

**Food insecurity and its association with mental health among
Syrian refugees resettled in Norway**

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**Centre for International Health
Faculty of Medicine
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Master of Philosophy in Global Health at the University of Bergen.

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Summary

Food insecurity is growing, even in high-income countries. Refugees are one of the most vulnerable social groups in society due to their pre-migration and migration history in addition to economic hardship, cultural and language differences, and difficulties accessing the job market in their new countries of resettlement.

The number of studies dedicated to food insecurity among asylum seekers and refugees is growing together with the number of refugees and asylum seekers in the world. However, most studies about refugees focus on people living in reception centers and refugee camps, while data about refugees who live in the community is scarce. Therefore, the first objective of this study is to widen knowledge about food insecurity among Syrian refugees (men, women, and children) who have been living in Norway for about a year.

Economic hardship and traumatic experiences may influence the mental health of refugees at any stage of their transfer to a new country. Mental health problems and food insecurity are associated together in the general population. However, no study on this association was previously conducted among refugees. Thus, our secondary aim was to study the association between mental health and food security among Syrian refugees living in Norway.

This Master thesis is based on data from a follow-up part of the Changing Health and health care needs Along Syrian Refugees' Trajectories to Norway

(CHART) project performed in Norway in 2018-2019 [1]. For the follow-up part of the study, 352 out of 428 Syrian refugees who came to Norway as resettlement refugees agreed to participate in the follow-up arranged as a telephone survey held by native Arabic-speaking interviewers (response rate 75%). Collected data included demographic, socio-economic, health, and food security information about the participants themselves and any children living in their households.

The findings of this Master thesis show that there is a high level of food insecurity among Syrian refugees who recently resettled in Norway. According to our results, 28% of Syrian refugees in a Norwegian setting and 16% of their children are food insecure. We also find a significant association found between food insecurity and mental health.

Lack of food security violates a fundamental human right – the right to food. Our results highlight that food insecurity among refugees in high-income countries is a topic that needs more attention from politicians and social organizations.

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The results of this study were presented at the Migration conference 2020: health and work in the new country (Bergen, September 2020).

This Master thesis is based on current guidelines provided by the Centre for International Health, University of Bergen. The format for this Master thesis is a scientific paper and a mantle. A scientific paper will be submitted to the Migration and Health journal in May 2021.

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Acronyms and abbreviations

CHART – Changing Health and health care needs Along the Syrian Refugees’ Trajectories to Norway;

COVID-19 – coronavirus disease 2019;

FAO – Food and Agricultural Organization;

HFSSM – Household Food Security Survey Module;

HSCL-10 – Hopkins Symptom Checklist, short version;

PTSD – posttraumatic stress disorder;

SDG – Sustainable Development Goals;

UNHCR – United Nations High Commissioner for Refugees.

Main definitions

Food security - a state when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life [2].

Food insecurity - lack of food security, associated with health risks such as cardiovascular diseases, poor self-rated physical and mental health, early child growth faltering, higher risk of acute infections in children, developmental problems, chronic conditions, and poor quality of life in general [3].

Mental health - a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work

productively and fruitfully, and is able to make a contribution to his or her community [4].

Migrant - a person who moves away from his or her place of usual residence, whether within a country or across an international border, temporarily or permanently, and for a variety of reasons. The term includes a number of well-defined legal categories of people, such as migrant workers; persons whose particular types of movements are legally-defined, such as smuggled migrants; as well as those whose status or means of movement are not specifically defined under international law, such as international students [5].

Migration - population movement, encompassing any kind of movement of people, whatever its length, composition and causes are; it includes migration of refugees, displaced persons, economic migrants, and persons moving for other purposes, including family reunification [6].

Refugee - someone who is unable or unwilling to return to their country of origin owing to a well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group, or political opinion [7].

Resettlement (quota) refugees - people who are registered as refugees by the United Nations High Commissioner for Refugees (UNHCR), but who cannot be offered a permanent solution in the country they are currently in and who are therefore offered resettlement in a third country [8].

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Throughout the writing of this master thesis, I have received great support and assistance from many people.

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In addition, I would like to thank my husband for his endless support and allowance to continue my careless student life for two more years.

Introduction

Food insecurity

Despite considerable improvement in the situation of global hunger in the period of 1990-2019, around 815 million people worldwide were still considered to be food insecure before the corona crisis [9]. In other words, the world is not on track to achieve Sustainable Development Goal (SDG) number two – zero hunger by 2030 [10].

Food security is defined by the Food and Agriculture Organization (FAO) as a state when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life [2]. One of the definitions of food insecurity is the lack of food security [3]. Lack of food security is associated with health risks such as cardiovascular diseases, poor self-rated physical and mental health, early child growth faltering, higher risk of acute infections in children, developmental problems, chronic conditions, and poor quality of life generally [3]. Food insecurity can also be defined as a disruption of food intake or eating patterns because of a lack of money or other resources [11].

Food insecurity among refugees in high-income countries is a growing concern. In these countries, food insecurity is mainly connected with economic vulnerability, poverty, and other social aspects of minorities like low levels of education or employment in low-paid jobs [12]. In high-income countries, the

diet of refugees and asylum seekers typically has low diversity and includes low micronutrient intake. Many also have to cut the portion sizes or skip meals [13]. The rate of food insecurity among some groups of refugees and asylum seekers in Norway has been much higher than in the general population. Food insecurity among the general population in Norway in 2017 was 3%, while refugees living in reception centers in Norway were 93% food insecure, according to Henjum et al [14].

It has been found that women have a higher rate of food insecurity than men of the same population. In South Korea, among female North Korean refugees, 29.8% are food insecure, whereas among North Korean refugee men 28% are food insecure [15].

Food insecurity may be influenced by several risk factors such as income, employment, ethnicity, disability, and other factors. The risk of food insecurity significantly increases when there is a lack of money. The participants of this study were resettlement refugees. They were undergoing a mandatory integration program in the period of collecting data. When participating in this program, the refugees get paid by the Norwegian government. They get approximately 1,000 Euro per month, while the average income among Norwegian citizens is approximately 3,500 Euro per month [16]. According to Norwegian law, refugees may have a side job, but only one study participant was working at the time of collecting data. Unemployment may also have a

negative effect on a households' food security status. The high unemployment rate among low-income social groups makes it more difficult to meet basic food needs [17]. A high rate of food insecurity may be associated in different ways with the experiences from home countries, transition period, individual characteristics, or financial hardships [18]. Some studies show that pre-migration traumatic events and post-migration stressors are associated with posttraumatic stress disorder (PTSD) and other severe mental illnesses, and can, through this path, impact food insecurity among refugees [19].

Mental health

Mental health is defined as a state of well-being in which the individual realizes their own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community [4].

Various factors can provoke mental disorders such as unhealthy lifestyle, poor nutrition, conflicts, misuse of drugs, and many more [20]. The path to immigration can pose risks and stressors that are unique to immigrants, both prior, during, and after arrival to their new country of residence [21]. The vast range of literature regarding migrants proves that complicated life conditions in their home countries before migration, exposure to a potentially traumatic experience, and post-migration stress are the most common factors associated with mental ill-health among migrants [22].

Hassan et al. in their systematic literature review, looked at mental health and psychological well-being of Syrian refugees, and they categorized mental health problems into three groups: worsening previously existing mental health disorders; new problems caused by conflict, displacement, and multiple losses; issues related to adaptation to post-conflict context [20]. We can conclude that migration to a new country of resettlement may worsen mental health of refugees in different ways.

Figure 1 tries to reflect some main factors influencing the mental health of refugees at pre-migration, migration, and post-migration stages.

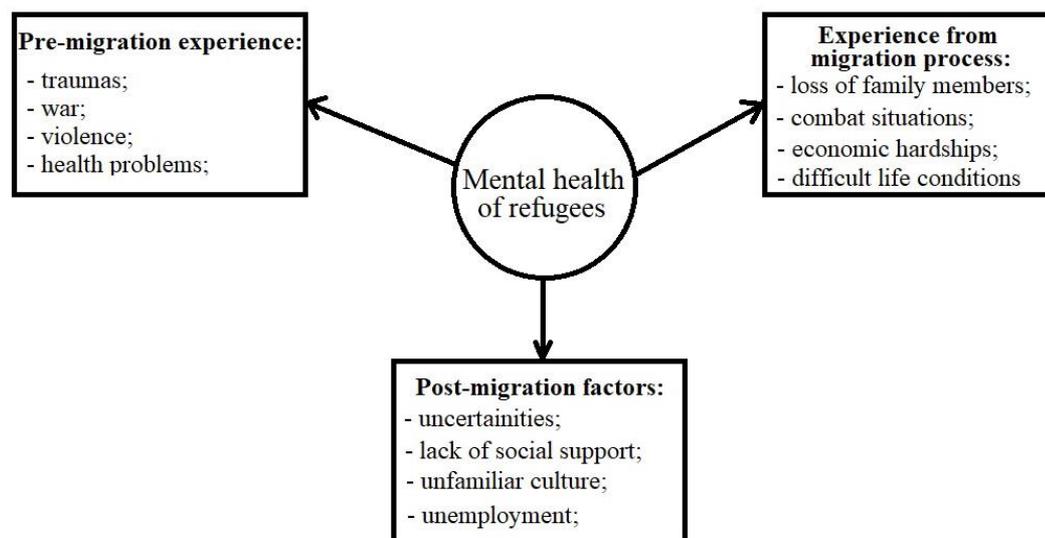


Figure 1 Factors influencing the mental health of refugees at all stages of the migration process

Over the last decades, much research has been done on the mental health of refugees living in camps, and reception centers. These studies have focused on mental health prevalence rates, risk factors, and opportunities for improvement for different age groups. Prevalence of depression, anxiety,

posttraumatic stress disorders, bipolar disorders, and schizophrenia is higher in people with experience of war, conflicts, and humanitarian emergencies [23]. Refugees not only experience traumas in the conflict settings in their home countries but are also going through many stressors during the migration process [24].

Refugees in Norway

In Norway 4.4% of the total population, more than 233,000 people, have a refugee background. Out of these, 38,000 came to Norway as resettlement refugees [25]. In 2018 there were 4,340 resettlement refugees arrived in Norway out of a total of 37,000 immigrants. Participants of this study are resettlement refugees, also known as “quota refugees.” The Norwegian government decides the number of quota refugees for each year. In 2019 the number of quotas for resettlement refugees coming to Norway was 3,100 people [26]. In 2020 the number of resettlement refugees fell dramatically due to coronavirus disease 2019 (COVID-19) to 1,527 people [27], and the total number of resettlement refugees living in Norway became 40,676 [28].

Rationale of the study

Several studies have investigated the living conditions of refugees and asylum seekers living in reception centers in Norway. However, data about food security among refugees who have been settled in Norway for some time is missing.

As far as we are aware, no studies are focusing on refugees' food security after their resettlement in the community. Further, there are no studies looking at the association between food insecurity and refugees' mental health after their resettlement in new communities. In order to fill these knowledge gaps, our study assesses food insecurity for women, men and children, and the associations between food insecurity and mental health among Syrian refugees who have been living in the community in Norway for one year.

Objectives

1. To describe food security among refugees (men, women. and children) who have been living in Norway for approximately one year;
2. To study the associations between food security and mental health among refugees.

Methods

The primary outcome of this study is food insecurity. To assess food insecurity, we used the Household Food Security Survey Module (HFSSM) (see Appendix 1). The HFSSM is a survey instrument consisting of 18 questions, which refer to the past 12 months' meal history. The questions aim to determine child and adult food security status. Ten questions of the questionnaire assess the adults' food security status, and eight questions assess the children's food security status. HFSSM focuses on self-report of uncertain, insufficient, or inadequate food access, availability, and utilization due to limited financial resources and compromised eating patterns. The questions specify that lacking money or other resources as the reason not to have enough food, and the measure should not be affected by fasting or voluntary dieting [29]. The food insecurity item consists of the following variables: "Not enough food", "Worried that food will not last", "Not eating balanced food", "Skipping meals", "Eating less", "Being hungry", "Losing weight", "Not eating for a whole day", "Cutting the size of portion for children", "Children skipping meals", "Children being hungry", "Children not eating for a whole day", "Low food diversity for children", "Children not eating balanced food", "Children not eating enough".

The original HFSSM questionnaire uses three categories to rate food security among children and adults: food secure, moderate food insecure, and

severe food insecure [30]. Responders can be assessed as food secure, moderate food insecure, or severe food insecure based on the number of affirmative answers they give:

Table 1	HFSSM participants' assessment	
	Food security status	10 item adult food security scale
Food secure	0 affirmative items	0 affirmative items
Food insecure, moderate	1-5 affirmative items	1-4 affirmative items
Food insecure, severe	≥ 6 affirmative items	≥ 5 affirmative items

The short version of the Hopkins Symptom Checklist (HSCL-10) was used to assess mental health symptoms (symptoms of anxiety and depression) (see Appendix 2). The mental health score item includes the following variables: “Being scared”, “Feeling fearful”, “Feeling dizziness or weakness”, “Feeling tense”, “Self-blaming”, “Having sleeping problems”, “Feeling blue”, “Feeling worthless”, “Feeling like everything is an effort”. In HSCL-10, the participants are asked to assess ten statements and rate them according to the following scale: not at all - 1, a little - 2, quite a bit - 3, extremely - 4. The average score of 1.85 (range 1 - 4) is a commonly used threshold for possible clinical mental distress [31].

Study setting and design

The data for this master thesis is a part of the follow-up assessment of the CHART study [1]. For this work, a cross-sectional design in which participants who came to Norway as resettlement refugees answered questions about their food security over the last 12 months and about their mental health over the last week is used. Both main variables were measured simultaneously at the time when the refugees had been living in Norway for about one year. We chose a quantitative study design as we wanted to assess a relatively large data set to be able to run regression analyses to study the association between variables (food insecurity and mental health).

A survey interview was held over the telephone by trained Arabic-speaking interviewers. Responders gave their written consent to participate at baseline with oral consent at follow-up. Each participant got a unique id number. For the follow-up part of the study, the response rate was 75%: 352 out of 428 Syrian refugees who came to Norway as resettlement refugees agreed to participate in follow-up. Data collected included demographic, socio-economic, health, food security information about the participants themselves and any children living in their household.

The answers of each participant were noted on paper questionnaires. After all participants' answers were recorded on paper, they were plotted into

EpiData software, where all the answers were coded. The data was cleaned and imported into STATA 16.0 for statistical analysis.

Inclusion criteria

We included refugees from Syria that have lived in Norway for about a year.

As this was a follow-up study, we had a purposeful sampling and included the same participants as the baseline, excluding those who did not agree to follow up. Contact details of participants were obtained from the Norwegian Directorate of Integration and Diversity and public refugee offices in the municipalities of the resettlement after the consent from the participants.

The most common reason for lost-to-follow-up included not wishing to participate further and not reachable after three phone calls.

Data collection

Data collection was performed in September – December 2019. Three Arabic-speaking interviewers conducted the survey interviews by phone. Plotting and cleaning the data was performed in December 2019 – January 2020.

Data analysis

In order to reach the objectives set for this master thesis, we performed descriptive statistical methods and logistic regression analysis.

Using descriptive statistics, we described the basic features of the participants, such as minimum, maximum, and mean age, the number of children, years of education, and other characteristics described in Table 2. We also stratified the food insecurity rate by gender, and reported the percent of food-insecure participants among adults and children.

We used logistic regression to study the association between our main variables (food insecurity and mental health). Logistic regression is a statistical method used to explain the relationships between two variables where the outcomes variable is discrete or binary.

To use logistic regression, we had to recode outcome variables into binary. We used a cut-off of 1.85 for mental health as suggested in the manual: everything under 1.85 was considered healthy, all above 1.85 was considered to have mental ill-health. The answers to food insecurity questions were also recoded into binomial variables, where “often true,” “sometimes true,” and “do not know or refuse to answer” were recoded to 1 (indicating some degree of food insecurity), and “never true” was recoded to 0 (indicating no food insecurity).

Ethical approval

The Regional Committee for Medical & Health Research Ethics of South-East Norway approved the project, reference 2017/377. All enrolled participants received information about the study and signed a consent form in Arabic at a baseline. The consent form was repeated orally in the follow-up interview.

Findings

Study participants and their characteristics

The study population (n=352) had a mean age of 35,6 years (SD=10,8) and consisted of 52% women and 48% men. The minimum age of participants was 17 years, and the maximum age was 79 years. The distribution of age had a heavy left tale, and the group of people in their 20s was the largest. The mean number of children per woman was 3.6. Most of the female participants, as well as the male participants of this study, had children (80% and 79%, respectively).

Regarding the education of the participants, the mean number of education years was eight years (SD 3.5). The majority of the refugees in our study had secondary education or lower (75.1%).

There were only eight participants who migrated to Norway alone (2.2%). All the others migrated either with some immediate family members (11.5%) or with all immediate family members (86.6%).

Table 2	Characteristics of study participants	
N total	352	
Gender, N (%)		
Female	181	51.7
Male	169	48.3
Age		
Mean (SD)	35.6	10.8
Minimum	17	
Maximum	79	
Number of children		
Total (mean, SD)	3.6	0.4
Female with children (n, %)	145	80
Male with children (n, %)	133	79
Education		
Mean, years (SD)	8	3.5
Secondary education or lower (n, %)	262	75.1
High school or higher (n, %)	87	24.9
Co-migration		
Migrated with all immediate family members (n, %)	301	86.3
Migrated with some immediate family members (n, %)	40	11.5
Migrated alone	8	2.2
Occupation		
Employed (n, %)	1	0.3
Working at home (n, %)	10	2.9
Not working (n, %)	19	5.5
Studying (n, %)	317	91.3
Year of arrival in Norway		
2017 (n, %)	123	34.9
2018 (n, %)	219	62.2
2019 (n, %)	10	2.9

All adult refugees (age 18-55) who come to Norway are obliged to participate in a two-year introduction and integrating course. This explains why

most of the participants (91.3%) responded that they were students. Even though the refugees who attend the introduction and integration course can have a side job together with the integrating course, only one participant reported that he/she was employed.

By the time we conducted our study, all participants had been living in Norway for about one year. Other characteristics of the participants can be seen in Table 2 above.

Results

Most participants were food secure (72%). One out of four participants was either moderate food insecure (22%) or severely food insecure (6%) (Figure 2).

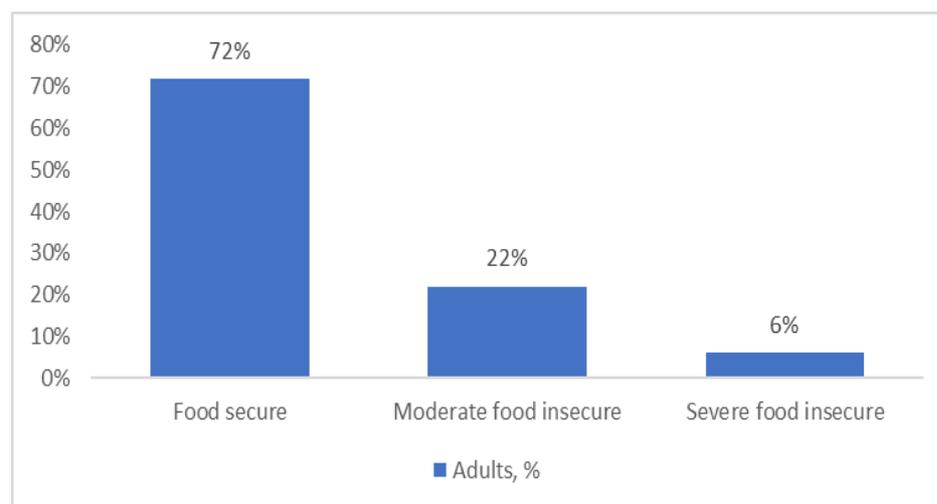


Figure 2 Percent of food secure, moderate, and severe insecure in the research population

Figure 3 shows that the most common problems for participants were that food did not last, that they skipped meals often or sometimes, and often worried that food would not last (approximately 15 % for each parameter). Respondents also reported that they did not have enough or appropriate food (11%), had not been eating balanced food in the past 12 months (9%), and had been eating less than before (7%).

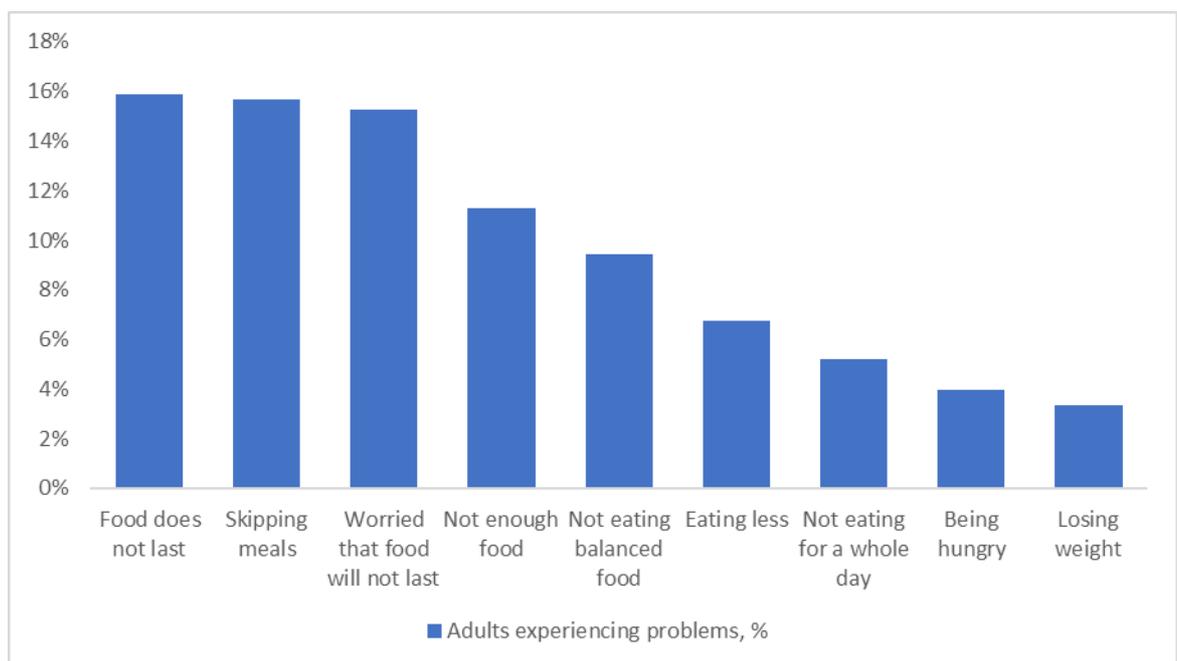


Figure 3 Food insecurity among adults

A few participants reported that they had not been eating for a whole day (5%), had been hungry (4%), and some respondents reported that they had lost weight because of these challenges during the last year (3%).

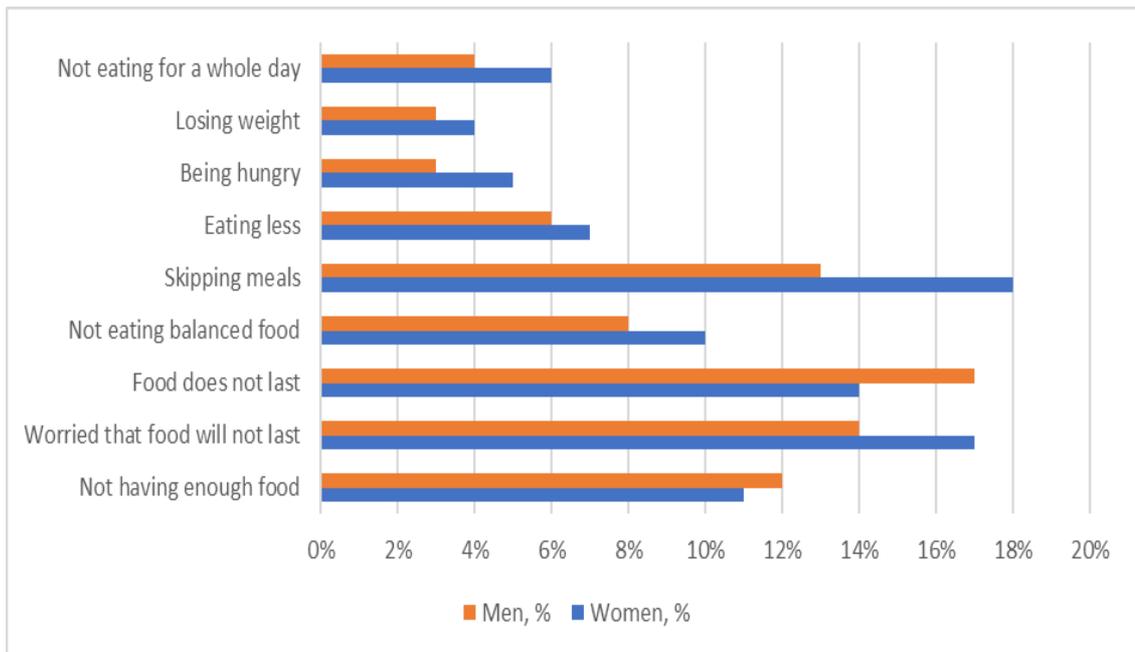


Figure 4 Food insecurity among adults stratified by gender

Figure 4 shows the results in food insecurity parameters by gender. Overall, women experienced food insecurity more often than men. The only two parameters where men experienced trouble more often than women were that food did not last until the next time they could afford to buy it and that the men did not have enough food.

The data about food insecurity among Syrian children living in Norway was based on reports from adult females in their households (Figure 5).

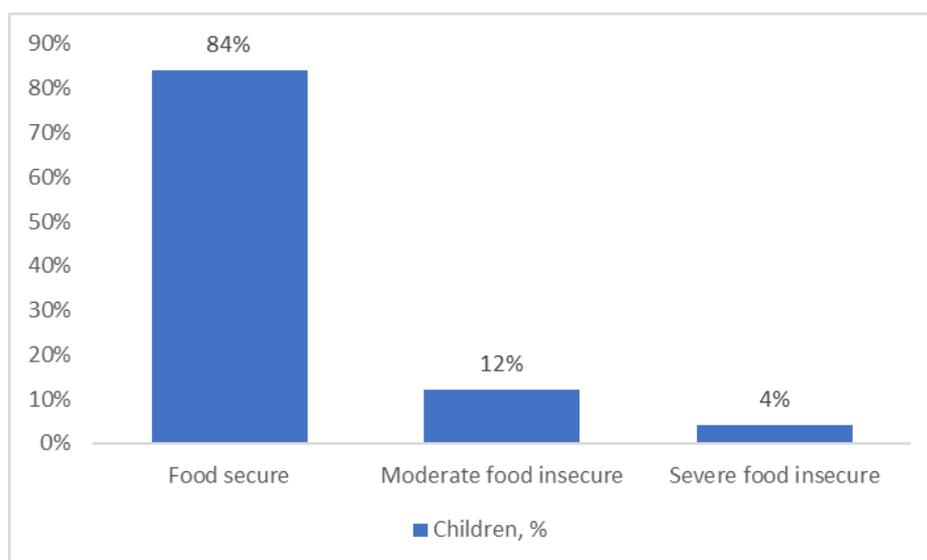


Figure 5 Percent of food secure, moderate, and severe insecure children in the research population, based on females' report

To assess food insecurity among children, we only considered female participants' responses, not to double-count children for whom both parents had participated in the study. Most of the women did not report any food insecurity among children in their households (84%), some reported that their children were moderate food insecure (12%), and a few that their children were severely food insecure (4%). Figure 6 shows the percentage of women who reported that their children often or sometimes got meal size cut (15%), had a low diversity diet (14%), regularly skipped meals (10%), were hungry (10%), did not eat balanced food (9%), and they did not consume a sufficient amount of food (9%). Five percent of the children had not received food for a whole day long.

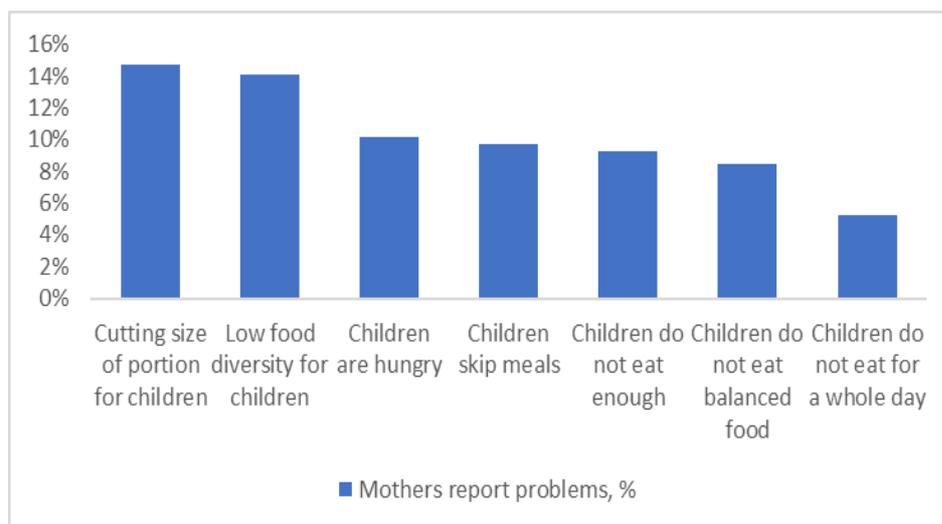


Figure 6 Food insecurity among children according to women’s report

The association between mental ill-health as exposure and the different items of food insecurity as outcomes are presented in Table 3. All items related to adults’ food insecurity, namely “Eating less”, “Being hungry”, “Not eating balanced food”, “Losing weight”, “Food does not last”, “Skipping meals”, “Worried that food will not last”, “Not enough food”, “Not eating for a whole day” were significantly associated with the mental health of study participants.

There was also a significant association between the mental health of women and “Low food diversity for children”, “Children do not eat balanced food”, “Cutting size of portion for children”, “Children do not eat enough”. There was no association between the women’s mental health and three of the seven items on children’s food insecurity (“Children are hungry”, “Children do not eat for a whole day”, and “Children skip meals”).

Table 3 Association between mental health and food insecurity

Variables	Crude		Adjusted for age and gender			
	OR	95% CI		OR	95% CI	
Eating less	7.62	3.61	16.11	8.70	3.75	3.75
Being hungry	6.67	2.78	15.99	6.58	2.62	16.53
Not eating balanced food	5.28	2.78	10.03	5.39	2.67	10.87
Losing weight	4.98	1.95	12.73	5.25	1.95	14.15
Food does not last	4.91	2.74	8.81	5.33	2.84	10
Skipping meals	3.92	2.07	7.41	4.62	2.23	9.57
Worried that food will not last	3.8	2.15	6.74	4.03	2.2	7.41
Low food diversity for children	3.77	1.94	7.33	3.86	1.87	7.96
Children do not eat balanced food	3.73	1.63	8.53	3.79	1.57	9.15
Not having enough food	3.61	1.94	6.72	3.67	1.9	7.08
Not eating for a whole day	3.48	1.17	10.4	3.47	1.1	10.98
Children do not eat enough	2.39	1.06	5.37	2.50	1.05	5.94
Cutting size of portion for children	3.29	1.44	7.53	2.98	1.18	7.53
Children skip meals	2.11	0.76	5.89	2.26	0.77	6.64
Children are hungry	2.03	0.72	5.69	2.16	0.73	6.39
Children do not eat for a whole day	1.53	0.35	6.74	1.83	0.38	8.81

Discussion

Among Syrian refugees settled in Norway for approximately one year, we find relatively high levels of food insecurity among adults, especially women and children. Food insecurity is strongly associated with refugees' mental health: all food insecurity items are significantly associated with adults' mental health, and four out of seven children's food insecurity items are significantly associated with mothers' mental health.

According to our results, 28% of Syrian refugees in a Norwegian setting and 16% of their children are food insecure. In comparison, the rate of food insecurity in the general population in Norway in 2017 was approximately 3% [14]. Our findings align with Canadian research, showing that the prevalence of food insecurity among refugees is much higher than among the general population [32]. A previous Norwegian study (Henjum, Terragni, et al.) conducted among refugees living in camps in Norway a short time after their arrival showed that two-thirds of refugees were food insecure [33]. The prevalence rate of food insecurity in our study is much lower. This discrepancy may be explained by the fact that our participants were refugees resettled and living outside the asylum reception centers. Thus, our participants may have had more time and a better chance to adapt themselves to a new country, and economic factors may also influence.

Data stratified by gender showed that Syrian women have a higher rate of food insecurity than men. This gender difference has been shown in previous studies on a different study population in South Korea [15].

Our findings of strong associations between mental health and food insecurity align with two Canadian studies [32], [34]. One of these studies showed that minorities and single mothers experienced higher poverty levels than the general population and found that poor mental health was associated with poverty and food insecurity. Our research confirms the strong association

between mental health and food insecurity among Syrian refugees settled in Norway.

Most of the participants in our study were enrolled in the compulsory two-years integration program offered by the municipality. During this period, refugees get 133,144 NOK per year, which equals about 1,000 Euro per month [16]. To compare, the mean income in the general population in Norway is 431,000 NOK per year after taxes, which is approximately 3,500 Euro per month [35]. The refugees participating in the integration program can have a side job, but only one participant of this study informed that he was working. Economic hardship in the resettlement country can add extra psychological pressure to adult refugees, as they cannot accommodate the needs of their family members. The combination of migration-related traumas and being under economic and social pressure for a long time may increase stress levels, and hence the prevalence of depression and other mental health disorders, and further influence the economic situation of the refugees' households [36]. On the other side, mental disorders may impede the ability to work and integrate into the new society.

Our findings concerning children are worrisome. Women in our sample had a mean of three children each. Considering that 16% of female participants said the children in the household are food insecure, we can multiply these numbers to assume how many children experience food insecurity. In their

research from Norwegian refugee reception centers, Henjum et al. showed that children's food insecurity rate was 20% [14]. Food insecurity can predict poor health in children: poorer dental and mental health as well as a higher rate of asthma, eczema, and other skin allergies [37].

Our study is the first comprehensive study assessing food insecurity among Syrian refugees resettled in Norway and linking their food insecurity with mental health. This study has, however, some limitations. We used self-reporting through a phone interview to assess sensitive variables such as mental health and food insecurity, which can lead both to under- and overreporting. However, voluntary self-reporting was considered the best option to obtain data from the participants.

Although our questions on food security of the children were not directly posed to the children, we excluded all male-answers to avoid doubling information, as inhabitants of the same households may participate in the research.

Conclusions

This study shows that about 28% of adults and 16% of children Syrian refugees living in Norway are food insecure one year after resettlement and that food insecurity is significantly associated with ill-mental health. Lack of food security violates a fundamental human right – the right to food. Our results

highlight that food insecurity among refugees in high-income countries needs more attention among politicians and social organizations. Refugees and their children coming to high-income countries should get a chance for a better life and find an implementation of a basic human right, namely the right to proper food.

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Article

Title: Food insecurity and its association with mental health among Syrian refugees resettled in Norway

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Abstract

Background: Refugees are more exposed to food insecurity than the general population. Simultaneously, prevalence rates of anxiety and depression are higher among refugees compared to the general population in receiving countries. This study aims to describe food insecurity and to study the association between food insecurity and mental health among Syrian refugees resettled in Norway.

Methods: As part of the CHART study (Changing Health and health care needs Along the Syrian Refugees' Trajectories to Norway), 352 Syrian refugees settled in Norway for approximately one year participated in a structured telephone survey. We assessed food insecurity with the Household Food Security Survey Module (HFSSM) and mental health (symptoms of anxiety and depression) with a short version of the Hopkins symptom checklist (HSCL-10). We used descriptive statistics to present food insecurity overall, and among women, men, and children separately. The association between food insecurity and mental health symptoms was studied using logistic regression.

Results: Among Syrian refugees resettled in Norway for one year, 28% of adults and 16% of children were food insecure. The following food insecurity parameters expressed as odds ratios with 95% confidence intervals (OR; 95% CI) were significantly associated with adult mental health: "Not enough food" (3.6; 1.9-6.7), "Worried that food will not last" (3.8; 2.1-6.7), "Food does not last" (4.9; 2.7-8.8), "Not eating balanced food" (5.2; 2.7-10.0), "Skipping meals" (3.9; 2.0-7.4), "Eating less" (7.6; 3.6-16.1), "Being hungry" (6.6; 2.7-15.9), "Losing weight" (4.9; 1.9-12.7), "Not eating for a whole day" (3.4; 1.1-10.4), "Low food diversity for children" (3.7; 1.9-7.3), "Children do not eat balanced food" (3.7; 1.6-8.5), "Cutting size of portion for children" (3.2; 1.4-7.5), "Children do not eat enough" (2.3; 1.0-5.3).

Conclusion: Food security is a human right. Food insecurity and its association to mental health should be better understood and targeted among Syrian refugees and their children living in Norway.

Keywords: food insecurity, mental health, refugees, migrant

1. Introduction

In 2019 record-high 86.5 million people were forcibly displaced worldwide due to persecution, violence, conflicts, or human rights violations [1]. In Norway, 4.4% of the total population, more than 233,000 persons, have a refugee background. Over the last five years, the highest number of refugees who came to Norway was from Syria.

Being a refugee increases the risk of food insecurity as prevalence is higher among individuals who experience disasters, instability, or other extensive changes, for example, a war, in their life [2]. Food insecurity is also related to economic vulnerability, poverty, and other social aspects [3]. Food insecurity among refugees in high-income countries is a growing concern, and has been estimated at levels between 8 and 20% [4]. In these countries, the diet of asylum seekers and recently resettled refugees typically has low diversity and micronutrient intake: many do not have a sufficient consumption of fruits and vegetables, have to cut portion sizes, or skip meals [5].

Several studies have investigated life conditions for refugees and asylum seekers living in reception centers in Norway or shortly after their resettlement (Terragni et al.). Henjum et al. showed that the rate of food insecurity among refugees and asylum seekers living in reception centers in Norway is high (93%): two-thirds of refugees eat their first meal of the day in the afternoon and food diversity was low. [6]. However, data about food insecurity among refugees who have settled in a new country out of reception centers for some time is missing. Furthermore, while most studies about food insecurity focus on women and children [7], the majority of asylum seekers are young men who more often migrate alone [8].

Refugees have a higher prevalence of mental health disorders than the general population [9]. According to Berg et al., 70% of refugees arriving in Norway have been directly affected by a war situation that could influence their mental health [10].

Jakobsen et al. showed that young asylum seekers have a high level of psychological distress at arrival, and it remains elevated after 2.5 years in Norway [11].

However, there is some evidence that mental health may improve shortly after arrival. In our study among Syrian refugees coming to Norway (CHART - Changing Health and health care needs Along the Syrian Refugees' Trajectories to Norway), parameters of mental health improve significantly (level of anxiety/depression was decreased from 33% to 11% prevalence) between the transit phase and the early resettlement phase one year after arrival to Norway (Strømme et al.) [12].

Food insecurity has previously been associated with ill mental health in the general population. A Canadian study (Maynard M. et al.) demonstrated that food insecurity had a high impact on females' mental health [13]. Another Canadian study (Tarasuk et al.) demonstrated that household food insecurity could be associated with mental health disorders [14]. However, to our knowledge, no research to date links mental health and food insecurity among refugees resettled in a new country.

To fill the described knowledge gaps, our study assesses food insecurity for women, men and children as well as the associations between food insecurity and mental health among Syrian refugees who have been living in the community in Norway for one year.

2. Methods

2.1 Study design and study population

The CHART study recruited resettlement refugees from Syria while they lived in Lebanon and followed them up after the participants came to Norway and had lived in the country for approximately one year. [15]. This paper presents survey data from the follow-up assessment, including 352 Syrian adults over 16 years old resettled in 134 different municipalities in Norway. Trained Arabic-speaking interviewers collected data through structured telephone surveys from May 2018 until December

2019. The response rates at recruitment and follow-up were 93% and 75%, as earlier described by Strømme et al. [16].

2.2 Variables

To assess food insecurity, we used the Household Food Security Survey Module (HFSSM) [17], a survey instrument consisting of 18 questions that refer to the past 12 months' meal history. Ten questions assess the adult's food security status, and eight questions assess children's food insecurity status for those with children. The HFSSM includes the following items: "Not having enough food", "Worried that food will not last", "Not eating balanced food", "Skipping meals", "Eating less", "Being hungry", "Losing weight", "Not eating for a whole day", "Cutting the size of portion for children", "Children skipping meals", "Children being hungry", "Children not eating for a whole day", "Low food diversity for children", "Children not eating balanced food", "Children not eating enough". Data about food insecurity among Syrian children living in Norway was based on reports from adult females with children in their households.

According to the HFSSM manual, participants can be categorized as food secure, moderate food insecure, or severe food insecure based on the number of affirmative answers they give [18]. Food secure: 0 affirmative answers (both for adults and children); moderate food insecure: 1-5 affirmations (adults), 1-4 affirmations (children); severe food insecure: more than six affirmations (adults), more than five affirmations (children).

The Hopkins Symptom Checklist (HSCL-10) was used to assess mental health symptoms (anxiety and depression). The HSCL-10 includes the following items: "Being scared", "Feeling fearful", "Feeling dizziness or weakness", "Feeling tense", "Self-blaming", "Having sleeping problems", "Feeling blue", "Feeling worthless", "Feeling like everything is an effort", "Feeling hopeless about future". The participants assess the degree to which they experience these symptoms and rate them

according to a scale: 1 - not at all, 2 - a little, 3 - quite a bit, 4 - extremely. Although the HSCL-10 is not a tool used for diagnostic purposes, an average score of 1.85 or above (range 1-4) is commonly used as a threshold for possible clinical anxiety and depression in research [19].

In addition, the survey included sociodemographic (gender, age, number of children, and education) and migration-related questions (date of arrival in Norway, migration with or without accompanying family members, and occupation in Norway).

2.3 Statistical analysis

We used descriptive statistics to summarize the study sample's sociodemographic and migration-related features as well as prevalence rates of food insecurity and mental ill-health. All the answers to food insecurity questions were recoded into binomial variables, where "often true," "sometimes true," and "do not know or refuse to answer" were recoded to 1 (indicating some degree of food insecurity), and "never true" was recoded to 0 (indicating no food insecurity). Mental health questions were also recoded into binomial outcomes, in which scores lower than 1.85 were recoded as 0 and scores equal or above 1.85 were recorded as 1. We used logistic regression to investigate the association between food insecurity and mental health symptoms among Syrian refugees. We ran crude regression models as well as models adjusted for age and gender. The results were presented as odds ratios with 95% confidence intervals. The significance level was set to 0.05. Analyses were performed using Stata software, version 16.0.

2.4 Research ethics

The Regional Committee for Medical & Health Research Ethics of South-East Norway approved the project, reference 2017/377. All enrolled participants received information about the study and signed a consent form in Arabic at a baseline. The consent form was repeated orally in the follow-up interview.

3. Results

The study population (n=352) had a mean age of 35.6 years (SD=10.8) and consisted of 52% women (table 1). The age distribution had a heavy left tale, and most participants were in their twenties. More than nine of ten of all participants report to be students as newly arrived refugees are expected to attend a two-year mandatory integration course. Most of the participants had lived in Norway for approximately one year by the time the study was conducted.

Table 1	Sociodemographic data	
N total	352	
Gender, N (%)		
Women	181	51.7
Men	169	48.3
Age		
Mean (SD)	35.6	10.8
Minimum	17	
Maximum	79	
Number of children		
Total (mean, SD)	3.6	0.4
Women with children (n, %)	145	80
Men with children (n, %)	133	79
Education		
Mean, years (SD)	8	3.5
Secondary education or lower (n, %)	262	75.1
High school or higher (n, %)	87	24.9
Co-migration		
Migrated with all immediate family members (n, %)	301	86.3
Migrated with some immediate family members (n, %)	40	11.5
Migrated alone	8	2.2
Occupation		
Employed (n, %)	1	0.3
Working at home (n, %)	10	2.9
Not working (n, %)	19	5.5
Studying (n, %)	317	91.3

3.1 Food insecurity

One out of four participants was either moderate food insecure (22%) or severely food insecure (6%). The most common problems for participants were that food did not last, that they skipped meals often or sometimes and that they were often

worried that food would not last (approximately 15% for each of the parameters). Respondents also reported that they did not have enough or appropriate food (11%), had not been eating balanced food in the past 12 months (9%), and had been eating less than before (7%). A few participants reported that they had not been eating for a whole day (5%), had been hungry (4%), and some respondents reported that they had lost weight because of these challenges during the last year (3%).

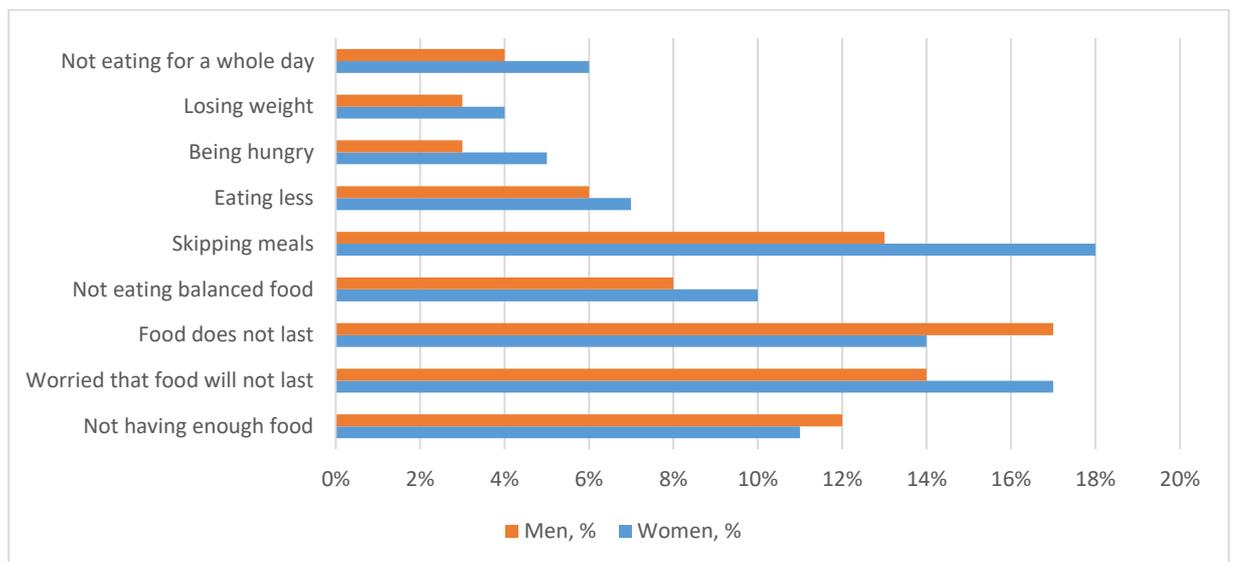


Fig. 1 Food insecurity among adults stratified by gender

Figure 1 shows the results in food insecurity parameters by gender. Overall, women experienced food insecurity more often than men and expressed in most of the items, except for the parameters “not having enough food” and “food does not last” until the next time they could afford to buy it.

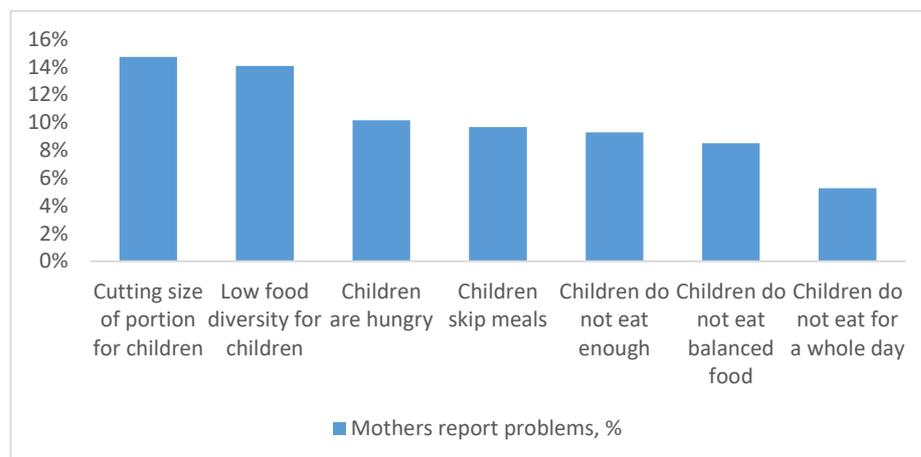


Fig.2 Food insecurity among children according to their mothers' report

To assess food insecurity among children, we only considered female participants' responses in order not to double-count children where both parents had participated in the study. Most of the mothers did not report any food insecurity among children in their households (84%), some reported that their children were moderate food insecure (12%), and a few that their children were severely food insecure (4%). Figure 2 shows the percentage of women who reported that their children often or sometimes got meal size cut (15%), had a low diversity diet (14%), regularly skipped meals (10%), were hungry (10%), did not eat balanced food (9%), and they did not consume a sufficient amount of food (9%). Five percent of the children had not received food for a whole day or longer.

3.2 Association between mental health symptoms and food insecurity

The associations between mental ill-health as exposure and the different items of food insecurity as outcomes are presented in Table 2.

Variables	Association between mental health and food insecurity					
	OR	Crude 95% CI		Adjusted for age and gender		
				OR	95% CI	
Eating less	7.62	3.61	16.11	8.70	3.75	3.75
Being hungry	6.67	2.78	15.99	6.58	2.62	16.53
Not eating balanced food	5.28	2.78	10.03	5.39	2.67	10.87
Losing weight	4.98	1.95	12.73	5.25	1.95	14.15
Food does not last	4.91	2.74	8.81	5.33	2.84	10
Skipping meals	3.92	2.07	7.41	4.62	2.23	9.57
Worried that food will not last	3.8	2.15	6.74	4.03	2.2	7.41
Low food diversity for children	3.77	1.94	7.33	3.86	1.87	7.96
Children do not eat balanced food	3.73	1.63	8.53	3.79	1.57	9.15
Not having enough food	3.61	1.94	6.72	3.67	1.9	7.08
Not eating for a whole day	3.48	1.17	10.4	3.47	1.1	10.98
Children do not eat enough	2.39	1.06	5.37	2.50	1.05	5.94
Cutting size of portion for children	3.29	1.44	7.53	2.98	1.18	7.53
Children skip meals	2.11	0.76	5.89	2.26	0.77	6.64
Children are hungry	2.03	0.72	5.69	2.16	0.73	6.39
Children do not eat for a whole day	1.53	0.35	6.74	1.83	0.38	8.81

All items related to the adults' mental health were statistically significant associated with food insecurity. There was no association between the women's mental health and three of the seven items on children's food insecurity ("children are hungry," "children do not eat for a whole day," and "children skip meals"). However, "Low food diversity for children", "Children do not eat balanced food", "Children do not eat enough" and "cutting size of portion for children" were significantly associated with women's mental health.

4. Discussion

This is the first comprehensive study assessing food insecurity among Syrian refugees who resettled in Norway and linking their food insecurity with mental health. Among Syrian refugees settled in Norway for approximately one year we find relatively high levels of food insecurity among adults, especially women, and children. Food insecurity is strongly associated with refugees' mental health.

According to our results, 28% of Syrian refugees in a Norwegian setting and 16% of their children are food insecure. In comparison, the rate of food insecurity in the general population in Norway in 2017 was approximately 3% [20]. These findings align with Canadian research, showing that the prevalence of food insecurity among refugees is higher than among the general population [13]. A previous Norwegian study (Henjum, Terragni, et al.) conducted among refugees living in camps in Norway a short time after their arrival showed that two-thirds of refugees were food insecure [6]. The prevalence rate in our study is much lower. This discrepancy may be explained by the fact that our participants were refugees resettled and living outside the asylum reception centers for one year. Thus, our participants may have had more time, better chance to adapt themselves to the new country, and probably have access to more alternatives to obtain appropriate food in the community as compared to the centers.

Most of the participants in our study were enrolled in the compulsory two-years integration program offered by the municipality. During this period, refugees get approximately 1,000 Euro per month [21]. To compare, the mean income in the general population in Norway is approximately 3,500 Euro per month [22]. The refugees who are participating in the integration program can have a side job, but only one participant of this study informed that he was working. Economic hardship in the resettlement country can add extra psychological pressure to adult refugees, as they cannot accommodate the needs of their family members. The combination of migration-related traumas and being under economic and social pressure for a long time may increase stress levels, and hence the prevalence of depression and other mental health disorders [23]. Mental disorders may impede the ability to work and integrate in the new society and further influence the economic situation of the refugees' households.

Our findings of strong associations between mental health and food insecurity align with two Canadian studies [13], [14]. One of these studies showed that minorities and single mothers experienced higher poverty levels than the general population and found that poor mental health is associated with poverty and food insecurity. Our research confirms the strong association between mental health and food insecurity also among Syrian refugees who have been living in different municipalities in Norway for one year.

Our findings concerning children are worrisome. Women in our sample had a mean of three children each, and taking into consideration that 16% of female participants said the children in the household are food insecure, we can multiply these numbers to assume how many children experience food insecurity. In their research in Norwegian refugee reception centers Henjum et al. showed that children's food insecurity rate was 20% [20], showing less improvement of the situation for children as compared to adults from resettlement centers to independent life in the municipalities. Food insecurity can predict poor health in children: poorer dental and mental health as well as a higher rate of asthma, eczema and other skin allergies [24].

Our results should be interpreted in light of some limitations. We used self-reporting through a phone survey for the assessment of sensitive variables such as mental health and food insecurity, which can lead both to under- and over-reporting. However, voluntary self-reporting was the best option to obtain data from the participants who now lived dispersed in most Norwegian municipalities. Also, as we assessed only Syrian refugees already settled in Norway for one year, most of them still at the integration program, our results might not be extrapolated to asylum seekers or other refugee groups who have lived in Norway for longer time.

5. Conclusion

This study shows high rates of food insecurity among Syrian adults and children living in Norway one year after their resettlement and that there is a significant

association between food insecurity and mental health. Lack of food security violates a basic human right – the right to food. Our results highlight that food insecurity among refugees in high-income countries need more support and attention among politicians and social organizations.

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Household Food Security Survey Module Survey (HFSSM)

1. You and other household members worried whether our food would run out before we got money to buy more. Was that often, sometimes, or never true for you in the last 12 months?

2. “The food that we bought just didn’t last, and we didn’t have money to get more.” Was that often, sometimes, or never true for you in the last 12 months?

3. “We couldn’t afford to eat balanced meals.” Was that often, sometimes, or never true for you in the last 12 months?

4. In the last 12 months, did you or other adults in the household ever cut the size of your meals or skip meals, because there wasn’t enough money for food? Yes/No

5. (If yes to question 4) How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

6. In the last 12 months, did you ever eat less than you felt you should, because there wasn’t enough money for food? Yes/No

7. In the last 12 months, were you ever hungry, but didn’t eat, because there wasn’t enough money for food? Yes/No

8. In the last 12 months, did you lose weight, because there wasn’t enough money for food? Yes/No

9. In the last 12 months, did you or other adults in your household ever not eat for a whole day, because there wasn't enough money for food? Yes/No

10. (If yes to question 9) How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

Questions 11–18 were asked only if the household included children age
0–17

11. “We relied on only a few kinds of low-cost food to feed the children in our household, because we were running out of money to buy food.” Was that often, sometimes, or never true for you in the last 12 months?

12. “We couldn't feed the children in our household a balanced meal, because we couldn't afford that.” Was that often, sometimes, or never true for you in the last 12 months?

13. “The children in our household were not eating enough, because we just couldn't afford enough food.” Was that often, sometimes, or never true for you in the last 12 months?

14. In the last 12 months, did you ever cut the size of any of the children's meals, because there wasn't enough money for food? Yes/No

15. In the last 12 months, were the children ever hungry but you just couldn't afford more food? Yes/No

16. In the last 12 months, did any of the children ever skip a meal, because there wasn't enough money for food? Yes/No

17. (If yes to question 16) How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

18. In the last 12 months, did any of the children ever not eat for a whole day, because there wasn't enough money for food? Yes/No

Hopkins Symptom Checklist (HSCL-10)

Listed below are symptoms or problems people sometimes have. Please indicate in the appropriate box how much each of these symptoms has bothered or distressed you in the last week.

Scale: “Not at all” – 1, “A little” – 2, “Quite a bit” – 3, “Extremely” – 4.

1. Suddenly scared for no reason
2. Feeling fearful
3. Faintness, dizziness, or weakness
4. Feeling tense or keyed up
5. Blaming yourself for things
6. Difficulty falling asleep, staying asleep
7. Feeling blue
8. Feeling of worthlessness
9. Feeling everything is an effort
10. Feeling hopeless about future