



The International Union for the Scientific Study of Population Problems was founded in 1928, with Dr Raymond Pearl as President. At that time the Union's main purpose was to promote international scientific co-operation to study various aspects of population problems, through national committees and by its members themselves. In 1947 the International Union for the Scientific Study of Population (IUSSSP) was reconstituted into its present form. It expanded its activities to:

- stimulate research on population
- develop interest in demographic matters among governments, national and international organizations, scientific bodies, and the general public
- foster relations between people involved in population studies
- disseminate scientific knowledge on population.

The principal ways through which the IUSSSP currently achieves its aims are:

- organization of worldwide or regional conferences
- operations of Scientific Committees under the auspices of the Council
- organization of training courses
- publication of conference proceedings and committee reports.

Demography can be defined by its field of study and its analytical methods. Accordingly, it can be regarded as the scientific study of human populations primarily with respect to their size, their structure, and their development. For reasons which are related to the history of the discipline, the demographic method is essentially inductive: progress in knowledge results from the improvement of observation, the sophistication of measurement methods, and the search for regularities and stable factors leading to the formulation of explanatory models. In conclusion, the three objectives of demographic analysis are to describe, measure, and analyse.

International Studies in Demography is the outcome of an agreement concluded by the IUSSP and the Oxford University Press. The joint series is expected to reflect the broad range of the Union's activities and, in the first instance, will be based on the seminars organized by the Union. The Editorial Board of the series is comprised of:

Ansley Coale, USA Henri Leridon, France
John Hoberaft, UK Richard Smith, UK
Georges Tapinos, France

Women's Position and Demographic Change

Edited by

NORA FEDERICI
KAREN OPPENHEIM MASON
SØLVI SOGNER

CLARENDON PRESS · OXFORD
1993

9 Social Change and Mortality Decline: Women's Advantage Achieved or Regained?

JACQUES VALLIN

Part of the excess mortality of men has always been considered to be biological. Different writers have estimated the importance of this biological contribution differently; some have even regarded the XY configuration of chromosomes that characterizes males as an inferior version of the XX configuration that characterizes females—a view which puts men at a relative disadvantage to women in the determination of human longevity.¹ Whilst it is possible to be sceptical about so deterministic a theory, the hypothesis that there exists a biological factor which is responsible for part of the difference between the mortality of men and women cannot be disregarded altogether, even though there are many considerations that point to this excess mortality being a reflection of socio-cultural and environmental factors. We must, therefore, ask whether in the beginning 'God did not create woman' as a more vigorous creature than man.

However, where information is available about past populations, or about present populations in which mortality is high, it is almost universally found that life expectancies at birth for the two sexes are nearly equal (this is the result of an excess mortality of women in adolescence and early adult life, and an excess mortality of men at higher ages), or that women suffer from an excess mortality which reduces their life expectancy below that of men. At some levels of social and economic development, the theoretical generosity with which nature appears to have endowed the female sex has been nullified by the actions of men, who reduced women to an inferior status, or even by nature itself, which has limited the hazards of reproduction to them.

Economic and social progress has been characterized by a reduction of the difference between the social status of the two sexes and of the hazards associated with maternity. Even during the early stages of the demographic transition it was clear that women were more long-lived than men. Does this mean that the improvement in their status enabled them to regain their

innate biological advantage? Though the answer to this question is likely to be in the affirmative, it does not provide a complete explanation for the relationship between the status of women and the difference between the mortality of the two sexes. We know that this difference can be caused by a variety of social factors, the effects of which are superimposed on those of biology. The improvement in the status of women may have enabled them to benefit from their innate advantage, which had previously been nullified by the social disadvantages from which they suffered. This would explain why, since the beginning of the nineteenth century, and particularly in Europe, excess mortality of men has continued to increase well above the level which could be accounted for by the biological difference between the two sexes.

However, this explanation would not suffice at a time when changes in the status of women, though allowing them to benefit from advantages that had previously been reserved for men, also resulted in their participation in forms of behaviour which were associated with a higher risk of dying, and which had hitherto been largely confined to men: drinking, smoking, driving motor vehicles, working outside their homes. Perhaps new hypotheses should be framed: it could be that the risks of these activities are not the same for men as for women, or that the effects of this new type of behaviour will only become fully apparent in the long run, or similar risks may produce different results for men and for women.

It is questions of this type that I propose to consider in this chapter, and, though it may not be possible to provide a definitive answer, it will be possible to point to certain problems in this field.

More Vigorous but at Greater Risk of Dying

It is difficult, perhaps impossible, to measure the relative influence of the genetic and the socio-cultural factors that underlie the differences between the mortality of different human groups. How can we isolate the effects of genotype from socio-cultural factors, when genetic variations between individuals may well be larger than those between groups? How are differences between the mortality of two groups to be interpreted, when the very constitution of these groups may have affected mortality through the effects of selection? These are but two questions to which it is difficult to provide an answer. As regards sex, we know at least that mankind is divided into two genetically distinct groups by the Y-chromosome, which characterizes an individual throughout his or her life, is determined at conception, and thus cannot select in a population for health. Is it, therefore, possible, that, as Pressat has written,² 'there exists a reference level which

¹ F. Lenz, 'Die Übersterblichkeit der Knaben im Lichte der Erbtichtheitslehre', *Archiv für Hygiene*, 93 (1940), pp. 126–50; N. Federici, 'La mortalità differenziale degli due sessi e le sue possibile cause', *Statistica*, 10 (1950), pp. 274–320.

² R. Pressat, 'Summortalité biologique et summortalité sociale', *Revue française de sociologie*, 14 (1983), pp. 103–10.

enables us to separate those parts of the excess mortality of men that are due to biological, and to social and behavioural causes respectively'. This would not be easy, because gender itself has resulted in socio-cultural differences, the effects of which are very difficult to assess, it is, therefore, difficult to measure how much of the difference in mortality was due to them and how much to biology.

A Probable Natural Advantage

Many demographers have argued that, at the outset of life, women are biologically superior to men, and they have given different reasons for their view.³ In a study of the continuous increase in the excess mortality of men that has resulted in a difference of six years between the life expectancies at birth of the sexes, Madigan wrote in 1957: 'not only [are] sociocultural pressures less important than biological factors in relation to the mortality differentials of the sexes, but they are of comparatively small importance in this respect.'⁴ He based this extreme view on a comparison of mortality in two religious communities consisting of monks and nuns respectively, in which, according to him, conditions of life were identical. The slight excess mortality of women which he observed at the beginning of the century had, during the previous fifty years, been continuously eroded and replaced by an excess mortality of men, similar to that observed in the general population. Believing that the only difference between the two communities was the biological one of sex, he concluded that, in the population as a whole, as well as among the religious, the emergence of an excess mortality of men could be explained almost entirely by a reduction in the prevalence of infectious diseases, as resistance to these diseases—and particularly to tuberculosis—was lower among women, and by the increased importance of neoplasms and cardiovascular diseases as causes of death, diseases to which, by contrast, women were more resistant than men. The author made little of one important social difference between the two communities—the consumption of tobacco.⁵ Nor did his argument allow for the possibility that, even though both monks and nuns were subject to similar rules, their life-styles may have been different. But these qualifications do not refute the thesis of a biologically determined excess mortality of men, which must be retained as a partial explanation of the excess mortality

that has been observed, even though it may not be its most important component. Other writers have also attempted to assess its importance.⁶

In 1952, Bourgeois-Pichat proposed to generalize the distinction that he had suggested existed between 'endogenous' and 'exogenous' mortality in early childhood,⁷ and calculated a life table which would correspond to the biological limits of human mortality. In that table, women's life expectancy at birth of 78.2 years exceeded that of men, which was 76.3 years, by 1.9 years.⁸ However, his 'endogenous' mortality was not the same as mortality from wholly biological causes—and even less like mortality from genetic causes. It included those morbid processes against which medicine at the time was powerless, or almost powerless. In 1952 these were mainly neoplasms and cardiovascular diseases. Bourgeois-Pichat believed that medical progress would result in increasing life expectancy. When he repeated his calculations twenty-five years later, using the same concepts, he arrived at a figure of 80.3 years for women and 73.8 years for men, a sex difference of 6.5 years,⁹ considerably larger than a quarter-century earlier. In actual fact, during this period the 'hard rock' of mortality was eroded, and women profited from this progress more than men. These changes could have been brought about by medical progress or by changes in behaviour, and it is probable that changes in behaviour affected the two sexes differentially. The increase in the difference between life expectancies probably overestimates the biological component.

Pressat estimated that women's inborn advantage resulted in a life expectancy two years higher than that of men. As effective medical treatment barely existed in the pre-industrial period, he suggested that differences between the life expectancies of the two sexes at that time were almost entirely biological. He was confirmed in this view by the fact that as at present the mortality of boys during the first year of life in the Western cultural area, where the only factor that could cause differential mortality is biological, is between 25 and 30 per cent higher than that of girls' and 'that a maintenance of this difference throughout life would produce a moderate difference [between life expectancies at birth] of the order of... two years'.¹⁰ This argument, based on sex differences in infant mortality, has for some time been recognized as being the most convincing.¹¹ Extrapolation to

⁶ e.g. G. Herdan, 'Causes of Excess Mortality in Men', *Acta genetica et statistica medica*, 3 (1952), pp. 351–75.

⁷ J. Bourgeois-Pichat, 'La Mesure de la mortalité infantile', *Population*, 6 (1951), pp. 381–94.

⁸ J. Bourgeois-Pichat, 'Essai sur la mortalité biologique de l'homme', *Population*, 7 (1952), pp. 233–48.

⁹ J. Bourgeois-Pichat, 'Future Outlook for Mortality Decline in the World', in *Prospects of Population: Methodology and Assumptions* (Papers of the ad hoc Group of Experts on Demographic Projections, 1977), pp. 227–66.

¹⁰ Pressat, op. cit. in n. 2.

¹¹ S. Shapiro, 'The Influence of Weight, Sex, and Plurality on Neonatal Loss in the United States', *American Journal of Public Health*, 44 (1954), pp. 142–53.

³ See Lenz and Federici, op. cit. in n. 1.

⁴ F. C. Madigan, 'Are Sex Mortality Differentials Biologically Caused?', *Milbank Memorial Fund Quarterly*, 35 (1957), pp. 202–23.

⁵ According to a contemporary study by the American Cancer Society, 54% of the excess mortality of men aged 35 and over who were smokers can be attributed to smoking. Smoking is particularly important in increasing the risk of dying from cancer or cardiovascular disease.

older ages is, of course, more hazardous. Here we merely note that there exists a consensus of opinion which agrees that women enjoy an innate advantage of lower mortality, but that this advantage is slight and difficult to measure.

The Consequences of Initial Unfavourable Conditions

In spite of women's innate advantage, in the past they have generally suffered higher mortality than men, and this continued to be true until recently in the less developed countries.

Maternal Mortality. It is well known that women suffer a higher mortality than men at reproductive ages. This has been adequately documented for Europe in the past,¹² and has been measured in France by the study of a representative sample of parish registers by Louis Henry.¹³ During the eighteenth and the beginning of the nineteenth century, women's age-specific mortality rates between the ages of 20 and 45 years exceeded those of men by between 5 and 20 per cent, depending on age group and period,¹⁴ and this was also true of the less developed countries until relatively recently.¹⁵

This excess mortality of women was largely caused by maternal mortality. In this sense it may be regarded as biological, as only women are exposed to the risk of pregnancy and childbirth. Thus nature takes away with one hand some of the advantages she has bestowed on women with the other. But maternal mortality is not entirely biological; the risks of dying in pregnancy or childbirth will be related to the social and economic circumstances of women and the nature of their reproductive lives, which, in turn, is closely linked to their social status, and to their fertility, which also depends on the socio-cultural status of females. It is a masculine society that has curtailed some of the advantages that women enjoyed. In eighteenth-century France the expectation of life of a woman on her twenty-fifth birthday differed little from, and was even slightly lower than, that of a man of the same age. Excess mortality of men at ages over 50 was not sufficient to compensate for women's excess mortality between the ages of 25 and 45 years.

Mortality at Young Ages. The importance of the social status of women is particularly marked when we consider their excess mortality at young ages, for this differential can be explained only by a difference in the behaviour of parents, and of society as a whole, to the two sexes.

¹² D. Tabutin, 'La Summortalité féminine en Europe avant 1940', *Population*, 34 (1978), pp. 121-48.

¹³ Y. Blayo, 'La Mortalité en France de 1740 à 1829', *Population*, 30 (1975), pp. 123-42.

¹⁴ *Ibid.*

¹⁵ See Potter and Volpp, Chapter 7 in this volume.

Excess mortality of girls was apparent in Europe in the past, and appeared to be marked between the ages of 1 and 4, and 5 and 9 years. This excess appears to have increased during the nineteenth century.¹⁶ In France, more detailed statistics show that, after 1889, females still suffered from an excess mortality over males, between the ages of 4 and 17 years, and that this did not disappear finally until the Second World War, though by then it was limited to a smaller age group.¹⁷ Tabutin has stressed the role played by mortality from infectious diseases in causing this excess. Tuberculosis, in particular, was important in this respect, and the excess mortality of girls and young women from this cause more than compensated for the higher mortality from accidents and violence suffered by men at these ages. He linked the excess mortality of women to the unfavourable conditions of life of girls during this period: they were given less care, and standards of hygiene and nutrition for them were lower as the result of an anti-feminist ideology,¹⁸ which regarded them as being intrinsically less valuable than boys.¹⁹

This low valuation of the female sex lies at the base of its excess mortality and can still be found today in a number of less developed countries. The most flagrant examples are found on the Indian sub-continent.²⁰ In Bangladesh, the mortality of girls between the ages of 1 and 4 years is 50 per cent higher than that of boys, and the principal reason is differential access to nutrition, and differences between the care given to boys and girls.²¹ Similar attitudes can be found in a number of other cultures. Excess mortality of girls is particularly prevalent in Muslim countries during the 1960s.²² In Algeria the mortality of girls exceeded that of boys from the age of three months onwards, but this excess was confined to deaths from 'exogenous'

¹⁶ Tabutin, *op. cit.* in n. 12.

¹⁷ *Ibid.*: see also J. Vallin, 'Tendances récentes de la mortalité française', *Population*, 38 (1983), pp. 77-106.

¹⁸ This ideology was developed by such writers as Jean Jacques Rousseau, Auguste Comte, Honoré de Balzac, and even by the socialist, Proudhon, who claimed to have established 'scientifically' that a woman's worth was only $\frac{2}{3}$ that of a man (see Tabutin, *op. cit.* in n. 12).

¹⁹ The way in which this ideology permeated the thought of the past has been illustrated by Armeingaud, who has quoted two anecdotes from Legouvé's *L'Histoire morale des femmes* (1849): 'ask a peasant about his family, and he will reply: "I have no children, I only have girls", and the Breton farmer whose wife had given birth to a daughter will still say today, "My wife has miscarried"' (A. Armeingaud, 'L'Attitude de la société à l'égard de l'enfant au XIXe siècle', *Annales de démographie historique* (Enfants et sociétés) (1973), pp. 310-11).

²⁰ L. C. Chen, E. Huq, and S. D'Souza, 'Sex Bias in the Allocation of Food and Health Care in Rural Bangladesh', *Population and Development Review*, 7 (1981), pp. 55-70; M. Das Gupta, 'Selective Discrimination against Female Children in India', *Population and Development Review*, 13 (1987), pp. 77-100.

²¹ Chen, Huq, and D'Souza, *op. cit.* in n. 20.

²² A. Adlakha and C. M. Suchindran, 'Infant and Child Mortality in Middle Eastern Countries', in IUSSP, *Proceedings of the International Population Conference, Florence 1985* (Liege, 1985), II, 367-76; T. Hatfad, 'Les Différences de mortalité selon le sexe et leurs conséquences', doctoral dissertation (Paris, 1984).

causes; 'endogenous' mortality was considerably higher among boys.²³ The explanation lies entirely in the lower degree of care that is given to girl children.²⁴ Even in sub-Saharan Africa, where the statistics are insufficiently detailed to make it possible to distinguish between the different causes of infant mortality, it is likely that the absence of a difference between the infant mortality rates of the two sexes is associated with the less favourable treatment given to girl babies, whose mortality would otherwise almost certainly be lower than that of boys.²⁵

The relationship between the social status of women, the valuation of females, and the excess mortality of little girls is seen particularly clearly in China, where traces of the old practice of infanticide of girl babies have persisted, and where the practice has probably been given new life by the one-child family policy.²⁶ In Anhui province, where infant mortality rates for girls exceed those of boys by 12 per cent, Zhang has estimated that infanticide, which was responsible for 60 per cent of all infant deaths, accounted for this exceptionally high excess mortality of girls during the first year of life.²⁷

Thus, the social disadvantages to which women were subjected for a long time in Europe masked, and continue to mask in developing countries today, the theoretical biological advantage in longevity that they enjoy. In India,²⁸ Bangladesh,²⁹ Pakistan,³⁰ and Sri Lanka,³¹ the cumulative disadvantage suffered by women which begins at young ages and continues throughout their reproductive lives resulted in a lower life expectancy at birth compared with that of men until the end of the 1960s. In Algeria, towards the end of the 1970s, the excess mortality of men at ages 50 and over

²³ J. Vallin, 'Un fait social: La Surmortalité des petites filles en Algérie', *Actes du 2e Colloque de Démographie Maghrbine* (Tunis, 24-28 April 1978), 1.

²⁴ *Ibid.*: N. Ferry, 'La Femme et l'enfant en milieu rural algérien: Etude sociologique et médicale de la maternité et du premier âge', thesis for the degree of MD (University of Lille, 1979).

²⁵ K. Gbenyon and T. Looch, 'Les Différences de mortalité entre garçons et filles', in G. Pison, E. van de Walle, and M. Sala-Diakanda (eds.), *Mortalité et société en Afrique* (Paris, 1989), pp. 221-44; English translation entitled 'Mortality Differences in Childhood by Sex in Sub-Saharan Africa', in *Mortality and Society in Sub-Saharan Africa* (Oxford, 1992), pp. 230-52.

²⁶ G. Calot and G. Caselli, *La Mortalité en Chine d'après le recensement de 1982, I. Analyse selon le sexe et l'âge au niveau national et provincial* (Paris, 1988).

²⁷ W. Zhang, *et al.*, 'Yinger xinghiti shihao yao qieshi jinzhong' (Effective measures must be taken against the abnormal masculinity at birth), *Shehui* (Society), 2 (1983), quoted by Calot and Caselli, *op. cit.* in n. 26.

²⁸ S. Raghavarachari, S. K. Biswas, A. K. Biswas, and S. S. Bawa, *The Population of India* (New Delhi, 1974).

²⁹ L. Bean and R. M. Khan, *Mortality Patterns in Pakistan* (Karachi, 1967); F. Yusuf, 'Abridged Life Tables for Pakistan and its Provinces', paper submitted to the USSR Conference, Sydney, 1967.

³⁰ M. Atzal, '1972 Census: Population Expected and Actual', *Pakistan Development Review*, 12 (1973), pp. 122-33; Yusuf, *op. cit.* in n. 29.

³¹ Sri Lanka, Department of Census and Statistics, *The Population of Sri Lanka* (Colombo, 1974).

led to life expectancies at birth being equal for the two sexes. In eighteenth-century France, where the absence of modern medicine resulted in mortality being less affected by social inequalities, the slight excess mortality of males during the first year of life, coupled with a high infant mortality rate, was sufficient to reduce men's life expectancy at birth below that of women. However, the higher mortality of women below the age of 45 meant that life expectancies at the first birthday were about equal for the two sexes, or even lower for women.

From Regaining an Original Advantage to New Advantages

During the last two centuries in Europe, and more recently but also much more rapidly in developing countries, women have achieved, or are achieving, a completely new social status in society, and no longer need to feel envious of men. Attitudes to children, both by individual parents and by society, have been considerably modified, and children of both sexes are more highly valued than previously.³² Little girls now have the same access to nutrition, hygiene, and medical facilities as their brothers, and need not, therefore, die earlier, but are able to enjoy the innate advantage that nature has granted them. Reductions in fertility and improvements in the care given to women in pregnancy and childbirth have reduced the only biologically sex-linked disadvantage in respect of mortality from which women used to suffer. However, recent changes in mortality have gone well beyond the stage in which women merely regained their original advantage. They have resulted in giving women a new privileged status in relation to longevity. We shall consider how this has come about by looking at statistics of mortality in France.

Women's Excess Mortality Eliminated: Men's Excess Mortality Increases Spectacularly

In France women's life expectancy at birth does not seem to have been lower than that of men, even under the *ancien régime* (see Table 9.1). Between 1740 and 1860, however, the advantage enjoyed by women was small, and the differences between life expectancies fluctuated irregularly between 0.6 and 2.4 years. Commonly, the difference was smaller than the two years at which Pressat has estimated the biological advantage of women, and which was not completely nullified by their lower social status, quite apart from the higher mortality of men from non-biological causes, such as

³² J. Vallin and A. Levy, 'Estimating the Increase in Fertility Consecutive to the Death of a Young Child', in S. H. Preston (ed.), *The Effects of Infant and Child Mortality on Fertility* (New York, 1978), pp. 69-90.

TABLE 9.1. Life expectancy at birth, by sex, France, 1740-1986 (years)

Year	Life expectancy at birth		Difference
	Women	Men	
1740-49	25.7	23.8	1.9
1750-59	28.7	27.1	1.6
1760-69	29.0	26.4	2.6
1770-79	29.6	28.2	1.4
1780-89	28.1	27.5	0.6
1790-99	32.1		
1800-09	34.9		
1810-19	37.5		
1820-29	39.3	38.3	1.0
1835-37	40.7	39.2	1.5
1845-47	41.9	40.7	1.2
1855-57	40.1	37.7	2.4
1861-65	40.6	39.1	0.9
1877-81	43.6	40.8	2.8
1898-1903	48.7	45.3	3.4
1908-13	52.4	48.5	3.9
1920-23	55.9	52.2	3.7
1928-33	59.0	54.3	4.7
1933-38	61.6	55.9	5.7
1946-49	67.4	61.9	5.5
1952-56	70.9	64.7	6.2
1960-64	74.3	67.2	6.9
1966-70	75.2	67.7	7.2
1973-77	77.0	69.1	7.9
1984-86	79.5	71.3	8.2

accidents and violence. Since 1860, however, the difference has increased very considerably from 2.8 years in 1877-81 to 8.2 years in 1984-86. It is now four times as large as the supposed biological advantage of two years. Even if this estimate were incorrect, it is clear that during the last hundred years women have done much better than merely regain this advantage, or, what at first sight appears to be the same thing, that men have lost more than can be accounted for by the removal of inequalities in the treatment of women. This impression is confirmed when we consider the ratios of men's age-specific mortality rates to those of women (Fig. 9.1).

In order to appreciate this change, we shall consider the consequences of the two hypotheses put forward by Pressat. He has suggested, in the first

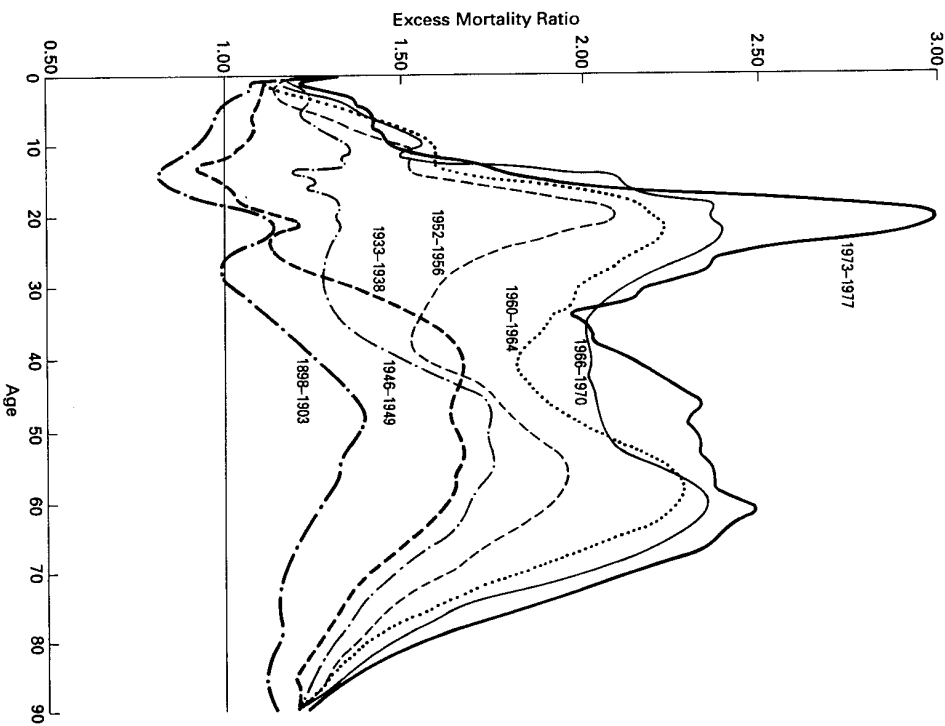


FIG. 9.1 Changes in excess mortality ratios of men by age between 1898-1903 and 1973-77
Source: INSEE

place, that the excess mortality of boys in infancy is essentially caused by biological factors. In the second place, he assumes that, in the absence of other disturbing factors, the same excess mortality would apply throughout life. In fact, the excess mortality of male babies during their first year of life has been almost constant at between 25 and 30 per cent since the beginning

of the present century, and we could use this figure as an indicator of men's biological handicap. In contrast to what is happening in some developing countries today, it would appear that infant mortality, concentrated during the first few weeks of life, has been little affected by differential attitudes to boy and girl babies.³³ However, the situation is different at other stages of life, where there have been radical changes.

At the beginning of the present century young women still suffered an excess mortality, but mortality at ages beyond 40 was higher among men, and at ages beyond 50 the difference was larger than during the first year of life. On the eve of the Second World War excess mortality of young women had almost completely disappeared (except at the ages of 13 and 14 years), but the excess mortality of young men was lower than during the first year of life. This suggests that the status of the two sexes in society could still influence the mortality of young girls negatively. However, during the same period, the excess mortality of men increased considerably among adults and was as high as 60 per cent between the ages of 40 and 60. By the end of the war the excess mortality of men up to the age of 35 years was nearly the same as during the first year of life, so that it would seem that women had regained their original biological advantage, whereas at higher ages men had continued to lose ground. After the 1950s the excess mortality of men increased at an accelerating pace, and there was a second steep peak at ages around 20 years. During the middle 1970s it exceeded 200 per cent between the ages of 18 and 75, it was 250 per cent between the ages of 60 and 70, and as high as 300 per cent at the age of 20. Since then the situation of men has deteriorated even further. We are far from an excess mortality of between 25 and 30 per cent at these ages, where the excess is nearly ten times as large.

Our description of the differences between the age-specific mortality rates of the two sexes has ignored the large variation of age-specific mortality with age, and of the different weights of age-specific mortality rates in determining life expectancy at birth. By decomposing the differences between the life expectancies of the two sexes, the contribution made by different age groups to this difference can be measured (see Fig. 9.2).³⁴

Although the excess mortality of males during the first year of life has remained relatively constant, the fall in infant mortality has meant that its weight in the difference between life expectancies at birth has greatly diminished. At the beginning of the present century, when the difference came to 3.3 years, 1.46 years, or nearly half the excess, could be attributed

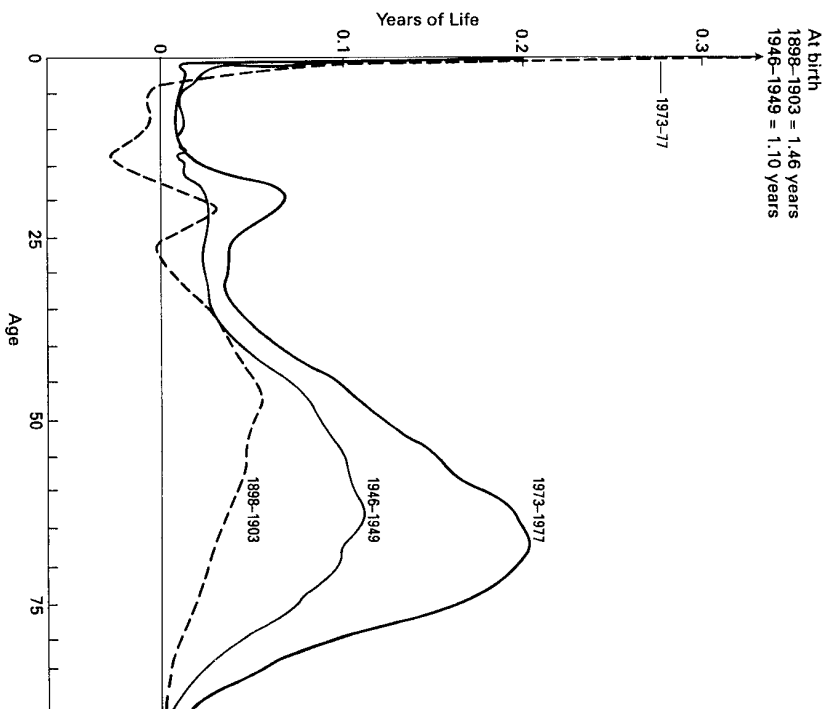


FIG. 9.2 Contribution made by each age group to differences in life expectancy at birth between the sexes, 1898-1903, 1946-49, and 1973-77

to mortality during the first year of life. In 1973-77 the analogous figure was 0.26 years for an excess of 7.9 years—only about 3 per cent. This radical change has been brought about by the fall in infant mortality.

However, even at this level the contribution made by infant mortality to the difference between life expectancies exceeds that of any other single age group. But infant mortality stands on its own, and it is the cumulative contribution of successive age groups that henceforth is likely to be the most important factor in explaining differences between the life expectancies at birth. The dominant age ranges are those between 50 and 75 years. The very

³³ An analysis of fertility following the loss of an infant has shown that recently the desire to replace a lost child did not depend on its sex (see *ibid.*).

³⁴ R. Pressat, 'Perspectives de réduction de la surmortalité masculine dans les pays ayant une faible mortalité', paper presented at the Meeting on Sex Differentials in Mortality: Trends, Determinants and Consequences, Canberra, 1981.

high excess mortality of men at age 20, on the other hand, is of minor importance, because overall mortality rates at this age are very low.

Medical Causes of the Increased Excess Mortality of Men

In looking at the contributions that mortality in different age groups makes to the difference between the life expectancies of men and women, we must also consider the principal causes of death.³⁵ Our calculations are based on a method of disaggregation suggested by Pollard, in which the causes of death are divided into seven major aetiological groups:³⁶

- parasitic and infectious diseases
- malnutrition, diseases of the digestive system
- accidents and homicides
- neoplasms
- hereditary and congenital diseases
- degenerative diseases (including functional diseases)
- suicide.

In France, statistics of deaths by cause are available for these categories for the period 1925–78,³⁷ and we shall consider the first and the last quinquennia of this period.

The Importance of Different Age and Cause Groups for Differences between Life Expectancies. In Figs. 9.3 and 9.4 we show the situation in 1925–29 and 1974–78 respectively. The contribution made by each age group to the difference between the life expectancies of the two sexes is decomposed into these seven major groups of causes, and the contribution made by each group is illustrated in Fig. 9.3. In some age groups the contribution of particular causes is negative—in themselves they would result in an excess mortality of women. To make the figure more easily comprehensible, these negative contributions have been cumulated separately from the positive ones, and are shown below the horizontal axis, whereas the positive contributions are shown above it. In other words, where all the contributions are positive, their total yields the contribution of the age group concerned; where some are negative, the total contribution is the difference between the areas above and below the horizontal axis.

Some excess mortality of women persisted among young girls until just before the Second World War. Between 1925 and 1929 this was caused by deaths from infectious diseases and, to a lesser extent, by deaths from

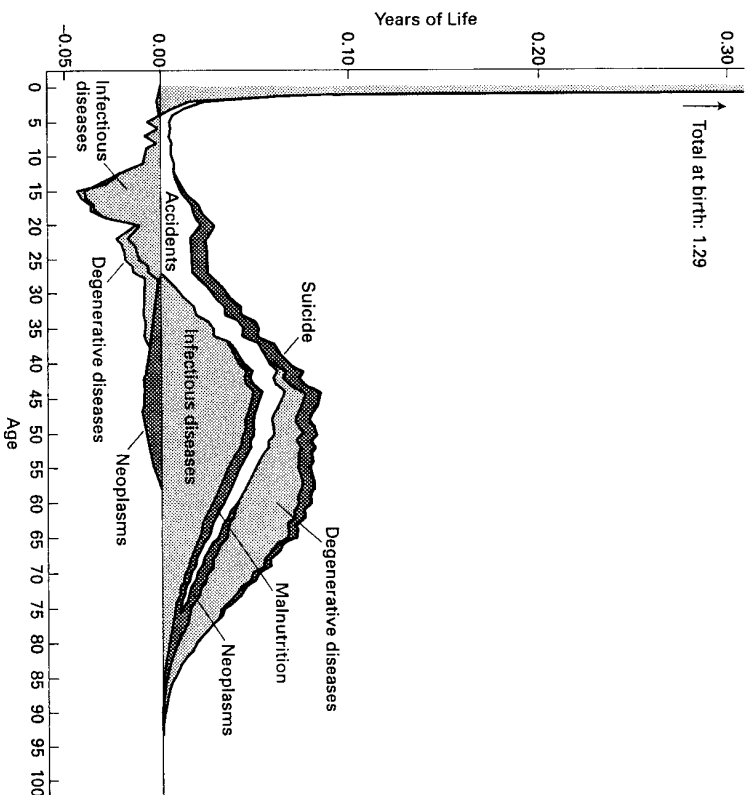


FIG. 9.3 Cumulative contributions of the main groups of causes of death to the difference between life expectancy at birth of the two sexes, by age, 1925–29

degenerative diseases and neoplasms. This excess was quite pronounced around the age of 15 years for deaths from infectious diseases; excess mortality of women from the other two groups of causes persisted to the age of 55, and perhaps shows the last traces of a non-negligible maternal mortality. The reduction in the excess mortality of women between the two wars was caused by a trade-off between their excess mortality from infectious diseases, neoplasms, and degenerative diseases, and men's excess mortality from accidents and suicide. The clear distinction between the contributions of deaths from infectious diseases and accidental deaths around the period of adolescence reinforces the hypothesis that young women received less care, but that this was compensated by the greater risks of violent death experienced by men. It should be borne in mind, however,

³⁵ J. Pollard, 'Causes de décès et espérance de vie: Quelques comparaisons internationales', in J. Vallin, S. D'Souza, and A. Palloni (eds.), *Mesure et analyse de la mortalité: Nouvelles approches* (Paris, 1988), pp. 291–313.

³⁶ J. Vallin and F. Meslé, *Les Causes de décès en France de 1925 à 1978* (Paris, 1988).

³⁷ Vallin and Meslé, *op. cit.*, in n. 35.

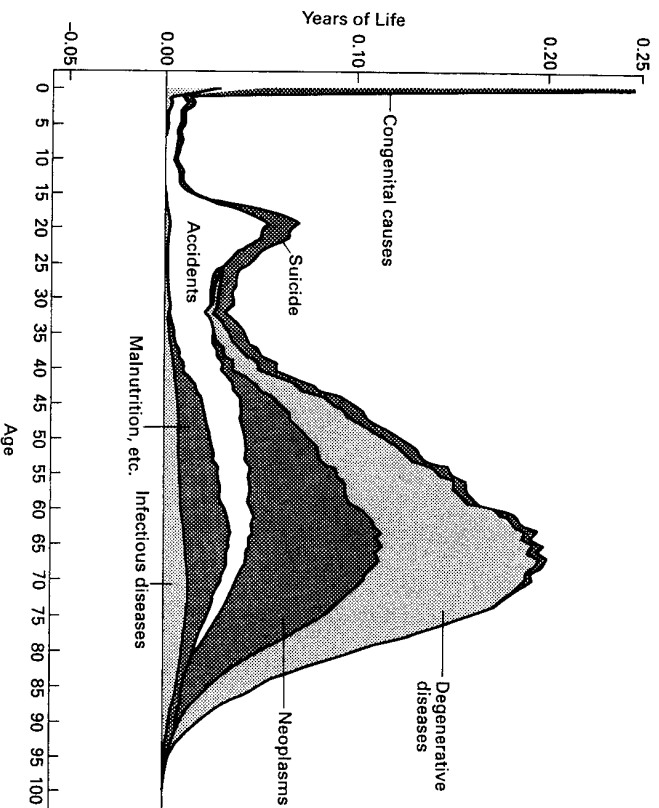


FIG. 9.4 Cumulative contributions of the main causes of death to the difference between life expectancy at birth of the two sexes, by age, 1974-78

that this contrast is found at ages where the overall mortality rate is now lowest.

Between 1925 and 1929, deaths from infectious diseases seemed to be the determining feature that caused differences between the life expectancies of the two sexes during the first year of life. However, in this instance the level of mortality is more important than the excess mortality of boys, which is generally quite low. High infant mortality rates are generally due to infectious disease. This conceals the importance of hereditary and congenital factors, which were to become much more apparent towards the end of the period.

As regards adult ages, we need to distinguish between two different situations in 1925-29. At ages above 55 years, all cause groups contributed to the excess mortality of men, but the main contribution to the difference between life expectancies came from deaths from infectious and degenerative diseases. At lower ages, deaths from infectious diseases accounted for more than half the difference, but deaths from other cause groups (especially deaths from neoplasms) actually tended to reduce it, as mortality from these causes is higher among women.

By 1974-78 the position had changed (see Fig. 9.4). There is no longer an excess mortality of women in any age-cause group. The contributions made by different causes of death to the difference between the life expectancies of the sexes have also changed radically. Deaths from infectious diseases have become marginal in determining the level of overall mortality, and, even though during the intervening period there was an excess mortality of men in all age groups from this cause, its contribution to the difference between life expectancies has become negligible. In the case of infant mortality, the contribution made by deaths from hereditary and congenital diseases has become predominant and confirms that, during the first year of life, the excess mortality of boys is due almost entirely to genetic causes. At around the age of 20, violent deaths account for almost the whole of the excess mortality of men. The contribution of this cause is not negligible at higher ages either, but is soon overtaken by deaths from malnutrition, neoplasms, and degenerative diseases, all of which make a massive contribution to the gap between the life expectancies of men and women.

The Contribution of Different Causes to Increases in Men's Excess Mortality. A comparison of the situation depicted in Figs. 9.3 and 9.4 makes it possible to estimate the contribution made by each group of causes to the increase in the difference between life expectancies from 4.33 years in 1925-29 to 7.99 years in 1974-78 (see Fig. 9.5). This increase has been brought about by changes in the importance of different causes of death in overall mortality, as well as by changes in the excess of men's mortality from these causes.

The part played by mortality from infectious diseases has been influenced above all by the much reduced importance of this cause of death. Originally, women's mortality from this cause exceeded that of men between the ages of 10 and 30 years. Its almost complete disappearance as a cause of death has resulted in an increased excess mortality of men.

The proportion of deaths from degenerative diseases in overall mortality has not changed greatly, but men's excess mortality from this cause has increased, and this has contributed to an increase in the difference between life expectancies. Excess mortality of men from accidental deaths has remained relatively stable, but the weight of this cause in overall mortality has increased. In the case of deaths from malnutrition and neoplasms, the two effects are combined: both the excess mortality of men and the weight of deaths from these causes has gone up. A more detailed analysis shows that this phenomenon was particularly pronounced for deaths from neoplasms of the respiratory system, and from alcoholism and cirrhosis of the liver.

The Increased Predominance of Environmental and Behavioural Factors. An examination of causes of death is insufficient on its own to prove the importance of social or genetic factors. For any cause of death, a difference

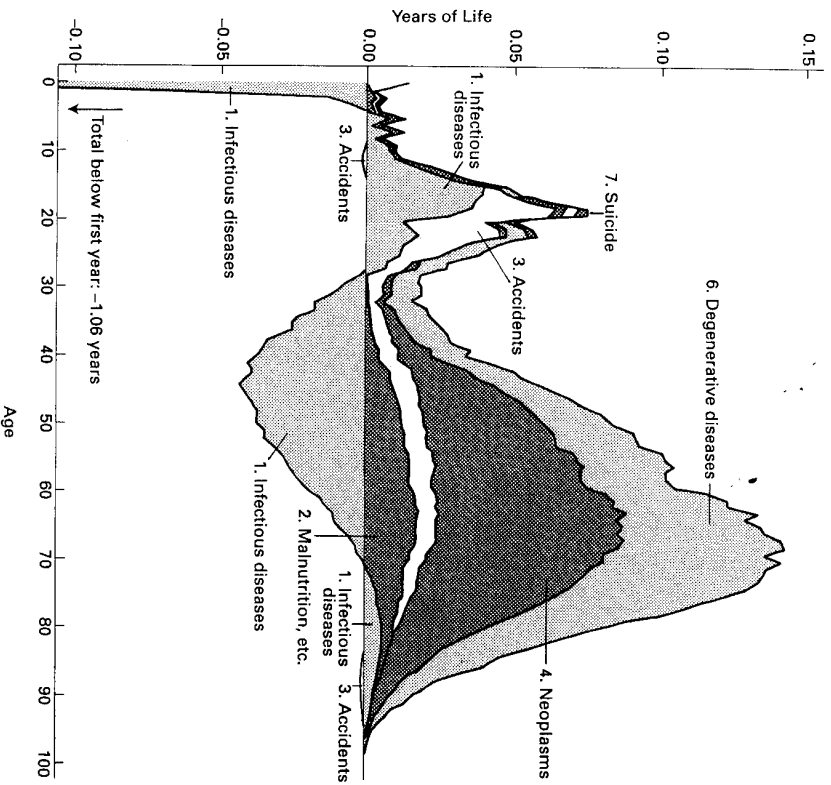


FIG. 9.5 Cumulative contribution to the increase in the differences between life expectancy at birth of the two sexes between 1925–29 and 1974–78

between the mortality of men and women can be interpreted as being biological (differential resistance to infection, for instance), or social (differential access to food or health care). However, Figs. 9.3 and 9.5 suggest interpretations which confirm some of the hypotheses that have been put forward.

The fact that an important part of the excess mortality of infants is linked to hereditary and congenital factors reinforces the view that this difference is biologically determined. The greater susceptibility of boy babies to infectious diseases does not contradict this assertion. Excess mortality has remained relatively stable during our period, and it is only the reduced importance of

infectious diseases as a cause of death that has resulted in the mortality of infants from this cause appearing as a moderating factor in the difference between life expectancies, which is shown in Fig. 9.5. At these ages the struggle against infectious disease has, at least since 1920, not depended on the sex of the infant, and the slight handicap to which boys are subject has not changed.

The same is not true at other ages. For a long time, infectious diseases have taken a heavy toll among young women. The biological advantage that they enjoyed was cancelled by their lower social status and by particular susceptibility to certain diseases. Now that the status of women has improved at all ages (as has been the case for older women for some time) mortality from infectious disease has become heavier among men than among women. This excess is larger than in infancy, and a more detailed analysis shows that it is particularly pronounced for respiratory infections which are closely linked to smoking and industrial pollution, two exogenous factors which impinge on men more than they do on women.

Degenerative diseases which are linked to the attrition of the human organism tend to affect men more than women, because men are less resistant to them. But a higher incidence among men could also be connected with less healthy conditions of life. This second interpretation is supported by the fact that the excess mortality of men from these causes has increased considerably during the last half century.

The most important cause of death which has resulted in increasing the excess mortality of men is neoplasms, particularly neoplasms of the respiratory system which are directly linked to smoking and industrial pollution, and neoplasms of the oesophagus which are linked to alcoholism. Environment and behaviour both play an important and prominent role in this area.

Lastly, deaths from accidents and violence are considerably more frequent among men, as are deaths from alcoholism and cirrhosis of the liver. Though they do not form a very high proportion of all deaths, they make a contribution to the overall excess mortality of men and to its recent increase.

Convergence of Behaviour and Persistence of Men's Excess Mortality

If environmental or behavioural differences were the main causes of men's excess mortality, how can its persistence be explained at a time when these differences have become progressively less important?

Smoking, Drinking, Driving, and Excess Mortality

It has become commonplace in recent years to state that men's and women's behaviour has become more alike. Whereas tobacco consumption is declining

among men, it has increased considerably among women. Women now commonly drive motor cars, and their labour-force participation rate has risen to a level near to that of men at a time when men's labour-force participation rates have been somewhat reduced. These developments were already apparent towards the end of the 1960s, and the authors of model life tables predicted that, as life expectancy increased, the difference between the sexes would diminish, so that the previous trend would be reversed.³⁸ However, their forecasts turned out to be wrong, in spite of the fact that they seemed well founded at the time. Not only have differences between the mortality of the two sexes continued to increase as life expectancy has reached higher levels, but the pace of increase has accelerated in some cases.³⁹

Of course, even though there has been some convergence between the behaviour of men and women, differences persist. Men tend to smoke considerably more than women, they drive motor vehicles much more frequently, and their labour-force participation rates are still slightly higher. Moreover, in some areas, such as the incidence of alcoholism, the difference between men and women has changed only slightly. This might explain the persistence of an excess mortality of men, but it does not account for its increase.

In a discussion of the excess mortality of men, it is tempting to concentrate on those causes of death which lead to an increase in the overall death rate, and to suggest that these result from behaviour that is more characteristic of men than of women. However, this explanation does not take account of the fact that changes in the excess mortality of men have coincided with an extraordinary progress in health. Is it not possible that, in addition to negative factors which affect men more than women, there may be aspects of the life-style of the two sexes which enable women to derive greater benefits from progress in health and medical care than men?

Women's Life-Styles

The Legacy of the Past. Women's inferior social status in the past was not entirely disadvantageous. Though they were slaves to both production and reproduction, they were also regarded as weak and fragile, and were, therefore, afforded some degree of protection. Machismo and gallantry often went together. In patriarchal societies, women were protected from some dangerous activities, such as war and hunting. In moments of danger,

³⁸ A. J. Coale and P. Demeny, *Regional Model Life Tables and Stable Populations* (Princeton, NJ, 1966).

³⁹ J. Vallin, 'Sex Patterns of Mortality: A Comparative Study of Model Life Tables and Actual Populations with Special Reference to the Cases of Algeria and France', in A. Lopez and L. Ruzicka (eds.), *Sex Differentials in Mortality: Trends, Determinants, and Consequences* (Cambridge, 1983), pp. 443-76.

the cry 'Women and children first' was heard. During the period of industrialization, the law prohibited the employment of women in some dangerous occupations, such as mining, or in night work, regulated their working hours, and later even protected their fertility by such measures as antenatal care and maternity leave. Towards the end of the nineteenth century a situation was reached in which women were prohibited from engaging in some forms of work in factories, and their participation in the labour force tended to be limited to occupations which were regarded as 'more fitted to their natures', such as home employment. They were thus spared not only the dangers of war and military service, but also a large part of the brutal conditions in heavy industry. Similarly, women smoked and drank less than men did, were subject to lower risks of death on the roads, and, because their sexual activities were more restricted, their health risks from venereal diseases (syphilis and gonorrhoea in the past, AIDS today) were lower.

Though it has been eroded to a large extent, some aspects of this protection have remained. Whilst women have gained an improved status in society, and have been able to reduce their reproductive burdens, they have also tended to retain some of the privileges that were attached to their former status, not only in the form of legal protection, but perhaps even more because they were thought to hold different attitudes to life and society.

The Move towards a Feminine Life-Style. The achievement of equal status by women does not mean that their behaviour will necessarily become more like that of men. Fundamental differences have persisted, and this goes some way to explaining why women have benefited more from modern progress in medicine than men.

Modern women smoke, drink, and drive, and it is not, therefore, surprising that men's excess mortality from these causes has tended to diminish. Some of the consequences of this convergence of behaviour are only likely to become apparent in the future: the effects of smoking, in particular, only manifest themselves with some delay. However, it would appear that, in spite of this convergence, women's behaviour in this respect is less risky than that of men. Although in recent generations the proportion of young girls who smoke cigarettes has become equal or sometimes even slightly higher than that of boys, the number of cigarettes smoked by regular smokers each day is much lower among women than among men.⁴⁰ Women's driving behaviour, too, is more prudent; on average they drive more slowly and take fewer risks than men. But these differences are less important than others which we now proceed to discuss.

⁴⁰ M. Blanc, 'Les Effets à long terme des programmes d'intervention contre le tabagisme: Application à la France', in J. Vallin and A. Lopez, *La Lutte contre la mort* (Paris, 1985), pp. 238-56.

TABLE 9.2. *Employed active population by major occupational groups and sex, France, 1982 (000s)*

Occupational group	Men	Women	Women (%)
Farmers, artisans, shopkeepers	2,024	1,134	36
Managers, professionals, civil servants, engineers	1,853	336	15
Teachers, scientific workers, journalists, artists, clergy, clerical workers in public and private sector	994	720	42
Foremen, skilled and unskilled manual workers, agricultural workers, policemen, drivers	6,516	1,415	18
Primary schoolteachers, workers in the health and social services, lower ranks of the public service, clerical workers	1,619	4,855	75
TOTAL	13,005	8,460	39

Although the increase in women's labour-force participation rates has been spectacular during the last few decades, their distribution between occupations has remained fundamentally different from that of men (see Table 9.2).⁴¹ It has often been noted that women reach positions of responsibility less frequently than men. Less stress has been put on the fact that women are, in general, more skilled than men, and are less often employed in low-grade occupations which demand hard physical work. In the French Census of 1982, 40 per cent of all employed persons recorded were female. Their participation in employment was, therefore, almost the same as that of men, but their distribution between different occupations was very different.⁴² They were underrepresented in decision-making

⁴¹ M. Levy and A. Labourie Raccapé, 'Le Salarariat féminin en perspective', *Population et Sociétés*, 165 (1983), pp. 1-3.
⁴² D. Dandoy-Marchant, *Tableaux de l'économie française* (Paris, 1986).

occupations (heads of enterprises, liberal professions), where they amounted to only 15 per cent of all those enumerated. In the more technical occupations, their proportions were even lower (6 per cent among engineers, and 9 per cent among technicians). They were equally underrepresented in industrial employment, handicrafts, and agriculture, both in skilled and unskilled work (18 per cent), and were particularly rare among supervisory personnel (only 6 per cent of foremen or equivalent grades were females). By contrast, the intermediate professions (teachers, ancillary health workers, the social services, the lower civil service, and clerical occupations) were largely staffed by women, who accounted for 75 per cent of all workers in this group. These occupations contained 57 per cent of the entire female labour force, and characterized the nature of women's employment. By contrast, well over half of all employed men worked in industry.

It is difficult not to link differences between the occupational profile of the male and female labour force with sex differentials in mortality. Men's death rates tend to be influenced considerably by their occupation. Men employed in professional and managerial occupations enjoy a life expectancy on their thirty-fifth birthday which is nine years longer than that of manual workers.⁴³ However, no such difference is found for women.⁴⁴ Women's employment tends to be concentrated in occupations that carry a low health risk (teaching, clerical work), but, even when they are employed in occupations in which the health risks for men are significant, women seem to be better protected. It would be necessary to study occupational mortality in much greater detail in order fully to understand this phenomenon; here we shall content ourselves with mentioning that, in the two occupations which appear to be the most dangerous in our society (policemen, and road transport drivers), the proportion of women is lowest (5 per cent and 2 per cent respectively). Although women work as hard as men do, and even harder when their domestic responsibilities are taken into account, their employment is concentrated in occupations in which the risk to health is lower. It is also possible that women arrange their work differently, and employ a working rhythm which is less dangerous for their health.

Finally, in general, women's attitudes to their bodies, their health, and life in general are very different from those of men. This is probably an aspect of evolution which is connected with their reproductive function. During a period when control of fertility has reduced the burden of maternity, medical services for the protection of mothers and infants, and obstetric and gynaecological services, have become increasingly important in medicine and have taken a larger share of medical resources. These developments have more than compensated for the higher risks that women in run as reproducers. They have contributed to a general improvement in

⁴³ G. Desplanques, *La Mortalité des adultes suivant le milieu social, 1955-1971* (Paris, 1976);

⁴⁴ 'Inégalité devant la mort', *Economie et statistique* (1980), pp. 29-50.

⁴⁵ Desplanques (1980), op. cit. in n. 43.

women's health, and women nowadays use medical services more and take better care of their health than men do. To give just one example: the early detection of cervical cancer as a result of routine screening has been one of the main reasons for the reduction of mortality from uterine cancers in general.⁴⁵

But the greater care that women give to their health is not confined to reproduction. The feminine life-style and culture have quite different effects on the human body than men's exaltation of virility. We might put this into an extreme form by saying that the quest for beauty is opposed to that for force and power. The former requires the body to be kept young and healthy for as long as possible; the latter subjects it to stresses and risks. Women pay greater attention to their bodily and health needs than men; they use medical services more frequently and are in closer contact with their medical practitioners.

More temperate in their use of tobacco and alcohol, women engage in fewer risky activities, take greater care of their health and their bodies, and have thus derived greater benefits than men from medical and social progress. Their advantage has been increased by recent developments in a different field: education. During the 1960s the proportion of girls who passed their *baccalauréat* examination came to exceed that of boys.⁴⁶ Even though women may reach the very highest educational levels less frequently than men, the average level of their education is higher, and this has given them another, and by no means less valuable, additional advantage in respect of their mortality.

⁴⁵ F. Hatton, R. Flammand, M. H. Bouvier-Colle, and L. Maujoi, 'La Lutte contre la mortalité cancéreuse', in Vallin and Lopez, op. cit. in n. 40.

⁴⁶ M. Lévy, 'Garçons et filles à l'école', *Population et Sociétés*, 151 (1981), pp. 1-3.

10 Sex Inequalities in Morbidity and Mortality

VIVIANA EGIDI AND ARDUINO VERDECCHIA

When we move from a descriptive to an analytical approach to mortality order to identify possible determinants of mortality and the difference between them, one of the first problems to crop up is that, in normal circumstances, death is simply one of a number of possible terminal even in a morbid process which began during previous stages of an individual life. In the developed countries, in which the principal causes of death are now chronic and degenerative diseases which are often prolonged, the risk exists that, by continuing to analyse trends and differentials solely in terms of the negative outcome (death), we shall lose sight of the true mechanism that underlie the process of morbidity. An analysis of the difference between the mortality of the two sexes will show this, as well as the far reaching cognitive and methodological consequences of analysing the whole of the morbid process from onset to final outcome. A reconstruction of the whole chain of events, which may or may not end in death, will make possible to account for the varying sizes, and often direction, of differences which characterize each phase of the illness, and will show that these may be influenced—positively or negatively—by different variables. So biological, behavioural, or environmental variables may operate during the phase of onset, and influence the type of illness and the part of the system that is affected. For instance, differences between the smoking and drinking habits of men and women, which continue to be widespread though declining, or the occupational hazards faced by the two sexes, will need be considered. Other biological, behavioural, or environmental variables may be more active during an illness, and influence both its duration and its outcome. Women are generally more concerned about their health and health facilities more frequently than men,¹ and consequently their illness may be diagnosed earlier and be more effectively treated.

The theoretical advantages that can be obtained by introducing morbidity into the analysis also render the phenomenon much more complex and far

¹ See, e.g., L. M. Verbrugge, 'Longer Life but Worsening Health? Trends in Health Mortality of Middle-Aged and Older Persons, *Milbank Memorial Fund Quarterly*, 62 (1994) pp. 475-519; Istituto Centrale di Statistica (ISTAT), *Indagine sulle condizioni di salute e popolazione e sul ricorso ai servizi sanitari*, Supplemento to *Bollettino Mensile di Statistica* (Nov. 1980).