

Trends in Perinatal, Neonatal and Postneonatal Mortality in Italy, 1955–84

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Introduction

Perinatal, neonatal and postneonatal mortality have dropped markedly in most developed countries over the last few decades [1–5]. These generalized downward trends have been observed in Italy as well, though the rates reported still appear relatively high compared to other Western European countries. However, only occasional and scanty data have, to our knowledge, been published on this subject. In the present paper we have therefore summarized trends in stillbirth, perinatal, neonatal and postneonatal mortality rates over the period 1955–84 using data published by the Central Institute of Statistics. Stratified and standardized stillbirth rates taking into account maternal age, socioeconomic indicators and birthweight distribution are also presented for selected periods and discussed. A more detailed and comprehensive analysis for the period 1955–79 has been recently published in a separate volume [6].

Materials and Methods

Stillbirth rates, perinatal, neonatal and postneonatal mortality rates were computed from denominators (numbers of livebirths plus stillbirths for stillbirth rates and perinatal mortality; numbers of livebirths only for neonatal and postneonatal mortality rates) and numerators (numbers of stillbirths and deaths in the first day of life, from the second to the seventh, from the eighth to the 28th, and from the 29th day to the first year of life) published annually by the Central Institute of Statistics (ISTAT) [7–9]. Up to 1984 in

Italy the definition of stillbirths included all fetal deaths after the 180th day of pregnancy, instead of from the 28th week or 196th day as suggested by the WHO.

Data on numbers of live and stillbirths were also available within strata of age of the mother and social class (based on the profession of the head of the household) from 1955 to 1979, and, for number of deaths in the first year of life, within strata of maternal education from 1972 to 1979. Thus, stratified rates were derived as well as the standardized ones, adjustment being made by the direct method using the total distributions as standard.

Finally, stillbirth rates within strata of weight at birth were computed for a few years (1958, 1963, 1967, 1973, and 1980) for which published data from the Central Institute of Statistics were available. Limits of the weight classes adopted by the ISTAT were 50 g higher than suggested by the WHO (1550, 2550, 3550, and 4550 g) for 1958, 1963, 1967 and 1973, but not for 1980.

Results

Trends in stillbirth, perinatal rates and mortality during the first day, from the second to the seventh day, from the eighth to the 28th day and from the 29th day to the first year of life are given in *Table 1*; perinatal mortality AND stillbirth trends are also summarized in *Figure 1*.

All these rates were steadily decreasing over the calendar period considered, with an overall 75% fall in

Tab. 1. Trends in perinatal, neonatal and postneonatal mortality rates in Italy, 1955–84.

Calendar year	Stillbirth rates/ 1000 births	Perinatal mortality rates/1000 births	Infant mortality rates/1000 livebirths during			
			1st day	2nd–7th day	8th–28th day	29th–365th day
1955	28.4	46.2	9.4	9.0	7.4	25.1
1960	24.5	41.9	9.2	8.7	5.8	20.3
1965	19.8	36.5	8.6	8.5	5.2	13.7
1970	15.4	31.2	7.6	8.4	4.3	9.2
1975	11.1	24.1	6.0	7.1	2.9	5.2
1980**	8.4	17.8	4.6	4.9	1.8	3.3
1984**	7.1	14.5	3.7	3.8	1.6	2.2
Change in rates						
Absolute change	– 21.3	– 31.7	– 5.7	– 5.2	– 5.8	– 22.9
Percent change/year*	– 5.8	– 4.0	– 3.2	– 3.0	– 5.3	– 8.4

* Average annual rate of change assuming that the change has been constant and estimated as $100\% \times \text{difference in log}_e \text{ rates divided by 29 years}$.

** Based on provisional data.

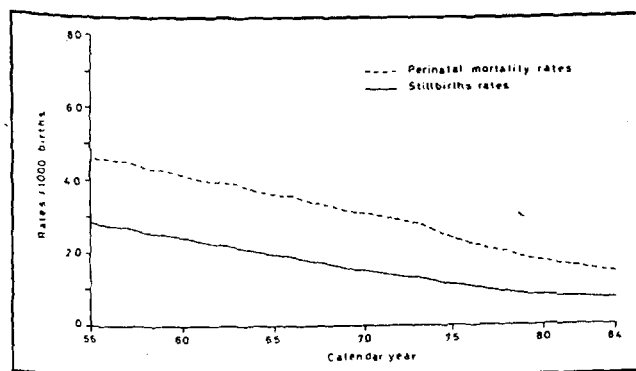


Fig. 1. Trends in stillbirth and perinatal (from the 180th day of pregnancy to the first week of life) mortality rates in Italy, 1955-84 (1980-84, provisional data).

stillbirth rates, an approximately 60% drop in mortality during the first week of life (and a nearly 70% decrease in overall perinatal mortality), an almost 80% drop in rates from the second to the fourth week, and a more than 90% decrease in mortality from the second month to the end of the first year of life. The decline was rather constant over the period considered, and the trends were still largely downwards in the early 1980s. This is true for all the statistics considered (including postneonatal mortality). For some of them (chiefly mortality during the first month of life) the decline appeared steeper in the last decade.

When various strata of maternal age were considered for the period 1955-79 (Table 2), the downward trend in stillbirth rate appeared less marked at later (≥ 40) ages. More important, changes in the distribution of

age at birth should be taken into account in evaluating the overall trends, since the proportion of births at very young or older age decreased noticeably over the period considered. However, direct standardization for age of the mother did not materially modify the measure of the downward trend described (Table 2). Likewise, the decrease in stillbirth rates was similarly evident within the four major strata of head of the household's profession (professional, managerial, and clerical; manual and unskilled workers; independent workers, such as shop-keepers, farmers, etc.; others, including unemployed, students, etc.). However, the difference between these indicators of social class appeared somewhat reduced over the 1955-79 period: compared to professional, managerial and clerical workers, the ratio decreased from 1.43 to 1.25 for manual, from 1.41 to 1.38 for independent workers and from 1.61 to 1.13 for others (which, however, may reflect a change in composition of this category, to include for instance a larger proportion of students). The hint towards a levelling of the social class differences was more apparent over the last years of the period considered (Table 2).

When categories of mother's education were considered (Table 3, data presented for selected years) the decrease in stillbirth rates in the 1970s was apparently greater for more educated women. There was no clear difference in trends between various educational levels for mortality during the first week of life (though no apparent gain was obtained over the period considered for women with university degree), whereas the decline in mortality rates from the second to the fourth week and up to the first year of life was apparently

Tab. 2. Trends in stillbirth rates according to maternal age and head of the household's occupation in Italy 1955-84*.

	Stillbirth rates/1000 births for					Change	
	1955-59	1960-64	1965-69	1970-74	1975-79	Total absolute change	Percent change/yr**
Age of the mother							
< 20	21.8	17.7	13.7	10.3	7.3	- 14.5	- 5.5
20-24	21.1	17.2	12.8	10.1	7.2	- 13.9	- 5.4
25-29	23.5	18.6	14.3	11.1	8.3	- 15.2	- 5.2
30-34	27.5	23.4	19.2	14.7	10.6	- 16.9	- 4.8
35-39	36.3	33.2	28.5	23.4	17.3	- 19.0	- 3.7
40-44	52.4	48.5	45.1	37.6	36.9	- 15.5	- 1.8
≥ 45	69.1	67.9	63.8	54.2	48.3	- 20.8	- 1.8
Total, age standardized	26.2	22.0	17.7	14.0	10.6	- 15.6	- 4.5
Head of the household's occupation							
Professional, managerial and clerical	19.5	16.0	12.4	10.1	7.7	- 11.8	- 4.6
Manual and unskilled workers	28.0	22.2	17.1	13.4	9.7	- 18.3	- 5.3
Independent workers	25.6	24.0	19.7	15.1	10.7	- 14.9	- 4.8
Others	31.3	29.1	27.3	14.7	8.8	- 22.5	- 6.4
Total, profession standardized	26.2	22.2	17.9	13.8	9.9	- 16.3	- 4.9
Total, crude	26.7	22.5	17.9	13.7	9.7	- 17.0	- 5.0
Total, age and profession standardized	25.7	21.8	17.7	14.2	10.6	- 15.1	- 4.6

* Illegitimate births excluded.

** Average annual rate of change assuming that the change has been constant and estimated as $100\% \times \text{difference in } \log_e \text{ rates divided by 20 years}$.

Stillbirth rates/1000 births for Mother's education (years)				Change	
	1972	1975	1979	Total absolute change	Percent change/yr*
Stillbirth rates/1000 births					
< 5	23.7	19.9	18.8	- 4.9	- 3.3
5– 7	14.3	12.2	9.9	- 4.4	- 5.3
8–11	10.1	8.4	7.0	- 3.1	- 5.3
≥ 12	9.7	7.6	6.8	- 2.9	- 5.2
University degree	10.1	7.4	6.7	- 3.4	- 5.9
Mortality rates 1st–7th day/1000 livebirths					
< 5	23.7	23.3	22.4	- 1.3	- 0.8
5– 7	12.9	13.4	11.8	- 1.1	- 1.4
8–11	11.8	11.3	9.6	- 2.2	- 3.0
≥ 12	6.6	8.3	6.0	- 0.6	- 1.3
University degree	5.6	6.5	6.0	+ 0.4	+ 1.0
Mortality rates 8th–28th day/1000 livebirths					
< 5	8.2	6.4	4.4	- 3.8	- 8.9
5– 7	3.7	3.1	2.2	- 1.5	- 7.4
8–11	2.7	2.3	1.9	- 0.8	- 5.0
≥ 12	1.4	1.5	0.9	- 0.5	- 6.2
University degree	1.4	1.1	1.5	- 0.3	- 3.6
Mortality rates 29th–365th day/1000 livebirths					
< 5	17.5	10.7	10.7	- 6.8	- 7.0
5– 7	6.0	5.7	4.5	- 1.5	- 4.1
8–11	3.6	3.1	3.0	- 0.6	- 2.8
≥ 12	1.4	1.7	1.2	- 0.2	- 1.4
University degree	1.0	1.6	0.5	- 0.5	- 10.2

* Average annual rate of change assuming that the change has been constant and estimated as $100\% \times \text{difference in } \log_e \text{ rates divided by 7 years.}$

Tab. 3. Trends in perinatal and postneonatal mortality rates in Italy according to maternal education, 1972–79.

larger in the case of less educated women. Nonetheless, in the late 1970s the difference in rates according to maternal education was still much larger in postneonatal (second month to first year) than in perinatal mortality.

Data on stillbirth rates according to birth weight were available for a few calendar years only (see Methods). The proportion of low birthweight (≤ 2550 g or ≤ 2500 g for 1980, see Methods) did not change appreciably during the period considered (from 5.7 to 5.5 of all births). A substantial drop in mortality was observed among low birth weight (from 156.6/1000 births ≤ 2550 g in 1958 to 83.1/1000 births ≤ 2500 g in 1980) and overweight babies (from 34.3/1000 births > 4550 g in 1958 to 11.4/1000 births > 4500 g in 1980) (Table 4). The considerable changes observed in rates of 1980 should, of course, be at least partly attributed to the changed cut off points in birth-weight classification (see Methods). This led to apparent rises in rates for low weight births (whose limit shifted from 2550 to 2500 g), and a marked decrease for the overweight category, and represents an *a posteriori* evidence of the data reliability. Although improvements were registered in each weight group, the greatest ones were observed among normal weight babies, and the abso-

lute proportion of low weight birth among stillbirths increased from 36 to 55% between 1958 and 1980.

Discussion

The data presented have, of course, chiefly a descriptive value as a general overview of trends in perinatal, neonatal and postneonatal mortality in Italy from the mid 1950s to the mid 1980s. The 75% drop in stillbirth rate and 70% fall in overall perinatal mortality (180th day of pregnancy to 7th day of life) compare well with trends in other developed countries [1–5]. The declines were, in fact, proportionally greater than that registered in the United States [4] over a similar calendar period, comparable to the British [1] and somewhat lower than the French [3] or Swedish [2] ones. It must be borne in mind, however, that in the latter two countries specific measures have been adopted to assist maternal and infant care, and to rationalize obstetrical services. The slope of the decline in perinatal mortality in Italy was rather constant over the three decades considered, in contrast, for instance, with the discontinuous trend observed in Britain [10]. Further, from 1955 to 1984 there was a marked decline in Italian postneonatal mortality, producing rates (around 2.2/1000 livebirths) comparable to those registered in American whites [11] and in several other developed countries in Europe [12].

It is likely that the large declines in Italian perinatal, neonatal and postneonatal mortality should be partly or largely attributed to general improvements in socioeconomic and cultural conditions rather than to any integrated policy of assistance of maternal and child care. Since the late 1960s, in fact, legislation on worker's rights has been enforced, including allowance for three months prenatal and six months postnatal fully paid leave.

Further, although the economic recession in the 1970s reduced the average growth of the gross internal product to less than 2.5% per year, there has been progressive improvement in the average cultural level of the Italian population. Only in 1963, for instance, was compulsory education in Italy extended from five to eight years. Finally, free medical assistance, previously

Tab. 4. Stillbirth rates according to birthweight categories for selected calendar years, Italy 1958–80.

Birthweight category	Stillbirth rates/1000 births for				
	1958	1963	1967	1973	1980**
< 1550	342.92	322.25	305.70	246.28	259.34
< 1550–2550	113.92	96.77	77.76	51.50	54.95
< 2550–3550	19.18	15.81	12.53	8.45	4.76
< 3550–4550	12.18	10.41	8.36	5.73	2.67
> 4550	34.30	32.24	29.41	24.26	11.44

* Average annual rate of change assuming that the change has been constant and estimated as $100\% \times \text{difference in } \log_e \text{ rates divided by 15 years.}$

** Birthweight category for 1980 are: ≤ 1500 , < 1500 –2500, < 2550 –3500, < 3500 –4500, > 4500 .

given on an insurance basis to workers and their families only, has been progressively extended up to 1978, when the whole population became covered by a National Health System. This may be reflected in the larger fall in stillbirth rates for independent and "other" workers.

It is harder, on the other hand, to evaluate the potential role of newer technologies (ultrasonography, fetoscopy, electronic fetal monitoring, fetal scalp blood PH) in the reduction of perinatal mortality. Certainly, their location and utilization has not followed any rational plan, and it is therefore possible that more technology (and hence more money) has gone where least required. However, it must be borne in mind that the decline in stillbirth rates was essentially due to a reduction in mortality at any given weight (the proportion of low birthweights has actually slightly increased.) This indicates that improved perinatal care may have played an important role as well [13, 14]. Interestingly, Italian stillbirth rates were comparable to those of richer countries, such as Switzerland, in the low birth weight category, but still considerably higher for normal weight babies [15].

The large drop in birth rates during the last decade (about 40% in the absolute number of births, and over 50% in the birth rates per woman in fertile age) has obviously increased the resources available per single pregnancy but, simultaneously, has posed other types of problems. For instance, there is now a large proportion of obstetrical units carrying on very limited numbers of deliveries, thus causing difficulties in adequate training of staff and rational use of resources. In 1979 in Lombardy, for instance, over 50% of maternity units performed less than 500 deliveries per year and 80% less than 1000, and perinatal mortality rates in various provinces were negatively correlated with average number of deliveries per hospital per year [16].

Probably as a consequence of these various (and hard to quantify) factors perinatal mortality in Italy, however substantially reduced over the last two or three decades, was still considerably higher in the early 1980s than in most other Western countries. (Though it should be borne in mind that Italian stillbirth rates are slightly inflated by the inclusion of all fetal deaths after the 180th day of pregnancy, instead of the 28th week or 196th day.) Certainly, Italian perinatal mortality rates are far from the values below 10 per 1000 births reached in Sweden, Japan or Switzerland and commonly considered a realistic target for developed countries, and only the rates for postneonatal mortality (2.2/1000) appeared comparable to those of most other Western countries. Finally, though the overall findings of this analysis of vital statistics are largely reassuring, since all the mortality rates considered were still steadily decreasing in the 1980s, there are a few factors which could negatively influence the declining trends. Chiefly, the prevalence of cigarette smoking, which is known to have a negative influence

on perinatal mortality in several aspects and has rapidly increased among young women over the last few years [17].

Abstract

Trends in stillbirth rates, perinatal, neonatal and postneonatal mortality in Italy over the period 1955-84 were analyzed. There was a 75% reduction (from 28.4 to 7.1/1000 births) in stillbirth rates, and a nearly 70% fall (from 46.2 to 14.5/1000 births) in overall perinatal mortality (from the 180th day of pregnancy to the first week of life). Further, mortality rates from the 8th to the 28th day of life dropped from 7.4 to 1.6/1000 livebirths, and mortality from the second month to the first year of life from 25.1 to 2.2/1000 livebirths. The fall in stillbirth rates was similarly evident across various indicators of maternal education and social class, and could only marginally be accounted for by changes in maternal age distribution. The causes of this large drop in perinatal, neonatal and postneonatal mortality are likely to be numerous and complex. In the absence of any comprehensive program of rationalization of obstetrical and neonatal care, a determinant role must have been played by a general improvement in economic and cultural conditions. However, the observation that decreased perinatal mortality was not due to a decline in the proportion of low birth weight indicates that improved perinatal care may have had an important role as well.

Although the decrease in various measures of perinatal and postneonatal mortality in Italy was proportionally comparable with that registered in several other developed countries, Italian perinatal mortality rates (14.5/1000 births in 1984) still appear considerably higher than in other countries, and are clearly far from the optimal theoretical value.

Résumé

Evolution des mortalités périnatale, néonatale et postnéonatale en Italie, 1955-1984

Les évolutions de la mortalité et des mortalités périnatale, néonatale et postnéonatale en Italie entre 1955 et 1984 ont été analysées. La mortalité a été réduite de 75% (de 28,4 à 7,1‰) et la mortalité périnatale de 70% (de 46,2 à 14,5‰). Les taux de mortalité entre le 8^e et le 28^e jour de vie sont tombés de 7,4 à 1,6‰, et la mortalité entre le deuxième mois et la fin de la première année de vie de 25,1 à 2,2‰. La chute de la mortalité est semblable parmi les différentes strates du niveau d'éducation maternel et de la classe sociale, et le changement de la distribution des âges maternels n'influe que marginalement dans cette évolution. Les raisons de cette importante chute des mortalités périnatale, néonatale et postnéonatale sont vraisemblablement nombreuses et complexes. L'absence de tout programme explicite d'amélioration des soins obstétricaux et néonataux rend vraisemblable le rôle déterminant qu'a dû jouer l'amélioration générale des conditions économiques et culturelles. Cependant, le fait que la chute de la mortalité périnatale n'est pas attribuable à une diminution de la proportion des faibles poids de naissance indique qu'une amélioration des soins périnataux a pu également jouer un rôle important. Bien que cette évolution favorable des mortalités périnatale et postnéonatale en Italie soit comparable à celles observées dans d'autres pays développés, les taux italiens de mortalité périnatale (14,5‰ en 1984) sont considérablement plus hauts que ceux d'autres pays et clairement loin d'avoir atteint une valeur optimale.

Zusammenfassung

Entwicklung der perinatalen, neonatalen und postneonatalen Sterblichkeit in Italien von 1955 bis 1984

Analysiert wurden die Entwicklung der Totgeburtensziffer und der perinatalen, neonatalen und der postneonatalen Sterblichkeit in Italien zwischen 1955 und 1984. Für die Totgeburtensziffer wurde ein Rückgang von 75% (von 28,4 auf 7,1‰), für die perinatale Sterblichkeit von 70% beobachtet (von 46,2 auf 14,5‰). Die Sterblichkeit zwischen dem 8. und 28. Lebensstag ist von 7,4 auf 1,6‰, die Sterblichkeit in der Zeit vom 2. Monat bis zum Ende des ersten Lebensjahres von 25,1 auf 2,2‰ gefallen. Der Rückgang der Totgeburten findet sich bei den Müttern unterschiedlicher Ausbildungsgrade und

verschiedener soziokultureller Schichten gleichermaßen und dann durch eine Veränderung in der Altersstruktur der Mütter nur teilweise erklärt werden. Die Gründe für diesen bemerkenswerten Rückgang der perinatalen, neonatalen und postneonatalen Sterblichkeit dürften zahlreich und komplex sein. Da es kein Programm zur Verbesserung der geburtshilflichen und neonatalen Pflege gibt, liegt die Vermutung nahe, dass die allgemeine Veränderung der wirtschaftlichen und sozialen Bedingungen eine entscheidende Rolle gespielt hat. Die Tatsache allerdings, dass der Abfall der perinatalen Sterblichkeit nicht auf einer Abnahme des Anteils von Kindern mit niedrigem Geburtsgewicht beruht, zeigt, dass die verbesserte perinatale Pflege ebenfalls von Bedeutung ist. Obwohl der Rückgang der perinatalen und postneonatalen Sterblichkeit in Italien vergleichbar ist mit jenem in anderen entwickelten Ländern, ist die neonatale Sterblichkeit (14,5% im Jahre 1984) doch noch beträchtlich höher als in anderen Ländern und weit von den Idealwerten entfernt.

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