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Assessment of prevalence and severity of food insecurity among parents/guardians of students in Basrah Province, Southern Iraq

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Abstract

Background and Aim: An individual's ability to obtain enough nutritious and healthy food to sustain a healthy lifestyle is a crucial indicator of food security. This study estimated food insecurity's prevalence and levels among parents/guardians of secondary school students in Basrah and describe its consequences.

Materials and Methods: The Food Insecurity Experience Scale (FIES) was implemented through a questionnaire survey to evaluate food insecurity. The relationship between financial factors, attitudes, and psychological impacts regarding food accessibility and affordability was studied in detail. The eight food insecurity questions' responses were measured using the Rasch model approach.

Results: Two hundred and fifty-two parents/guardians took part in the survey. The prevalence of food insecurity was estimated as 24% (with a 95% confidence interval of 18.9%–29.8%). Around 50% of the parents/guardians stated that their typical income is middle-income. 28% of respondents reported having sufficient food but not their preferred choices, while 35% paired food shortage with financial instability, 32% could not afford nutritionally balanced meals, and 21% of the parents admitted to cut or skipped their meals to other family members. 21% of parents/guardians were affected by inadequate food supply during the COVID-19 pandemic. The level of food insecurity included that 50% of the respondents exhibited mild food insecurity, 19.4% had moderate food insecurity, and 4.3% were classified as having severe food insecurity. According to the Rasch analysis of the FIES data, the likelihood of experiencing severe food insecurity is linked to consuming unhealthy food, having food run out, and eating unbalanced meals.

Conclusion: The study found that financial constraints, food safety concerns, and limited access to nutritious food explain the widespread food insecurity reported. Significant efforts are required to alleviate chronic food shortages in Basrah, including job creation, strengthening agricultural production, and implementing safety-net policies for affected families.

Keywords: food accessibility, food insecurity, parents/guardians, Rasch model.

Introduction

Providing an individual with nutritious food is essential for both human well-being and societal development as part of food security. Eight hundred million people in developing and low-income countries endure undernourishment and micronutrient deficiency, as per the Food and Agriculture Organization [1]. The term "food security" refers to individuals' consistent access to adequate, safe, and nutritious food for sustaining a healthy lifestyle. People experience food insecurity when they do not have enough safe and nutritious food. Food security consists of four main dimensions: availability, economic and physical access to food, food consumption/utilization, and price stability [2].

Weak health systems and policies, lower income, rapid urban growth, and lack of sanitary conditions are among the indirect factors contributing to food insecurity [3, 4]. Climate change significantly heightens food insecurity by affecting agriculture and livestock production [5]. Extreme weather events, such as floods/hurricanes, cause people to evacuate their homes and disrupt food supply [6]. The increase in world population, particularly in Asia and Africa, has outpaced the growth in food availability, rendering food demands unsustainable [2]. By 2050, the world population is projected to surpass 9 billion. Increased population growth has led to the reduction and inhabitation of many pasture regions by new residents [7].

The unemployment rate, low-income, and deadly violence in low-income countries significantly contribute to long-term food insecurity. Over 1.3 billion people live in dire poverty, earning <1.25 dollars a day, resulting in the deaths of many children. Since 1990s,

the global rate of undernourishment has decreased from 18% to 11% in 2012–2014 and from 23% to 13% in the developing world [2]. Despite advancements, the world's hunger rate remains elevated on a global scale. Two billion people suffer severe malnutrition in the poorest regions [8]. Geopolitical instability causes ongoing food insecurity due to population displacement caused by lethal conflicts. Families in Syria, Iraq, and Ukraine struggle to find food and shelter due to ongoing conflicts.

Lack of essential micronutrients, minerals, and amino acids can result in significant illnesses, such as impaired physical and cognitive development in children [9]. Iodine deficiency can cause goiter and cretinism due to its role in thyroid hormone function [10]. One in every five children in the developing world experiences severe malnourishment, accounting for nearly half of all child deaths. Malnourished mothers can give birth to low-birth-weight infants, leading to similar deficits in future generations [11]. Undernutrition makes individuals more prone to disease infection and less responsive to vaccines [12]. The intersection of undernutrition and infectious diseases severely undermines immune resistance, exacerbating the impact of pathogens when micronutrient reserves are depleted [13]. Mental health issues, such as anxiety, depression, and stress, are linked to food insecurity at a rate four times higher [14].

For decades, the Food and Agriculture Organization has been instrumental in reducing hunger in impoverished areas by reinforcing agriculture and food security [15]. In 2020, food insecurity and lack of access to adequate food were estimated at 30%, and by 2030, the plan to end hunger and malnutrition through the application of Sustainable Development Goal 2, although more challenges are anticipated [16]. An economic crisis and inadequate health infrastructure pose significant challenges to maintaining food safety and security in middle- and low-income countries. The COVID-19 pandemic left approximately 90–150 million people in poverty and instigated a 24% surge in food insecurity [17, 18]. The poverty rate also rose from 11% to 31% in 2020 as a result of the worldwide financial crisis due to the COVID-19 outbreak [19]. The Middle East and African nations facing political instability and limited agriculture production, such as Yemen, Iraq, Libya, and Syria, are at risk of their food security being compromised due to this disease [20]. The COVID-19 pandemic worsened food insecurity in Iraq through increased food prices and soaring unemployment. In addition, the population of Iraq has increased to more than 40 million people [21]. Agricultural productivity in Iraq is negatively impacted by climate change, resulting in decreased rainfall and water scarcity [22]. About 20% of Iraqi households lack a consumption smoothing strategy due to high unemployment rates. The diversity of diet among households in the middle and north of Iraq is estimated to be 6.4%, and the minimum percentage was reported in Basrah and Thi-Qar (Southern region) by 5.5% and 2.7%, respectively [23]. The extent of food insecurity in Iraq remains unexplored.

This study estimated the prevalence and degrees of food insecurity among parents/guardians at various secondary schools, as well as the associated consequences. In Basrah province, this study aims to enhance our knowledge of food security and the causes of heightened food insecurity within the Basrah community.

A comprehension review of undernourishment in Iraq in the past 30 years

The prevalence of undernourishment rose to 37.5% in Iraq in 2019, up from 22.4% in 2001 (Table-1). Consuming insufficient dietary energy, leading to undernourishment, differs among individuals and is influenced by age, gender, and lifestyle. This type of food insecurity significantly impedes human development and performance, particularly in children under the age of five whose bodies display wasting, stunting, and underweight conditions. Across countries, 149 million children under the age of five were estimated to be stunted, and 45 million were estimated to be wasted during 2020 [24].

From 1991 to 2018, the World Bank Data on Hunger and Undernourishment reported a decrease in the prevalence of wasting, stunting, and being underweight [25]. For 30 years from 1991 to 2018, Table-1 displays the progression of undernourishment among Iraqi children under the age of five. The study by Jawad *et al*. [26] found that 7.6%, 20.6%, and 6.6% of the population in Babylon, a province in Iraq, experienced underweight, stunting, and wasting, respectively. In the Kurdistan regions of Northern Iraq, the occurrence of stunting ranged from 7% to 17% [27]. Improving households' food baskets with balanced dietary contents will help decrease the prevalence of food-related diseases.

Materials and Methods

Ethical approval and Informed consent

The proposal of the study was submitted to the College of Veterinary Medicine, University of Basrah, and then, ethical approval was obtained from the Scientific Committee (UB.VET.13) on October 04, 2021. The verbal informed consent was obtained from each respondent.

Study period and location

This study was conducted from December 2021 to February 2022, within a 3-month timeframe in Basrah province. It is located in the southern region of Iraq, with high temperatures in the summer season and precipitations are rather low. Around three million people live in Basrah.

Data collection and measure food security

The Food Insecurity Experience Scale (FIES) is commonly employed to assess food insecurity and

Table-1: Undernourished status of the children under the age of 5 years in Iraq from 1991 to 2018.

Estimated Year	Prevalence of wasting, weight for height (%)	Prevalence of stunting, height for age (%)	Prevalence of underweight, weight for age (%)
1991	4.4	27.6	10.4
2000	6.6	28.1	12.8
2003	5.6	33.7	10.1
2004	6.9	20.0	8.0
2006	5.8	27.5	7.1
2011	6.5	22.1	7.2
2018	3.0	12.6	3.9

Source: World Bank data (https://ourworldindata.org/hunger-and-undernourishment)

its degree. We gathered data using the Department of Agriculture's questionnaire, containing indicators concerning food security for households/individuals [28]. The questionnaire was transformed into an Arabic Google form. We aimed at the secondary school parents/guardians in Basrah province. Fourteen administration schools in nine Basrah regions collaborated to achieve this. Eighteen parents/guardians from each school were contacted using their contact numbers to obtain their consent for the survey, and the questionnaire was then provided to them as a link. The questionnaire, however, consists of the sociodemographic characteristics of the respondents, while the second part deals with different food security components and mainly concerns the financial affairs of parents/guardians and how influenced their food supply prior to the 12 months of interviewing. A question regarding food accessibility in the context of the COVID-19 pandemic was included in the survey.

The level of food insecurity can be measured on a continuum scale that categorizes respondents into distinct levels. The study incorporated the eight questions from the FIES to assess the latent trait theory and quantify the psychological impacts, including feelings of worry and other related attitudes that stem from insufficient food and financial resources. Based on their responses, parents/guardians were sorted into four categories: zero signifies food security, mild food insecurity is represented by 1–3 scores, moderate food insecurity corresponds to 4–6 scores, and severe food insecurity is denoted by 7–8 scores. Parents/guardians with a food security score of zero or mild food insecurity were classified as food secure, while those with moderate or severe food insecurity were labeled as food insecure. The prevalence of food insecurity is determined.

Statistical analysis

Data analysis for this study was conducted using the Jamovi software (version 2.3) from Sydney, Australia. Descriptive statistics was carried out to assess the proportions and their 95% confidence intervals (95% CI) for each categorical variable. The Rasch model was used to assess the responses to the eight-food insecurity-related questions, including specific experiences and attitudes/behaviors of respondents/households. In this model, the mean, standard error, outfit, and infit values are calculated. The R package's Person separation reliability was integrated into the model. The latent traits and food insecurity levels are represented visually as figures.

Results

Sociodemographic characteristics of household respondents

Two hundred and fifty-two respondents from nine Basrah districts (Abu-Alkaseeb, Al-Dyer, Al-Zubair, AL-Qurna, AL-Midaina, AL-Hartha, Shatt-Al-Arab, Karmat-Ali, Basrah center) filled out the questionnaire. Table-2 presents details about the sociodemographic status of the parents/guardians, including their living or deceased status, family size, and overall family membership. About 50% or more have a university education, while 15–20% have a primary school education. 50% (125/252) of the respondents reported having a middle-income, while roughly 40% (99/252) had a good income. 15% of fathers, compared to 54% of mothers, were employed less. 166/252 (65%) of the respondents stated that their family consisted of 5–7 persons, while 54/252 (21%) said their family size was 3–4.

About 40% of the parents reported having the desired food available, while 28% acknowledged having enough food but not their preferred types (Table-3). Around one-third (35% [35 + 54/252]) feel worried when food runs out before getting money to buy food. Almost a third of the parents (32% [20 + 62/252]) admitted the food often/sometimes ran out because they did not have enough money to buy food. 32% of the respondents acknowledged they could not afford a balanced diet. 21% of respondents reported reducing or skipping meal portions due to insufficient food supply. 21% of parents reported experiencing food insecurity during the COVID-19 outbreak. Although 95% of parents knew about disease transmission via food, over half (54%) had contracted a gastroenteritis infection from local market purchases.

Estimation of FIES

According to Rasch model analysis of eight questions, individuals consuming unhealthy food have a major mean effect (0.55, Infit value 1.60), while those anxious individuals have a lower mean effect (0.35, Infit value 0.87) (Table-4). The statistics' reliability was calculated to be 0.63. Figure-1 represents the parents/guardians' FIES question responses, revealing a

Table-2: Sociodemographic characteristics of the respondents.

Demographic factors	Categories	Frequency (n)	Percentage (95%CI)
Parents alive			
Father	Present	230	91.27 (87.1, 94.4)
	Died	22	8.73 (5.6, 12.9)
Mother	Present	245	97.22 (94.4, 98.9)
	Died	7	2.78 (1.1, 5.6)
Education level of parents			
Father's education	Primary school	38	15.08 (10.9, 20.1)
	Secondary school	24	9.52 (6.2, 13.8)
	High school	31	12.30 (8.5, 17.0)
	University	159	63.10 (56.8, 69.1)
Mother's education	Primary school	49	19.44 (14.7, 24.9)
	Secondary school	43	17.06 (12.6, 22.3)
	High school	35	13.89 (9.9, 18.8)
	University	125	49.60 (43.3, 55.9)
Parents own job			
Does father have a job	Yes	212	84.13 (79.0, 88.4)
	No	40	15.87 (11.6, 21.0)
Does mother have a job	Yes	114	45.24 (39.0, 51.6)
	No	138	54.76 (48.4, 61.0)
Level of income per family	Good	99	39.29 (33.2, 45.6)
	Middle	125	49.60 (43.3, 55.9)
	Low	28	11.11 (7.5, 15.7)
Number of children per family	<5 children	184	73.02 (67.1, 78.4.4)
	≥5 children	68	26.98 (21.6, 32.9)
Total member per family	3–4 members	54	21.43 (16.5, 27.0)
	5–7 members	166	65.87 (59.7, 71.7)
	≥8 members	32	12.70 (8.9, 17.5)

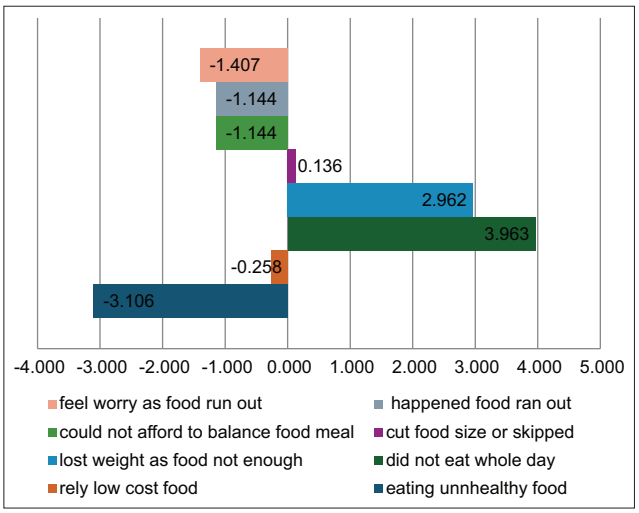

Figure-1: Relative severity of items response resulted from Rasch Model.

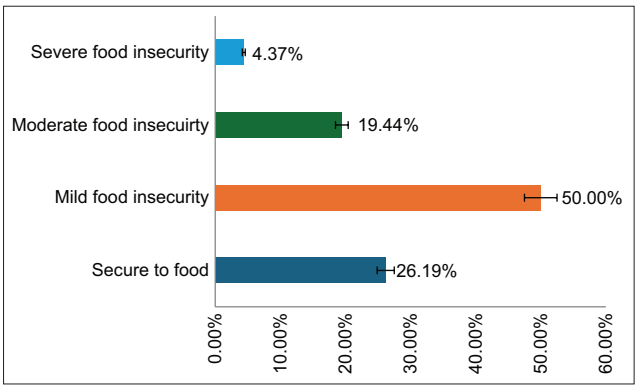

Figure-2: Levels of food insecurity measured among parents/guardians.

negative effect value of −3.106 associated with eating unhealthy food and falling ill, alongside estimated included affect values for food supply issues (−1.44).

The food insecurity levels are reported in Figure-2, with 50% of the parents/guardians having mild food insecurity, 19.4% having moderate food insecurity, and 4.3% for those with severe food insecurity. The validation measurements determined a food insecurity prevalence of 24% (95% CI: 18.9–29.8).

Discussion

The study aimed to ascertain the prevalence of food insecurity and describe accompanying food accessibility issues among Basrah secondary school parents/guardians. FIES indicators were integrated into the Rasch model to measure varying levels of question-response severity. Based on the severity of food insecurity, the prevalence was calculated. However, food insecurity causes long-term health effects including physical retardation and mental development and susceptibility to communicable and non-communicable diseases [29]. Over several decades, Iraq has faced significant issues due to geopolitical upheaval, decreased agricultural productivity, and surging food costs [30]. During the Gulf War, international sanctions resulted in trade embargoes and sieges, significantly impacting food availability and population health in Iraq [31].

The research findings highlighted three primary sociodemographic distinctions: income level, parental employment status, and family size. Income, among the sociodemographic variables, emerges as

Table-3: Statements answer from the respondents concerning food security components.

Question statement	Frequency (n)	Percentage (95%CI)
Which of these statements best describes the food eaten in your household in the last 12 months?		
Enough of the kinds of food we want to eat	99	39.29 (33.2, 45.6)
Enough but not always the kinds of food we want	71	28.17 (22.7, 34.2)
Sometimes not enough to eat	12	4.76 (2.5, 8.2)
Often not enough to eat	2	0.79 (0.1, 2.8)
Refused answer	68	26.98 (21.6, 32.9)
Do you buy your food based on quality of food or quantity of food?		
Quality	212	84.13 (79.0, 88.4)
Quantity	40	15.87 (11.6, 21.0)
(I/We) feel worry when food run out before (I/we) got money to buy food		
Often true	35	13.89 (9.9, 18.8)
Sometimes true	54	21.43 (16.5, 27.0)
Never true	91	36.11 (30.2, 42.4)
Refused answer	72	28.57 (23.1, 34.6)
Did it happen that the food you have ran out of and there is no money to buy enough food?		
Often true	20	7.94 (4.9, 12.0)
Sometimes true	62	24.60 (19.4, 30.4)
Never true	130	51.59 (45.2, 57.9)
Refused answer	40	15.87 (11.6, 21.0)
Could not afford to eat balanced meals in the preceding 12 months		
Often true	19	7.54 (4.6, 11.5)
Sometimes true	63	25.00 (19.8, 30.8)
Never true	127	50.40 (44.1, 56.7)
Refused answer	43	17.06 (12.6, 22.3)
In the last 12 month did you ever cut the size of your meals or skip the meals because there was not enough money for food		
Yes	53	21.03 (16.2, 26.6)
No	170	67.46 (61.3, 73.2)
Refused answer	29	11.51 (7.8, 16.1)
In the last 12 months did you lost your weight because there was not enough money to buy food		
Yes	16	6.35 (3.7, 10.1)
No	212	84.13 (79.0, 88.4)
Refused answer	24	9.52 (6.2, 13.8)
In the past 12 months, did (you, other adult in your household) ever not eat for a whole day because there was not enough money for food?		
Yes	10	3.97 (1.9, 7.2)
No	219	86.90 (82.1, 90.8)
Refused answer	23	9.13 (5.9, 13.4)
We relied on only a few kinds of low-cost food to feed family because running out of money to buy food		
Often true	22	8.73 (5.6, 12.9)
Sometimes true	39	15.48 (11.2, 20.5)
Never true	146	57.94 (51.6, 64.1)
Refused answer	45	17.86 (13.3, 23.2)
Have your family ever been affected or suffered from inadequate food over the covid-19 outbreak period as there was not enough money for food?		
Yes	54	21.43 (16.5, 27.0)
No	198	78.57 (73.0, 83.5)
Do you know there are many bacterial and viral diseases can be transmitted via food?		
Yes	241	95.63 (92.3, 97.8)
No	11	4.37 (2.2, 7.7)
Did you or someone in your family have gastroenteritis because of the food you bought from the market?		
Yes	138	54.76 (48.4, 61.0)
No	114	45.24 (39.0, 51.6)

the principal predictor of food insecurity, in line with previous research by Silvestri *et al*. [32], Sheikomar *et al*. [33], and Moodi *et al*. [34]. 50% of the parents/guardians earn the middle-income, while 11% live below that income level. The correlation between food expenditure and family/individual income value is largely determined by food market prices. Some families oriented their food consumption toward eating certain staple foods because they could not afford diversity, especially for those who earn a low-income per day/month [35, 36]. In Bangladesh, food insecurity is linked to lower income and higher food prices, with relative risks of 3.87% and 1.29%, respectively [37]. 65% of respondents reported their family size

Table-4: The FIES questions experienced by parents/guardians.

Questions response	Mean	S.E.	Infit	Outfit
Feel worry because food run out	0.3532	0.192	0.879	0.760
Happened that the food you have ran out	0.3254	0.196	0.682	0.511
Could not afford to eat balanced meals	0.3254	0.196	0.812	0.648
Cut the size of your meals or skip the meals	0.2103	0.228	0.837	0.791
Lost weight because there was not enough food	0.0635	0.363	0.839	1.222
Happened to not eat for a whole day	0.0397	0.470	1.091	3.908
Relying on only a few types of low-cost food	0.2421	0.216	0.839	0.622
Had gastroenteritis because ate contaminated food	0.5476	0.191	1.608	8.521

FIES=Food insecurity experience scale, S.E.=Standard error

to be between 5 and 7 individuals. A study from Iran confirmed that a size of family with larger than five persons are more likely to increase food insecurity, compared to small size family [34]. These families had to cut back on meals and portion sizes The federal government should allocate funding intervals and promote cost-effective nutritious food to reduce food insecurity among poorer households.

In the present study, 24% of the parents/guardians experienced food insecurity. Food insecurity shows significant differences between countries and continents. The food insecurity rates in Nigeria, India, Vietnam, and Iran were assessed as 61.8%, 77.2%, 36.2%, and 48%, respectively [34, 38–40]. The family's education level, family size, demographics, and economic situation significantly contribute to the likelihood of food insecurity [41]. The extensive family size influenced considerably the food demands for each person, as stated by other researchers [42, 43]. A significant amount of food insecurity exists in Basrah, requiring substantial efforts to address this issue for each population unit.

Approximately 35% of parents/guardians, worried about food running out and 32% who have experienced their food running out, associate their attitudes and undesired experiences with food insecurity. These aspects can significantly measure the magnitude of food insecurity and distinguish the crucial variables related to it. Studies from Ghana and Bahamas, indicated the majority numbers of the respondents who experienced food insecurity also expressed worrisome feelings due to a lack of variety in their diets as well as relying on a few low-energy categories of food [44, 45]. Another study suggests a link between food insecurity and heightened anxiety, stress, hypertension, and diabetes due to elevated cortisol levels [46]. Safety-net policies should be adopted to mitigate the impact of both poverty and high food prices on food supply for those with lower revenues.

This study revealed that 50% of the parents/guardians have mild food insecurity, 19.4% have moderate food insecurity, and only 4.3% suffer from severe food insecurity. In line with our research, a study was conducted between 2015 and 2018 in Bangladesh and interviewed 15,000 households, indicating that 12% experienced mild food insecurity, 13% experienced moderate food insecurity, and 3.5% experienced severe food insecurity [47]. The degree of food insecurity can be categorized based on the intensity of hunger. In the Alborz Province of Iran, food insecurity was estimated at 20.5% without hunger and 19.3% with mild to intense hunger [48]. The complexity of food insecurity arises from factors such as climate variability [49], as well as employment rates, gender equality, and financial problems [50, 51].

The Rasch model determined the relative severity of consuming unhealthy food as −3.106, but the impact of other food items unable to balance meals was smaller, at −1.44. Under the Rasch model, the degree of importance of each item can be determined based on its relative risk severity. Based on this approach, the relative risk of food insecurity, as measured by the FIES, has been used to compare conditions between populations and nations. The severity of items in the Zambia national survey was estimated at 1.66 logistic units, while it was at 2.60 logistic units in Ethiopia [52]. Monitoring market-place products for pathogens is crucial for health authorities to minimize food contamination. In addition, families need food assistance to prevent hunger when food supplies at home are insufficient or unbalanced.

During the COVID-19 pandemic, 21% of families reported experiencing inadequate food. Reports from several nations expose the devastating impact of COVID-19 on families' income and their descent into food insecurity, particularly in low- and middle-income nations. Jordan, Lebanon, Kenya, and Uganda experienced food insecurity increase of 23%, 24%, 38%, and 44%, respectively, due to the COVID-19 crisis [53–55]. The COVID-19 pandemic causes disruption of the food supply, interrupts market trades, spiking food prices, and exacerbates low wages; there will be a prolonged humanitarian crisis and widespread impoverishment [56–59]. Cash, food, and medical aid should be provided to poor families.

Conclusion

This study comprehensively elucidated the causes of food insecurity in Basrah province. This study examines the socioeconomic features of 252 parents/guardians, the prevalence of food insecurity, and related food security aspects concerning food accessibility and safety. This survey's findings can be utilized to improve our understanding of food insecurity in Basrah and execute interventions, including

food distribution and health education for low-income families. In Basrah, promoting sustainable economic growth is crucial for enhancing food security.

Data Availability

The supplementary data (including the questionnaire) can be available from the corresponding author on a reasonable request.

Authors' Contributions

MFA and MMA: Conceived the idea and designed the study. MFA, FAA, and AMA: Managed and analyzed the data. MFA and FAA: Drafted and revised the manuscript. All authors have read, reviewed, and approved the final manuscript.

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Competing Interests

The authors declare that they have no competing interests.

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