

PERSPECTIVES

Impact of Immunization on Under 5 Mortality

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Child mortality is a sensitive indicator of a country's development and telling evidence of its priorities and values. It has several advantages as a barometer of child well-being in general and child health in particular. First, it measures an 'outcome' of the development process rather than an 'input', such as per capita calorie availability or the number of doctors per 1,000 population - all of which are means to an end. Second, the U5MR is known to be the result of a wide variety of inputs: the nutritional status and the health knowledge of mothers; the level of immunization and oral rehydration therapy; the availability of maternal and child health services (including prenatal care); income and food availability in the family; the availability of safe drinking water and basic sanitation; and the overall safety of the child's environment, among other factors. Third, the U5MR is less susceptible to the fallacy of the average than, for example, per capita gross national income (GNI per capita). This is because the natural scale does not allow the children of the rich to be 1,000 times as likely to survive, even if the human made scale does permit them to have 1,000 times as much income. In other words, it is much more difficult for a

wealthy minority to affect a nation's U5MR, and it therefore presents a more accurate, if far from perfect, picture of the health status of the majority of children (and of society as a whole).

UNICEF defines under 5 mortalities as 'annual number of deaths of children age <5 yrs expressed as a rate per 1000 live births. It measures the probability of dying between birth and exactly 5 yrs of age. UNICEF considers this as the best single indicator of social development and well-being rather than Gross National Product per capita.

Child mortality rate = (Num of deaths of children <5yrs of age in a given year x 1000)/ Num of live births in the same year.

In India, the SRS estimates of child mortality rate is calculated as 'the annual number of deaths in children <5 yrs of age per 1000 <5 yrs of age children. While reviewing reports and analyzing data, these differences should be kept in mind.

Global scenario

In 2006, for the first time since mortality data have been gathered, annual deaths among children under five dipped below 10 million to 9.7 million. Since 1990 U-5MR has declined by half (49%), from 90/1000LB to

46/1000LB in 2013. Neonatal mortality has declined by 40% from 33/1000LB to 20/1000LB. The dramatic decline in preventable child deaths over past quarter of century is the reason for it. World's highest U5MR is concentrated in sub-saharan countries.

Globally 44% deaths occur during neonatal period and remaining 56% occur during 1-59 mths during which communicable diseases play major role as shown in the chart (Figure 1). Overall 50% of U5MR is attributable to undernutrition which is a predisposing factor for infections. Six conditions account for 70% to over 90% of all these deaths. These are acute lower respiratory infections, mostly pneumonia (19%), diarrhoea (18%), malaria (8%), measles (4%), HIV/AIDS (3%), and neonatal conditions, mainly preterm birth, birth asphyxia, and infections (37%).(Figure 2)

India

Each year 27 million children are born in India. India contributes to 25% of global under 5 mortality rate. In 1990 U5MR was 126/1000LB and in 2013 it was 56/1000LB, rate varies from 15 in Kerala to 95 in Uttar Pradesh. In Karnataka under 5 mortality rate is 32 /1000 LB (NFHS-4). (Figure 3)

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When: Distribution of U5MR by age groups (Figure 1)

Where: Geographic variations in under-five deaths (Figure 3)

Why: Reasons for death (Figure 4)

Among children who die before their fifth birthday almost one third of infectious causes are preventable. Social determinants for child mortality include marriage and childbirth at very young age, less spacing between births and low literacy level among women, poor access to and use of contraceptives.

A large number of maternal and child deaths are attributable to 3 delays

Delay in

- Deciding to seek care
- Reaching the appropriate health facility
- Receiving quality care once inside an institution

The steady improvement in Under 5 survival is explained by combination of advances

- Expanded program of immunisation
- Development in science and technology. Ex : Oral rehydration therapy for dehydration, insecticide treated mosquito nets for malaria, antibiotics for sepsis, pneumonia and ear infection, antimalarials,

vitamin A and treatment of anaemia.

• Simplified diagnostic and treatment methods: Integrated Management of Childhood Illness (IMCI) strategy addresses the principal causes of child mortality i.e. diarrhoeal disease, acute respiratory infection, measles, malaria and underlying malnutrition.

- Promotion of breastfeeding and complementary feeding for healthy nutrition.
- Improved sanitation
- Improved health seeking behaviors.

Figure 1: Distribution of U5MR by age groups

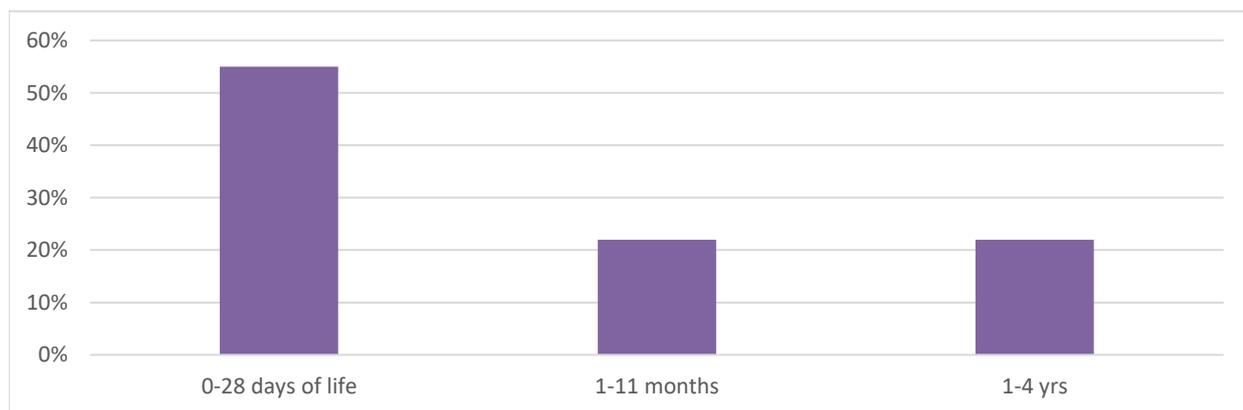
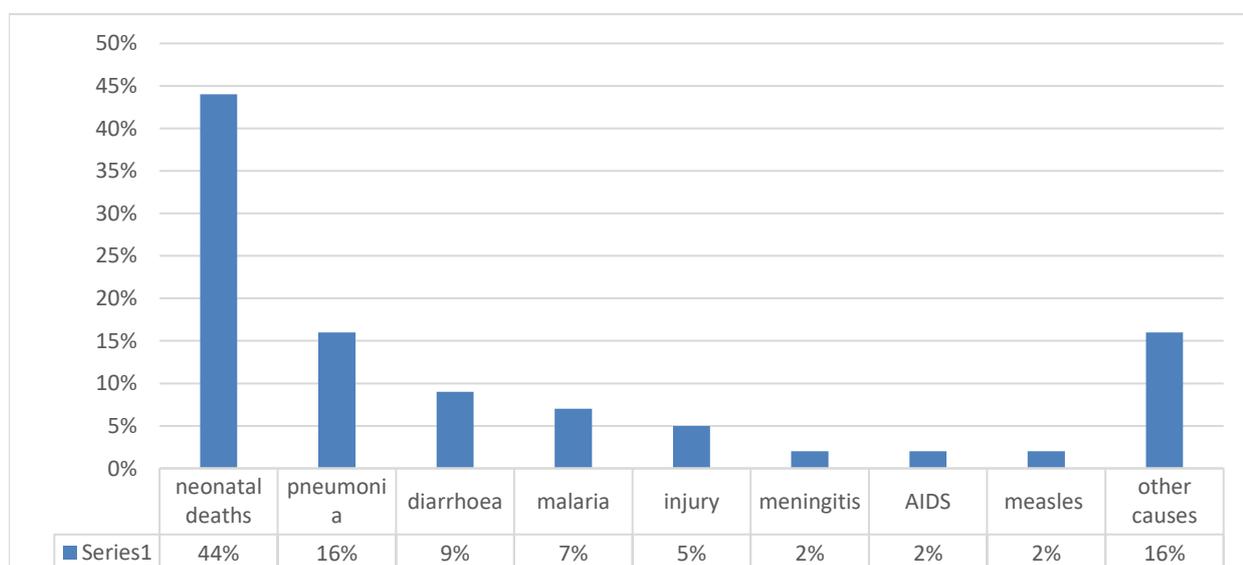


Figure 2: Distribution of U5MR by cause in 2013



Universal Immunisation Programme

India's Universal Immunisation Programme (U.I.P.) is one of the largest in the world in terms of quantities of vaccine used, the number of beneficiaries, the number of Immunisation sessions organised, the geographical spread and diversity of areas covered. In 1974, the WHO launched its "Expanded Programme of Immunization" (EPI) against six, most common, preventable childhood diseases, viz. diphtheria, pertussis (whooping cough), tetanus, polio, tuberculosis and measles. "Expanded"

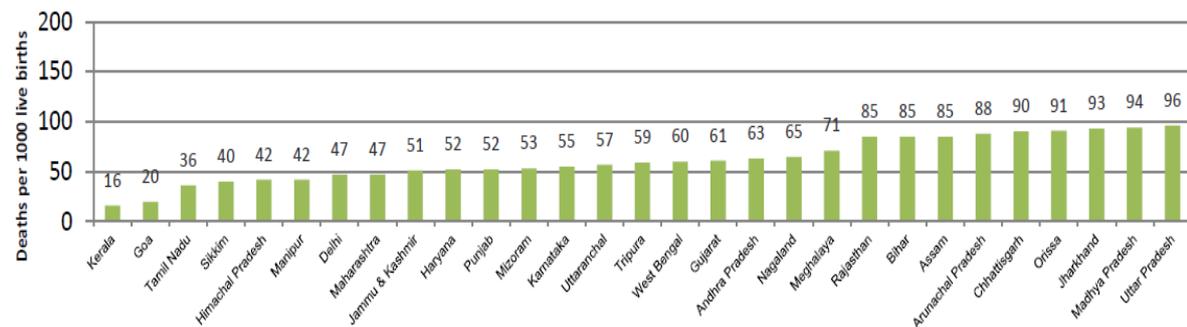
in the WHO definition meant adding more disease controlling antigens to vaccination schedules, extending coverage to all corners of a country and spreading services to reach the less privileged sectors of the society. While the WHO's programme is called EPI, the UNICEF in 1985 renamed it as "Universal Child Immunization". The national policy of Immunisation of all children during the first year of life with DPT, OPV, BCG to complete the series of primary vaccination before reaching the age of one year was adopted in 1978 with the launching of EPI to increase the Immunisation

coverage in infancy to 80%. UIP against six preventable diseases, namely, diphtheria, pertussis, childhood tuberculosis, poliomyelitis, measles and neonatal tetanus was introduced in the country in a phased manner in 1985, which covered the whole of India by 1990. It had two vital components

- 1) immunization of pregnant: women against tetanus,
- 2) immunization of children in their first year of life against the six EPI target diseases.

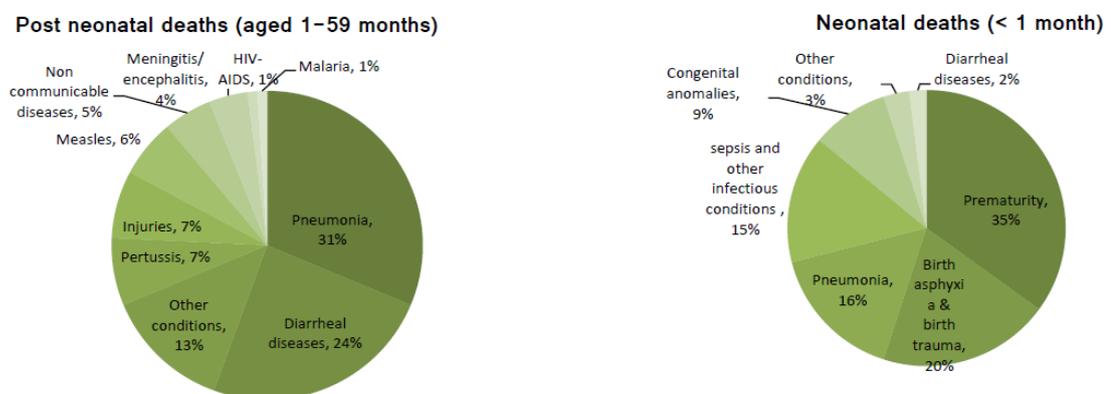
The aim was to achieve 100 per cent coverage of pregnant women with 2 doses of tetanus toxoid (or a booster dose), and at

Figure 3: Geographic variations in under -five deaths



Source: India DHS 2005-06

Figure 4: Reasons for death



Source: CHERG/WHO/UNICEF for distribution of causes of neonatal and under-five deaths (published in Liu et al, Lancet 2012).

Notes: These are estimated proportions of causes of death obtained from models with input data from available Vital Registration data and population-based studies (for detailed methods and list of references please refer to Liu et al, Lancet 2012).

These estimates are not necessarily the same as those from the Member State, which may use alternative methods of estimation of causes of death. All Member States have undergone an official country consultation on the CHERG estimation (documents available upon request).

least: 85 per cent coverage of infants with 3 doses each of DPT, OPV, one dose of BCG and one dose of measles vaccine by 1990. Although the target was "universal" immunization by 1990, in practice, no country, even in the industrialized world, has ever achieved 100 per cent immunization in children. It is, however, generally agreed that when immunization coverage reaches a figure of 80 per cent or more, then disease transmission patterns are so severely disrupted as to provide a degree of protection even for the remaining children who have not been immunized, because of "herd immunity"

The UIP was taken up in 1986 as National Technology Mission and became operational in all districts in the country during 1989-90. UIP became a part of the Child Survival and Safe Motherhood (CSSM) Programme in 1992 and Reproductive and Child Health (RCH) Programme in 1997. Under the Immunization Programme, infants are immunized against tuberculosis, diphtheria, pertussis, poliomyelitis, measles, tetanus, hepatitis, haemophilus influenza type B, rotavirus diarrhea, Japanese encephalitis. Significant progress was made under the Programme in the initial period when more than 90% coverage

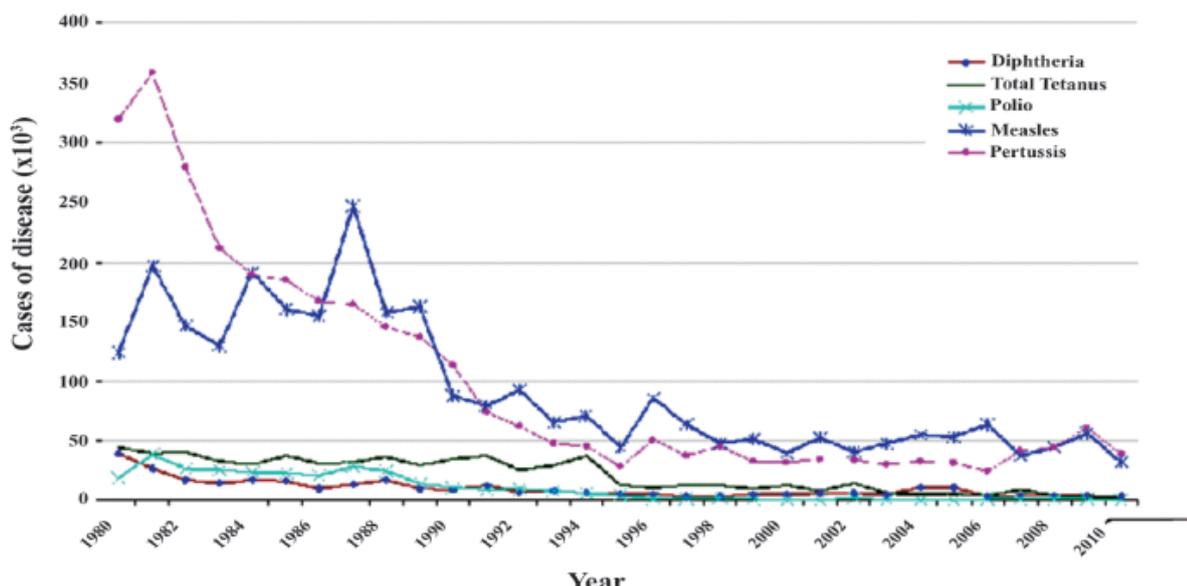
for all the six antigens was achieved. By the end of 2012, coverage was 87% for TT in pregnant women, 87% for BCG, 72% for 3 doses of DPT, 74% for measles, 70% for OPV and HepB 3 doses. (Table 1)

Immunization programme in India started with the aim to reduce VPDs, completed three decades in 2008. It has partially succeeded in reducing the burden of vaccine preventable diseases; however, significant proportion of VPDs still exists for the reason of suboptimal coverage with the UIP antigens. Though reported vaccination coverage is always higher, there is a wide gap in reported and evaluated coverage in India.

Table 1: Decline in Vaccine preventable diseases

Vaccine preventable diseases	% Decline as on 2013 compared with 1987
Poliomyelitis	100
Diphtheria	68
Pertussis	78
Maternal and neonatal tetanus	95
Measles	94

Figure 5: Reported cases of major vaccine preventable diseases in India (1980-2010)



Though the antigen wise coverage is suboptimal, the existing coverage has helped in noticeable reduction of the reported cases of VPDs in India, even with an increasingly sensitive surveillance system (Fig. 5).

The evaluated coverage has been low, with the proportion of fully immunized children in India is still at 61 per cent, with wide state-wise, geographical, religion, rural urban and gender variations. The situation seemed to have improved only slightly

in the last few years and the district-wise coverage also showed wide variations and poor performing districts within good performing states. There have been additional national efforts to improve coverage, which include launch of Immunization strengthening Project (ISP), Urban Measles Campaigns and that of Border Districts Cluster strategy (BDCs), Mission Indradhanush.

Mission Indradhanush(MI) envisioned to encash

knowledge and infrastructure built during the polio campaign to step up routine immunization. It targets: pregnant women & unvaccinated /partially vaccinated children against 7 vaccine preventable diseases (VPD). Indradhanush meaning 'rainbow' has seven colors and it is a 7 days programme. It's a special drive to increase coverage of immunization and to achieve at least 90 % coverage by 2020.

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