WHAT IS THE INFANT MORTALITY RATE IN SOUTH AFRICA? THE NEED FOR IMPROVED DATA
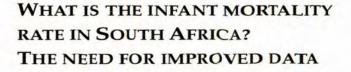
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Objectives. To review recent infant mortality and birth registration data in South Africa and to investigate geographical differences.

Outcome measures. Estimates of infant mortality rates, proportion of births not registered, and proportion of births recorded in health services.

Methods. 1. Published infant mortality data for South Africa were collated. Demographic data from national household surveys (1993 and 1994 October Household Surveys and the 1993 Poverty Survey by the Southern African Labour and Development Research Unit (SALDRU) at UCT) were analysed using the indirect method developed by Brass.

2. Birth registration data were analysed and compared with the estimated number of births to identify regions with greater under-registration. The number of births recorded in the health services was analysed by province in order to assess and explore alternatives within health authorities that could complement the existing system.

Results. 1. Published estimates of infant mortality for the period from 1990 range from 40 to 71/1 000 births and estimates based on national household surveys conducted in this period from 11 to 81/1 000 births.

2. Completeness of birth registration in the nine provinces ranges from less than 10% in the Eastern Cape, North West and Northern Province to 60% in the Western Cape. An overall improvement from 19% to 60% could be achieved if births recorded through the health services were included in the vital registration system.

Conclusions. The infant mortality rate in South Africa is not known with any certainty. The extent of completeness of the birth registration system was 19%, which indicates a need for urgent improvement in order to provide key health status indicators. This study indicates that there is some potential for improving the extent of birth registration if it could be facilitated through the health service. However, this alone would not achieve complete registration.

Recommendations. Surveys will have to be relied upon until such time as routinely available statistics are accurate. The October Household Survey conducted annually by the Central Statistical Service is potentially an important source of health status information. It is imperative that either the design of the birth history questionnaire be improved or that it be replaced by a less frequent but more specialised demographic and health survey.

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Infant mortality, the probability of dying in the first year of life, is one of the most widely used indicators of the health status and socio-economic development of a population.[1] The infant mortality rate (IMR) and under-5 mortality rate are useful indices for policy formation and planning purposes because they reflect not only child mortality levels but also the health status of the community. A child's growth and development are heavily dependent upon the living conditions of the family. These conditions generate the biological risk factors that act directly on the child's health through the occurrence of disease and its development, of which death is one possible outcome. The IMR in South Africa indicates the need to investigate and monitor inequalities in health status and socio-economic conditions. In the light of the emerging HIV/AIDS epidemic, the IMR takes on new meaning and importance in assessing the impact of vertical transmission of the disease.

In the context of global efforts to improve child health, there have been widespread international efforts to estimate national IMRs. This has been accelerated by the United Nations International Children's Emergency Fund (UNICEF) 1990 call upon national and international organisations to set targets to reduce infant and child mortality by one-third before the year 2000,[2] and by the 1989 adoption of the Convention of the Rights of the Child.[3]

This article reviews available estimates of the national IMR for South Africa for the period from 1990. Included are estimates derived from secondary analysis of three national surveys. The timely registration of births in the nine provinces is examined and compared with the percentage of births recorded through the health services in an effort to assess the improvements that could be achieved by facilitating birth registration in the health services.

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METHODS

1. Published infant mortality data for South Africa were collated. In addition, the demographic data from the 1993[1] SALDRU Poverty Survey[4] and the October Household Surveys (OHS) of 1993[5] and 1994[6] were analysed using the indirect

method developed by Brass.[7] This calculates the proportion of children who have died and converts them into probabilities of dying using model life tables. In the case of the SALDRU Poverty Survey, infant, child, and under-5 mortality were estimated based on the Trussell and Palloni-Heligman[8] variants of the original Brass method which utilise information on each woman's age and the number of her children ever born alive, the number of her children still alive, and model life tables. These estimates are shown in Table I.

2. A review of the number of registered births was undertaken to identify which provinces experience the worst data problems and to explore ways of improving the quality of estimates derived from existing data. An estimate of the number of births was obtained from the Department of Health. This number was calculated using 1991 population census age-specific fertility rates (CSS Report No. 03-01-26, 1991) applied

to estimates of the 1994 female population of childbearing age (R Swanevelder — personal communication). The percentage of births registered through the vital registration system was calculated on the basis of these figures and is shown in Table II. The number of births recorded in the health service, either through local authority birth notification systems or through the Regional Health Management Information System (ReHMIS) were obtained from the provincial Departments of Health.

RESULTS

There have been a number of estimates of the IMR in South Africa (Table I). Some of the estimates reflect the entire South African population while others exclude the former Transkei, Venda, Bophuthatswana and Ciskei (TBVC). They exhibit

Table I. Estimates of the South African IMR from 1990

Source	TBVC	Year	IMR/1 000
Development Bank of Southern Africa[9]	–	1990	40.2
Department of Welfare[10]	–	1991	46.0
UNICEF[11]	+	1992	71.0
SALDRU Poverty Survey[4]	+	1993	81.0
October Household Survey[5]	–	1993	14.6
Development Bank of Southern Africa[12]	+	1994	41.8
UNICEF[2]	+	1994	52.0
Ministry for Welfare & Population Development[13]	–	1994	41.0
October Household Survey[6]	+	1994	11.0
Institute for Futures Research[14]	+	1991 - 96	56.1
Development Bank of Southern Africa*	+	1990 - 95	46.0

*The Development Bank of Southern Africa estimates of the IMR for the period 1990 - 1995 are published by population group[15] while the national IMR from the same analysis of 46/1 000 was obtained through personal communication with J M Calitz.

Table II. Estimated number of births, percentage of births registered, and percentage of births recorded with health authorities in the nine provinces, 1994

Province	Estimate*	Registered births (CSS)	Registered (%)	Health service	Recorded in health service (%)
Eastern Cape	218 733	19 035	8.7	115. 328‡	52.7
Free State	91 149	18 071	19.8	97 740‡	107.2
Gauteng	195 006	76 933	39.5	72 269†	37.1
KwaZulu-Natal	279 576	34 251	12.3	181 317‡	64.9
Mpumalanga	96 869	11 138	11.5	67 552‡	69.2
North West	113 230	7 242	6.4	52 714‡	46.6
Northern Province	178 004	6 931	3.9	97 290‡	54.7
Northern Cape	20 827	10 990	52.8	12 482†	59.9
Western Cape	90 040	55 745	61.9	76 120†	84.5
South Africa	1 283 434	240 336	18.7	772 812	60.2

*Estimated births based on 1991 census age-specific fertility rates (CSS Report No. 03-01-26, 1991) and estimates of the female population of childbearing age in 1994 (R Swanevelder — personal communication, August 1996).
†Local authority
‡1994 Regional Health Management Information Systems (ReHMIS) data.

substantial variability ranging from 11 to 81 per 1 000 births.

We have calculated IMRs from the annual OHSs of 1993 and 1994 as well as from the 1993 SALDRU Poverty Survey. Both of these recent national surveys derive their IMRs from birth history questionnaires (although neither one uses the standardised Demographic and Health Survey (DHS) birth history questionnaire) that produce extremely low estimates from the OHS, whereas the SALDRU estimate is high.

Calculations of IMRs from the 1993 OHS produced unrealistically low estimates of 13.9, 18, 13, and 13.4 for black, coloured, Asian, and white population groups, respectively. An IMR of 11 for blacks was obtained from the 1994 OHS.

While the overall level of infant mortality derived from the SALDRU Survey should be viewed with caution, analysis of patterns of infant mortality according to socio-economic factors reveals differential relationships commonly observed throughout the world. The IMR for South Africa's rural areas (94) is 65% higher than the metro IMR (57); the urban MRI is 69. Significant differences were observed according to low (95), middle (62) and high (58) levels of education. Similar gradients correlating high infant mortality with low socio-economic status were observed in the estimated IMRs of low (89), middle (79), and high (63) expenditure households.

In 1994 only 18.7% of the estimated number of births were registered within the first year of life. For each province, the percentage of births registered was compared with the percentage of births recorded through the health services. Table II shows that the completeness ranges from less than 10% in the Eastern Cape, North West and Northern Province, to 60% in the Western Cape. It can also be seen that 60% of births are recorded in the health services.

DISCUSSION

Ideally, the number of infant births and deaths should be available through the vital registration system responsible for the recording of births and deaths. An adequately developed vital registration system serves as a continuous source of statistics on births, deaths, infant deaths and stillbirths. This information collectively allows for the computation of birth rates, IMRs and death rates. This is not the situation in many developing countries, however, where vital registration systems are severely incomplete.[16] It is for this reason that national surveys such as DHSs, UNICEF surveys, and surveys collecting epidemiological information have been conducted. It is also for these parts of the world that demographers have endeavoured to overcome data inadequacies by developing indirect methods of demographic estimation that make possible the calculation of rates from the analysis of data obtained indirectly through a series of interrelated questions,[7,17] or by adjusting incomplete and defective data.[18] These methods have been adapted over time to accommodate the changing demands of survey and census data, such as the need to monitor the impact of the HIV/AIDS epidemic.

Estimates of the IMR show considerable variation. Some of the differences can be accounted for by the exclusion of the TBVC homelands. Since these areas probably experience relatively high IMRs, their inclusion could be expected to increase the average rate. However, this does not appear to explain the significant disparities observed.

IMRs from the Development Bank of Southern Africa[9] and the Department of Welfare[10] are of the same order of magnitude; both are based on the Human Science Research Council's series of DHSs that included a section on birth history, and both excluded the TBVC homelands. UNICEF[11,2] estimates are based on projections and show marked variations over a short timespan.

The Development Bank of Southern Africa has also based its estimates for the period 1990 - 1995[15] on projections. Including the former TBVC homelands the published IMRs for blacks (53.4), coloureds (42.4), Indians (13.4) and whites are consistent, giving a national figure of 46/1 000 (J M Calitz — personal communication). The Institute for Futures Research[14] derives its estimates of IMRs from estimates of life expectancies, using a population projection programme. The IMR for coloureds (60.5) is higher than that for blacks (59.0), while rates for Asians (34.1) and whites (19.3) are considerably higher than the Development Bank of Southern Africa's estimates for the same period. These estimates also include the TBVC homelands.

The most likely reason why analyses have yielded such low rates from the OHS is the disproportionate underreporting of infant deaths compared with reporting of surviving children, which leads to underestimation of mortality levels. These results strongly indicate that there are problems in the design and implementation of the surveys' birth history questionnaire. Most importantly the questionnaire does not incorporate probes for all possible pregnancy outcomes. Moreover, the common practice of proxy reporting (by the head of household, which in South Africa is often a man) adversely affects the accuracy of the information. Although the validity of birth history data can be affected by distortions common for retrospective data,[19] namely the ability of the respondent to recall events and their corresponding reference periods accurately and the omission of children who die at young ages,[20] data collected on birth histories and infant and child mortality from DHSs are reported to be of high quality.[21,22] These methodological problems have largely been overcome because DHSs have evolved to be more probing in design. Proxy reporting is minimised as the respondent is the mother who is guided through a carefully structured recall of her entire reproductive history. The structure of the questionnaire also allows for cross-checking, and the interviewer is most often a woman.

The validity of the infant mortality estimates of 81 per 1 000 live births for South Africa as a whole and 86 per 1 000 live births for the black population derived from analysis of the

1993 SALDRU survey by Mazur[4] must be viewed with caution. They suggest much higher rates than have been previously obtained by other researchers, although these are not necessarily consistent.[23-26] However, while the overall level of infant mortality is subject to question, these data clearly indicate that there are significant differences in the probabilities of infant survival determined by the external socio-economic environment. The IMR in rural areas is 65% higher than the IMR in metropolitan areas. The IMR of women with low education up to Standard 6 level is 64% higher than that of women with high education (above Standard 9 level), and the IMR for low-expenditure households is 41% higher than for high-expenditure households.

The vital registration system in South Africa is known to be inadequate and incomplete for large sections of the population.[27] As long ago as 1937 Gear pleaded to have this problem addressed.[28] This is especially true of the rural areas and the black population, for whom it is estimated that approximately 50% of deaths are not recorded.[29] Examination of the completeness of birth registration shows very poor coverage, with only 19% of births registered timeously. It demonstrates that provincial registration systems are not equally developed, resulting in substantial variance in the completeness of birth registration among provinces. Comparison of the number of births recorded in the health service indicates that there would be an improvement of 19 - 60% if births recorded through the health services were to be included in the registration system.

CONCLUSIONS AND RECOMMENDATIONS

The two data sources necessary for estimation of the IMR, namely vital registration and surveys, are both problematic in South Africa. Consequently the level of infant mortality is not known. The need to have reliable basic health status indicators for a society in transformation has become pressing. Several courses of action to improve the collection of this important information should be pursued.

The first task is to address long-term problems and improve the accuracy and coverage of the existing vital registration system. This is now recognised by both the Department of Health and the Department of Home Affairs, who together with other interested parties have formed a technical committee that has been investigating improved mechanisms to register births and deaths (S Khotu — personal communication). This study has shown that although an enormous improvement would be achieved if health facilities ensured that births were registered, this alone will not eliminate the problem. Ensuring registration of births that occur outside of the health service needs to be addressed.

The second task is to provide recent health information in the form of the first national South African Demographic and Health Survey (SADHS). The survey will be similar in design

to other DHSs in developing countries and will include a full pregnancy history. It will need to record in a comprehensive and mutually exclusive manner all possible pregnancy outcomes in a logical order (pregnancies, miscarriages, stillbirths, children born alive, children living with mother and elsewhere, and children who died), with all information recorded separately for male and female children. In addition to designing the question format in this manner, thorough training and in-field supervision of interviewers is needed. Information about each woman's experience of pregnancy, birth, and mortality of children should be obtained from the individual woman herself, rather than from a respondent.

A third direction that would contribute to the improvement of our knowledge of mortality levels and determinants is the addition of indirect demographic questions to large-scale household surveys and censuses. Minimum questions in the case of a shorter census form are those pertaining to children born alive, those alive at the time of the census, and those who were born alive but have subsequently died — all listed according to gender, with appropriate clarification of the meaning of these questions by interviewers. Regardless of whether the data collection process involves a survey or a census, it is essential that current fertility (having a live birth in the past 12 months) be recorded to permit valid evaluation of contemporary fertility levels and differentials.

In addition, many developing countries[30] incorporate questions relating to the survival of relatives. This approach has provided valuable information for the estimation and analysis of infant, childhood and adult mortality levels.[31,32] Furthermore, the approach of asking questions about the survival of mothers in household surveys and censuses is being strongly recommended in Africa, where the need to monitor the impact of the AIDS epidemic on mortality is urgent.[33]

The 1996 census has acknowledged some of these recommendations by including indirect questions relating to the number of children born who have died as well as questions relating to paternal and maternal mortality. However, the current format of the demographic questions in the OHS is not adequate. Although the OHS is not intended to collect health-specific information, more reliable and crucially needed public health information could be gained by modifying questions already included in the survey. To exclude the mortality questions in existing household-based enquiries or to leave them in their present format would mean the loss of a significant opportunity. The OHS and other large-scale surveys have an important contribution to make to the planned health information system until such time as the quality of vital and medical statistics is improved enough to facilitate ongoing monitoring and evaluation.

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