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Prevalence of Malnutrition among Adolescent: The Socio-Economic Issues and Challenges in Mumbai Metropolitan Region

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Abstract

Adolescent must have access to health care, nutrition and education. The physical and psychological changes are taking place in this period. Healthy adolescent means healthy future human resource for any country. The well educated and healthy adolescent always leads to development of country. But adolescent health is critical issue in slums of Mumbai Metropolitan Region. The incidence of severe malnutrition among male and female is found much higher in all suburbs. Such incidence is higher for male as compare to female. The physical and electronic asset holding is more among adolescent. But still incidence of severe malnutrition is higher. We have also found that pulses, vegetables, fruits eaten is more among the adolescent but still we found more incidence of malnutrition. At lower educational level of parents, the incidence of malnutrition is higher among adolescent. At lower per capita income, the body mass index of adolescent is found low. If the per capita income increases then body mass index of adolescent also increases. The logistic regression result shows that malnutrition among female is positively co-related with sex, women water related trips, sewing machine, behavior of health staff and still breastfeeding to child. It is negatively correlated with age, weekly required liter of water, milk and hours of breastfeeding. The malnutrition among male is positively co-related with private health care treatment, purify drinking water, electricity, not known any contraceptive method. It is negatively corelated with sex, age, government water supply, cooker, sewing machine, television, bike, hygiene in public health care. The malnutrition among male and female is positively corelated with fan in house and outside food to child. It is negatively co-related with sex, age and watch television, assistance for delivery, child shown to health professional and child care at work. Therefore the policy such as water supply, the health care access to slums especially adole

Index terms— behavior, health care, contraceptive.

1 Introduction

dolescent is a key phase of human development. It is a transition period from childhood to adulthood. Such period occurs between twelve to nineteen years of age. All adolescent must enjoy good health and well being. Adolescent girls are the vital bridge between the present and future generation. Therefore adolescent nutrition and health care is a major concern all over world. In South Asia, a high prevalence of under-nutrition among adolescents has been observed. Under-nutrition and overweight is a global problem, especially overweight and obesity spreading even to developing world, where it is an increasing threat to health. One third of all deaths globally already stem from ailments linked to excess weight and low consumption of food (Funke O.M.2008).

1 INTRODUCTION

Malnutrition which refers to an impairment of health either from a deficiency or excess or imbalance of nutrients is of public health significance among adolescents all over the world. It creates lasting effect on the growth, development and physical fitness of a person. Despite the economic growth observed in developing countries, malnutrition and particularly under nutrition is still highly prevalent. Under nutrition in adolescents has a detrimental effect as it affects their ability to learn and work at maximal productivity. Concurrently, a growing prevalence of obesity and its related chronic diseases is being observed in these countries (Mahajan, H. and Shalini Srivastav 2013). In developing countries, half of all children and adolescent fail to achieve their full genetic growth potential. It is due to inadequate nutrition and frequent illness and lack of health care access. Adolescent girls go under the stage of menarche. Nutrition has an important bearing on age at menarche. Adolescents gain fifty percent of adult weight and more than twenty percent of their adult height during this period. Menarche is attained earlier by well nourished adolescents. A minimal amount of body fat is essential for initiation of menarche **??**Acharya A. et.al 2006). The adolescent girls are discriminated in distribution of and access of food and health care within the family. In India, adolescent girls are ignored and they remain a largely neglected population (Bhattacharyya, Himashree, Alak Barua 2013). The problem of malnutrition among adolescent is received recognition by the academicians and policy makers. It is because now also adolescent suffer from chronic malnutrition which adversely affects their health and wellbeing **??**Iyer U. et.al.2011). The numbers of national nutrition programs are introduced by central government to combat the adolescent malnutrition. However malnutrition still persists among adolescent across India.

Adolescent nutrition is major problem of slums in Mumbai Metropolitan Region. Parents' education is a sole determinant of health of adolescent. Good educated parents always understand the health needs of adolescents. Higher household income allows families to buy milk, fruits, fish and vegetables. Such food has high nutritional contents. It helps adolescent to overcome with nutritional stress and achieve more gain in health and education. But households in slums have very low income. Most of the people are involved in contractual work and self employment. Household's physical assets are playing important role in health status of members. In a poor family, everybody is using such assets and improve well being. But most of the families are very poor and they are not in an economic condition to buy the physical and electronic assets. In households, there is no place to keep such valuable assets. But still few households buy second hand physical and electronic assets. Age of the adolescent is important determinant of nutritional status. At lower age, adolescents do not understand the nutritional requirement of body. In slums, household resources are less and family members are more. Therefore the resources are not transferred adequately to adolescent. In adolescent period, female required good quality food for better growth and development. Good nutrition benefits not only female own body but future pregnancies and generations. But in slums, the poor households buy less quality and quantity of food. The adolescent males are offered good quality food because they are considered as future asset for family. Females are neglected in terms of care, food and medical care. Adolescents are a potential group in view of rapid growth and maturation which demands extra nutrients. With the multitude of social customs and beliefs cited against adolescents especially adolescent girls it is no wonder that they form the vulnerable group of under nutrition **??**Saxena Y. and Saxena V.2011).

Adolescent are exposed to mass media and internet. They know about the current affairs in society and politics. They are exposed to good and bad affairs in everyday life. Youth often drink alcohol, drive vehicles and smoke cigarettes. Such behaviors are dangerous for their physical and intellectual growth. The present credit based system in academics is forcing adolescent to study more in schools and colleges. It is high pressure on adolescent to perform continuously in different semester related examinations. The poverty and the socio-economic conditions in slums do not help adolescent to study more. They are involved in carrying drinking water for family. Female adolescents are doing number of household chores such as cooking for family, cleaning and washing utensils, cloths, care of older and children etc. The female adolescents in poor households do not get time and economic resources for study. They often fail and leave school and college early. They work for few days in labor market and get married. Malnourished adolescent girls have babies at a young age. They may have complications during pregnancies because their body has not yet reached maturity stage. Maternal mortality is higher in anemic women. Even when they survive, poorly nourished adolescent mothers are more likely to give birth to low birth-weight babies, perpetuating a cycle of health problems which pass from one generation to the next (Hossain G.M.M et.al 2013). Such poverty and nutrition trap cannot be overcome easily in slums. Adolescent health is completely neglected issue in slums. The malnutrition during adolescence is continued in adult population and it is followed by chronic and degenerative comorbidities. Promoting the adolescent health, prevention of the health problems before their emergence is more cost-effective then their treatment, especially when it may be too late to cure them **??**Radu E. and Luminita Oana Ciotaru 2007). The main objective of the paper is to examine the incidence of malnutrition among adolescents in region. Second objective is to find the gender bias in malnutrition of slums. Third objective is to find the socio-economic correlation with adolescent malnutrition in slums of Mumbai Metropolitan Region. The first part of research paper deals with data, methodology and economic model. The second part of paper deals with incidence of malnutrition among adolescent in Metropolitan Region. The second last part of paper deals with regression analysis. The last section of paper deals with policy implication and conclusion.

2 II.

3 Economic Model of Adolescent Malnutrition

We have developed economic model of malnutrition among adolescent in Mumbai Metropolitan Region. It is as followsM a = (A, N t , P e , Y)**(1)**

Adolescent malnutrition is related to physical and electronic assets, nutrition ate, parents education and household income. All the major variables are further categorized into sub-variables as follows.

4 A= (P, E, M)

(

Assets comprise as physical, electronic and mobility related assets in particular household. They are further categorized as follows.P=(C, B, W, F,S W ,)**(2a)**

The physical assets in the house consist of cooker, bed, chairs, watch, fan, sewing machine.E= (R, T f , T v , F r) (2b)

The electronic assets comprises as the radio, telephone, refrigerator and television in house.

5 M= (B, B i , C a) (2c)

Mobility related assets with households consist of bicycles, bike and car. Such asset helps family members for mobility in surrounding area. During emergency, such vehicles are important for family members.

F= (V, N V)

(3) Food ate by the adolescent comprises as the vegetarian, non vegetarian food and fruits.

V= (M, C, P, B, V, F) (3a)

Vegetarian food comprises as milk, curd, pulses, beans, vegetables and fruits. Adolescent health is depending on all vegetarian and non vegetarian food.N= (E g ,C,M e ,F)**(3b)**

Non vegetarian food comprises as eggs, chicken, meat, fish in the diet. P e = (I l , P, S S , H C , C)

The parent's education of adolescent consists of illiterate, primary, secondary, higher secondary and college education.

N s =Y (5) Nutritional status is sole determinant of income of family.

6 Y=(S, A, B, D W) (5a)

The income of any household comprises as the income from salary or daily wage, assets and self employment. We have calculated the household income from all the above sources. It is further divided by household members. Therefore we have per capita income of each household.

7 B= (Y p) (5b)

The body mass index of the adolescent is determined by the per capita income of the family.

8 III.

9 Data and Methodology

For this study, we have collected primary data of slum households in Mumbai Metropolitan Region. We have collected 767 households' data from eight slums such as Mankhurd East and West, Govandi East and West, Kalwa, Koparkhairne, Rabale, Turbhe, Vashi and Ghatkopar. The household heads and women are interviewed during survey. The questionnaire comprises as different questions related to household members, income and expenditure, adolescent women's fertility behavior, household assets, media exposure and illness. We have used body mass index to classify as malnourished or not. The primary data is collected in May-June 2014. We have analyzed data in SPSS@20 and STATA@12 software.

10 a) Incidence of Malnutrition among Adolescent

Based on above primary data, we have classified the adolescent into different categories of malnutrition. Adolescence period is characterized by rapid growth and development. Therefore it is accompanied by increase requirements for nutrients. When these increase needs are not met under-nutrition results **??**Abdulkarim A. et.al. 2014). Following table shows the incidence of malnutrition among adults in suburbs of metropolitan region. The 79.43 percent male are severely malnourished in Mankhurd (E). In Mankhurd, there are many slum pockets. Such slums are denied the access of basic facilities by Municipal Corporation Greater Mumbai and government. Households struggle to get minimum water supply. The electricity, sewage line, roads, solid waste are the important issues observed in all slums. Poverty at household level does not help to invest more in health and education of adolescent. In Vashi, only 27.27 percent male are severely malnourished. We have not found slums in Vashi. Vashi is one of the good suburbs of Navi Mumbai Municipal Corporation. Navi Mumbai is also one of the modern cities in Mumbai Metropolitan Region. The 42.31 percent female are severely malnourished in Koparkhairane. Only 14.29 percent female are severely malnourished in Ghatkopar. In interior part of

Ghatkopar, we have found very few slums. Therefore incidence of malnutrition among adolescent is very low. Total one fourth male are moderately malnourished in Govandi (E). We have not found moderately malnourished male in Vashi. The 11.11 percent female in Vashi are moderately malnourished. The one forth male of Govandi are mild malnourished. The 20 percent female of the Mankhurd (W) are mild malnourished. The female are not mild malnourished in Ghatkopar. We have found 46.50 percent male and 32.32 percent female severely malnourished in region. We have found more incidence of severe malnourished among male in region. It is a major concern of this study. It may be because female are genetically more strong as compare to male. Therefore the incidence of malnutrition would be low among female. The 13.59 percent male and 6.81 percent female are moderately malnourished. The 13.59 percent male and 8.51 percent female are mild malnourished in region. Many studies have found that under-nutrition is a persistent problem among future mothers. Most adolescent girls conceive soon after marriage making the period between marriage and first conception perhaps too short to be able to target this period effectively. Thus the girls may start pregnancy at a great advantage. Moreover, they are at increased risk of problems in delivery (Mulugeta et.al 2009). The richer households may easily overcome with these problems. They have different household assets which may provide comforts to adolescent. We found very few households in slums have different physical and electronic assets. Total 46.15 percent male and 32.34 percent female are severely malnourished but they have cooker in house. The 48.84 percent male and 34.09 percent female have bed in house but they are severely malnourished. The 35 percent male and 27.84 percent female are severely malnourished and they have fan in their house. Slum households don't have legal electricity connection. Therefore most of the houses do not have fan. Nearly 36.36 percent female and male are severely malnourished and they have bicycle in house. Bicycle at home is useful for mobility in local area. The 33.33 percent male and female have swing machine but they are severely malnourished. We have not found radio in any category of malnourishment among adolescent. Radio is useful for listening news, family planning programs and songs. But few households have bought radio. The 30.56 percent male and 32 percent female are severely malnourished but they have telephone in house. Telephone is useful to call during emergency. But it is either not bought it or they do not have contacts to call. Most of the time telephone companies do not give telephone connections in slums. We have not found refrigerator in house of any category of malnutrition among adolescent. Refrigerator is useful to preserve food and improve health status of adolescent. But poor households do not have money to buy such expensive asset and keep it in house. Therefore it is affecting on health status of adolescent in slums. The 35.71 percent Volume XV Issue VIII Version I 16 ( ) male and 21.05 percent female are severely malnourished but they have television in house. Ownership of television helps households to observe various programs and listening news. But they cannot buy such asset due to poverty. The half of severely malnourished male have bike in house. The female are 33.33 percent in this category. We have not found car in any house with different categories of malnourished adolescent. Car is very important for mobility of family.

But it is not bought due to space and poverty. Most of the time, asset ownership does not help for good health. Food intake is the determinant of health status of the adolescent. Eating nutritious food is the basic determinant of adolescent good health. Nearly 39.67 per cent male and 29.86 percent female eat milk but they are severely malnourished. Milk contents most of the nutrients but poor households cannot buy milk because of economic problem. They eat milk and curd occasionally. The poor households do not buy milk every day. Therefore 44.62 percent male and 28.83 percent female are severely malnourished but they eat curd. Total 42.25 percent male and 28.57 percent female are severely malnourished but they eat pulses. Pulses provide iron, protein and vitamins to adolescent. But they are costly as compare to fresh vegetables. Therefore fewer pulses are bought and ate by the poor people and adolescent. Only 45.31 percent male and 30.77 percent severely malnourished female eat beans but they are severely malnourished. The 39.17 percent male and 26.71 percent female are eating vegetable but they are severely malnourished. The slum households do not eat fresh vegetables. They are costly because they are fresh. They buy low quality fruits and vegetables. Therefore they do not get the proper vitamins and nutrition. The 37.90 percent male and 28.95 percent female are eating fruits but they are severely malnourished. Only 37.90 percent male and 29.41 percent female are severely malnourished but they are eating eggs. Eggs are bought once in a week or after fifteen days. Therefore eggs do not provide maximum nutrition and vitamins. The 37.60 percent male and 29.61 percent female eat chicken and meat but they are severely malnourished. The 37.60 percent male and 29.94 percent female eat fish but they are severely malnourished. The poor households either buy fish, meat or chicken once in a week or in month. Therefore it is not a source of vitamins and nutrition on continuous basis. In order to work at different work sites, the workers required good nutrition. The adolescent also required the good nutrition for physical and intellectual growth. Good nutrition is a future investment among adolescent. The parent's education is the sole determinant of the adolescent health. In slums, the educational attainment of parents is very low. The 27.78 percent male and 40.66 percent female are severely malnourished but both the parents are illiterate. Illiterate parents do not understand the nutrition and its value for good health. The 26.09 percent male are mild malnourished but the parents are primary studied. Half of females are malnourished but the parents are primary studied. The 36.59 percent male and 48.94 percent female are malnourished but the parents are secondary school studied. All the high school studied parents have severe malnourished adolescent male. All the college studied parents have severe malnourished female. We need to understand the daily per capita income and incidence of malnutrition among adolescent in slums.

11 Figure 1 : BMI and per capita daily income of the adolescent in MMR

Above figure shows that the BMI of adolescent is positively correlated with per capita daily income in slums. It shows that at low per capita daily income (Rs.0-50), the body mass index is very low. As the per capita daily income increases from Rs. 50 to 100, the BMI of the adolescent also increases. As the per capita daily income increase from the Rs.200 to 250, the malnourishment among adolescent declines fast. Therefore Rs. 200 per capita daily income is must to overcome with the adolescent malnutrition in slums of region.

12 b) Logistic regression model:

We have used logistic function (Greene, W. 2003) to understand the correlation of socioeconomic variables with adolescent malnutrition. It can be shown as followsZ=? +? 1 x 1 + ? 2 x 2 + ? 3 x 3+ ? 4 x 4+ ? ? . . .+ ? k x k (6)

To obtain logistic model from logistic function, we write z as the linear sum ? plus ? 1 times x 1 plus ? 2 times x 2 and so on to ? k time's x k . The x s are independent variables of interest and ? and the ? 1 are constant terms representing unknown parameters. In short, z is an index that combines the x's 1 F (Z) = - **??**———————- (7) 1+e -Z

We can substitute the linear sum expression for z in the right hand side of the formula for f (z) to get the expression f (z) equal 1 over 1 plus e to minus the quantity ? plus the sum of ? 1 x 1 for i ranging from 1 to k. The logistic model can be written as1 P(x) = ———————— (8) 1+e -(? +?ixi)

The logistic model is used for malnutrition among adolescent in slums of Mumbai Metropolitan Region. The dependent variable is malnourished adolescent in region. Independent variables are the personnel, family, social and economic factors. The regression results are presented in the following table. The female are more malnourished as compare to male. It is positively co-related and statistically significant. The age of the child is negatively co-related and statistically significant. The male are 75 percent less likely to be malnourished as compare to female. The study has found that on average, adolescent girls were heavier compared to boys throughout the early and middle adolescent period; boys ultimately seemed to grow taller than girls. The turning point in height, i.e. when adolescent boys in the sample catch-up with their female counterparts, is right after the age of 14 years. Timing and tempo of changes in height, weight, and body composition in adolescence vary greatly by sex: lean body mass may attain its adult level as early as by the fourteenth year in girls, but the growth spurt usually subsides at the age of sixteen whereas in boys, adult height is reached later, possibly as late as at the ages of 17-18 years **??**Bosch A.M et.al 2008). Weekly water requirement is negatively co-related to female malnutrition. The women drinking water trips are positively co-related with female adolescent malnutrition. The swing machine in house is positively co-related to the female malnutrition. It is statistically significant and positively co-related. Such incidence is four times more related to swing machine in house. The milk is negatively co-related with female malnutrition. The adolescent female are three percent less likely to drink alcohol as compare to male. The health staff behaves properly with malnourished female adolescent. The adolescent mothers do not breastfeed more hours to children. It is negatively correlated and statistically significant. It means malnourished adolescent are ninety percent less likely to breastfeed exclusively to their children. The physical strength is less and therefore they are comparatively less likely to breastfeed children for more time. But malnourished adolescent mothers are twice breastfeeding currently to children as compare to other mothers. Therefore still breastfeeding to child is positively co-related and statistically significant. The boys are less likely to be malnourished as compare to girls and it is statistically significant. The age of the male is negatively co-related with malnutrition and it is statistically significant. The age of the adolescent male is 87 percent less likely to be malnourished as compare to adolescent female. Treatment in the private health care is statistically significant and positively corelated. Adolescent females are twice depends on the private health care. The drinking water by municipal pipeline is statistically significant and negatively corelated. Most of the households do not get municipal pipeline water. The water purification by the traditional method is statistically significant and positively corelated with male malnutrition. The households of male adolescent are eleven percent more likely to purify water as compare to not malnourished male. The cooker in the house is negatively co-related and statistically significant with malnutrition among male. Households are poor and they have 38 percent less likely to have cooker in house. All malnourished male have electricity in house. It is positively co-related and statistically significant. The swing machine is not found in the house of the malnourished adolescent male. It is statistically significant and negatively co-related. Telephone in the house is negatively co-related and statistically significant. Most of the poor households do not have telephone in house. The bike is not found with malnourished male. It is negatively co-related and statistically significant. The hygiene in public hospital is negatively co-related and statistically significant. Most of the public hospitals are not cleaned properly in region. It is 37 percent less likely to be cleaned as compare to private hospitals. Most of the malnourished adolescent males do not known about the different traditional and modern methods of contraceptive. It is positively corelated and statistically significant. They are four times less likely known the different methods of contraceptives.

The male are less likely to be malnourished as compare to female. It is statistically significant and positively co-related. The male are 31 percent less likely to be malnourished as compare to female. The age of the adolescent is negatively co-related to the malnourished adolescents and it is statically significant. The fan is found in house

of malnourished adolescent in slums. It is statistically significant and positively corelated. The malnourished adolescents do not watch television. The malnourished adolescents are 48 percent less likely to watch television. It is negatively co-related and statistically significant. The malnourished adolescent female said that they have not received assistance during delivery. They have received 85 percent less assistance during delivery. It is negatively co-related and statistically significant. The adolescent females have not shown themselves and the baby to health professional after delivery. They have 82 percent less received post natal care as compare to non malnourished adolescent mothers. The post natal care is negatively co-related and statistically significant. The hours of breastfeeding by malnourished adolescent are 99 percent less to their babies. It is negatively correlated and statistically significant. The adolescent mothers give other or outside food except milk and it is 99 percent more as compare to other mothers and children. The outside food given to child is positively co-related and statistically significant. The malnourished adolescent females do not bring their children at work. The possibility is 60 percent less of not bringing children at work. It is statistically significant and negatively corelated. At work, there is no arrangement for child care.

13 c) Policy implication

It has been suggested that since under nutrition is a function of both food deprivation and disease, which are in turn the consequences of poverty. The nutritional needs of these girls had been sadly ignored in development programs. The focus had rather been only on the preschool children and the mothers. It seems that there is scope for much improvement on nutritional status among adolescent girls **??**Maiti et.al 2011). Mumbai Metropolitan Region is most developed region in India. But the nutrition issue among adolescent is completely ignored by government. We found that the incidence of severe malnourishment among male is higher in Ghatkopar and among female it is higher in Koparkhairne. The total incidence of severe malnourishment is higher among male as compare to female in region. The physical asset holding is more with severe incidence of malnourishment among male as compare to female. The valuable assets such as radio, television refrigerator has not owned by households of Prob > chi2 = 0.00 Log likelihood =-283.944 Pseudo R2 = 0.1399 *significant at 1 percent, ** significant at 5 percent , *** significant at 10 percent malnourished adolescent said that they eat all kinds of food but still we found more incidence of malnutrition among them. The incidence of severe malnourishment among female is much higher with parent's secondary school education. The incidence of mild and moderate malnutrition is observed lower with higher education of parents. With college education of parents, we have not found the incidence of malnutrition among adolescents. The BMI of adolescent and per capita daily income of household is positively correlated in slums of region. The Municipal Corporations must supply safe drinking water to all slums in region. It will reduce the time and energy of women and children. Such time women can spend in income generating activities. The children can spend more for study and complete more education. Under-nutrition is a persistent problem among future mothers in slums. Most adolescent girls conceive soon after marriage making the period between marriage and first conception perhaps too short to be able to target this period effectively. Thus, the girls may start pregnancy at a great disadvantage. Such adolescent mother must be taught about the family planning, institutional delivery and breastfeeding to children. Government must provide vocational and technical education to workers of slums. It will definitely improve their skills and income. Such income can be used to purchase assets and food. Such households and adolescents can go to private health care facility for effective health treatment. Such access to health care can reduce the incidence of malnutrition among adolescent. Public health care facilities must improve the health care services to poor people of slums. Health care staff must help for institutional deliveries and care of low birth weight babies in slums. They must provide antenatal and postnatal care to all adolescent mothers. Women must be promoted to watch the family planning programs and maternal child health care programs on television. The seminars, lectures and symposium must be organized for parents and adolescent students in secondary schools and colleges on the need to eat balanced diet (Adeoye O.O. 2008). It will reduce the incidence of malnutrition among adolescent at some extent. NGO's must be encouraged to work on adolescent health and nutrition issues in slums. The health care professionals, policy makers, academicians and politicians must focus on adolescent health issues in region. They must work to complete eradication of incidence of malnutrition among adolescent. Such policies will certainly help to improve the health status of adolescent, expected mothers and future human resource in region.

14 IV.

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Figure 1:

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Year 2015 15) (

Malnourished adolescent	Severe M				Moderate F		Mild M	F
Mankhurd (E)	71.43	39.39	7.14			6.06	7.14	9.09
Mankhurd(W)	31.58	20.00	10.53	0.00	10.53	20.00		
Govandi(E)	12.50	23.08	25.00	7.69	25.00	15.38		
Govandi (W)	48.00	38.46	16.00	3.85	16.00	3.85		
Kalwa	48.94	35.00	17.02	10.00	17.02	6.25		
Koparkhairn	56.67	42.31	13.33	3.85	13.33	15.38		
Rabale	30.77	25.00	7.69			8.33	7.69	8.33
Turbe	40.00	16.67	20.00	4.17	20.00	8.33		

[Note: Vashi 27.27 22.22 0.00 11.11 0.00 11.11 Ghatkopar 40.00 14.29 20.00 0.00 20.00 0.00 Total 46.60 32.34 13.59 6.81 13.59 8.51 Source: Compiled from primary data Volume XV Issue VIII Version I]

Figure 2: Table 1 :

2

Asset	Sever		Moderate		Mild	
holding	M	F	M	F	M	F
Cooker	46.15	32.34	11.54	5.99	18.59	10.78
Bed	48.84	34.09	9.30	4.55	16.28	11.36
Fan	35.71	27.97	12.24	8.47	21.43	5.08
Bicycle	36.36	36.36	18.18	0.00	9.09	18.18
Sewing machine	33.33	33.33	0.00	33.33	0.00	0.00
Radio	0.00	0.00	0.00	0.00	0.00	0.00
Telephone	30.56	32.00	8.33	8.00	11.11	8.00
Refrigerator	0.00	0.00	0.00	0.00	100.00	0.00
Television	35.71	21.05	11.43	9.21	24.29	6.58
Bike	50.00	33.33	0.00	33.33	0.00	0.00
Car	0.00	0.00	0.00	0.00	0.00	0.00

Source: As per Table one

Figure 3: Table 2 :

3

Nutritional	Severe		Moderate		Mild	
food eaten	M	F	M	F	M	F
Milk	39.67	29.86	13.22	8.33	17.36	6.25
Curd	44.62	28.83	12.31	9.01	20.00	4.50
Pulses	42.25	28.57	15.49	7.56	14.08	6.72
Beans	45.31	30.77	14.06	8.65	15.63	6.73
Vegetables	39.17	26.71	12.50	7.53	17.50	6.85
Fruits	37.90	28.95	12.90	7.24	17.74	6.58
Eggs	37.90	29.41	12.90	7.19	17.74	6.54
Chicken	37.60	29.68	12.80	7.10	17.60	6.45
Meat	37.60	29.68	12.80	7.10	17.60	6.45
Fish	37.60	29.94	12.80	7.01	17.60	6.37

Source: As per Table one

Figure 4: Table 3 :

4

Parents	Severe		Moderate		Mild	
education	M	F	M	F	M	F
Illiterate	27.78	40.66	5.56	15.38	6.48	19.78
Primary	21.74	50.00	4.35	0.00	26.09	16.67
Secondary	36.59	48.94	17.07	6.38	0.00	17.02
High school	100.00	25.00	0.00	25.00	0.00	25.00
College	0.00	100.00	0.00	0.00	0.00	0.00

Source: As per Table one

Figure 5: Table 4 :

5

Variables	Co-efficient	Standard error	Z test	95% Conf. Interval
Sex	411.97*	443.68	5.59	49.91-3400.14
Age	0.76*	0.039	-5.53	0.68-0.84
Weekly water liters	0.99**	0.00	-3.20	0.99-0.99

Figure 6: Table 5 :

Sewing machine	4.23**	3.16	1.93	0.98-18.29
Milk consumed	0.03**	0.056	-2.25	0.00-0.66
Behavior of health staff	2.47***	1.22	1.83	0.93-6.54
Exclusive breastfeeding	0.99**	0.00	-2.04	0.99-0.99
Still breastfeeding to child	2.38**	0.82	2.49	1.20-4.71
	LR chi2=224.88	Prob > chi2 =0.00	Log likelihood = -150.31	Pseudo

*significant at 1 percent, ** significant at 5 percent , *** significant at 10 percent

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Women trip for water	1.21*	0.06	3.86	1.10-1.34

Figure 7: Per capita daily income BMI and per capita daily income relationship

6

Variables	Co-efficient	Standard error	Z test	95% Conf. Interval
Sex	0.004*	0.00	-10.36	0.00-0.01
Age	0.87**	0.04	-2.39	0.79-0.97
Private health care treatment	2.29**	0.80	2.37	1.15-4.57
Municipal water supply	0.24**	0.11	-2.92	0.09-0.62
Purify water	11.75**	9.58	3.02	2.37-58.11
Cooker	0.38**	0.18	-2.00	0.15-0.98
Electricity	7.60**	4.56	3.38	2.34-24.63
Sewing machine	0.08***	0.11	-1.71	0.00-1.44
Television	0.33**	0.14	-2.52	0.14-0.78
Bike	0.22***	0.18	-1.79	0.04-1.14
Hygiene in public hospital	0.37***	0.22	-1.66	0.11-1.19
Not known method	4.42**	3.12	2.11	1.10-17.66
	LR chi2(19) = 336.90	Prob > chi2 = 0.00	Log likelihood = -137.76	Pseudo R2 = 0.55

*significant at 1 percent, ** significant at 5 percent, *** significant at 10 percent

Figure 8: Table 6 :

7

Variables	Co-efficient	Standard error	Z test	95% Conf. Interval
Sex	0.31*	0.06	-5.44	0.20-0.47
Age	0.83*	0.02	-5.13	0.77-0.89
Fan	2.69**	0.89	3.00	1.40-5.15
Watch television	0.46**	013	-2.61	0.26-0.82
Assistance in Delivery	0.85**	0.05	-2.30	0.74-0.97
Post natal care	0.82***	0.08	-1.81	0.66-1.01
Exclusive breast feeding	0.99***	0.00	-1.66	0.99-1.00
Outside food given	1.99**	0.64	2.16	1.06-3.75
Child carried at work	0.60**	0.14	-2.12	0.38-0.96
	LR chi2(10) = 92.37			

Figure 9: Table 7 :

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