In Focus

Zdenek Štembera

Prospects for higher infant survival

Studies on trends in infant mortality and its constituent elements of early neonatal, late neonatal and postneonatal death, in developed and developing countries, point to ways of making further progress towards the target of infant mortality rates not exceeding 50/1000 live births in all countries by the year 2000.

One of the objective indicators of the improving health of the world population in the twentieth century is the decrease in the infant mortality rate which has occurred in the developed countries, and, since the 1950s, in many developing countries. This decrease is attributable not only to improved quality and availability of care for infants, especially at the level of primary health care, but also to healthier lifestyle and a better social and cultural environment.

Data for 25 European countries show that, before the Second World War, infant mortality rates ranged from 38 to 184/1000 live births. Between 1937 and 1984 they decreased in all the countries, but at different speeds. The countries can be divided into groups A, B, C and D according to the infant mortality rates in 1937, which averaged 153, 102, 66 and 43/1000 respectively. Fig. 1 shows that the decreases in the mean infant mortality rates slowed down over the 47-year period in all four groups, and that group A, with the highest infant mortality rate at the outset, had the most rapid reduction. For similar levels of mortality the slopes of the curves are similar; in other words, similar rates of reduction in infant mortality occurred at different times, depending on the initial value.

Furthermore, a significant decrease in infant mortality rates has been taking place in many developing countries during the second half of the twentieth century. A WHO survey of infant mortality rates in developing countries gives average values for 1970-75 and 1980-85 (1). For comparison with the European countries we have chosen all the developing countries with a starting value in the first period lower than 100/1000. The 44 countries concerned were divided into eight groups, coded E to L, according to this value. For each group we calculated the average infant mortality rates for 1970-75 and 1980-85.
Fig. 1. Infant mortality rates (1937–84) in four groups of European countries.

A – Bulgaria, Hungary, Poland, Portugal, Romania, USSR, Yugoslavia (mean in 1937 = 153/1000)
B – Austria, Belgium, Czechoslovakia, German Democratic Republic, Greece, Italy, Spain (mean in 1937 = 102/1000)
C – Denmark, Federal Republic of Germany, Finland, France, Ireland, Luxembourg, United Kingdom (mean in 1937 = 66/1000)
D – Netherlands, Norway, Sweden, Switzerland (mean in 1937 = 43/1000)

Fig. 2. Infant mortality rates (1970–75 and 1980–85) in eight groups of developing countries with initial values below 100/1000.

E – Hong Kong, Singapore
F – Cyprus, Malta, Puerto Rico
G – Barbados, Cuba, Martinique
H – Argentina, Democratic People’s Republic of Korea, Fiji, Guadeloupe, Jamaica, Kuwait, Malaysia, Panama, Republic of Korea, Surinam, Trinidad, Uruguay
I – Costa Rica, Guyana, Mauritius, Paraguay, Reunion, Sri Lanka, Venezuela
J – Bahrain, Chile, China, Colombia, Mexico, Mongolia, Philippines, Qatar, Thailand, United Arab Emirates
K – Dominican Republic, Jordan, Syria
L – Brazil, Cape Verde, Guatemala, Iraq

(prospects for higher infant survival)
Fig. 3. Infant mortality rates for eight groups of developing countries with initial values above 100/1000 and for the eight groups in Fig. 2.

Whereas in group L, with a high initial infant mortality rate, there was a decrease in 10 years from 93 to 73/1000, i.e., by 20/1000, in groups E and F, of low infant mortality rate, there were decreases of only 6.5/1000 (from 18 to 11.5/1000) and 9/1000 (from 25 to 16/1000) respectively. The slowing down of the decrease in the infant mortality rate is demonstrated even more clearly by shifting each curve except the uppermost to the right until it meets the next higher curve.

Some 68 countries with a starting infant mortality rate higher than 100/1000 were divided according to their starting values into eight groups (M to P and R to U), for each of which the average starting and final values were calculated and graphed together with the curves for groups E to L, and displacement to the right was effected as before (Fig. 3). At infant mortality rates higher than 70/1000 the rate of decrease over ten-year periods always remained at about 21/1000.

The reduction of the infant mortality rate to 50/1000 or less in all countries by the year 2000 is an important WHO target. Fig. 4, based on the same data as Fig. 1 and 3, suggests that this is only attainable in countries which, in 1985, had an infant mortality rate lower than 80/1000, since only they can be expected to
achieve a decrease of 30/1000 in the achieve a 15-year interval. There are only 10–15 such countries, with about 300 million inhabitants. However, a mean decrease of 57/1000 was achieved in the European countries of group A, and in those of group B the infant mortality rate decreased from 102 to 51/1000 between 1937 and 1953. If this could be repeated in the 20 developing countries with infant mortality rates between 80 and 105/1000 in 1985, they could also achieve a decrease in the infant mortality rate to 50/1000 by the year 2000. However, there would still remain some 45 countries of the 139 reviewed, with 1300 million inhabitants, having infant mortality rates higher than 50/1000.

How did some European countries reduce the infant mortality rate from 130 to 70/1000 over a 10-year period 40–50 years ago? This was a much more rapid reduction than that now being achieved in developing countries. And how is it that when the rate is already under 70/1000 it is further reduced at a similar speed both in European and developing countries?

When seeking answers to these questions we should remember that the causes of early neonatal death (1st to 7th day) are partly different from the factors causing late neonatal death (8th to 28th day) and very different from those causing postneonatal death (29th day to 1 year).

Data from European countries for 1979–82 were examined to see if decreases in early neonatal, late neonatal and postneonatal mortality followed the same pattern as total infant mortality. Because of the low incidence of late neonatal deaths, the grouped data for late neonatal and postneonatal deaths were compared with the data for early neonatal deaths (Fig. 5).

- In the countries of group D, with the lowest infant mortality rates, reduced from
In Focus

averages of 8.8 to 7.5 between 1979 and 1984, the ratio of early neonatal deaths to late neonatal deaths plus postneonatal deaths was approximately 4:3; there was a more rapid decrease of late neonatal deaths plus postneonatal deaths than of early neonatal deaths during the same period.

- In the countries of groups B and C, with decreases in infant mortality rates ranging from 20 to 9/1000, there was a quicker fall in early neonatal than in late neonatal plus postneonatal death rates. In countries with an infant mortality rate of about 20/1000, such as Czechoslovakia and Hungary, early neonatal death rates were higher than the combined late neonatal and postneonatal death rates.

- Portugal and Yugoslavia had total infant mortality rates higher than 25/1000 and early neonatal death rates above 12/1000. As late neonatal deaths plus postneonatal deaths decreased, early neonatal mortality showed little change. Some other countries probably belong in this group, including developing countries having an infant mortality rate higher than 30/1000. In the majority of these countries, however, the early neonatal death rates have been underestimated and therefore cannot be used comparatively. This is a consequence of an insufficient registration of deaths occurring in the first hours after birth in infants of very low birth weight (i.e., less than 1500 g).

Data from Czechoslovakia for 1951–84 were examined in order to assess whether the changing shape of the curve of early neonatal mortality against late neonatal plus postneonatal mortality, obtained from a number of countries during a short period, reflected changes in one country over
a long period (Fig. 6). From 1967 to 1984, the total infant mortality rate fell from 24 to 15/1000, the main reason being a drop of 6/1000 in the early neonatal death rate; late neonatal plus postneonatal mortality decreased by only 4/1000. From 1951 to 1967, on the other hand, when the total infant mortality rate decreased from 77 to 24/1000, the main decrease was in late neonatal plus postneonatal mortality (from 49 to 10/1000); the neonatal death rate only decreased from 28 to 14/1000. These changes in the relationship between early neonatal mortality versus late neonatal plus postneonatal mortality are similar to those depicted in the section of the curve covering Yugoslavia to France between 1979 and 1982 (Fig. 5). Thus the changing relationship between early neonatal versus late neonatal plus postneonatal mortality has probably been similar in all countries, and it evidently depends on the level of the total infant mortality rate.

The curve has three sections, through which several European countries have passed during the last 30 years. The ratio of early neonatal to late neonatal plus postneonatal mortality changes because the relative influences of different causes of infant mortality do likewise. When the infant mortality rate is high, late neonatal deaths and postneonatal deaths predominate, the main causes being diseases of the digestive and respiratory tracts and other infectious diseases; birth injuries and infections of pre- and postnatal origin are less important. In the second part of the curve, however, where early neonatal deaths predominate, the consequences of premature birth, intrauterine asphyxia and nonviable malformations are the main causes of infant mortality. The priorities for intervention aimed at achieving the greatest possible drop in infant mortality are therefore quite different in each period.

Where infant mortality is very high the first priority should be wide coverage of maternal and child health care, including preventive action and curative measures in respect of the most common diseases. Large-scale health education is also essential.
If early neonatal mortality predominates, specialized neonatal care should be given emphasis. In Europe the need for better obstetric care led to the emergence of the interdisciplinary specialty of perinatology during the 1960s. Its development has necessitated an expanding use of new health technologies and the establishment of specialized services.

No detailed analysis has yet been performed for those countries where the infant mortality rate has decreased to under 9/1000 (left hand part of Fig. 5), with a view to determining measures capable of improving the situation still further.

The progressive improvement and coverage of highly qualified care leads to increased costs. In contrast to those developing countries where the infant mortality rate is higher than 50/1000, during the last ten years European countries have experienced a negative correlation between the per capita GNP and the infant mortality rate. Further medicosocial studies are needed to evaluate the cost-benefit of the different resources deployed. The question remains as to whether this correlation is only an expression of the increasing resources available for perinatal and infant care, or whether it also expresses the effects of socioeconomic and cultural development in general. It would appear to be the joint effect of all favourable influences, and this would explain why only the countries with the highest per capita GNP belong to the group with the lowest infant mortality rates. However, the striking decreases in infant mortality rates in European countries between 1937 and 1955 (Fig. 1) were achieved long before the sophisticated equipment of today was available. In other words, reductions in infant mortality rates from above 50/1000 are possible as a result of factors other than the use of the new technologies. Therefore in the developing countries with an infant mortality rate above 50/1000, where the sum of the late neonatal and postneonatal death rates exceeds the early neonatal death rate, it should be possible to achieve a striking decrease of the total infant mortality rate by means of simple, inexpensive, widely used and acceptable methods in the same way as was done 30–50 years ago in Europe.

Unfortunately, in many developing countries with infant mortality rates above 50/1000 a strategy based on advanced technology is chosen, aimed mainly at decreasing early neonatal deaths. This cannot substantially decrease infant mortality rates in those countries. The main strategic aim should be to remove the most significant causes of late neonatal and postneonatal mortality, and to achieve safe delivery so as to decrease the early neonatal death rate. This could hasten decrease in the infant mortality rate during the next few years. Progress could be monitored by comparing the results against the curve in Fig. 4.

Reference