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Birthweight and infant mortality in Bulgaria's transition crisis

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Summary

Between 1988 and 1991, years of political and economic crisis, Bulgaria reported a 25% increase in infant mortality. From 1991 to 1995, the rate then dropped slightly. Analysis of detailed unpublished vital statistics shows that the reported increase could not have been a result of more complete reporting of early neonatal mortality for very low-weight births. Old reporting practices continue unchanged. Rather, these statistics reveal an increase in the proportion of low-weight births, combined with rising death rates, particularly for low-weight births in the postneonatal period, but also for normal-weight babies.

Introduction

Dramatic declines in infant mortality,¹ even during two recent decades of rising working-age mortality,² brought the official 1988 infant death rate for Bulgaria to an all-time low of 13.58 deaths per 1000 livebirths. However, during the ensuing decade of political and economic upheaval, the rate turned upward, erasing nearly three decades of recorded progress.³ In 1989, as unsettled conditions began to manifest themselves in the country, the registered infant death rate rose to 14.37, then to 14.77 in 1990, and to 16.93 in 1991. It remained at or near 16 infant deaths per 1000 registered livebirths for several years, but declined slightly to about 15 deaths per 1000 births by 1995.

In any population, such a 25% increase in recorded infant deaths within a span of only 3 years sends a clear danger signal to anyone who monitors public health. However, before beginning attempts to identify and to remedy public health problems that may underlie such a mortality increase, a possible alternative explanation for observed statistics must be considered. Could the observed increase in Bulgarian infant mortality have resulted from changes in recording practices, specifically changes in the definition of a livebirth, and therefore be (in whole or in part) artefactual rather than factual?

Hoehn⁴ has noted that definitions of a livebirth vary from country to country. Anderson and Silver⁵ demonstrated that the limited definition of a livebirth used in Soviet statistics classified many high-risk pregnancies as ending in stillbirths or spontaneous abortions when they should have been classified as livebirths according to the standard definitions established by the World Health Organisation (WHO). Using indirect techniques, Anderson and Silver⁵ estimated that the Soviet infant mortality rate would have been 20–25% higher if WHO definitions had been used.

After 1968, Bulgaria undertook officially to conform to the vital statistics practice of COMECON (that is, using the Soviet definitions), involving a special restricted definition of livebirths. This action formalised a practice for which unofficial pressure had been building for some time in the country, and which had already been applied in an unknown fraction of deliveries up to that time; considerable controversy and conflict existed among physicians concerning these issues before 1968. Enforcement of the new standard was heightened in 1981 with an order⁶ requiring completion of a special working data form in all deliveries weighing between 500 and 999 g; only if such 'special abortions' survived for more than 1 week were they to be recorded as official livebirths.

Radical political changes began to occur in 1988 and 1989. Particularly for the major period of administrative and governmental upheavals in 1990, officials claimed not to have full and reliable statistics on special high-risk cases. They attributed this deterioration of data collection to the suspension of the authority of the government to collect a variety of types of information judged by reformers to be intrusive. The special monitoring commissions gradually lost their functional power, and as of the beginning of 1994 were officially discontinued.

A clinical source⁷ documents 118 cases of newborns weighing < 1500 g, delivered and studied at the higher medical school in Pleven from 1989 to 1992. Of these, 61 cases weighing 1000–1499 g were normally registered as official livebirths. Of the 61 official 'very low-weight' births, 17 died within 1 week, giving a death rate of 279 per 1000. The researchers also followed 57 other newborns weighing 500–999 g during the same 4-year period, a category of births subject to the official statistical restrictions. (This research therefore was politically very risky.) From these 57 births, 48 (or 842 per 1000) were observed to die in the first week of life. As a result, only nine infants survived to the prescribed age of 7 days and so received recognition as officially registered livebirths. The others were classified as 'spontaneous abortions.' These figures give some approximate idea of the effect of the COMECON definition of livebirths as it produces an underestimate of infant mortality compared with the WHO definition.

Consider, then, the case for a potential statistical artefact in infant mortality trends. The government has gradually withdrawn the requirement for completing the special working data form for births weighing 500–999 g. The authority of commissions to inspect these forms has been curtailed. The Ministry of Health no longer has confidence that such cases are being reported uniformly or accurately according to the old standards. The imposition of the COMECON standard was a contentious decision for doctors even at the time of its adoption.

Did the practice of mislabelling certain high-risk births as spontaneous abortions decline after rapid political changes swept the country? Did doctors spontaneously return to the WHO definition? Could such a change have produced the observed increase in reported infant mortality in the country?

Findings

Based on recorded vital statistics using the non-standard definition of livebirths, we clearly must reject any such hypothesis. Suppose that doctors had begun to apply the WHO definition of livebirths after the surveillance and enforcement system for the COMECON standard gradually ceased to function. If they had, the observed increase in registered infant deaths should have occurred at birthweights between 500 and 999 g. The increase should also have involved deaths recorded after less than 7 days of life.

Table 1, comparing 1987, 1991 and 1995 vital statistics, illustrates that the category in question (birthweight < 1000 g, dying within 7 days) remains virtually empty.

Further, given the evidence from the Pleven study, this category should exhibit the highest risk of death of any birthweight category. Instead, for all 3 years examined, infants in this category have a lower risk of dying than any category of birthweight except normal births (> 2500 g). This certainly indicates that the recorded cases in the lowest weight category are the few select cases that survived more than 7 days. In 1987, there were 1.4 such cases out of every 1000 births (not including the misclassified 'spontaneous abortions', who should have been present). By 1991, the incidence had actually dropped to only 1.0 case per 1000 births, a figure that remained unchanged in 1995. The old system and practices of registration remain essentially intact in the country, with one book for recording only obstetric events in which the delivered fetus weighed between 500 and 999 g, and another book for all other obstetric events. Cases are transferred from the 'abortions' book only in cases of survival beyond day 7 after delivery.

Although there is no evidence of increased reporting of the lowest-weight births at risk of dying in the first week after delivery, other findings document factors actually related to the officially reported infant mortality increase. The proportion of births recorded as having low birthweights (< 2500 g) increased from 6.62% in 1987 to 8.26% in 1991, roughly a 25% increase, indicating a serious shift in the birthweight distribution towards lower weights and higher risk (without including any of the misclassified 'special abortions') By 1995, this proportion of births < 2500 g fell back to 7.43% of the total, indicating that the transitional crisis of the early 1990s had subsided slightly, but that conditions were still worse than in the late 1980s.

In addition to shifts in the birthweight distribution, Table 1 documents a clear increase in the risk of death within some birthweight categories and periods of infancy. At normal birthweights (≥ 2500 g), risks of dying jumped between 1987 and 1991, but then fell back again by 1995 for all periods of infancy. For the late neonatal period (7–27 days of life), the 1995 level actually fell below that of 1987, but for early neonatal and postneonatal periods the drop was smaller.

At low birthweights (< 2500 g), changes in risk were less consistent and more alarming. The risk of dying again jumped between 1987 and 1991 (the only exception being 'heavier' low-weight births early in the neonatal period). In contrast to normal birth-weights, for low-weight births the risk of death continued to increase between 1991 and 1995, instead of subsiding from crisis levels. This was true for three of the four low-birthweight categories in the early neonatal period and also in the late neonatal period, and for the two largest low-weight categories in the postneonatal period.

Discussion

This evidence eliminates any possibility that reported increases in Bulgarian infant mortality might be due to a shift from the COMECON to the WHO definition of livebirths. Such a shift has not taken place. No revised procedures have been mandated to replace old special reporting practices for 'special abortions' (deliveries < 1000 g, even with signs of life). The previous system continues of reporting such cases only after surviving a week. The increase in the risk of death for Bulgaria's youngest citizens has been all too real, and for the most vulnerable of these infants the risk may still be increasing today. Further research and better data are urgently needed to address this disturbing epidemiological phenomenon.

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Table 1
Risk of death (per 1000 livebirths) during specified intervals by birthweight, Bulgaria 1987, 1991 and 1995 (with number of cases at risk)

	Weight in grams				
	500-999	1000-1499	1500-1999	2000-2499	≥ 2500
Risk of dying < 7 days ^a					
1987	6.1 (163)	182.6 (564)	76.7 (1734)	21.5 (5253)	2.3 (108 952)
1991	10.3 (97)	187.8 (607)	66.7 (1753)	18.2 (5450)	2.7 (87 992)
1995	12.8 (78)	205.4 (404)	74.5 (1020)	17.4 (3918)	2.5 (67 508)
Risk of dying 7-27 days ^b					
1987	74.1 (162)	73.8 (461)	28.7 (1601)	8.2 (5140)	1.4 (108 703)
1991	125.0 (96)	103.4 (493)	31.2 (1636)	6.2 (5351)	1.5 (87 755)
1995	272.7 (77)	77.9 (321)	36.0 (944)	6.2 (3850)	1.3 (67 342)
Risk of dying ≥ 28 days ^c					
1987	80.0 (150)	42.2 (427)	25.1 (1555)	17.7 (5098)	5.3 (108 547)
1991	119.0 (84)	61.1 (442)	26.5 (1585)	18.4 (5318)	5.6 (87 620)
1995	107.1 (56)	57.4 (296)	34.1 (910)	20.6 (3826)	5.4 (67 254)

Source: unpublished statistics, Bulgarian National Statistical Institute (Sofia), 1994 and 1999.

^aIncludes all livebirths.
^bPer 1000 survivors to 7 days only.
^cPer 1000 survivors to 28 days only.