

Trend analysis of maternal and child health indicators using national family health survey from 1992 to 2016

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ABSTRACT

Background and objective: National Family Health Survey (NFHS) is one of the reliable source to estimate some indicators at State and National level. The first NFHS survey was conducted in 1992-93 and the fourth survey in 2015-16. This analysis is aimed to find the trend of selected maternal and child health indicators over these survey periods to help the programme planners and implementers to plan or modify the strategy towards achieving the goals.

Material and methods: The results of four NFHS conducted during 1992-93, 1998-99, 2005-06 and 2015-16 were taken for analysis to assess the trend over these periods. The trend analysis comprised of antenatal care received, institutional births, fully immunized, stunted and underweight children below five years, infant mortality rate (IMR), under 5 mortality rate (U5MR) and total fertility rate (TFR). Linear regression analysis was applied to assess the trend for the selected variables.

Results: The amount of variance explained in linear trend for ante-natal visit, institutional deliveries, fully immunized children, stunted children, underweight children, IMR, U5MR and TFR were 0.85, 0.84, 0.85, 0.92, 0.99, 0.99, 0.99 and 0.96 respectively. Hence, the estimates were concluded as reliable for the future rounds though the interval among the survey was not uniform. The projected ante-natal visit was 55%, institutional delivery was 87%, fully immunized will be 66%, stunted 25%, underweight 29%, IMR 30, U5MR 30.25 and TFR will be 1.85.

Conclusion: The trends show that the achievement of all the above indicators was not satisfactory.

Keywords

NFHS survey, Trend analysis, ante-natal visit, Stunted children, IMR, TFR

INTRODUCTION

India had a very long history of data collection with population data for Maternal and Child Health indicators. One among such survey conducted by the Government of India was National Family Health Survey (NFHS). The first of its kind was started in 1992-93 conducted by a representative sampling method which adequately represent Indian states and Union territories. The International Institute for Population Sciences, Mumbai was the Nodal agency to conduct the survey. The second NFHS was conducted in 1998-99, third in 2005-06 and the fourth in 2015-16. The domain of data capture

was improved in each round. It provides a reliable estimate of Maternal and Child Health and related information for States and Union territories. In the present analysis an attempt was made to do a trend analysis using the results of four rounds of NFHS results for selected Maternal and Child Health indicators. The indicators included in the graphical presentation in NFHS4 fact sheet are included in this analysis. Every pregnant woman shall receive at least 3 ante-natal visits to get ante-natal services to protect herself and the child from health issues. First NFHS survey, measures the ante-natal services as the "percent of women receiving ante-

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natal care in first trimester” and subsequently it was changed to “percent of women received at least one ante-natal check up”. Ante-natal visits can be thought of improving perinatal services and ensure new born health and survival.¹

Deliveries attended by skilled health personnel and occurred in institutions are important indicators. When the skilled care for antenatal, natal and post-natal are insufficient, perinatal mortality will be very high. Institutional deliveries will address the emergency obstetrics and gynecology problems and survival of new born.¹ Hence, the percentage of deliveries at health facility was included in the analysis.

Every child has to be immunised against vaccine preventable disease as per norms (ie) one dose of BCG at birth, 3 doses of DPT/Polio and one dose of measles at 9 months of age. Having up-to-date vaccinations was significantly protective of underweight and suggestive of protecting against stunting.^{2,3} A higher prevalence of stunting and underweight are causes of increased morbidity and mortality among children below five years. Hence, immunization status, stunting and underweight are included in the analysis. These nutritional indicators in NFHS1 were measured among children below 4 years, in NFHS2 below 3 years and NFHS3 and NHFS4 it was below 5 years children.

Infant mortality rate and under 5 mortality rate are the two important indicators to monitor the overall health status of children below five years. Total fertility rate represent the effectiveness of overall implementation of family welfare programmes is also included in the analysis. Though, we have enough data for each round of NFHS, this type of trend analysis was lagging. Though, the key indicators collected in NFHS4 was strictly not comparable with previous trend due to differences in strategy, different sample size, an attempt was made to understand the trend analysis.⁴ This trend analysis will help the planners, programme managers to identify the current status and magnitude of maternal and child health indicators and plan and modify for an effective outcome based schemes.

MATERIAL AND METHODS

The National Family Health Survey (NFHS) is a large-scale, multi-round survey conducted in India and published on website. The required data for analysis was captured from the authenticated website of NFHS for all the four rounds. The results of four

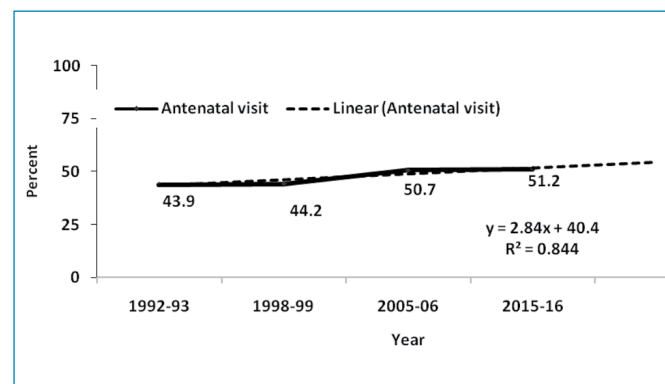
NFHS conducted during 1992-93, 1998-99, 2005-06 and 2015-16 were taken for analysis to assess the trend over these periods. The data on ante-natal care received, deliveries at health facility, fully immunized child, stunted and underweight children below five years, Infant mortality rate, U5 mortality rate and total fertility rates were taken for this analysis. All the relevant data for analysis were taken from the official website of NFHS.⁴⁻⁶ The selected indicator values were compared with that of Nepal, Bangladesh and Tamilnadu in India.

Linear trend analysis was used when the trend was linear over the four surveys to understand the trend by visual. Trend analysis was done using linear trend methodology and regression model was used to estimate the future values for each indicator included in the analysis. R^2 was used to estimate the variations explained in this model and inferential statistics was not administered in this analysis.

RESULTS

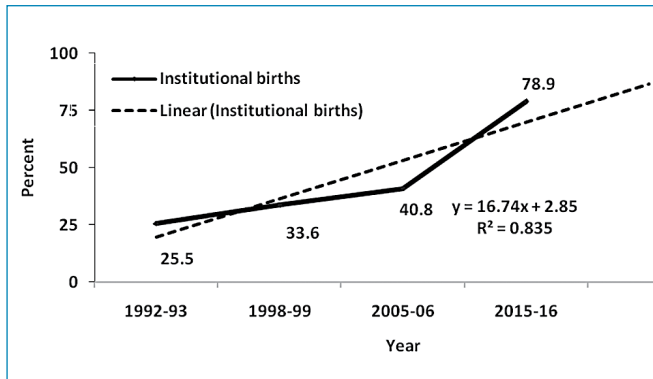
The trend of ante-natal visits is given in Figure 1. There was a difference in the parameters between the various rounds of survey. In the fourth round the criteria was raised to four visits. The percentage coverage of antenatal visits increased from 43.9% in 1992-92, to 51.2% in 2015-16. The trend was linear and significant. Projecting the trend further, the expected proportion in the next round could be 55% or better.

Figure 1: Trend of ante-natal visits from 1992-2016



Percent of births occurred at institutions over the four rounds was presented in Figure2. In 1992-93 it was 25.5% which increased to 78.9% in 2015-16. The values increase linearly and the linear trend analysis shows that the variance ($R^2=0.84$) in institutional birth accounted for by this model was 84.0%.

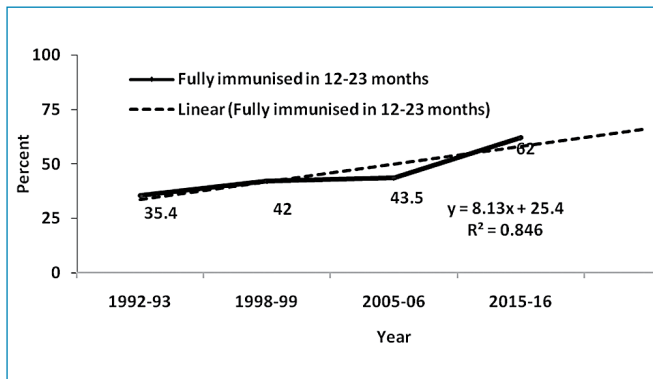
Figure 2: Trend of institutional births from 1992-2016



The institutional deliveries expected in future round in the existing situation will be 86.5 percent.

The trend of fully immunised children in 12-23 months of age was shown in Figure 3. Its percentage increased from 35.4% in 1992 -93 to 62% in the fourth round. The observed trend was linear and 84.7% of the

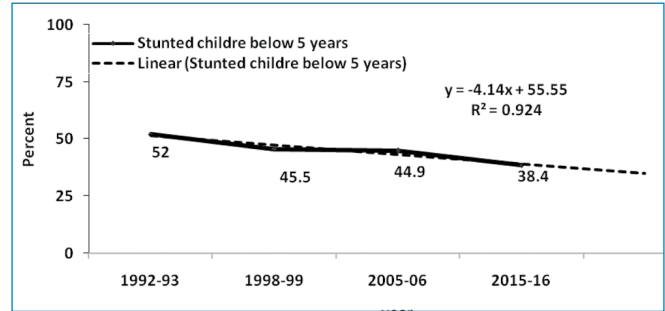
Figure 3: Trend of fully immunised children in 12-23 months



variance explained in this model. The prediction shows that fully immunised children will be 66.0 percent in the future round.

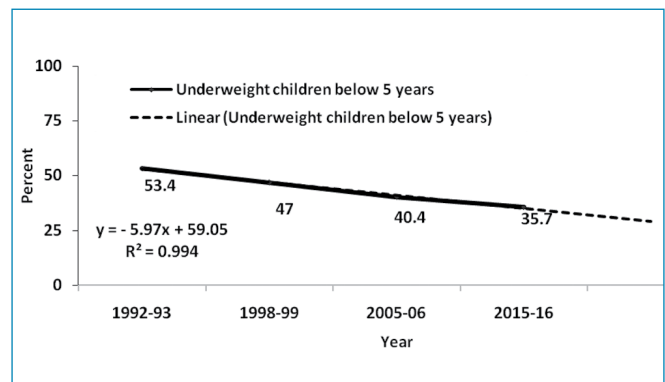
Percentage of stunted children is an important indicator of child health and nutritional status. There was an essential difference between the first three rounds and round 4, in that the first 3 studied children below three whereas round four studied under five. The trend analysis was done assuming that the status of stunted children is unaltered with age. The analysis is shown in Figure 4. There is a steady and significant decline across the surveys. It could be expected that the percentage would drop to 25%.

Figure 4: Trend of stunted children below 5 years



The proportion of underweight was significantly reduced from 53.4% in 1992-93 to 35.7 percent in 2015-16 (Figure 5). The linear trend analysis shows that the model accounted for 99.5% of the variations in

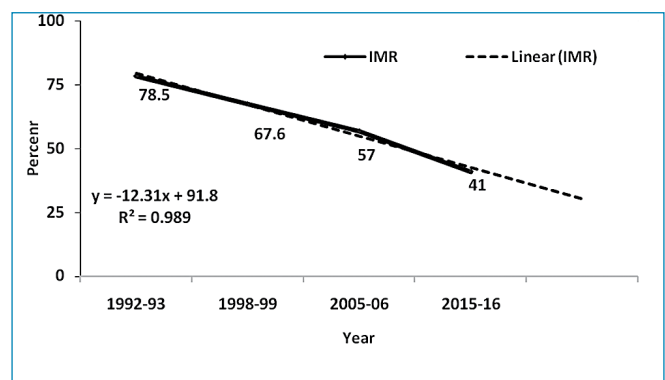
Figure 5: Trend of underweight children below 5 years



underweight. It is hoped that the trend is maintained and the expected level of underweight children in future survey would be 29% or lower. However, this still is a cause for concern.

The Infant mortality rate over the four decades per 1000 infants was shown in Figure 6. This measure too

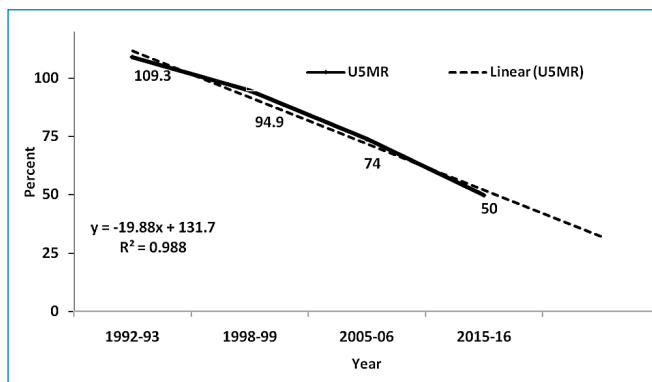
Figure 6: Trend of Infant Mortality Rate



has shown a significant linear trend. The rate, though it has dropped from 78.5 to 41.0 is way above the desired target of 27 per 1000 Infants. If the trend is maintained we should at least expect an IMR of 30 in the next round of survey.

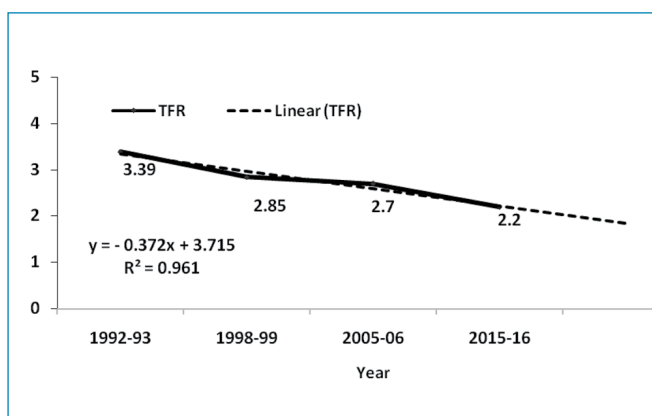
U5MR has shown a sharper decline than the others, dropping by over 50% across the surveys. If this trend continues there would be still a shortfall from the target set for 2020. The trend in U5MR continues linearly

Figure 7: Trend of under five mortality rate (U5MR)



decreasing over the four decades. It was 109.3 among 1000 children below five years in 1992-93 and 50.0 in 2015-16. A linear trend analysis was done and the model accounted for 98.8% of the variations. The expected IMR in future survey will be 30.25 per 1000 children below five years (Figure 7).

Figure 8: Trend of total fertility rate



Total fertility rate (TFR) is the number of children each woman will have in her reproductive life span if no mortality. It was 3.39 in 1992-93 and 2.2 in 2015-16. The linear trend model accounted for 96.1% of variation of TFR and it will be 1.845 in future round is a satisfactory value in population control (Figure 8).

DISCUSSION

The percentage of mothers had at least four antenatal visits was 51 in NFHS4 and it was projected to be 55% in 2025 which is much less compared to the increased maternal and infant mortality rates in India. As compared with previous studies in Nepal it was increased to 29% over a decade from 9 percent.⁷ It was only 10% in a study conducted in Bangladesh in 2007.⁸ When the existing situation continuous the percent of ante-natal care received will be unaltered in future. Ante-natal registration is the basic for providing all mother care services including family welfare, getting at least one check up is most important and need to be strengthened.

Regarding the institutional deliveries, it was 81 percent in India compared to 18% in Nepal and 14.3% in Bangladesh.⁸ In spite of a huge effort in immunizing the infants, fully immunised infants were only 62 percent and the trend shows that only 64 percent could be achieved in future round. In a representative survey conducted in Tamilnadu in 2009, fully immunised were 89% shows a better achievement compared to India.⁹ Hence, one-third is a Himalayan target to be achieved to protect the children from vaccine preventable diseases. Fully immunised infants were 83% in Nepal and 76% in Bangladesh which is better than Indian children in receiving protection against vaccine preventable diseases.^{7,8} Stunting is one of the serious growth retardation among children below 5 years. It was 52 in 1992-93 and reduced to 38.4 in 2015-16 which is still considerably very high. As compared to the level of 49 in Nepal and 43 in Bangladesh,^{7,8} India had a little lesser children as stunted but it was 39% in Tamilnadu.⁹ Stunting is a major nutrition problem among children below five years, an immediate intervention is required to improve the situation. Underweight was a major problem in many of the countries and it was reduced from 53 to 36 in India over four decades and it was 39 in Nepal and 41 in Bangladesh.^{7,8} It was 25.7 percent in Tamilnadu having a better achievement in this regard.⁹ Since, both stunting and underweight children are very high, nutritional intervention is an urgent need to prevent childhood morbidity and mortality.

Infant mortality rate is the mirror of effective implementation of maternal and child health care activities in a country. It was as high as 79 in India in 1992-93 and reduced to 41 in 2015-16. Though the trend was decreasing, it was still very high to achieve the millenium development goal of 27 in 2015.

Comparatively Nepal and Bangladesh had a higher level of IMR with 48 and 52 respectively. Though, there was much reduction in IMR over four decades, it was not satisfactory and new strategies required to cut down the rate in emergency.

Under 5 mortality is the over all indicator for the programme implemented towards child health. It was as high as 109 in 1992-93 and reduced to 50 in 2015-16. Though the rates are comparatively higher in Nepal and Bangladesh with 61 and 65 respectively, it is very hard to achieve the required goal of 42 per 1000 children below five years.¹⁰ Total fertility rate is an indicator to assess the programme implementation towards population growth. It was reduced from 3.39 in 1992-93 to 2.2 in 2015-16 and the goal was already achieved the expected level of 2.1 for India.

CONCLUSIONS

The trend of antenatal registration was not appreciable over four decades but institutional delivery shows an increasing trend. Full Immunisation of infants was showing an increasing trend but the over all performance was poor. A decline in the proportion of stunting and underweight was observed but still it was very high. IMR and U5MR shows a linear decreasing trend but not satisfactory. TFR was achieved and there was a significant decreasing trend. In toto, all the indicators taken for analysis need to be given grave improtant to improve in short course of time. The limitation of the analysis was the interval between each of the four NFHS data was not uniform.

CONFLICTS OF INTEREST

None

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A new drug that could make dental fillings a thing of the past.

Researchers found that small amounts of tideglusib, an Alzheimer's drug, promotes the growth of dentin, the material under enamel that can repair teeth, and jump-start tooth regeneration. Their works shows that teeth can repair themselves naturally, using stem cells to stimulate the growth of dental tissue. Dental fillings could become obsolete.

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