

# Improving Public Health in France. The Local Political Mobilization in the Nineteenth Century

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With hindsight one of the achievements of the rich countries has been to reconcile tremendous social changes with remarkable improvements in health. For instance, the life-expectancy for French women has increased from 35 years to 83 years since the eve of the French Revolution (Appendix table 1). Despite industrialisation, urbanisation and rural de-population, which have changed the conditions of living, the environment and the economic origin of the family means, the improvement has been incredible. But this does not imply that there has been a smooth evolutionary improvement for the whole population. On the contrary, during several decades, the first industrialization led to increases in mortality (and probably increasing morbidity) among the workers and the urban poor population, especially the children.

In fact, to appreciate the links between social change and health, scholars have to pay attention to different analysis scales.<sup>1</sup> The chronological scale first, because the social change effects on health improvement have not been immediate, regular or constant – an increase of the mortality can even be the first consequence of a social change. The geographical scale is also important because the economic and social change occurred first at a local level, and surveys at a national or regional scale can immerse these changes. Taking into account the social scale is fundamental because specific categories, new industrial workers or women or children have been more exposed than the others, and were, at least during a first phase, the main losers of the evolution. The three dimensions, the three scales, have to be connected to each other.

I propose here, after a global perspective on life-expectancies, to focus first, at a local level, on an example of the consequences for mortality and health of the 19<sup>th</sup> century industrialization. The ways in which the industrial and urban penalties have

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<sup>1</sup> Jacques Revel, *Jeux d'échelle, la micro-analyse à l'expérience* (Gallimard-Le Seuil, Paris, 1996).

been solved lead me to pay more attention to the local policies and municipal initiatives. In the third part of this paper I will emphasize on a French specificity: the importance of municipal, state and public institutions in the field of Public Health and assistance. In other words, who were the main victims of the mortality-increase in the industrial cities? What was the influence of employer's policies-specific to industrial towns-in reducing level of mortality? More generally, how have the policies to improve public health developed? What scale? What political leaders? What ideas?

## The Global Evolution

At the national level, life expectancy curves indicate that the crisis have been first linked to the wars periods, striking mostly men: the end of the first Empire (1812–1814), the First and Second World Wars (figure 1). When life expectancy for women decreased, it is the result of a surge of epidemics, smallpox, measles, dysentery in 1871, and Spanish influenza in 1918–1919. At the national level, the consequences of the industrialization process or of the urbanization are not very obvious, except during the decades 1840–1850 when the trend stagnated. What is interesting is the differential increase of the expectancy for each sex since the late 19<sup>th</sup> Century with a growing gap until the 1950s. It is also clear that the curves continue their progression after the wars.<sup>2</sup>

In spite of a tremendous social change over the 19<sup>th</sup> Century, life-expectancy began to increase, especially in the last third when important policies to fight against infant mortality were implemented and when the main industrial centres completed their rapid growth period. But men were more vulnerable than women, with working conditions, professional illnesses, consumption of alcohol and tobacco supposedly explaining the differences. Since the Second World War the cross-sectional values of life tables are more regular than before, emphasising that the sanitary situation and the epidemics are under control. To examine more precisely the links between social change and health the local scale is necessary.

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<sup>2</sup> Many thanks to France Meslé and Jacques Vallin for having open us their annual reconstitution of the French Life expectancy.

Figure 1. Life expectancy. France 1806–2001.



Source: see note 2.

## The Health Effects of Industrialization and Urbanization

The consequences of the new economic conditions, the large industries (textile first and then, mines and metal plants) on the health of the workers in both England and France, have been the centre of the political debate for several decades. The danger for children's health has been emphasised on the both sides of the Channel, from the beginning of the 19<sup>th</sup> century. The new economy was accused of using children as slaves and to cause weakness, malformations, severe illnesses, and very often to anticipate their death.<sup>3</sup> On the other side, the industrialists advocated that industry was the cause for a new prosperity and better health.<sup>4</sup> On the both sides of the Channel the first sociological surveys were organized.<sup>5</sup> In France, several surveys to analyse what were the new conditions of living of industrial workers and urban

3 Christopher Hamlin, *Public Health and Social Justice in the Age of Chadwick, Britain, 1800–1854* (Cambridge University Press, 1998).

4 Andrew Ure, *The Philosophy of manufactures; or an Exposition of the scientific, moral and commercial economy of the factory system of Great-Britain* (London, Charles Knight, 1835).

5 Edward Palmer Thompson, *The Making of the English Working Class* (London, Victor Gollancz, 1963).

population and the origins of the dysfunction's were done in the 1830's.<sup>6</sup> In the most famous, Villermé tried to show that the situation was bad, and worse in the industrial cities. At the end of his own work he reconsidered the results given by M. Ure who had found the cotton industries to protect children from cholera and the development of scrofula. The heat in the industrial buildings, the quality of food and of clothes allowed by high wages were benefit for them. Ure even insinuated that the rural population has a worse health that the manufacture's one. Villermé emphasised that these assertions were probably a response to Michael Saddler's contradictory thesis. In contrast, Villermé tries to maintain a critical position in front of all the studies. It is the reason why he chose statistics published by the Houses of Communes, giving some indications on mortality and average life for counties and districts. The data are all the more relevant as they have not been organized to answer to that specific question. Splitting the industrial counties and districts from the agricultural ones, he finds strong evidences that the mortality was higher in the former compared to the latter. He calculated that of 10 000 children born, 4 457 reach 40 in the agricultural area, 4 124 in the districts partly agricultural, partly industrial, and 3 541 in the manufacture districts. He also shows that the mortality between 0 and 10 years old and the mortality from 10 to 40 were ranked similarly.<sup>7</sup> It was not really a surprise for him, because some data collected for Mulhouse, the large textile centre in Alsace region, gave more or less the same results. Life expectancy had declined from 25 years in 1812 to 21 in 1827, during the industrial growth (but he also emphasised that this was still a better performance than Leeds). Villermé emphasised that even if mortality is not the direct consequence of the industrial work but the result of the living conditions near the factories, of the housing conditions, industrialisation was still responsible for the deterioration.

As for the increase of the urban population, Villermé was the first to conduct an extensive study of the mortality differences among the Parisians during the 1820's. His papers published by the new *Annales d'hygiène* contributed to the emergence of a new paradigm. Traditionally, in these decades, the neo-Hippocratic thesis dominated medicine and the explanations for mortality differences were seen in the level of hygrometry, direction of the wind, orientation of the streets and of the flat's windows, or the distance to the Seine river, or the altitude etc. With the censuses data and vital registration for each "arrondissement", Villermé was able to show that mortality was not linked to these environmental factors but mainly to the degree of the individual wealth of the arrondissements. It was a total break from the

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6 Kate Lynch, *Family, Class, and Ideology in Early Industrial France* (The University of Wisconsin Press, 1988).

7 Louis-René Villermé, *Tableau de l'état moral et physique des ouvriers employés dans les manufactures de coton, laine et de soie* (1840, reprint EDI, Paris, 1989), 513–518.

**Table 1.** Mortality rates among young children, 1847–1857 (per thousand).

Country/City	Infant mortality		Mortality in ages 1–4		Mortality in ages 5–9	
	Males	Females	Males	Females	Males	Females
France	180	157	130	130	47	50
Lyon	–	194	–	174	–	63
Le Creusot	207	163	197	217	137	147
Mâcon	139	121	145	176	59	58
Seraing	214	188	261	254	101	85

**Sources:** Lyon; Samuel Preston and Etienne Van de Walle, 'Urban French Mortality in the Nineteenth Century', *Population Studies*, 32,2 (1978), 275–297. Le Creusot; Bourdelais and Demonet, (2000). Mâcon; Research to be published by Patrice Bourdelais and Michel Demonet, on the French urban mortality (1861). Seraing; Suzy Pasleau, *La formation d'un prolétariat industriel, Seraing 1846–1914*, (Thèse de l'Université de Liège, 1990); Michel Oris, 'Mortalité, industrialisation et urbanisation au XIXe siècle', Pp 252–281, in *Dix essais sur la démographie urbaine de la Wallonie au XIXe siècle*, édité par Desama (Claude et Michel Oris, 1995).

traditional view, it oriented the mortality analysis towards a social perspective in the analysis.<sup>8</sup>

In the Parisian case, social changes led directly to the degradation of health for the new population. In the context of the then dominant paternalist policy paradigm, these numerous surveys and the debates around the negative consequences of industrialisation and urbanization had a major influence especially with respect to employers' obligation towards the workforce. We could follow the Mulhouse case studied by Florence Ott<sup>9</sup>, but it is not the only example. Another one is offered by the metal industrial city of Le Creusot in which the mortality has been systematically reconstructed.<sup>10</sup> It is clear here that the increase of the city led to a big decline of the life-expectancy.

We propose first to place the mortality of Le Creusot in its geographical context, in relation to other towns in the same department (Saône-et-Loire), to the neighbouring city of Lyon, to France as a whole and to another industrial town, Seraing. All of our previous studies have shown the importance of mortality up to

8 Ann La Berge, *Mission and Method. The Early Nineteenth Century French Public Health Movement* (Cambridge University Press, 1992); Patrice Bourdelais, *Les épidémies terrassées. Une histoire de pays riches* (Editions de La Martinière, Paris, 2003).

9 Florence Ott, *La Société Industrielle de Mulhouse, 1826–1876, ses membres, son action, ses réseaux* (Presses universitaires de Strasbourg, 1999).

10 Patrice Bourdelais and Michel Demonet, 'Demographic Changes in European Industrializing Towns. Examples and Elements for Comparison', *The History of the Family. An International Quarterly*, 5, 4 (2000), 363–372.

**Table 2.** Mortality rates in Le Creusot, 1833–1839 (per thousand).

Age	Males	Females
Infants	130	120
Ages 1–4	81	97
Ages 5–9	89	95

10 years of age; our comparison will thus concentrate first on infant mortality and then on the age groups 1–4 and 5–9 years.<sup>11</sup>

In the middle of the nineteenth century, the mortality rate for Lyon – the nearest city to Le Creusot – was higher for all ages in comparison to the mean mortality of a largely rural France. The gap between Lyon and Le Creusot was, however, even more important between the first and fifth birthdays and especially between the fifth and tenth. At the latter age, mortality in Le Creusot was three times higher than mortality in France, and over twice as high as mortality in Lyon (which was already 26 % above the average rate for France). For the industrial city, it is not rare that the mortality quotient between 1 and 5 years is superior to that of infant mortality. The coal-mining town of Seraing near Liège in Belgium, cradle of the Cockerill factory and thus very similar to Le Creusot in socio-economic terms, offers another point of comparison. While the mortality rate of Le Creusot from 1–4 years is high when measured by the general mortality rate for France, when compared to Seraing, it stands out by its high mortality rate among children over 5 years of age. In contrast, infant mortality and mortality from the 1st to the 4th birthday are lower in Le Creusot than in Seraing.

A Belgian study has shown that by the end of the century mortality increased in proportion to the size of the town considered.<sup>12</sup> English studies have come to the same conclusion.<sup>13</sup> As for Le Creusot and its surroundings, the overall relation between the size of the town and levels of mortality is perceptible, but there is an additional factor, which appears to characterize the mortality here. The question

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11 Patrice Bourdelais, 'Infant mortality in France, 1750–1950, Evaluation and Perspectives', in *The decline of infant mortality in Europe –1800–1950– Four national case studies*, ed. Carlo Corsini and Pier Paolo Viazzo (Florence, UNICEF, 1993), pp. 51–69.

12 Thierry Eggerickx and Marc Dubuisson, 'La surmortalité urbaine : le cas de la Wallonie et de Bruxelles à la fin du XIXe siècle (1889–1892)', *Annales de Démographie Historique*, (1990), 23–41.

13 Gerry Kearns, 'Le handicap urbain et le déclin de la mortalité en Angleterre et au Pays de Galles 1851–1900', *Annales de Démographie Historique*, (1993), 75–105 ; Naomi Williams, and Chris Galley, 'Urban-rural differentials in infant mortality in Victorian England', Conférence on 'The European decline of infant mortality', Istituto degli Innocenti, Florence, 5–7 décembre 1994 (1994).

**Table 3.** Life expectancy at birth, at 5 and at 10 (in years).

Year	E0 Males	E0 Females	E5 Males	E5 Females	E10 Males	E10 Females
1836	37,2	42,1	41,3	47,9	40,0	47,6
1846	32,8	30,9	43,7	41,8	44,3	42,3
1851	32,1	32,1	45,6	42,8	48,3	45,8
1856	29,7	32,5	42,2	43,3	42,9	44,6
1861	31,6	34,6	47,2	46,7	49,3	48,6
1866	36,2	36,8	48,2	47,0	47,6	46,9
1872	35,7	37,5	44,2	47,4	43,4	47,2
1876	37,2	42,5	48,7	53,8	46,6	52,1

therefore arises as to whether it is as a result of industrialization or rather the rapid population growth, which followed that industrialization and made it possible?

The chronology is important to understand what happened. In the case of Le Creusot, the years 1846–1866 constituted the heart of the phase of paroxysmal growth, with annual rates reaching 10 %. Can, therefore, the increase in mortality be traced back to the town’s demographic surge and industrialization?

In 1836, when Schneider bought the Creusot factories, the site – with some 2 300 inhabitants – was neither a town nor an industrial centre faced with an influx of large workforce, but a village, with some little forges and one cristallerie, which had more or less vegetated since the French revolution. Life tables calculated for the years 1833–1839, give a proxy for the mortality in Le Creusot before its massive growth. Although the limited numbers surveyed and the probable modifications with the population structure between 1833 and 1839 prevent one from commenting on small disparities, the results are spectacular:

Mortality was still fairly low, even if the level for 5–9 years old was already high compared with that of the two previous age groups. Life expectancy at birth at the time was 36.9 years for men and 42 years for women, owing to a net excess-mortality among men of 15–35 years during the median period of professional activity. But twenty years later, life expectancy was only 31.1 years for men and 31.6 for women. The years of massive industrialization and rapid population growth thus correspond to a loss of over 6 years of life expectancy for men and over 10 years for women.

Women were the main losers of these changes. Is one to suppose that in an industrial town deprived of wage-earning activities for women, girls were less brought up with care than boys? Yet in Seraing, which had the same employment situation, excess-mortality among girls was not perceptible; it was, however, in 1861

in Elbeuf, where textile works provided plenty of possibilities for the feminine workforce. No conclusion can therefore be drawn on this point as long as results appear to contradict the hypotheses when various towns or industrial centres are compared. Nevertheless, the effects of industrialization and the influx of workforce on the mortality rate of a given site appear to be undeniable.

But for young adults, their mortality increased, in particular among young women. We have shown that the age of marriage decreased markedly between 1836 and 1856, thus rendering the proportions of those at risk through childbirth greater at the end of the period in question. Given such a hypothesis, it would seem that the sanitary conditions in which women gave birth had also worsened.

### An Excess-Mortality Among Immigrants?

Lately, one of the most debated questions has been whether the increase in mortality was due to recent immigrants who had a hard time adapting to new surroundings or rather to those individuals who had already lived in the town for a period of time and been worn out by hard work and a awful environment? By reconstituting the population of Le Creusot and linking the longitudinal data, it is possible to measure the mortality of both sub-populations. Recent immigrant women appear to have died more frequently than those already installed in the town for the age groups 5–9 and 30–34 years.

If one now compares the evolution of mortality in Le Creusot with that of the whole of the French population between 1836 and 1876, one detects certain particularities for Le Creusot, but also very many resemblances, in particular in the evolution from one census to the next one. Whatever the date examined, excess-mortality in Le Creusot for 1 to 4 and especially for 5 to 9 years old is indisputable. When one compares the evolution of mortality quotients over the twenty years for Le Creusot and for France as a whole, one is struck by a very strong resemblance, although the divergences are larger in Le Creusot particularly amongst women in 1876. In both cases, the evolution is not regular, but follows a series of advances and retreats. This is rather surprising, but may point to the importance of conjuncture of the epidemiological context.

There are also notable differences between men and women. Whether for France in general or for the town of Le Creusot, life expectancy varied much more among men than among women. In both cases, the years 1861–1876 were favourable to women of almost all ages, except perhaps for elderly women; on the other hand, life expectancy dropped fairly quickly for men after their 10<sup>th</sup> birthday. It should finally be noted that variations among men were particularly prevalent between the fifth and twentieth birthdays; afterwards, they tended to diminish for

France, while remaining rather important in Le Creusot. Overall, if one considers globally the period 1846–1876, women of all ages and in both cases – albeit much more massively in Le Creusot – gained in number of years left for them to live. Their life expectancy rose back up to 42.5 years, close to that they had known in 1836 (42.1 years). For men, however, this bonus disappeared by the 20<sup>th</sup> birthday for France in general, and turning into a deficit by the 25<sup>th</sup> birthday in Le Creusot,

One further element is worthy of note: the growing gap between men and women in Le Creusot in 1876. From the age group of 10–14 years upwards, women – especially until the ages of 35–39 years – died in far fewer numbers than their masculine counterparts. And yet on the national scale – except, to a certain extent, for the age group of 20–24 years – one would have to wait 40 years for feminine mortality to become slightly inferior to that of men. Could this be explained by the effects of poor working conditions – fatal accidents and injury?

Arduous working conditions, mining or factory accidents account for the high level of masculine mortality compared to that of young women of the same age (15–35 years). This is especially during the initial industrialisation phased in 1836. Later on, masculine mortality fell at a time when feminine mortality was on the rise, so that the gap diminished. Industrialization does not seem thus to have directly incurred over-mortality, especially as women in Le Creusot participated only very marginally to production.

As to the middle – and long-term effects of pollution (often described as spectacular) on the health of the population, they are impossible to verify, although there is no dearth of written accounts. In the 1870's, the pollution was so intense in the poorly ventilated valley where the waste from the mine and factory hovered over the town, that the Director of the factory works, Emile Cheysson, left the town abruptly in order to preserve the health of his wife, who did not tolerate well the smoggy environment. The number of cases of chronic bronchitis, so weakening to the organism, must therefore have been very high.

In conclusion, it would appear as if public health measures, the development of individual housing, water supply, garbage disposal, a hospital, consultancies and free treatment, as well as the acquisition of the principles of individual and family hygiene were indispensable in compensating for the negative effects linked to population growth. The life expectancy at birth among inhabitants of le Creusot in 1836 was thus attained once more in 1876, after forty years of worsening living and environmental conditions. The paroxysmic phase would appear to be that of very high mortality rates, whereas the consolidation of the phase signalled the return to levels of mortality preceding the surge in population growth.

# The City: The First Scale for Public Health Intervention:

## *The Le Creusot Example*

The experience of Le Creusot in France or Seraing in Belgium illustrate the challenges major companies faced in organising accommodation for their growing workforce. Initially this was of no concern to them, but the inability of the private market to provide enough houses and flats led them to play an increasing role in the organisation of the city. Starting with little caserns they quickly moved building little houses with gardens as a bulwark against the rising threat of socialist radicalism. There was also a more direct utility for the industrialists in having a workforce close to the factories.

In the case of Le Creusot, it is possible to follow very precisely how the initiatives converge to improve public health. The analysis of mortality has brought to light certain particularities which are worth considering. First of all, the surprising mortality rate among children up to 10 years, especially between 5 and 10 years. It has been known for years that mortality among 1 to 4 years old is an excellent indicator of conditions of hygiene and healthiness in which young children live. This is much more true than for infant mortality, since infants benefit for a time from maternal immunity and from the mother's antibodies through breastfeeding. While infant mortality is generally high, it is not particularly so in Le Creusot, where young children died mostly in late summer and early fall, the usual time for gastro-enteritis and epidemics such as scarlet fever. According to Dr Cancal, the Creusot children, "frail and sickly scrofulous and syphilitic", died in large numbers: out of "300 cases in 1857, 193 died of gastro-enteritis". The measure lacks the precision one would wish, but Dr Cancal indicated that between 1854 and 1858, out of a total of 3 482 births, 729 deaths from gastro-enteritis were recorded among young children.<sup>14</sup>

Lists of causes of death were kept with great care by physicians and have survived for the years 1857 and 1858. In Le Creusot, Dr Cancal appears to have made a conscientious listing insofar as the columns headed "other causes" (including still-births) and "unknown causes" account for 13 % of the cases only, out of a total of 895 deaths. The principle causes of death, for the whole of the population, were the following:

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<sup>14</sup> Dr. Cancal, 'Note à M. le Dr. Carion, médecin des épidémies de l'arrondissement d'Autun' (Académie François Bourdon, Le Creusot, March, 1859).

**Table 4.** Major causes of death reported. Le Creusot 1857–1858.

Causes of death	% of total deaths
Measles	2.0
Croup	4.8
Meningitis, convulsions	6.0
<b>In total</b>	<b>12,8</b>
Catarrh, pleurisy, pneumonia	7.2
Pulmonary consumption	8.9
<b>In total</b>	<b>16.1</b>
Typhoid	3.8
Enteritis	29.6
Dysentery	4.9
Diarrhoea	7.4
<b>In total</b>	<b>45.7</b>

The “sickness of the digestive organs”, suffered mainly by “young children”, come far ahead of all the other causes of death according to the cross-checkings established from different evidence assembled by Dr Cancal (193 out of 212 deaths in 1857 and 137 out 163 in 1858).

These findings direct attention to the quality of the water supply. In spite of the influx of workforce, the number of wells remained small, leading to ever greater water shortages in the 1850's. It is estimated that the 16 000 inhabitants consumed only 100 cubic meters of water per day (that is, six litres per person, per day!). The shortage was so severe, that the water reservoirs of Riaux and Forge of 200 000 cubic meters were rapidly consumed by the factory at a rate of 3 000 cubic meters per day, forcing the workshops sometimes to close down. In the town as a whole, there was only one source of water which was abundant and did not dry up: the Riaux springs. On the hottest summer days, water merchants went to fill their vaults from the mountain springs near Le Creusot and sold it to the town dwellers. It is easy to imagine that the modest consumption of water, which was at once expensive, hardly fresh and probably polluted, could not but begin harming the youngest organisms as early as August.

Between 1862–1864, a stream was captured in the neighbouring hills and eased the situation though many people still had to rely upon water fountains. However, the very prominent reduction of mortality in infancy by 1876 seems to have resulted, at least in part, from the introduction of water distribution. Preston's and Van de Walle's demonstration of a strong relationship between the implementation of water supply and sewages and decreases in mortality in Lyon, Paris and Marseille

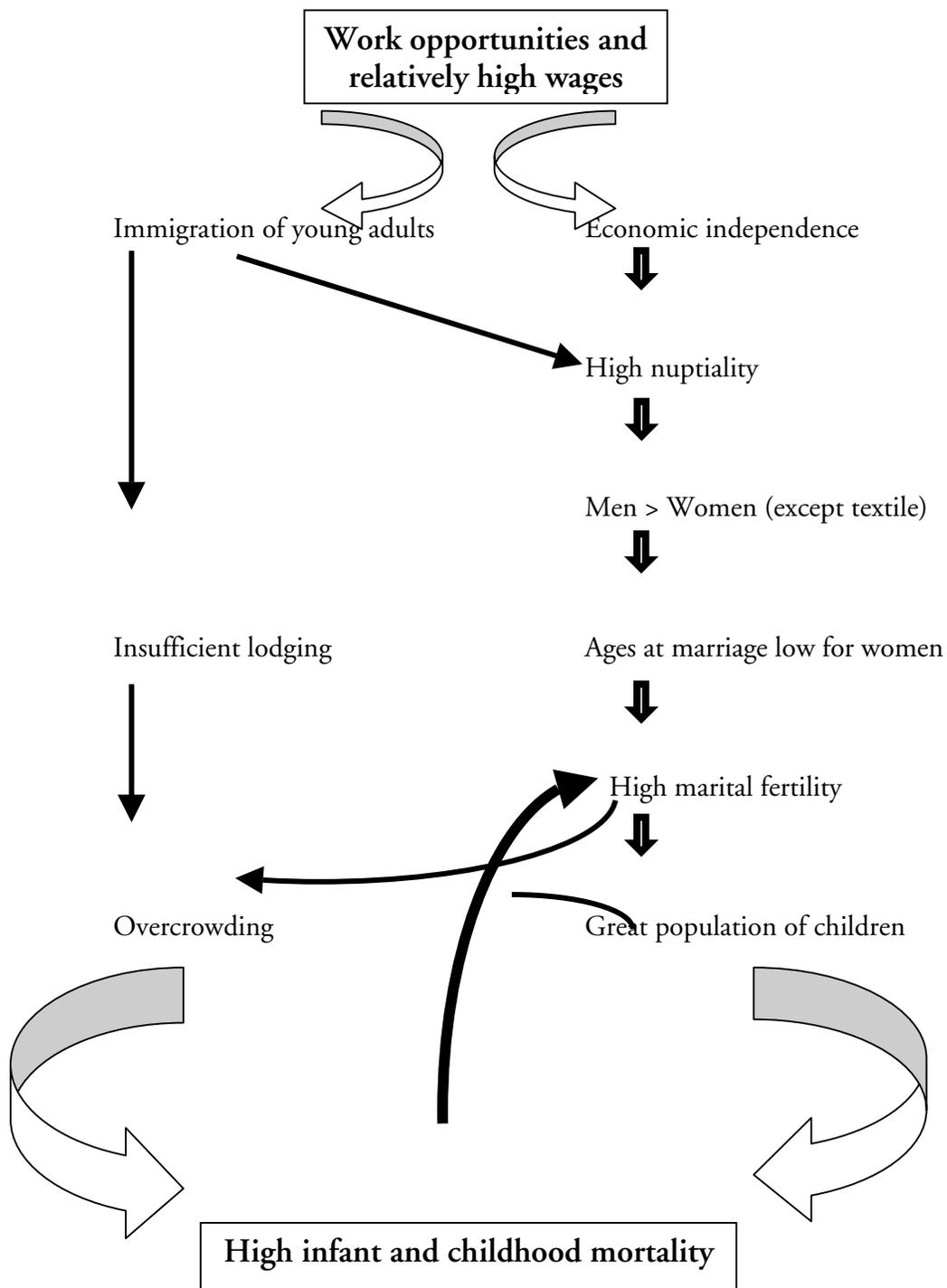
seem to be confirmed in a little industrial town too. Nevertheless, even in 1876, mortality among the 5–9 year-olds was still much higher in Le Creusot than in the rest of France (6 per thousand instead of 3!). Water being still no doubt scarce, the summer of 1873 saw another water shortage, for the population of the town had grown by some 8 000 inhabitants since the early 1860's.

Public health improved slowly: in 1867, a general service of garbage and waste disposal was introduced, while a slaughterhouse was not built until 1879. Besides these public hygiene shortcomings, causes of mortality were also to be found in housing. Construction could not keep pace with the rapid population growth of 10% per annum between 1846–1866. A juxtaposition of permanent constructions, workers' barracks and make-shift dwellings haphazardly lined along the roads which crisscrossed the town. Certain neighbourhoods of Le Creusot must have resembled the slums of modern third-world cities, in which child mortality is likewise very high. Respiratory ailments, particularly tuberculosis, came second in causes of death for the years 1857–1858, without any noticeable imbalance between the sexes. Young girls were not kept inside by activities linked to the nearby textile industry or to needle work distributed merchant-contractors.

Such housing and hygiene conditions were probably the cause, at least in part, of feminine excess mortality in early childbearing years. For young women newcomers these risks were compounded by their lack of social relations in the new environment which might have allowed them to secure more hygienic childbirth conditions and assistance based on mutual aid (the number of midwives was very small). The lack of social capital could be one of the factors of their high mortality. However, in this case too, mortality had receded significantly by 1876. The parsimonious distribution of water is not enough to explain such a significant decrease. This raises the question of the possible effects of employee policy.

The Schneiders were faced with the obligation of organizing a small village into a town whose population was increasing relatively to the rate of development of the factories. They rapidly set up a church, a school, took charge of refuse collection and urban planning and then housing for their workforce. The construction of districts and then of sorts of housing lots was undertaken as early as 1856 (rue de Montchanin). It was marked by a sudden increase in numbers of advances ceded to the personnel (predominantly to pay for the housing). The total sum of advances came to 150 000 francs in 1856, the first noted maximum to 100 000 francs in 1860 when the Boulevard du Guide was constructed, then to 440 000 francs in 1856, when the building of the Sablière, Villedieu and Saint-Charles was launched. Between two large operations, the annual sum leveled off at 25 000 francs. At the end of the period studied the construction of Croix-Menée was launched and the advances went from 11 000 francs in 1874 and 1875 to 150 000 francs in 1876, 118 000 in 1877 and again to 118 888 francs in 1878. Such successive incentives

Figure 2. The Demographic Pattern in the «Paroxysmic Phase»



towards constructing small houses with gardens produced an unquestionable improvement in housing conditions in the Creusot area (for example, 150 houses were built in the sole operation of Villedieu).

Housing conditions improved all the more after 1870 with the considerable decrease in the rate of population growth. In 1863, Schneider opened a hospital in which his workers and employees, their wives and children under 15 years were treated without charge; three consultancies were created within it as well as pharmacies. The level of medical efficiency was certainly not very high, but elementary advice on hygiene could thus be given to mothers and an awareness of health was allowed to develop. Nor can one neglect the consequences of free schooling for boys and girls. Future mothers were able to acquire notions of family hygiene which may have contributed to the aforementioned accelerated decrease in mortality.

The relatively lower mortality among young masculine immigrants in Le Creusot during the period which marked the greatest cramming and promiscuity requires some explanation. One can argue that those who emigrated from the country to the town were the strongest peasants – a form of selection bias. In such a hypothesis, the selection would not have come into play for their wives, who simply accompanied their husbands, which would explain their high mortality rate compared to local women. Finally, it is not impossible that the young men who immigrated to Le Creusot had become progressively used, thanks to their former temporary migrations, to a new bacterial environment, while their wives had not had such an opportunity before settling in Le Creusot. Both explanations are more complementary than antagonistic. And Le Creusot is not an exceptional case.

### *The Others Cities*

The growth of industrial workforce is not the only explanation for the new local policies that appeared in several French cities during the first decade of the Third Republic. The phenomenon of the high mortality in some poor urban districts was clearly known and for the new local elite – republican – it was no longer possible to be apathetic. At the same moment, the multiplication of international scientific conferences on Public Health highlighted the creation of *Municipal Board of Health* in Brussels (created by Dr. Janssens in 1863) and Turin (1864).<sup>15</sup>

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15 Anne Rasmussen, 'L'hygiène en congrès (1852–1912): circulation et configurations internationales' in P. Bourdelais, *Les Hygiénistes, enjeux, modèles et pratiques* (Belin, Paris, 2001), 213–239; Serenella Nonnis Vigilante, 'Idéologie sanitaire et projet politique. Les congrès internationaux d'hygiène de Bruxelles, Paris et Turin (1876–1880)', in P. Bourdelais, *Les Hygiénistes, enjeux, modèles et pratiques* (Belin, Paris, 2001), 241–265.

Following these conferences men such as Dr. Gibert of Le Havre succeeded in convincing the majority of the town council of the utility to create such a Board. But not without difficulty. Between the opposition of the doctors who fear the loss of potential customers and the city council men who do not want to engage in any additional expenditure, the way is narrow. In order to convince the local elites and public opinion, Dr. Gibert leaves on mission to Brussels and addresses five letters to a newspaper of Le Havre so that it publishes them.<sup>16</sup> Even if the rhetoric of these letters is that of a political operation of promotion and a setting in scene of the medical claims, it is also a vibrating plea in favour of medical progress.<sup>17</sup> After stating his admiration for the whole of the organization, Dr. Gibert shares with his reader the visit to the office of the director of the Board of hygiene, Dr. Janssens. “Here you find a chart of the town of Brussels, constellated with a quantity of small red, green points, blue, etc. You approach, each coloured point is a head of a pin; each pin, according to its colour, represents a disease. Each day Dr. Janssens pricks these pins; thus, the smallpox is represented by a blue head, the typhoid fever by a red head, etc. It does not insert the pin of the day, it leaves it left all its height. Then, this made work, the chart is carried the evening, each evening, in the Mayor office, who, after having examined the new cases of contagious diseases, inserts the pins.” Thus, it adds, the mayor seizes in a simple glance which are the epidemic dangers and what is the trail of the disease. Information is collected by the doctors who, vis-à-vis a case of “smallpox, scarlet fever, measles, typhoid fever, typhus fever, Asian cholera, diphtheria, epidemic dysentery”, fill an *avis sanitaire* addressed to the Board of Hygiene; they indicate on it the name, the age and the residence of the patient while respecting the professional confidentiality thanks to the use of a numbered nomenclature of 116 causes of death. Each day, the municipal administration thus knows the magnitude of all new epidemic and can take adequate measurements. In the event of smallpox, for example, all the inhabitants of the house and street concerned are vaccinated or revaccinated. All clothing and pieces of furniture of the patient are disinfected, and the patient isolated as far as possible downtown, or at the hospital in a service specific to the contagious patients. The Board of Hygiene also organizes daily and free vaccinations; moreover, all the pupils of the schools are revaccinated. If it is about the typhoid fever, as soon as a case is announced, the Office of Hygiene makes make an accurate check of the roadway system of the district, and particularly of the sealing of the sewers and water pipelines.

On the question of the unhealthy flats, very sensitive since the law of 1850, Dr. Gibert stresses that in Brussels, the commission of the unhealthy flats is joined

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16 Bourdelais, (2003).

17 Dr. Gibert, *Une visite au Bureau d'hygiène de Bruxelles* (Imprimerie F. Santallier, Le Havre, 1878a).

together at the Board of Hygiene, so that “the municipal administration has any authority to make carry out by the owners the improvements which the Board of Hygiene will have asked for”, it is also a judge of the conformity of work completed. It describes finally the organization of medicine in the Brussels schools. Each school is visited once per week, which makes it possible for the doctor to identify the children with any contagious disease of the eyes, skin, scalp and to exclude them until their cure. He must give a brief lecture also there on this disease observed at one of the pupils or on another epidemic. Gibert underlines the double utility of these lectures because “the children admirably retain all that one says to them, and will repeat at home these precepts of hygiene which penetrate more easily in the families in this manner than by the book or the journal.”

He completes his last letter by tackling the budgetary matters, to which the city council men are necessarily very attentive. “Thanks to a weak sacrifice, the administration saves many human lives, and it can be proud justifiably to have given to all Europe a similar example to follow.” Nevertheless, by mentioning the level of the wages of the doctors of the Board of Hygiene of Brussels, he insists on the need for also remunerating them by Le Havre: “Pay your doctors well, otherwise you will not have anything. If you do not want to pay well, do not do anything. That is worth better.” These words are more poignant coming from a doctor who established the first dispensary for children in France, on his own capital stocks, in Le Havre in 1875, and which gave free consultations every morning! Like all the medical hygienists, he is convinced that this prevention policy will result in substantial savings on the budget of the hospital and that of the medical care.

In the creation of a Board of Hygiene in Le Havre, presented in front of the town council of the city, Gibert insists on the eminent place that medicine must occupy in the management of the city.<sup>18</sup> He succinctly captures the thoughts of the medical ambitions and hygienists of the time. “If the social life did not profit yet from all the progress made by medicine in our century, the fault is especially with the routine which did not make it possible for the Doctors to up to now take in the social body the place to which they have right, and to be made the popularizers of the scientific conquests that they only can know and make.” A Board of Hygiene would fill four principal gaps of the existing systems: the timely monitoring of epidemics; the roadway system and initially sewers and drainings (always the question of the sealing of the sewers, the use of the mobile tubs and the conditions of removals of the refuses); the unhealthy houses (the law exists but is not applied, the Board of Hygiene would centralize the complaints, would supervise the completions of the work prescribed by the Commission of the unhealthy houses);

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18 Dr Gibert, Fauvel and Lafaurie, *Création d'un Bureau d'hygiène municipale* (Imprimerie Alphée Brindeau et Cie, Le Havre, 1878b).

medical care (organization of the helps in residence, of means of bandage and treatment distributed by districts, in order to prevent that the hospital becoming “the rendez-vous of all the wrecks of the social life”). The Board of Hygiene must also deal with the protection of the infants, of the ergonomics of the school furniture as well as of the infectious diseases present in the schools, as well as organization of baths for children.

Gibert by insisting on the relevance of the municipal scale of the Board of Hygiene, because “the municipalities, generally, do not listen or listen only imperfectly and almost never seriously into practice do not put the opinions of the Councils of hygiene, departmental and of arrondissement.” Lastly, typical of the French elites, it does not fail to locate the efforts requested from the point of view of the demographic safeguard of France: “A stronger reason the country will have it the right to be applauded to have granted to hygiene its true place in the social life, if each year a more considerable number healthy and robust defenders is preserved for the army, if a more crowd of arms is preserved at her workshops of all kinds, and if a greater number of girls are prepared, by a salutary education, with their role of mothers... we are not the first in the production of the human life, now be the first in the economy and the saving of this treasure incomparable.”

Demographic fear and particularly the spectacle of the catastrophic mortality which accompanies the urban growth at the end of the Second Empire are also at the origin of the pleas in favour of the creation of Board of Hygiene in Nancy, Rheims or Grenoble. In the latter, Dr. Berlioz presents at his project of creation of Board of Hygiene at the end of the 1880's and highlights on the high level of mortality in his town compared to other comparable cities. He also highlights the extent of the fall recorded in the cities, which obtained this device and quotes the example of Glasgow. Lastly, insofar as the Board mainly make it possible to fight against the epidemic mortality, which accounts for 20% of the whole of mortality in Grenoble, its effectiveness would be significant.<sup>19</sup>

The first Board of Hygiene is created, after a year of committee work, by the municipality of Le Havre in March 1879. It soon is followed by Nancy the same year, then by others towns: Rheims (1881), Saint-Etienne (1884), Amiens (1884), Pau (1885), Bordeaux (1890), Grenoble (1889); a new system is set up in Rouen at the middle of 1880's. Finally, if the debates in Parliament find hardly legislative outlets in the field of the public health, the cities multiply the initiatives. In about fifteen years, more than twenty French cities created this new municipal service in particular.

One of the first effects of the existence of such Boards is the reinforcement of the control of the smallpox re-vaccinations and the attempt to determine the

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19 Lucie Paquy, *Santé publique et pouvoirs locaux. Le département de l'Isère et la loi du 15 février 1902*. History thesis (Université Lyon 2, 2001).

characteristics of the epidemics by their cartography. To this end, “sanitary registers of houses” (*casiers sanitaires des maisons*) are set up, in Le Havre (à la Brussels) and also in other cities like Bordeaux, Nantes, Nancy or Saint- Etienne. The survey of houses or blocks and the comparison of numbers, which the renowned social engineer Emile Cheysson recommends highly, constitute a prototype of the crossing of the administrative organization (hierarchical) with the empirical hypothetical deductive approach. In Le Havre, statistics of death by phthisis, typhoid, diarrhoea enteritis as well as seasonal curves and charts by street are published regularly.

Paris launches out in its turn in the adventure of the constitution of sanitary register of houses of the capital in the last years of the 19th century. Tuberculosis and cancer are particularly tracked: the unhealthy small islands are represented starting from a concentration of “cases” located with the address (number and name of the way). But this innovation is not only technical: it rather translates as the will to “treat” the small islands. Cartography is one of the principal means of visualization and consolidates the territorialisation of the public action by identifying infected places or environment: buildings, streets, small islands, subdistricts. The teaching aspect of many presentations leads to the publication of directories, or of booklets, which as many become familiar tools for the local municipal officers and elected representatives. Issued from the comparison of administrative files concerned with two different sectors, the technical and the social one, the statistics made it possible to identify factors starting from simple comparisons between the causes of death and the climate, the medical infrastructures, the characteristics of the residences etc. There is no more opposition between the importance of the environment, in the neo-hippocratic sense, and the recent discoveries of bacteriology, because it from now on is empirically shown that the bacillus of Koch for example survives and multiplies more easily safe from the light and in a humid atmosphere.

On the eve of the 1902 law, the first great general law of public health, which imposes at the cities of more than 20 000 inhabitants to create an Office of Hygiene, many large French cities had already created such structures entirely on their municipal budget. Some had already moved onto the constitution of a sanitary register (*casier sanitaire*). The volume of the correspondence exchanged between the French cities, on technical subjects (organization of the night medical service, surveillance of the markets, organization of the Board of Hygiene, but also construction of the sewers) testifies these advances.

## Institutionalisation, Professionalism. A Revenge of Non-Catholic Élite?

With the 3d Republic, a new group of politicians emerged: less conservative, more often non-catholic. It is amazing to have a list in each big city and to verify this point. In Le Havre, Jules Siegfried, belonging to the well-known protestant family of industrialists in Mulhouse has been elected mayor. Dr. Gibert, protestant from Switzerland has married one of the daughters of another protestant Mulhouse's family: the Dollfus. In Nancy, during the 1870's, Charles Nathan-Picard, from jewish religion, begins to advocate for more municipal credits for the official municipal charitable Board.<sup>20</sup> Some years later, the radical reorganization of the municipal charitable system is from Léopold Lallement, lawyer and protestant. In Rouen, Louis Ricard, republican and protestant, built the "Rouennais system" in the 1880's, and some other personalities of the reform in Rouen were freemason, as was the first director of the Municipal Board of Health in Grenoble.

These men proposed to organize, under the municipal responsibility, new Boards of Health, new dispensaries, new systems to help poor people. Pushing away all the catholic volunteers and religious nurses they proposed finally an institutionalisation, a municipalisation and a professionalisation of the people working in charitable activities. These changes didn't occur without any conflicts. Two examples illustrate the difficulties.

In Nancy, during the 1870's, Charles Nathan-Picard proposed to make permanent, non exceptional as it was usually, the relief to elderly people, widows, and ill people. For such a purpose, he asked for municipal funds. But the private catholic charitable organizations protested because they would loose their role and also their social importance.

In Rouen, in 1879–1880, Ricard worked for a fusion between the social and sanitary administration of the city.<sup>21</sup> For instance, the members of the fifteen boards of the dispensaries are exclusively the catholic elite. So he designates some personalities from Jewish milieu and from protestant organizations. But a lot of clashes occurred. Very explicitly, one of the previous catholic administrators writes that in the Town Hall, behind the mayor, is the representation of the Republic with its claims for human rights, these he cannot recognize because he only abides by duties taught by the Christ. Guillou was dismissed for postponing the distribution of meat cards for poor to celebrate the 14<sup>th</sup> July (the anniversary of the French revolution) to the 17<sup>th</sup>, to "discredit the Republic". Some months later a new clash

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20 Sanford Elvitt, *The Third Republic Defended: Bourgeois Reform in France, 1880–1914* (Louisiana State University Press, Baton Rouge, 1986).

21 Yannick Marec, *Bienfaisance communale et protection sociale à Rouen (1796–1927)*, La Documentation française (Paris, 2002).

occurs between the new administration and two catholic nurses in charge of the poor relief. They were opposed to the new reforms and refused to give card relief just to the poor regularly registered and even organized a demonstration of poor against the new administrator. It is in such a situation that the dismissal of the catholic nurses was sought and that the municipality planned to employ municipal servants for each dispensary. Salaries were not the only cost. The buildings in which the dispensaries were organized belonged to the catholic orders or to the bishop. And so, a big municipal program to think what could be the new dispensaries and how it would be possible to build it very quickly was launched.

But in Nancy, as in Rouen, the main concern of the new elite was the distribution of relief to poor people without rules, just if they were “good poor”, belonging to the catholic influence networks and so on. In Rouen for instance, the catholic nurses kept the relief cards of the dead and gave it to some poor people they knew.

In such context, the municipalization of the Public Health and assistance system seemed to republicans the only way to prevent favouritism, discrimination, and to implement social justice in the relief distribution. For that, they had to propose new procedures for the targeting of the poor. Voluntary workers (catholic) were pushed away and replaced by new municipal servants who were more and more professionalized. Criteria were produced: First, the person has to be an inhabitant of the city for one year at least. Second were the economic criteria – the person has to have less than 1 franc per day from her work or be unable to work. For the families, tables were established. The threshold to receive relief was fixed to 9 francs each week for a two persons family, 12 for a three persons family, 15 for a 4 persons family... Reliefs for elderly people are limited to those over 70. For each poor person or family, a dossier had to be opened. The poor had to ask for relief on a form, supply a certificate for his address (given by the police officer), a receipt for his flat rent, a marriage certificate, a birth certificate for children and unmarried people, a vaccination certificate for each person in the family, a certificate from the dispensary’s physician indicating infirmities of the family members and a certificate for school attendance (just after the laws on free primary schools, secularized and compulsory). After receiving the dossier, the municipal employee (the ancestor of our social workers) has to do an investigation at the family address, to verify the information given and to verify also if the situation of the family has changed since the opening of the dossier. For each district a position of verification officer was opened and another one existed to the central level of the municipality. So, the information on individuals and families were verified and crossed before relief! The transparency was the prerequisite for social justice; but it has also opened the doors to the interpretations in terms of social control.

Each step of the process means to invent printed forms, cards, alphabetical systems to cross the information between all the relief districts. A real professionalism emerged and improved very quickly.

In the 1880's, another new direction was the linking of social assistance to medical care. For instance, in Rouen all the new dispensaries built had a special room for medical examination. This was the case in Le Havre since the 1870's, but on a private basis of private and individual beneficence (Dr. Gibert personal dispensary). Physicians were appointed to the dispensaries and their role was to treat minor illnesses before it worsened and required hospitalisation. So, an economic purpose was also behind this policy of preventive medicine : the choice was to invest more money in Municipal Board of Health, in dispensaries, to try to diminish strongly the very high hospital budgets.

## Conclusion

Around the middle of the 19<sup>th</sup> century, in France, industrialization leads to urbanization of old market town or countryside places as well as the development of workers areas in larger cities. In the first case, all the European studies, in this instance in Le Creusot, show how the consequences of the unregulated growth of the industrial city had tremendous consequences on the decline of the expectancy of life and on the high level of childhood mortality. A paternalistic policy improves the local environment and sanitary situation to mitigate the penalty of growth. The new liberal economy was not able to provide people regular work and wages making families vulnerable to pauperisation because of illness of the father or because of the economic situation. In a lot of large cities, poverty lead to a high mortality and to epidemics. The first policy against the mortality and the epidemics, to improve Public health occurred at the local level. As early as the 1870s a variety of local initiatives have been initiated. But it is clear that the change of political regime has also been decisive. The new local political elite increasingly came from Protestant or Jewish origins and freemasons became more influential. In that context, it is possible to analyse why and how the assistance system and public health structures have been municipalized. For the Republican, often non active catholic elite or not at all catholic, the social justice in attribution of relief was linked to transparency of procedures. That led to a reflection about the objectiveness of the criterion chosen to decide who will be relieved. New methods, new forms, new investigation follow and a professionalisation of what will become the "social" work, as a guarantee for rational choice between people to help. Introduced to compensate the uncertainty of workers revenues, the system was rapidly linked to health perspective and

medical cares, even to preventive medicine. The question of the regulation of social changes and of consequently vulnerability is still addressed to our societies.

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## References

- Bourdelaï, Patrice, *Les épidémies terrassées. Une histoire de pays riches* (Editions de La Martinière, Paris, 2003).
- Bourdelaï, Patrice and Michel Demonet, 'Demographic Changes in European Industrializing Towns. Examples and Elements for Comparison', *The History of the Family. An International Quarterly*, 5, 4, (2000), 363–372.
- Bourdelaï Patrice, 'Infant mortality in France, 1750–1950, Evaluation and Perspectives', in *The decline of infant mortality in Europe –1800–1950– Four national case studies*, ed. Carlo Corsini and Pier Paolo Viazzo (Florence, UNICEF, 1993, 51–69).
- Canal Dr., 'Note à M. le Dr. Carion, médecin des épidémies de l'arrondissement d'Autun' (Académie François Bourdon, Le Creusot, March, 1859).
- Eggerickx, Thierry, and Marc Dubuisson, 'La surmortalité urbaine : le cas de la Wallonie et de Bruxelles à la fin du XIXe siècle (1889–1892)', *Annales de Démographie Historique* (1990), 23–41.
- Elvitt, Sanford, *The Third Republic Defended: Bourgeois Reform in France, 1880–1914* (Louisiana State University Press, Baton Rouge, 1986).
- Fijalkow, Yankel, *La construction des îlots insalubres, Paris 1850–1945* (L'Harmattan, Paris, 1998).
- Gibert Dr., *Une visite au Bureau d'hygiène de Bruxelles* (Imprimerie F. Santallier, Le Havre, 1878a).
- Gibert Dr., Fauvel and Lafaurie, *Création d'un Bureau d'hygiène municipal* (Imprimerie Alphée Brindeau et Cie, Le Havre, 1878 b).
- Hamlin, Christopher, *Public Health and Social Justice in the Age of Chadwick, Britain, 1800–1854* (Cambridge University Press, 1998).
- Kearns, Gerry, 'Le handicap urbain et le déclin de la mortalité en Angleterre et au Pays de Galles 1851–1900', *Annales de Démographie Historique* (1993), 75–105.
- La Berge, Ann, *Mission and Method. The Early Nineteenth Century French Public Health Movement* (Cambridge University Press, 1992).
- Lynch, Kate, *Family, Class, and Ideology in Early Industrial France* (The University of Wisconsin Press, 1988).
- Marec, Yannick, *Bienfaisance communale et protection sociale à Rouen (1796–1927)*. La Documentation française (Paris, 2002).
- Nonnis Vigilante, Serenella, 'Idéologie sanitaire et projet politique. Les congrès internationaux d'hygiène de Bruxelles, Paris et Turin (1876–1880)', in P. Bourdelaï, *Les Hygiénistes, enjeux, modèles et pratiques* (Belin, Paris, 2001), 241–265.

- Ott, Florence, *La Société Industrielle de Mulhouse, 1826–1876, ses membres, son action, ses réseaux* (Presses universitaires de Strasbourg, 1999).
- Paquy, Lucie, *Santé publique et pouvoirs locaux. Le département de l'Isère et la loi du 15 février 1902*. History thesis (Université Lyon 2, 2001).
- Preston, Samuel, and Etienne Van de Walle, 'Urban French Mortality in the Nineteenth Century', *Population Studies*, 32,2 (1978), 275–297.
- Quincy-Lefebvre, Pascale, 'Naissance et affirmation d'un service public dans le monde de la charité', in André Gueslin and Pierre Guillaume, *De la charité médiévale à la sécurité sociale* (Les éditions ouvrières, Paris, 1992), 91–106.
- Rasmussen, Anne, 'L'hygiène en congrès (1852–1912): circulation et configurations internationales', in P. Bourdelais, *Les Hygiénistes, enjeux, modèles et pratiques* (Belin, Paris, 2001), 213–239.
- Revel, Jacques, *Jeux d'échelle, la micro-analyse à l'expérience* (Gallimard-Le Seuil, Paris, 1996).
- Thompson, Edward Palmer, *The Making of the English Working Class* (London, Victor Gollancz, 1963).
- Ure, Andrew, *The Philosophy of manufactures; or an Exposition of the scientific, moral and commercial economy of the factory system of Great-Britain* (London, Charles Knight, 1835).
- Villermé, Louis-René, *Tableau de l'état moral et physique des ouvriers employés dans les manufactures de coton, laine et de soie* (1840, reprint EDI, Paris, 1989).
- Williams, Naomi, and Chris Galley, 'Urban-rural differentials in infant mortality in Victorian England', Conférence on '*The European decline of infant mortality*', Istituto degli Innocenti, Florence, 5–7 décembre 1994 (1994).

# Table

**Table 5. Life expectancy at birth. France 1806–2001.**

Year	Men	Women									
1806	32,8	37,3	1855	35,0	39,0	1904	46,5	49,8	1953	64,3	70,2
1807	32,0	36,5	1856	38,5	40,9	1905	46,6	50,3	1954	65,0	71,2
1808	31,2	38,0	1857	38,7	39,8	1906	46,0	49,7	1955	65,2	71,5
1809	31,3	39,0	1858	39,2	39,9	1907	46,5	50,2	1956	65,1	71,6
1810	35,3	39,7	1859	34,4	35,7	1908	47,5	51,4	1957	65,5	72,2
1811	34,0	38,4	1860	42,4	43,6	1909	48,1	52,0	1958	66,8	73,1
1812	24,3	39,4	1861	39,1	40,3	1910	49,5	53,3	1959	66,8	73,3
1813	23,8	38,9	1862	41,8	43,0	1911	46,2	50,1	1960	67,0	73,5
1814	23,8	36,7	1863	40,8	42,1	1912	49,6	53,8	1961	67,5	74,3
1815	34,2	38,9	1864	41,0	42,5	1913	49,4	53,5	1962	67,0	73,7
1816	38,9	41,0	1865	38,7	40,2	1914	29,5	53,3	1963	66,8	73,7
1817	37,7	39,8	1866	40,5	42,1	1915	27,2	52,6	1964	67,7	74,7
1818	37,7	38,7	1867	41,2	42,8	1916	30,8	52,4	1965	67,5	74,7
1819	36,5	37,8	1868	38,9	40,8	1917	35,6	52,0	1966	67,8	75,1
1820	38,0	39,5	1869	40,0	42,0	1918	28,6	43,3	1967	67,8	75,2
1821	38,6	39,8	1870	33,7	37,7	1919	43,7	50,2	1968	67,8	75,2
1822	37,3	38,7	1871	26,3	31,7	1920	50,2	53,9	1969	67,5	75,1
1823	39,0	40,9	1872	41,8	44,0	1921	50,6	54,8	1970	68,4	75,8
1824	38,2	39,9	1873	40,4	42,3	1922	52,9	56,8	1971	68,3	75,9
1825	37,4	38,4	1874	42,6	44,7	1923	52,6	56,7	1972	68,5	76,2
1826	36,6	37,7	1875	41,0	43,1	1924	53,0	57,4	1973	68,7	76,3
1827	38,4	39,9	1876	41,6	44,1	1925	52,0	56,7	1974	69,0	76,7
1828	36,6	38,1	1877	43,0	45,0	1926	51,8	56,2	1975	69,0	76,8
1829	38,5	40,1	1878	42,0	44,1	1927	53,6	57,8	1976	69,2	77,2
1830	38,3	39,9	1879	42,8	45,0	1928	53,3	57,5	1977	69,7	77,8
1831	38,2	40,0	1880	41,0	43,2	1929	51,9	56,5	1978	69,8	77,9
1832	34,8	36,2	1881	41,8	44,3	1930	54,3	59,3	1979	70,1	78,2
1833	38,0	39,5	1882	41,7	44,3	1931	54,5	59,2	1980	70,2	78,4
1834	34,1	35,6	1883	41,9	44,4	1932	54,7	59,7	1981	70,4	78,4
1835	38,2	40,2	1884	41,0	43,7	1933	55,1	60,2	1982	70,7	78,8
1836	40,6	42,3	1885	42,2	44,9	1934	55,5	61,2	1983	70,7	78,7
1837	38,5	39,7	1886	41,1	43,9	1935	55,4	61,1	1984	71,2	79,3
1838	38,5	39,8	1887	42,2	44,8	1936	55,8	61,7	1985	71,3	79,4
1839	40,2	41,4	1888	42,4	45,5	1937	56,1	62,1	1986	71,5	79,6
1840	39,1	40,7	1889	44,0	46,9	1938	55,9	62,0	1987	72,1	80,2
1841	39,1	41,3	1890	41,3	44,3	1939	56,5	62,6	1988	72,3	80,5
1842	38,8	40,7	1891	42,2	45,2	1940	42,6	59,1	1989	72,5	80,6
1843	39,9	41,3	1892	41,9	44,8	1941	53,9	61,2	1990	72,8	81,0
1844	41,5	42,8	1893	42,0	45,2	1942	53,6	61,5	1991	72,9	81,1
1845	42,6	43,9	1894	43,9	47,2	1943	48,9	58,1	1992	73,2	81,4
1846	39,4	40,7	1895	42,7	46,2	1944	41,8	53,7	1993	73,3	81,4
1847	39,3	40,9	1896	45,4	48,7	1945	51,3	58,6	1994	73,7	81,8
1848	39,3	41,0	1897	46,2	49,3	1946	59,8	65,1	1995	73,9	81,9
1849	35,1	36,6	1898	44,5	47,4	1947	61,2	66,6	1996	74,1	82,0
1850	42,4	43,8	1899	43,7	47,1	1948	62,7	68,7	1997	74,5	82,3
1851	40,7	42,0	1900	43,4	47,0	1949	62,1	67,5	1998	74,8	82,4
1852	40,4	41,6	1901	45,4	49,0	1950	63,4	69,2	1999	74,9	82,4
1853	41,5	42,9	1902	46,4	49,5	1951	63,1	68,8	2000	75,2	82,7
1854	34,8	36,6	1903	46,8	50,2	1952	64,4	70,2	2001	75,5	83,0

Source: see note 2.