Infant Mortality about 1800

— A Preliminary Exploration into a Norwegian Local Material

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In discussion of the decrease of the death rate in Western Europe after 1750, little attention has been paid to changes in infant mortality. There are two particular reasons to regret this neglect. First, a decline in the traditionally high mortality in the first year of life may have had a strong impact on the level of the crude death rate and on the life expectancy at birth. If for instance the life expectancy at the first birthday is set at 50 years, a fall in the death quotient for the first year of life from 300 to 200 per 1 000 will augment the life expectancy at birth from 35 to 40 years approximately. Second, changes of this kind in infant mortality are simple to observe through the number of births and deaths in the parish records because migration hardly disturbs the population under study during the short span of time between birth and death. In this paper we shall make an inquiry into the infant mortality of a Norwegian parish about 1800. One additional purpose of the investigation is to test the effectiveness of the analytical tools we employ. To what extent can we hope to throw light upon the subject?

The area we study, *Etne*, is a parish in Western Norway, situated 85 km south-east of Bergen. The combination of animal husbandry and farming was the predominant occupation of the people. Some of them got a certain surplus income by participating in the coastal fisheries during some weeks in the late winter. Up to 1750, Etne had an almost static population of about 900 inhabitants. Later the population grew steadily, as the official censuses show:

1769:	1000	1815:	1632
1801:	1412	1825:	1935

The maximum of 2 612 inhabitants was attained in 1865. This population growth contributed to the formation of a new social group in the parish: In addition to a rather stable number of *farmers*, there was an expanding number of *cottars*. The cottars might be described as a kind of agricultural »proletariat» living on tiny pieces of land rented (for money or for work) from the

farmers, but mainly dependent on what little they could earn as farm workers. There was a wide gap between the generally well-to-do farmers and the usually impoverished cottars. The distinction also was a universally recognized and legally sanctioned one that is found in most sources and thus greatly facilitates the use of socio-economic variables. Various tests indicate that the infant mortality in Etne up to 1775 was about 300 per 1 000. From 1815 to the middle of the 19th century it fluctuated at a new level of approximately 170 per 1 000. Mortality in the two social groups can hardly be ascertained before 1775 because the cottars still were few in number. After 1815 the difference between the two groups seems to have been slight or even insignificant.

Between the two relatively stable periods before 1775 and after 1815 we find a phase of transition from a high to a moderate level of infant mortality. Our study shall be limited to this period.

Analysis

In the years 1775—1814, 1723 registered live births took place in Etne. This forty-year cohort has been kept under observation up to the census of 1900. All the families living in the parish during 1775—1814 have been reconstituted as far as possible. This control work is likely to have eliminated most errors in the source material. We then find that of the 1723 persons 393 died under one year of age. The death quotient was 228 per 1000. The 1723 persons consisted of 894 boys and 829 girls. During the first year of life, 227 boys and 166 girls died, thus giving respective death quotients of 254 and 200 per 1000. A sex-ratio of 107.8 at birth had fallen to 100.6 at the first birthday.

If we then proceed to a division into ten-year periods and separate farmers and cottars, our data take the form of Table 1.

Table 1. Infant mortality by ten-year period and social group.

Social group		1775—84	1785—94	1795—1804	1805—14
Farmers:	Births	256	304	288	220
	Deaths	74	83	67	42
	Death quot.	289	273	233	191
Cottars:	Births	135	119	207	194
	Deaths	25	19	42	41
	Death quot.	185	160	203	211

For the farmers, the death quotients show a falling trend from approximately 300 in 1775 to less than 200 in 1815. For the cottars, the death quotients lie on a steady average level below 200 throughout the period. We

consequently draw the somewhat surprising conclusion that the lower social group had by far the lowest infant mortality in 1775, and that it took the farmers 40 years to close this gap.

Table 2. Infant mortality by period of birth and social group.

Category	Births	Deaths 0—1 year	Death quotient per 1000
Farmers 1775—94	560	157	280
Farmers 1795—1814	508	109	215
Cottars 1775—1814	655	127	194

We now proceed to the actual investigation, which will consist of several comparisons among three different levels of infant mortality: A high level represented by that of the farmers during the years 1775—94; a medium level by that of the farmers 1795—1814; and a low level being that of the cottars during the whole period 1775—1814. Our data appear in Table 2.

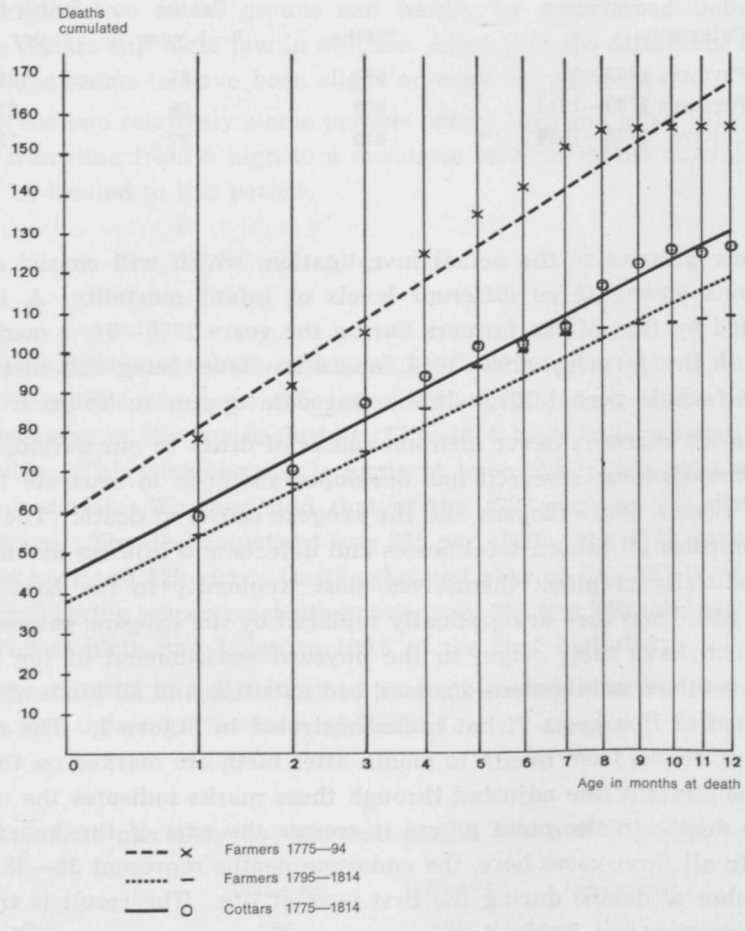
The parish registers never mention causes of death in our period. However, modern demographic research has developed methods to separate two crude groups of causes: The *endogene* and the *exogene* causes of death. The endogene causes comprise all inborn weaknesses and defects and injuries at birth. These causes naturally manifest themselves most frequently in the first days and weeks of life. Then they are gradually replaced by the exogene causes of death, all of which have their origin in the physical environment of the child and reveal themselves as infectious diseases, bad nutrition and all kinds of accidents. The method of Bourgeois-Pichat is demonstrated in Figure 1. The cumulated numbers of deaths from month to month after birth are marked on the vertical axes. The straight line adjusted through these marks indicates the number of endogene deaths in the point where it crosses the axis of the imaginary Oth month. In all three cases here, the endogene deaths represent 35—38 % of the total number of deaths during the first year of life. The result is transcribed to death quotients in Table 3.

Table 3. Endogene and exogene infant mortality by period and social group.

Category	Total death quot.	Percentage endogene deaths	Endogene death quotient	Exogene death quotient
Farmers 1775—94	280	38.3	107	173
Farmers 1795—1814	215	34.8	75	140
Cottars 1775—1814	194	35.4	69	125

As the relation between the endogene and the exogene component is nearly constant in all the three categories, it is easily concluded that the cottars are better off in both respects.

Figure 1. Diagram for the reading of endogene and exogene deaths.



A further inquiry into the exogene mortality during the first year of life will, in addition to the great practical difficulties it encounters, largely exceed the boundaries of this paper. Epidemics, lack of hygiene, malnutrition and other environmental causes of death obviously inflict themselves on all age groups of a population and should consequently be considered within this complete context. For this reason, we will leave this particular component of mortality while retaining the previous observation that the inferior social group had the privilege of the lowest exogene mortality among its infants.

In the remainder of this paper, our interest will be exclusively oriented towards the endogene infant mortality. First of all it should be stressed that the diminishing infant mortality cannot be ascribed to the installation of a doctor or even a midwife in the parish. Written evidence excludes any innovation of this kind, and considering the geographical extent of the parish (30 km or 18 miles from east to west) one should expect a midwifeservice to favor the central and most densely populated areas. But infant mortality is about the same in all parts of the parish.

A scrutiny of the endogene or inborn causes of death conveniently starts by the distribution of deaths on the very first days of life (Table 4).

Table 4. Distribution of deaths up to the twelfth day of life.

	Age at death (days)													
Category	0	1	2	3	4	5	6	7	8	9	10	11	12	Sum
Farmers 1775—94	1	1	2	4	4	10	8	3	18	5	1	4	3	= 64
Farmers 1795—1814	2	0	0	3	3	3	2	1	19	1	0	0	0	= 32
Cottars 1775—1814	1	3	2	1	3	5	2	2	21	1	2	0	1	= 44
All categories	4	4	4	7	9	18	12	6	58	7	3	4	4	= 140

The main pattern is identical for all three categories. Deaths become more numerous up to the fifth day and then decrease, but with one astonishing exception for the eighth day. A distribution like this one is likely to arouse suspicion. Normally one should expect most deaths during the first two or three days and falling numbers beyond that. Our distribution indicates an incomplete registration of early deaths and erroneous age declarations. The key to the problem, however, is offered by the new and exhaustive system of registration introduced in the parish in 1832. Comparing the distributions of early deaths before and after this date, we notice a slight increase of the deaths during the first 24 hours of life. Before 1832 some of these deaths must have been classified as stillbirths and left out of the registration. The high number of deaths at the age of eight days turns into a long wave from the fifth to the tenth day, but still with its highest point at the seventh or the eighth day. The accumulation of deaths on the eighth day therefore must have been due to a rounding-off of the age — in current language at that time, eight days meant one week. The pattern of accumulated deaths between the fifth and the tenth day of life is consequently a real one; it is a particularity of the endogene infant mortality in the parish of Etne during most of the 18th and 19th centuries. The causes of this strange pattern are, as we see, not social. The pattern will probably have some medical explanation.

The following steps of the analysis concern two variables, birth order and age of mother. Previous research, for instance that of Louis Henry, has shown

that the first child and to a lesser degree also the last child born of a woman living through her reproductive period run a greater risk of dying before their first birthday than intermediate children, and that this excess mortality should be attributed to the factor of endogene mortality. By means of the reconstituted families, some light can be shed on this subject. In order to facilitate our study, it will from now be restricted to deaths during the *first month of life.* There is reason to believe that they will still offer a serviceable measure of the endogene mortality for our comparative purpose. Table 5 reveals that first-born children have approximately average endogene death risk. The great deviations are restricted to the lastborn children: In the cottars' group, they have a much lower endogene mortality than the average for children, while an excessive mortality is found among these children in the farmers' group. This high mortality has decreased from the first to the second period, but is still apparent. As most marriages and consequently first births occur to women aged 25—29 years and most last births to women 40—44 years of age, these results can be followed into the next table showing mortality according to age of mother:

Table 5. Deaths during the first month of life by order of birth.

Category		All born	First-born	Last-born
Farmers 1775—94	Births	560	93	62
	Deaths	78	12	13
	Death quotient	139	129	210
Farmers 1795—1814	Births	508	80	67
	Deaths	54	8	11
	Death quotient	106	100	164
Cottars 1775—1814	Births	655	120	93
	Deaths	59	11	5
	Death quotient	90	92	54

The pattern is striking. We find a general homogeneity for ages under 35 years, both when comparing periods and social groups. Over 35 years, however, farmers' wives experience a very high death risk among their children. This excess mortality tends to disappear from the first to the second period, the mortality pattern of the farmers approaching that prevalent in the cottars' group, where the age of the mother seems to have had little or no impact upon the endogene mortality level of the children. To sum up then: When the endogene infant mortality in the farmers' group declined from 107 to 75 per 1000 (see Table 2) during the period from 1775 to 1814, this was probably due to the disappearance of the previous extraordinary mortality among children born to women having passed their 35th year.

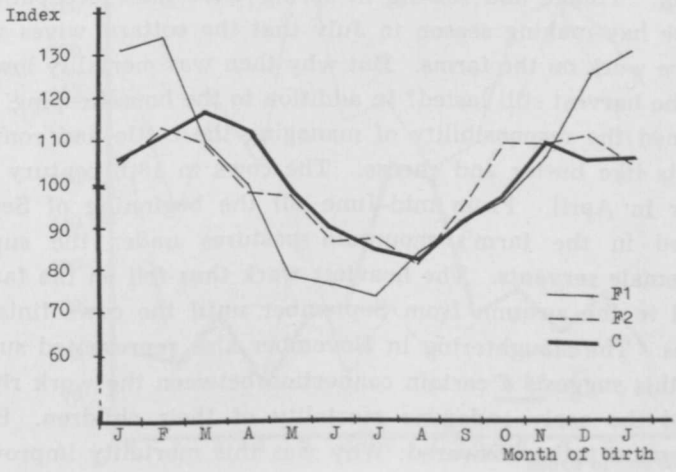
Table 6. Deaths during the first month of life by mother's age.

Category		Under 30	30—34	35—39	Over 40	Age unknown
Farmers 1775—94	Births	220	143	103	72	22
	Deaths	19	15	19	14	10
	Death quot.	86	105	186	194	
Farmers 1795—1814	Births	182	110	113	90	12
	Deaths	23	11	13	7	0
	Death quot.	126	100	115	78	
Cottars 1775—1814	Births	156	147	144	123	85
	Deaths	15	15	15	9	3
	Death quot.	96	102	104	73	

But even if the changes can be so closely identified, we fail to explain them. We know that the wives of cottars had a higher average age at marriage and consequently had fewer children than those of the farmers. But this observation is of dubious value in so far as the age-specific fertility was almost identical in the two social groups and the trend in the farmers' group went towards earlier marriages and more births per woman. There is nevertheless a possible relation between infant mortality and the reproductive history of the mothers.

Up to this point, we have studied the endogene infant mortality in the light of two different life cycles: That of the child (age at death) and that of the

Figure 2. Births distributed according to month and social group (3 months' moving average).



mother (birth order, age at birth). We conclude this analysis by situating the endogene mortality in the annual cycle that both nature, the society and its individuals live through. Figure 2 shows the variations in the monthly number of births during the calendar year when 100 is taken as the average. In the cottars' group, the highest point of 116 is reached in March and the lowest point of 82 in August. In the farmers' group, the curve for the first period has a more dramatic course with a flood of 134 in February and an ebb of 73 in July. But in the second period this pattern is replaced by one that strongly resembles that of the cottars. The levellingout of the curve should probably be explained by the fact that part of the farmers in Etne in the 1790s started to fit out boats and participate in the late winter herring fisheries outside the parish. The cottars had joined foreign boats from an earlier date.

The question is then how the endogene death risk — still crudely represented by the death quotient for the first month of life — varies according to the month of birth. This is shown by Figure 3. Out of 1000 cottars' children, 80—90 die in the course of the first month following birth. This death quotient rests stable throughout most of the year. Only the months of July and August deviate from this rule by a death risk of 120. For the farmers, the pattern is more complex. There are two tops, a brief one in May and a lasting one from September till January. This main pattern is discernible in both periods, but with a partial lowering of level: The high endogene mortality in September—January remains almost unchanged, while a considerable fall has occurred for February—August, including the top of May. The sudden fluctuations from one month to another seem to eliminate explanations like the nutrition or general health condition of the mother. We know from other sources that the diet was most deficient in January—March, and this was also the period of most frequent diseases and illnesses of all kinds. But these months had, as we have seen, a relatively low endogene infant mortality in both social groups. Is perhaps the explanation to be found in the seasonal work obligations of the women? The cottars' wives had little work to do at home except the daily housekeeping. Tillage and sowing in spring were male occupations. It was not until the hay-making season in July that the cottars' wives were offered remunerative work on the farms. But why then was mortality low in September, while the harvest still lasted? In addition to the housekeeping, the farmers' wives assumed the responsibility of managing the cattle and converting milk into products like butter and cheese. The cows in 18th century Etne calved once a year in April. From mid-June till the beginning of September the cattle stayed in the farm's mountain pastures under the supervision of particular female servants. The heaviest work thus fell on the farmers' wives in May and in the autumn from September until the cows finished milking at Christmas. The slaughtering in November also represented supplementary work. All this suggests a certain connection between the work rhythm of the mothers and the early endogene mortality of their children. But a lot of questions remain to be answered: Why was this mortality improved only for

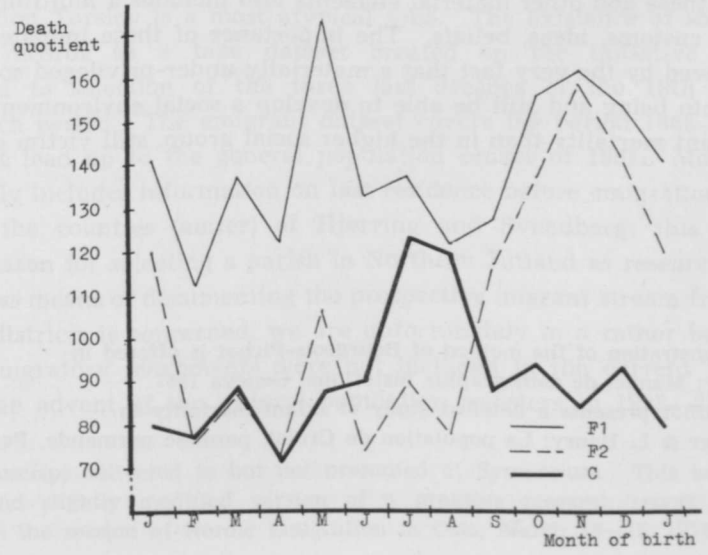
the months of February—August, and not September—January? And how is this fact to be related to what was found concerning the endogene mortality by age of mother? Once again we fail to build a coherent explanation out of the individually clear elements of the analysis.

Conclusive Remarks

From a methodological point of view, this study of the infant mortality in the parish of Etne during the years 1775—1814 has confirmed that a quite ordinary parish register can supply data for an extensive inquiry into the different components of infant mortality. The method of Bourgeois—Pichat permits establishing an acceptable separation of the endogene and the exogene mortality. The limited scope of our investigation forced us to leave out the exogene mortality at an early stage. By means of the family reconstitution, we could extend the analysis of the endogene mortality: The age distribution of the earliest deaths, deaths according to birth order, deaths by mother's age, deaths by month of birth. Throughout the study, we have been able to compare social groups and periods.

What then are the results of this study? At first glance, the work has been unsatisfactory because all the attempted explanations have ended in unanswered questions. But in spite of this, some interesting facts have been revealed.

Figure 3. Death risk for the first month of life by month of birth and social group (3 months' moving average).



About 1800 mortality rates in Western Europe were falling. Many regions had already entered what is now called the first phase of the demographic transition. What are the alleged causes of this falling mortality? Most experts cite better and steadier food supplies, better nutrition, small-pox vaccination, better hygiene and greater medical knowledge. Mortality was declining because man got a greater dominance over his environment. But all this, even if it is confirmed, principally concern the exogene component of mortality. And our experiences from a Norwegian peasant community do not fit into this nice general scheme. In the first place we find that a materially under-privileged social group, the cottars, had a lead of half a century on the traditional upper class, the farmers. In addition, we have found a remarkable fall in the endogene mortality. What part has better nutrition played in that development? Perhaps none. Small-pox vaccination? None at all. Better hygiene and medical ability? Probably none. The key to this aspect of the falling mortality is surely to be found elsewhere. We started by concentrating on three levels of infant mortality, and ascertained that the farmers were descending through the two upper levels towards the lower one, which was that of the cottars during the whole period. This very simple *unilinear* model seemed valid. Analysis of endogene mortality by order of birth and by age of mother offered repeated examples of how the mortality pattern of the farmers was approaching that of the cottars. But then our investigation of endogene mortality by month of birth exposed two widely different patterns. The cottars apparently rested invariably in theirs; the farmers were in the act of ameliorating theirs; but there was no sign at all of an assimilation in structure between the two patterns.

Our evolutionary model therefore has to be made *multilinear*. We must be willing to accept that mortality is far more than a simple function of nutrition, medicine or economic condition. It is placed in a larger social context which in addition to these and other material elements also includes a multitude of rules of conduct, customs, ideas, beliefs. The importance of these immaterial influences is proved by the very fact that a materially under-privileged social group can come into being and still be able to develop a social environment favoring a lower infant mortality than in the higher social group, still victim of its own past.

References

A good demonstration of the method of Bourgeois-Pichat is offered in

L. Henry: Manuel de demographie historique. Geneva 1967.

The same author presents a detailed study of infant mortality in

E. Gautier & L. Henry: La population de Crulai, paroisse normande. Paris 1958.