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Magnitude And Associated Factors of Food Insecurity Among Pregnant Women Attending Antenatal Care in Selected Public Hospitals in Addis Ababa, Ethiopia, 2024

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Abstract

Background: Food insecurity is a critical issue in developing countries such as Ethiopia which has limited access to sufficient and nutritious food. These issues impact individuals at every stage of life, including pregnant women, and lead to adverse health outcomes. Despite efforts to address food insecurity, there is still a lack of research and strategies specifically targeting women in Ethiopia and an even scarce study on food insecurity among pregnant Women.

Method: A cross-sectional study was conducted from May 25 to June 25, 2024, among 315 pregnant women in ANC follow-up in selected public hospitals in Addis Ababa, Ethiopia. Study subjects were selected via a systematic sampling technique. Data were collected and entered into a mobile application called the Kobo toolbox and transferred to SPSS version 27.0.1.0 for analysis. A descriptive analysis was conducted to obtain a summary value for each variable. For all variables for which data were collected, crude and adjusted odd ratios were calculated to assess the associations between the dependent and independent variables with a 95% confidence level. All variables with p-value < 0.25 in bivariate analysis were entered into a multivariable logistic regression model to identify factors of statistical significance associated with the outcome variable. The level of statistical significance was set at a p value < 0.05. The data are presented in statements, tables, and graphs.

Results: This study revealed that the overall prevalence of food insecurity among pregnant women was 59%. Women who are house wives are 2.6 times more likely to be food insecure than those who are working [AOR=2.6; 95% CI: 1.56, 4.35]; women who are unmarried are 5.51 times more likely to be food insecure than those who are married [AOR=5.51; 95% CI: 1.56, 4.35]; women whose family size is greater than 5 are 2.16 times more likely to be food insecure than women whose family size is less than 5 with [AOR=2.16; 95% CI: 1.24, 3.78]; and women whose average family income level is less than 4500ETB are 2.72 times more likely to be food insecure than those whose average monthly income is less than 4500ETB with [AOR=2.72; 95% CI: 1.25, 6.04), with a significant association with food insecurity.

Conclusion and recommendation: There are high rates of household food insecurity among women in the study area. Family size, average monthly family income, employment status, and marital status were found to be important predictors of food insecurity. The creation of job opportunities, family planning, income support, strong marital relationships and continuous research and monitoring are needed to improve food security among pregnant women.

Keywords: food insecurity; magnitude; pregnant women; public hospitals

Introduction

Food insecurity is defined as either a lack of nutritionally adequate and safe food or a limited ability to acquire acceptable food in socially acceptable ways [1]. It is a process that may start with household members being worried about not being able to access food followed by sacrificing the quality of their diet and then eventually reducing the number of calories consumed. This usually occurs when regular access to adequate and nutritious food is limited [2]. The four key dimensions of food security are the availability of food, economic and physical access to food, adequate food utilization, and sustained access to adequate food. Food insecurity occurs when one or more of the key dimensions of food security fail to be fulfilled [2]. Household food insecurity can be chronic and transitory. Chronic food insecurity is often the result of extended periods of poverty, a lack of assets, and inadequate access to productive resources. Transitory household food insecurity is caused primarily by short-term shocks and fluctuations in food availability and food access, including year-to-year variations in domestic food production, food prices, and household income [3]. Food insecurity is frequently seen as the most significant impediment to individual nutrition, and

its effect on other health and behavior outcomes is increasingly recognized [4,5]. It has also been identified as a public health issue for women living in low-income households, resulting in poorer health outcomes, such as decreased self-rated health status among adults and children depression and anxiety in mothers reduced micronutrient intake, decreased fruit and vegetable consumption overweight poor child physical growth low birth weight and elevated prenatal depressive symptoms [6,7,8,9,10,11,12]. Therefore, even though food insecurity can be understood and addressed as an entity, it should also be recognized as an important indicator of health and nutritional outcomes [13]. Goal 2 of the Sustainable Development Goals (SDGs) aims to end hunger, increase food security, and promote sustainable agriculture. By 2030, 2.1 of the SDGs aim to achieve the objective of ending hunger and ensuring year-round access to food for all people, including pregnant and lactating mothers, but the existing high level of poverty is considered a major challenge in achieving this goal set by the SDG [14].

Methods

Study area and period

The study was conducted from May 25 to June 25, 2024, at selected public hospitals (namely, Yekatit 12 Hospital Medical College, Ras Desta Damtew Memorial Hospital, and Menelik II Comprehensive Specialized Hospital) in Addis Ababa, Ethiopia.

Study Design

A cross-sectional study was conducted on hypertensive patients in selected public hospitals in 2024.

Source and Study Population

The source population was all pregnant mothers receiving antenatal care within the study period in selected hospitals in Addis Ababa, Ethiopia. The study population included all pregnant mothers receiving antenatal care who met the eligibility criteria at selected public hospitals in Addis Ababa during the study period.

Study unit patients

Inclusion criteria

All pregnant mothers pregnant with ANC services at selected health institutions within the study period were included in this study.

Exclusion criteria

Pregnant mothers with special requirements and pregnant mothers who were seriously ill were excluded from the study.

Sampling Procedure

First, a list of public hospitals in Addis Ababa was identified, and three public hospitals were included randomly in the study (1 teaching hospital, 1 specialized hospital, and 1 general hospital). Second, study participants who were seeking ANC follow-up were identified using inclusion and exclusion criteria. On the basis of the total number of pregnant women seeking ANC care in hospitals during the study period, the sample size of the study was allocated to those hospitals proportional to the number of pregnant women. These hospitals approximately had total ANC visits of 360,420,480 pregnant women during the study period. The final part of the final sample size was selected via systematic random sampling.

Data collection methods

Data collection instruments and procedure

Data were gathered via a mobile application called Kobo Toolbox. A structured and standardized questionnaire was utilized to gather data on household food insecurity. Standard household food insecurity access scale (HFIAS) questions derived from the food and nutrition technical assistance (FANTA) project, which was specifically developed for use in developing countries (40), were used to determine the outcome variable of food insecurity. The instrument consists of nine questions that illustrate the frequency of occurrence and quantify the severity of food insecurity in the previous four weeks using Likert scale responses: 0= No. 1=rarely (1 or 2 times), 2=sometimes (3–10 times), and 3=often (>10 times).

Pregnant women were required to respond to these questions on behalf of their entire household. Each respondent indicated whether they had encountered the following due to a lack of food or money to buy food in the previous month; Worrying about running out of food; Lack of preferred food; The respondent or another adult had limited access to a variety of foods because of a lack of resources. forced to eat unpreferred food due to lack of resources; Eating smaller portions; Skipping meals; The household ran out of food; Going to sleep hungry and Going 24 hours without food.

Data quality control

Enumerators and supervisors were trained for 2 days, 1 week before the date of data collection on study objectives, key highlights in methods to assess household food insecurity, data collection, and interviewing approach, and data recording. Pretesting was performed on 5% of the sample that was not selected for the actual study, and changes were made before the final data collection began. Data collection was strictly supervised daily. The data were then checked for completeness and consistency before data was exported. Incomplete and inconsistent documents were avoided. The data was exported to SPSS version 27.0.1.0 for further data processing and/or to avoid manual work limitations and for missing, incomplete, and inconsistent data.

Operational definition

Food-secure women

Women who have experienced none of the FI (access) conditions or have just been worried, although rarely, during the past 4 weeks (30).

Food insecure women

Women who are unable at all times to access food sufficient to lead an active and healthy life (include all stages of FI; mild, moderate, and severe (30)

Mildly food insecure women

Women who worry about not having enough food sometimes or often and/or are unable to eat preferred foods and/or eat a more monotonous diet than desired and/or some foods considered undesirable, but only rarely (30)

Moderately food-insecure women

Women who sacrifice quality more frequently, by eating a monotonous diet or undesirable foods sometimes or often, and/or have started to cut back on quantity by reducing the size of meals or the number of meals, rarely or sometimes. However, they do not experience any of the three most severe conditions (30).

Severely food insecure women

Women who have been forced to cut back on the meal size or number of meals often and/or experience any of the three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating) (30).

Data processing and analysis

The data distributions of the variables are reported as percentages and frequencies via descriptive statistics. A bivariable logistic regression analysis was carried out to evaluate the relationships between food insecurity and each independent variable. All factors significant in bivariable analyses at the $P < 0.25$ level are included in a multivariable model from the outset. The variables from the bivariable analysis that are more likely to be significant are fitted together in a multivariable model. In the multivariate analysis, a P value of less than 0.05 and a 95% confidence interval were used to evaluate statistical significance. Consequently, nonsignificant variables are removed from the final model using the backward exclusion method.

Results

Sociodemographic characteristics

A total of 314 respondents responded to questionnaire giving a response rate of 99.6%. With respect to the age of the mothers, the minimum number of women discovered was in the age group of <20 years, which was 8 (2.5%), whereas the greatest number of women were in the age group of 20~35 years, which was 236 (75.2%), with an average age of 30.8 (±0.458 SD). With respect to the educational status of the pregnant women, 268 (85.3%) were educated, yet almost half of the 153 (48.7%) were unemployed, while 114 (49.2%) of the husbands had received secondary education, and 228 (98.7%) were working. The Majority 232(73.8 %) of the moms in the research were married, whereas the remaining 82 (26.2%) were single, divorced or never married, with the majority of the house holds 237(75.5%) being headed by males. A total of 263 (83.8%) of the households had a monthly income greater than 4500, while 51 (16.2%) of the families had an income less than or equal to 4500; finally, a family size of 6 or more was found to be 110 (34.9%), while the remaining had a family size of <6. (Table 1).

Table 1: Sociodemographic status of pregnant mothers at selected public hospitals in Addis Ababa, 2024.

Variable	Variable category	Frequency	Percentage
Age(yrs)	<20	8	2.5
	20-35	236	75.2
	>35	70	22.3
Head of Household	Female	77	24.5

	Male	237	75.5
Monthly Income	<4500	51	16.2
	>4500	263	83.8
Educational Status	No education	6	1.9
	Primary (<8)	12	3.82
	Secondary (8-12)	28	8.9
	More than Secondary	268	85.3
Employment Status	House wife	153	48.7
	Student	113	35.9
	Merchant	32	10.1
	Civil Servant	16	5.09
Marital Status	Married	232	73.8
	Widowed/Separated	4	1.2
Husbands educational Status	Never married	73	23.2
	Divorced	32	10.1
	No education	4	1.73
	Primary (<8)	114	49.1
	Secondary (8-12)	66	28.5
	More than Secondary	48	20.7
	Not Working	4	1.73
occupational Status	Civil Servant	100	43.2
	Merchant	68	29.3
	Other	35	15.08
Family Size	>6	110	34.9
	<6	205	65.1

Conditions Of the Respondents

Of the study participants, 53 (16.8%) of the mothers were on their first pregnancy, while 261 (83.1%) of the mothers were on their second or above pregnancy, and 240 (76.4%) of the pregnancies were wanted; however, the remaining 74 (23.6%) of the pregnancies were unplanned and therefore unwanted. Most of the mothers were pregnant during their first trimester pregnancy, accounting for 49.6% of the total mothers. (Table 2).

Table 2: Pregnancy conditions of pregnant mothers at selected public hospitals in Addis Ababa, 2024.

Variable	Variable category	Frequency	Percentage
Parity	Nulliparous	53	16.8
	Multiparous	261	83.1
Months of pregnancy	First Trimester	156	49.6
	Second Trimester	66	21%
	Third Trimester	92	29.2
Wanted pregnancy	Yes	240	76.4
	No	74	23.6

Conditions Prior To Pregnancy

Prior to pregnancy, 44 (14%) of the pregnant mothers had a chronic illness, 20 (45.4%) of whom had DM, 7 (15.9%) of whom were hypertensive, 15 (34%) of whom were known RVI patients, and the remaining 2 (11.3%) had other chronic illnesses, such as respiratory and autoimmune diseases. In a previous pregnancy, 89 (28.3%) of the mothers had compilations such as abortion, miscarriage and still birth (Table 3).

Table 3: Conditions prior to pregnancy of pregnant mothers at selected public hospitals in Addis Ababa, 2024.

Variable	Variable category	Frequency	Percentage
Chronic illness prior	DM	20	45.4
pregnancy	HTN	7	15.9

		No	%
	RVI	15	34
	Other	2	4.5
Complications on	Yes	89	28.3
previous pregnancy	No	225	71.7

Food Security Status and Associated Factors of Food Security

Household food insecurity access-related conditions

The participants' level of food security was evaluated using the nine HFIAS questions suggested by the FAO, and they were grouped into four distinct categories representing different levels of food security. The research delved into the attitudes and beliefs of the mothers surveyed regarding the various aspects and circumstances associated with HFIAS. The table below indicates the number of respondents who positively answered that they had experienced food insecurity within the past 4 weeks of the reference period. Among all the study participants, 156 mothers (59% of the total) gave a score of 0 or 1, indicating that they had never experienced food insecurity; 173 respondents (54.9%) said they had ever worried about running out of food in the house; and 106 participants (8.3%) said they had run out of food. Among the participants, 211(67%), 199(63%), 117(37%) and 130(41%) complained of not eating the kind of food they preferred, limiting their variety of food, not eating interesting foods and repeating similar foods all due to a lack of resources. Furthermore, 145(46%) of the households said that their family went to bed hungry because there was not enough food in the house, and 170(54%) of the respondents said that their family members went without meals all day and night. Furthermore, 16(5.1%) of the participants had eaten few meals because there was not enough food at HH, and 2(0.6%) participants had no food at HH. (Table 4).

Table 4: Food insecurity status among pregnant mothers at selected public hospitals in Addis Ababa, 2024.

Mothers HFIAS response frequency and percentage										
items	yes		No		Rarely		Sometimes		Always	
	No	%	No	%	No	%	No	%	No	%
Worry not having enough food in the HH	173	55	142	45	69	22	78	25	26	8.3
Kinds of food not able to eat due to lack of food	211	67	103	33	79	25	90	29	43	13.7
Limiting variety of food due to lack of resource	199	63	116	37	24	7.6	30	9.5	62	19.7
Eating not interesting foods due to lack of resource	117	37	198	63	47	15	72	23	80	25.4
Repeating similar foods due to lack of resource	130	41	185	59	94	30	33	11	3	1
Eating few meals due to shortage of foods in HH	16	5.1	299	95	13	4.1	2	0.6	1	0.3
Do you face no food in the HH	2	0.6	313	99	0	0	0	0	0	0
Have the family go to bed with hunger due to shortage of food in the HH Is any family members not food the	145	46	170	54	40	13	73	23	32	10.2
whole day and night due shortage of HH	170	54	145	46	40	13	73	23	32	10.2

Household Food Insecurity Access Scale

The HFIAS scale was calculated by summing the frequency of occurrence of each question. The mean HFIAS score with minimum and maximum scores of 0 and 27, respectively. A lower HFIAS score indicates a lower level of food insecurity, whereas a high HFIAS score indicates a remarkably high severity of food insecurity. A score of 0 on the HFIAS scale indicates the absence of food insecurity. This finding suggests that the household has consistent access to an adequate quantity and quality of food, without any concerns or limitations regarding its availability, accessibility, or utilization.

Prevalence of household food insecurity

The study target groups were assessed by calculating the prevalence of HFIAS, which is a categorical measure used to indicate the scale of access to food insecurity. According to this study, 59% (95% CI: [53.6%, 64.4%] of the study population were categorized as food insecure. (Figure 3) These findings emphasize that a staggering majority of the studied population face varying degrees of food insecurity, which includes individuals classified as mildly food insecure (15.9%), indicating a marginal lack of access to sufficient and nutritious food. Additionally, a notable proportion of the population, 36.9%, is categorized as moderately food insecure, signifying a more pronounced insufficiency in food availability and quality, and a minor portion of the population (6.3%) has severe scarcity of food (Table 6).
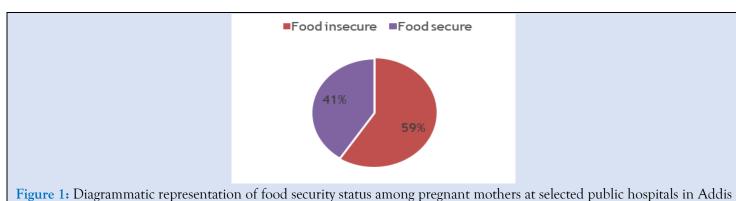

Figure 1: Diagrammatic representation of food security status among pregnant mothers at selected public hospitals in Addis Ababa, 2024

Table 5: Severity of household food insecurity among pregnant mothers at selected public hospitals in Addis Ababa, 2024

HFIAS Category	Frequency	%
Food Secure	128	41%
Mildly Food Insecure	50	15.9%
Moderately Food Insecure	116	36.9%
Severely Food Insecure	20	6.3%

Both bivariate and multivariate binary logistic regression analyses are used to determine whether there is a significant association between sociodemographic variables and other variables. Maternal employment status, marital status, family size, and average monthly family income strongly correlated. The results in the table below show that women who are house wives are 2.6 times more likely to be food insecure than those who are working [AOR=2.6; 95% CI: 1.56, 4.35]; women who are never married are 5.51 times more likely to be food insecure than those who are married [AOR=5.51; 95% CI: 1.56, 4.35]; women whose family size is greater than 5 are 2.16 times more likely to be food insecure than women whose family size is less than 5 [AOR=2.16; 95% CI: 1.24, 3.78]; and women whose average family income level is less than 4500 ETB are 2.72 times more likely to be food insecure than those whose average monthly income is less than 4500 ETB [AOR=2.72; 95% CI: 1.25,6.04] Table 7.

Table 6: Factors associated with food insecurity among pregnant mothers at selected public hospitals in Addis Ababa, 2024.

Variable	Variable category	Freeney	Food Security status		COR (95%CI)	AOR (95%CI)
			Insecure (186)	Secure (128)		
Head of house hold	Female	77	54	23	1.86(1.07-3.24) *	0.56(0.17-1.77)
	Male	237	132	105	1	1
Monthly Income	<4500	51	40	11	1	1
	>4500	263	146	117	0.34(0.169-0.698) *	2.72(1.25-6.0) **
Educational Status	No education	6	4	2	1.57(0.28-8.73) *	1.94(0.56-6.71)
	Primary (<8)	12	10	2	3.93(0.84-18.2)	0.19(0.02-1.6)
	Secondary (9-12)	28	22	6	2.88(1.133-7.34) *	1.28(0.15-10.8)

	>Secondary	268	150	118	1	1
Employment Status	Housewife	153	100	53	0.12(0.10–0.97) *	2.60(1.56-4.3) **
	Student	113	69	44	0.10(0.01-0.82) *	0.16(0.021-1.37)
	Merchant	32	2	30	0.004(0.00-0.05) *	0.19(0.0-1.5)
	Civil servant	16	15	1	1	1
Marital Status	Married	232	126	106	1	1
	Widowed/separated	4	3	1	2.52(0.04-4.1)	1.9(0.08-1.76)
	Never married	73	55	18	2.57(1.42-4.52) *	5.51(1.6- 18.4) **
	Divorced	5	2	3	0.56(0.01-1.53)	2.2(0.76-5.34)
Family size	>6	110	75	34	1.86(1.14-3.05) *	2.16(1.24-3.7) **
	<6	205	111	94	1	1
Parity	Nulliparous	53	27	26	0.66(0.36-1.21) *	0.52(0.25-1.10)
	Multiparous	261	159	102	1	1
Wantedness of pregnancy	Yes	240	129	111	0.34(0.28-5.24) *	2.467(0.25-4.86)
	No	74	57	17	1	1
Chronic illness prior to pregnancy	DM	20	13	7	1.8(1.31-4. /93) *	1.11(0.67-1.37)
	HTN	7	5	2	2.5(0.24-11.5)	0.58(0.46-6.45)
	RVI	15	9	6	1.5(0.32-2.71)	1.18(0.69-4.67)
	Other	2	1	1	1	1

P<0.25*, P<0.05* represents statistically significant variables at the 95% confidence interval.

Discussion

Food insecurity occurs when all people, at all times, lack secure access to sufficient amounts of safe and nutritious food that meets their dietary needs and food preferences as well as being unable to obtain food that is necessary for normal growth, development and an active healthy life. Studies have shown that different factors affect the food insecurity of pregnant mothers during pregnancy. The purpose of this study was to investigate the magnitude of food insecurity and its associated factors among pregnant women in selected hospitals in Ethiopia, 2024. In terms of food insecurity in this study, 59% of the pregnant women in this survey were food insecure (62.3%, 26.8% and 10.7%, mildly, moderately and severely food insecure, respectively). The results of this study were greater than those of studies conducted in Sodo town (77.6%) (15) and Abay District (78.1%) (16). This difference could be attributed to socioeconomic differences because pregnant mothers have more access to an employment and a source of income in Addis Ababa, in contrast to the more rural areas and culturally, in urban areas, women are not frowned up on when they seek support for their family on their own as opposed to waiting from their male partner. Multiple logistic regression analysis revealed four main risk factors associated with the food insecurity status of pregnant women. Marital status (unmarried), occupational status (being not employed), and household size (having >5 family members and average monthly income (<4500 ETB) were significantly associated

with food insecurity in pregnant women. This study was not able to observe a significant association between the sex of the head of household, the educational status of the mother, and parity, wontedness of pregnancy or chronic illness prior to pregnancy.

One of the variables linked to food insecurity was occupation. Women without jobs are more likely to experience food insecurity. This is a result of the mother's ability to produce revenue and withstand the difficulties associated with financial instability in the home. The outcome was corroborated by related studies [15,17,18]. Family size also affects securing food in the household because when family size increases, the demand also increases, and it becomes difficult to secure food availability in the household, with similar findings from other studies validating these findings [15,17,18]. Women with family income levels greater than 4500 ETB have a lower risk of being food insecure than those with lower average monthly income. This is because women with higher incomes can combat food insecurity by keeping a backup supply of food if the home runs out. Similar findings from other studies have also verified these findings [15,17,18]. The marital status of the mother is another contributing factor to food insecurity, with a significant association, possibly because unmarried mothers have less support financially, making it difficult to meet the nutritional demands of the family. Other studies have reported similar results and supported the findings of this study [15,17,18].

Limitations

The study was conducted in a limited number of public hospitals in Addis Ababa; private hospitals and health centers were excluded. As a result, the prevalence of food insecurity may have been somewhat underestimated.

Owing to the study's reliance on self-reports, social desirability and recollection bias may exist among participants, which could be mitigated more if an objective measure was used. The probability sampling method and relatively small sample size (n=315) restrict the representativeness of the study population and wider applicability of the results. A larger randomized sample would improve generalizability, and the cross-sectional data would not allow for the establishment of a temporal association between food security and other outcomes. The study also did not account for other variables, such as dietary diversity, maternal mental status, food extension service, domains of food security, and coping strategies, that were not covered in this study.

Conclusion

The overall magnitude of food insecurity among pregnant women in selected public hospitals in Addis Ababa, Ethiopia, 2024, for 315 pregnant women was as follows: more than half of the pregnant women at the selected hospitals were food insecure, among which two-thirds were mildly food insecure and the remaining one-third were moderately and severely food insecure, whereas less than half of the remaining pregnant women were food secure. This finding also shows that having a stable job to support a family increases the level of food security. In addition, having a smaller family size was significantly associated with food insecurity. The study also revealed that the marital status of pregnant women was significantly associated with food insecurity. In addition to the marital status of the pregnant woman, average family income was also significantly associated with food insecurity.

Acronym

ANC: Antenatal Care; EDHS: Ethiopian Demographic and Health survey; FANTA: Food and Nutrition Technical Assistance FAO Food and Agriculture Organization report; HFIAP: Household Food Insecurity Access Prevalence; HFIAS: Household Food Insecurity Access Scale; MDG: Millennial Developmental Goal MRN Medical Record Number; NGO: Non-Governmental Organization; SDG: Sustainable Development Goals; SPSS: Statistical Package for Social Science; SSA: Sub Saharan Africa; UMBC: Universal Medical and Business College; UNICEF: United Nations Children's Fund; WHO: World Health Organization.

Declaration

Ethical consideration

Ethical clearance was obtained from the Addis Ababa Public Health Research and Emergency Management Directorate. Permission letters were obtained from the Addis Ababa City Administration Health Bureau Institutional Review Board with reference number (A/A/650/227). Informed consent to participate was obtained from all of the participants. All the study participants were reassured/informed that they would be anonymous. Access to the collected information was limited to the investigators, and confidentiality was maintained throughout the project.

Consent for Publication

Not Applicable

Availability of data and materials

All relevant data are available upon reasonable request.

Competing interests

The authors declare that they have no known competing interests.

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Author Contributions

B.A. contributed to the study conception, designed the study, performed the statistical analysis, and drafted the manuscript. K.W. and M.D. assisted in the statistical analysis, drafted the manuscript and contributed to table and figure preparation. All the authors revised and approved the final manuscript.

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