

# The Association between Food Security Status and Depression in Two Iranian Ethnic Groups Living in Northwest of Iran

A. Rezazadeh, N. Omidvar, H. Eini-Zinab

**Abstract**—Food insecurity (FI) influences may result in poor physical and mental health outcomes. Minor ethnic group may experience higher level of FI, and this situation may be related with higher depression prevalence. The aim of this study was to determine the association of depression with food security status in major (Azeri) and minor (Kurdish) ethnicity living in Urmia, West Azerbaijan, north of Iran. In this cross-sectional study, 723 participants (427 women and 296 men) aged 20–64 years old, from two ethnic groups (445 Azeri and 278 Kurdish), were selected through a multi stage cluster systematic sampling. Depression rate was assessed by “Beck” short form questionnaire (validated in Iranians) through interviews. Household FI status (HFIS) was measured using adapted HFI access scale through face-to-face interviews at homes. Multinomial logistic regression was used to estimate odds ratios (OR) of depression across HFIS. Higher percent of Kurds had moderate and severe depression in comparison with Azeri group (73 [17.3%] vs. 86 [27.9%]). There were not any significant differences between the two ethnicities in mild depression. Also, of all the subjects, moderate-to-sever FI was more prevalent in Kurds (28.5%), compared to Azeri group (17.3%) [ $P < 0.01$ ]. Kurdish ethnic group living in food security or mild FI households had lower chance to have symptom of severe depression in comparison to those with sever FI (OR=0.097; 95% CI: 0.02-0.47). However, there was no significant association between depression and HFI in Azeri group. Findings revealed that the severity of HFI was related with severity depression in minor studied ethnic groups. However, in Azeri ethnicity as a major group, other confounders may have influence on the relation with depression and FI, that were not studied in the present study.

**Keywords**—Depression, ethnicity, food security status, Iran.

## I. INTRODUCTION

FOOD security is the physical, social, and economic access of all people at all times to sufficient, safe, and nutritious food for a healthy and active life [1]. Food security is related with many aspects of physical and psychological health [1]-

[3]. Previous studies presented that people with lower socioeconomic status and food insecure households had higher possibility to experience different degrees of depression [3]-[5].

Iran is a country that experiences an accelerated nutrition transition [6]. During the last decades, Iranians' major dietary patterns have been changing from healthy traditional to Western and unhealthy dietary habits [7]-[9]. Nutrition transition led to higher prevalence of chronic disease. Besides, previous reports showed higher prevalence of depression in Iranian population [10], [11]. Another worrying concern according to the international map of food security is that Iran is categorized as the countries of the "high risk" group [12]. A national study revealed that three states of Iran were “very insecure” (Hormozgan, Kohkilouieh and Boyerahmad, Sistan and Baloochestan), four states were “insecure” (Khuzestan, Kerman, Ilam, Booshehr) and six states “relatively insecure” (n=4: Ardebil, Charmahal and Bakhtiari, Fars, Kermanshah, Kordestan, Lorestan, South Khorasan) [13]. Also, in another study, prevalence of FI (moderate to severe) based on household income/expenditure surveys amounted 10% [14]. There is a valid report implying the fact that depression may be a result of food and nutrition [15]-[17]. FI is linked with poor mental health such as anxiety and depression. Hence, in people with low socioeconomic affordability and in immigrants or minor ethnic groups that have lower social position, higher rate of depression may be as a result of FI [18]. Seligman et al. [1] stated that “food-insecure households usually report that they are unable to afford balanced meals, worrying about the adequacy of their food supply, running out of food, and cutting the size of meals or skipping meals”. The severe levels of FI usually result in hunger because of lack of money for food and not being able to eat food for entire day. Urmia city located in west Azerbaijan Province, the north-west of Iran, has diverse ethnic populations (including Azeris [76.2%], Kurds [21.7%], Persians [0.8%] and others [1.4%]) living together [19], [20]. There is not enough information about the diverse ethnic groups' FI status and its relation with health outcomes such as depression. The current study aimed to determine the association between FI and depression in Azeri and Kurdish ethnic groups living in Urmia.

## II. METHODS

The design of study is cross-sectional. The sample size was 723 participants (427 women and 296 men) from two ethnic groups (445 Azeris and 278 Kurds), aged 20–64 in Urmia city

A. R. is with the National Nutrition and Food Technology Research Institute. Faculty of Nutrition and Food Technology. Shahid Beheshti University of Medical Sciences and Health Services. Iran (phone: +989141003389; fax: +98 21 2236 0660; e-mail: Arezoo.rezazadeh@gmail.com).

N. O. is with the National Nutrition and Food Technology Research Institute. Faculty of Nutrition and Food Technology. Shahid Beheshti University of Medical Sciences and Health Services. Iran (phone: +989125330191; fax: +98 21 2236 0660; e-mail: omidvar.nasrin@gmail.com).

H. E-Z is with the National Nutrition and Food Technology Research Institute. Faculty of Nutrition and Food Technology. Shahid Beheshti University of Medical Sciences and Health Services. Iran (phone: +98 914 849 2321; fax: +98 21 2236 0660; e-mail: hassan.eini@sbmu.ac.ir).

collected by a multistage systematic sampling methods. Data were obtained through home participants and face-to-face interviews with heads of households or their spouse at the households' home. General characteristics of participants such as age, gender, demographic, and socioeconomic status, belonging to Azeri or Kurdish ethnic groups, were obtained by a questionnaire. Household food security (HFS) was measured by using a validated household FI access scale (HFIAS) [21], [22]. The questionnaire consisted of nine items with four frequency options that classified households into secure, mild, moderate, and severe FI categories. Depression score was examined by short form of "Beck" questionnaire through interview. This questionnaire was previously validated in Iranians [23]. In this 13-item questionnaire, there are several sentences which show an emotional status, and individuals should select the option that represents their exact feeling at that time. Respondents to this test must be at least the fifth or sixth grade and must have the ability to read in order to understand its provisions. They should respond items based on a four-point Likert scale ranging from three to zero (the scales were categorized as decreasing score in terms of the severity of depression). The total score was in the range of minimum score of zero and a maximum of 39, that is interpreted as follows: 0 to 4: no or minimal depression; 5 to 7: mild depression, 8 to 15: Moderate depression, 16 and higher:

severe depression.

#### A. Statistical Analysis

Data were analyzed using SPSS software V.21 (SPSS Inc., USA). The Kolmogorov-Smirnov test and histograms were used to test the normality of variables. To compare general characteristics within the two ethnic groups, independent sample T-test and chi-square test were used wherever applicable. Binary logistic regression method was used to estimate OR and 95% confidence interval (95% CI) of moderate and severe depression adjusted for various confounders.  $P < 0.05$  was considered as significant.

### III. RESULTS

Characteristics of the participants from the two ethnic groups, Azeris and Kurds, are presented in Table I. Azeri households were more food secure than Kurdish households; in contrast, moderate-to-severe FI was significantly higher in Kurds than Azeri group. The two groups were not significantly different in mild FI. Mild depression was not significantly differed between the two ethnic groups. On the other hand, moderate and severe depression had higher frequency in Kurdish minor ethnic group when compared to Azeri ethnic group.

TABLE I  
FI STATUS AND DEPRESSION OF AZERI AND KURD ETHNIC GROUPS IN URMIA

Variable	Azeri		Kurd		P-value
FI status	N	%	N	%	
Total FI score	2.41 <sup>a</sup>	3.7 <sup>b</sup>	3.6 <sup>a</sup>	5.0 <sup>b</sup>	0.00
Food secure	261	59.3	138	49.8	0.01
Mild food insecure	103	23.4	60	21.7	0.58
Moderate and severe food insecure	76	17.3	79	28.5	0.00
<b>Depression Status</b>					
Depression Total Score	4.07 <sup>a</sup>	4.9 <sup>b</sup>	5.6 <sup>a</sup>	5.8 <sup>b</sup>	0.000
Non	278	65.9	146	53.5	0.001
Mild	51	16.8	51	18.7	0.53
Moderate	78	13.7	51	18.7	0.08
Sever	15	3.6	25	9.2	0.002

Notes: <sup>a</sup> Mean, <sup>b</sup> Standard deviation, P-values were calculated by independent sample T-test and chi-square test methods where appropriate.

In Table II, binary logistic regression analysis was applied to reveal the odds of moderate and severely according to FI status. Findings showed that Kurdish ethnic group who lives in severe food insecure households had higher chance to have moderate and severe depression in comparison with those who

live in food secure or mild food insecure households. However, there was no significant association between depression and household FI in Azeri group. After adjustment for various confounders such as age, gender, socioeconomic status, and energy intake, the results remained significant.

TABLE II  
THE OR OF MODERATED AND SEVERE DEPRESSION ACCORDING TO FI STATUS

Variable	Azeri				Kurd			
	Crude OR <sup>1</sup>	95% CI	Adjusted OR <sup>2</sup>	95% CI	Crude OR <sup>1</sup>	95% CI	Adjusted OR <sup>2</sup>	95% CI
Food secure	1		1		1			1
Mild food insecure	1.46	0.82–2.62	1.39	0.77–2.51	0.66	0.30–1.41	0.71	0.29–1.72
Moderate and severe food insecure	0.90	0.44–1.85	0.85	0.39–1.84	1.66 <sup>*</sup>	1.001–3.18	1.65 <sup>*</sup>	1.001–3.13

OR values were significantly different from the reference group: <sup>\*</sup> $P < 0.05$ , CI: confidence interval, <sup>1</sup> Crude model: without any adjustment, <sup>2</sup> Adjustment for age, gender, socioeconomic status and energy intake.

## IV. DISCUSSION

In the present study, the possible association of FI with depression was explored in Kurdish and Azeri ethnic groups in Urmia, Northwest Iran. Findings revealed that the association of FI with depression and its severity were not similar in these two Iranian ethnic groups. Severe FI increased the chance of moderate and severe depression in Kurds, while there were not any significant correlations in Azeris.

The relation between FI and depression is mutual. Some studies showed that those peoples who experienced depression may be at higher risk of FI. In a study by Vilar-Compte et al. [24], FI and its association with depression were assessed in urban older adults (65 years and older). Findings showed that probability of moderate-severe FI was about 2.8 times higher among elders at risk of depression (OR=2.84). Also, FI was independently associated with high symptoms of depression, anxiety in rural Ethiopia [3]. In a study on urban Ecuadorian women with children, household FI was associated with the mental and physical health in low-income households, and they suggested that food security improvement in these households may alleviate the burden of mental distress in these women [18]. In another study by Munger et al. [25], the effect of an interventional program (Supplemental Nutrition Assistance Program: SNAP) on FI and probability of maternal depression was examined. They found that FI was connected to risk of depression over time. Also, in food insecure group, losing SNAP benefits was related with higher risk of depression during two-year, while receiving benefits was related with reduced risk. This study suggested that this assistant program may reduce the emotional hardship FI experience. Furthermore, in a study applied by Leung et al. in 2015 [26], the association between FI and depression by SNAP participation status was assessed. Among low-income, eligible nonparticipants, very low food security was significantly associated with higher odds of depression (OR: 5.10; 95% CI: 3.09, 8.41).

The depression and FI was related in the present study only in Kurds that were a minor ethnic group living in Urmia. Minor ethnic group usually have weak health status due to lower economic affordability [27]. Some studies found similar findings in minor ethnic groups of immigrants. As an instance, Maharaj et al. in 2017 [28] investigated the FI and risk of depression among refugees and immigrants in south Africa. About 23% of immigrants was food insecure and eating less was related with anxiety and depression. Also, in a study by Kapulsky et al. in 2015 [29], FI was significantly related with depression in HIV-infected Hispanic individuals. These studies suggest that economic status and social support are the main determinants of relationship between FI and depression.

## V. CONCLUSION

Findings suggested that household FI was strongly related with depression in Kurds as the minor ethnic groups and the severity of depression was associated with the severity of depression. However, in Azeris, other confounders may have influence on the association between depression and FI (such

as genetic susceptibility and cultural background) that was not considered in the current research.

Further studies seem to be necessary to consider other influencing factors such as cultural background, eating habit and genetic determinants on relation between FI and depression in ethnic group.

## REFERENCES

- [1] Seligman, H.K., Laraia, B.A., and Kushel, M.B.: 'Food insecurity is associated with chronic disease among low-income NHANES participants', *The Journal of nutrition*, 2010, 140, (2), pp. 304-310
- [2] Chilton, M., Black, M.M., Berkowitz, C., Casey, P.H., Cook, J., Cutts, D., Jacobs, R.R., Heeren, T., De Cuba, S.E., and Coleman, S.: 'Food insecurity and risk of poor health among US-born children of immigrants', *American journal of public health*, 2009, 99, (3), pp. 556-562
- [3] Hadley, C., Tegegn, A., Tessema, F., Cowan, J.A., Asefa, M., and Galea, S.: 'Food insecurity, stressful life events and symptoms of anxiety and depression in east Africa: evidence from the Gilgel Gibe growth and development study', *Journal of epidemiology and community health*, 2008, 62, (11), pp. 980-986
- [4] Huddleston-Casas, C., Charnigo, R., and Simmons, L.A.: 'Food insecurity and maternal depression in rural, low-income families: a longitudinal investigation', *Public health nutrition*, 2009, 12, (8), pp. 1133-1140
- [5] Hadley, C., and Patil, C.L.: 'Seasonal changes in household food insecurity and symptoms of anxiety and depression', *American Journal of Physical Anthropology*, 2008, 135, (2), pp. 225-232
- [6] Azizi, F., Azadbakht, L., and Mirmiran, P.: 'Trends in overweight, obesity and central fat accumulation among Tehranian adults between 1998-1999 and 2001-2002: Tehran lipid and glucose study', *Annals of nutrition and metabolism*, 2005, 49, (1), pp. 3-8
- [7] Rezazadeh, A., Rashidkhani, B., and Omidvar, N.: 'Association of major dietary patterns with socioeconomic and lifestyle factors of adult women living in Tehran, Iran', *Nutrition*, 2010, 26, (3), pp. 337-341
- [8] Rezazadeh, A., and Rashidkhani, B.: 'The association of general and central obesity with major dietary patterns of adult women living in Tehran, Iran', *Journal of nutritional science and vitaminology*, 2010, 56, (2), pp. 132-138
- [9] Rezazadeh, A., Omidvar, N., Eini-Zinab, H., Ghazi-Tabatabaie, M., Majdzadeh, R., Ghavamzadeh, S., and Nouri-Saeidlou, S.: 'Major dietary patterns in relation to demographic and socio-economic status and food insecurity in two Iranian ethnic groups living in Urmia, Iran', *Public Health Nutrition*, 2016, pp. 1-12
- [10] Bayati, A., Beigi, M., and Salehi, M.: 'Depression prevalence and related factors in Iranian students', *Pak J Biol Sci*, 2009, 12, (20), pp. 1371-1375
- [11] Mohammadi, K., Rahnama, P., and Montazeri, A.: 'Prevalence and risk factors for depression in women with multiple sclerosis: a study from Iran', *Annals of general psychiatry*, 2015, 14, (1), pp. 29
- [12] McGuire, S.: 'FAO, IFAD, and WFP. The State of Food Insecurity in the World 2015: Meeting the 2015 International Hunger Targets: Taking Stock of Uneven Progress. Rome: FAO, 2015', *Advances in Nutrition: An International Review Journal*, 2015, 6, (5), pp. 623-624
- [13] Kolahdouz F, N.F., Sadeghi F: 'the National System of for monitoring food security and nutrition situation in Iran and development of the first map of food security in the country', in Editor (Ed.)^(Eds.): 'Book the National System of for monitoring food security and nutrition situation in Iran and development of the first map of food security in the country ' (Community Nutrition Office, Ministry of Health & Medical Education, 2012, edn.), pp.
- [14] Mohammadi-Nasrabadi, F., Omidvar, N., Khoshfetrat, M., and Kolahdooz, F.: 'Household food insecurity in the Islamic republic of Iran: a systematic review and meta-analysis/Insecurite alimentaire des menages en Republique islamique d'Iran: revue systematique et meta-analyse', *Eastern Mediterranean Health Journal*, 2014, 20, (11), pp. 698
- [15] Whitaker, R.C., Phillips, S.M., and Orzol, S.M.: 'Food insecurity and the risks of depression and anxiety in mothers and behavior problems in their preschool-aged children', *Pediatrics*, 2006, 118, (3), pp. e859-e868
- [16] Bronte-Tinkew, J., Zaslow, M., Capps, R., Horowitz, A., and McNamara, M.: 'Food insecurity works through depression, parenting, and infant feeding to influence overweight and health in toddlers', *The*

- Journal of nutrition, 2007, 137, (9), pp. 2160-2165
- [17] Kim, K., and Frongillo, E.A.: 'Participation in food assistance programs modifies the relation of food insecurity with weight and depression in elders', *The Journal of nutrition*, 2007, 137, (4), pp. 1005-1010
  - [18] Weigel, M.M., Armijos, R.X., Racines, M., Cevallos, W., and Castro, N.P.: 'Association of Household Food Insecurity with the Mental and Physical Health of Low-Income Urban Ecuadorian Women with Children', *Journal of Environmental and Public Health*, 2016, 2016
  - [19] Iran, c.o.t.g.c.o.: 'Plan of examine and assessment of the general culture of the country indices (not registerd indices): West Azerbaijan province, in Editor (Ed.)'(Eds.): 'Book Plan of examine and assessment of the general culture of the country indices (not registerd indices ): West Azerbaijan province ' (2012, edn.), pp.
  - [20] Rezazadeh, A., Omidvar, N., Eini-Zinab, H., Ghazi-Tabatabaie, M., Majdzadeh, R., Ghavamzadeh, S., and Nouri-saeidlou, S.: 'Food insecurity, socio-economic factors and weight status in two Iranian ethnic groups', *Ethnicity & health*, 2016, 21, (3), pp. 233-250
  - [21] Wunderlich, G.S., and Norwood, J.L.: 'Food insecurity and hunger in the United States: An assessment of the measure' (National Academies Press Washington, DC, 2006. 2006)
  - [22] Mohammadi, F., Omidvar, N., Houshiar-Rad, A., Khoshfetrat, M.-R., Abdollahi, M., and Mehrabi, Y.: 'Validity of an adapted Household Food Insecurity Access Scale in urban households in Iran', *Public health nutrition*, 2011, 15, (1), pp. 149
  - [23] GH, R.: 'The psychometric properties of the short form of the Beck Depression Inventory (BDI-13).', *Developmental Psychology (Journal Of Iranian Psychologists)*, 2005, 1, (4), pp. 291-299
  - [24] Vilar-Compte, M., Martínez-Martínez, O., Orta-Alemán, D., and Perez-Escamilla, R.: 'Functional Limitations, Depression, and Cash Assistance are Associated with Food Insecurity among Older Urban Adults in Mexico City', *Journal of health care for the poor and underserved*, 2016, 27, (3), pp. 1537-1554
  - [25] Munger, A.L., Hofferth, S.L., and Grutzmacher, S.K.: 'The Role of the Supplemental Nutrition Assistance Program in the Relationship Between Food Insecurity and Probability of Maternal Depression', *Journal of Hunger & Environmental Nutrition*, 2016, 11, (2), pp. 147-161
  - [26] Leung, C.W., Epel, E.S., Willett, W.C., Rimm, E.B., and Laraia, B.A.: 'Household food insecurity is positively associated with depression among low-income supplemental nutrition assistance program participants and income-eligible nonparticipants', *The Journal of nutrition*, 2015, 145, (3), pp. 622-627
  - [27] Cook, J.T., Frank, D.A., Berkowitz, C., Black, M.M., Casey, P.H., Cutts, D.B., Meyers, A.F., Zaldivar, N., Skalicky, A., and Levenson, S.: 'Food insecurity is associated with adverse health outcomes among human infants and toddlers', *The Journal of nutrition*, 2004, 134, (6), pp. 1432-1438
  - [28] Maharaj, V., Tomita, A., Thela, L., Mhlongo, M., and Burns, J.K.: 'Food Insecurity and Risk of Depression Among Refugees and Immigrants in South Africa', *Journal of immigrant and minority health*, 2016, pp. 1-7
  - [29] Kapulsky, L., Tang, A.M., and Forrester, J.E.: 'Food insecurity, depression, and social support in HIV-infected Hispanic individuals', *Journal of immigrant and minority health*, 2015, 17, (2), pp. 408-413