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Programmatic Factors Affecting Infant and Child Mortality in Aurangabad District of Maharashtra

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Abstract
The decline in IMR of Maharashtra was 12 points (33.3%) since 2005. As per the SRS report 2013, NMR of Maharashtra was 11 points below the national level. Still about 65% of child deaths during neonatal period and about 27% child deaths are taking place after neonatal period and before first year of birth. Lack of child care services in rural areas coupled with early marriage, teenage pregnancies, anaemia amongst mothers, and low level of ANC and immunization coverage affecting the survival of children in the district. Aurangabad has witnessed rapidly growing population due to industrialisation but required health facilities at different levels were lacking. A large proportion of women access government facilities for pregnancy and childbirth related services. High anemia among women and low birth weight are important factors affecting infant and child mortality. The state specific innovations were quite effective in addressing anemia among women, malnutrition among children and childhood diseases especially among tribal/nomadic population in the district. However, there are a few shortfalls in achievements that get accentuated when disaggregated by gender, rural–urban sectors and social groups at the grass root level.

Keywords: *Child Mortality, Child Health Services, Regional Health Planning, Focus Groups, Maharashtra-Aurangabad*

1. Introduction
Maharashtra, today is the most affluent and one of the largest states in the country with the highest per capita income, it continues to have high levels of poverty and inequalities which get reflected in health outcomes which are better but not the best in the country [1]. However, Maharashtra has to still struggle with malnutrition deaths, child mortality and maternal mortality. The intra-state differences are very sharp. The average Infant Mortality Rate (IMR) is estimated to be 29 as per the Survey of Causes of Diseases in Maharashtra for the year 2009. The highest IMR (44) was observed in Wardha district, which was almost thrice the lowest recorded value of 16 in Sangli. Aurangabad is one of the below average performing districts in Maharashtra in terms of reduction in IMR. The estimated IMR of district Aurangabad was 34, which was above the state average [2].

The pace of decline in infant mortality in has quickened in recent years after the introduction of the NRHM. However, the post-neonatal deaths have declined faster than the neonatal deaths despite the emphasis on preventing the latter in the NRHM. Apart from a number of reasons, this is linked to the inadequate public health services in general, and the undernourishment and high anaemia levels of pregnant women in particular [3].

Early marriage continues to be prevalent in Maharashtra. As per DLHS-3 reports, 17.6 % girls are married below the legally permissible age of 18 years. Teenage fertility still remains a concern and it has health implications for women. Percentage of births to women during 15-19 year age group is 9.7% and varies across districts. In Aurangabad district 37.8% of teenage girls get married before the age of 18 and Percentage of births to women during 15-19 years to total births was 29.9. Percentage of births to women during 15-19 years to total births is significant to percentage girls marrying before 18 years. Only 43.8% women used Government ANC checkup facilities in the state. More than one in 10 rural women did not receive any antenatal care. The proportion of women who received at least three ANC is 74.4 percent and 33.9 percent of the women received full ANC in Maharashtra. In district Aurangabad the lowest 14.1 percent of women have received full ANC. The proportion of women who consumed 100 IFA tablets /syrup was 45.7 percent for state as a whole. The percentage of safe delivery was 69.2 but is low in rural areas, tribes and lowest wealth index group. 75.5% mothers have had a postnatal checkup done within two days of childbirth. 69% children are fully immunized out of these 86% children got vaccinated at Government health facilities [4].

2. Materials and Methods
This is a descriptive and exploratory study. District Aurangabad was selected as one of the moderate performer district in terms of infant and child mortality indicators in the state of Maharashtra. The study was conducted during December 2012. Primary and secondary data were collected. Interviews were conducted with District Health Officer (DHO), Medical Officer In-charge of PHC Adool. Semi-open ended interview schedules were used for collection of data regarding infant and child mortality (Under 5 Mortality), socio-economic conditions, diseases and causes of deaths among infants and children, mother and child health services, related HMIS data, programmatic interventions under NRHM, availability of services etc. from the health officials. Focus Group Discussions (FGD) were conducted with mothers with at least one living child of age 5 years or below at government

health facility in the selected study area. Tools for FGDs were developed as per the framework given by Mosley and Chen (1984) [5]. About 8 to 12 mothers in the age group of 19-35 years, were invited to participate in FGD.

3. Findings

3.1 Aurangabad District Profile

Aurangabad district is a part of the Marathwada region. As per Census 2011 the district population is over 3.7 million and has shown 27.76 % decadal growth rate. The sex ratio in the district is low at 917 female per 1000 male as compared 925 in the state. The Child Sex Ratio is further low at 848 as compared to 883 in State. The sex ratio in the age group of 0-6 for Aurangabad has actually dropped from 890 to 848 from 2001 to 2011. An adverse 0-6 sex ratio also reveals that socio-cultural factors are determining survival chances of female child. The literacy rate was 79.02% compared to 82.91% for the State. In the district, Male Literacy Rate is 87.37% and the Female Literacy Rate is 70.08% [6]

In the district, proportion of households with piped drinking water is 95% in urban areas and 47 % in rural areas. Around 50% of population is dependent on agriculture. Aurangabad comes under drought prone area; nearly 200 villages in the district face acute shortage of drinking water for most of the year. In terms of households having flush toilet facility, 82% of the urban houses have flush toilets, whereas only 15% of the rural households have toilet facility [7]. Urban population is increasing rapidly due to immigration. This has added burden on public health facilities. Primary Health Centres in peri-urban areas are covering population nearly double than decided norm.

3.1.1 Health Care Infrastructure

As per the Rapid Household Survey data 2011, there were 279 Sub-Centres, 50 PHCs, 10 CHC/Rural Hospitals, 4 Sub-Divisional Hospitals and 1 Medical College and 1 MCH Hospital in Aurangabad district. However, IPHS compliant PHCs were only 30 and IPHS compliant Sub-Centres were also 30 [8]. As per Zilla Parishad Vision 2020 document, ideal requirement of PHCs and SCs are 67 and 402. Only 40% of the Sub centres conduct deliveries. Gap in human resource was about 174 (positions lying vacant) in Sub Centres across the district. Rural Hospitals (RH) and Sub-District Hospitals (SDH) constitute the secondary level of health care. There are 10 Rural Hospitals and 3 Sub-District Hospitals in the district. Government Medical College & Hospital and other private hospitals cater to the tertiary healthcare needs of Aurangabad and surrounding districts [9].

3.1.2 Status of selected RCH indicators in District Aurangabad

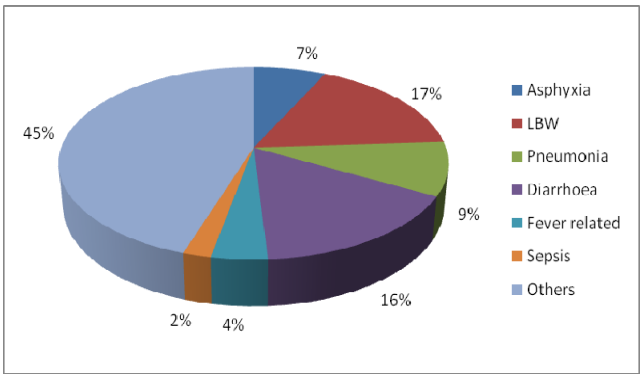
The data from HMIS (2011-12) was studied to analysed for factors affecting infant and child mortality in the district Aurangabad.

Three Antenatal Care (ANC) Checkups against ANC Registration was found to be better at 73.0% and this could be because of families in rural areas avail mostly avail government health facilities for ANC checkups. TT2 Booster and 100 IFA tablets given pregnant woman against ANC registration were 84.0% and 66.0% respectively.

During the year 2011-12 the reported deliveries against expected deliveries in the district were 97.6% and the institutional deliveries against reported deliveries were 95.1%. The home deliveries were reported merely 4.9 %. The percentage of newborns weighted against reported live births in the district was high at 95%. The percentage of low birth weight (<2.5kg) in the district was 14%. The newborns breastfed within one hour of live birth were 92% which is a remarkable achievement for the district.

The HMIS data on fully immunized children against reported live births were 76% and immunization sessions held as percentage of required Village Health and Nutrition Day (VHND) was 50%. Diarrhoea and Dehydration are the major causes (93.4%) of childhood illness in the district. Respiratory infections in the district were (6.6%). No Vaccine Preventable Diseases were reported in HMIS.

Causes of Child Deaths (against total reported infant & child deaths)



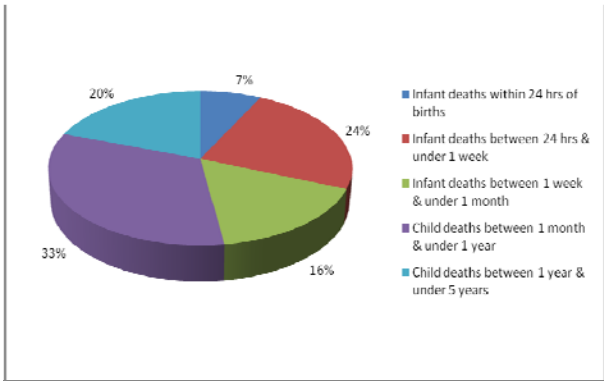
Data source: HMIS (2011-12)

Fig 1: Causes of childhood deaths.

From the HMIS data on causes of child deaths, it appears that Asphyxia, Low birth weight, Diarrhoea, Pneumonia are major causes of deaths among children. There is need to improve child death audit as nearly half of deaths (45%) are reported due to other causes.

Child Deaths by Age: Aurangabad district of Maharashtra is one of the moderate performing districts in terms of child survival indicators. The HMIS report shows highest number of deaths (33%) is taking place between one month and one year in the district.

Reported Child Deaths by Age



Data source: HMIS (2011-12)

Fig 2: Reported child deaths by age

From above graph we can see that 47% of Under 5 deaths are occurring during neonatal period. The Child Mortality Indicators (against reported 1000 live births in HMIS 2011-12) were unbelievable low; Neonatal Mortality Rate (2.81), Infant Mortality Rate (4.73) and Under 5 Mortality Rate (5.9). This could be due to poor reporting of child deaths in HMIS.

3.1.3 Determinants of Infant and Child Mortality

In order to describe various factors affecting infant and child mortality in Aurangabad district DLHS-3 data was analysed using Chi-square test with the help of SPSS software (Ver 21.0) and findings are presented in this section. The third round of District Level Household and Facility Survey (DLHS-3) was carried out in India during 2007-08 to provide estimates on maternal and child health, family planning and other reproductive health services in India. In addition, it provides information related to the programs of the NRHM. In this survey, 1079 ever-married women (age 15-49) were interviewed from Aurangabad district out of which 95.5% were currently married women. 941 women experienced motherhood out of which 172 mothers (18.3%) lost their child (below 5 years of age).

Socio-economic variables

Religion and cast groups: Out of the 1079 ever married women 72.9% were Hindus, 21.6% were Muslims, rest 5.5% were Buddhists and others. Out of 1046 women respondents 25.9% were SC/ST, 48.5% were from general category and quite a large 25.6 % women were from nomadic/tribe communities. Out of the mothers who lost their children, 71.5% were Hindus, 18.6% were Muslims and rest 3.9% were Buddhists and others. Analysis showed significant association between religion groups and child deaths. (χ^2 P< 0.02). However there was no significant association found between cast groups and child survival.

Mother's education: In this survey information on education of 35.5% women were missing. From the available data 15.8 % women were below primary and illiterate 50.7% were educated till middle standards and rest 33.5% were matriculate and above. Surprisingly, Chi-square showed no significant association between education and survival of children. This could be due to large amount of missing data.

Type of Locality: In DLHS-3 data, 60.8% of ever married women were from rural area of Aurangabad district and rest were from urban area. Amongst the children died (172), a large proportion 72.1% of children died from rural area. Chi-square showed highly significant (P<0.01) association between type of locality and survival of children

Wealth index: The wealth index was re-coded in to four categories; poor & lower middle, middle, upper middle and rich. Amongst the 172 mothers who lost their children 34.3% were from lower category, 22.1% were from middle category, 27.3% were from upper middle and 16.6% were from rich category. Chi-square showed highly significant association (p<0.01) between wealth index and survival of children.

Sanitation: As per DLHS-3 data for Aurangabad district, only 37% of women have flush toilet and more than 60% women go to latrine in open place. Out of the mothers who lost their children, 72% had no toilet facility. Chi-square showed highly significant association (P< 0.01) between availability of toilet facility in home and survival of children.

Age at Marriage and age at first birth

In this analysis, 37.8 % of the women were married before the legal age (18 years) of marriage. Out of the mothers who lost their children, 81.4% of them were married before 18 years of age. Significant association (P<0.03) was found between age at marriage of a mother and survival of a child. The age of first birth was compared between 15-17 years and 18-20 years. 48.7 % of women had child birth in the age group 15-17. Out of 138 child deaths, mothers of 56.5 % children died gave birth by the age 17 years. Chi-square showed significant association (P<0.05) between age at first birth of a mother and survival of children.

Anti-natal Care (ANC)

Out of 376 women only 14.4% received full ANC. Out of 45 child deaths, 77.8% mothers did not receive full ANC. Though, Chi-square showed no significant association between survival of children and mother received full ANC; the ANC coverage has been an important child survival strategy. In Aurangabad district 75% of women consumed 100 IFA Tablets /Syrup. Out of 172 children died, mothers of 17% children did not take IFA Tablets. Chi-square shows highly significant association between consumption of IFA tablets by mothers and survival of children (P<0.01).

Diarrhoea among children

It was found that 23.0% children had diarrhoea. Out of 39 children died, 23.1 % died due to diarrhoea. Chi-square shows no significant association between child deaths and diarrhoea (P=0.992). It shows diarrhoea is a well manageable disease due to various interventions under NRHM and now having lower threat for child survival.

3.2 Programmatic Issues at District Level- Interview with District Health Officials

In-depth interview was conducted with District Health Officer (DHO) and his team. It was informed that district Aurangabad is a drought prone and poverty stricken district and ill famous for *female feticide* due with one tribal block in which highest number of child deaths (57) were reported.

3.2.1 Implementation of Child Health Programmes: It was informed that Newborn Stabilization Unit **(**NBSU) units are available in all the Sub-District Hospitals (SDH) and in two CHCs. Newborn Care Corners (NBCC) are available in all the SDHs, CHCs and 23 SCs. SNCUs and NBSUs are available in SDH. All the SNCUs, NBSUs and NBCCs are fully equipped with infrastructure and trained manpower. All SDH have Nutrition Rehabilitation Center (NRC) and CHCs have Child Treatment Centres (CTC) with necessary equipment and trained manpower. Malnourished children are identified through school visits, with the help of Medical Officers (MO) in PHC. NRC unit functions well in Sub Center and is collaborated through Anganwadi workers. Rashtriya Bal Suraksha Karyakram (RBSK) provides treatment to the children in the age group of 0-6 years and also up to 18 years either in 42 centers in the district or in Referral Hospital or in Medical College Hospital for any diseases. The number of children screened in all the CHCs in the district under RBSK scheme was 38,921. It was found that majority of screened children were from 3-6 years age group and least from 0-6 month's age group. As a part of this scheme, monthly visits

are done to high-risk areas by MO and pharmacist. Monthly camps are arranged twice in CHC and children are examined and identified and if necessary send to medical college for further investigation. A proper record of list of families with 0-6 year children under RBSK is also maintained. It was further informed that there were 76 children with heart problem, 25 children needed heart surgery. Out of 16 heart surgeries, 14 children got funds from Jeevan Dai Yojana and efforts were made to get money from MLA funds for remaining surgeries. It was suggested that one paediatric camp per PHC per month is required for detection of risk to children. In the camp at the PHC level, 5 case of Sickle Cell were detected.

3.2.2 Human Resource Management: The shortage of Child Specialists, Medical Officers, ANMs and other paramedical staff was the biggest constraint to handle child health in the district and 11 Medical Officers posts were vacant. Situation is somehow managed by temporary shifting of MOs from one PHC to other. It was suggested that practice of creating panel and hiring specialists in Paediatrics, Gynoecia, Medicine, and Anaesthesia from panel should be strengthened with reasonable rates and allowances.

3.2.3 Training in Child Health: There was MoU with Medical College and they are fully involved in training in child health to staff of PHC/Sub-centre. ASHAs were given Home Based Newborn Care (HBNC) training. Training programmes on Skill Birth Attendant (SBA), Navjat Shishu Suraksha Karyakram (NSSK), Integrated Management of Neonatal and Childhood Illness (IMNCI), Immunization, Cold Chain and CTCs were conducted for both staff nurse and medical doctors. The training load shows 100 percent completeness as per target in training programs of ASHA induction. Completeness of training load in SBA was 75% and in NSSK it was 70%. Medical Officer in-charge of trainings in District Training Centre (DTC) suggested early completion of the training load in SBA, Basic Emergency Obstetric Care (BEmOC), RTI/STI (for ANM, LHV and Lab Technician). Although, the training rooms were well-equipped, accommodation facility was very poor and inadequate.

3.2.4 Inter-Sectoral Coordination: Private sector was cooperating in Immunization, Surveillance, and Revised National Tuberculosis Control Programme (RNTCP) etc. Medical Associations have adopted remote villages and organize child health camp in collaboration with PHC in the area. PRIs also support for camp related activities. There was a District Planning and Development Committee chaired by Guardian Minister for coordination within health department. The Health Department has coordination among Integrated Child Development Scheme (ICDS), Social Welfare, Education, Woman and Child Health Department. In each Taluka, there is a Child Development Officer for better coordination with other departments. The social welfare department was supporting for handicap children. There was less coordination due to shortage of staff and interdepartmental organizational structure for handling malnutrition among children. Despite of high child mortality; presently no International Organisations or big NGOs were working on child health in the district.

3.2.5 Referral Services: It was informed that there are 4 Sub-divisional hospitals, one medical college where children are referred and Ambulance provided under the 102 scheme without any cost to patients. Besides, Village Health and Nutrition Committee (VHNC) fund was also provided to Anganwadi Workers (AWWs) for referral transport. ASHAs had mobile number of ambulance drivers and in case of referral they could be contacted immediately. There was referral register in the PHC/Sub-Center and treatment outcome of referral is recorded there.

3.2.6 Community Level Innovations

For improving child survival, a innovative concept of 'Gopal Pangat' is introduced in Anganwadi Centers. It is celebration of children's birthday with distribution of cloths and sweets in Anganwadis for which money is provided from ANM's untied funds. Funds from VHNC are also provided to Anganwadi Centers to buy cloths, furniture etc. It was also informed that new dress is provided to girl child born in the PHC. Aurangabad Municipal Corporation has worked out an innovative model for child health in slums. The Corporation is running 25 Anganwadis and 133 Balwadis at different places in the slums. Doctors visit these slums regularly. An online MIS was also developed for screening of children. In the year 2011-12, a total of 3102 children from Balwadis and 21127 Children from Anganwadis were examined, treated and referred as per the requirement. USHAs were appointed for follow-up of immunization and to hold sessions with mothers and also help families to take sick children to health facility in case of emergency.

3.3 Programmatic Factors at PHC Level

The PHC Adool situated in Paithan Tehsil about 32 KM away from Aurangabad city was selected for the study which was an ISO Certified PHC. The Adool PHC caters to more than 36,000 population under its area. Normal deliveries were conducted and Newborn Baby Corner was functional at PHC. The second Medical Officer was trained in Paediatrics in Aurangabad Medical College. For emergency, PHC has 102 facility provided under NSSK and child is shifted to Medical College by it. ASHAs are involved in immunization specially Measles, PNC, Diarrhoea, Pneumonia, identification of Severely Acute Malnourished Children (SAM) and Moderately Acute Malnourished (MAM) Children in villages and provide them with special food for which money was provided to PHCs. It was found that people approach ANMs in case their children are sick. With improvement in facilities and staff, more people have started coming for OPD services in the PHC.

Programmatic Actions undertaken to reduce NMR, IMR and U5MR at PHC level were (i) Strengthening New Born Care Unit (ii) Monitoring of IMNCI activities (iii) Sustaining fully immunized children (iv) Development of CTCs for management of SAM & MAM children (v) Strengthening paediatric services (vi) Pre-school check-up and treatment of children below 5 years (vi) Referral services for critically ill children.

3.4 Community Perceptive about Child Health

During the FGDs, it was found that the treatment facilities and services at PHC/ Sub-centre were improved a lot. Credit for low morbidity among children goes the immunization

program. Institutional deliveries have improved and mothers were aware of the benefits of early and exclusive breastfeeding. ASHA/ANMs were doing home visits and mothers found it useful for child health. The mothers appreciated innovative concept of 'Gopal Pangat' at Anganwadi to celebrate birthday of child. The mothers were aware of importance of minimum three Antenatal Check-ups. The community was aware of risk of anaemia in pregnant woman and take balanced diet and rest during pregnancy. The community informed that there was no discrimination against girl child in providing care. The nomadic tribes in the district have blind faiths during child illness. This community keeps secrecy of births in their family and large numbers of child deaths remain unreported.

4. Discussion

Early devolution of primary health care implementation to the Zilla Parishads has been a special feature of Maharashtra's health organization system which helped Maharashtra to gain an early lead among states to expand the rural health care infrastructure (Maharashtra Health status 2010).(7) Due care is taken to effectively cover tribal areas in the state. There is a shortfall of 21% in health facilities/ infrastructure and acute (above 50%) shortage of Obstetricians & Gynaecologists, Paediatricians and Specialists at CHCs [8].

Poor infrastructure in hospitals and under staffing at its centres, inadequate number of doctors and specialists, growing slum population and poor sanitation facilities are some of the important factors affecting the health care services. It was found that better coordination between DHO, Civil Surgeon and Municipal Health Officer was needed in providing satisfactory health services.

Other researchers also studied problem of high child mortality in the state and found that persistent malnutrition and widespread anemia in tribal areas in general and even in urban population continue to be a significant problem for children and adults in the State. The intake of IFA tablets in Aurangabad district it was low at 28.5% as compared to the state was 47.3% contributing to low birth weight and causing neonatal mortality. Anemia is primarily linked to poor nutrition and nearly half (48 per cent) of women in Maharashtra are anemic. More than half of the women who are pregnant or breastfeeding are anemic in the state. About 36 per cent of women are underweight [10].

In this study, it was found that there were some cases of infant deaths in migratory/ nomadic population in Aurangabad district. Language barrier and trust issue was found the major difficulty in reaching them. One of the biggest challenges in implementing any strategy across communities in India is to reach them, especially tribal areas with poor infrastructure, lack of human resources and different cultural norms [11].

The Neonatal Disease Surveillance Study (NDSS) conducted in Ramtek Block of Nagpur district of Maharashtra state with considerably high level of neonatal mortality 73 per 1000 live births and tribal women had higher rates of low birth weight neonates than non-tribal women. The main cause of neonatal mortality was LBW, followed by sepsis and respiratory illness.(12) Child Mortality Determinants in 3 Backward districts; Nandurbar, Yavatmal and Jalna of Maharashtra showed that there are no alternative sources of rigorous data for child mortality in the districts; but some evidences suggest that there is some underestimation both due to recording methods. NMR was a major component (about half) of IMR, which in turn is a major component of U5 child mortality. The listed causes of neonatal deaths mainly included lbw, Prematurity, asphyxia, sepsis and ARI. The cause-of-death-allocation is not a very systematic exercise as no differentiation is made between underlying (like LBW) and immediate (like ARI) cause. Malnutrition -gr. 2-remained high despite ICDS but grade 3 and 4 together were less than 1 percent. Referral services were underdeveloped at block level [13].

In this study, HMIS data regarding child morbidity and mortality found to be under reported, therefore analysis using HMIS data need to explain results cautiously. In a study conducted by an alliance of NGOs called Child Deaths Study and Action Group (CDSAG), examined official statistics on child mortality rates in Maharashtra and also showed the extent and causes of under-reporting of child deaths especially neonatal deaths in the state. The study strongly recommended for proper child death audit and goal of 100 per cent recording of child deaths in MIS so that it can be harnessed as tool for social change [14].

It was found that the state is implementing evidence based interventions and strategies. The health department was making constant efforts to reach out to the most vulnerable in the society. However, these innovations/ schemes are working in varying pace and the outcomes are not uniform.

5. Conclusion

Provisioning of health facilities in the state of Maharashtra needs to be structured in the context of the sizeable tribal and nomadic population spread across several districts. The recommendation for the district is to focus essential interventions aimed at reduction in the IMR of the socially and economically disadvantaged groups. Higher focus is essential on interventions aimed at reduction in NMR through establishing SNCUs and NBCCs. Locally acceptable innovative ideas would help in improving child health programs and removing discrimination against girl child in community. There was under reporting of child deaths and causes of child deaths in HMIS data. For effective planning of interventions to reduce the child mortality, complete reporting of births and child deaths is a necessity.

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