CHILDHOOD MORTALITY IN KWAZULU-NATAL – 2001

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EXECUTIVE SUMMARY

Childhood mortality rate which comprises of Infant Mortality Rate (IMR) and Under 5 Mortality Rate (U5MR), are key indicators used internationally, nationally and locally as a sensitive but non-specific way of comparing health status and development within countries, between countries and communities.

The aim of the study was to measure childhood mortality at a district level across the province of KwaZulu Natal using a quick, simple and indirect method (Rapid Epidemiological Assessment Tool) and to compare the rates among districts for strategies and prevention.

Objectives of the study were to collect preceding pregnancy history of the first antenatal care (ANC) attendee from health facilities and to calculate the IMR and U5MR using the model life table.

A cross sectional facility based survey was conducted using the Rapid Epidemiological Assessment tool (Preceding Birth Technique) throughout the Province of KwaZulu-Natal over the month of May 2001. Data was collected using the midwives administered questionnaire from all first antenatal attendee in health facilities.

The total facility response rate of 48% (from all facilities those provide antenatal care) considered low with the breakdown of 71% from fixed clinics, 16% from mobile clinics, 10% from district, 3% regional and the rest from central hospitals. Furthermore the response rate from rural districts such as DC 21, DC 22, DC 23, DC 24 found 90%, 90%, 92%, 72% and 74% respectively considered acceptable for estimation of Childhood mortality for those districts.
The Durban Metropolitan district estimated the lowest IMR of 74 and U5MR of 103/1000 live births respectively. The highest IMR and U5MR of 112 and 164 per 1000 live births respectively were observed in the district of DC 28. The IMR and U5MR for KZN being 96.5 and 138.8 per 1000 per 1000 live births respectively considered high compared to South African Demographic Survey 1998 where IMR estimated 52/1000 life births and Under-5 mortality of 74.5/1000 life births.

The method (Rapid Epidemiological Assessment tool, Preceding Birth Technique) used to measure these indicators found useful in rural KwaZulu Natal health districts and thus be useful.

The observed high rate of childhood mortality in KZN 2001 could be due to high incidence and prevalence of HIV/AIDS epidemic and low socio-economic development thus warrants a comprehensive strategy including socio-economic development and health service programme which is known to reduce childhood mortality such as integrated Management of Childhood illness.
INTRODUCTION
Since 1994, the Democratic Government of South African (SA) has developed a framework for socio-economic development in its Reconstruction and Development Programme (RDP). It has set out broad principles and strategies for development in all key areas and sectors in order to effectively address the various problems facing the majority of the population of SA. The other major thrusts of the RDP concerns are to build the economy, which would address the poverty issues. The RDP also proposes that the health services be restructured such that all citizens of SA can achieve the optimal level of health and well being through Primary Health care (PHC) principles, decentralization (District Health System) and community participation. Furthermore to enhance the utilization of services, national policy was taken to remove the user's fee for pregnant women and children under 5 years of age. The Provincial Department of Health, KwaZulu Natal (KZN) introduced a programme of extensive Clinic Upgrading and Building programme (CUBP) to improve the access of the health facilities to the communities. Ultimately, the District strategy would be to implement the national and provincial policies through a comprehensive planning for health targeting the well-being and promotion of children.

Childhood (Infant and under –five) mortality rates are key indicators for assessing the health status of communities, districts and countries1. These indicators are used internationally as a sensitive although non-specific way of comparing health status and development within (district, provinces) and between countries. The factors contributing to the death of infants include socio-economic status of family, level of community development and education, availability, access and quality of health services2. Early neonatal mortality is associated with maternal health and access to care around the time of delivery, with Post neonatal mortality is associated with socio-economic conditions, preventive and curative health services2. The under five-mortality rate (U5MR) is also a good reflection of the general well being of children in an area2. The IMR and U5MR of an area all have implications of local health provision, policy and resource allocation decisions2.
Furthermore the IMR is an indicator not only of the health status of infants but also of whole population, their socio-economic conditions and the availability, utilization and effectiveness of health services. It is both an indicator by which the health status of a population can be judged, and an important statistics for planning and evaluating health interventions\textsuperscript{3}.

The under 5 mortality rate is known to be the end result of a variety of inputs: the nutrition and knowledge of caregivers; the level of immunization and oral rehydration therapy use; the availability of appropriate maternal and child health services; the availability of clean water and sanitation; the family income and the safety of the environment\textsuperscript{3}.

The recent epidemic of cholera persisted in rural KZN and affected most of its districts through August 2000 till date is a clear indication of lack of basic facilities such as safe water supply, toilets and safe hygienic practices among these communities.

The mortality rate among infants and children remain an emotion-laden issue in South Africa, not only owing to black-white disparities but also to urban-rural disparities\textsuperscript{4}. Children have been given priority in the process of South Africa's transformation. The rights of the child are included in the constitution. South Africa has thus committed itself to protecting children as a valuable group and ensuring that all government policies, laws, programmes, budgetary decisions and executive actions will priorities children\textsuperscript{5}. In order for the Government's commitment to be translated into tangible benefit, supportive policies at the national level must be reflected through provincial and eventually district comprehensive and integrated planning targeting the children. Therefore it is important that area (district) specific indicators are measured timeously and made available for comparison and to monitor progress towards the Government's set goals.
BACKGROUND

The key child health problems in South Africa as identified are malnutrition, preventable childhood infections such as diarrhoea and respiratory infections, Emerging epidemics including HIV/AIDS and the scourge of violence and trauma against children. The national infant mortality and under 5 mortality rates as indicated in the South African Demographic Health Survey (SADHS, 1998) are 45 and 59 per 1000 life births respectively. There is a significant variation between provinces ranging from 30 to 61.2. KZN scores 3rd highest 52.1. The SADHS also showed that the IMR is higher in:
- Rural areas
- Babies born to mothers with no formal education
- Families with 4 or more children
- Families where the birth interval between children less than two years.

Furthermore, 75% of poor people live in rural areas of which two thirds are in the provinces of Eastern Cape, KZN and Northern provinces. Most of these risk factors are rampant in KZN. Whereas both national and provincial indicators may appear to be relatively low, but masks the actual status for specific health districts.

One in every 22 children born in South Africa dies before its first birth day. Infant mortality is increasing due to HIV/AIDS. (Source: South African Demographic and Health Survey, Department of Health, 1998.)

South African’s infant mortality rate is four times higher than that of countries with comparable economies. (South African Yearbook, 1999)

Full immunization coverage against major childhood illnesses 62%, Urban 67%, Rural 59%.

One in three children in SA with Vitamin A deficiency.

No. of preventable deaths from infections in children under 5 estimated between 1.3 to 2.2 million. (Source: Irene Roberts, Nutrition Information Centre, University of Stellenbosch, 1999.)

Although the SADHS estimates IMR of 45 but recent report from UNICEF quote the IMR for South Africa 54 per 1000 life births and U5MR of 69 per 1000 life births. This higher rate of IMR is not yet explained but could be due to real increase of rates or could be due to different data source.
The estimated mid-year population of KZN for 2001 is 9070475, therefore constitutes 21% of total population of South Africa and the same population is confined to 8% of the land area of S.A. Female (53%) dominates the male\textsuperscript{10}. The population pyramid of KZN (Figure 1) shows the typical feature of a developing third world country with a broad base. The majority of the population (57%) lives in the rural areas of the province. Africans are the majority (82%) among all other race groups (census 1996).
Over half (52%) of the population are illiterate or have no schooling. The high unemployment rate of 39% with low average per capita income of R1140, 29% of total population is economically dependent with 6% disabled. 48% of the population lives in formal and 32% traditional type of dwellings. The rest 20% live in informal type of dwellings. 29% of the population does not have access to safe water supply.

About 42% of households have flush or chemical toilet, 41% uses pit latrine whereas 17% do not have toilet and uses open air. These basic facilities also have further disparity among rural/urban settings in KZN.

Given a strong decentralization observed policy, services including health will have to based their strategic plans on actual prevailing status in order to precisely address the true burden and set realistic goals.

Figures from the recent World Health Organization (WHO) report show that counties with a comparable income level to South Africa such as Mexico and Brazil report have far lower mortality rates in the under-5 age group. The mortality rates (IMR for SA) as observed 50 in 1986 and 40 in 1991. It is a clear declining trend but at higher rate of 45 observed in SADHS 1998 (Figure 2). This fluctuation rate needs regular monitoring of IMR in order to identify the root causes and appropriate interventions. WHO also quotes mortality rates for U5MR of 67 for girls and 85 for boys respectively. The difference between SADHS and the WHO figures are quite marked. A possible reason for this could be a real increase in U5MR due to the HIV-epidemic in the country or the usage of different databases in two studies. Therefore this indicates that there is a need for regular, updated and district based information.

Vital registration is the key source of reliable childhood mortality. Despite significant efforts to improve this situation, vital registration is still incomplete. Many births and deaths are not registered in South Africa. Routinely available data can thus not be used to calculate childhood mortality. Surveys such as Demographic Health Surveys conducted to collect this information on an intermittent basis to measure national and provincial rates. This is a very costly exercise for the province to implement on a regular basis.
Rapid Epidemiological Assessment tools are collection of methods which provide health information more rapidly and simply and at a lower cost than standard methods of data collection, yet also yield reliable results for use primarily at the district and sub-district level\textsuperscript{11}, One such method is the Preceding Birth Technique (an indirect method) used for measuring CMR. It is one of the alternative but well recognized simple clinic-based approach to measure IMR and U5MR\textsuperscript{1}. The purpose of the survey was to estimate the CMR at the sub-national (District) level using easy, quick and reliable method as Preceding Birth Technique (PBT) in order to compare the IMR and U5MR in KZN.

The specific objectives:

- To obtain previous birth data from the mothers attending health facilities for the month of May 2001.
- To calculate/estimates of IMR and U5MR for each health district in KZN using west model life table

MATERIALS AND METHODS

Setting and Population

The study was conducted in all 11 Health Districts of the Province of KwaZulu Natal for the month of May 2001. The population of the districts, women and children less than 5 years are as follows:

<table>
<thead>
<tr>
<th>District</th>
<th>Population</th>
<th>Women</th>
<th>Children &lt; 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC21</td>
<td>693 926</td>
<td>55%</td>
<td>85504</td>
</tr>
<tr>
<td>DC22</td>
<td>948 069</td>
<td>53%</td>
<td>94710</td>
</tr>
<tr>
<td>DC23</td>
<td>597 443</td>
<td>54%</td>
<td>74650</td>
</tr>
<tr>
<td>DC24</td>
<td>460 401</td>
<td>56%</td>
<td>62263</td>
</tr>
<tr>
<td>DC25</td>
<td>442 676</td>
<td>52%</td>
<td>45301</td>
</tr>
<tr>
<td>DC26</td>
<td>768 791</td>
<td>54%</td>
<td>104731</td>
</tr>
<tr>
<td>DC27</td>
<td>542 953</td>
<td>54%</td>
<td>79433</td>
</tr>
<tr>
<td>DC28</td>
<td>821 551</td>
<td>54%</td>
<td>107945</td>
</tr>
<tr>
<td>DC29</td>
<td>577 073</td>
<td>53%</td>
<td>68085</td>
</tr>
<tr>
<td>DC43</td>
<td>252 607</td>
<td>54%</td>
<td>32510</td>
</tr>
<tr>
<td>Durban Metro</td>
<td>2 964 276</td>
<td>51%</td>
<td>278761</td>
</tr>
<tr>
<td>TOTAL</td>
<td>9 070457</td>
<td>100%</td>
<td>1977107</td>
</tr>
</tbody>
</table>

The pregnant women attended health facilities (public and local authority run) for the month of May 2001 for first antenatal bookings were the sample population in the study.

Antenatal services are provided through 441 health facilities which include PHC fixed clinics, mobile points, District, Regional and Central hospitals. (GIS, KwaZulu Natal Health Bulletin 2000). Training workshop in each district with the District Co-ordinator, PHC Supervisors, Midwives were conducted to explain the methodology and requested to participate in conducting the study during the month of February 2001.

**Sampling frame, data collection and analysis:**

All provincial and local council health facilities provide antenatal services were requested to participate. Preceding birth outcome questionnaire were completed from pregnant women who visited for their first ANC visit for the month of May 2001. The month May 2001 was chosen arbitrarily. The midwives collected data at the time of patient history taking on a prescribed questionnaire, which addressed the issue of outcome of previous pregnancies. Primigravidas (First time pregnant women) and repeat ANC attendees were excluded from the study.

The data was entered and analyzed using Epi–Info 6.04 statistical package to produce the result.
RESULTS

The study population numbered 7087 pregnant women who attended for first antenatal bookings at the selected health facilities. Of these, 4990 (70%) pregnant women had preceding live births, therefore the outcome of these preceding life births were analyze to estimate the infant mortality and under five mortality rates, (Table 1, 2 & 3) using west model life table.

Table 2: Total number of pregnant women interviewed per Health District

<table>
<thead>
<tr>
<th>District Councils</th>
<th>Number of Pregnant Women Interviewed</th>
<th>No. of women's preceding life birth outcome analyzed</th>
<th>Percentage of Total Preceding life birth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Durban Metropolitan</td>
<td>640</td>
<td>404 (63%)</td>
<td>8%</td>
</tr>
<tr>
<td>DC 21 Ugu</td>
<td>1304</td>
<td>826 (63%)</td>
<td>17%</td>
</tr>
<tr>
<td>DC 22 Umgungundlovu</td>
<td>841</td>
<td>482 (57%)</td>
<td>9%</td>
</tr>
<tr>
<td>DC 23 Uthukela</td>
<td>923</td>
<td>611 (66%)</td>
<td>12%</td>
</tr>
<tr>
<td>DC 24 Umzinyathi</td>
<td>379</td>
<td>262 (69%)</td>
<td>5%</td>
</tr>
<tr>
<td>DC 25 Amajuba</td>
<td>604</td>
<td>369 (61%)</td>
<td>8%</td>
</tr>
<tr>
<td>DC 26 Usuthu</td>
<td>634</td>
<td>552 (87%)</td>
<td>13%</td>
</tr>
<tr>
<td>DC 27 Umkhanyakude</td>
<td>518</td>
<td>352 (68%)</td>
<td>7%</td>
</tr>
<tr>
<td>DC 28 Uthungulu</td>
<td>301</td>
<td>246 (81%)</td>
<td>5%</td>
</tr>
<tr>
<td>DC 29 Ilembe</td>
<td>430</td>
<td>430 (100%)</td>
<td>9%</td>
</tr>
<tr>
<td>C D43 Griqualand</td>
<td>512</td>
<td>356 (69%)</td>
<td>7%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7087</strong></td>
<td><strong>4990 (70%)</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

The highest (17%) sample population were obtained from the District UGU (DC21) followed by DC26 of 13% and DC 23 of 12%. Durban Metro constitutes highest number of population (33%) of total KZN but contributed only 8% of the sample population.
## Table 3: Calculation of IMR and U5MR across the Province

<table>
<thead>
<tr>
<th>District Council</th>
<th>Last baby Alive (A)</th>
<th>Last baby dead (D)</th>
<th>Proportion</th>
<th>IMR / 1 000 live births* (95% Confidence Interval)</th>
<th>U5MR / 1000 Life births* (95% Confidence Interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Durban Metro</td>
<td>369</td>
<td>35</td>
<td>0.086</td>
<td>74 (30-115)</td>
<td>103 (32-148)</td>
</tr>
<tr>
<td>DC 21</td>
<td>728</td>
<td>98</td>
<td>0.118</td>
<td>95 (60-130)</td>
<td>136 (81-191)</td>
</tr>
<tr>
<td>DC 22</td>
<td>417</td>
<td>65</td>
<td>0.134</td>
<td>107 (64-149)</td>
<td>156 (82-220)</td>
</tr>
<tr>
<td>DC 23</td>
<td>548</td>
<td>63</td>
<td>0.103</td>
<td>86 (52-115)</td>
<td>122 (67-168)</td>
</tr>
<tr>
<td>DC 24</td>
<td>226</td>
<td>36</td>
<td>0.137</td>
<td>111 (52-161)</td>
<td>162 (142-246)</td>
</tr>
<tr>
<td>DC 25</td>
<td>331</td>
<td>38</td>
<td>0.101</td>
<td>84 (36-167)</td>
<td>120 (48-246)</td>
</tr>
<tr>
<td>DC 26</td>
<td>566</td>
<td>86</td>
<td>0.127</td>
<td>100 (62-136)</td>
<td>145 (81-203)</td>
</tr>
<tr>
<td>DC 27</td>
<td>307</td>
<td>45</td>
<td>0.127</td>
<td>100 (51-147)</td>
<td>145 (72-222)</td>
</tr>
<tr>
<td>DC 28</td>
<td>212</td>
<td>34</td>
<td>0.138</td>
<td>112 (52-161)</td>
<td>164 (71-245)</td>
</tr>
<tr>
<td>DC 29</td>
<td>379</td>
<td>51</td>
<td>0.130</td>
<td>102 (85-129)</td>
<td>148 (120-191)</td>
</tr>
<tr>
<td>DC 43</td>
<td>308</td>
<td>48</td>
<td>0.134</td>
<td>107 (54-157)</td>
<td>156 (72-234)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4391</strong></td>
<td><strong>560</strong></td>
<td><strong>0.113</strong></td>
<td><strong>92 (87-102)</strong></td>
<td><strong>132 (121-147)</strong></td>
</tr>
</tbody>
</table>

- Using western model life table

The highest mortality rates were observed in DC 28 of 112 (95% CI, 52-161/1000) and 164 (95% CI, 71-245) per 1000 life births IMR and U5MR respectively. The lowest Infant mortality rate of 74 ( 95% CI, 30-115) per 1000 life births and Under 5 Mortality Rate of 103 (95% CI, 32-148) per 1000 life births were observed in the Durban Metropolitan district.

The overall estimated childhood mortality of KZN being IMR of 92 and U5MR of 132 per 1000 life birth (Graph 2 and graph 3)

**Graph 1: Distribution of pregnant women interviewed at health facilities.**

The majority of pregnant women interviewed had presented at Primary Health Care Clinics. This is in line with the Primary Health Care approach, where complicated pregnancies would be referred to District, Regional and Central Hospitals only.
DISCUSSION

Although vital registration and census statistics are used in developed countries to provide demographic information such as childhood mortality, in South Africa particularly in KwaZulu Natal these information is incomplete and inadequate. Demographic household surveys are conducted nationally; the results are disaggregated unto the nine provincials, rural/urban and different race groups. The survey results of under 5 mortality in 1993, 1995 and 1998 yield difference from the results obtained from the Census (Figure 2). Therefore an attempt to adopt an alternative easy, quick but reliable such as indirect Rapid Epidemiological Assessment tool Preceding Birth Technique shows strengths and weakness in our study setup.

Several methods based on model life tables have been developed to estimate childhood mortality. Surveys are conducted to measure childhood mortality collects information from women the number of children they had in the past specific (usually 2 to 5 years) time. This data is then grouped into a cohort of births and the probability of dying in each time-period is calculated. This is known as a life table analysis, and is used to estimate IMR or the childhood mortality rate (the probability of a child dying before the age of five). The 'Preceding Birth' Technique (PBT), originally advanced from Brass and Macrae, holds promises as just such a method its practical appeal derives largely from simple data requirements, is one of the simpler methods that can be used in a routine manner.

The Brass method (Indirect method), involves surveying a sample of women and asking them how many children they ever had, and how many of those children died. The proportion of those who died, according to the age of mothers, can be converted into an infant mortality rate on the basis of model life tables. This method requires mother's age. Both these methods (Life table analysis and Brass) have problems with recall bias and proxy reporting (some household members may not be aware of infant deaths which occurred a long time ago).
The PBT estimates child mortality from information obtained from mothers at the time of a delivery, about the outcome of their previous pregnancy and whether a live-born child from that pregnancy has died. It has been shown that the proportion of the preceding births, which have died can be used to estimate the mortality for children up to the age of 2 years. On the basis of a suitable model life table, this can be converted to an estimate of the Infant Mortality Rate (IMR) or an Under-5 mortality rate (U5MR). If this information is obtained from all the pregnant women in a community, the PBT will give a recent, population-based estimate of the childhood mortality\textsuperscript{1,12}.

Since many women deliver their babies at home and not in the health service, it would be difficult to obtain the necessary information from all the women at the time of delivery. However, it appears that the percentage of pregnant women who attend clinics for an antenatal check-up is much higher (98.8\%) in KwaZulu Natal than the percentages who deliver in the health service\textsuperscript{8}. Virtually every woman (98.8\%) had attended antenatal care on one or more occasions during her pregnancy with the index child\textsuperscript{8}. The vast majority of the pregnant women received their ANC service at fixed clinics (75.3\%) or mobile (11\%) clinics, while 4.4\% attended local hospitals for this services\textsuperscript{8} in one rural of KZN. Furthermore the sample size of this study (Fixed clinic-71\%, Mobile clinic-16\% and local hospital-13\%) contributed according to the findings of the above study. Therefore to obtain the most information for a community, the methodology in this study found suitable for estimation of childhood mortality.

It is recommended that this method can be used in a routine manner, if the preceding birth history of all pregnant women can be obtained, the estimate of IMR and under 5 Mortality Rate (U5MR) using model life table can provide a recent population based estimate of the childhood mortality. In our attempt to obtain such information using antenatal facilities in KZN shows some good responses from rural districts (eg. DC 21, DC 22, DC 23 and DC 24) and very high estimate of IMR and U5MR compared to census and SADHS. It is also recommended that at least 100 pregnant women who had preceding life births from a community can give such childhood mortality measures\textsuperscript{1}. The collection of such information does not matter for the duration of time as monthly, bi-monthly or yearly for the said estimation. We have collected such data for a period of one month and obtained total samples of 4490 for the province and in some districts over 500, which is well above 100. The minimum sample size of 246 obtained from district DC 28.
The overall response rate of 48% facilities seems quite low for the district level estimation. The sample size obtained from districts are clearly in line with the percentage of district population except the Urban District of Durban Metro, where 33% of total population reside but constituted only 8% of the sample population. District DC21 constitutes 10% of total population but contributed 17% of the sample population. The other districts population and sample population show little or no variation (table 1and 3). The majority (71%) respondents attended the fixed clinics could be due to the most number of facilities those provide antenatal care services close to their home.

The sample size obtained from districts are clearly in line with the percentage of district population except the Urban District of Durban Metro, where 33% of total population reside but constituted only 8% of the sample population. District DC21 constitutes 10% of total population but contributed 17% of the sample population. The other districts population and sample population show little or no variation (table 1and 3). The majority (71%) respondents attended the fixed clinics could be due to the most number of facilities those provide antenatal care services close to their home.

The relative cost-effectiveness of rapid assessment (survey) and household surveys have been estimated using a sensitivity analysis approach and compared in a study on contraceptive use among women in Ecuador - the Sierra. The results indicate that the majority of demographic and contraceptive use measures are similar between two surveys. The rapid survey was three times as cost-effective as the household traditional survey. In our study we used the midwives from the facilities, therefore no extra cost encountered to conduct but off course minimum opportunity cost incurred.
The Infant Mortality rate for KZN is estimated of 92 per 1000 live births and the under 5 mortality rate of 132 per 1000 life birth. It appears high compared to the Demographic Health Survey of 1998 (59/1000 live births) and census 1996, 89/1000 live birth for KZN. This high rate of childhood mortality can be compared with other finding. The difference of findings observed between Demographic surveys and Censuses are marked (Figure 2). The Census estimation constantly higher than the Demographic estimation. These could be due to the use of different method of calculation such as Census uses Brass Indirect Method (1968) and later uses direct method. In our set up we used indirect estimation using model life table.

![Figure 2: National under-five mortality](image)

Source: Department of health, Pretoria 2000

The highest estimation of IMR of 112 and U5MR of 164 per 1000 life birth were observed in the district DC 28 which is a deep rural district followed by DC 22 and DC43 (table 2). The IMR varied between districts such as 74 being lowest (Durban Metro) and being 112 per 1000 life birth in DC 28. The variation IMR & U5MR
between districts could be related to the socio, demographic, cultural and economic factors therefore need to observe with the background information of districts of KZN and could be well understood.

The Districts have more remote, rural communities as compared to the Durban Metropolitan that has a better infrastructure, e.g. roads and transportation shown worst childhood mortality rates (Table 4 and Map 2 and Map 3).

When these district estimation are observed with 95% Confidence Interval (CI), The difference between the lower and upper limit shows wide variation eg. DC 21 IMR of 95/1000 life birth (95% CL; 60-130), the difference of 70 although the response rate from facilities over 90%. On the other hand IMR for KZN of 92/1000 life birth with (95% CL, 87-102), the difference between the lower and the upper limit is 15 which could be acceptable. This is due to the sample size. Therefore the sample size from the district should be considered more than what expected or recommended in the method.

A shortcoming with the life table is “the proportion of dead children over life birth given with two decimal places eg, 0.04, 0.05 etc”. The rate of IMR and U5MR calculation using three decimal show significant difference (table2) such as Durban Metro using proportion of 0.08 the estimation of IMR 67 and U5MR 92 per 1000 life births. The estimation of IMR and U5MR for Durban Metro using the proportion using three decimal of 0.086 are 74 and 103 per 1000 life births. Again if one considers the proportion of 0.09 instead of 0.086, the IMR become 79 and U5MR of 110 per 1000 life births respectively. These differences are remarkable for estimation of such indicators.

KwaZulu Natal is known to have the highest incidence of HIV/AIDS in South Africa (Figure 6). The IMR and U5MR per district could be compared with the infra structures and demographic variable of the district such as literacy level, employment status, basic infra structure such as water supply and sanitation.
The childhood mortality rates estimated by Irwig (Irwig L M et al) in rural Transkei 130 per 1000 (80% CI, 118-142) live birth and U5MR of 190 per 1000 (80% CI, 172-208) in 1980. The known two problems that emerged as serious threats to child health and well being are rapidly rising HIV infections and the scourge of trauma and violence against children were concluded in that study. These factors prevail in KZN and therefore may have contributed to the observed high rates of CMR.

Infant mortality rate alone is considered an accurate indicator of access to essential child health and environmental health services. Therefore IMR together with U5MR for KZN health districts would guide the policy makers for future child health and environmental health services strategies.

The IMR estimated in SA evidenced great variations among different race groups, and rural urban inhabitants (Table 5).

**Table: 5 IMR between1981 – 1985 (1990)**

<table>
<thead>
<tr>
<th>RACE</th>
<th>NATIONAL</th>
<th>URBAN</th>
<th>RURAL/PERIURBAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>12.3 (7.4)</td>
<td>12.3</td>
<td>12.3</td>
</tr>
<tr>
<td>Indian</td>
<td>17.9 (15.9)</td>
<td>17.1</td>
<td>19.8</td>
</tr>
<tr>
<td>Coloured</td>
<td>15.9 (28.6)</td>
<td>25.9</td>
<td>66.0</td>
</tr>
<tr>
<td>African/Black</td>
<td>94.124 (48.3)</td>
<td>36.6</td>
<td>100 - 135</td>
</tr>
</tbody>
</table>

Source: Yach D IMR in urban areas of South Africa. 1988

The IMRs in rural areas are substantially worse than IMR in urban areas and the difference being most marked for Coloured and African groups. Since our study population constituted from rural health facilities and represented rural African population, therefore the high rate of childhood mortality is most likely (Table 5 & 6).

The factors found attributed to IMR in South Africa are maternal education, physical characteristics of dwellings, type of water supply and sanitation services in addition to residential status. There is more than four-fold variation in the post – neonatal mortality rate in relation to varying levels of mother’s education. Considering the background information of KZN on these risk factors it is highly likely to have high CMR.
Table 6: Leading cause of deaths among children <5 years according to race group.

<table>
<thead>
<tr>
<th></th>
<th>Africans</th>
<th>Whites</th>
<th>Coloureds</th>
<th>Indians</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1 yrs</td>
<td>Perinatal 50%</td>
<td>Perinatal 59%</td>
<td>Perinatal 46%</td>
<td>Perinatal 71%</td>
</tr>
<tr>
<td></td>
<td>Infectious 25%</td>
<td>Congenital 15%</td>
<td>Infectious 26%</td>
<td>Congenital 11%</td>
</tr>
<tr>
<td></td>
<td>Resp. 11%</td>
<td>Respiratory 6%</td>
<td>Respiratory 14%</td>
<td>Respiratory 7%</td>
</tr>
<tr>
<td></td>
<td>Endocrine 3%</td>
<td>Infectious 6%</td>
<td>Congenital 5%</td>
<td>Infectious 7%</td>
</tr>
<tr>
<td>1-4 Yrs</td>
<td>Infectious 36%</td>
<td>Trauma 54%</td>
<td>Infectious 39%</td>
<td>Trauma 29%</td>
</tr>
<tr>
<td></td>
<td>Respiratory 16%</td>
<td>Respiratory 10%</td>
<td>Trauma 16%</td>
<td>Infectious 18%</td>
</tr>
<tr>
<td></td>
<td>Ill Defined 14%</td>
<td>Congenital 8%</td>
<td>Respiratory 17%</td>
<td>Congenital 12%</td>
</tr>
<tr>
<td></td>
<td>Endocrine 14%</td>
<td>Infectious 6%</td>
<td>Endocrine 14%</td>
<td>Respiratory 9%</td>
</tr>
</tbody>
</table>

Source: Bradshaw, 1997

Race appears to be a strong determinant of the distribution of causes of deaths in South Africa. Among South African population and under 5 group Infectious and Respiratory conditions are the major cause of deaths could be easily prevented. Since most of the people in Rural KZN are African, the data obtained in our study from these rural poor African population (with the assumption that rich people may have attended the private sector) therefore this high rate of IMR and under 5 MR could be due to the presence of these determinants.

The impact of HIV/AIDS epidemic is having a major impact on all cause infant and child mortality. Based on the census and Demographic and Health Surveys, the estimates of Infant Mortality plateaued in the early 1990’s and then began to rise rapidly in 1995, whereas Mortality at ages 1-4 only began to increase rapidly in 1997 (Figure 3 &4).
Furthermore among population groups in the census and SADHS show an upturn in trend from the two most recent points (Figure 3 and 4) and well estimate the same trend of high rise in childhood mortality. If we consider our findings for the recent period of Early 2001. The estimated mortality for the province of KZN and its districts would well fit.

It is clearly evident that an increase of under five mortality among all four groups of people and could be probable link of HIV/AIDS epidemic\textsuperscript{18}.
The census provides provincial under five mortality estimates in figure 5. Accordingly it is observed that the mortality rates stopped falling up late 1991 in all the provinces with the exception of Mpumalanga, where the downward trends continues to 1994, thereafter appeared to rise. The rise of the childhood mortality rate among could have been due to the surge of the epidemic of HIV/AIDS.
The income level and the childhood mortality are directly linked. KZN being the poorest

Figure 6: Provincial infant mortality and 1997 HIV prevalence

Figure 9: Provincial infant mortality and prevalence of poverty

Province in South Africa and highest incidence and prevalence of HIV/AIDS, shows the worst childhood mortality. The association between infant mortality and HIV prevalence in the provinces indicates that HIV could explain 26% of the difference seen in provincial IMR and Together with income levels could explain an additional 61% of the variability.18
CONCLUSION

The use of Preceding Birth Technique for estimation of childhood mortality rate in the health districts of KZN found easy, inexpensive and quick. The most rural districts responded better than the urban districts such as Durban and Pietermaritzburg.

The simple questions were asked in any case part of the routine enquires made of all antenatal clinic first attendee. The study required no additional staff or special funding yet provided an inexpensive but acceptable technique for measuring childhood mortality those are otherwise difficult to obtain in rural areas in KZN.

The IMR and U5MR throughout the province estimated very high could be due to poor socio-economic conditions of the people of KZN, high incidence and prevalence of HIV/AIDS.
RECOMMENDATIONS

Preceding Birth Technique can be used on a regular basis in all Health Districts of KZN to monitor such powerful indicators (Childhood mortality).

Further study could be considered to identify the major cause of childhood mortality in KZN and to identify the appropriate strategy/strategies.

There is an urgent need for strategy for prevention of childhood mortality in KZN through health services provision and socio-economic development.
REFERENCES


*** http://www.unicef.org/stats/Country_1Page160.html
Acknowledgement

I wish to thank the following people without whose help; the work would not be completed:

- Dr. Stephen Knight for assisting the project from writing up of the protocol, conducting workshops at district level.
- The Provincial Department of Health who had permitted and requested to conduct the study.
- The Regional or the District Coordinators who had coordinated the study within the district.
- The Midwives from the Antenatal Clinics who had collected the data.
Map 1: Showing the facilities that participated in the study

NB. LIMITATION. Due to missing co-ordinates, some anti-natal facilities that showed a return could not be mapped.

Compiled and Produced by
The GIS Unit
KZN Health Department

Date of Production: 16 November 2001
Map 2: Showing the IMR for KZN Districts

Compiled and Produced by
The GIS Unit
KwaZulu Natal Department of Health
Date of Production: 14 November 2001

Calculation of IMR
- 111 to 112
- 100 to 111
- 74 to 100

Durban