Mother's Autonomy and other Determining Factors of Child Immunisation: Scenario of Barak Valley, Assam

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Abstract

The study analyses the impact of mothers' autonomy on child immunisation. The study also scrutinizes the factors associated with the autonomy and health of a mother in the study area. This study is based on a novel data set especially collected for this study. Using the UNDP-HDI methodology and logit model the objectives are investigated. The study concludes that child immunisation is highly affected by mother's autonomy and the factors that determine mother's autonomy are household size, mother's education, mother's occupation, living condition index, asset index, and mother's awareness index.

Keywords: *Mother's autonomy, Immunisation, Barak Valley, Assam, Logit model*
JEL Classification: *I1, I15*

1. Introduction

Health nowadays is considered to be one of the most important development criteria for every economy. Because a healthy human being is considered as a human resource for the economy. An improved state of health leads to better economic conditions. That is why people in richer countries are comparatively healthier than their counterparts (Weil, 2005). Realising this fact, the World Health Organisation has rightly emphasized the health issues in its Millennium Development Goals (MDGs) and later in its Sustainable Development Goals (SDGs). Accordingly, many countries, including India, have dived into action to accomplish the goals. As mentioned in MDGs and SDGs the focus of the health sector has been put on improving child and maternal health. Various policies and programmes were introduced to improve the condition of maternal and child health in the country. Maternal and child health are very closely related. A healthy mother is expected to give birth to a healthy child. Rahman et al. (1982) found a negative correlation between a mother's status of tetanus immunisation and neonatal

death. Mothers' awareness and satisfaction also have a positive impact on child immunisation (Harrington et al., 2000). Zahid (1996) found that children whose mothers are less than 20 years of age are having the highest rate of neonatal, infant, and child mortality. Studies also find that maternal mental condition and child nutrition status has a close association (Harpham et al., 2005). Maternal and child health are again influenced by the mother's autonomy. Low autonomy of mothers during the reproductive age hampers maternal and child health (Gupta, 1996). Ameyaw et al., (2016) empirically examined the relationship between women's decision-making autonomy regarding health and the place of delivery and found that women with more autonomy regarding health decision-making were utilizing the safe delivery option. Against this backdrop, the paper tries to investigate the impact of mothers' autonomy on child immunisation in the Barak Valley of Assam, India. Northeast India is the most diverged part in the whole country. Starting from the socio-cultural-geographical aspect to economic condition, this part is very different from the rest of the country. Among the eight northeastern states, Assam is considered the most advanced state from a socio-economic perspective (Sharma, 2012). Assam, is again, divided broadly into two provinces, Barak Valley and Brahmaputra Valley. The names are sought after the two mighty rivers of Assam, Barak and Brahmaputra. Barak Valley is considered a backward region compared to mainland Assam. The geographical and sociocultural location of the valley keeps it at a bay. Therefore the development parameter of the region is also affected. Thus the investigation of the health condition of this region is a legit demand of the time. The study is novel in itself as the problem stated has not been investigated thoroughly in the region. A scientific investigation has been thus carried out judiciously. The paper proceeds as follows: the next section defines the materials and methods used in the investigation. Further analysis of the empirical results is done followed by a conclusion and policy prescriptions.

2. Material and Methods

In this section we have discussed the data used and the methodology that is followed to carry out the study. The details are given below.

2.1. Data

The study is based on primary data. The data was collected through field survey using a pre-tested questionnaire. The area considered for this study is Barak Valley of Assam. Barak Valley basically comprises three districts, viz., Cachar, Hailakandi and Karimganj. The primary data is collected covering all three districts. The Cachar district has 15 Community Development Blocks[1], Hailakandi has 5 Community Development Blocks and Karimganj has 7 Community Development Blocks. From each of the districts, one rural development block and one urban development block were selected randomly using the random number table. The selected blocks from rural and urban categories under each of the districts are respectively as follows: Lakhipur and Silchar Development Block from Cachar district, Algapur and Hailakandi Development Blocks from Hailakandi and lastly Badarpur and Karimganj Development Block from Karimganj. From each of the rural blocks, one village is selected randomly, and likewise, from each of the urban blocks, one ward is selected. From the selected sample areas, 30 samples

[1] Community development block was first started in the Etawah district in 1947 by Albert Mayer and D. P. Singh with an idea of "development from below". It was started with a vision to develop the Indian villages. The blocks function with block and village officers under the supervision of District Commissioner. The democratic policies are executed through these community development blocks for the overall development of the villages (Neale, 1985).

are collected purposively, targeting the mothers of the children from the age group 0-10 years. In total, we have 180 sample sizes.

2.2. Materials, Methods, and Models

In the next section, we have discussed in detail the procedures followed to investigate the prime objective of this study.

2.2.1. Mother's Autonomy: the determinant factors

As defined by Dyson and Moore (1983), Basu (1992), and Doan and Bisharat (1990) women's autonomy implies one's control over resources and information to make decision about one's own well-being or about one's close family members. Again Mason (1984) and Safilios-Rothschild (2012) conceptualized autonomy as one's ability to determine their life's events even if other people oppose their wishes. In this paper an index has been constructed for attainments of the mother's autonomy and the related indicators that may affect the same. Broadly the UNDP-HDI methodology has been used. For every sample unit, the mother's autonomy index was constructed using the modified UNDP-HDI formula which was also suggested by Iyengar and Sudarshan (1982). There are other indexes such as the financial inclusion index of mothers, asset index, living condition index etc. are also constructed following the same formula. The other related indicators are household size, mean years of schooling of the adult female, husband's education, mother's average income, and mother's education. While some indicators are positively related to the mother's autonomy level, others may have a negative association with the level.

Let X_{is} represent the size/value of the i-th component in the s-th household (i = 1,2,3,…n; s = 1,2....180). If X_{is} a component, its normalised values can be obtained as

$$I_{is} = (\text{Actual } X_{is}) / (\text{Max}_s X_{is}) \quad \text{----------(1)}$$

2.2.2. Functional Specification and Estimation Procedure of Mother's Autonomy Index

In light of the above discussion, the basic functional relationships can be written as

$$MAI_s = F(H_s, MYF_s, HE_s, LI_s, AI_s, ME_s, FII_s, MEdu_s) \quad \text{---------- (2)}$$

The dependent variable MAI_s being an index lying between 0 and 1, a linear specification for the function (2) will not be appropriate. Because the predicted values from a linear regression equation will not be necessarily contained between 0 and 1. Hence a logistic functional form for the relation (2) has been adopted. Thus MAI_s has been modelled as-

$$MAI_S = \frac{1}{1+e^{-zs}} \quad \text{---------- (3)}$$

Where z_s is a linear combination of explanatory variables and a random disturbance U_s.

$$Z_s = \alpha + \zeta H_s + \beta MYF_s + \gamma HE_s + \delta LI_s + \theta AI_s + \eta ME_s + \partial FII_s + \mu MEdu_s + Us \quad \text{----------(4)}$$

Combining equations (3) and (4) we obtain the following linear equation of the constructed dependent variable $Ln\{ MAI_s /(1 - MAI_s)\}$

$$Ln\{ MAI_s /(1 - MAI_s)\} = Z_s = \alpha + \zeta H_s + \beta MYF_s + \gamma HE_s + \delta LI_s + \theta AI_s + \eta ME_s + \partial FII_s + \mu MEdu_s + Us \quad \text{-------(5)}$$

The Breusch-Pagan / Cook-Weisberg test for heteroskedasticity was carried out to check for the presence of heteroscedasticity[2]. The test did not reject homoscedasticity. Accordingly, the model was found to be estimable by Ordinary Least Square method.

[2] Breusch-Pagan / Cook-Weisberg test for heteroskedasticity for H_o: homoscedasticity against H_a: unrestricted heteroskedasticity gave Chi^2 (1) = 0.73 Prob>Chi^2 = 0.3916

We also checked whether the problem of multicollinearity is present or not. A Variance inflation factor (VIF) greater than or equal to 5 implies that imperfect multicollinearity is likely and 10 implies serious multicollinearity. Here Variance inflation factor[3] (VIF) for all explanatory variables is less than 4. So, we can say that there is no multicollinearity problem.

The detailed description of the variables and their functional relationship with the dependent variable has been presented in the appendices table A.1.

2.3. Mother's Health Index and other Indicators

Following the methodology used for mother's autonomy, mother's health index is also constructed in the same manner. Other variables are taken into consideration to analyse their probable impact on mother's health.

2.3.1. Functional Specification and Estimation Procedure

In light of the above discussion, the basic functional relationships can be written as

$MHI_s = F(R_s, Hs, MYS_s, MA_s, SU_s, P_s, LI_s, AI_s, ME_s, FII_s, MAI_s, MAwI_s)$ ---------- (6)

The dependent variable MHI_s being an index lying between 0 and 1, a linear specification for the function (6) will not be appropriate. Because the predicted values from a linear regression equation will not be necessarily contained between 0 and 1. Hence a logistic functional form for the relation (6) has been adopted. Thus MHI_s has been modelled as-

$$MHI_S = \frac{1}{1+e^{-zs}} \qquad \text{---------- (7)}$$

Where z_s is a linear combination of explanatory variables and a random disturbance U_s.

$$z_s = \alpha+\lambda R_s+\zeta H_s + \beta MYS_s + \gamma MA_s + \pi SU_s+\rho P_s+\delta LI_s + \theta AI_s + \eta ME_s + \partial FII_s + \mu MAI_s+\varphi MAwI_s+Us \qquad \text{----------(8)}$$

Combining equations (7) and (8) we obtain the following linear equation of the constructed dependent variable $Ln\{ MHI_s /(1 - MHI_s)\}$

$$Ln\{ MHI_s /(1 - MHI_s)\} = Z_s = \alpha+\lambda R_s+\zeta H_s + \beta MYS_s + \gamma MA_s + \pi SU_s+\rho P_s+\delta LI_s + \theta AI_s + \eta ME_s + \partial FII_s + \mu MAI_s+\varphi MAwI_s+Us \qquad \text{----------(9)}$$

[3]

Variable	VIF
Household Size (H)	1.16
Mean years of schooling of adult female members (MYF)	3.23
Husband education (HE)	1.49
Living conditions index (LI)	1.71
Asset index (AI)	1.02
Mothers' average earning (ME)	1.26
Financial inclusion index of mother (FII)	1.02
Mothers' education (M Edu)	3.51
Mean VIF	1.80

The Breusch-Pagan / Cook-Weisberg test for heteroskedasticity was carried out to check for the presence of heteroscedasticity[4]. The test did not reject homoscedasticity. Accordingly, the model was found to be estimable by Ordinary Least Square method.
We also checked whether the problem of multicollinearity is present or not. A Variance inflation factor (VIF) greater than or equal to 5 implies that imperfect multicollinearity is likely and 10 implies serious multicollinearity. Here Variance inflation factor[5](VIF) for all explanatory variables is less than 3. So, we can say that there is no multicollinearity problem.
The detailed description of the variables and their functional relationship with the dependent variable has been presented in the appendices table A.2.

2.4. Measuring Child Immunisation

Child immunization is the process through which every child is made immune to various diseases, usually through providing vaccines. In our study we have considered three situations for child immunization, viz., "fully immunized", comprises those who have administered all the doses of vaccines till their age; "partially immunized", those who have taken few doses of vaccines in the initial stages but did not receive the subsequent doses, and "not immunized", those who have not received any kind of vaccine doses. However, when we proceeded to the study area for the field survey, we encountered only two situations, either "fully immunized" or "partially immunized". No cases of "not immunized" was recorded. Therefore, we have converted child immunization into a binary variable by assigning values 1 to fully immunized and 0 to partially immunized cases.
The immunization function can be conceived as a part of a simultaneous equation model in which the first equation is the mother's autonomy function which is specified in the above section followed by the child immunization function. Where the prime independent variable is

[4] Breusch-Pagan / Cook-Weisberg test for heteroskedasticity for H_o: homoscedasticity against H_a: unrestricted heteroskedasticity gave Chi^2 (1) = 0.04 Prob>Chi^2 = 0.8438

[5]

Variable	VIF
Religion (R)	1.47
Household Size (H)	1.39
Mean years of schooling of adult members (MYS)	2.26
Mother's age (MA)	1.34
Substance use (SU)	1.17
Parity (P)	1.28
Living conditions index (LI)	2.18
Asset index (AI)	1.09
Mothers' average earning (ME)	1.80
Financial inclusion index of mother (FII)	1.23
Mothers' autonomy index (MAI)	1.60
Mother's awareness index (MAwI)	2.23
Mean VIF	1.59

the mother's autonomy index. But there are also exogenous variables such as mother's health index, household size, the distance of health institutions from home, mother's age, mother's education, living condition index, asset index and mother's awareness index. Again, those variables are already taken to determine the effects on mother's autonomy and health. Thus, to avoid double consideration we have considered only mother's autonomy index, distance from health institution and mother's awareness index as the independent variables.

The functional relationship of child immunisation with the independent variables can be written as

$$I = F(MAI_S, D_S, MAwI_S) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (10)$$

Although this constitutes a simultaneous equation, as the mother's autonomy figures as the dependent variable in the first equation and an independent variable in the second equation, this falls in the category of a recursive model of the broad class of simultaneous equation model. In a recursive model the dependent variables are determined not exactly simultaneously but in a sequential manner. In this model also first mother's autonomy is determined and then subsequently in the second equation child immunization is determined in terms of the mother's autonomy and other exogenous variables. So, this enables us to estimate the second equation also as an independent equation. The dependent variable is binary in nature taking values 1 or 0 the appropriate model for estimating the second equation is the LOGIT model. Accordingly, a LOGIT model has been run and the results are shown in the following section.

3. RESULTS

In this section, we are going to present the results of the data estimation.

3.1. Factors Affecting Mother's Autonomy in Barak Valley

In this section, we are going to discuss the result of the regression of the mother's autonomy index on explanatory variables. The result shows how the other variables are affecting the level of mothers' autonomy in the study area.

Table 3: Results of Linear Regression of Mothers Autonomy Index Values of Barak Valley of Assam

Variables, etc.	Estimated Coefficient /Values	t-values
Household Size (H)	-0.060***	-2.89
Mean years of schooling of adult female members (MYF)	0.068**	1.78
Husband education (HE)	0.010	0.54
Living conditions index (LI)	0.071*	1.61
Asset index (AI)	0.002***	5.48
Mothers' average earnings (ME)	0.00002***	2.84
Financial inclusion index of mother (FII)	0.297	1.22
Mothers' education (M Edu)	0.021*	1.63
Constant	-0.529	-1.05
R^2	0.7148	
F (8,171)	9.83***	

Notes: 1. Number of Observations = 180

2. *, **, *** indicate significance at 0.10, 0.05 and 0.01 levels respectively.

The explanatory variable of the study, H_s has come out statistically highly significant with the expected negative sign. This result confirms that a large family size negatively impacts the mother's autonomy. The coefficient of mean years of schooling of adult females (MYF_s) being statistically significant with a positive sign implies that the condition of female adult education in a household played a crucial role in the mother's autonomy. Other significant variables are the living condition index (LI_s), asset index (AI_s), mother's average earnings (ME_s), and mother's education ($M\ Edu_s$). The AI_s and ME_s being positive and highly significant confirm the fact that the family's economic condition and the mother's earnings are highly correlated with the mother's autonomy. Living condition index and the mother's education also have a positive impact on the mother's autonomy. It should be noted that though the husband's education and financial inclusion index of the mother are not statistically significant but have a positive sign.

3.2. Factors Affecting Mother's Health in Barak Valley

In this section, we are going to discuss the result of the regression of mother's health index on explanatory variables. The result shows how the factors that are affecting the level of mother's health in the study area.

Table 4: Results of Linear Regression of Mothers Health Index Values of Barak Valley of Assam

Variables, etc.	**Estimated Coefficient /Values**	**t-values**
Religion (R)	0.022	0.10
Household Size (H)	-0.099	-0.96
Mean years of schooling of adult members (MYS)	0.131 **	3.8
Mother's age (MA)	-0.093*	-1.71
Substance use (SU)	-0.104	-0.58
Parity (P)	-0.191*	-1.68
Living conditions index (LI)	0.797*	1.60
Asset index (AI)	0.001***	2.3
Mothers' average earning (ME)	0.00001***	1.62
Financial inclusion index of mother (FII)	0.565*	1.92
Mothers' autonomy index (MAI)	1.316**	2.28
Mothers awareness index (MAwI)	0.902*	1.63
Constant	1.741**	2.44
R^2	0.704	
F (12,167)	4.89***	

Notes: 1. Number of Observations = 180

2. *, **, *** indicate significance at 0.10, 0.05 and 0.01 levels respectively.

The explanatory variables, viz., mean years of schooling of the adult female, mother's age, parity, living condition index, asset index, mother's average earning, financial inclusion index of mother, mothers autonomy index and mother's awareness index come out to be statistically significant. All these variables are in the expected sign. The mean years of schooling of the adult member are positively significant at 5 per cent level which implies that it affects the

mother's health positively. If the adult members of a household are educated then they realise the necessities of mother's health and also provide a helping help in achieving the target. Mother's age and parity are in the negative sign and statistically significant at 10 percent level implying that if a mother's age is less, then her health is more vulnerable. It goes with the earlier studies. The negative sign of parity implies that the higher the number of children lower the mother's health level. Giving birth to multiple children naturally deteriorates the health of a mother. Other variables like the living condition index, asset index, mother's average earnings, and financial inclusion index of the mother are representing the economic and sanitation level of the household. The asset index and the mother's average earnings being highly significant imply that the economic condition of both mother and the household is closely related to mother's health. An earning mother is healthier than her counterpart. Better access to improved facilities in terms of assets are also reflected in better condition of the mother's health. Thus it can be interpreted that the better the condition of sanitation and economy of a household the better the health condition of the mother. Mother's autonomy index and mother's awareness index are two other important determinants of mother's health. Higher autonomy of a mother gives her authority to make the decision for the betterment of her health also. And if a mother is more aware of the facilities provided to a mother then she can utilise those in her favour and thus the level of the mother's health improves. The variables like religion, household size and substance use are expected signs but not statistically significant. Though it was observed in other empirical studies that religion is an important factor in determining the mother's health. But in the study area, it came out to be insignificant. The probable reason may be due to the widespread functioning of ASHA workers under the NRHM scheme. They are providing door-to-door services and also working to eradicate any religious myth. It should be further mentioned that the coefficient of constant is significant with 10 per cent level. The significance of the constant term implies that there are other variables also which affect the mother's health level but are not included in the model. Therefore, there lies the opportunity of further studies.

3.3. Factors Affecting Child Immunisation in Barak Valley

The focus point of the whole study is discussed in this section. The following section gives a detailed discussion on whether the mother's autonomy has an impact on child immunisation in the Barak Valley region of Assam.

Table 5: Results of Logit Regression of Child Immunization of Barak Valley of Assam

Variables, etc.	**Estimated Coefficient /Values**	**z-values**
Mothers' autonomy index (MAI)	13.99***	5.09
Distance of Health Institution from Home (**In Km)**	-0.015	-0.82
Mothers awareness index (MAwI)	1.54	0.99
Constant	-3.11***	-3.86
Pseudo R^2	0.4379	
LR chi2(3)	75.1^{***}	

Notes: 1. Number of Observations = 180

2. *, **, *** indicate significance at 0.10, 0.05 and 0.01 levels respectively.

A close perusal of the above table-5 reveals that of the three variables only mother's autonomy index came out to be significant. Among the variables, the target variable mother's autonomy index is positive and highly significant at 1 percent level. This implies that child immunisation does have a positive relationship with mother's autonomy. The higher the mother's autonomy

higher will be the level of child immunisation. The finding goes in line with other studies where we find that mother's autonomy also affects the child's malnutrition (Carlson et al., 2014). An autonomous mother is expected to have the power to take the decision regarding the well-being of her child. As the dimensions of our mother's autonomy index are decision-making autonomy, economic autonomy and autonomy of mobility. Therefore, a higher level of autonomy implies that the mother is able to take decisions, has economic power and is able to move around whenever necessary. Thus autonomy enables the mother to act upon the child's welfare which ultimately increases the level of achievement regarding child immunisation. We can also find that the variable distance of health institutions from home is an expected sign but not statistically significant. This negative sign of the variable implies that if the distance of the health institution is more, then the level of child immunisation is hampered. The probable reason behind this may be the opportunity cost. Especially in rural areas most of the people are day labourers. Hence, the opportunity cost of taking a child to the far-away health institution for vaccination is comparatively very high, as the parents have to let go of their one-day income. The result also verifies the earlier findings of Abdulraheem et al., 2011 and Root et al, 2014. However, in this exercise, we find that the variable is statistically not significant. So we cannot claim that distance has a negative impact on child immunisation in the context of our study area, i.e., Barak Valley, Assam. The probable reason may be that the negative impact of the distance factor has been overcome to a great extent by the strength of the mother's autonomy. Similarly, mother's awareness index is not statistically independent but it is expected to have some positive impact on the level of child immunisation. A more aware mother is generally expected to utilize the child's health care properly and thus it may positively contribute to the well-being of her child.

4. Conclusions and Policy Prescriptions

From the above discussion, it can be concluded that mother's health and autonomy play an important role in determining the child's immunisation level in Barak Valley. There are many factors that determine mother's health, autonomy and also child immunisation simultaneously. In this study mother's autonomy is both explained variable and explanatory variable. The factors like family size, mother's education, education of family members, access to assets of the family, financial inclusion of the mother etc. determine the health and autonomy aspect in this region. It is worth mentioning that earlier studies show that both religion and distance from the health institution play an important role in child immunisation in the country (Patra, 2006). But one crucial finding of the study is that in this region both these factors are statistically insignificant. The probable justification behind this may be the achievement of ASHA workers. The ASHA workers are tirelessly working to fulfill the target of zero unimmunised children in this country. They are serving door to door, thereby eliminating the barrier of distance. They are also working to eliminate the societal myths regarding the religious barrier to immunisation. Another reason may be due to the improvement in the mother's autonomy those barriers are also eliminated. The positive impact of the mother's autonomy surpasses the negative impact of distance. Therefore, based on the above discussion we can suggest some policies which can be implemented to further uplift the health condition of this region. As we can see that mother's autonomy is the most crucial indicator in determining child immunisation, therefore, the mother should be given more importance in the family. For this education, women are most important. There may be awareness camps for the women of the society to make them knowledgeable about their rights and powers. Secondly, the financial inclusion of the mother is another important aspect, thus initiatives may be taken to make the mothers more financially included in the society. Thirdly, access to media and necessary amenities should be increased to achieve the high level of child immunisation. Lastly, health institutions should take further

initiatives to reach to the target population. Conflict of interests: The paper has no conflict of interests.

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APPENDICES

Table A.1: Description of Variables of Mother's Autonomy and the Functional Relationship

Indicator	Category	Explanation	Functional Relationship
Mother's autonomy index	Dependent	Mother's autonomy index is constructed following the modified UNDP formula (Iyengar and Sudarshan,1982). The index consists of the four dimensions of autonomy, viz., decision-making autonomy, and economic autonomy, autonomy of mobility and positional autonomy.	----
Household size	Independent	Household size determines the level of autonomy. In an Indian context where the families tend to be larger in size, mother's autonomy is negatively affected by the large size.	Negative
Mean years of schooling of adult female	Independent	Mean years of schooling determines the number of years spent in education. A family where the female members are educated understand the importance of mother's autonomy and thus positively affects the level.	Positive
Husband's education	Independent	An educated husband is expected to support and understand the mother's autonomy in maintaining a healthy family relationship.	Positive
Living condition index	Independent	This variable reflects the access to sanitation and amenities, therefore positively affecting the level of mother's autonomy.	Positive
Asset index	Independent	The possession of assets by a household reflects the economic condition of that household. Access to better assets and media helps the mothers to increase their level of awareness which ultimately boosts the level of the mother's autonomy.	Positive
Mother's average earning	Independent	This is another important indicator of mother's	Positive

		autonomy. An earning mother has some advantages within the family. Thus she naturally enjoys a higher level of autonomy. An earning mother has a higher level of economic autonomy.	
Financial inclusion index of mother	Independent	The financial inclusion index of mothers comprises the possession of bank accounts and involvement in microfinance institutions of the mothers. If a mother is financially included then she has some economic advantage in the system. That ultimately increases the level of the mother's autonomy.	Positive
Mother's education	Independent	It is well-established fact that higher the level of mother's education higher will be the level of her awareness. An educated mother can grasp the facilities provided for her as well as for society. Mother's education is, thus, positively associated with the mother's autonomy.	Positive

Source: Authors' own data

Table A.2: Description of Variables of Mother's Health and the Functional Relationship

Indicator	Category	Explanation	Functional Relationship
Mother's health index	Dependent	Mother's health index is also constructed following the modified UNDP formula (Iyengar and Sudarshan, 1982). ANC, quantity of ANC, delivery and post-delivery care are the variables that construct the mother's health index.	----
Religion	Independent	Religion is considered to be an important factor to determine the health level of a mother in a household. Various empirical studies show	Positive/Negative

		that mother's health and child immunisation are less in the Muslim community than in Hindu (Kumar et al, 2001). In Barak Valley, there are basically two dominant religious communities, viz., Hindu and Muslim. In this study, we have considered dummy of religion as 0 for Muslim and 1 for Hindu. If the result is positive and statistically significant then it implies that mother's health is better in the Hindu community and vice-versa.	
Household size	Independent	Like the mother's autonomy, household size also determines the level of the mother's health. In a bigger family, a mother is spared less time to take care of herself and her health condition. Therefore, the larger the household size lower will be the mother's health level.	Negative
Mean years of schooling of adult members	Independent	Educated adults will help and understand the mother's health. The opportunities available to mothers will be better understood by educated people as the awareness level also tend to be high among educated people.	Positive
Mother's age	Independent	This variable is expected to have a negative impact on the mother's health. In medical science also it is an established fact that becoming a mother at premature age deteriorates the health condition of the mother. Moreover, a young mother will not be	Negative

		well aware or mature enough to take proper care of her as well as her child's health. Therefore, age negatively impacts health conditions.	
Substance use	Independent	Using substance like Tabaco generally deteriorates the health condition. And the mother's health is also negatively affected by substance use.	Negative
Living condition index	Independent	Like the mother's autonomy level, the mother's health is also determined by the living condition index. The living condition index includes the type of houses, sources of amenities and safe drinking water, electrification etc. those variables are crucial to boost up health condition of every human being. Therefore, access to better living conditions will positively affect the mother's health condition.	Positive
Asset index	Independent	The availability of better means of cooking, usage of vehicles, and tools to use in day-to-day life enable the mother to lessen her physical burden. Access to television and smartphones helps the mothers to know about the health care facilities provided and thus making them aware. Thus the asset index positively affects the mother's health index.	Positive
Mother's average earning	Independent	If the mother has her own earnings, then she is entitled to enjoy the privilege of better health	Positive

		and autonomy. Personal income gives security and supremacy to the mother. Thus the variable mothers' average earning has a positive and significant impact on mothers' health.	
Financial inclusion index of mother	Independent	The financial inclusion index of mothers comprises the possession of bank accounts and involvement in microfinance institutions of the mothers. If a mother is financially included then she has some economic advantage in the system. That ultimately increases the level of the mother's autonomy as well as the mother's health.	Positive
Mother's autonomy index	Independent	Mother's autonomy index is considered to be the most important aspect of mother's health. If a mother has autonomy in the family, then she can take the decision for the betterment of her and her child's health. An autonomous mother has decision-making autonomy, economic autonomy and autonomy of mobility. Thus, the mother can freely take the decision, provide for her health facilities and also move around to get better access to healthcare facilities. Therefore, the mother's autonomy index positively and significantly affects the mother's health.	Positive
Mother's awareness index	Independent	Another important factor that can positively affect mother's health is the	Positive

		mother's awareness index. The more aware the mother is the better will be her health condition. If a mother is aware of the healthcare facilities then she can utilize them better.	

Source: Authors' own data