To Study the Association between Maternal Depression & Agency and Child Under-Nutrition, Stunting and Wasting Among Children Less Than 2 Years Age from the Rural Underserved Area

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Abstract:- Early childhood development is the key to a full and productive life for a child and to the progress of a nation.[1] The early stage of life is a period of rapid growth and development from the first day of pregnancy until 2 year of age, the so called "first 1000 days". Thus, this period offers a critical window of opportunity to shape long term health. It is a period of enormous potential, but also of enormous vulnerability.[2] Depression can have negative effects on early infant growth, a problem that might be more pronounced in low income countries with less favourable environments. This was Community based cross sectional study conducted in 50 identified villages for near "Bor" forest area and the total sample size was 488. Out of the total participants 488.majority of mother belongs to 23-27 age group315(64.55%).majority of the mother were secondary education 267(54.71%). Most of them are wealthy (4thQuintiles) 104(21.31%). Most of children belongs to age group 13-24 month (323) and among them majority are female child 246(50.41).The average score of maternal agency was 26.32± 5.15 and maternal depression was 14.21± 9.56.wealth index was statistically significant with maternal depression & agency. In present study found severe stunting present in Male child i.e. 36(14.88%), Moderate stunting was present in Female child 83 (33.73%%). Education of mother and Stunting in children were statistically significant (p < 0.05). Severe wasting present in Female child i.e. 31(12.61%) and moderate wasting present in male child 45 (18.59%).Severe and Moderate Under-nutrition present in Male child i.e. 52(21.11%) and 53(21.90%). Out of 488 children, 220(45.08%) children were found to stunted, 201(41.19%) children had Underweight and 142(29.1%) children had wasting.The association was tested using t -test, there is no statistically significant association of maternal depression with stunting, wasting and underweight. There is association of maternal agency with wasting. As the maternal agency is increased, the child is less likely to be wasted. The result in this study on maternal depression is not associated with stunting, wasting, under underweight.

I. INTRODUCTION

Child growth is a process with a multi-factorial determination, involving genetic and environmental factors (food availability, feeding practices, health, and morbidity, besides general child care) that act by promoting or restricting the individual inherent potential for growth. Maternal depression may contribute to the risk of growth impairment and illness through several ways, including early cessation of breastfeeding and inadvertent reduced maternal attention to and care of children's needs and distress in pregnancy and during the child's first year does not only affect mothers, but is also likely to have significantly impact on foetal and child development[3]. Greater maternal decision making (agency), control and autonomy in the household likely improve child nutrition by improving child-care practices. Some studies have found women's status and empowerment to be associated with child height/length-for-age (HAZ/LAZ), weight-for-age (WAZ) or weight-for-height/length (WHZ/WLZ) Z-scores.[54]Maternal agency is the notion that mothering can be empowerment and a location for social change for women, maternal agency means that action not only of literate mother but of any and all people who are guided by maternal attitudes are more likely to be found in women because of their monopoly on childbearing. Women who were underweight were twice as likely to have underweight or wasted child, while women who believed domestic abuse was justified were 20% more likely to have a stunted child evidence.[13,]Prenatal depression encompasses major and minor depressive episodes beginning during pregnancy and lasting up to six months to a year after pregnancy. Women experiencing prenatal depression may have an underlying vulnerability to changing hormone levels which trigger the onset of symptoms. Postpartum depression is a mood disorder that can affect women after childbirth. Mothers with postpartum depression experience feelings of extreme

sadness, anxiety, and exhaustion that may make it difficult for them to complete daily care activities for themselves or for others.[5]

Infant of depressed mother are likely to be underweight and stunted compared to children of mothers without depression. Maternal depression may contribute to under nutrition in children by having a negative impact on interpersonal behaviour and parenting as well as impairment in social functioning associated with most psychiatric disorders. Maternal depression not only reduces maternal interest in child but also impairs a women's ability to cope with the responsibilities of being mother. This leads to an inability to provide a healthful diet for a child.[7] The prevalence of underweight children in India is among the highest in the world. In India, 20 per cent of children under five years of age suffer from wasting due to acute under nutrition. More than one third of the world's children who are wasted live in India. 43 per cent of Indian children under five years are under weight and 48 per cent are stunted due to chronic under nutrition, India accounts for more than 3 out of every 10 stunted children in the world.[8]

Stunting, caused by chronic under nutrition early in a child's life, blights the lives of some 165 million children around the world. It is far more than a problem of inadequate growth / height for these children. It can trap them in a lifetime cycle of poor nutrition, illness, poverty and inequity. Stunted growth in the first months of a child's life means stunted development of the brain and thus, of cognitive capacity permanently. While the effects of stunting last lifetime, they can also be passed on from one generation to another. Girls who are born malnourished and become stunted as children often grow up to become malnourished mothers who in turn give birth to malnourished babies and the cycle repeats itself. An estimated 20% of stunting begins in the womb—with a mother who herself is malnourished and is not getting enough of the nutrition she needs to support her baby's growth and development during pregnancy. Stunting is almost always irreversible but it can be prevented by improving nutrition for women and children in the first 1,000 days.[9,10] In 2015, 23.2 per cent, or just under one in four children under the age 5 worldwide had stunted growth .Overall trends are positive. Between 1990 and 2015, stunting prevalence globally declined from 39.6 per cent to 23.2 per cent, and the number of children affected fell from 255 million to 156 million. In 2015, just two out of every four stunted children lived in South Asia and one in three in sub-Saharan Africa.[11]

In 2012, the World Health Assembly endorsed a global stunting target to reduce the number of children under age five who are stunted by 40% by 2025.Wasting occurs when a child rapidly loses body weight as a result of moderate or severe malnutrition, putting a child at increased risk of illness or death. Globally, wasting accounts for 2 million childhood deaths each year. Severely wasted children are, on average, 11 times more likely to die than their healthy counterparts, as wasting is shown to increase the risk of death from infectious diseases such as diarrhea, pneumonia

and measles. Even higher mortality has been reported when children are both wasted and stunted.[9,10]

In 2015 globally, 50 million children under 5 were wasted and 17 million were severely wasted. This translates into a prevalence just over 7 per cent and just less than 3 per cent, respectively. In 2015, half of all wasted children lived in South Asia and one quarter in sub-Saharan Africa, with similar proportions for severely wasted children[11] In 2012, the World Health Assembly endorsed a global wasting target to reduce and maintain the rate of wasting to 5% or less by 2025.[9,10] A stunted child is nearly five times more likely to die from diarrhoea than a non stunted child because of the physiological changes in a stunted body. Stunting is also associated with impaired brain development.[15,16]

Any community or nation can never hope to develop to its full capacity if its children do not achieve the optimum growth and development. Women with mental health problems and particularly depression are less likely to provide the stimulating environment and adequate care for proper growth and development of their children. When children grow up in an environment not conducive for their overall development may be seriously compromised, with implications for their future productive life. However, in Indian rural context, very few studies are available that explore the effect of maternal depression on growth of children under five years of age. With this background we undertook this research work to determine the association between maternal depression & agency and stunting, wasting & malnutrition in children less than 2years age.

- **Study setting-**Target population was rural underserved area from Nagpur & Wardha districts. This population in these districts is around 12% of total population. This is one of the poorest regions with an average annual per capita income below the state average. Availability & accessibility of health & social services for tribal people is a great challenge, a situation further exacerbated by heavy rains in monsoon.

- **Study design-**Community based cross sectional study was conducted in 50 identified villages near "Bor" forest area.

- **Sample size:-**Fifty villages were randomly selected using random number table for study. Universal sampling (Complete enumeration) was done for the mother-child dyad in the selected 50 villages. Information of the total households is obtained from the records of the Anganwadi Centers of the respective villages was cross verified from either local administrative office/Grampanchayat or the ANM of the sub-centre. The entire study area covers an approximate population of 25000 with a mother child (under 2 years) dyad of approximately 532. At the time of data collection, 6 children were severely sick, 17 was not present at the time after two consecutive visits and 21 was migrated to other villages. Thus the total sample size was 488.

- **Study Duration:** Study was conducted from July 2016 to January 2017.

- **Study population-**Mother of children less than 2 years of age and their Children

- **Exclusion –** The household were excluded from the study if the child was sick or ill on to consecutive visits, if the child was having any congenital anomaly or known developmental delay and families who were not present at household even after two consecutive visits were excluded from the study.
- **Data collection tool** –
  - ➢ Anthropometric indices were used to assess height and weight of children.
  - ➢ To assess the maternal depression suffered by mother in past week.
  - ○ To assess the coping ability of mother for different situation. Increasing maternal agency could have a positive impact on child health.
- **Assessment of socio demographic characteristics:-** Information on the mothers including age, marital status, educational level, religion, and number of previous children were obtained from the respondents. Information was requested on ownership of 50 household items: mobile phone, TV, sewing machine, DVD player, satellite dish, radio, mattress, refrigerator, computer, electric fan, bicycle, motorcycle/tricycle, animal drawn cart, and vehicle etc. These household items are thought to reflect household socioeconomic status. Using the 50 household item a wealth score was derived for each household using principal component analysis and the scores were ordered/classified into Quartiles. The first Quintiles represents the poorest socioeconomic group, the 2nd Quintiles ,3rd Quintiles, 4th Quintiles represents the poor, middle, and wealthy socioeconomic group and Highest Quintiles show the wealthiest socioeconomic group.
- **Assessment of stunting, wasting and under nutrition**:- Anthropometric measurements were done following standard procedures. Recumbent length was measured for children below the age of 2 years and standing height for the remainder of the children up to the nearest 0.1 cm using infantometre. Children were weighed naked or wearing minimal clothing being carried by their mothers using the UNISCALE to the nearest 0.1 kg. Birth weight, sex and birth date were recorded from the child welfare booklet and age was calculated from the date of interview and date of birth. Height for age, weight for age, and weight for height z-scores were derived based on the World Health Organization (WHO) Multicentre Growth Standard , summarized and presented as means and standard deviations and also used to construct categorical variables. A z-score of less than −2 standard deviations was considered as stunting, underweight and wasting for height for age, weight for age, weight for height indices respectively . Stunting, wasting and under nutrition was considered as the dependent variable.
- **Assessment of depression and agency**:-Depression status assessment was done using the Centre for Epidemiological Studies Depression (CES-D)Scale. The CES-D scale comprises of 20 questions and responses and is used to assess depressive feelings and behaviours during the past week. Questions are statements expressing "negative thoughts" the responses are scored from 0 to 3 with 0 indicating that those "thoughts" were rarely had (at most 1 day)and 3 indicating that those "thoughts" were

had most days (5–7 days) of the week and Four questions (4, 8, 12, and 16) are statements expressing "positive thoughts" are reverse scored. Mother copping ability assessment was done using the agency questionnaire. 10 questions use to assess the copping ability of mother. Maternal depression and agency are independent variable Maternal depression and agency tools is originally available in English language. The interview to the mother will be asked in local language *Marathi* (local language) and *Hindi*. The tool can estimate the maximum score in agency and depression are 40 and 60 respectively, whereas the minimum could be zero. As the agency score increases, the mothers are more likely to be empowered. In case of depression, mother are more likely to be depressed, if their depression score increases.

- **Data collection process:**–The data were collected from sample households of the selected villages. Prior to data collection, the investigator underwent training in administering the tool and assessment of maternal depression and agency from the trained supervisor. The respondents were informed about the study objectives, purposes, study tools and ethical aspects of the research. After obtaining verbal/written consent and assuring the confidentiality of information, the mother was interviewed in local language and their home environment was observed.
- Electronic tablet was used for data collection. "ODK collect" (open data kit) application was used to collect the data on the tablet device & sent it to a server "ona.io". Data were extracted from server in excel form server & check for consistency, quality & missing values & analysed using statistical test.
- **Quality control of data:-**Data quality was checked for its completeness and appropriateness and minimum of 5% record was checked by the supervisor. Re visit by the investigator were done to complete the data as and when required**.** Supervisors manually checked information provided by key informants and interviewers. Data input officer, and data manager undertook manual and systematic data checks.
- **Data analysis:-** The data collection was done on predesigned & pretested questionnaire. The data was entered in MS excel and analyzed by *STATA* statistical software Descriptive statistics like Chi Square (χ^2), t- test for mean, S.D, Regression, was used. level of statistical significance was set at 0.05. The data thus analyzed was presented in the form of graphs, pie diagrams etc.

II. OBSERVATION AND RESULTS

(n=488)

Variable	No Stunting No (%)	Moderate Stunting (<= -2SD) No (%)	Severe Stunting (<-3SD) No (%)
Child Sex			
Male	136 (56.19%)	70 (28.93%)	36 (14.88%)
Female	132(53.66%)	83(33.73)	31(12.61%)
Child Age (In month)			
Under 12 months	106 (64.24%)	37 (22.42%)	22(13.34%)
13 to 24 months	162(50.15%)	116 (35.91%)	45(13.94%)

Table 1: Stunting and gender wise distribution of study participants

Table 1 shows that severe stunting present in Male child i.e. 36(14.88%) and Female child 31(14.88%) Moderate stunting was found in 83(33.73%)Female child and 70(28.93%) in Male child.

Table 1 shows under 12 month of age majority 106 (64.24%) of children belong to no stunting followed by 37(22.42%) were moderate stunting and 13 to 24 month of age majority 162(50.15%) were no stunting followed by 116(35.91%) were moderate stunting.
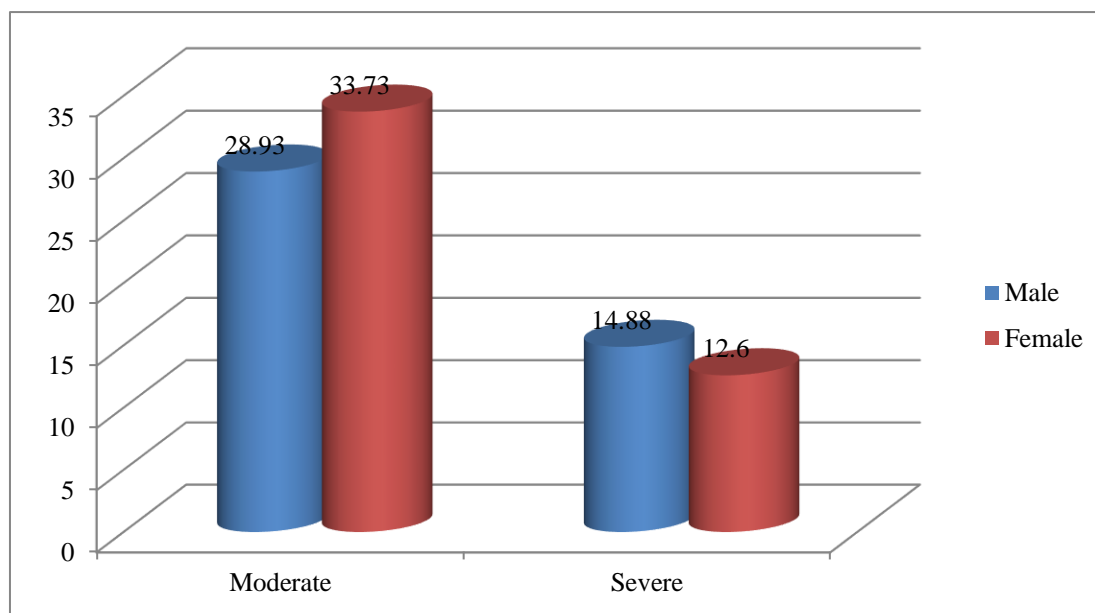

Fig. 1: Gender wise distribution of children according to level of stunting

Variable	No Wasting No (%)	Moderate Wasting (<= -2SD)No (%)	Severe Wasting (< -3SD)No (%)
1. Child Sex			
Male	173 (71.48%)	45 (18.59%)	24(9.93%)
Female	173(70.32%)	42 (17.07%)	31(12.61%)
2.Child Age(In month)			
Under 12 months	103(62.42%)	36 (21.82%)	26(15.76%)
13 to 24 months	243(75.24%)	51 (15.78%)	29(8.98%)

Table 2: Wasting and gender wise distribution of study participants (n=488)

Table 2: (1) shows that severe wasting present in Female child i.e. 31(12.60%) and Male 24(9.92%). Moderate wasting were found in 45(18.59%) male child and 42(17.07%) in female child. (2) Under 12 month s of age majority 103 (62.42%) of children belongs to no wasting followed by 36(21.82%) were moderate wasting and 13 to 24 month of age majority 243(75.24%) of children found no wasting followed by 51 (15.78%) were moderate wasting.
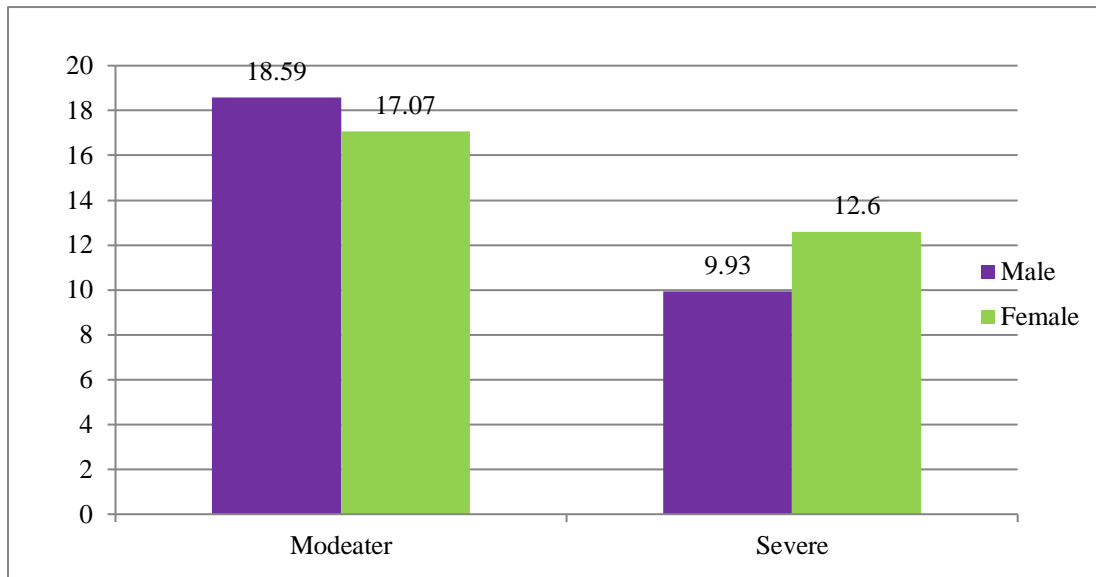
Fig. 3: Gender wise distribution of children according to level of wasting

(n=488)

Variable	No Under nutrition No (%)	Moderate under nutrition (<= -2SD)No (%)	Severe under nutrition (-3SD)No (%)
1.Child Sex			
Male	137(56.61%)	53 (21.90%)	52(21.49%)
Female	150 (60.97%)	49 (19.91%)	47(19.12%)
2.Child Age (In month)			
Under 12 months	129(78.18%)	20 (12.12%)	16(9.7%)
13 to 24 months	158(48.90%)	82 (25.30%)	83(25.8%)

Table 3: Under- nutrition and gender wise distribution of study participants

Table 3 (1) shows that severe level of under nutrition present in Male child i.e. 52(21.11%) than Female child 47(19.11%) and Moderate under nutrition was found in 53 (21.90%)Male child and 49(19.91%) in Female child.

Table 3(2)shows Under 12 month of age majority 129(78.18%)of children belong to no under nutrition followed by 20(12.12%) were moderate under nutrition and 13 to 24 month of age majority 158(48.90%) of children found No under nutrition followed by 83(25.8%) were sever under nutrition.
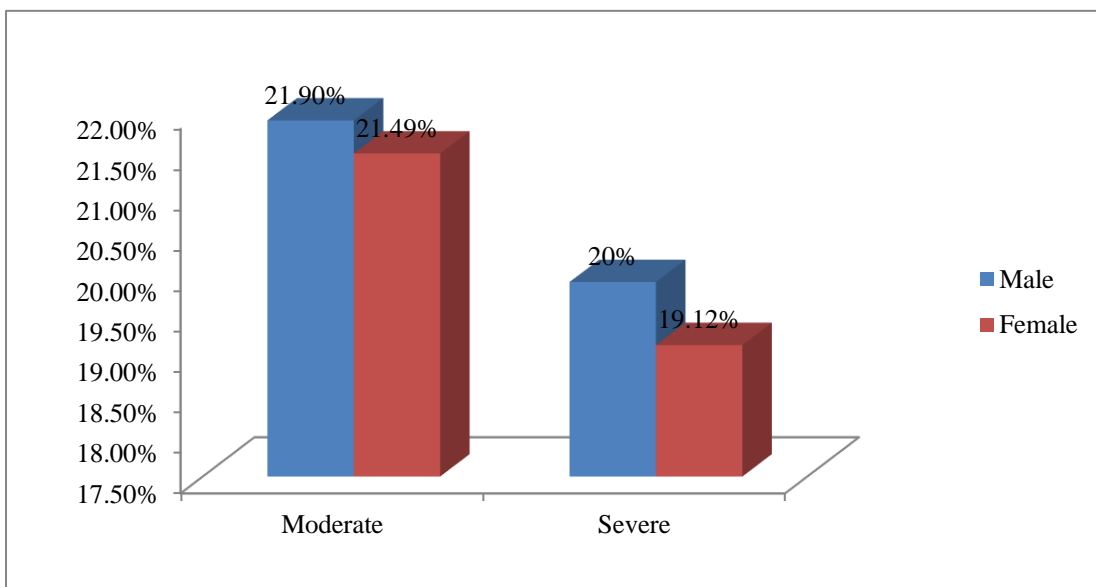

Fig. 4: Gender wise Distribution of children according Under nutrition

(n=488)

	Mean	SD
Agency	26.32	5.15
Depression	14.21	9.56

Table 4: Mean score of depression and agency among respondent mothers

The tool can estimate the maximum score in agency and depression are 40 and 60 respectively, whereas the minimum could be zero. As the agency score increases, the mothers are more likely to be empowered. In case of depression, mother are more likely to be depressed, if their depression score increases.

On administering the tool, we observed that the mean score of agency and depression were 26.31 ± 5.15 and 14.21 ± 9.56 respectively.

(n=488)

Mother characteristics	No stunting	Stunting	t- test	p value
Agency Mean (SD)	26.64(5.19)	25.927(5.09)	1.52	0.12
Depression Mean(SD)	13.57(9.088)	15.00(10.07)	-1.64	0.10

Table 5: Comparison of Mean score of agency and depression with stunting

Table 5 shows that there was no significant difference found between mean score of agency in no stunting and stunting, adjusted age and sex. There was no significant difference found between mean score of depression in no stunting and stunting adjusted age and sex.

(n=488)

Mother characteristics	No wasting	Wasting	t- test	p value
Agency Mean (SD)	26.63(5.10)	25.54(5.22)	0.03	0.03*
Depression Mean(SD)	14.16(9.51)	14.35(9.71)	-0.21	0.84

Table 6: Comparison of Mean score of agency and depression with wasting

Table 6 shows that there was significant difference found between mean score of agency in no wasting and wasting adjusted age and sex and .

There was no significant difference found between mean core of depression in no wasting and wasting adjusted age and sex.

(n=488)

Mother characteristics	No underweight	Underweight	t- test	t- test (p value)
Agency Mean (SD)	26.35(5.15)	26.25(5.17)	0.21	0.83
Depression Mean(SD)	14.63(9.22)	14.47(10.04)	-0.62	0.62

Table 7: Comparison of Mean score of agency and depression with underweight

Table 7 shows that there was no significant difference found between mean score of agency in no under -weight and under -weight adjusted age and sex.

There was no significant difference found between mean score of depression in no under-weight and under-weight adjusted age and sex.

Variable	Stunting No (%)	Wasting No (%)	Under –nutrition No (%)
Maternal education			
Primary	73.33%	26.67%	46.67%
Secondary	49.06%	31.46%	44.94%
Higher Secondary	38.82%	25.00%	36.84%
Graduate and above	35.19%	29.63%	33.33%
p-value	0.002	0.47	0.045
X^2	0.01	0.57	0.231
Maternal age(in year)			
<=22	40.66%	34.07%	35.16%
23-27	45.0%	28.57%	43.17%
28-32	50%	25.61%	40.24%
p-value	0.145	0.891	0.584

Table 8: Association between Maternal education and Age with stunting, wasting and under-nutrition

Table 8 shows maternal education was significant relation with stunting (p<0.002)

- Maternal education was no significant relation with wasting and under-nutrition.(p>0.05)

- No significant relation between maternal age with stunting, wasting and under- nutrition.

Variable	Coef	SE	T	p>|t|	[95% Conf. Interval]	
a) Stunting	-0.79	0.23	-3.49	0.00	-1.24	-0.35
b) Wasting	-0.24	0.25	-0.95	0.34	-0.73	0.25
c) Underweight	-0.40	0.23	-1.74	0.08	-0.86	0.51
d) Depression	-0.04	0.01	-3.18	0.00	-0.06	-0.01
e) Agency	0.06	0.02	2.69	0.01	-0.01	-0.10

Table 9: Linear Regression of Wealth index with Stunting, Wasting and Underweight, Maternal depression and Maternal agency

In Table 9 we,

- Conclude that for every unit decrement in wealth score, the stunting will decreases by (-0.79) and the p value of our t- status is highly statistically significant i.e. p< 0.001
- Since our p value is 0.342 which is higher than acceptable level of significance i.e. 0.05 and hence we do not have enough evidence to conclude that wealth score is associated with wasting.
- Since our p value is 0.082 which is higher than acceptable level of significance i.e.0.05 and hence we do not have enough evidence to conclude that wealth score is associated with underweight
- Conclude that for every unit decrement in wealth score, the maternal depression will decreases by (-0.037) the p value of our t- status is highly statistically significant i.e. p< 0.002.
- Conclude that for every unit increment in wealth score, the stunting will increase by 0.059 the p value of our t-status is highly statistically significant i.e. p< 0.007.

III. DISCUSSION

A. Background of study:

This present study is to assess association between "Maternal Depression & Agency and children with stunting and wasting and under nutrition among children less than 2 year age".

This study was a community based cross sectional study, conducted in 50 identified villages near "Bor" forest area. Villages were selected using random number table for the study. Complete enumeration was done for the mother-child dyad and total sample size was 488.

B. Assess the Maternal Depression & Agency

The average score of Maternal agency was 26.32 with SD 5.15.Mother with high maternal agency score are less likely to have their child under nourished, stunted or wasted then mother who have less agency score. On regression analysis statistically significant association was found between Socioeconomic status with maternal agency (p<0.007). Which signifies that mother who has good socio-economic status tends to have high agency. There are very few researches available on maternal agency.

The present study, CES-D (Center for Epidemiologic studies Depression) scale was used to assess the Maternal Depression. The average score of Maternal depression was 14.21 with SD 9.56. Although the tool is not designed for clinical trial but is used for symptoms of depression as seen in clinical cases. In the present study the investigator cannot commit on the depression score as the tool was validated in western setting and thus its implication in Indian setting needs to be done. Even though similar tool was used by **Rodloff (1977)** [52]and the clinical cut off of 16 or more was used in descriptive analyses.

On regression analysis statically significant association found between Socioeconomic status with maternal depression(p<0.002) .Similar findings were found in the study conducted by other Income and SES emerge as inconsistent risk factors for Maternal depression, reflecting the literature on common mental disorders in LICs in general **(Patel & Kleinman, 2003)**[68]. A longitudinal community-based study in rural Bangladesh **(Black et al., 2007)**[69]found evidence of a bivariate relationship between income and depression and another community-based study in rural India **(Chandran et al., 2002)** identified "low income" as a significant risk factor for the onset of Post natal depression in multivariate analyses. However some studies from a wide range of settings found no bivariate association between income and PND. A study in urban Mongolia **(Pollock et al., 2009)** is unusual in its measurement of (family) income at two points in time – before and after the birth.

C. Assess Stunting, Wasting and Under -nutrition

Out of 488 children 220(45.11%) were stunted, 142(29.10%) wasted & 201(41.19%) underweight similar finding observed by **Nandy S et al, (2005)** [55] shows in their study that 45% of children were stunted, 47% were underweight and 16% had wasting. Similar findings were found in the study conducted by other **Pradeep R. Deshmukh et al.(2013)**[67] they observed Prevalence of stunting was to be 52.3% and severe stunting was 25.1%. **Deeksha Kapur et al.(2007),** observes that 35% severely underweight and 39% severely stunted, **Sengupta P et al, (2010)** [66] revealed in their study that 74% had stunting and 42% wasting. **Islam S et al, (2014)** [56] found prevalence of stunting and wasting to be 30.4%, and 21.6%, respectively. **Jayswal A et al, (2014)** [29] showed in their study that conducted in Raipur that 52.6% children were stunted 24.1% were wasted. **Barun Kanjilal et al,(2010)** found 46 percent of the children severely underweight (thin for age), 38 percent are moderately to severely stunted (short for age), and approximately 19 percent are moderately to severely wasted (thin for height). **Víctor M. Aguayo et al(2016),** They find that 22.7% of children were stunted,

with one third (7.4%) of the stunted children severely stunted. **Sushmita Das et al[33]** that found 35% of children were underweight, 17% wasted, and 47% stunted.

The current study shows that severe stunting present in Male child i.e. 36(14.88%) and Female child 31(14.88%) Moderate stunting was found in 83(33.73%)Female child and 70(28.93%) in Male child. Similar finding were by **Zere E et al, (2003),[57]** found that the rate of stunting was significantly higher in male children**. Biswas S et al, (2008), [47]** found the rates of stunting among boys (43.4%) compared with girls (35.4 %). **Agrawal N et al,(2014) [58]** showed 57.7% boys and 45.4% girls were stunted**. Ejaz M S et al,(2010) [36]** observed male (41%) and female (42%) had severely stunting.

In this present study we found under 12 month of age majority 106 (64.24%) of children belong to no stunting followed by 37(22.42%) were moderate stunting and 13 to 24 month of age majority 162(50.15%) were no stunting followed by 116(35.91%) were moderate stunting.

In this present study we found that mother's education is an important predictor for child stunting. In current study, Primary educated mother were 73.33%, Secondary(49.06%), Higher Secondary (38.82%),Graduate and above (35.19%) maternal education and there was significant relation with stunting(p<0.002). The greater the number of years spent in education, accessing health education from healthcare service providers, and health-seeking behaviour may have a protective effect against stunting. Lower maternal education led to stunted offspring. Low or no education was an important risk factor for child stunting as indicated by a number of studies**. Reurings et al. (2013)[66]** reported that low or no primary education was related to lower HAZ, in children aged 6-23 months (95% CI: 1.039-3.371; P<0.05) **Urke et al. (2011)[61]** total no of participant were 1426 under 2 year of age found a positive association between incomplete primary education and childhood stunting, in both the national population and the Andean population levels (P<0.01). **Wamani et al. (2004)[62]**cross section study conducted in Uganda and total 720 mother child pair found that non-educated mothers were more than twice as likely to have stunted children (aged 0-23 months) vs. mothers with more than primary schooling, as did **Mohsena et al. (2010)[63]** . **Sakisaka et al. (2006)[64]**found that mothers' illiteracy, or lack of formal education, was associated with stunted growth, among children aged 0-23 months**. Masibo and Makoka (2012)[66]**found that no maternal education or education at primary level was associated with stunting in children aged <5 year . **Biswas & Bose (2010)** found that maternal education and lower than secondary school level led to stunting in girls aged 1-5 years. (**Bloss E, Wainaina 2004)[28]** Stunting among children were also strongly associated with maternal education, as children of mothers with no formal education were more likely to be underweight than children of mothers with at least secondary school education (OR = 1.64; 95% CI = 1.04–2.59) .

In present study shows that regression analysis statically significant association found between Socioeconomic status (Wealth score) with stunting (p<0.001), The children who belong to households from the poorest SES quintile have higher prevalence of worse nutritional status. While, on the contrary the children hailing from richest asset quintile households are associated with better nutritional status. Similar study by **GURMU E et al (2013) [59]** found that stunting among children from low socio-economic status increased by at least 42% (p<0.001). While more than half of children from households with low socio-economic status were stunted.

India has largest number of stunting children (**kanjial et al.2010**). Although studies have shown that socioeconomic factors play a critical role in the percentage of stunted children in India, it is important to note that 48% of children in India are stunted across economic groups (**Gulati2010**) give the overall economic growth throughout India, it is shocking that percentages in sub- Saharan Africa where the GDP is much more (**panagaiya 2013**) this suggests that stunting is a systemic problem that requires immediate attention by policy maker and influential decision – makers.

The present study shows that severe wasting present in Female child i.e. 31(12.60%) and Male 24(9.92%). Moderate wasting were found in 45(18.59%) male child and 42(17.07%) in female child Similar finding were by **Mandal GC et al, [60]** in their study found that wasting was higher in boys (52.4 %) than girls (47.4 %) **Nisha Aet al,(2014) [58]** observed that 34.6% boys and 21.7% girls had wasting.

In current study shows Under 12 months of age 26 (15.76%) of children were severe wasting and 36(21.82%) were moderate wasting and 13 to 24 month of age 29(8.98%) of children was severe wasting and 51(15.78%) moderate wasting .

The current study shows severe level of under nutrition present in Male child i.e. 52(21.11%) than Female child 47(19.11%) and Moderate under nutrition was found in 53 (21.90%)Male child and 49(19.91%) in Female child. Similar finding observed by **Nisha A et al.(2014)[30],** observed that 49.7% boys and 30.8% girls were underweight.

In the current study found under 12 month of age 20(12.12%)of children moderate under nutrition and 16(9.7%) moderate under nutrition and 13 to 24 month of age 83(25.8%)of children found severe under nutrition and 82(25.30%) moderate under nutrition.

D. Association between Maternal Depression & Agency and children with stunting , wasting and under nutrition
In the present study we found that maternal agency has significant association with wasting adjusting for age and gender as our p value in t test is 0.03 which is less than acceptable level of significance i.e. 0.05. There are very few researches available on maternal agency. **Chunningham et al.(2015)[54]** Cross-sectional survey of 4080 households conducted in rural Nepal study participants

Children under 24 months of age and their mothers (n 1787). Women's Empowerment in Agriculture Index (WEAI)'s Five and child length-for-age Z-scores (LAZ) and weight-for-length Z-scores (WLZ).The overall WEAI 5DE was positively associated with LAZ (β=0·20, P=0·04). Three component indicators were also positively associated with LAZ: satisfaction with leisure time (β=0·27, P<0·01), access to and decisions regarding credit (β=0·20, P=0·02) and autonomy in production (β=0·10, P=0·04). Thus we can conclude with the help of other studies that our findings compliment the work by another researcher.

The present study shows that there is no significant relation between maternal depression with stunting (p = 0.10), wasting(p = 0.08) and under nutrition(p= 0.61) similar study was found **Alexandra Brentani , Günther Fink (2016)[19]** study conducted in Butantã Jaguaré' region of São Paulo Seven, the total sample size was seven hundred and ninety eight (798) mother child dyads result were found No association was found between maternal depression variables and children's height, weight, stunting, and obesity. Positive associations were found between possible depression and ASQ (delta = 0.33; 95CI 0.110.54; p value< 0.01); no associations were found between likely depression and any of the outcomes analyzed. **Karen A. Ertel et al.(2010)** they find out that relationship between postpartum depression and greater HAZ was evident starting at 6 months and continued to age 3. We found minimal relationships between antenatal depression and child height outcomes. .**Maureen M Black** The correlation matrix showed that maternal depressive symptoms were significantly related to length-for-age at 12 month (r ¼ 20.13, P ¼ 0.05), but not to other anthropometric indexes at 6 or 12 month **Nusrat Husain et al (2012)** There was no difference in the birth weight or weight and height at 6 months of infants of depressed mothers versus infants of psychologically well mothers.

Other study observed by **Anthony Wemakor, Kofi Akohene Mensah (2016)[17]** that in adjusted multivariate logistic regression model, children of depressed mothers were almost three times more likely to be stunted compared to children of non depressed mothers (Adjusted OR = 2.48, 95 % CI 1.29–4.77, p = 0.0011). **Pamela J Surkan et al (2010)** Mothers with moderate/severe depressive symptoms at 9 months postpartum had children with shorter stature at this same point in time [average 0.26 cm shorter; 95% CI: 5 cm, 48 cm] than mothers without depressive symptoms; children whose mothers reported postpartum depressive symptoms remained significantly shorter throughout the child's first 6 years. Our result shows stunting with female child but not with male child, it might be due to neglect of female child in rural tribal area.

In this study, we found no association between maternal depression with stunting, wasting and under nutrition. Even though there are lot of literature which suggest that the maternal depression have the effect of child's anthropometric measurements, but interestingly in this area we found mother to be more capable to handle stress as there agency scores are good. This reveals that the stunting , wasting and under nutrition in this area are due to various other causes like socio economic status, food insecurity, food unavailability, lack of minimum dietary diversity. another reason could be that the depression tool may not clinical assess the depression as they are validated in western countries and hence cannot be claimed in the study.

IV. CONCLUSION

- Average score of Maternal depression was Mean (SD) 14.32±5.15 and Average score of Maternal agency was Mean (SD) 20.32± 5.15.
- Out of 488 children, 220(45.08%) children were found to have stunting, 201(41.19%) children had Underweight and 142(29.1%) children had wasting, Overall the present study revealed more stunting & less wasting cases from the rural underserved area of the Seloo and Hingana block of the Wardha and Nagpur District.
- Severe stunting present in Male child i.e. 36(14.88%) and Moderate stunting was found in Female 83(33.73%) in Female child. Severe wasting present in Female child. i.e. 31(12.61%) and moderate wasting present in male 45(18.59%).
- There is significant association found between Maternal education and Stunting (p<0.05).
- There is no statistically significant association of maternal depression with stunting, wasting and underweight. There is association of maternal agency with wasting.
- The overall study shows, Our findings do not support the hypothesis that maternal depression is associated with child under nutrition and wasting.

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