Original Article
DOI: https://doi.org/10.70749/ijbr.v3i10.2387

INDUS JOURNAL OF BIOSCIENCE RESEARCH
https://ijbr.com.pk
ISSN: 2960-2793/ 2960-2807

Micronutrient Deficiency Comparison among Childbearing Women in Rural and Urban Livelihood

Shizma Junejo[1], Mehreen Lateef[1], Ambreen Surti[2], Muhammad Kamran Yousuf[1]

[1]Department of Pharmacology, Bahria University Health Sciences Campus, Karachi, Pakistan
[2]Department of Biological and Biomedical Sciences, Aga Khan University, Karachi, Pakistan

ARTICLE INFO

Keywords: Micronutrient, vitamin B12, vitamin D, urban, rural, deficiency.

Correspondence to: Shizma Junejo, Assistant Professor, Pharmacology, Bahria University Health Sciences Campus, Karachi, Pakistan.
Email: shizma.bumdc@bahria.edu.pk

Declaration
Authors' Contribution: All authors equally contributed to the study and approved the final manuscript.

Conflict of Interest: No conflict of interest.

Funding: No funding received by the authors.

Article History
Received: 29-07-2025 Revised: 24-09-2025
Accepted: 28-09-2025 Published: 10-10-2025

ABSTRACT

Objective: This descriptive type, cross-sectional study was meant to assess and compare status of micronutrient intake deficiency. amongst childbearing age women. The study was targeted towards assessing the difference in levels of vitamin B12 and vitamin D amongst females of child bearing age. **Materials & Methods:** This cross-sectional study was conducted on 227 married females. The study participants were recruited from private clinic in urban city and rural setting. Married women of 18-45 years were part of study after obtaining written informed consent while, unmarried, pregnant, lactating women, women with liver failure, renal failure and cancer were excluded from study. After attaining informed consent, the study participants were asked to fill a brief questionnaire. The questionnaire was followed by getting blood tests to assess vita min B12 level and vitamin D level. Data was analyzed by SPSS version 23. Mean and standards deviation were used for quantitative variables while percentages and frequencies were used for the qualitative variables. Chi square test was done. Pcut value was <0.05. **Results:** The study included 277 females. Mean age of participants was 25± SD. Nearly 127 (55.97%) females were from urban areas. Whereas participants from rural areas were 100 (44.05%). Females in urban area had preponder- ance of vitamin D deficiency whereas rural areas females had vitamin D and vitamin B12 deficiency. **Conclusion:** It was concluded that the females in urban areas were less deficient in vitamin D and vitamin B12 as opposed to females in rural areas. In urban areas diminished exposure to sunlight was observed as cause

INTRODUCTION

Micronutrient deficiency, termed also hidden hunger, constitutes at present crucial worldwide health related issue. Contrasting with protein energy malnutrition (PEM), micronutrient deficiency consequences are frequently less conspicuous and hence considered as 'hidden hunger'. The negative remifications of micronutrient deficiency negatively affect, physical as well as mental development. As ultimate outcome, it can culminate in higher propensity towards illness, mental retardation, blindness as well as overall diminished life-long productivity Globally over 115 000 maternal deaths per annum are caused by anaemia. Globally two out of every five pregnant women as well as one out of every three non-pregnant women within reproductive age have anaemia.

Within low- and middle-income countries anaemia is most prevalent in women of reproductive age. as a result of interface between dietary factors, nutrient deficiencies as well as high propensity for acquiring infectious diseases including malaria, human immunodeficiency virus infection and parasitic infestations[1]. For women of reproductive age, anaemia has longstanding consequences. Women with anaemia have higher propensity towards adverse birth outcomes, inclusive of high maternal death risk as well as delivery of low-birth-weight baby or small-for-gestational-age baby. Anaemia amongst mothers can lead to anaemia in their offspring[1]. Sixty-fifth World Health Assembly approved an action plan in 2012, for improved maternal, infant as well as child nutrition. Global nutrition targets were also put forward which were approved by Member States. Amongst those one worldwide nutrition target includes 50% lowering of anaemia prevalence amongst women of reproductive age by 2025. For achieving this reduction worldwide, a broad strategy is functional under the umbrella of which focus is on multiple areas inclusive of, improved dietary intake, food diversification, food fortification as well as iron, folic acid supplementation for pregnant and lactating women[2]. Yet such strategy requires considering factors vested at individual locality levels for correct intervention being in action most peculiarly for marginalized communities[3].Within past decade, an increase is observed in tendency towards being aware regarding anaemia as well it's ramifications directed towards women's, children's health and development. In 2012, global targets

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for maternal, infant and young child nutrition, were sanctioned by 65th World Health Assembly (WHA) targeted towards lowering anaemia amongst women of reproductive age (15–49 years) till 2025.[4] This target was extended by WHO as well as UNICEF towards 2030 to align with the UN Sustainable Development Goals (SDGs).[5] Within 2020, due to anaemia enormousness in women aged 15–49 years, this was added as indicator 2.2.3 of the SDGs[3].Worldwide diminished lowering anemia prevalency has been observed in women aged 15–49 years as well as children aged 6–59 months, having reached global worldwide reduction around 2–4% percent[4]. Inspite of maternal and child health programs prioritizing anaemia globally anaemia is prevalent amongst33% of worldwide population [5]. Globally anemia constitutes significant threat for reproductive age (WRA), within developed as well as developing countries.

Anemia among women of reproductive age is highly prevalent, over fourfold within developing countries. According to a study, anemia was 9 % prevalent within developed countries whereas in developing countries, 43%, affecting children as well as women of reproductive age (WRA) more with risk of acquiring anemia. Anemia risk elevated amongst reproductive age females as a result of parity, age, education, knowledge, iron (Fe) consumption, vitamin A deficiency, economic status, nutrition and diet. According to World Health Organization economic level holds importance at fundamental level[6]. World Health Organization (WHO) has reported worldwide anemia being prevalent in children aged 6–59 months at a rate of 39.8% whereas in women of reproductive age 15–49 years at a rate of 29.9%[7]. Worldwide anemia is significant health related concern. As per World Health Organization (WHO), anemia definition includes, hemoglobin (Hb) levels below 12.0 and 13.0 g/dL in females and males, respectively. Despite anemia having multifarious linkages, nutritional deficiencies as well as chronic diseases are most frequent causes anemia in children as well as older adults, respectively. Keeping with anemia type as well as extent of anaemia there is difference between anemia presentation clinically and complications of anemia. Iron deficiency anemia can lead to immune system dysfunction, gastrointestinal tract disturbance, impaired thermoregulation as well as neurocognitive function. Tuberculosis and heart failure are in addition other diseases from which anemia can result and also be a prognostic factor for these diseases[8]. Food-assisted maternal and child health and nutrition (FA-MCHN) incorporates a comprehensive methodology for addressing hunger, food insecurity, as well as undernutrition within low- and middle-income countries. FA-MCHN program constitutes efficacious strategic improvement of household food consumption as well as reduction of child linear growth faltering[9]. Vitamin D constitutes chief micronutrient in connection with bone mineral density. Vitamin D level is regulated by multifarious factors. Out of all the consequences of vitamin D deficiency the most important one is weakening of bones. Vitamin D deficieny culminates in diverse chronic diseases inclusive of cardiovascular disease, diabetes mellitus, hypertension, as well as chronic kidney disease. Vitamin D holds significance to prevent and treat autoimmune diseases. Vitamin D deficiency being over 80% was reported among females in Karachi [10]. One time only 25(OH)D assessment serves as an index of ongoing vitamin D status but devoid of yearly fluctuation as a result of sunshine reception in the skin. The 25(OH) levels in terms of being produced are impacted by age, body mass index, physical activity, diet, duration of exposure to sunshine, time of exposure during the day, geographical location, skin surface, as well as skin type Individuals having ample exposure to sunshine, have exhibited cut off levels, between 62–80 ng/ml, which is indicative of cutaneous production being halted over these levels.[11]. Vitamin B12 constitutes significant micronutrient crucial for cellular growth, differentiation, as well as development. Furthermore, vitamin B12 as well as folate are necessary to synthesize DNA, RNA, lipids, as well as protein in the cellular cytoplasm. Peculiarly, vitamin B12 as well as folate constitute necessary co-factors to convert homocysteine to methionine necessary to synthesize neurotransmitters as well as phospholipids. Animal proteins inclusive of meat, eggs as well as milk are chief dietary sources of vitamin B12. Vitamin B12 mediates folate metabolism chiefly and deficiency culminates in secondary folate deficiency having specific role within the rapidly dividing placental and fetal tissues. Folate during pregnancy is required for embryonic formation, peculiarly during neural tube closure as well as for preventing birth defects as well as growth retardation. According to prior studies, folate during pregnancy has been linked to higher propensity towards stillbirth, preterm delivery as well as low birth weight. A study revealed, that 6.8% of adult population in Pakistan had vitamin B12 deficiency. Furthermore, 39.7% were reported having folate deficiency. A study conducted in Brazil revealed, 0.3% of pregnant women having folate deficiency as opposed to 7.9% having vitamin B12 deficiency [12]. Supplementing vitamin B12 along with iron and folic acid, is linked to good pregnancy sequel inclusive of placental health cum function as well as birth weight[12].

The health status of women of child bearing age has direct implications on growth and development of their children. Adequate health status requires proper supply of macronutrients as well as micronutrients. There is a chief role of micronutrients in terms of maintenance of appropriate health of an individual. Miconutrient deficiency in reproductive age amongst females can have a direct impact as contributing to impaired well-being of future children in neonatal phase and when in extreme can be a cause of under-five mortality. Hence a study as this one is imperative to elucidate the problem of maternal micronutrient deficiencies as a cause of under-five mortality, at grassroot level, by evaluating the micronutrient status amongst women of childbearing age.

METHODOLOGY

The study was a descriptive cross-sectional study conducted with overall 6 months duration of study, March 2023 to August 2023 at various private consultant clinics, in urban area of Karachi and in rural areas of, Thatta and Hyderabad cities. This was conducted on 227 women of child bearing age, recruited from urban and rural private clinics, by non-probability convenience sampling. Sample

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size calculation was done using open epi access calculator. This study included married women of 18 -45 years after obtaining written informed consent while, unmarried, pregnant women, lactating women and women with longstanding chronic illnesses like renal failure, liver failure and cancer were excluded from the study. The sample size for this research study was 227 individuals. The study participants were required to fill questionnaire form followed by being investigated via blood tests for vitamin B12 and vitamin D levels.

After attaining ethical approval from ethical review committee (ERC) Bahria University Medical and Dental College vide ERC reference number, 52/2019, data was collected by means of structured questionnaire and laboratory tests. Written informed consent was obtained from study participants, prior to data collection. Questionnaire included questions regarding age , marital status, education level, occupation, education level of spouse, occupation of spouse , having children, number of children, family members in house, family type, total monthly income of family, past history of abortion, past history of ante partum hemorrhage, past history of juandice , tuberculosis , cardiac disease , uterine fibroids , renal diseases , multivitamin supplements in past two years, multivitamin supplements at present and dietary history. Also blood samples were drawn to assess levels of vitamin B12 and vitamin D. The blood samples were used for analysis of extent of vitamin B12 and vitamin D using appropriate testing methods.

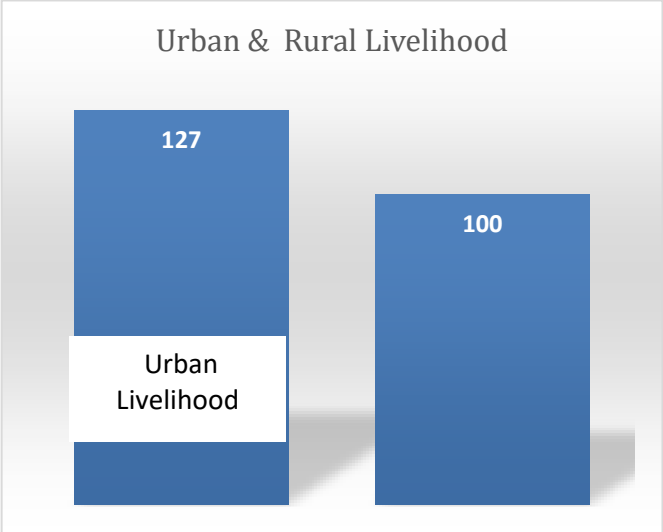
Data analysis was done using SPSS version 23. Descriptives for quantitative variables included mean and standard deviation whereas percentages and frequencies for qualitative variables. the inferential statistic included Chi square test and p value <0.05 was significant.

RESULTS

The study included 227 females. Amongst 227 females in this study, 127 (55.97%) were from urban livelihood and 100 (44.05%) were from rural livelihood., as shown in figure 1.

Figure 1

Place of Residence



The mean age of participants was 25± SD (as shown in table 1).

Table 1

Sociodemographics

Variable		N (%)
Age		25± SD
Marital Status	Married	227 (100%)
	Separated	0 (0%)
	Divorced	0 (0%)
	Widow	0 (0%)
Occupation	Teaching	10(4.4%)
	Healthcare professional	35 (16.1%)
	Housewife	117 (51.5%)
	Self employed	25 (11%)
		40 (17%)
Education level of your spouse	Uneducated	60 (27.1%)
	Matric	40 (17%)
	FSc	27 (11.8%)
	Graduate	70 (30.8%)
	Postgraduate	20(8.8%)
	Other	10 (4.4%)
Children	Yes	190 (83.7%)
	No	37 (16.2%)
Number of children	1	20 (8.8%)
	2	52 (22.9%)
	3	30 (13.2%)
	>3	125 (55%)
Family members living in your house	4	30 (13.2%)
	<4	97 (42.7)
	>4	60 (26.4%)
	>10	40 (17.6%)
Family Type	Family type Single family Joint family	107 (48%) 120(52%)

Marital status, occupation, education level of spouse, having children, number of children, family members living in house, family type, are as shown in table 1.

The education level of study participants included, uneducated 60 (26%), matric 40(17%), FSc 27(11.8%) graduate 70 (30.8%), postgraduate 20 (8.8%). The occupation of spouse was responded as teaching 10 (4.4%), healthcare professional 35 (16.1%), engineer 40 (17%), lawyer 3 (1.3 %), IT professional 5(2.2%), banker 15(6%), self-employed 25 (11%) and other 40(17%). The total monthly income of family was reported as between 10,000 and 40,000 150 (66%), between 5000 and 10000 27 (11%) and <5000 50(22%).

Vitamin D deficiency risk factors including sunlight exposure, maximum no of hours per day spent in indoor activities, settlement in polluted areas, exposure to environmental chemicals, smoking, vitamin D fortified foods and vitamin D supplements, were as shown as in table 2.

Table 2

Risk factors for deficient Vitamin D

Vitamin D Deficiency Risk Factors	Urban Livelihood	Rural Livelihood	P- Value
Sunlight exposure	20(15)	80 (80%)	0.05
Maximum no of hours per day spent in indoor activities	70 (55 %)	10 (10%)	<0.001
Settlement in Polluted areas	10 (7%)	5 (5%)	0.04
Exposure to environmental chemicals	4(3%)	1 (1%)	0.458
Smoking	3 (2%)	1 (1%)	0.155
Vitamin D fortified foods	11 (8%)	0(0%)	<0.464
Vitamin D supplements	9 (7%)	1 (1%)	<0.000

The participants having reported past history of abortion were yes 130 (57%) and no 97 (42%). The response of study participants to having past history of ante partum

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hemorrhage was yes 20(8.8%) and no 207(91%).

Around 100 (44%) reported taking multivitamin supplements in past two years whereas 127 (55%) reported not having taken multivitamin supplements in past two years. Current multivitamin supplement intake was reported by 50 (22%) and 177 (78%) mentioned not currently taking multivitamin supplements.

Vitamin B deficiency risk factors, inclusive of restricted to vegetarian diet only, adequate meat intake in diet, insufficient meat intake in diet and history of gastric surgery in past 1 year, are as shown in table 3.

Table 3

Factors Predisposing to Vitamin B12 Deficiency

Vitamin B 12 Deficiency Risk Factors	Urban Livelihood	Rural Livelihood	P-Value
Restricted to vegetarian diet only	20 (16%)	60 (60%)	<0.001
Adequate meat intake in diet	58 (46%)	20 (20%)	0.404
Insufficient meat intake in diet	45 (35%)	80 (80%)	<0.001
History of gastric surgery in past 1 year	4 (3%)	1 (1%)	<0.000
B_{12} fortified foods intake	5% (4%)	0 (0%)	0.012

Meals consumed from the group meat, poultry, dry beans, eggs and nuts group in the last week were reported as >10 by 140 (61%) and <4 by 87 (38%). In the last week intake from from milk, yogurt and cheese group was reported as >10 by 180 (79%)and <4 by 47 (20%). Meals consumed in the last week from fruit group were mentioned by as >14 by 50 (22%) as <6 by 177 (77%). Vegetable group intake in last week included >16 by 70 (30%) and <6 by 157 (69%). Meals having been consumed from bread, cereal, and rice group included >15 by () 190 (83%) and <10 by 37 (16%). Meals consumption within last week based on fats, oils and sweets group was reported as >6 by 165(72%) and by 62 (27%) as <6.

DISCUSSION

Similar to this study, the study by by rehman et al, also showed vitamin D deficiency more pronounced in urban locality based females [13]. Our study results coincided with study by Shamsi et al., which revealed vitamin D deficicncy being highly prevalent in healthy women of child-bearing age [14]. Our study results differed from study by Marzban et al, which revealed higher vitamin D deficiency within rural area[15]. Results of our study also differed from study by Griffin at al, which revealed higher propensity towards vitamin D being deficient amongst rural dwellers. The reason for the difference between our study and study by Griffin et al, can be diminished hours of sun exposure in part of the worlsd, where the study by Griffin et al.was conducted[16]. Our study results were synchronous with study by Ahmed et al, which revealed higher prevalence of vitamin D deficiency in females belonging to rural areas [17]. Synchronous with our study, study by Sobowale et al, revealed increased propensity to develop vitamin B12 deficiency with decreased meat intake per week [18]. Similar to ur study, Velez et al, revealed adequacy of vitamin B12 status in females from urban areas [19]. Our study results coincided with study by Basalamah et al, wherein vitamin B12 deficiency amongst young adult group was coupled to higher intake of junk food items [20]. Similar to study by Benhem et al, in this study B12 fortified foods intake was remarkably low amongst the study participants[21]. Synchronous with our study, the study by Amani et al, revealed lack of trend towards taking vitamin B12 supplements[22].

The study limitations included, lack of information sought from participants regarding exact timings spent outdoor and level of physical activity was not taken into account. Furthermore, the study did not inquire regarding frequency of eating out, which would have been index of quality of food in terms of micronutrient content. Afood diary should have been provided to study participants to get more accurate response regarding dietary intake.

CONCLUSION

It is therefore concluded that vitamin D deficiency was observed more in women from urban areas due to lack of sun of exposure whereas vitamin B12 deficiency was observed more in women from rural areas due to diminished affordability of meat in this group.

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