted into kynurenine compared to the amount used in synthesizing serotonin (Hankes 1974).

eight months, with effects dependent on individual resistance. The nosological records of the Gris pellagra ward (only persons in the first two stages of the disease were admitted to the "pellagra" section)[7] almost constantly report cases of diarrhoea, even among patients who regained their health after a few months on a varied diet.

• *Phase 3: neurological disorders*. This stage may be of highly variable length. According to admissions records for the Ferrara psychiatric hospital run by Clodomiro Bonfigli (Bonfigli, 1881), pellagra patients with serious neurological and psychiatric disorders had been ill for at least two years, although some had been living with the disease for eight or twelve years, or even since childhood. These patients, who all had a previous history of pellagra, had consumed nothing but maize for at least a few years, even in the summer months. At this stage motor disorders set in, accompanied by debilitating fatigue. Subjects complain of cramps, pains, leg fatigue and walking difficulties; also tingling, trembling, loss of feeling in the extremities, headaches and dizziness. At this third stage epileptic convulsions may occur, along with phonation difficulties.

• *Phase 4: psychiatric disorders*. This last phase of vitamin B3 deficiency disease generally begins with irritability, apathy, hypochondria, nocturnal agitation. These symptoms evolve into loss of memory and sense of direction, a general state of mental confusion and insomnia. Patients suffer from hallucinations, ideas of persecution, self-accusatory impulses and a sort of melancholy *errabunda* (wandering) that impels them to leave home. Pellagra-induced dementia comprises periods of depression (absolute mutism, crying spells, depression, obnubilation, intellectual torpor) alternating with moments of anxiety (delirious hysteria, obsessive-compulsive behaviour, propensity to suicide or homicide); the shift from one phase to the next may be accompanied by a change from diarrhoea to constipation. Eating disorders are often noted: in addition to sitiophobia (refusal to eat) and bulimia, *pellagrosi* suffer from pica (compulsive eating of non-nutritive substances), particularly geophagy, or the compulsion to eat soil-like substances, including earth, sand and lime. This phase could lead quickly to death: according to the admissions records at Ferrara hospital, a patient in this condition could succumb to *pellagra marasmus* or wasting in a few days. Clearly, those who reached this stage had never received nutritional treatment during their long years of recurrent relapse.

In Italy, then, the subjects at risk for pellagra were farm workers, particularly day labourers, who had absolutely no job security and were forced, primarily for economic reasons, to eat nothing but maize for prolonged periods.

More specifically, there is a tie between a particular age category (25-45), women and pellagra. The reasons for the sexual disparity were cultural as well as biological, and pertain to the destitute situation of women in the northern

(7) The Gris Institute was divided into three wards: the pellagra ward, the "*Ospizio*" (hospice) and the "*Asilio per alienati tranquilli*" (asylum for the non-violent mentally deranged).

Italian countryside in the late nineteenth century, in a culture where farmers chose their wives for their work and child-bearing capacities. Farm women received much less education and occupational training than their men and worked much harder for less pay. In the Veneto in the late nineteenth century, male wage-earners worked an average of 242 days a year, whereas women worked 289 days for daily wages amounting to 45% of the amount earned by men in the family (Jacini survey, 1882). Women's "silent participation" meant they were extremely unlikely to be in positions of authority; only women workers in cities took part in the feminist movements that accompanied the socialist thinking of the time. These "invisible producers" were the last to eat: the head of household was served first and therefore best fed; next came adult and younger male fieldworkers; only then could women and children eat, usually consuming between them the same amount of food as the father alone. Men sat at the family table, whereas women "ate standing up, in the kitchen, in a corner, on a crate of logs, plate in hand, or often sitting on the floor, without fork or spoon, eating only what was left over and not until the men had gone back to the fields" (Sorcinelli, 1995). Women worked during their pregnancies, and while breastfeeding, when their nutritional needs – notably for niacin – were much greater than those of men.(8) Their return to work the day after after giving birth, combined with perpetual malnutrition and closely spaced pregnancies, led to premature ageing and made women vulnerable to disease. The fact that they worked outdoors reduced the attention, protection and care they could give to their infants.

Early pellagra specialists had already intuited the role played by pregnancies and breastfeeding in the development of pellagra among women of childbearing age. Quite recently, Roberto Finzi (Finzi, 1990) claimed that the only reasons for the prevalence of the disease among women were the increase in nutritional needs due to their work, pregnancies and breastfeeding, and malnutrition due to low-quality and insufficient food intake. However, although these cultural and physiological factors all increase women's predisposition to pellagra, they are not the only causes. At childbearing ages, women produce reproductive hormones, the most important of which are oestrogens and progesterone. Oestrogens considerably limit the activity of at least four enzymes implicated in metabolically converting tryptophan into niacin (Rose, 1966; Rose and Adams, 1972; Bender and Totoe, 1984), thereby further reducing the amount of niacin available to a women from puberty to menopause. Hence, when diet provides little or no niacin and tryptophan to women of reproductive age, the high levels of oestrogen in their bodies places them at greater risk of developing pellagra than men of the same age.

(8) In the northern Italian countryside in the nineteenth century, women farm workers practiced *baliatico*, hiring themselves out as wet nurses – often the day after giving birth – for babies born to bourgeois families, abandoned children, or orphans, in order to bring in a little extra family income. The practice increased their daily niacin needs.

III. The place of maize in Italy and the Veneto

The first mention of maize on the Italian peninsula goes back to 1495, and the first region it was grown in was the Veneto. Thanks to this manna from foreign shores, Italy's northern farmers seemed in a position to stave off food shortages and famine. Maize was considered a specifically "Venetian glory" (Messedaglia, 1927) as Lombard and Piedmontese peasants only began growing it intensively after the plague of 1630.

In the Veneto, an area connected to the rest of the world through trade, maize growing was facilitated by the new mode of managing Venetian agriculture. From 1646 to 1727, Venetian and church properties of the mainland domains were sold to the city's bourgeois and patrician families to refill the coffers of the Serenissima, emptied by military spending. By the late eighteenth century, these arrangements had led to the creation of vast bourgeois and noble landholdings in which a production stimulation strategy was applied that put immense pressure on peasant wage-earners to produce at lower cost and sell more (Beltrami, 1955; Berengo, 1959 and 1963; Valenti, 1919). The new Venetian and Lombard landholders applied the same economic and production criteria to farming as to their trading activities: rents and fixed expenses rose; farmers had no decision-making power; the threat of losing one's job was constant and employment was always insecure.

The capitalization of agriculture marked the beginning of a process whereby farm work was degraded and the farmers were proletarianized and pauperized. These diverse socioeconomic factors, operating within an overall dynamic of agrarian crisis and price instability, accompanied the diffusion of pellagra in northern Italy. In the Veneto, but also in Lombardy, land uses gradually changed and the balance between livestock rearing, arable farming and forestry was destroyed. First, the loss of pasture brought about the decline of livestock rearing to the exclusive benefit of cereal farming and vineyards.

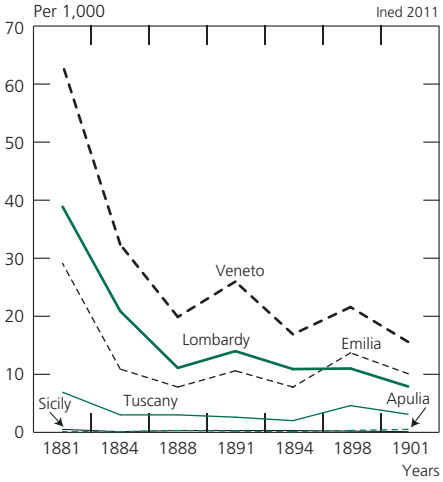
Over a series of stages that ran from the late eighteenth to the end of the nineteenth century, cereal crops took over more and more land, replacing vineyards, olive trees, silkworm breeding and chicken farming, resulting in diets that were very low in meat and dairy products. In 1846, 53.6% of Veneto farmland was being used to grow maize, and the proportion increased in the following years. The high profitability of maize and its ease of handling stimulated production, triggering a fall in production of other cereals; soon the land was producing only maize. The main consequence was a radical change in the peasant diet.[9] Before maize took over, Italy's northern farm workers ate broad beans with wheat, spelt, millet, rye, barley and buckwheat. Afterwards,

(9) The process also brought about a general decline in height in northern Italy from 1730 to 1870, consistent with the fall in income and impoverished diet. The Jacini survey reports that high percentages of young Veneto men were declared unfit for military service because too thin, sickly or small to meet official requirements (Jacini survey, 1882; A'Hearn, 2003).

wheat shortages and the accompanying rise in prices forced farmers to consume more of the new cereal until finally they were eating nothing else; this in turn led to the development of pellagra. These processes, leading to single-crop farming and single-food diets, unfolded similarly in Lombardy and Emilia, the other regions with high pellagra prevalence, although in the Veneto all the necessary conditions were in place to make the situation worse. Moving south, where wheat, olives and wine grapes were priority crops, resulting in a more diverse peasant diet entirely different from that of northern Italian peasants, the disease was much rarer.

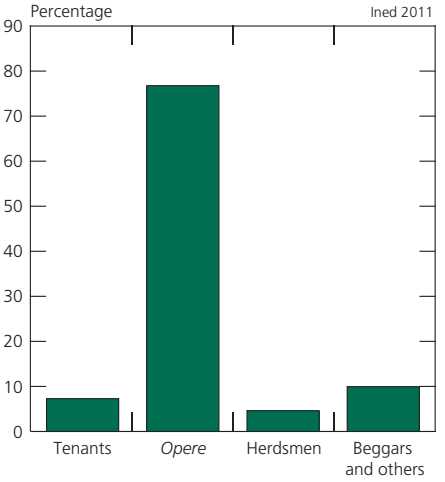
Figure 1, derived from ISTAT data on mortality in Italy, shows deaths from pellagra in the various Italian regions. We see both a general decline in deaths from vitamin B3 deficiency between 1881 and 1901 and clear preponderance of the disease in the three regions of the "pellagra triangle": Veneto, Lombardy, Emilia. The figures for the three other regions are extremely low in comparison: Tuscany never went beyond 6.8 cases per 1000 deaths, and the levels in Sicily and Apulia were close to 0.2 per 1,000.

Figure 1. Proportion of mortality due to pellagra by region, 1881-1901 (per 1,000 deaths)



Source: ISTAT, 1881-1911; ISTAT, 1955.

Figure 2. Occupational distribution of *pellagrosi* in the Gris pellagra ward, 1883-1907 (percentage of patients admitted)



Note: Tenants leased the land they worked, *opere* were day labourers, herdsmen worked primarily with livestock.
Source: Gris, 1908.

During the period when the disease was at its peak, it severely affected the three "pellagra triangle" regions, above all their farmers. In the Veneto around 1870, for example, 8% of persons working the land were sharecroppers, 13% were tenant farmers, 26% were landowners and 53% were wage-earning farm workers (Jacini survey, 1882; Vanzetto, 1982). In northern Italy, landowners

generally hired farm workers under three types of contract: annual (indeterminate period), seasonal (to the end of the summer) or day work. Day labourers, called *opere* in Venetian, were hired and paid by the day and never owned or leased land. Though not socially marginalized, these proletarians of Venetian agriculture were by far the most destitute peasant category. In the Veneto and the other regions, it was in this social class that pellagra took its heaviest toll (Figure 2).

During the winter, the diet of these rural "parias" was considerably reduced in both quantity and quality because they were often unemployed. In summer, the improved income of all family members, including women and children, allowed for a more varied diet. In 1893, two physicians from Bologna conducted an innovative experiment on nutrition in rural areas of northern Italy (Albertoni and Novi, 1894). Their study is particularly precious given that it was conducted without the benefit of any knowledge of required daily intakes. The authors detailed the diet of a peasant family in Ferrara, a province in Emilia-Romagna severely affected by pellagra. The parents were day labourers in good health living in rented housing. The father was 41, the mother 38; she weighed 50.6 kilos and had given birth six times; the couple had been married for 16 years and had a son of 14, the only surviving child. Noting what the family consumed during two winter days and two summer days, the doctors analysed changes in seasonal diet and deduced nutritional impact, taking into account seasonal variation in work intensity. They specify that the mother did all the housework in addition to her work in the fields; that although her food "rations" were better than minimal they were below her husband's; and that both her and her son's intake seemed insufficient to meet their nutritional needs. By contrast, the family's summer diet was richer, as was the case for many peasants in northern Italy. The study showed that the nutritional benefits of the summer diet (according to standards known at the time, and therefore without a breakdown of vitamin requirements) were higher than those of the winter diet (Table 1).

On the basis of their empirical material, the authors concluded that most of the diseases affecting northern Italian peasants, including pellagra, were due to their winter diet, too low in nutritional components, noting that the first signs of pellagra, at least in the prodromal phase, appeared at the end of winter.

To gather information on the rural diet, the Jacini agrarian survey submitted a questionnaire to 100 Veneto farming municipalities on the ordinary, average diet of their farmers (Jacini survey, 1882). It turned out that even during the summer months and in good harvest years, the staple foods consumed by inhabitants of rural Veneto municipalities varied little, especially among *opere*. In every municipality without exception, polenta was the staple: 62% of surveyed municipalities cited cornbread. Wheat and pasta were very seldom consumed, even by better-off farmers, and only 23% of inhabitants in the municipalities

Table 1. Winter diet of a family of farm workers, winter and summer nutritional levels (grams)

	Winter diet				Protein		Fat		Carbohydrates	
	Day 1		Day 2							
	Polenta	Lard	Polenta	Herrings	Winter	Summer	Winter	Summer	Winter	Summer
Father	1,515	37	2,024	32	83	152	64	65	579	677
Mother	840	19	1,200	29	60	88	38	49	389	408
Son	463	20	1,020	21	51	83	38	40	335	329

Note: Food consumed by a family of three in the area of Ferrara as recorded for two winter days of 1893.
Source: Albertoni and Novi, 1894.

surveyed ate meat. Mention was occasionally made of broad beans and other beans, and wild herbs such as chicory. Wine and brandy-drinking seem to have been fairly widespread – the survey notes the popularity of these "harmful vices". The tie between pellagra and alcoholism thus became a feature of the overall rural profile of the time, against a background of extreme poverty, an exclusive maize diet, and physical and mental degradation: "Malnourished, oppressed by fatigue, exhausted by the sickness that is destroying them, *pellagrosi* seek solace for their ills in the fleeting pleasures of alcohol" (Gonzales, 1900).

IV. The impact of pellagra in terms of age

Pellagra affected first and foremost a specific age group, and this holds even after taking account of population distribution in pellagra-affected regions in the late nineteenth century.(10) In Italy as elsewhere and regardless of source, pellagra and pellagra mortality seem to have affected women and men in the 25-45 age group more than any other. This is the period in life when energy needs are high. It is also the period when men become heads of household with dependent children and ageing parents who cannot really assist them. Farm work was extremely strenuous; many peasants had two or more occupations (working as both tenant farmers and day labourers, or as sharecroppers and craftsmen); indigence and debt seemed irreversible and diet changed irremediably. But the main reason for prevalence of the disease among this age group is the much higher niacin requirements of both men and women at that age, given their energy needs.

From 1784 to 1787, the pellagra hospital in Legnano, near Milan, admitted 124 *pellagrosi* at the four stages of the disease. Carlo Allioni (1795) published statistics on 114 patients, presented by age group. In the absence of detailed

(10) According to the 1881 census (ISTAT, 1883), 42.9% of the population in the Veneto were aged 1-19, 48.1% were aged 20-60, and 8.9% were over 60 in the census year.

information on the number of children admitted to the Milan pellagra hospital, we assume that pellagra had little impact on children aged 1-15. However, parents' reluctance to send their children to hospital is also a plausible explanation. The low percentage of patients aged 60 and over, meanwhile, may be due to a hospital policy of admitting few elderly persons or to earlier "selection" by the disease itself; it is impossible to tell without more precise information. The second case analysed here concerns 85 admissions to the psychiatric asylum in Ferrara in 1879 (Bonfigli, 1881, p. 24). These were patients in the last stage of the disease. Given its usually slow progression, we can conclude there were no children or young persons among them; the same argument may be cited to explain the higher proportion of patients aged 60 and over. The third case analysed is the census of *pellagrosi* (all stages) organized as part of the Jacini agrarian survey in the province of Treviso from 31 December 1878 to 1 January 1880, based on data collected by the municipalities on instruction from the provincial authorities (N. 2281 III, 5 December 1879). In this survey, the last age category is over 51, and the under-15s seem to have been counted with greater precision, despite the wariness of those concerned, as attested by the higher percentage of young people with the disease than in the other two sources. Table 2 synthesizes these different sets of information.

Table 2. Distribution (%) by age group of *pellagrosi* in Ferrara (1879), Legnano (1784) and Treviso (1880). Percentage of total number of patients in each establishment, and numbers

Establishments (total number of admitted patients)	Age 1-9	Age 10-14	Age 15-19	Age 20-30	Age 31-40	Age 41-50	Age 51-59	Age 60-69	Age 70-79	Total
Legnano	9.7 (11)			72.0 (82)			15.7 (18)	2.6 (3)		100.0 (114)
Ferrara		3.5 (3)		10.6 (9)	22.4 (19)	25.8 (22)	15.3 (15)	13.1 (13)	3.5 (4)	94.2* (85)
Treviso	11.8 (1,154)		56.4 (5,534)				31.8 (3,129)			100.0 (9,817)

*Data as indicated by Clodomiro Bonfigli (1881).
Sources: Allioni, 1795; Jacini survey, 1882; Bonfigli, 1881.

Pellagra specialists who treated patients with B3 avitaminosis consistently found a fairly low number of child *pellagrosi* and explained this factor by families' desire to protect the young generations, who were expected to take over their work, ensure the future of the family and take care of their elders. There is no doubt that the women of the family gave priority to their children's nutrition over their own, while unweaned infants were protected by their mother's milk. Nonetheless, the extent of pellagra among children may well

have been underestimated. Did parents openly declare their sick children, knowing that they might be stigmatized as bad parents? In cases of manifest deficiency, were children hospitalized?

The same questions arise for elderly sufferers. According to the sources examined, there were few sick persons over 70. In addition to low life expectancy in late nineteenth-century Veneto, we can reasonably ask whether families even reported elderly *pellagrosi* or whether, in accordance with notions of the time, their advanced age precluded their receiving any treatment. Furthermore, some hospitals did not admit elderly patients and treatment was a luxury, notably when curing the patient would not provide practical support to the family. *Pellagrosi* aged 50-70, on the other hand, were more frequently affected and more likely to receive treatment. They worked as much as younger farmers while being less well nourished and were therefore equally exposed to the disease.

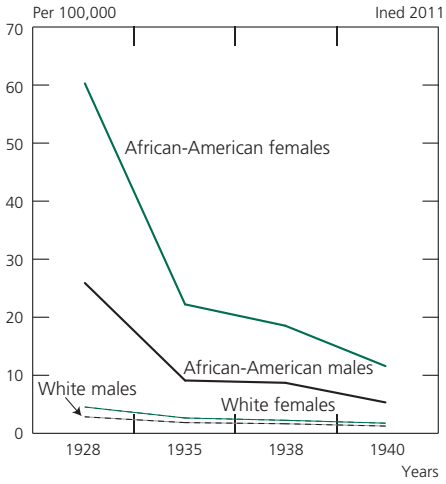
V. Pellagra and women

Everywhere and at all times, pellagra has affected women more severely than men. Their more marked vulnerability has both physiological causes (higher bodily requirements, hormone peaks) and cultural ones (less access to food). Our data confirm women's predisposition to pellagra for Italy and other countries affected by the disease. In Romania, for example, 79% of pellagra victims from the start of the twentieth century to the interwar period were women. During the latest pellagra epidemic in Africa, affecting Mozambican refugees in Malawi in 1991,[(11)] the prevalence rate was 7.8% higher for women than men. Although the present study focuses on Italy, it is useful to observe pellagra trends for the United States, which confirm its identity as a social disease of women more than men. In the early twentieth century, Pellagra ravaged the cotton-belt states of the American South,[(12)] particularly affecting African-American women (Figure 3) whose diet consisted mainly of maize. The first American cases were recorded in 1906 at Mount Vernon Hospital in Alabama. In this asylum for mentally disturbed African Americans, 88 cases of pellagra were discovered, 80 of them women with an average age of 34. Most pellagra deaths in 1928 were female, including in the white population (Figure 3), and most were women of reproductive age. Above age 60, the male and female curves converge (Figure 4). The sharp fall in pellagra mortality in the US from 1928 to 1940 was due to the discovery of niacin in 1937 and the government-regulated practice of adding niacin to cornmeal.

(11) The civil war in Mozambique was responsible for a million deaths. The massive civilian exodus was covered and monitored by the UN High Commissioner for Refugees (HCR).

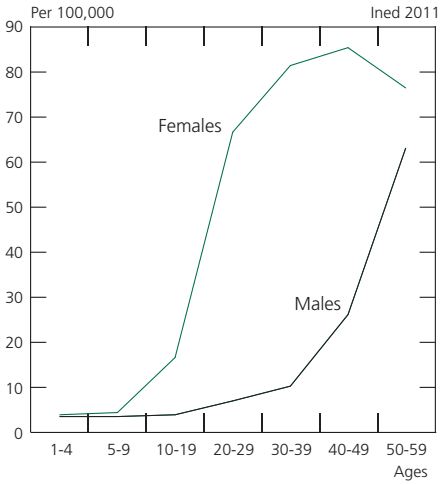
(12) The cotton belt of the American South encompasses Georgia, Louisiana, Alabama, Mississippi and South Carolina. Despite the preponderance of cotton, maize was also widely grown.

Figure 3. Proportion of deaths from pellagra in the United States by sex and ethnic group, 1928-1940



Source: Park et al., 2000

Figure 4. Proportion of pellagra deaths in the United States by sex and age in 1928



Source: Marks, 1947.

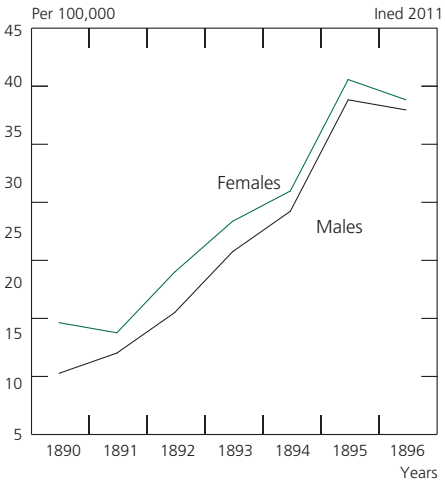
In Italy, the high proportion of women among pellagra cases is frequently mentioned in the sources of the time: "We see it over and over again: women suffer more from pellagra than men" (Bonfigli, 1881). To explain this predisposition, pellagra specialists cited women's delicate metabolism and their reproductive functions, which made them more vulnerable. They also cited domestic ills, high child mortality, poor marital relations, economic problems and strenuous labour. A variety of other sources – hospital admissions registers, health surveys, state statistics – likewise illustrate the predominance of women. The Gris pellagra ward did not accept elderly *pellagrosi* or persons beyond the second stage of the disease, and it gave priority to men to facilitate their return to work. But despite patient selection, hospital admissions from 1890 to 1896 show that more women were hospitalized than men (Figure 5).

In the last decades of the nineteenth century, the majority of *pellagrosi* admitted to Italian psychiatric hospitals were women. Figure 6 shows the percentages of women among total pellagra patients admitted to Venice's two psychiatric hospitals from 1874 to 1880.[13] Although the proportion of *pellagrosi* among annual admissions of mentally disturbed persons was not reported by this source, the Jacini survey shows a rise in number of admissions of women with pellagra, confirming the generalized increase in the disease from 1870 to 1880. Figure 6 also presents data collected by the Treviso "alienist" Gregorio Gregorj, who studied psychiatric patients with pellagra admitted to Italian

(13) Until 1978 Venice had two psychiatric hospitals: San Servolo for men and San Clemente for women. Around 1870 each had the same number of beds. The two structures were transformed after Italy closed its psychiatric asylums in 1978.

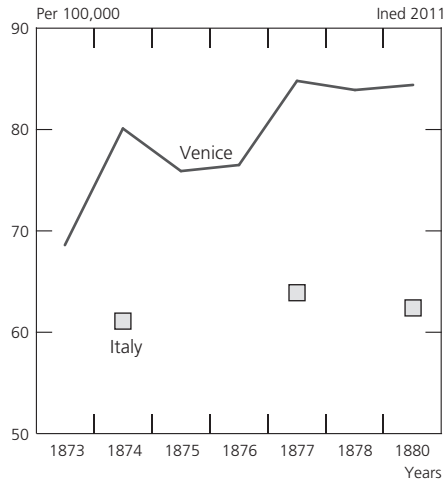
asylums in 1874, 1877 and 1880, taking into account all regions of the Italian peninsula, including southern ones where pellagra was virtually non-existent. For the years in question, Gregorj estimated that 17.3% of the psychiatric patients counted annually in northern region hospitals had pellagra and that most were women. However, his results should be read with caution since we do not know how he reached his figures.

Figure 5. Number of *pellagrosi* admitted to the Gris Institute from 1890 to 1896 by sex



Source: Gris, 1908.

Figure 6. Proportion of women among *pellagrosi* in psychiatric hospitals in Venice and Italy, 1873-1880 (percentage of all pellagra patients admitted)



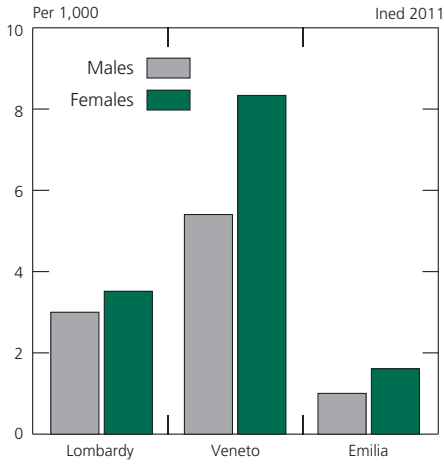
Sources: Jacini survey, 1879, for Venice; Gregorj, 1893, for Italy as a whole.

Figure 6 compares hospital admissions of female *pellagrosi* in Venice and Italy; the two curves illustrate the situation in the Veneto compared to that of Italy as a whole. Gregorj's data for the whole of Italy already indicate a high proportion of women (over 60% of all psychiatric patients with pellagra), but the percentages for Venetian asylums were even higher. The unfavourable situation of Veneto women is thus confirmed (see also Figure 7, from a Ministry of Agriculture survey of 1880).

Ferrara asylum data confirm this observation: there were always more women than men among pellagra patients. The proportion was higher still in reproductive age groups and fell after the menopause (Figure 8).

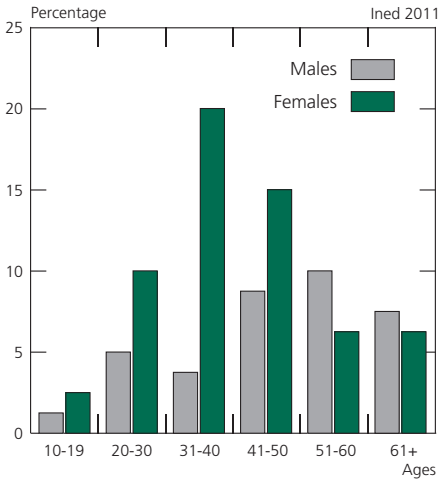
The fact that pellagra was more prevalent among women of reproductive age raises the question of a possible impact of pellagra on fecundity, and on birth rates and fertility in the most severely affected regions. The first pellagra specialists had already noted numerous cases of menstrual disorders (Bonfigli, 1881; Gillmann, 1951): dysmenorrhoea, menorrhagia, metrorrhagia, but above

Figure 7. Pellagra prevalence rates[a] by sex in 1880 among farmers in the "pellagra triangle" regions



[a] Ratio of pellagra patients to the segment of the population at risk for the disease, i.e. farmers. In these specific cases, the farmers counted included owners, tenant farmers, sharecroppers and farm labourers on annual contracts.
Source: Annali d'agricoltura, 1885.

Figure 8. Percentage of *pellagrosi* among patients admitted to Ferrara psychiatric asylum in 1879, distributions by sex and age



Source: Bonfigli, 1881.

all persistent amenorrhoea that must certainly have affected fecundity. Table 3 illustrates the main pathologies, either secondary to or resulting from pellagra, affecting female pellagra patients admitted to the Gris pellagra ward in 1908.[14]

Amenorrhea occurs when inadequate nutritional intake causes such severe weight loss that the body can no longer perform metabolic functions or secrete gonadotropins (Alauddin Chowdhury, 1975; Laughlin, 1996, 1999; Warren and Perloth, 2001). Moreover, the weakness associated with pellagra may reduce libido and lower the frequency of sexual intercourse. "Pellagra causes early impotence in men" (Lombroso, 1869) and "numerous cases of atrophied testicles and pubic hair loss" (Marie, 1908). Fertility may therefore have declined in regions severely affected by pellagra, particularly in the last decades of the nineteenth century, characterized by increasing pellagra prevalence and rising mortality rates in Veneto and Lombardy. Several authors have studied the connection between pellagra and fertility in the Veneto region (Livi-Bacci, 1986; Rossi and Rosina, 1998) but no consistent or conclusive results have

(14) The pellagra ward registers listed 167 women and 180 men leaving the Gris Institute in 1908, including 23 women aged 15-28, 20 of whom were cured, 2 hospitalized in another structure, and 1 deceased.

Table 3. Proportion of patients leaving the Gris pellagra ward in 1908 who had been admitted with secondary pathologies or complications (percentage of total patients in each age group)

	Age 15-28	Age 28-42	Age 42-63
Amenorrhoea	11.7	–	–
Menorrhagia	5.8	–	3.4
Metrorrhagia	–	4.3	3.4
Leucohorrea	–	10.8	13.7

Source: Gris Institute registers, 1908.

been obtained. They postulate that fertility decline in the Veneto region from 1871 to 1881 was due to the increase in pellagra and that the waning of the disease produced the opposite effect. First, it is difficult to obtain precise data on the development of pellagra in the Veneto prior to 1870 because the region was under Austrian rule until it became incorporated into the new kingdom of Italy in 1866, and the archives became inaccessible. Furthermore, as the reporting of causes of death began quite late in Italy, it is difficult to verify statistics on pellagra deaths prior to 1881 or even 1888. However, given our present knowledge, the hypothesis that pellagra in the Veneto increased from 1870 to 1880 is plausible (Figure 6); our sources show a general peak around 1880-1881, followed by a gradual decline (Figures 1 and 9).

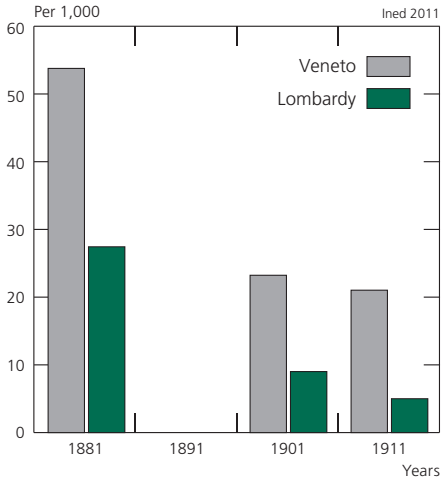
Based on the consistent pattern in terms of prevalence and mortality for the two larger regions of the "pellagra triangle", we can postulate that if B3 avitaminosis had influenced demographic behaviour in the regions affected by it, then Veneto and Lombardy should show the same general birth rate and fertility trends, even though pellagra levels in Lombardy were slightly lower than in the Veneto (Figure 9).

The analysis of birth rates and fertility in Lombardy and the Veneto is based on sources that combine urban and rural data, a fact that may mask trends since pellagra only affected rural populations. However, census data make it clear that the Italian regional landscape in the late nineteenth and early twentieth century – in the Veneto and Lombardy among others – was composed essentially of rural municipalities: in 1881, 99.1% of Lombard municipalities and 98.4% of Veneto municipalities were rural,[15] while for Italy at large the figure was 95%. It is therefore reasonable to conclude that the census data reflect the demographic behaviour of rural populations first and foremost.

Table 4 shows trends in birth rates and fertility from 1871 to 1911 for the Veneto and Lombardy regions in comparison with Calabria, which had no

(15) Rural municipalities were classified by proportion of farmland, structure of the population by farming activity, population size and density of the built-up centre of the municipality, educational levels, settlement characteristics.

Figure 9. Pellagra prevalence rates per 1,000 farmers in the Veneto and Lombardy in 1881, 1901 and 1911



Note: 1911 prevalence rates were calculated on the basis of number of *pellagrosi* in 1910 (assumed constant in 1911) and the census count of farmers in 1911.
Source: *Rivista Pellagrologica Italiana*, 1901; ISTAT, 1881, 1901, 1911.

pellagra, and Italy as a whole. From 1871 to 1881, the fertility of Veneto women fell, but the decline also affected Calabrian women, none of whom had pellagra. Unfortunately, we have no data for 1891 because the census was cancelled, but there does seem to have been a general fall in fertility that was reversed after 1901 in all geographic sectors studied. Behaviour in Lombardy from 1871 to 1901 was very different from that in the Veneto and closer to that of Italy as a whole; we therefore cannot confirm any clear impact of pellagra on fertility. Regarding birth rates, Table 4 clearly shows that the trends in these two regions of the pellagra triangle did not differ considerably from national and Calabrian ones, which fell quite steadily from 1871 to 1911. However, the trend observed in the Veneto might have corresponded to the spread of pellagra, leading to a sharp fall in the birth rate from 1871 to 1881 (also visible in the province of Padua).

Clearly, then, the hypothesis that the decline in pellagra engendered a rise in birth rates can only be validated for Veneto from 1881 to 1901. Everywhere else in that period, the trend in birth rates was downward.

Since pellagra affected two markedly rural regions – Veneto and Lombardy – its effect on their respective birth and fertility rates should have been similar. This was simply not the case. It is likely that Veneto demographic trends were influenced not by pellagra (or only marginally so) but rather by a set of factors that have not yet all been identified. The fall in fertility and birth rates in the Veneto from 1871 to 1881 may have been due to the high emigration rate. According to data from the Jacini agrarian survey, from 1876 to 1880, an average of 33,200 Venetians, 90% of them adult men, left their villages for good each year. This change is also visible

Table 4. Trends in birth and fertility rates (ages 15-49) from 1871 to 1911 in Lombardy, Veneto, Calabria and Italy (per 1,000)

	1871		1881		1891	1901		1911	
	Births	Fertility	Births	Fertility		Births	Fertility	Births	Fertility
Italy	36.5	160.5	36.6	160.9	–	33.1	138.3	32.5	147.7
Veneto Padua	37.4 40.3	170.2	34.9 34.6	158.7	–	36.5	157.6	36.8	173.4
Lombardy Bergamo	37.4 38.8	160.6	36.7 38.6	161.2	–	34.5	142.8	32.8	173.4
Calabria Reggio	38.5 35.1	164.2	37.0 36.6	154.9	–	34.9	140.3	35.9	160.7

Coverage: Live births in and out of wedlock. Fertility rates calculated per 1,000 women aged 15-49 counted in census years.
Source: ISTAT, Sviluppo della popolazione italiana, 1861-1961.

in marriage rates: the number of weddings celebrated in the Veneto plummeted from 1871 to 1901. It is nonetheless very likely that pellagra strongly influenced still birth rates and mortality among young children born to mothers with the disease, though both these rates were high even without the pellagra factor (see, for example, the pellagra-free Ferrara family, Table 1). For this reason, the decline in pellagra from 1901 can be linked to lower neonatal and infant mortality, gradual improvement of living conditions and diet, and systematic decline in overall and pellagra mortality and in pellagra prevalence.

VI. The decline of endemic pellagra

> Malaria and pellagra: the twofold scourge and shame of Italy. So we ourselves acknowledge, and so foreigners define us. But these two ills have been silently diminishing ever since Italy was reconstituted and began to gather strength. Why remain silent about these changes, two great victories for our country? (Coletti, 1922)

Though attested from the late eighteenth century (Frapolli, 1771; Allioni, 1795), vitamin B3 deficiency began to develop and spread in the second half of the nineteenth century (Baruffi, 1847; Balardini, 1862). After peaking in the 1870s and 1880s, the disease began declining in 1881 (Figures 1 and 9; Table 5) and continued to wane despite the food shortages of the First World War. On 26 May 1927, the parliamentary deputy Benito Mussolini declared that the pellagra problem had been entirely resolved.(16)

(16) The very last pellagra deaths in Italy were registered during World War II.

Table 5. Numbers of pellagra cases in 1905 and 1909, new cases registered, and number of pellagra deaths between 1911 and 1920 in the "pellagra triangle" regions

	1905	1909	1911	1914	1915	1916	1917	1918	1919	1920
Lombardy										
Pellagra cases	10,484	9,269	278	241	203	158	80	91	95	26
Deaths			334	207	256	205	227	238	174	108
Veneto										
Pellagra cases	27,764	22,525	818	768	601	363	261	113	249	202
Deaths			531	366	365	382	300	242	248	160
Emilia										
Pellagra cases	3,043	2,431	176	29	35	16	10	19	13	1
Deaths			111	57	60	59	61	47	29	17

Sources : ISTAT, Statistiche cause di morte 1911;ISTAT, Sviluppo della populazione italiana; De Giaxa, 1927.

Several hypotheses can be put forward to explain this outcome. Without any doubt, governmental and municipal measures (such as low-cost inns and kitchens, pellagra wards, the requirement to identify and treat all *pellagrosi*, propaganda in favour of crop diversification), despite their intrinsic limitations, helped bring about this result. And after the First World War, deficiency thresholds and the concept of "vitamin" were defined.

> One reason pellagra decreased and disappeared was the general fall in food prices from the beginning of the twentieth century, which gave many peasants access to a more varied diet. (De Bernardi, 1980)

The fall in food prices was one effect of the agricultural revolution that began around 1870-1880 and which gradually introduced farm mechanization and fertilizers. The industrialization of farm labour, while reducing job supply, led to increased crop yields. More land was devoted to pasture, and this had a positive effect on livestock rearing, thereby increasing meat and dairy consumption. Toward the end of the nineteenth century, the amount of land used to grow maize began shrinking and farmers could now enrich their diet with beets and potatoes (Sorcinelli, 1995).

The high mortality caused by the Great War and the dietary changes that occurred at that time may also have favoured the disappearance of pellagra (Porisini, 1974), but the disease had begun to decline well before war broke out. The war did have an impact but was not the major factor. The permanent emigration of significant numbers of northern Italian peasants worked to redistribute land and improve the living standards of those who stayed behind via a spontaneous mechanism of labour market regulation and land redistribution.

Federterra,[17] the first and main farmers' union founded in 1901, sought to defend its wage-earner members through demands for increased day wages. Strikes became the main instrument in the struggle, and the increase in day labourers' wages thus obtained (Table 6) led to improved nutrition of farm workers that in turn led to the decline of pellagra.

Table 6. Farm worker wage indexes, 1905-1913 (100 = Veneto in 1905)

	Italy	Veneto	Lombardy	Emilia
1905	109	100	110	116
1906	113 – 115	103	113	118
1907	126	113	123	137
1908	126	120	135	151
1909	128	121	135	152
1910	137 – 136.5	130	147	170
1911	141 – 142	122	158	175
1912	145	118	154	174
1913	143	119	156	166

Note: The two figures given for Italy in some years indicate a change in farm wages during that year (rise or fall).
Source: Arcari, 1936.

> It is clear that in the first years of our century, free Italian unions obtained two results: improvements in workers' living conditions and the rapid decline of pellagra. (Di Vittorio, 1945)

Other arguments could be cited, such as the urban industrialization process, which attracted large numbers of unskilled workers from rural areas. Many regular farm workers left the countryside to live and work in cities, mainly in construction or industry (particularly textiles but also the metallurgic industry). This internal "emigration," temporary at first, soon became permanent.

It was the combination of all these factors, including local initiatives, that helped eradicate the disease from the Italian countryside (Finzi, 1981).

Conclusion

B3 avitaminosis is a perfect example of a social disease triggered by the economic norms of a capitalist, productivist agrarian system of the sort facilitated by the political situation of the young Italian state, a system that made maize its single crop and day labourers the disease's primary victims. Moreover, the "comfortable" incomprehension of its aetiology led to a negation of the deficiency doctrine as politically undesirable. The disease was finally eradicated by a set of factors that led to diet diversification. Here, the relations between the changes

(17) Federazione Nazionale dei Lavoratori della Terra.

that forced this population to adopt an all-maize diet and the epidemiological structure of B3 avitaminosis, the deficiency that prevents correct metabolic functioning and so brings on pellagra symptoms, constitute the bases for a study of the social and demographic effects of the disease. Moreover, pellagra is the perfect model of a "social pathology" because of its extremely strong selective impact; the "selection" criteria of the disease are here brought to light and analysed using results from available sources. Clearly it was among the poorest peasant classes, forced into eating little but maize for prolonged periods, that pellagra took its highest toll, specifically in the few regions where new economic motives engendered a high crop yield policy. And as demonstrated by the examples cited above, women were hardest hit by the disease – more so than adult men and children – because of their miserable social and family condition. Women were severely undernourished, particularly in their childbearing years. However, despite the high number of women pellagra victims and claims by some authors on this question, the disease had no clear impact on births and fertility rates in the affected regions.

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Monica Ginnaio • Pellagra in Late Nineteenth Century Italy: Effects of a Deficiency Disease

In many countries across the world at different times, a diet made up exclusively of maize led to the development of B3 avitaminosis, or pellagra. Caused by extremely limited nutrition, B3 avitaminosis is a deficiency disease due to insufficient intake of niacin and tryptophan. From the late eighteenth century up to the time of the First World War, pellagra was endemic in Northern Italy, particularly in the Veneto. The "sickness of the poor" and the turmoil it caused affected a single social class whose diet consisted entirely of cornmeal polenta: farm workers, especially day labourers, a particularly underprivileged occupational category. This multidisciplinary analysis, based on various types of documentary sources, retraces the epidemiological, social, political and demographic mechanisms that led to the spread of pellagra, primarily among women farm workers of reproductive age in the Veneto and Lombardy regions. Observation of the demographic impact of the disease on the female peasant population leads to a discussion of possible effects on the birth and fertility rates of the populations of these two regions in the late nineteenth century.

Monica Ginnaio • La pellagre en Italie à la fin du XIX[e] siècle : les effets d'une maladie de carence

Dans de nombreux pays du monde, à différentes époques, la consommation de maïs comme unique denrée alimentaire a développé la pellagre. Maladie causée par une extrême pauvreté nutritionnelle, l'avitaminose B3 est une maladie de carence due à la déficience en niacine et en tryptophane. Depuis la fin du XVIII[e] siècle, en Italie du Nord et particulièrement en Vénétie, la pellagre demeure endémique jusqu'aux années autour de la première guerre mondiale. Le bouleversement causé par le "mal de la misère" n'affecte qu'une seule classe sociale, celle dont l'alimentation est totalement fondée sur la consommation de polenta de maïs : les agriculteurs, notamment les journaliers, catégorie professionnelle particulièrement défavorisée. Fondée sur des sources documentaires d'origines diverses et entreprise dans une perspective pluridisciplinaire, cette analyse retrace les mécanismes épidémiologiques, sociaux, politiques et démographiques qui ont mené à la diffusion de la pellagre principalement parmi les agricultrices vénètes et lombardes d'âge fertile. L'observation de l'impact démographique de la maladie sur la population paysanne féminine engage une discussion à propos des éventuelles conséquences sur la natalité et la fécondité des populations de ces deux régions à la fin du XIX[e] siècle.

Monica Ginnaio • La pelagra en Italia a finales del siglo XIX: los efectos de una enfermedad por carencia

En numerosos países del mundo, en diferentes épocas, el consumo del maíz como alimento exclusivo ha provocado la pelagra. Enfermedad causada por una pobreza nutricional extrema, la avitaminosis B3 es una enfermedad por carencia debida a la deficiencia en niacina y en triptófano. Desde finales del siglo XVIII, en Italia del Norte y particularmente en Venecia, la pelagra subsiste en forma endémica hasta la Primera Guerra mundial. La convulsión causada por le "mal de la miseria" afecta a una sola clase social, cuya alimentación está exclusivamente fundada en el consumo de la polenta de maíz: los campesinos, y sobre todo los jornaleros, categoría particularmente desfavorecida. Basado en fuentes documentales de origen diverso y conducido con un espíritu pluridisciplinario, este análisis reconstituye los mecanismos epidemiológicos, sociales, políticos y demográficos que han llevado a la propagación de la pelagra, principalmente entre los campesinos venecianos y lombardos de edad reproductiva. La observación del impacto demográfico de la enfermedad en la población campesina femenina lleva a una discusión sobre las eventuales consecuencias en la natalidad y la fecundidad de la población de estas dos regiones a finales del siglo XIX.

Keywords: Italy, nineteenth century, avitaminosis, pellagra, mortality, social disease, rural world, gender history

Translated by Amy Jacobs.