

Effect of Microcredit on Health and Nutrition of Women: A Case Study of Anganwadi Workers in North Delhi District

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Abstract—Over the past few decades microfinance has been evolving across India as a mechanism of financial inclusion. Microfinance stands not just as one of the most assuring and cost-effective tools to attack poverty across the world but also to influence the nutrition level and health of people, directly as well as indirectly. This research is conducted to investigate the impact of microcredit on the health of women with the main focus on Anganwadi workers of Timarpur, Wazirabad and Gulabi bagh areas in North Delhi district. In a developing nation like India, women in rural areas enjoy less liberty and overburdened by household chores, the expenditure on their health is less than minimal. They often tend to ignore their health and in this regard, it's important to empower these women socially and economically to improve their nutrition level, health and livelihood through access to short term credit provided by MFIs. We have exclusively studied the impact on health and nutrition of women since a large proportion of women in rural areas suffer from high blood pressure, anemia, digestive disorders as well as heart and kidney disorders. This study covers various aspects such as maternal health, ante natal and post natal care, diversity of food consumed, availability of health care services, micronutrient intake, and prevalence of anaemia in women. The primary data for this research project is exclusively collected through a survey of the Anganwadi workers under Timarpur project and official permission was taken from the Deputy Director-ICDS, Department of Women and Child Development, Govt. of NCT of Delhi. Also, for an extensive literature review special permission was taken to access CDE (Delhi School of Economics) and Ratan Tata Library. The analysis of correlation coefficient between the explanatory variables and health and nutrition of women using Gretl reveals that there is significant impact of the availability of microcredit on women's health and nutrition.

Keywords: Microcredit, Nutrition, Health, Anganwadi, Financial Inclusion, Maternal Health.

1. INTRODUCTION

The term 'microfinance' refers to the full range of financial services that low-income people use, including not only credit but also savings, insurance and money transfers. MFIs, as well as development non-government organizations (NGOs) with a strong microfinance component, are increasingly recognized

for their capacity to provide effective and sustainable programmes to reduce poverty and associated vulnerabilities such as food insecurity among the world's poorest people. However not many studies have been undertaken to this indirect link between availability of microcredit and its impact on health and nutrition level of women. Over 3500 MFIs around the world provide microcredit and other financial services to more than 155 million households (Daley-Harris 2009).

Anganwadi's were started by the Indian government in 1975 as part of the Integrated Child Development Services (ICDS) program to combat child hunger and malnutrition. An Anganwadi centre is a part of the Indian public health-care system and provides basic health care facilities in Indian villages such as contraceptive counseling and supply, nutrition education and supplementation, as well as pre-school activities. The Ministry of Women and Child Development has laid down certain guidelines as to the basic work of Anganwadi workers which is extremely important and needs to be carried out in the most efficient manner possible. These include showing community support and active participation in executing this programme, to conduct regular quick surveys of all families, to provide antenatal care for pregnant women and ensuring that they are immunized against tetanus, to provide post natal care to nursing mothers, to provide basic health and nutritional education to families especially pregnant women as to how to breastfeeding practices, to provide pre-school education to children between 3 to 5 years old, etc. The project has two interdependent interventions: microcredit & health and nutrition.

2. LITERATURE REVIEW

"Nearly forty years after nationalization of banks, 60% of the country's population do not have bank accounts and nearly 90% do not get loans," India has been currently the second-highest number of financially excluded households in the

world[52]. Theoretically, financial inclusion implies increasing the coverage of the formal financial system, it may be expected to contribute to the development of a financial system. The relationship between financial development and growth has been studied by a number of economists[54]. There is an agreement that the two are related, but there is a lack of consensus on the direction of causality[20]. It is commonly argued that the economy as a whole benefits through financial inclusion and a number of empirical studies however suggest that development of the financial system spurs growth in an economy. [36]. However, not many studies have been conducted to establish a link between microcredit availability and health and nutrition of women.

“Microcredit, or microfinance, is banking the unbankables, bringing credit, savings and other essential financial services within the reach of millions of people who are too poor to be served by regular banks, in most cases because they are unable to offer sufficient collateral [23]. The broad objective of Financial Inclusion (FI) is to extend the scope of activities of the organized financial system to include within its ambit people with low incomes. [54] MFIs provide products and services to their customers as formal sector financial institutions. Increasingly today, MFIs have begun to offer additional products, such as savings, consumption or emergency loans, insurance, and business education. The scale and method of delivery differ, but the fundamental services of savings, loans, and insurance are the same [9]. The Indian state has put stress on providing financial services to the poor and underprivileged since independence. The commercial banks were nationalized in 1969 and were directed to lend 40% of their loan able funds, at a concessional rate, to the priority sector which included agriculture and other rural activities and the weaker strata of society in general[16].

To supplement these efforts, the credit scheme Integrated Rural Development Programme (IRDP) was launched in 1980. But these supply side programs (ignoring the demand side of the economy) aided by corruption and leakages, achieved little [17]. 70% of landless/marginal farmers did not have a bank account and 87% had no access to credit from a formal source[67]. It was in this cheerless background that the Microfinance Revolution occurred worldwide as pioneered by the Bangladeshi Grameen Bank. In India it began in the 1980s with the formation of pockets of informal Self Help Groups (SHG) engaging in micro activities financed by Microfinance [59] which represents a good vehicle for promotion of financial inclusion in developing countries [54]. Sharma K.C. [57] conceptualize SHG as an informal association of individuals which comes together voluntarily for promotion of economic and social objectives, and contributes to the development of rural people in a meaningful manner [56]. Presently, in India, Micro-credit programmes are run primarily by NABARD in the field of agriculture and SIDBI in the field of Industry, Service and Business (ISB). (Government Of India ,Ministry Of SSI, 2003). These microcredit programmes generally sustain themselves by charging interest rates that are

above market rates to recover the operating costs associated with extending small amounts of credit. (UNICEF)

In India there are wide ranges of variation in educational, medical and food consumption expenditure within different income groups of the households. Elderly women in India face various socioeconomic, environmental, psychological, and health related issues due to their increased vulnerability, as they are more likely to be widowed and have low economic security, lower educational attainment, less labour force experience, and more care giving responsibilities[65]. [22] have found that gender inequity, particularly in untreated morbidity and health care cost, continued to be severe.[46] concluded that gender acts as an important determinant of health inequalities and inequity. [33] investigated gender differences in the use of healthcare and the extent to which any observed gender differences were mediated by differential health needs and economic access and find that health needs were substantially greater among older women compared with older men and that women had fewer economic resources. [1] concluded that health expenditures on female adults are significantly lower than those on males in Odisha and [45] suggest that women continue to face inequities related to health care, often invisible within the discourse of the ageing policy.

Gender also plays the main role in intra-household food allocation. [21] examined the gender difference in expenditure allocation for three states, namely, Kerala, Bihar, and Maharashtra, and found that it is more prevalent in the adult age group. They conclude that, in Maharashtra, increase in the proportion of male adults leads to a strong and significant increase in the budget share of food, whereas that in female adults leads to a statistically significant decline, thus providing a strong example of pro male gender bias in food spending in Maharashtra [7]. According to a study conducted by A. Nesbitt, S. Majowicz, R. Finley et al. [43] in Canada, consumption of many food items varies by gender and age and specific foods are significantly more likely to be consumed by the elderly male individuals[7].

A small but growing number of studies that integrate microfinance with other non-financial services seem to support the argument that MFI financial services have positive impacts beyond the direct financial benefit, such as women’s empowerment and decision making agency [39], nutritional status of children [18] and health outcomes, including use of contraceptives, higher child-survival rates, reduced family violence and increased use of health services [41]. Cheston and Kuhn, J.Murugesan and Narasaiah [12,27,42] in their study concluded that Micro Finance programmes have been very successful to empower poor women, by creating awareness about newer economic opportunities available to women [29], by practicing a kind of development more generally - that could engage women's solidarity to challenge dominant gender ideologies [35] and by enabling them to

become self-dependent and self-reliant by accepting gross root women entrepreneurship [53].

Hans Dieter and Uben [25] had shown how financially viable institutions can sustainably reach the poor in significant numbers, both in borrower selection, as well as in project implementation [28] and bring about a marginal improvement in the beneficiaries' income. Anwarul [4] tried to present evidence of the important contributions made by microcredit in the eradication of poverty by empowerment of poor people to access development services such as health and education. There is increasing recognition that poor health is a dimension of poverty [64]. Microfinance schemes have been documented as the best opportunity for increasing financial and logistical accessibility of health care services to many populations which are difficult to reach especially in developing countries [57]. Abdullahel and J Health Population Nutrition [2,26] suggested that improving health is one of the most unambiguous benefits of microcredit in Bangladesh. Instead of being portrayed as a panacea, microcredit programmes may be better seen as providing a forum to link vulnerable populations to public health to address the barriers faced by the poor. [51,19]

Women, who experience greater rates and depths of poverty, are especially vulnerable to poor health [5]. Improving the health of the poor is a public health priority worldwide and this is particularly true in low-income countries, where the burden of disease is heaviest [66]. The fact that the typical female advantage in life expectancy is not seen in India suggests there are systematic problems with women's health [63] and the leading contributor to high maternal mortality ratios in India is lack of access to health care. Severe anemia accounts for 20 percent of all maternal deaths in India (The World Bank, 1996). While malnutrition in India is prevalent among all segments of the population, poor nutrition among women begins in infancy and continues throughout their lifetimes [11,15]. The negative effects of malnutrition among women are compounded by poverty, by childbearing and rearing, and by special nutritional needs of women, resulting in increased susceptibility to illness and consequent higher mortality [63]. Further, Indian women have little autonomy [11,15] towards education which is highly correlated with the level of malnutrition among children [44] and labour force participation. All of these factors exert a negative impact on the health and nutritional status of Indian women. Microcredit can be the source of increased household income. Countries with higher average national income tend to have fewer households in extreme poverty, and also have fewer undernourished children [60]. Access to microloans can significantly improve the health conditions (high cholesterol, infertility/miscarriages, eating disorders, high blood pressures, etc) of the women; and children's survival rates and nutrition. Variations in bodyweight that do not exceed the clinical threshold may convey information about changes in nutritional status, as a predictor of health outcomes [48].

Microcredit has been called "the" significant intervention in the fight against poverty for the twenty-first century [49]. But the thrust of the movement has been especially to engage poor women, not only to alleviate poverty, but also to increase their access to resources and enhance their power in household decision-making [61]. This is reflected in the growing prevalence of microcredit programmes, with numerous schemes sprouting up in Asia, Africa, Latin America and the Caribbean, and the Middle East. In reference to India, not many studies have been undertaken to study this link between the health status of women and microcredit and hence there are gaps in the literature. Therefore, a similar study has to be conducted in India to establish and study the link between access to microcredit facilities and health & nutritional status of women.

3. OBJECTIVES

The objectives of this paper are as follows:

- To examine the role of MFIs and SHGs in enhancing the health conditions of women which has not been extensively studied yet.
- To explain the role and importance of financial inclusion.
- To enumerate the total number of Anganwadi workers seeking assistance in form of loans by MFIs or SHGs.

There is a positive impact of microcredit on women's health and nutrition and there is a need to strengthen and expand its outreach. In view of these objectives, it was necessary for us to generate primary data on the use of microcredit by the Anganwadi workers and to assess people's need for loans from MFIs. Therefore, we decided to undertake a Survey of Anganwadi workers in Timarpur, Wazirabad and Gulabi Bagh areas of North Delhi district.

The main objective of the survey was to collect the financial and personal details along with details related to their food intake. The paper computes a Health index as well as a Nutrition Index based on various factors as mentioned in the methodology which was further analysed for empirical findings. We did the entire work of conducting the survey, data entry, tabulation and empirical findings were done by us for a thorough and original study. For the purpose of conducting the survey to collect the primary data, all the Anganwadi workers were grouped into 3 regions and a total of 200 Anganwadi workers were interrogated.

4. METHODOLOGY

Study design and sampling in this study was conducted from August 2015 to January 2016 among a large sample of female 'Anganwadi workers' of North Delhi districts. Delhi has a population of approximately 9.879 million (2001), with a large proportion of semi urban/rural population. The state of Delhi received a sanction of 546 AWCs (05 projects) from Government of India during the year 2005-06 and same has

been operationalized. After receiving a special permission from Deputy Director-ICDS, Department of Women and Child Development, Govt. of NCT of Delhi, New Delhi we were allowed to approach the Anganwadi workers under Timarpur Project and a total of 200 Anganwadi workers were interviewed and asked questions about a variety of socio, demographic and health indicators along with the personal details such as monthly family income, age, number of family members and children, etc.

Measures: covariates

Anganwadi workers were asked about their age, number of family members, monthly family income, age at first birth, monthly visits to hospital and gap between two consecutive births, etc. Each of these indicators were then analysed. Workers were asked about their educational attainment, borrowing from MFIs, Part of SHGs or Mahila mandal, miscarriage/abortion, antenatal care visits, postnatal care within 24 hours of delivery.

Measures: outcomes variables

Health Index for individual observation was calculated as:

HI = (High Blood Pressure+ Kidney Disorders+ Anaemia + Digestive Disorders+ Eating Disorders+ Heart Conditions +Malnutrition)/7; where value 1 represents presence of a disease and 0 indicates absence of a disease. Further, each value oh HI was changed into a dummy variable based on its value. 1 was given for value = or > 0.5 and 0 for value < 0.5

Nutrition Index for individual observation based on weekly intake was calculated as:

NI = (milk/milk products + fruits and vegetables+ eggs+ non-veg food+ nuts+ pulses or beans)/6; where value 1 represents weekly consumption and 0 does not indicate weekly consumption. Further, to calculate the nutrition index for each observation was given value 1 for mean = or > 0.5 and 0 for value < 0.5.

5. METHODOLOGY OF PROBIT MODEL

We have used the **probit model**, a type of regression where the dependent variable can only take two values and is suitable for qualitative variable such as HI and NI. The probit model depends on an unobservable utility index I_i (also known as a latent variable), that is determined by one or more explanatory variables, say in such a way that the larger the value of the index I_i , the greater the probability of having a disease.

We express the Index I_i as $I_i = \beta_1 + \beta_2 X_i$, where, X_i are the independent variables described later.

It is reasonable to assume that there is a critical or threshold level of the index, call it I_i^* , such that if I_i exceeds I_i^* , then individual will have disease, otherwise it will not. The threshold I_i^* , like I_i , is not observable, but if we assume that it is normally distributed with the same mean and variance, it is possible not only to estimate the parameters of the index given

in but also to get some information about the unobservable index itself. Given the assumption of normality, the probability that I_i^* is less than or equal to I_i can be computed from the standardized normal CDF as

$$P_i = P(Y = 1 | X) = P(I_i^* \leq I_i) = P(Z_i \leq \beta_1 + \beta_2 X_i) = F(\beta_1 + \beta_2 X_i)$$

Where $P(Y = 1 | X)$ means the probability that an event occurs given the value(s) of the X , or explanatory, variable(s) and where Z_i is the standard normal variable, i.e., $Z \sim N(0, \sigma^2)$.

If a variable X follows the normal distribution with mean μ and variance σ^2 , its

$$\text{PDF is } f(X) = (1/\sqrt{2\sigma^2\pi}) e^{-(X-\mu)^2/2\sigma^2} \text{ and CDF is } F(X) = \int_{-\infty}^X (1/\sqrt{2\sigma^2\pi}) e^{-(X-\mu)^2/2\sigma^2}$$

The derivative of this function with respect to X is: $dP_i/dX_i = f(\beta_1 + \beta_2 X_i)\beta_2$

6. DATA ANALYSIS

The data from the primary survey was entered and initially analysed in excel before using GRETL for the basic statistical analysis. Arithmetic mean of the personal details of the interviewed sample was then calculated and the mean values of age, monthly family income, savings, number of family members, number of children, age at first birth, trips to healthcare facility each month, gap between two consecutive births was found for the sampled Anganwadi workers (Table 1)

PERSONAL DETAILS	AVERAGE
AGE	37.165
NO. OF FAMILY MEMBERS	4.5477
MONTHLY FAMILY INCOME	11345
SAVINGS	693.02
NO. OF CHILDREN	1.755
AGE AT FIRST BIRTH	23.832
MONTHLY VISITS TO HEALTHCARE FACILITY	1.415
GAP BETWEEN 2 CONSECUTIVE BIRTHS	2.2645

Further, respondent's education details along with other details such as miscarriage or abortion, availability of antenatal care and postnatal care and consumption of iron or vitamin A were analysed using dummy variables as mentioned in table (2.1 & 2.2).

	Frequency (n=200)
EDUCATION	
B.A. (0)	80
12TH (1)	85
10TH (2)	35
MISCARRIAGE OR ABORTION	
Miscarriage (0)	56
Abortion (1)	39
None (2)	98
Both (3)	7

Table 2.2

	Frequency (n=200)	
	YES=1	NO=0
BORROWED FROM MFI	104	96
PART OF SHG OR MAHILA MANDAL	98	102
VITAMIN A OR IRON DROPS	116	84
ANTENATAL CARE	160	40
POST NATAL CARE	164	36

From the data it was known that out of 200 women, 104 borrowed from a MFI and 98 were a part of a SHG or Mahila Mandal. It was calculated using a dummy variable taking value 1 for Yes and 0 for No. The Health Index (HI) and frequency of occurrence of the various diseases is shown in Table (3) and Nutrition Index (NI) based on weekly consumption of diverse food items is shown in Table (4).

Table 3: HEALTH INDEX

DISEASES	Yes(1)	No(0)
Blood pressure	65	135
Kidney disorders	41	159
Anaemia	120	180
Digestive disorders	57	143
Heart conditions	52	148
Eating disorders	58	142
Malnutrition	89	111
Health Index	70	130

Table 4: NUTRITION INDEX

WEEKLY CONSUMPTION OF	YES(1)	NO(0)
Milk/milk products	144	56
Fruits and vegetables	153	47
Eggs	76	124
Non-veg Food	68	132
Nuts	19	181
Pulses/beans	126	74
Nutrition Index	105	95

In this case study of 200 Anganwadi workers, 94 borrowed from microfinance institutions (MFIs) and had good health as indicated by the Health Index whereas solely 4 of the respondents borrowed from microfinance institutions (MFIs) and were unhealthy. 36 healthy respondents had not borrowed from any MFIs and 57 healthy women were a part of the Self-help groups (SHGs) or Mahila Mandal. As specified by the nutrition index, 89 of the borrowers had good nutrition levels and 85 out of 200 women who did not borrow from any MFI had low nutrition level. Merely 17 workers had a good nutrition level despite of the fact that they did not borrow from any MFI. Likewise, 48 members were part of the SHG or Mahila Mandal and revealed passable nutrient intake.

Considering the case of most frequently occurring diseases, 74 of these 200 anganwadi workers were anaemic and malnourished and 48 of them were suffering from both anaemia as well as high blood pressure. Also, 37 personnel suffered from malnourishment and high blood pressure both.

Comparing HI, NI as well as women’s participation in SHG’s or Mahila Mandal; 40 anganwadi workers who were borrowing from MFIs and were a part of SHG or Mahila Mandal too possessed good health. 54 healthy borrowers exhibited good health even after not being a part of any SHG or Mahila Mandal. Also, 51 of the borrowers were not the part of any SHG or Mahila Mandal also exhibited adequate nutrient intake.

7. EMPIRICAL FINDINGS

The evidence from case study respondents suggests that there is a significant impact of microcredit on the health and nutrition index. The availability of microcredit not only helped the Anganwadi workers to improve their nutrient intake and health status but also improved their social status, family life, and possibly children’s nutrition – although it is harder to support the latter arguments through this particular case study data alone.

8. STUDYING THE IMPACT OF AVAILABILITY OF MICROCREDIT ON THE HEALTH STATUS:

Model: Probit, using observations 1-200
 Dependent variable: HEALTHINDEX
 Standard errors based on Hessian

Analysis result using Probit as in Table (5) show that the explanatory variable: Borrowed from MFI is highly significant. Its clear from the results that the health index decreases or the health of the individual becomes better with increase in monthly family income and borrowing from MFI. However, monthly family income didn’t turn out to be a significant factor affecting the health and nutrition of women in our case study since number of family members and number of children also affect the per head availability of resources affecting health and nutrition of members in the family. In case of education level, since 0 represents a graduate in the data the decrease in value of dummy variable for education shows betterment of health of the respondent. Though there are evidences of a direct relationship between borrowing from MFI and health and nutrition of the Anganwadi workers but in this sample education wasn’t a significant factor.

$$Y_i = \beta_1 + \beta_2(X_2=11,345) + \beta_3(X_3=1) + \beta_4(X_4=1)$$

Where, X_2 = the average monthly family income i.e. $X_2 = 11,345$

X_3 = the one who are borrowing from MFIs

X_4 = the one with educational attainment upto 12th std.

Resolving the above equation by placing the values, we interpret the result as:

If the average monthly family income of an individual is 11,345 as per our data and education attained is upto 12th std., then the probability of getting a Health disease is **3.920%** when an individual borrows from MFI.

Table 5

	coefficient t	std. error	z	p-value
const	0.495870	0.339172	1.462	
MONTHLY FAMILY INCOME	-3.73614e -06	2.33836e- 05	-0.159 8	-1.19847e -06
BORROWED FROM MFI	-2.12471	0.264932	-8.020	-0.607708 ***
EDUCATION	-0.093917 7	0.158210	-0.593 6	-0.030126 6

Studying the impact of availability of microcredit on the Nutrition:

Model 5: Probit, using observations 1-200

Dependent variable: NUTRITION_INDEX

Standard errors based on Hessian

Analysis result for Nutrition index as in Table (6) shows the significance of the explanatory variable: Borrowed from MFI to a high extent. The results show that the nutrition index increases or the weekly consumption of healthy food increases with increase in monthly family income, post-natal care, education level and borrowing from MFI. However, similar to the case of Health Index, monthly family income is affected by varying number of family members. Also, in this sample education, postnatal care and monthly family income didn't come out to be significant.

$$Y_i = \beta_1 + \beta_2(X_2=11,345) + \beta_3(X_3=1) + \beta_4(X_4=1) + \beta_5(X_5=1)$$

Where, X_2 = the average monthly family income i.e. $X_2 = 11,345$

X_3 = the one who are borrowing from MFIs

X_4 = the one with educational attainment upto 12th std.

X_5 = the one who received postnatal care within 24 hours of delivery.

Table 6

	coefficient	std. error	z	p-value
const	-1.15307	0.451292	-2.555	0.0106**
BORROWED FROM MFI	2.30278	0.235640	9.772	1.48e- 022 ***
MONTHLY FAMILY INCOME	4.98944e- 06	2.45557e- 05	0.2032	0.8390
POST NATAL CARE	0.219029	0.288599	0.7589	0.4479
EDUCATION	- 0.0673063	0.160359	- 0.4197	0.6747

Resolving the above equation by placing the values, we interpret the result as:

If the average monthly family income of an individual is 11,345 as per our data, education attained is upto 12th std. and she gets proper postnatal care within 24 hours of delivery, then the probability of Nutrition Index (NI) is **8.691%** (where NI

=1 indicates high nutrition level) when an individual borrows from MFI.

Nutrition is a short run concept. Evidently, enhancement of nutrition level amongst women is exhibited by borrowing from MFI but Health Index will not change immediately. An individual suffering from anaemia, malnutrition, etc may not recover immediately but there will be gradual improvement in their health as borrowing from MFIs will provide them with sufficient money which would improve their dietary intake and build up a strong immune system. With the passage of time, they will develop immunization against diseases. Our study is based on cross-sectional data over a period of time and for microcredit to have an extensive impact on the health of an individual we need to have data for a long period of time since it is expected that health index (HI) will improve gradually.

9. SIGNIFICANCE OF THE STUDY

The objective was to understand, through a case study process, how microcredit impacts participants' health and nutrition level. 94 of the 200 respondents who borrowed from MFIs appear to have good health. 89 of these 200 Anganwadi workers borrowing from MFIs showed high nutrition level. Therefore, there seems to be a significant impact of availability of microcredit on health and nutrition level of Women.

While more difficult to verify with case studies alone, there was evidence that borrowing from MFIs imparted both good health and adequate nutrient intake when associated with SHG or Mahila Mandal.

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