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RESEARCH ARTICLE

CHILD HEALTH INDICATORS

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ABSTRACT

Children of today are tomorrow's citizen; thus, it is extremely important to ensure good health for children. Child health plays a vital role in the development of a country. The first six years of life constitutes the most crucial span in life. India is listed in the countries where child morbidity and mortality is alarmingly high. The main child health indicators are poverty, malnutrition, health care provision, maternal health, empowerment of women, birth weight, breast feeding, immunization, access to health care and anaemia and the child mortality indicators are perinatal mortality rate, neonatal mortality rate, infant mortality rate and under 5 mortality rates. As per latest Sample Registration System, 2019-21 Report; The country's average Infant Mortality rate stands at 35 per 1,000 live births The Under Five Mortality Rate in India is 42/1000 live births. The govt of India has launched and is successfully running several programs for reducing child mortality and to improve child health.

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INTRODUCTION

India, with 1.21 billion of population is the world's second most populous country after China. An estimated 26 million of children are born every year. It is alarming that with an absolute increase in population of about 181 million in the population during the census 2001 and 2011, there is a reduction of 5.05 million in the child population aged 0-6 years during the same period[1]. According to 2011 census, the total number of children aged 0-6 years is 158.79 million which is reduced by 3.1 percent compared to the child population in 2001 census. According to the data available the share of children of the age group 0-6 years to the total population is 13.1 percent in 2011[2]. In terms of child mortality, globally **76** lakh children died in 2010 before reaching their fifth birthday. Five countries – India, Nigeria, Democratic Republic of the Congo, Pakistan and China – collectively accounted for half or nearly **37.5** lakh of all global deaths in children younger than five years. India presently accounts for nearly **20%** of the world's child deaths. It is the largest number of child deaths (approximately 15.8 lakh) under the age of five years in any country[3].India is listed in the countries where child morbidity and mortality is alarmingly high. Thedata released by the Office of the Registrar General of India, indicates that although the mortality rate especially infant and under-five mortality rate is declining over the years, yet there are some states where these rates are very high. This shows that despite the progress in health care sector in India, young population especially in the age group 0-6 years continuously lost their lives due to inadequate nutrition and proper care[4].

Causes of child mortality

•Lower respiratory infections (17·9%), preterm birth (15·6%), diarrheal diseases (9·9%), and birth asphyxia and trauma (8.1%) were the leading causes of under-5 death in India in 2017.Preterm birth (27·7%), birth asphyxia and trauma (14·5%), lower respiratory infections (11.0%), and congenital birth defects (8.6%) were the leading causes of neonatal deaths in India in 2017. 80% of the neonatal deaths were in the early neonatal period of 0–6 days.

Risk factors for child deaths

•The dominant risk factor for under-5 death in India in 2017 was child and maternal malnutrition, to which 68% of the deaths could be attributed. The largest contributors to the malnutrition were low birth weight and short gestation (46%) followed by child growth failure (21%). In 2017, 11% of the under-5 deaths in India could be attributed to unsafe water and sanitation and 9% to air pollution.

- For neonatal deaths, child and maternal malnutrition was the predominant risk factor to which 83% of deaths could be attributed, almost all of which were due to low birth weight and short gestation. The proportion of under-5 deaths attributable to child and maternal malnutrition varied between the states from 51% to 73%, unsafe water and sanitation from 1% to 14%, and air pollution from 2% to 14%.The proportion of neonatal deaths attributable to child and maternal malnutrition varied between the states from 63% to 87%, unsafe water and sanitation from 1% to 6%, and air pollution from 2% to 9%[5].

INDICATORS OF CHILD MORTALITY

- Morbidity and mortality from childhood illnesses has remained a major point of interest globally. Around 5.9 million children under the age of 5 years died in 2015.The leading causes of death among children under five in 2015 were preterm birth complications, pneumonia, intrapartum-related complications, diarrhea, and congenital abnormalities. About 45% of all child deaths are linked to malnutrition. India has the largest number of deaths due to pneumonia. In 2015 under five mortality rate was 48 per 1000 live births [6].
- But the rate of this reduction in under-5 mortality was insufficient to reach the Millennium Development Goal (MDG) target of a two-thirds reduction of 1990 mortality levels by the year 2015[9].A child's risk of dying is highest in the neonatal period, the first 28 days of life. Prematurity was the largest single cause of death in children under five in 2015. 45% of child deaths under the age of 5 years take place during the neonatal period (2015)[7].

Uses of mortality and morbidity indicators

- In explaining trends and differentials in overall mortality
- Indicating priorities for health action and allocation of resources
- In designing intervention programme
- Assessment and monitoring of public health problems and programmes
- Gives clues for epidemiological research[8]

Child mortality indicators are

Perinatal morality rate (PMR) (22weeks of gestation to 7 days after birth): Perinatal mortality id defined as the "number of stillbirths (death of foetus during 22 weeks to till delivery) and deaths in the early neonatal period (first week of life) per 1,000 total births, the perinatal period commences at 22 completed weeks (154 days) of gestation and ends seven completed days after birth"[9].

$$\text{PIMR} = \frac{\text{No: of stillbirth and deaths in the 1st week of life X 1000 total births}}{\text{No of live birth}}$$

Neonatal mortality rate (NMR) (0-28days): A neonatal death is defined as a death during the first 28 days of life (0-27 days) for 1000 live birth divided by total no of live birth. Current NMR is 25/1000 live birth in 2021. It is classified as early neonatal mortality rate (ENMR) and late neonatal mortality rate (LNMR).

$$\text{ENMR} = \frac{\text{No: of death under 7 days after birth X 1000 live births}}{\text{No: of live birth during that year}}$$

$$\text{LNMR} = \frac{\text{No: of death from 7 to 28 days after birth X 1000 live births}}{\text{No: of live birth during that year}}$$

Causes

Still birth (22 weeks to till delivery)	Early neonatal period (birth to 7 days)
• Abruption, • Severe preeclampsia, congenital anomalies, • Birth asphyxia • Preterm labour • Severe IUGR • Uterine rupture, • Eclampsia • Gestational diabetes • Cord prolapse • Immune hydrops	Hyaline membrane disease Meconium aspiration Extreme prematurity Sepsis Congenital malformation Pulmonary haemorrhage

- Intrapartum-related complications (birth asphyxia or lack of breathing at birth) is leading cause for ENMR. (prolonged labour, Birth injury, Hypothermia, HIE, Asphyxia, Neonatal seizure, Neonatal sepsis, Congenital disorder, Bleeding disorder)
- Preterm birth, Infections cause most neonatal deaths in late neonatal period.

Infant mortality rate (IMR) (birth to 1 year): Infant mortality rate is defined as "the ratio of infant deaths registered in a given year to the total number of live births registered in the same year; usually expressed as a rate per 1000 live births". In India (2021) IMR is 35/1000 live births

$$\text{IMR} = \frac{\text{No: of death under 1yr age X 1000 live births}}{\text{No: of live birth during that year}}$$

- IMR is also a useful indicator of a country's level of health or development, and is a component of the physical quality of life index. But the method of calculating IMR often varies widely between countries based on the way they define a live birth and how many premature infants are born in the country[10].

Causes of IMR: Leading causes of infant death are

- Congenital anomalies, Pre-Term Birth/Low Birth Weight, Sudden Infant Death Syndrome, Problems related to maternal complications of pregnancy, Problems related to complications of placenta, cord, membranes, Respiratory Distress Syndrome, Accidents, Diarrhoea, Pneumonia, Poison, Infections.

Under five mortality rates (1 to 5 years): It is defined as the number of deaths under<5 yrs. in a given year, per 1000 children in that age group at the midpoint of the year concerned[11]. It thus excludes infant mortality. The current Under 5 Mortality rate is 42/1000 live births in 2021.

$$\text{Under 5 mortality rate} = \frac{\text{No of death of children less than 5 years of age in a given year x 1000}}{\text{No of live birth in the same year}}$$

Child Survival Index: A child survival rate per 1000 birth can be simply calculated by subtracting the under 5 mortality rates from 1000 dividing this figure by ten shows the percentage of those who survive to the age of 5yrs[11]

$$\text{Childsurvivalrate} = \frac{1000 - \text{under 5 mortality rates}}{10}$$

Causes under five mortalities

- Pneumonia, Diarrhoea, Congenital anomaly accident, Injury, Accidents, Poisons, Infectious Diseases[12]

Causes for adolescent mortality

- Suicide
- Accidents

Maternal mortality rate (MMR): Maternal death is defined as the death of a woman while pregnant or within 6 weeks of termination of pregnancy irrespective of the duration and the site of pregnancy from any cause related to or aggravated to by the pregnancy or its management but not from accidental or incidental causes.

Causes

- The primary causes of death are haemorrhage, hypertension, infections, and indirect causes, mostly due to interaction between pre-existing medical conditions and pregnancy[13].

$$\text{MMR} = \frac{\text{No of female death from pregnancy, child birth, Puerperial causes in an year X1000}}{\text{No of live birth in same area during that year}}$$

INDICATORS OF CHILD HEALTH

Poverty and malnutrition

- Socioeconomic determinants play a major role in the health of young children[14, 15]. Improving sanitation has been shown to have a significant effect on reducing child mortality[16]. Poverty and malnutrition are major problems in India. Over 40% of children are underweight, and more than one in four babies have low birth weight[17].
- This is illustrated by the example of Kerala, which has successfully reduced poverty and malnutrition, and has the lowest child mortality rates in India.

Healthcare provision

- The government provides public healthcare, but only 1.1% of gross domestic product (GDP) is allocated to health. In contrast, 2.7% of GDP is allocated to military spending. The private medical sector is the primary source of healthcare for the majority of the population in both urban and rural areas[18].
- Approximately, two-thirds of the population seeks healthcare from the private medical sector. Even in rural areas, 63% of the population go to a private provider. There are numerous private healthcare providers, and this results in a lack of coordination in healthcare facilities. The private medical sector in India is extensive and politically influential, with little desire to see implementation of universal healthcare[19].

Maternal health

- The health of the mother is clearly related to the health of the child. A malnourished mother is likely to result in malnutrition in the young infant. Antenatal care is crucial for the birth of a healthy baby. The NFHS-5 looked at nine summary indicators of the utilisation of antenatal care services. More than half (58%) of the women had at least four ANC visits during their last pregnancy, as recommended by WHO. Urban women are more likely to have had four or more ANC visits than rural women (68% and 54%, respectively).

Empowerment of women

- Empowerment of women is crucial for the health of children. One in three women is illiterate. In many rural areas, women need to seek permission from a man in the family before being allowed to travel or use money to pay for either healthcare consultations or drug treatment[20]. Even within urban areas, the financial autonomy of women is a key determinant of child health[21]. The National Family Health Survey, NFHS-5 found a direct relationship between the empowerment of women and lower child mortality rates (neonatal, infant and under 5 mortality rates)[22].

Birth Weight

- Birth weight is an important indicator when assessing a child's health for early exposure to childhood morbidity and mortality. Children who weigh less than 2.5 kilograms (kg) at birth are considered to have a higher-than-average risk of early childhood death. In the 2015-16 National Family Health Survey, eighteen percent of these infants had a low birth weight of less than 2.5 kg. Low birth weight decreases with an increase in the mother's schooling and household wealth status. Only 15 percent of births to mothers having 12 or more years of schooling have a low birth weight, compared with 20 percent of births to mothers having no schooling[23].

Breast feeding

- Breast feeding is almost universal in India. However, only a quarter of infants started breast feeding within an hour of birth and 64% children were exclusively breastfed[22].

Immunisation

- Immunisation plays a crucial role in reducing infant and child mortality. In India, 76 percent of children age 12-23 months received all basic vaccinations at any time before the survey. Coverage was highest for the BCG vaccine (95%) and lowest for 2nd dose of measles vaccine (32%)[22].

Access to healthcare: antibiotics for respiratory tract infection (RTI), oral replacement solution for diarrhoea

- Acute respiratory tract infections are one of the leading causes of the death of children throughout the world. Early diagnosis with treatment with antibiotics can save many lives. In the NFHS-5, mothers reported that 3 percent of children under age five years had symptoms of acute respiratory infection (ARI) in the two weeks before the survey.
- Diarrhoea is the second most common cause of death in children under the age of 5. In the vast majority of cases, simple rehydration can prevent death. In the NFHS-5 survey, Mothers reported that 7 percent of children under age five years had diarrhoea in the two weeks before the survey. Advice or treatment was sought for 69 percent of

children under age five years who had diarrhoea in the two weeks before the survey.
- Oral rehydration therapy (ORT) is a simple yet effective way to reduce dehydration caused by diarrhoea. Sixty percent of children with diarrhoea received some form of ORT—ORS packets. Thirty percent were given both zinc and ORS, which can reduce the duration and severity of diarrhoea[22].

Anaemia

- Anaemia is a major problem in children throughout India. Almost 67% of children under the age of 5 years in India are anaemic[22].

EXISTING PRACTICES TO REDUCE MORTALITY AND TO IMPROVE HEALTH OF CHILDREN

New born health has captured the attention of policymakers at the highest level in India. This has resulted in strong political commitment to end preventable under 5 children death, and recognize children health as a national development necessity. In this regard, the Government of India is building on a series of efforts, policy decisions, and programmes introduced since independence to address maternal and child health[24]. Mile stones of those health programmes are as follows.

1950 – MCH services as a basic health service in Primary health care
1952 – National Family Welfare program
1978 – Extended Program on Immunization
1985 – Universal Immunization Program
1992 – National Child survival and safe motherhood program
1997 – RCH Phase I
2002 - Integrated management of neonatal and childhood illness**(**IMNCI)
2005 – National Rural Health Mission (NRHM)
2005 – RCH Phase II

Interventions under NRHM

2009 – Navjaat Shishu Suraksha Karyakram
2011 – Facility Based &Home Based Newborn care
2011 – Janani Shishu Suraksha Karykram
2013 – RMNCH+A Strategy
2013 – Rashtriy Bal Swasthy Karyakram
2014 – Mission Indra Dhanush
2015 – Beti Bachao Beti Padhao
2018 – Ayushman Bharat Scheme

Progress since launch of NRHM-2005 in reducing child mortality and improving child health

- Janani Suraksha Yojana (JSY) has increased the number of women delivering in public health facilities to 107 lakhs each year.
- 470 new maternal and child health wings (30/50/100 bedded) have been sanctioned in the public health system, adding more than 28,000 beds.
- A nationwide network of facility-based new born care has been established at various levels: 14,135 New born Care Corners at the point of child birth; 1,810 New born Stabilization Units; 548 Special New born Care Units (SNCUs) for sick and small new born, with care to more than 6 lakhs new born being provided in SNCUs each year.
- Janani Shishu Suraksha Karyakram (JSSK) has entitled all pregnant women and infants to free delivery, drugs, diagnostics, treatment, food, and transportation to and from facilities.
- 38,300 public health facilities constructed/ upgraded and more than 20,000 ambulances have been sanctioned.
- The total number of technical human resource supported under NRHM increased to 3.45 lakhs which includes 30,429 doctors/specialists including AYUSH doctors, 38,421 staff nurses, 21,965 para-medics and 2.39 lakhs ANMs.
- Incentivized Home-Based New born Care programme has been launched in 2011: 8.95 lakhs ASHAs selected and more than 6 lakhs ASHAs trained to improve new born practices at the community level; early detection and referral of sick new born babies by making home visits as per schedule during the first 42 days after birth[24].

STRATEGIES TO IMPROVE THE SITUATION / MINIMIZE OR SOLVE PROBLEMS:

Various national health Programs have been launched to improve the child health and to reduce child mortality. The Government of India has launched various programmes for children.

Universal Immunization Program: It was launched in 1978 with objective to increase the immunization coverage. Under this program mission Indradhanush was launched in 2014 against seven diseases diphtheria, measles, polio, tetanus, pertussis, tuberculosis, hepatitis B[25]

Child Survival and Safe Motherhood Program: It was launched in 1992. The main aim of this programme was to reduce infant mortality[26].

Reproductive & Child Health (RCH): The first phase of RCH program was launched in 1997.RCH phase1 program incorporated the 4 components are family planning, CSSM, client approach to health care, prevention/ management of STD/ RTI/AID. RCH –PHASE II began from 1st April 2005.The focus was to reduce maternal and child mortality and morbidity with emphasis on rural health care[27].

Integrated management of neonatal and childhood illness: It was launched in 2002. Components of this program are improvement of the case management skills of health providers, improvement in the overall health system, improvement in family and community health care practices and collaboration/coordination with other Departments[28].

Facility based new born and child care (FBNC): Neonatal mortality is one of the major contributors (2/3) to the Infant Mortality. Facility based new-born and child care consists of Special New born Care Units (SNCU), New-born Stabilization units (NBSUs) and New Born Care Corners (NBCCs)[29].

National health mission: Government of India Launched NRHM on 5th April 2005 for a period of 7 years (2005-2012), extended up to 2017. It was launched to improve rural healthcare delivery system. National health mission has two sub parts: National Rural Health Mission and National Urban Health Mission. Main goal of this mission is to reduction in IMR and MMR and universal access to public health services. Major initiatives of National Health mission relevant to child health

- **Web enabled Mother and Child Tracking system**: Name based tracking of pregnant women and children up to the age of 3 years.
- **Mother and Child Health wings:** 100/50/30 bedded maternal and child health wings have been sanctioned in public health facilities.
- **Kilkari:** It is an Interactive Voice Response based mobile services that delivers time sensitive audio messages about pregnancy and child health[30,31].

Navjat Shishu Suraksha Karyakaram: It was launched in 2009.NSSK is a program aimed to train health personnel in basic

newborn care and resuscitation, has been launched to address issues at birth. The objective is to have a trained health personnel in Basic newborn care and resuscitation at every delivery point[32].

Janani Shishu Suraksha Karyakaram: Janani Shishu Suraksha Karyakram (JSSK) was launched on 1st June 2011and has provision for both pregnant women and sick new born till 30 days after birth are[33]:

Free and zero expense treatment.

Reproductive, maternal, newborn, child and adolescent health: RMNCH+A approach has been launched in 2013 The RMNCH+A strategic approach has been developed to provide an understanding of 'continuum of care' to ensure equal focus on various life stages[34].

Rashtriya bal swasthya karyakram: It was launched in 2013. The Ministry of Health & Family Welfare, Government of India, under the National Health Mission launched RBSK which includes child Health Screening and Early Intervention Services basically refer to early detection and management of a set of 30 health conditions prevalent in children less than 18 years of age. These conditions are broadly Defects at birth, Diseases in children, Deficiency conditions and Developmental delays including Disabilities - 4D's[35].

India newborn action plan: The India Newborn Action Plan (INAP) was launched in September 2014 with the aim of ending preventable newborn deaths and stillbirths by 2030.

The Baby Friendly Hospital Initiative: The Baby Friendly Hospital Initiative (BFHI) was started in India in 1993. Under this, the hospital with maternity services, have to follow the ten steps to successful breastfeeding. These hospitals are assessed and certified as baby friendly (BF) if they adopt the "Ten Steps" and follow these practices[36].

Other Measures to prevent Mortality: Almost 2/3rd of child deaths is avoidable through following implications.

1.Skilled care: skilled care during pregnancy, childbirth and in the post-natal period
2.Infant feeding: exclusive breastfeeding, complementary feeding and micronutrients, Vital vaccines: measles and tetanus immunization and other conventional and new vaccines (Hib, pneumococcus, rotavirus) at ages 0-5 years.
3.Combating diarrhea: low osmolarity ORS and zinc in case management of diarrhea, antibiotics for dysentery, Exclusive breast feeding, Adequate sanitation and hygiene, Safe water and food, adequate nutrition and vaccination.
4.Treating pneumonia and newborn sepsis: prompt treatment with appropriate antibiotics
5.Others measures: Combating malaria and preventing and caring for HIV (mother and child), Oxygen for severe illness, Reduction of household air pollution.

Conclusion

Child health is the face of a country's health and development status. Child health care is a human right. Every child deserves a dignified comprehensive care. India has made considerable improvements in reducing under 5 child mortality and morbidity with the implementation of different National Health Programs for children. Government of India is committed to achieve the National Health policy Goals and SDG's.Still,we need more strategies for child health intervention with focus on improving skills of the health care workers, strengthening the health care infrastructure and involvement of the community through behavior change communication.

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