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Maternal and Child Mortality Rates in India: Sustainable Development Goal (SDG) Targets and Achievements

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Abstract

The Government of India is committed to achieve Sustainable Development Goals (SDG) Agenda 2030 consisting of 17 goals and 169 targets, spanning the three dimensions of economic, social and environmental development. Since the Government of India is the biggest entity with the most resources to ensure achievement of the Sustainable Development Goals (SDG) and targets that have been set, the legal and policy framework already in place in the country has to be critically reviewed to see how capable it is of achieving the SDGs and identify the gaps and challenges, if any, for rectification. In this context, the basic objective of the present paper is to review the efforts made by the Government of India for the development of health facilities throughout the country in order to achieve the targets of Sustainable Development Goals (SDG), to examine the trends in the annual compound reduction rates in the selected Maternal and Child Mortality Rates in India during the first 7/8 years of the Sustainable Development Goals (SDP) period, project the Maternal and Child Mortality Rates based on the existing annual compound reduction rates up to the target year of 2030 and then compare the projected values of selected Maternal and Child Mortality Rates with the SDG targets fixed for achievement by 2030. The paper found that the Maternal Mortality Rate (MMR) has the annual compound reduction rate of 6.4%, Under 5 Mortality Rate (U5MR) has the annual compound reduction rate of 5.0%, Infant Mortality Rate (IMR) has the annual compound reduction rate of 4.9% and Neonatal Mortality Rate (NMR) has the annual compound reduction rate of 4.3% in India during the period between 2015 and 2021/2022. By assuming that the Government of India will continue its efforts to maintain the existing annual compound reduction rates in the Maternal and Child Mortality Rates during the remaining period of Sustainable Development Goals, the paper has projected that India is on the track of achieving the SDG targets of MMR at 70/lakh live births by 2025 (5 years before the target year), U5MR at 25/thousand live births by 2026 (4 years before the target year), IMR at 20/thousand live births by 2027 (3 years before the target year) and NMR at 12/thousand live births by the target year 2030.

Keywords : *Maternal mortality, Child mortality, Infant mortality rate (IMR), Sustainable Development Goals (SDGs)*

1. Introduction

The Government of India is committed to achieve Sustainable Development Goals (SDG) Agenda 2030 consisting of 17 goals and 169 targets, spanning the three dimensions of economic, social and environmental development. The 17 Goals of Sustainable Development: the Agenda for 2030 was adopted by 193 nations of the World at the United Nations Summit in September 2015, which officially came into the force on 1st January 2016. The SDGs have, in principle, charted out a path for 193 nations including India to achieve sustainable development that is fair, equitable, inclusive and the environment friendly. Since the Government of India is the biggest entity with the most resources to ensure achievement of the Sustainable Development Goals (SDG) and targets that have been set, the legal and policy framework already in place in the country has to be critically reviewed to see how capable it is of achieving the SDGs and identify the gaps and challenges, if any, for rectification. In this context, the present paper tries to review the efforts made by the Government of India for the development of health facilities throughout the country in order to achieve the targets of Sustainable Development Goals (SDG), to

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examine the trends in the annual compound reduction rates in the selected Maternal and Child Mortality Rates in India during the first 7/8 years of the Sustainable Development Goals (SDP) period, project the Maternal and Child Mortality Rates based on the existing annual compound reduction rates up to the target year of 2030 and then compare the projected values of selected Maternal and Child Mortality Rates with the SDG targets fixed for achievement by 2030.

2. Targets fixed for Maternal and Child Mortality Rates:

The Sustainable Development Goals: Agenda 2030 has selected four Maternal and Child Mortality Rates to fix the targets to be achieved by 2030. They are as follows:

a. **Maternal Mortality Rate (MMR**), which is defined as the number of maternal deaths during a given time period per one lakh live births during the same time period;

b. **Under 5 Mortality Rate (U5MR),** which is defined as the number of deaths of children under the age of five years per thousand live births during the same time period and it is a key indicator used to measure child health and survival;

c. **Infant Mortality Rate (IMR),** which is defined as the number of deaths of infants (children under the age of one year) per thousand live births during the same time period and it is a crucial health indicator; and

d. **Neonatal Mortality Rate (NMR),** which is defined as the number of deaths of infants (children under the age of four weeks), because neonatal health care provided by the Government is concerned with the condition of the new born infants from birth to 4 weeks (28 days) of age.

According to Sustainable Development Goals: Agenda for 2030, the following are the measurable indicators of Maternal and Child Mortality Rates along with the targets set for 2030 under SDG-3: Ensure healthy lives and promote well-being for all at all ages.

1. Reduce the global Maternal Mortality Ratio (MMR) to less than 70 per 100,000 live births;
2. Reduce Under-5 Mortality Rate (U5MR) to less than 25 per 1,000 live births;
3. Reduce Infant Mortality Rate (IMR) to less than 20 per 1,000 live births (as per the Civil Society Report on Sustainable Development Goals: Agenda for 2030, IMR is about 80% of U5MR); and
4. Reduce Neonatal Mortality Rate to less than 12 per 1,000 live births.

3. Objectives of the paper:

The following are the objectives of the paper:

a. To review the efforts made by the Government of India to improve Maternal and Child Health Facilities;

b. To assess the trends in the Maternal Mortality Rate and to measure the annual compound reduction rate in the Maternal Mortality Rate during the period study;

c. To examine the trends in the Under 5 Mortality Rate and to estimate the annual compound reduction rate in the Under 5 Mortality Rate during the period study;

d. To evaluate the trends in the Infant Mortality Rate and to calculate the annual compound reduction rate in the Infant Mortality Rate during the period study; and

e. To appraise the trends in the Neonatal Mortality Rate and to compute the annual compound reduction rate in the Neonatal Mortality Rate during the period study.

f. To forecast the values of MMR, U5MR, IMR and NMR based on the estimated annual compound reduction rates up to the target year 2030 and compare the projected values of MMR, U5MR, IMR and NMR with their corresponding targets fixed for 2030.

4. Hypotheses of the paper:

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The following are the null hypotheses formulated to test and make inferences:

a. The existing annual compound reduction rate in the Maternal Mortality Rate is zero and is not sufficient to reach the target of less than 70 per 100,000 live births;

b. The existing annual compound reduction rate in the Under-5 Mortality Rate (U5MR) is zero and is not sufficient to reach the target of less than 25 per 1,000 live births;

c. The existing annual compound reduction rate in the Infant Mortality Rate (IMR) is zero and is not sufficient to reach the target of less than 20 per 1,000 live births; and

d. The existing annual compound reduction rate in the Neonatal Mortality Rate is zero and is not sufficient to reach the target of less than 12 per 1,000 live births.

5. Methodology of the paper:

The present paper is based on the secondary data collected from 'SRS Special Bulletins on Maternal Mortality in India' and 'SRS Bulletins on Vital Statistics' published annually by the Registrar General of India and the publications of the NITI Aayog, Government of India, especially on Sustainable Development Goals. The paper estimates the annual compound reduction rates of the four selected Maternal and Child Mortality Rates based on the existing data during the period of study by using SPSS software for estimation of compound function of curve estimation in Regression Analysis. The paper, further, uses the estimated annual compound reduction rates for projecting/forecasting the values of the four selected Maternal and Child Mortality Rates up to the target year of 2030 and then present the existing and forecasted rates in the form of trend lines in charts and compare them with the target lines set for 2030 separately for selected Maternal and Child Mortality Rates to find inferences to judge the formulated hypotheses and to make conclusions.

6. Efforts of the Government of India to Improve Maternal and Child Health Facilities:

The Government of India, under National Health Mission (NHM), has made a determined effort to increase the access to the quality maternal and the newborn health services, which are targeted to minimize the preventable maternal deaths. The implementation of the various health schemes designed by National Health Mission effectively is the key to achieve and accomplish the targets fixed in the National Health Policy (NHP), 2017. The schemes namely 'Janani Shishu Suraksha Karyakram', 'Janani Suraksha Yojana' and 'Surakshit Matritva Aashwasan' have been implemented to deliver the assured and the respectful service delivery initiatives including the identification of the high risk pregnancies and ensuring three follow up visits under 'Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA)' and 'Extended Pradhan Mantri Surakshit Matritva Abhiyan' schemes. Further, the Government of India has been promoting quality care during the intrapartum period and providing respectful choice of birthing to all the pregnant women under the scheme 'LaQshya' and the Midwifery initiatives are being implemented. The Government of India has been also rolling out the Midwifery Services, functionalizing the First Referral Units (FRUs), establishing the Maternal and Child Health (MCH) Wings, and Operationalizing the Obstetric High Dependency Units (HDU) and the Intensive Care Units (ICU) throughout the country.

The Government of India has been undertaking the outreach activities like 'Monthly Village Health Sanitation and Nutrition Days (VHSND)', 'Birth Waiting Homes (BWH)' and the 'Reproductive and Child Health (RCH)' portal to ensure holistic maternal and childcare services. The Government of India has been distributing the 'MCP Cards' and 'Safe Motherhood Booklets' to educate pregnant women and to create awareness on the 'Anemia Mukt Bharat (AMB)' strategy targets to reduce anemia among pregnant women and children. The Government of India has been optimizing 'Postnatal Care' initiative, which was launched in 2023, to strengthen the

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postnatal care quality by highlighting the detection of danger signs and encouraging ASHAs with incentives for prompt intervention, referral, and the treatment of the high-risk postpartum mothers.

The above initiatives and strategies, initiated by the Government of India, have collectively aimed to improve the maternal health services, reduce the maternal and child mortality rates, and promote well-being for all pregnant women in India.

7. Estimation of Annual Compound Reduction Rates:

The present section records the existing data for the selected Maternal and Child Mortality Rates and presents the estimated percentage of reduction and annual compound reduction rates in the selected Maternal and Child Mortality Rates in India. The trends in the existing values of the selected Maternal and Child Mortality Rates in India between 2015 and 2021/2022 are provided in Table – 1.

Table – 1: Trends in the existing values of the selected Maternal and Child Mortality Rates

Year	MMR	U5MR	IMR	NMR
2015	130	43	37	25
2016	122	39	34	24
2017	113	37	33	23
2018	103	36	32	23
2019	97	35	30	22
2020	93	32	28	20
2021	88	31	27	19
2022	NA	NA	26	NA
Reduction between 2015 and 2021/2022	32.3%	27.9%	29.7%	24.0%

Note: MMR = Maternal Mortality Rate; U5MR = Under 5 Mortality Rate; IMR = Infant Mortality Rate; NMR = Neonatal Mortality Rate; and NA = Not Available

Source: 1. Registrar General of India: SRS Special Bulletins on Maternal Mortality in India; and

2. Registrar General of India: SRS Bulletins on Vital Statistics in India

It is observed from the table that the Maternal Mortality Rate (MMR) has declined from 130 per lakh live births in 2015 to 88 per lakh live births in 2021, i.e., declined by 32.3% over a period of 7 years; the Under 5 Mortality Rate (U5MR) has declined from 43 per thousand live births in 2015 to 31 per thousand live births in 2021, i.e., declined by 27.9% over a period of 7 years; the Infant Mortality Rate (IMR) has declined from 37 per thousand live births in 2015 to 26 per thousand live births in 2022, i.e., declined by 29.7% over a period of 8 years; and the Neonatal Mortality Rate (NMR) has declined from 25 per thousand live births in 2015 to 19 per thousand live births in 2021, i.e., declined by 32.3% over a period of 7 years.

The estimates of Compound Functions of Regression Analysis and Annual Compound Reduction Rates (ACRR) for the selected Maternal and Child Mortality Rates in India have been summarized in Table – 2. The values in the table are estimated by using SPSS software. It is observed from the table that all the estimated Compound Functions have very high coefficients of determination and high F Values with significance level of less than 1% and hence the estimated values of regression parameters and estimated annual compound reduction rates (ACRR) are statistically significant.

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Table – 2: Estimates of Compound Functions of Regression Analysis and Annual Compound Reduction Rates (ACRR) for the selected Maternal and Child Mortality Rates in India

Dependent Variable	Constant (b_0)	Regression Coefficient (b_1)	Coefficient of Determination (R^2)	F Value	Significance Level	ACRR (%)
MMR	137.875	0.936	0.988	416.713	0.000	6.4
U5MR	44.112	0.950	0.968	151.848	0.000	5.0
IMR	38.370	0.951	0.988	474.557	0.000	4.9
NMR	26.468	0.957	0.937	74.286	0.000	4.3

Note: ACRR = Annual Compound Reduction Rate = $(1-b_1)*100$

From the above table it is inferred that the Maternal Mortality Rate has the annual compound reduction rate of 6.4%, Under 5 Mortality Rate has the annual compound reduction rate of 5.0%, Infant Mortality Rate has the annual compound reduction rate of 4.9% and Neonatal Mortality Rate has the annual compound reduction rate of 4.3% in India during the period between 2015 and 2021/2022.

8. Achievements/Trends in the Maternal and Child Mortality Rates:

The present section deals with the achievements/trends in the four identified maternal and child mortality rates in India during the period of Sustainable Development Goals (SDG) with 2015 as the base year and 2021/2022 is the latest year for which the data is available. The present section also deals with projections/forecasts of the future values of the identified maternal and child mortality rates in India up to the target year 2030. The following sub-sections will deal with the achievements/trends in the Maternal Mortality Rates (MMR), Under 5 Mortality Rates (U5MR), Infant Mortality Rates (IMR) and Neonatal Mortality Rates (NMR) one by one.

8.1. Trends and Achievements in Maternal Mortality Rate (MMR):

Maternal Mortality Rate (MMR) of India has declined at the annual compound reduction rate of 6.4% during the first 7 years of the Sustainable Development Goals (SDG) period. With this reduction rate, it is projected that India is on the track of achieving the SDG targets of MMR at 70/lakh live births by 2025, even before 5 years of the target year 2030 as depicted in Chart –1. The linear trend line exhibited in the Chart shows that there will be a reduction of 5.263 in the MMR in response to a one year increase in the time period and it is statistically best fit and significant because the value of the coefficient of determination is very high at 0.978.

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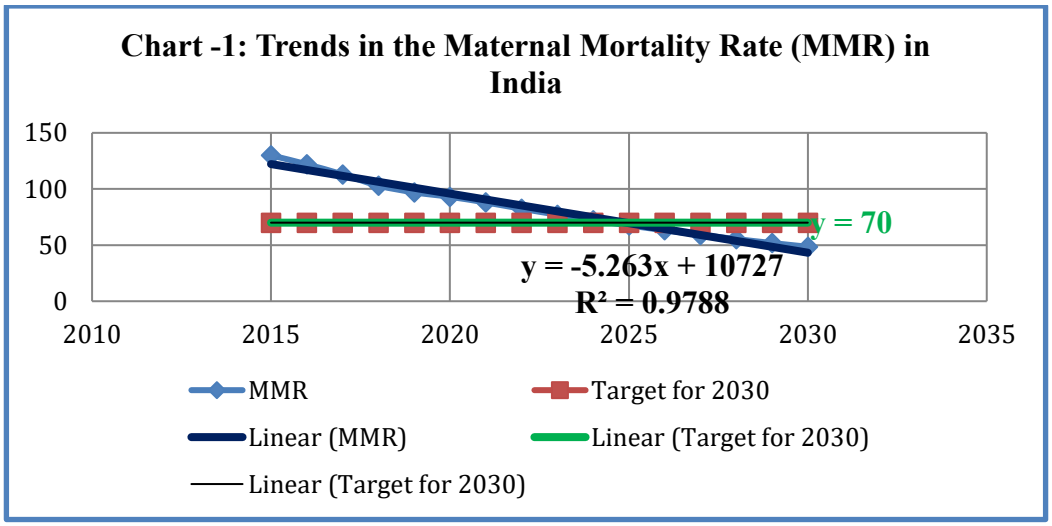
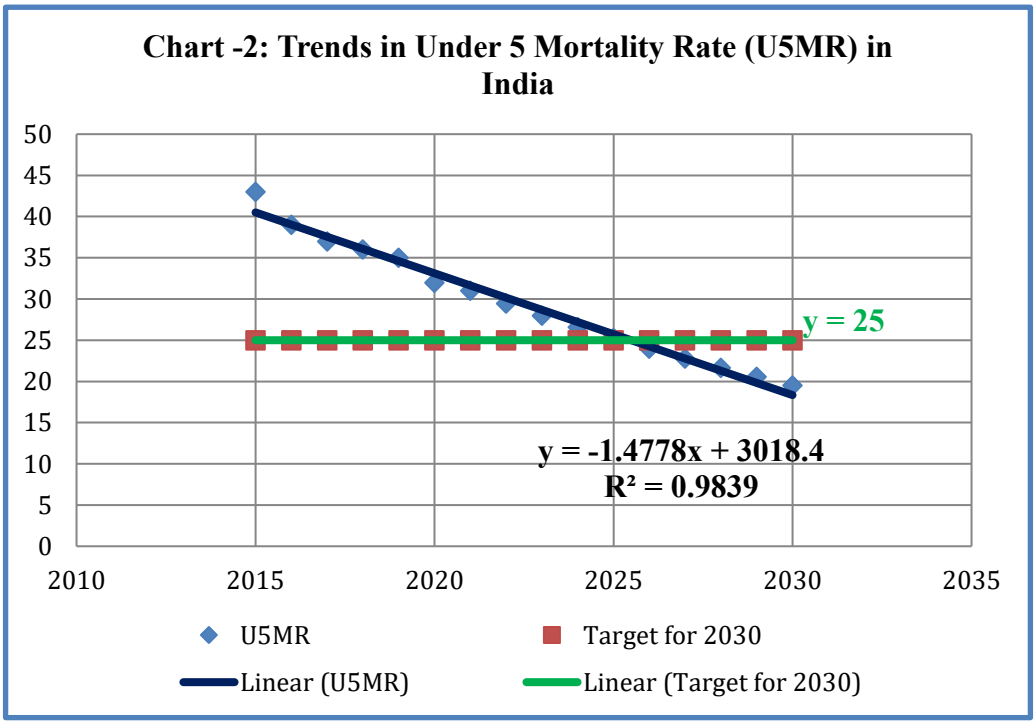


8.2. Trends and Achievements in Under 5 Mortality Rates (U5MR):

Under 5 Mortality Rate (U5MR) of India has declined at the annual compound reduction rate of 5.0% during the first 7 years of the Sustainable Development Goals (SDG) period. With this reduction rate, it is projected that India is on the track of achieving the SDG targets of U5MR at 25/thousand live births by 2026, even before 4 years of the target year 2030 as depicted in Chart –2. The linear trend line exhibited in the Chart shows that there will be a reduction of 1.477 in the U5MR in response to a one year increase in the time period and it is statistically best fit and significant because the value of the coefficient of determination is very high at 0.983.



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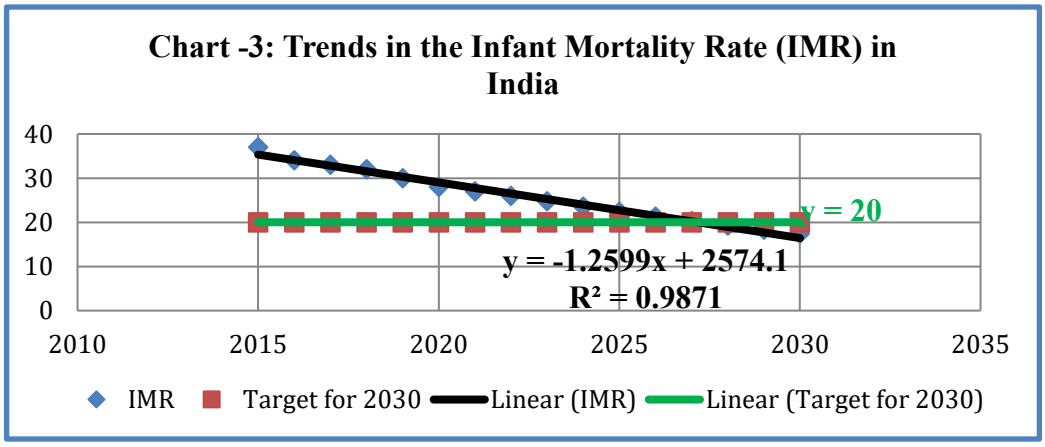
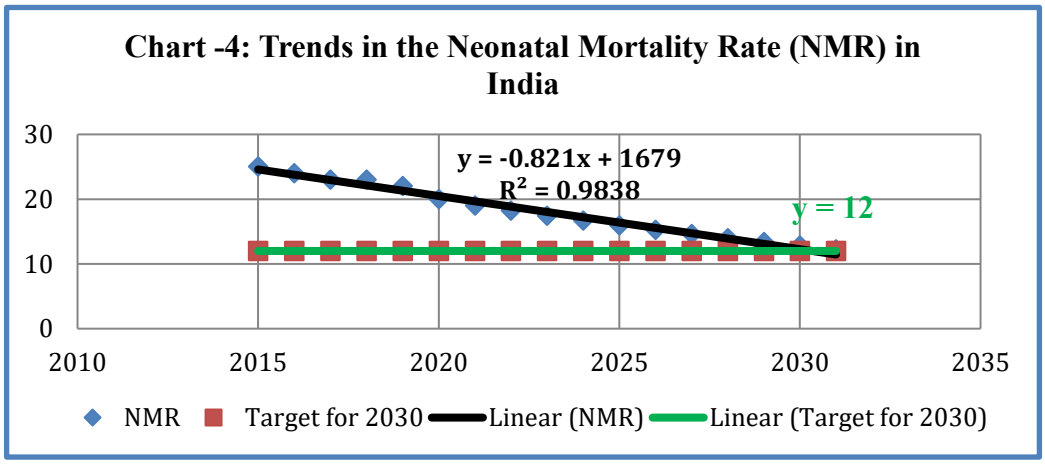
8.3. Trends and Achievements in Infant Mortality Rates (IMR):

Infant Mortality Rate (IMR) of India has declined at the annual compound reduction rate of 4.9% during the first 8 years of the Sustainable Development Goals (SDG) period. With this reduction rate, it is projected that India is on the track of achieving the SDG targets of IMR at 20/thousand live births by 2027, even before 3 years of the target year 2030 as depicted in Chart – 3. The linear trend line exhibited in the Chart shows that there will be a reduction of 1.259 in the IMR in response to a one year increase in the time period and it is statistically best fit and significant because the value of the coefficient of determination is very high at 0.987.



8.4. Trends and Achievements in Neonatal Mortality Rates (NMR):

Neonatal Mortality Rate (NMR) of India has declined at the annual compound reduction rate of 4.3% during the first 7 years of the Sustainable Development Goals (SDG) period. With this reduction rate, it is projected that India is on the track of achieving the SDG targets of NMR at 12/thousand live births by the target year 2030 as depicted in Chart–4. The linear trend line exhibited in the Chart shows that there will be a reduction of 0.821 in the NMR in response to a one year increase in the time period and it is statistically best fit and significant because the value of the coefficient of determination is very high at 0.983.



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9. Conclusions of the Paper:

The paper concludes that the Maternal Mortality Rate (MMR) has the annual compound reduction rate of 6.4%, Under 5 Mortality Rate (U5MR) has the annual compound reduction rate of 5.0%, Infant Mortality Rate (IMR) has the annual compound reduction rate of 4.9% and Neonatal Mortality Rate (NMR) has the annual compound reduction rate of 4.3% in India during the period between 2015 and 2021/2022. Therefore, it is inferred that all the four null hypotheses formulated have been rejected because the estimated annual compound reduction rates are significantly higher than zero and they are sufficient for achieving the targets of SDGs and all the estimated Compound Functions have very high coefficients of determination and high F Values with significance level of less than 1% and hence the estimated values of regression parameters and estimated annual compound reduction rates (ACRR) are statistically significant. By assuming that the Government of India will continue its efforts to maintain the existing annual compound reduction rates in the Maternal and Child Mortality Rates during the remaining period of Sustainable Development Goals, the paper has concluded that India is on the track of achieving the SDG targets of MMR at 70/lakh live births by 2025 (5 years before the target year), U5MR at 25/thousand live births by 2026 (4 years before the target year), IMR at 20/thousand live births by 2027 (3 years before the target year) and NMR at 12/thousand live births by the target year 2030.

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