

Effect of Maternal Nutritional and Socio-economic Factors on Survival Status of Children in India

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Abstract

Nutrition is both the maker and a marker of development. Malnutrition is an often invisible impediment to the successful achievement of the SDGs. In India the number of children under the age of five dying due to malnutrition has dropped by two-thirds from 1990 to 2018. Despite the huge drop in malnutrition deaths, it continues to be an underlying risk factor for 68 per cent of the deaths among children under the age of five in India. India has the world's worst level of child malnutrition. The influence of maternal nutrition on the health and the survival of children are exceptionally high during the first five years of life. In India, one in two women and one in five women who enter pregnancy are anaemic or undernourished, respectively. The objective of the present study is to find the effect of maternal nutrition and socio – economic characteristics on the survival status of children in India. Data from NFHS – 4 was used in the study. Univariate and bivariate distribution tables are used to analyse maternal nutrition and socio – economic characteristics and survival status of children. Chi-square and Logistic regression analysis were also done for the detailed and in-depth study. The study identifies the determinants of underfive mortality in India. There is a significant relation between maternal nutritional factors on the survival status of children in India. It is the predominant risk factor for death in children younger than 5 years of age in every state of India. India is one among the many countries where child undernutrition is a major underlying cause of child mortality in India.

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Introduction

Under-five mortality is defined as the probability of a child born in a specific year or period dying before reaching the age of five, if subject to age-specific mortality rates of that period. Under-five mortality rate measures child survival. It also reflects the social, economic and environmental conditions in which children (and others in society) live, including their health care. Because data on the incidences and prevalence of diseases (morbidity data) frequently are unavailable, mortality rates are often used to identify vulnerable populations. Under-five mortality rate was a MDG indicator.

“Nutrition is both the maker and a marker of development. Improved nutrition is the platform for progress in health, education, employment, empowerment of women and the reduction of poverty and inequality, and can lay the foundation for peaceful, secure and stable societies” (Ban Ki – moon, former UN Secretary General). Malnutrition is responsible for more ill health than any other cause – good health is not possible without good nutrition. All forms of malnutrition are associated with various forms of ill health and higher levels of mortality. Undernutrition explains around 45% of deaths among children under five, mainly in low and middle-income countries. The health consequences of overweight and obesity contribute to an estimated four million deaths (7.1% of all deaths).

Globally, undernutrition contributes for more than one third of child deaths which can be prevented through public health interventions. Over two-thirds of these deaths, which are often associated with inappropriate feeding practices, occur during the first year of life. In developing countries nearly one-third of children are underweight or stunted. Half of the total infants less than 6 months are exclusively breastfed, whereas one – third of total women of reproductive age have anaemia (Global Nutrition Report – 2020).

In India, one in two women and one in five women who enter pregnancy are anaemic or undernourished, respectively. Women and child

malnutrition remains a major issue of public health concern in India. India is considered as a major global economy and a country in epidemiological transition, but growth faltering rates are much above critical levels of 20 percent, and need immediate attention to achieve the sustainable development goals (SDGs). The number of children under the age of five dying due to malnutrition has dropped by two-thirds from 1990 to 2018. Despite the huge drop in malnutrition deaths, it continues to be an underlying risk factor for 68 per cent of the deaths among children under the age of five in India. The influence of maternal nutrition on the health and the survival of children are exceptionally high during the first five years of life. Hence it is very important to study the effect of maternal nutrition on the survival status of children below five years of age.

Objective

The objectives of the present study is to find the effect of maternal nutritional and socio – economic factors on the survival status of children under five years in India.

Data and Methodology

Secondary data from the NFHS – 4 were used for the study. Interviews were completed among 259627 mothers out of 699686 women aged 15 – 49. When univariate tables give the distribution of predictor and outcome variables, the bivariate tables provided the survival status of last born children by the predictor variables. Chi-square and logistic regression analysis were also done for the detailed and in-depth study. Chi-square test was used to know the association between predictor variables and the dependent variable. Factors related to child survival were grouped as follows; community level factors, socio – economic factors, proximate factors and other factors. Proximate factors include maternal factors such as their age and nutrition factors. Maternal nutrition factors consist of height for age (stunting), weight for height (wasting), BMI and anaemia level. Other factors were ‘the place of birth’ and ‘time of initiation of breastfeeding after the delivery of last child’.

The dependent or outcome variable is child survival. In logistic regression analysis, the variable child survival is further recoded as: "Child Not Alive = 1" and "Child Alive = 0".

RESULTS AND FINDINGS

Univariate Analysis

The predictor variables included were:

- a) Community level factors such as place of residence and region.
- b) Socio – economic factors such as religion, caste, household wealth index and maternal educational level.
- c) Proximate/ Maternal factors – Age at birth and nutritional factors such as height for age (stunting), weight for height (wasting), BMI and anaemia level.
- d) Other factors – Place of birth of the last child and time of initiation of breastfeeding after the delivery.

In case of community level factors, the highest proportion of mothers were found in rural and central region (72 and 27 percent respectively), while considering socio – economic factors, greater proportion of mothers were found among Hindu religion, OBC ethnic group (79 and 46 percent respectively) and mothers from poor household (47 percent) and who had secondary education (46 percent) (Fig 1).

While considering the maternal factors; the highest proportions of mothers were among 25 – 29 age group and more than half of the total mothers were too short for their height. Only 15 percent and 47 percent of the total mothers had normal height for their age and normal weight for their height respectively and about 65 percent had normal BMI. More than 55 percent of the total mothers were anaemic at some sort. More than half of the total children were born in public hospitals and nearly 44 percent had their initial breastfeeding within one hour of birth (Fig 2).

Fig 1: Percentage Distribution of Mothers by their Background Characteristics

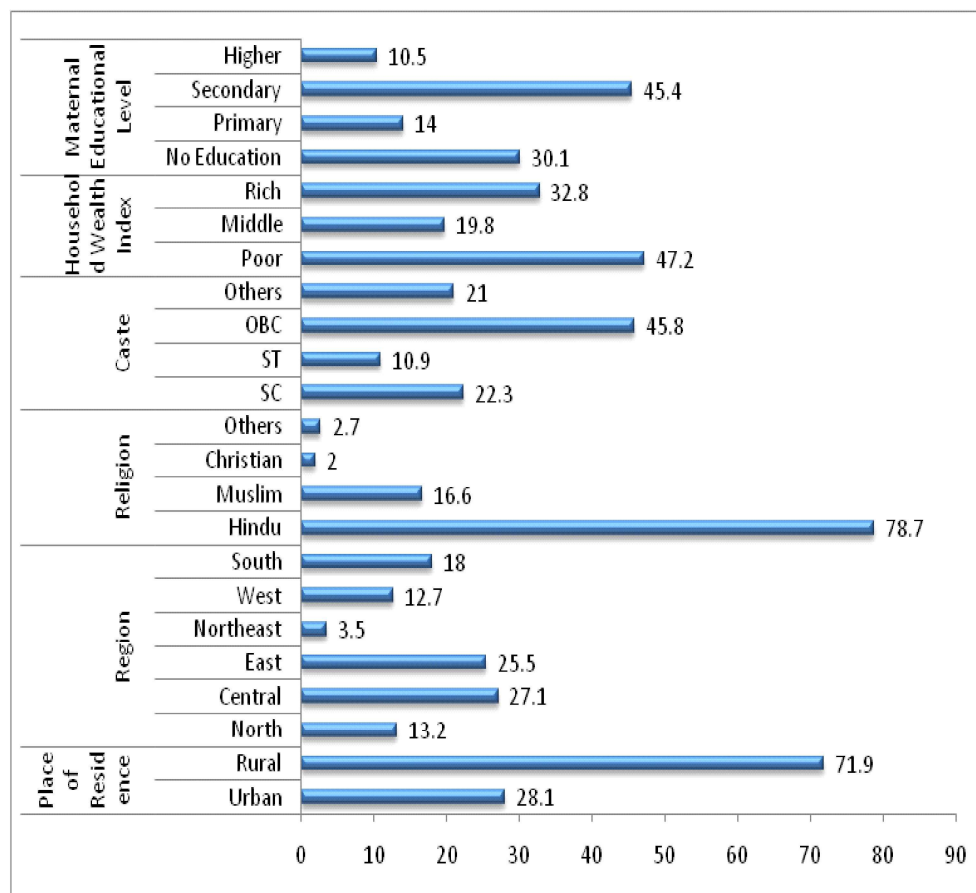


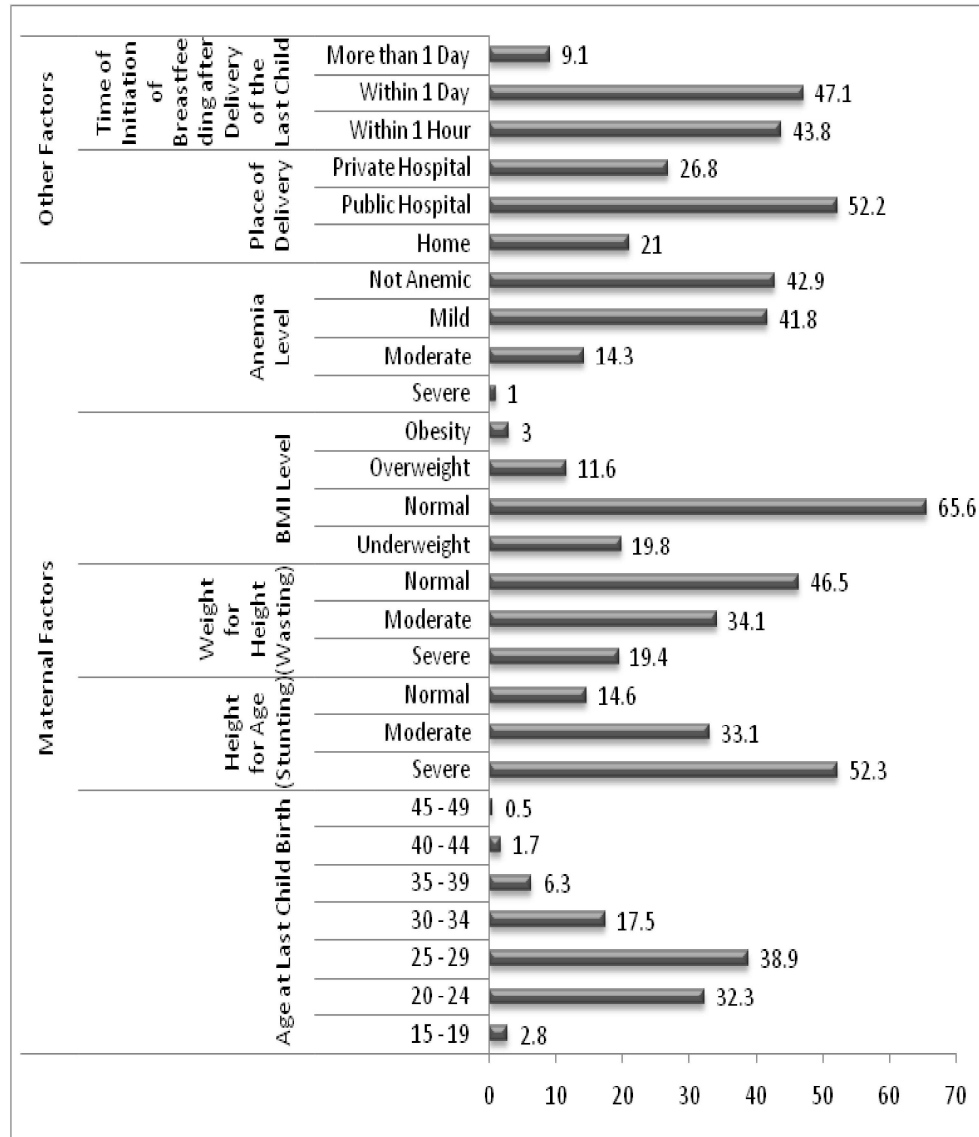
Fig 2: Percentage Distribution of Mothers by Maternal and Other Factors

Fig 3 indicates that out of 259627 children, 4.4 percent (11884) children below five years of age (last child of sample mothers) had died at the time of survey.

Fig 3: Percentage Distribution of Last Child of Sample Mothers by their Survival Status in India - 2015-16

Child Survival

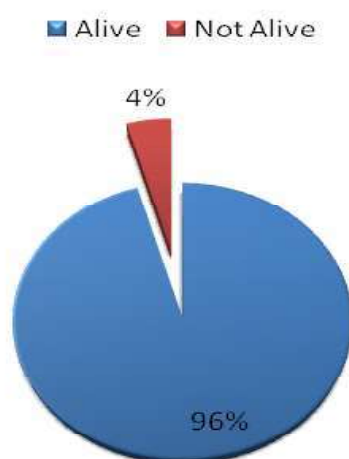


Table 1 shows the distribution of mothers as per the survival status of their last child by the maternal community level and socio-economic factors.

As per place of residence, five and three percent of total children born to rural and urban mothers were not alive at the time of survey. Region wise distribution shows that, six and five percent of total children born in Central and Eastern region and three percent of those born in Southern and Western region were not alive at the time of survey. Considering religious groups, five, four and three percent of total children born to mothers of Hindu, Muslim and Other religious groups respectively were not alive at the time of survey. In case of Ethnic groups, five percent of total children born to SC and ST mothers and four percent of those born to mothers of OBC and other religious groups were not alive at the time of survey. When wealth index is considered, six, and four percent of total children born to mothers of poor and middle household were not alive at the time of survey. When the education level is considered, six percent of total children born to mothers

who had no education were not alive at the time of survey; whereas for mothers with higher education it is two percent.

Table 2 shows the distribution of mothers by the survival status of last child according to proximate/ maternal factors. According to the mother's age group, 12 percent of total children born to mothers of 45 – 49 age group were not alive at the time of survey, whereas it is seven and six percent for those born to 40 – 44 and 15 – 19 age groups respectively. While for mothers of 25 – 29 and 30 – 34 age groups, four percent of their total children had died before attaining five years of age. When stunted mothers are considered, five and four percent of total children born to severely and moderately stunted mothers were not alive at the time of survey. In case of wasted mothers, five percent of total children born to severely and moderately wasted mothers were not alive at the time of survey. When BMI is considered, five percent of total children born to underweight and normal mothers and four percent of those born to overweight mothers were not alive at the time of survey. As per anaemia level, eight percent of children born to severely anemic mothers were not alive at the time of survey.

Table 1

Percentage Distribution of Mothers by Survival Status of their Children According to the Various Socio – Economic and Background Characteristics.

Background Characteristics	Variables	Categories	Distribution in Percentage	
			Alive	Not Alive
Community Level Factors	Place of Residence*	Urban	96.9	3.1
		Rural	95.1	4.9
		Total	95.6	4.4
	Region*	North	96.0	4.0
		Central	93.6	6.4
		East	95.5	4.5

		Northeast	95.6	4.4
		West	97.1	2.9
		South	97.3	2.7
		Total	95.6	4.4
Socio – Economic Factors	Religion*	Hindu	95.5	4.5
		Muslim	95.6	4.4
		Christian	97.2	2.8
		Others	96.6	3.4
		Total	95.6	4.4
	Caste*	SC	95.1	4.9
		ST	95.1	4.9
		OBC	95.5	4.5
		Others	96.5	3.5
		Total	95.5	4.5
	Wealth Index*	Poor	94.3	5.7
		Middle	95.8	4.2
		Rich	97.3	2.7
		Total	95.6	4.4
	Educational Level*	No Education	94.0	6.0
		Primary	94.6	5.4
		Secondary	96.4	3.6
		Higher	97.9	2.1
		Total	95.6	4.4
	Total		259627	

*Significance Level at 1%

Table 2
Percentage Distribution of Mothers by Survival Status of their Children
According to the Nutritional and Health Characteristics of Mothers.

Proximate/ Maternal Factors	Categories	Distribution in Percentage	
		Alive	Not Alive
Age – Group*	15-19	94.2	5.8
	20-24	95.5	4.5
	25-29	96.0	4.0
	30-34	95.8	4.2
	35-39	94.7	5.3
	40-44	92.9	7.1
	45-49	88.3	11.7
	Total	95.6	4.4
Stunted*	Severe	94.9	5.1
	Moderate	96.2	3.8
	Normal	96.8	3.2
	Total	95.6	4.4
Wasted*	Severe	94.7	5.3
	Moderate	95.3	4.7
	Normal	96.1	3.9
	Total	95.6	4.4
BMI*	Underweight	95.3	4.7
	Normal	95.5	4.5
	Overweight	96.2	3.8
	Obesity	96.6	3.4
	Total	95.6	4.4
Anaemia Level*	Severe	92.0	8.0
	Moderate	94.7	5.3
	Mild	96.0	4.0
	Not Anemic	95.5	4.5
	Total	95.6	4.4
Total		259627	

***Significance Level at 1%**

Table 3
Percentage Distribution of Mothers by Survival Status of their Children
According to Other Factors.

Other Factors	Categories	Distribution in Percentage	
		Alive	Not Alive
Place of Birth of the Last Child*	Home	93.9	6.1
	Public	96.0	4.0
	Private	96.5	3.5
	Total	95.7	4.3
Time of First Breast feeding after delivery of Last Child*	Within 1 Hour	98.6	1.4
	Within 1 Day	98.4	1.6
	More than 1 Day	98.0	2.0
	Total	98.4	1.6
Total		259627	

***Significance Level at 1%**

Table 3 shows the percentage distribution of mothers by the survival status of their last child according to the place of birth and the time of first breast feeding. According to the place of birth of the children, eight and six percent of total children born at other places and homes respectively were not alive at the time of survey. When the time of first breastfeeding after delivery is considered, around two percent of children who had their breastfeeding within and more than twenty four hours of birth were not alive at the time of survey.

Results of Logistic Regression Analysis

The table 4 shows the odds ratio of logistic regression analysis explaining the effects of maternal socio – economic and nutritional factors on survival status of children in India.

Exp (B) gives the Adjusted Odds Ratio (AOR) for child survival.

The dependent variable is:

Whether the Child is Alive or Not (if No = 1, Yes = 0)

The independent variables selected are age of mothers, place of residence, wealth index, religion, caste, educational level, stunting, wasting, BMI and anaemia of mothers, place of birth and time of breastfeeding of the last child.

Table 4
Results of Logistic Regression Analysis

Factors	Variables	Categories	B	S.E.	Exp(B)
Community Level	Place of Residence	Urban®			
		Rural	0.059	0.055	1.06
Socio - Economic	Religion	Hindu®			
		Muslim	-0.037	0.059	0.963
		Christian	-0.039	0.079	0.962
		Others	-0.162	0.104	0.85
	Caste	SC®			
		ST	-0.008	0.061	0.992
		OBC	-0.11	0.051	0.895*
		Others	-0.096	0.065	0.908
	Wealth Index	Poor®			
		Middle	-0.136	0.054	0.873*
		Rich	-0.32	0.064	0.726**
	Educational Level	No Education®			
		Primary	-0.129	0.056	0.879*
		Secondary	-0.381	0.049	0.683**
		Higher	-0.801	0.103	0.449**
Proximate/ Maternal	Age Group	15-19®			
		20-24	-0.502	0.095	0.605**

		25-29	-0.53	0.094	0.588**
		30-34	-0.482	0.099	0.618**
		35-39	-0.208	0.107	0.813
		40-44	-0.032	0.129	0.969
		45-49	0.239	0.166	1.27
	Stunting in Mothers	Severe®			
		Moderate	-0.046	0.042	0.955
		Normal	-0.124	0.061	0.884*
	Wasting in Mothers	Severe®			
		Moderate	-0.208	0.067	0.812**
		Normal	-0.3	0.074	0.741**
	BMI of Mothers	Underweight®			
		Normal	0.184	0.069	1.202**
		Overweight	0.341	0.1	1.407**
		Obesity	0.466	0.143	1.594**
	Anaemia Level	Severe®			
		Moderate	-0.459	0.14	0.632**
		Mild	-0.742	0.136	0.476**
		Not Anemic	-0.544	0.135	0.581**
Other Factors	Place of Birth of the Last Child	Home®			
		Public	-0.232	0.044	0.793**
		Private	-0.309	0.065	0.734**
		Others	0.389	0.285	1.475
	Time of first Breast feeding of the last child	Within 1 Hour®			
		Within 1 Day	0.028	0.04	1.029
		More than 1 Day	0.149	0.067	1.161*
	Constant	-2.405	0.179	0.090**	

** Significance Level at 1%; * Significance Level at 5%

With reference to the 15 – 19 age groups, the chance of children to be not alive is 27 percent higher for mothers in the 45 – 49 age group. There are three and nineteen percent lesser chance for the children to be not alive among mothers in the age groups 40 – 44 and 35 – 39 respectively compared to the reference age group. The least chance (41 percent) of children to be not alive at the time of survey is among the mothers of 25 – 29 age group followed by those among the 20 – 24 and 30 – 34 age groups with a chance of 40 and 38 percent respectively compared to the reference category. Corresponding to the reference category, six percent higher chance of last child's death happens to the rural mothers. There are 27 and 13 percent lesser chance of child mortality among mothers of rich and middle categories compared to the reference category. When Hindu religion is considered as the reference category, four percent lesser chance of child's death happens to mothers of Muslim as well as Christian religion, whereas there is 15 percent lesser chance for those among other religious group. As per caste, the chance of the children to be not alive among mothers of ST, OBC and other categories are one, 10.5 and nine percent lesser than those of reference category. When educational level is considered, the chance of the children to be not alive is least (55 percent) for those mothers who had attained higher education, followed by those with secondary education (32 percent) and primary education (12 percent) compared to the reference category. There are five and 12 percent lesser chance for the last child to be dead for mothers of moderately stunted and normal categories than the reference category. In case of wasted mothers, the children of mothers in moderate and normal categories has 19 and 26 percent lesser chance to be not alive than the reference category. As per the BMI level, there are 59 and 41 percent higher chance for the children of obese and overweight mothers to be dead respectively and 20 percent higher chance for those whose mothers are normal compared to the reference category. There is 42 percent lesser chance for the child's death in case of not anemic mothers and 52 and 37 percent lesser chance for those of mildly and moderately anemic mothers when compared with reference mothers. With reference to home, there is 48 percent higher chance for the children born in

other places to be not alive whereas 21 and 27 percent lesser chance for those born in public and private hospitals respectively. Of the children who had their first time breastfeeding within and after twenty four hours, the chances of mortality are two and 16 percent higher when compared to those with the reference time period respectively.

The variables age, wealth index, educational level, wasting, BMI and anaemia level of mothers and place of birth of the child had high significant association with the survival status of children, while caste and stunting of mothers and time of first breastfeeding of the children had less significant association with the survival status of children.

Summary & Conclusion

Malnutrition is a state of over or under nutrition and its consequences on maternal and child health are very alarming. Malnutrition affects overall mother and child health, survival, economic productivity of individuals and a healthy development and growth of a child. Adequate nutrition has always been a definitive tool for achieving the maternal and child health targets. Maternal nutrition played an important role in improving the health of mothers and their children and also offered healthy growth of newborn infants. Maternal malnutrition is the prime cause of mortality and morbidity in children below five years of age. Underfive mortality is defined as the death of children under the age of five. Malnutrition is a major contributor to disease burden in India. It is the predominant risk factor for death in children younger than five years of age in every state of India.

As mentioned, the objectives of the present study aims to analyse the effect of maternal nutritional and socio – economic factors on the survival status of children underfive years in India. The data used for this study were drawn from the fourth (2015 – 2016) level of National Family Health Survey.

In this study, univariate, bivariate, chi-square and logistic regression analysis were used to analyze various socio-economic and other characteristics of the respondents to examine the impact of maternal

nutritional and socio – economic characteristics on underfive mortality in India.

Stunting, wasting and BMI are the indicators used to measure the maternal nutritional status. The table shows that more than half of the total mothers in India are severely stunted (52 percent), while that of moderately stunted are 33 percent. Again it is noted that only about 15 percent mothers are with normal height. When it comes to wasting, mothers in the normal category (47 percent) exceed the other two categories viz; severe and moderate with 19 and 34 percent respectively. Similarly, in BMI more than half of the mothers come under normal category (66 percent), while only 20 percent mothers have underweight, 12 percent have overweight and a very low proportion of obese mothers (three percent). Thus it indicates that among the three indicators stunting is more dominant among mothers in India. As for anaemia level which is taken as a health character of mothers; majority of them are mildly (42 percent) or non anaemic (43 percent). About 14 percent are moderately anaemic though a comparatively very low percent are severely anaemic (one percent).

More than half of the total children were born in public hospitals (52 percent) which is nearly twice as those born in private hospitals (27 percent). About 21 percent of children were delivered in homes. Only about 44 percent children got their first breast milk within one hour of birth and nearly 47 percent infants got first milk within a day of their birth, whereas nine percent of children had it after their first day of birth.

The variables age, wealth index, educational level, wasting, BMI and anaemia level of mothers and place of birth of the last child had high significant association with the survival status of children. There is higher chance for children of mothers in 45 – 49 age groups to be not alive when compared to children among mothers of 15 – 19 age groups. Compared to the children from poor household, those from rich and middle class household have lesser chance to be dead at the time of survey. With reference to children of mothers with no education, the chance of the last child to be

not alive is least for those mothers who had attained higher education. In case of wasted mothers, the last child of mothers in moderate and normal categories has lesser chance to be not alive than those of severely wasted mothers. As per BMI level of mothers, there is higher chance for the children to be dead among mothers of other categories when compared to those of underweighted mothers. Children of non anaemic mothers and those of mildly and moderately anaemic mothers have lesser chance to be dead when compared to children of severely anemic mothers. The children born in public and private hospitals are less likely to be not alive as compared to those born at their homes.

Conclusion

The study gives the determinants of underfive mortality in India. There is a significant relation between maternal nutritional status and nutritional status of children in India. These inter- generational cycle of undernutrition transmitted from mothers to children greatly impacts on the country's present and future. Undernourished children are much more likely to suffer from infection and die from common childhood illness than well – nourished children. Undernutrition puts women at a greater risk of pregnancy – related complications and death. Widespread child undernutrition greatly impedes India's socio – economic development and potential to reduce poverty. India is home to one – third of world's total stunted children. The state of malnutrition in India is alarming and disturbing. India is one among the many countries where child undernutrition is a major underlying cause of child mortality in India.

194.6 million population are undernourished in India, which equals one – fourth of the undernourished population in the world. The National Food Security Act was launched in 2013 and it aims to provide subsidized food grains. All the existing programs such as ICDS, the Mid Day Meal Scheme for school children and Public Distribution System will fall under this act. This is the Agenda 2 –Zero Hunger- of SDGs and Mission Indradhanush was launched in 2014 with an objective of ensuring full

immunization with seven vaccine preventable diseases to all children under the age of two years as well as pregnant women. This falls in the agenda 3 – Good Health and Well Being- of SDGs. In early 2018, the Prime Minister of India the National Nutrition Mission (NNM), also known as POSHAN Abhiyaan, to bring focus and momentum to this effort, which has the overarching goal of reducing child and maternal malnutrition. Government has also rolled out various community nutritional programmes to combat malnutrition and to get nutrition on track. Despite enormous challenges, India has made considerable progress in tackling hunger and undernutrition in the past two decades, yet this pace of change has been unacceptably slow, uneven and many have been left behind. But with sustained prioritization, increased resource allocation, adopting comprehensive, coordinated and holistic approach with good governance and help of civil society, India has the potential to end malnutrition in all its forms and turn the ambition of the Sustainable Development Goals into a reality for everyone.

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