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Double Burden of Malnutrition Among Mother-Child Pairs in Ibadan, Nigeria

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Abstract
Background*: The occurrence of the double burden of malnutrition in Sub-Saharan Africa keeps increasing. Evidence tosupport this statement at household levels in Nigeria are few.This study was designed to determine the magnitude of the double burden of malnutrition among mother-child pairs in Ibadan, Oyo State, Nigeria.*
Materials and Methods:*This cross-sectional study employed three-stage sampling procedures to select three communities (high, medium and low density), involving 393 households and 393 mother-child pairs. A pre-tested interviewer-administered questionnaire was used to obtain data on socio-economic characteristics and anthropometric characteristics. The anthropometric characteristics of the mothers weremeasured and Body Mass Index (BMI) was determined using WHO classifications. The children anthropometry was also measured and classified as stunting (height for age), wasting (weight for height) and (weight for age) using WHO Anthro data were analysed using descriptive statistics and Chi-square test.*
Results:*The mean ages of children and mothers were 20.0±15.9 months and 30.8±6.7 years respectively. Mothers were mostly artisans (30.0%) and traders (26.5%) while 52.2% had completedsecondary education. Prevalence of stunting, wasting and underweight among the children were 32.1%, 3.8% and 10.9%respectively. Prevalence of underweight, overweight and obesity among mothers was 7.2%, 26.0% and 13.3%respectively. Overall double burden of malnutrition (DBM) prevalence was 20.6%, with the highest prevalence in the low-density community (13.0%).Predominant DBM (8.4%) was stunted child-overweight mother (SCOVM).*
Conclusion*:There was a high prevalence of double burden of malnutrition at household level in Ibadan South West Local Government Area, Ibadan, Nigeria with the highest form ofthe occurrence of child undernutrition and maternal overweight in the same household.Therefore, there is an urgent need to strengthen existing policies that addressthe prevalence of malnutrition and corrective nutrition education in urban areas.*
Keywords: *Undernutrition, Double burden of Malnutrition, Mother-child pair, Anthropometry*

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I. Introduction

Malnutrition is a universal public health problemthataffects both children and adults globally[1]. It is a condition caused by the insufficiency of one or more of the vital nutrients essential for existence, growth, development and reproduction. Malnutrition could lead to an increased risk of communicable and non-communicable diseases when not given proper attention[2].An important cause of malnutritionis poor maternal nutritional status, which can harm the offspring, thus leading to a vicious cycle of malnutrition from one generation to another.Thisburdencontributes to about 45% of deaths in children lessthan five years of age and it ismost common in low and middle-income countries[3]; where90% of malnourished children in the world lives. Malnutrition affects all nationsand more one third of the world's populace[4].

The most disturbing occurrence is the co-existence of undernutrition andovernutrition (double burden of Malnutrition) in the same population[5], which is presentlybecoming anessential global health issue. In particular, the low- and middle- income countries, there is a rapid risein the prevalence of double burden households, most commonly with stunting and/or underweight among children coexisting with an overweight or obese mother[6]. This is probably greatest in the world's poorest countries; especially in Sub-Saharan Africa and Asia[7].The double burden of malnutrition (DBM) often manifests itself as a life-cycle problem– the result of inadequate nutrition during the early years of life in many developing countrieshas been associated with morbidity, mortality and delayed mental and motor developments[8]. While the long-term consequences have been linked to impairments of intellectual performance, reproductive outcomes, work capacity and the overall health[9]. Therefore, the nutritional status of mothers is crucialboth for her health and that of the baby. The DBM could actually occur at the three different levels- individual, household and at community or national[10].

Numerous studies in low and middle- income countries have found an increasing trend in the prevalence of the double burden of malnutrition in households, particularly households that have both underweight and stunted children and overweight/obese mothers[11,12]. This is probably greatest in the world's poorest countries, especially in Sub-Saharan Africa and Asia[11]. The increase in the co-existence of overweight and undernutrition in these developing countries is largely attributed to lifestyle changes that growth, urbanization and globalization which has caused a significant shift in the quality and quantity of human diets and nutrition-related epidemiology that has occurred in the past few decades[13]. Nutrition and associated epidemiological and demographic transitions were once accepted as near-linear, gradual processes, instead, countries are now experiencing a fast-evolving and more complex nutrition paradigm[14].

Currently, numerous countries are facing a double burden of malnutrition; with coexisting complications of stunting, wasting,overweight and micronutrient deficiencies. Although, the occurrence of double burden of malnutrition among populations has been well described in both urban and rural areas in Nigeria[15,16,17]however the data describing the prevalence among mothers and their under five children in the urban locationsmostly generalize and those considering the different population density groupings are few. Therefore, this study was carried out to determine DBM among mothers and their under five children living in the different density groupings in Ibadan South West local Government Area, Ibadan, South West Nigeria. The outcome of this research can help to illuminate appropriate policy and strategies to reduce the prevalence of households with the coexistence of undernutrition and overnutrition peculiar to eachpopulation density groupings in urban areas.

II. Materials and Methods

This study wasdescriptive cross-sectional. The study populations consisted of mothers and their under-five children living in the same household. A household refers to a group of people who live together, eat from the same pot, living under the same roof.The study was carried out in Ibadan South West local Government Area, Ibadan, Oyo State, Nigeria.The prevalence of double burden of malnutrition among household in 28 Sub-Sahara Africa countries was 0.63[17], which was used to determine the minimum sample size of the mother–child pair respondents recruited in the study.

Sample size calculation

The sample size for this study was determined using the formula below:

$$\mathbf{N} = \frac{Z\alpha^2 pq}{d^2}$$

N = Minimum sample size desirable

$Z\ \alpha^2 = 1.96$

P = Prevalence of double burden of malnutrition among households in 28 Sub-Saharan Africa countries = 0.63

d = Desired precision (0.05)

$$\mathbf{N} = \frac{(1.962)^2 x\ 0.63\ x\ (1-\ 0.63)}{0.05^2}$$

N= 358.19

To cater for a potential~10% attrition, 393 mother-child pairs were included in the study.

Sample size: Three hundred and ninety-three women were randomly selected from the communities.

Subject and Selection Methods: A multi-stage sampling technique was employed in the selection of the respondents.Ibadan South West Local Government Area was purposively selected out of the 33 local Government Areas of Oyo state due to its unique characteristics of having different density groupings of high, medium and low-density location according to the National Population Commission groupings[18]. The low density areas are planned areas with provision of basic amenities and infrastructures such as water, security, sanitation, health care; the high density areas are slums with little or no access to basic amenities while the medium density areas have a combination of certain features from both the planned areas and slum neighbourhoods.

A list of the 12 wards in the Ibadan South West Local Government Area was drawn and stratified into high, medium and low-density areas. Three wards (one from high, medium and low-density areas) were selected using the simple random technique of sampling and then one community from each of the three wards selected. The list of households in the selected study communities was obtained from the three different communities. Using systematic sampling, every fifth household of motherwith under-five children in each of the three selected communities were chosen for the study. In the case of non-availability of mothers with under-five children in a selected household, the next household was selected to replace it.

Procedure methodology: A pre-tested, interviewer-administered, semi-structured questionnaire developed in English and translated to the local language (Yoruba) was used to collect data on household and socio-demographic characteristics of mothers; this includes information on age, education, household size and occupation.Anthropometric indicators for mothersand children were collected in the study to assess their nutritional status. Weight and height for bothmothers and children were collected using standardprocedures, which comprises of weighing procedure andlength (recumbent) measurement for children under 60 months, while height measurement (standing) was carriedout for children above 2 years and their mothers.

Statistical Analysis

Data were entered, cleaned and analysed using the IBM Statistical Product and Service Solution (SPSS) version 20. Weightand height values were used to calculate and classify bodymass index (BMI) for mothers based on the World HealthOrganization classifications underweight (BMI < 18.5), normal weight (BMI = 18.5–24.9), overweight (BMI= 25.0–29.9) and obese (BMI ≥ 30). Height-for-age,weight-for-age, and weight-for-height were determinedusing WHO-Anthro Plus software, 2006. The results obtainedwere compared with reference values from thepopulation of well-nourished children.Occurrence of underweight/stunting/wasting/overweight in children and underweight/overweight/obesity among mothers was used to identify double burden of malnutrition (DBM) in the households. Essential basic descriptive statistics were conducted using SPSS version 20. Analysis of variance (ANOVA) procedure was used to determine any significant differences in the prevalence of DBM in the three selected communities. Multiple comparisons test (Post hoc test) was used to determine any significant differences in the three study communities considering the prevalence of DBM.One-way analysis of variance (ANOVA) was used to determine whether significant differences exist between double burden of malnutrition and the different locations.

Ethics Approval and Informed Consent

The ethical approval was obtained from the Joint Ethical Review Committee of the University of Ibadan and University College Hospital, Ibadan and from Ibadan South West Local Government Area where the research was conducted. Written informed consent was obtained from the women who participated in the study.

III. Results

As shown in Table 1, the mothers' ages ranged from 16 to 50 years with a mean age of 30.8±6.20 years. The majority (93.1%) were married. More than half of the women (52.2%) completed secondary education while one third (30.0%) were artisans. Children aged 3-12 months constituted the largest proportion (50.6%). There were more boys in the medium (59.0%) and low (54.2%) density areas, while there are more girls (57.6%) in the high-density area. The mean age of the children was 20.0±14.1 months.The BMI of the mothers as presented in Table 2; about 7.1% were underweight, 53.6% had normal weight, 25.9% were overweight. In the high, medium and low-density areas, underweight, normal weight and overweight was found to 8.6%, 65.5%, 17.3%; 10.4%; 56.0%, 24.6% and 1.7%, 37.5%, 24.6% respectively.Table 3 revealed the prevalence of stunting and wastingwashighest in the high density areas (36.9% and 4.2%) respectively while the prevalence of underweight was highest in the medium density area(11.9%).

The prevalence of double burden of malnutrition among the mothers and children is shown in Table 4. The total number of overweight/obese mothers with stunted children was fifty-eight (14.8%), those with wasted children is five (1.4%) while those with underweight children was twelve (3.1%). Out of the underweight mothers, only six (1.5%) had overweight children. Summarily, the total number of households with double burden of malnutrition was 20.6%; with the highest occurrence in the low-density areas (11.7%), 5.6% in the medium density area while only 3.3% resides in high density areas.

Table 1: Socio-economic characteristics of mothers

Characteristics	High (139)	Medium (134)	Low (120)	Total (393)	P
Children's age (months)					
3-12	59(42.4)	76(56.7)	64(53.3)	199(50.6)	
13-24	26(18.7)	20(14.9)	27(22.5)	73(18.6)	
25-36	19(13.7)	18(13.4)	13(10.8)	50(12.7)	.023
37-48	18(12.9)	9(6.7)	14(11.7)	41(10.4)	
49-59	17(12.2)	11(8.2)	2(1.7)	30(7.6)	
Sex					
Male	59(42.4)	79(59.0)	65(54.2)	203(51.7)	.019
Female	80(57.6)	55(41.0)	55(45.8)	190(48.3)	

Age of Mothers (years)					
Less than 20	89(5.8)	1(0.8)	1(0.8)	10(2.6)	.000
21-25	33(24.1)	19(14.4)	13(10.8)	65(16.7)	
26-30	30(21.9)	54(40.9)	43(35.8)	127(32.6)	
31-50	42(30.7)	26(19.7)	43(35.8)	111(28.5)	
36-40	16(11.7)	27(20.5)	19(15.8)	62(15.9)	
Above 40	8(5.8)	5(3.8)	1(0.8)	14(3.6)	
Marital Status					
Single	7(5.2)	7(5.5)	2(1.7)	16(4.1)	.004
Divorced	6(4.4)	4(3.0)	1(0.8)	11(2.8)	
Occupation					
Civil servant	8(5.8)	19(14.2)	32(26.5)	59(15.0)	
Private-company worker	12(10.1)	14(10.4)	34(28.3)	60(15.3)	
Farming	2(1.4)	9(6.4)	0(0.0)	12(3.1)	.001
Trading	47(33.8)	23(17.2)	33(27.5)	103(26.5)	
Artisan	42(33.1)	54(40.3)	18(15.0)	118(30.0)	
Teaching	14(10.1)	11(8.2)	1(0.8)	26(6.6)	
Others	10(7.2)	4(3.0)	1(0.8)	15(3.8)	
Mothers Education					
No education	1(0.7)	3(2.2)	0(0.0)	4(1.0)	
Incomplete primary	11(7.9)	6 (4.5)	0(0.0)	17(4.3)	
Completed primary	16(11.5)	10 (7.5)	1(0.8)	27(6.9)	.000
Incomplete secondary	2(1.4)	3(2.2)	4(3.3)	9(2.3)	
Completed Secondary	96(69.1)	69(51.5)	40(33.3)	205(52.2)	
Degree	11(7.9)	38(28.4)	69(57.6)	118(30.0)	

Table 2: Body mass index of mothers (BMI) by location

BMI category (kg/m^2)	**High density (%)**	**Medium density (%)**	**Low density (%)**	**Total %**	**P**
Underweight	12(8.6)	14(10.4)	2(1.7)	28(7.2)	
Normal weight	91(65.5)	75(56.0)	45(37.5)	211(53.6)	
Overweight	24(17.3)	33(24.6)	45(37.5)	102(26.0)	.000
Obese type I	8(5.8)	9(6.5)	19(15.8)	36(9.2)	
Obese type II	4(2.9)	3(2.2)	9(7.9)	16(4.1)	

Table 3: Prevalence of undernutrition in the selected communities

Prevalence of Undernutrition	**High density (139)**	**Medium density (134)**	**Low density (120)**	**Total**	**P**
Stunting					
Mild/Moderate	50(36.9)	41(30.6)	35(29.2)	126(32.1)	.513
Severe	37(27.6)	31(22.3)	26(21.7)	94(23.9)	
Wasting					
Mild/Moderate	6(4.2)	4(2.9)	2(2.2)	12(3.1)	.666
Severe	5(3.3)	3(2.2)	1(0.7)	9(2.3)	
Underweight					
Mild/Moderate	14(10.1)	16(11.9)	13(10.8)	43(10.9)	.555
Severe	9(6.5) 30.78	7(5.2) 25.95	6(5.0) 20.86	22(5.6)	

Table 4:Double burden of malnutrition in households and Population density

Forms of DBM	**High density**	**Medium density**	**Low density**	**Total**	**P**
Stunted child/ Overweight mother(SCOVM)	7(1.8)	16(4.1)	32(8.1)	55(14.0)	.025
Stunted child/ Obese mother (SCOBM)	4(1.0)	3(0.8)	8(2.0)	15(3.8)	0.46

Wasted child / Overweight mother(WCOVM)	1(0.3)	1(0.3)	0(0)	2(0.5)	.002
Wasted child/Obese mother(WCOBM)	1(0.3)	1(0.3)	0(0)	2(0.5)	.011
Underweight child/overweight mother (UCOVM)	1(0.3)	2(0.5)	7(1.8)	10(2.5)	.010
Underweight child/ Obese mother (UCOBM)	1(0.3)	2(0.5)	4(1.0)	7(1.8)	.042
Overweight child/ Underweight mother(OCUWM)	1(0.3)	2(0.5)	3(0.8)	6(1.5)	.070
Overall	13(3.3)	22(5.6)	46(11.7)	81(20.6)	

The prevalence of double burden of malnutrition among the three communities (Table 5) showed that there exists a significant difference between the BMI score means (p =.000) and therefore, there is a statistically difference in the BMI group in the different locations. ANOVA (F (2, 390) =16.547, P = .000). Stunting and wasting also showed a statistical difference with the different locations with values of ANOVA (F (2, 390) =8.4, p= .000) and ANOVA (F (2, 390) = 3.451, p =.033), respectively while underweight showed no statistical difference (p= .162). A multiple comparison was also done using Turkey post-test for the body mass index of mothers revealed that statistical difference exists between the high- and low-density areas and also between medium and the low density as seen in Table 6. However, there was no significant difference between the high density and medium density areas. The same trend was observed in stunting and wasting with the no of differences observed in between high and medium density areas as seen in Tables 7–9. The negative values of the mean difference values show that the prevalence of stunting decreases as one moves from high density area to medium density area and then to low density areas (Table 7).

Table 5: ANOVA of the prevalence of double burden of undernutrition

		Sum of squares	Degree of freedom	Mean square	F value	Sig.
BMI of mothers	Between groups	892.861	2	446.430	16.547	.000*
	Within groups	10521.710	390	26.979		
	Total	11414.571	392			
Underweight	Between groups	10.747	2	5.373	1.272	.162
	Within groups	1145.158	390	2.936		
	Total	1155.905	392			
Stunting	Between groups	52.759	2	3.140	8.400	.000*
	Within groups	1224.710	390	26.380		
	Total	1277.469	392			
Wasted	Between groups	13.360	2	6.680	3.451	.033
	Within groups	754.819	390	1.935		
	Total	768.179	392			

Table 6: Post Hoc test -Multiple Comparison of BMI of mothers

Dependent Variable	Type of location(I)	Type of location(J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower	Upper
BMI of mothers	**High density**	Medium density	-.55242	.62883	.654	-2.0319	.9270
		Low Density	-3.50554*	.64724	.000*	-5.0283	-1.9828
	Medium density	High density	.55242	.62883	.654	-.9270	2.0319
		Low density	-2.95312*	.65281	.000*	-4.4890	-1.4173
	Low density	High density	3.50554*	.64724	.000*	1.9828	5.0283
		Medium density	2.95312*	.65281	.000*	1.4173	4.4890

Table 7: Post Hoc test -Multiple Comparison of Stunting in children

Dependent Variable	(I) type of location	(J) type of location	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower	upper
Stunting	High density	medium density	-.00209	.21454	1.000	-.5068	.5027

	population	population					
		low density population	-.79658	.22082	.001*	-1.3161	-.2771
	Medium density population	high density population	.00209	.21454	1.000	-.5027	.5068
		low density population	-.79449	.22272	.001*	-1.3185	-.2705
	Low density population	high density population	.79658	.22082	.001*	.2771	1.3161
		medium density population	.79449	.22272	.001*	.2705	1.3185

Table 7: Post Hoc test–Multiple Comparison of underweight in children

Dependent Variable	(I) type of location	(J) type of location	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower	upper
Underweight	High density population	Medium density population	.38750	.20745	.149	-.1006	.8756
		Low density population	.26781	.21353	.422	-.2345	.7702
	Medium density population	High density population	-.38750	.20745	.149	-.8756	.1006
		Low density population	-.11968	.21536	.844	-.6264	.3870
	Low density population	High density population	-.26781	.21353	.422	-.7702	.2345
		Medium density population	.11968	.21536	.844	-.3870	.6264

Table 8: Post Hoc test -Multiple Comparison of wasting in children

Dependent Variable	(I) type of location	(J) type of location	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower	upper
Wasting	High density population	Medium density population	.24861	.16843	.304	-.1476	.6449
		Low density population	-.20915	.17336	.450	-.6170	.1987
	Medium density population	High density population	-.24861	.16843	.304	-.6449	.1476
		Low density population	-.45777	.17485	.025*	-.8691	-.0464
	Low density population	High density population	.20915	.17336	.450	-.1987	.6170
		Medium density population	.45777	.17485	.025*	.0464	.8691

IV. Discussion

This study presents further evidence of the prevalence of double burden of malnutrition among mother-child pairs in households in Ibadan South West Local Government Area, Oyo State, Nigeria. The result of this study indicated a high prevalence ofstunting and underweight among the children in Ibadan South West Local Government Area.

The stunting levelsamong the under five children were of high severity. In this study, the levels of stunting were higher than those reported in Akwa-Ibom(37.4%), and Ogun (28.6%) states in Nigeria[16,19]. However, thestunting level is higher than those reported in theliterature[20, 21] from Lagos state (12.6%) and South eastern states of the same country (34.9%).These stunting values presented in this study are higher when compared with national estimates of stunted children (36.8%), wasting (6.8%) and underweight (22%) in Nigeria[22]. Prevalence of underweight among children was similar to results reported in the literature in South west, Nigeria[23, 24]. The wasting values in this study are lower to results reported in north central (29.3%) and south east Nigeria (13.1%)[25,16]. No significant difference was observedin stunting, underweight, and wasting in three different population densities considered.

Age specific patterns in this study indicated that children within the age of 3-12 months had the highest prevalence of stunting, wasting and underweight in the different age groups. The results also showed undernutrition decreased with the age of the children. However, the trend was different from those observed in the reports[22,26,27] in which the prevalence of undernutrition fluctuates between the different age groups as against what was observed in this study. The decrease in the prevalence of malnutrition among the under-five children could possibly be attributed to the growth experienced by children and an increase in the level of immunity as they advance in years. The youngest age group could bemostly affected possibly dueto their low level of immunity and regular exposure unhygienic environment.This predisposes them to infections and disease thereby increasing the prevalence of malnutrition.

Based on the three different locations, there was a little disparity in the prevalence of undernutrition (stunting, wasting and underweight). The highest prevalence of undernutrition was reported in the high-density community (this could possibly be due to their low standard of living or high poverty levels and the unconducive environment they live and low level of food security. All these factors have effect on the nutritional status of the children residence in such environment or location. A study in Sub-Sahara Africa[28]reported that one of the features of urban poverty is the proliferation of overcrowded slums and shantytowns characterized by unhygienic environmental conditions which worsen the susceptibility of residents to various health problems. As a result of such unhealthy conditions, rates of child malnutrition, morbidity and mortality are several times higher in slums and peri-urban areas than in more privileged urban neighbourhoods.This further supports report of Fosto[29] that gathered evidence from developing countries which showed that the locus of poverty and malnourishment is gradually shifting to urban areas, as the number of urban poor and undernourished is increasing more quickly. Another study[30] also reported that urban childrenliving in poverty are more likely to suffer from malnutrition. This is because in high-density low-areas,major factors like poor living infrastructures, inadequate access to basic amenities and having contact with environmental hazards, combined with low incomes, further promotes food insecurity and malnutrition. The medium density community (25.9%) showed a lower of prevalence of undernutrition than those in the high-density areas (30.8%);this could possibly be as a result of an improvement in the living conditions and access to health than those residing in high density areas. This area has better access to improved houses,access to medical care, food and clean water. The low-density community has the lowest prevalence of undernutrition and the best nutritional status. This could partly be due to their improved living condition, better health care and having adequate purchasing power to eat healthy and nutritional foods.

Even though the maternal undernutrition in this study is low, undernourishment in women is always a situation of public health concern[31]. The prevalence of underweight in the present study is lower than the 11.0% and 12.0% reported among women in the National Demographic Health Survey reports[22, 26] respectively.
The prevalence of overweight and obesity among mothers in this study(39.3%) was lower than the 41.3% reported in a study conducted in Lagos[32]. This may be because Lagos is a big city where daily life promotes weight gain. This study further confirms the increase in obesity among women in the low-density areas which are often higher due to their high standard of living which often promotes consumption of energy dense foods and encouragessedentary lifestyles; thereby promoting regular weight gain among women. This is similar to observations made by a study in Delta State that reported the proportion of obese persons in the urban is three (3) times those in the rural areas (15.7% versus 4.7%) which is similar to the trend reported in another study among adult Nigerians[33]. Others studies that affirmed obesity as an urban problem in Nigeria are studies from Benin City[34], Niger Delta region[35]and Enugu state[36].When compared with the national estimates, this study showed an increase in the incidence of overweight/obese women of reproductive[37]which may possibly have both short and long-term consequence for maternal and child health[38, 39] resulting from nutrition transition[16]. If the whole population is thusconsidered, there is a high prevalence of undernourished children and overweight mothers which indicates the existence of a double burden of malnutrition in the same population.

In comparing the three population densities, this study revealed a high prevalence of double burden of malnutrition in the urban locations with the highest prevalence in the low-density areas. This could be as a result of the change in diets from traditional fresh foods along with sugar sweetened beverages, containing more fat, sugar and salts; thereby promoting poor dietary pattern due to high purchasing power[40]. The high consumption of processed foods could be encouraged by the availability and access to the numerous fast food outlets in the low density areas.
Contrary to the reports in developing countries that malnutrition exists in one direction and mostly in the rural settings; this study furtheraffirms the co-existence of undernutrition and overnutrition in urban areas which are reasonably evident in all the different population densities groupings in urban communities. This therefore raises the questions ofthe possibility of the occurrence of other forms of malnutrition existing in these urban

locations instead of generalizing the problem.In location comparison, the study showed a level of similarity between the high and medium density areas. This could possibly mean that similar factors are being experienced and are responsible for increase in the prevalence of DBM in both high and medium density areas but different from the low density areas.

V. Conclusion

This study found a high prevalence of double burden of malnutrition at household level;this is evident in high prevalence of stunting and underweight among the children and maternal overnutrition among mothers. There is no significant difference instunting, underweight and wasting among the children.However,the high prevalence ofmalnutrition is particularly high in high- and low-density urban areas. This study further confirms the existence of the double burden of malnutrition in urban households and adds to the growing body of literature; it is therefore important that interventions should be targeted at both forms of malnutrition. It is also essential that interventions should be specific and directed towards the needs of each population densityand not just generalizedfor urban households as previously done.It is therefore recommended thatnutrition assessment should be done from time to time toidentifythe current trend of malnutrition and proffersolutions based on reports for each population density. Nutrition education among women should be encouraged while infant and child care feeding practises should be strengthened.Further studies are recommended to identify the risk factors associated with the double burden of malnutrition among mother and under-five children in urban locations.

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