



Cardiovascular Disease Risk Factors among Migrant Seasonal Agricultural Workers: Comparison with Local Residents

*Gulsum Ozturk Emiral*¹, **Muhammed Fatih Onsuz*², *Ozkan Ozay*³, *Burhanettin Isikli*²,
*Selma Metintas*²

1. District Health Directorate of Cankaya, Ankara, Turkey
2. Department of Public Health, School of Medicine, Eskisehir Osmangazi University, Eskisehir, Turkey
3. Department of Public Health, School of Medicine, Giresun University, Giresun, Turkey

*Corresponding Author: Email: fatihonsuz@gmail.com

(Received 11 Feb 2020; accepted 15 Apr 2020)

Abstract

Background: Seasonal agricultural workers group is one of the most disadvantageous groups of working life in Turkey same as many other countries. We aimed to determine the status of cardiovascular disease risk factors among migrant seasonal agricultural workers (MSAW) and to compare obtained data with local residents.

Methods: This study cross-sectional study was conducted among MSAW in Eskisehir, Turkey and closest town residents in 2015 during agricultural season. These 455 MSAW were living in camps composed of 20 or more tents. Local residents sample composed of 532 local residents were reached at their houses by using random sampling method with data acquired from health organization records. Both groups were subjected to same questionnaire.

Results: The prevalence of overweight/obesity among MSAW women was 40.5%, hypertension 19.9%, diabetes 4.9% and hypercholesterolemia 6.5%. These prevalences were 68.0%, 38.6%, 13.9% and 20.8% respectively among local residents. The prevalence of smoking risk among local residents was 1.5 times more than MSAW. In addition, the prevalence of overweight/obese risk was 4 times more; hypertension risk 1.8 times more, diabetes risk 3.8 times more and hypercholesterolemia risk 2.7 times more among local residents than MSAW ($P<0.05$).

Conclusion: The prevalence of cardiovascular disease risk factors of MSAW was lower than local residents in the study groups. Even though health risks that MSAW faced were more linked with environment and life conditions, cardiovascular disease risk factors should not be ignored. Health services should be guided by considering obstacles that MSAW experienced in accessing health services.

Keywords: Migrant; Agriculture; Cardiovascular disease; Turkey

Introduction

Migrant seasonal agricultural workers (MSAW) are defined as agriculture workers who migrate to regions with agriculture related jobs with the opening of the agriculture season and return their

houses with the end of the season (1,2). Approximately waged 450 million out of 1.1 billion agricultural workforces in the world is formed by MSAW (3). Although total number of migrant



seasonal agricultural workers was not identified, there are more than 3 million migrant seasonal agricultural workers in the US alone (4). In addition, similar to other countries, approximately 18.4% of 27 million workforce employed in Turkey is constituted by agricultural workforce. Moreover, about half of this workforce employed in agriculture are comprised of MSAW. In Turkey, MSAW migrate from Eastern and South-eastern Anatolia regions where socioeconomic index is lower compared to Western regions in order to meet growing need for agriculture workforce (5,6).

Despite the lack of well-organized and large scaled studies considering comparison of MSAW with local residents, MSAW hold the lowest social mobility and higher poverty rates and they experience many social, financial and health-related problems that differ from those of local residents (7,8). MSAW struggles with number of problems such as unhealthy living conditions, food insufficiency, insufficient-unbalanced nutrition, inappropriate environmental conditions, extreme heat or extreme cold, noisy environments and they are exposed to physical factors such as pesticides, long working hours and problems in access to health care (1,3).

In the literature, diseases attributable to working and living conditions are reported as the most common health problems of MSAW. This leads researchers in agriculture field to focus on occupational diseases/risks and to ignore chronic diseases/risk factors. On the other hand, the prevalence of chronic disease subject is also increasing attention in studies concerning MSAW (3, 9-16). Therefore, there is insufficient information about risk factors of cardiovascular diseases which are the most important causes of mortality and morbidity in all around the world. In addition, MSAW is a lifestyle beyond being a profession and comparison of this lifestyle with resident agricultural workers located in the same country is significant in determining cardiovascular disease risk factors.

The aim of this study was to determine the status of cardiovascular disease risk factors among

MSAW and to compare obtained data with local residents.

Materials & Methods

Study design and study population

Data in respect of this cross-sectional study were collected during a field visit in between Apr and Nov 2015 during agricultural season. The study group consisted of camp sites with at least 20 tents and local residents in the closest town.

The Ethics Committee of Eskisehir Osmangazi University, regional health organizations and local administrators reviewed and approved the study. Verbal consent was obtained from the participants. Before the field study began, all researchers received theoretical training.

Eskisehir, where the study was conducted, is a developed province located in the Central Anatolian Region of Turkey. However, the rural region of the province has the characteristics of developing regions. Total population of the province is 826,716, 86% of this population lives in the city center and 14% lives in the rural area (17). Eskisehir is an intense agricultural employment area and rural area of Eskisehir requires MSAW due to continuous outward migration. Approximately 10,000 workers migrate to Eskisehir from April to November for vegetable production, sugar beet weeding and harvesting, cherry harvesting and pulses harvesting (18). In study area, 7 camp sites including at least 20 tents where MSAW located were involved in the study. MSAW located in rural areas close to their workplaces and lived in tents. The tents were built on the ground, most of them were covered with nylon or tarpaulins. Only 19% of the tents had electricity. In many tents, there was no allocated area for kitchen, bedroom, toilet, bathroom etc. There was no running water or toilet in the tents. Water was carried by buckets and there were limited number of common toilets outside the tents. People living in tents were exposed to many health problems due to their living conditions. Sample for local residents was selected from an urban area named Alpu, which was the closest

town to MSAW camping area. Houses in the town were constructed from mud brick and mostly had one or two floors. There was running water and electricity in the houses. Majority of the population were engaged in farming and agriculture in their own land. There was a family health center and a public hospital in the town and health records of local residents were kept in those health institutions.

Camp sites were visited and screened during working hours/days. No sample selected and all the voluntary participants were involved in the screening. Each MSAW tent in the camping area was considered as one household and visited by the public health professionals and intern doctors one by one. Firstly, contacted people were informed about the subject and purpose of the study and then the questionnaire was filled by the researchers with face to face interview method. The interviews had been usually arranged according to the rest time of the workers. Participants who did not speak Turkish chose Turkish speaking individuals by themselves and filled the questionnaire by their help. In total, 455 MSAW were reached. During the study period number of local residents was decided to be at least the same with MSAW participant number. Sample group was formed by 532 farmer local residents living in the town. The number of this sample group was close to number of MSAW. Same questionnaire form was presented to the local residents by the same research group.

Survey Instruments-Measures and risk factors for cardiovascular diseases

In the study, a questionnaire form prepared by reviewing literature and consisted of two parts was used to collect data (19-21). First part contained descriptive information and second part investigated personal medical histories and cardiovascular disease risk factors and comorbidities. In line with the aim of the study, uncontrollable risk factors like genetic risk factors were not questioned in the study.

Cardiovascular disease risk factors and comorbidities were designated referring definitions of Centers for Disease Control and Prevention (CDC)

(21). Study data were obtained from health records and clinical examinations of people. Identification of current tobacco usage was based on participants own declaration (Yes/No). For identification of obesity, "Body Mass Index (BMI)" was calculated by measuring the height and weight of the subjects. Participants with a BMI of 25-29.9 were defined as "overweight", those with a BMI 30 and above were defined as obese (22). The diagnosis of diabetes mellitus and hypercholesterolemia was based on the declaration of the participants (prior diagnosis by the physician and/or medication use). The diagnosis of hypertension was based on both the declaration of the participants (previous diagnosis by the physician and/or the use of medication) and the measurements made by the researchers (systolic blood pressure ≥ 140 and/or diastolic blood pressure ≥ 90 mmHg).

Statistical Analyses

Data were analyzed using SPSS ver.,15.0 (Chicago, IL, USA). Chi square test was used for simple analyses in which study groups were compared. Firstly, Odds Ratio (OR) and 95% Confidence Interval (CI) were calculated by simple logistic regression analysis in order to determine cardiovascular disease risk factors and comorbidity risk among MSAW compared with local residents. Later, by multiple logistic regression analysis adjustment was realized according to age, gender, education status, marital status, monthly income and number of people in the household. The level of statistical significance was accepted as $P \leq 0.05$.

Results

Age scale of MSAW ranged between 18-80 yr with a mean (SD) of 35.0 (13.8), and a median of 33 years. Age scale of the local population ranged from 18 to 92 yr with a mean (SD) of 48.0 (16.3) and a median of 48 yr ($P < 0.001$). The proportion of those who were younger than 40 yr old, female, non-graduate, unmarried and had monthly income less than 1000 TL (375 USD) and num-

ber of people in the household 5 and more were higher among MSAW than local residents. The distribution according to sociodemographic char-

acteristics of the study groups is demonstrated in Table 1.

Table 1: Distribution of the individuals in the study groups according to their sociodemographic characteristics

<i>Sociodemographic characteristics</i>		<i>MSAW (n=455) n (%)</i>	<i>Local residents (n=532) n (%)</i>	<i>Test value X²; P</i>
Age group (yr)	< 40	282 (62.0)	182 (34.2)	96.271; <0.001
	40-64	156 (34.3)	251 (47.2)	
	≥65	17 (3.7)	99 (18.6)	
Sex	Male	149 (32.7)	273 (51.3)	34.549; <0.001
	Female	306 (67.3)	259 (48.7)	
Educational status	Non-graduates	302 (66.4)	127 (23.9)	180.204; <0.001
	Graduates	153 (33.6)	405 (76.1)	
Marital Status	Married	394 (86.6)	446 (83.8)	1.473; 0.225
	Unmarried	61 (13.4)	86 (16.2)	
Monthly income	<1000 TL	213 (46.8)	182 (34.2)	16.227; <0.001
	≥1000 TL	242 (53.2)	350 (65.8)	
Number of people in the household	1-4	97 (21.3)	308 (57.9)	135.599; <0.001
	5 and above	358 (78.7)	224 (42.1)	

The prevalence of overweight/obesity, hypertension and diabetes among male MSAW and overweight/obese, hypertension, diabetes and hypercholesterolemia among female MSAW were low-

er than local residents. The prevalence of cardiovascular disease risk factors and comorbidities of MSAW and local residents in terms of gender, their OR and 95% CI are indicated in Table 2.

Table 2: The prevalence of cardiovascular disease risk factors -comorbidities in terms of gender and OR-%95 CI by MSAW and local residents

<i>Cardiovascular disease risk factors comorbidities</i>	<i>Male</i>			<i>Female</i>		
	Local residents ^a n (%)	MSAW n (%)	OR %95 CI	Local residents ^a n (%)	MSAW n (%)	OR %95 CI
Smoking	163 (59.7)	87 (58.4)	0.947 (0.631-1.421)	48 (18.5)	65 (21.2)	1.186 (0.782-1.798)
Overweight/Obese	167 (61.2)	43 (28.9)	0.257 (0.168-0.396)***	176 (68.0)	124 (40.5)	0.321 (0.227-0.454)***
Hypertension	74 (27.1)	18 (12.1)	0.370 (0.211-0.647)***	100 (38.6)	61 (19.9)	0.396 (0.272-0.576)***
Diabetes mellitus	27 (9.9)	2 (1.3)	0.124 (0.029-0.529)**	36 (13.9)	15 (4.9)	0.319 (0.171-0.598)***
Hypercholesterolemia	37 (13.6)	11 (7.4)	0.508 (0.251-1.029)	54 (20.8)	20 (6.5)	0.265 (0.154-0.457)***

a: Local residents was taken as the reference group. *P<0.05; **P≤0.01; ***P≤0.001

After adjusting in terms of age, gender, education status, marital status, monthly income, and number of people in the household in the multiple logistic regression analysis, prevalence of cardiovascular disease risk factors/comorbidities

among MSAW was lower than local residents. ODDS ratio (95% CI) value of cardiovascular disease risk factors /comorbidities of MSAW compared with local residents adjusted with multiple model is indicated in Table 3.

Table 3: ODDS Ratio (95%CI) value of cardiovascular disease risk factors /comorbidities of MSAW compared with local residents adjusted with multiple model

<i>Variables</i>	<i>Smoking OR (95%CI)</i>	<i>Over- weight/Obese OR (95%CI)</i>	<i>Hypercholesterole- mia OR (95%CI)</i>	<i>Hypertension OR (95%CI)</i>	<i>Diabetes melli- tus OR (95%CI)</i>
Study group					
Local resi- dents	1	1	1	1	1
MSAW	0.67 (0.47- 0.95)*	0.25 (0.18- 0.36)***	0.37 (0.22-0.63)***	0.56 (0.36-0.87)*	0.26 (0.13-0.51)***
Age(yr)					
<40	1	1	1	1	1
40-64	0.96 (0.70-1.33)	3.06 (2.26-4.13)	3.03 (1.79-5.10)***	8.71 (5.54- 13.69)***	6.67 (3.08- 14.44)***
≥65	0.33 (0.19- 0.57)***	2.06 (1.28- 3.331)	7.70 (3.98-14.88)***	31.51 (17.08- 58.01)***	6.54 (2.97- 16.50)***
Gender					
Male	1	1	1	1	1
Female	0.13 (0.91- 0.19)***	1.33 (0.95-1.82)	1.34 (0.83-2.16)	1.79 (1.20-2.66)**	1.34 (0.76-2.36)
Educational Status					
Non- graduates	1	1	1	1	1
Graduates	1.39 (0.46-1.01)	0.14 (0.40- 0.85)**	0.02 (0.40-1.18)***	0.04 (0.38-0.95)	0.01 (0.22-0.83)***
Marital Status					
Unmarried	1	1	1	1	1
Married	1.08 (0.70- 1.66)	2.14 (1.41- 3.24)***	1.64 (0.86-3.13)	1.20 (0.69-2.08)	0.92 (0.45-1.88)
Monthly income					
<1000 Tl	1	1	1	1	1
≥1000 Tl	0.93 (0.69-1.26)	1.22 (0.91-1.62)	0.90 (0.59-1.38)	0.68 (0.48-0.98)*	1.33 (0.79-2.26)
Number of household people					
1-4	1	1	1	1	1
≥5	1.68 (1.21- 2.33)**	1.21 (0.89-1.65)	1.39 (0.88-2.19)	1.03 (0.70-1.52)	1.11 (0.64-1.91)

* $P < 0.05$; ** $P \leq 0.01$; *** $P \leq 0.001$

Discussion

Today, cardiovascular diseases are the most important causes for death in global scale. Overall, 80% of cardiovascular disease-related deaths occur in low and middle-income countries (20,23). Behavioral risk factors such as smoking and alcohol usage, unhealthy nutrition, physical inactivity, stress and poverty are major risk factors for cardiovascular diseases. Social, economic and cultural differences (globalization, urbanization and social aging) are the main determinants underlying all these factors (18). Therefore, it is important to evaluate the prevalence variation of cardiovascular diseases risk factors from one society to another and even among different socio-cultural groups within the same community. In addition, cardiovascular diseases are one of the diseases that we can monitor the effects of the demographic transformation in all over the world. For future periods, it is required to have projection of the course of these diseases in developing countries. Therefore, in this study two group of people were compared. One group had the most risky living and working conditions and the other was doing the same job but having better living conditions and better health care access. MSAW is one of the most disadvantageous groups of working life in Turkey same as many other countries. Difficulties of working and living conditions, environmental impacts, general lack of services to be provided, difficulties in accessing health care services make MSAW a labor force struggling with tough conditions (24,25). Studies on health status of MSAW are primarily associated with life and working conditions and there is very limited information about of cardiovascular diseases risk factors and comorbidities that people face most within the whole community (26).

Unlike MSAW in many countries, MSAW in Turkey migrate with their wives and children. This group is younger and has lower income, higher number of people in the household, plural marriage, higher fertility and maternal-infant mortality rates (26). In general, there become

more women and children in the tent sites when young adult male MSAW go to work. Therefore, sociodemographic characteristics of MSAW will be different from the local residents. As expected, number of women, young people, individuals with low income and education level and crowded households were more at MSAW than local residents. Prevalence of smoking which has important place in risk factors of cardiovascular diseases was 33.4% among MSAW and 39.7% among local residents. In a study considering Latin agricultural workers in the United States prevalence of smoking was reported as 19% (19). In a study conducted throughout Turkey prevalence of smoking was reported to be 25% in the rural area and 31% in the urban area (23). In our study, according to the results of multiple analysis, although smoking prevalence among MSAW was found to be lower than local population, it was higher than the ratio measured throughout Turkey and other reported results. Smoking, which is a major public health problem all over the world, is increasing consistently, especially among low socio-economic groups (27). There was a relationship between uninsured work and smoking (19). Socio-cultural stressors may be the reason for the increase in the tendency to smoking.

In this study, the prevalence of overweight/obesity was 36.7% among MSAW and 64.5% among local residents. In both study groups' prevalence of overweight/obesity among women was higher. In a study conducted in Turkey by Ministry of Health considering chronic diseases and risk factors, prevalence of overweight/obesity was demonstrated as to be 52% among males and 58% among females. Moreover, overweight/obesity prevalence was higher in urban areas in general and men in urban areas and women in rural areas were more at risk for overweight/obesity (23) in terms of gender. MSAW is a risk group in terms of accessibility to food. Resident agricultural workers and migrant agricultural workers were compared and it was found that prevalence of obesity in resident inhabitants was higher than that of seasonal agricultural workers (19). The prevalence of malnutrition among MSAW children was high and ac-

cessibility problems to food were more prevalent among MSAW (28,29). Overweight/obesity prevalence might have been low among MSAW due to reasons such as not being able to reach necessary food for adequate-balanced nutrition, excessive effort due to heavy working conditions and being economically worse. While the prevalence of hypercholesterolemia, diabetes and hypertension were 17.1%, 11.7% and 32.7% among local residents respectively, it was 6.8%, 3.7% and 17.4% among MSAW. Prevalence of all three factors were lower among MSAW. According to the results of multiple analysis, hypertension prevalence was higher among women. On the other hand, there were no gender differences among prevalence of hypercholesterolemia and diabetes. Furthermore, prevalence of all three risk factors were higher among older age groups. In the United States, there were no differences between residents and migrants in terms of hypercholesterolemia, diabetes and hypertension, on the other hand all these risk factors were reported to be higher in older ages. Moreover, prevalence of hypercholesterolemia and hypertension did not change in accordance with gender, but prevalence of diabetes was higher among women (19). In Turkey, hypertension, diabetes and heart disease were reported to be health problems which were common among MSAW in recent years (30). A population-based study conducted in Turkey indicated that prevalence of hypercholesterolemia was found to be 12.5%, prevalence of diabetes was 11.0%, and prevalence of hypertension was 24.0%. Moreover, the prevalence was increasing in the same line with age. In the same study, prevalence of hyperlipidemia was shown to be higher among women and urban populations and prevalence of hypertension was demonstrated to be higher among women and rural populations. In addition, there was no difference in prevalence of diabetes in terms of gender and residential area (23). In addition, risks of hypercholesterolemia, hypertension and diabetes were higher in urban areas than in rural areas (31,32). Higher prevalence of hypercholesterolemia, hypertension and diabetes among local residents could be associated with their more obesity and

sedentary lifestyles than MSAW. Moreover, working conditions of MSAW were requiring more effort. In addition, because of average amount of daily earning of MSAW, their inability to use their healthcare facilities effectively during their migrant time, their inability to use routine health care and screening programs because of their lack of health records, and their inability to use the healthcare facilities effectively due to lack of communication might have hindered their diagnosis. Therefore, prevalence of cardiovascular disease risk factors of MSAW might have been lower than local residents because of lack of diagnosis.

This study had some limitations. Since the study was a cross-sectional study, it was not suitable to declare a causative relationship among results. Another limitation is the absence of any measurement in the study and conducting the study on cases diagnosed by the physician. In addition, the study group had low level of education and despite the usage of translator during survey there was a slight language barrier. This fact could have influenced the results.

Despite the limitations, this study also has some strengths. Firstly, this study is one of the rare studies in literature that researches cardiovascular disease risk factors of MSAW by comparing local residents who are more advantageous in terms of sociocultural and economic factors. Especially in Turkey, no studies could be found compared in this respect. Moreover, another strength of the study is working with a group of people limited access to health care. Furthermore, evaluation of the comparison of cardiovascular disease risk factors/comorbidities of MSAW with local residents by performing multiple logistic regression analysis is another key strength.

Conclusion

Results of the research will provide significant contributions to the literature in this context. All cardiovascular disease risk factors in the study were found to be higher among local population. Disease pattern of the disadvantaged group

MSAW differs from local population who live in more favorable conditions. On the other hand, the difference between MSAW and local residents in terms of access to health services and rates of utilization of these services should not be ignored. Identification of preventable risk factors for cardiovascular diseases which are the most important cause of mortality and morbidity in the world, may especially guide the determination of health services.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

Acknowledgements

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Conflict of interest

The authors declare that there is no conflict of interests.

References

1. Weathers AC, Garrison HG (2004). Children of migratory agricultural workers: the ecological context of acute care for a mobile population of immigrant children. *Clin Pediatr Emerg Med*, 5(2): 120-9.
2. Özbekmezci Ş, Sahil S (2004). Analysis of seasonal agricultural workers social, economic and housing problems. *J Fac Eng Arch Gazı Univ*, 19(3): 261-74.
3. Hurst P, Termine P, Karl M (2007). *Agricultural workers and their contribution to sustainable agriculture and rural development*. 1st ed. ILO Publications. Geneva.
4. National Center for Farmworker Health. Farmworker Health Worksheet. <http://www.ncfh.org/fact-sheets--research.html>. Accessed June 22, 2019
5. Turkish Statistical Institute [Internet] Seasonally Adjusted Main Labor Force Indicators (2016). <https://turkstatweb.tuik.gov.tr/Start.do>
6. Selek Öz C, Bulut E (2013). The status of seasonal agricultural workers in Turkish Legislation. *ÇSGB Labour World*, 1(1): 94-111.
7. Villarejo D (2003). The health of U.S. hired farm workers. *Annu Rev Public Health*, 24: 175-93.
8. Quandt SA, Arcury TA, Rao P, et al (2004). Agricultural and residential pesticides in wipe samples from farmworker family residences in North Carolina and Virginia. *Environ Health Perspect*, 112(3): 382-7.
9. Arcury TA, Quandt SA (2007). Delivery of health services to migrant and seasonal farmworkers. *Annu Rev Public Health*, 28: 345-63.
10. Hansen E, Donohoe M (2003). Health issues of migrant and seasonal farmworkers. *J Health Care Poor Underserved*, 14(2):153-64.
11. Simsek Z, Koruk İ, Doni NY (2012). An operational study on implementation of mobile primary healthcare services for seasonal migratory farmworkers, Turkey. *Matern Child Health J*, 16(9): 1906-12.
12. UNICEF, World Health Organization (2012). Progress on Drinking-Water And Sanitation–2012. http://www.who.int/water_sanitation_health/monitoring/jmp2012/en/
13. Rautiainen RH, Reynolds SJ (2002). Mortality and morbidity in agriculture in the United States. *J Agric Saf Health*, 8(3): 259-76.
14. Donham KJ, Thelin A (2006). *Agricultural medicine: occupational and environmental health for the health professions*. 1st ed. Blackwell Publishing. Iowa.
15. Emmi KE, Jurkowski JM, Codru N, et al (2010). Assessing the health of migrant and seasonal farmworkers in New York State: Statewide Data 2003–2005. *J Health Care Poor Underserved*, 21(2): 448–63.
16. Rajjo T, Mohammed K, Rho J, et al (2018). On-the-farm cardiovascular risk screening among migrant agricultural workers in Southeast Minnesota: a pilot prospective study. *BMJ Open*, 8(7):e019547.
17. Turkish Statistical Institute. Adrese Dayalı Nüfus Kayıt Sistemi. Available from:

- <https://biruni.tuik.gov.tr/medas/?kn=95&loca=tr>.
18. Kalkınma Atölyesi (2014). Mevsimlik Gezici Tarım İşlerinde Çocuk İşçiliğiyle Yerel Düzeyde Mücadele Eskişehir İlinde Bitkisel Üretimde Çalışan Çocuklar 2014. <http://humanistburo.org/dosyalar/humdosya/Eskisehir%20Ilinde%20Bitkisel%20Uretimde%20Calisan%20Cocuklar.pdf>
 19. Castañeda SF, Rosenbaum RP, Holscher JT, et al (2015). Cardiovascular disease risk factors among Latino migrant and seasonal farmworkers. *J Agromedicine*, 20(2): 95-104.
 20. World Health Organization (2017). Cardiovascular Diseases. <http://www.who.int/mediacentre/factsheets/fs317/en/>
 21. Centers for Disease Control and Prevention (2015). Heart Disease Behaviour. <https://www.cdc.gov/heartdisease/behavior.htm>
 22. Centers for Disease Control and Prevention (2017). Defining Adult Overweight and Obesity. <https://www.cdc.gov/obesity/adult/defining.html>
 23. Ünal B, Ergör G, Horasan GD, et al (2013). *Chronic diseases and risk factors survey in Turkey*. 1st ed. Republic of Turkey Ministry of Health, Publication No:909. Ankara.
 24. Kaya M, Özgülner N (2015). Qualitative overview of living conditions and health status of seasonal (mobile/temporary) agricultural workers in two housing units. *Turk J Public Health*, 13(2): 115-26.
 25. Simsek Z, Ersin F, Kirmizitoprak E (2016). Development of the seasonal migrant agricultural worker stress scale in Sanliurfa, Southeast Turkey. *J Agromedicine*, 21(1): 56-60.
 26. Earle-Richardson GB, Brower MA, Jones AM, et al (2008). Estimating the occupational morbidity for migrant and seasonal farmworkers in New York State: a comparison of two methods. *Ann Epidemiol*, 18(1): 1-7.
 27. Metintas S, Arikan İ, Kalyoncu C (2009). Awareness of hypertension and other cardiovascular risk factors in rural and urban areas in Turkey. *Trans R Soc Trop Med Hyg*, 103(8): 812-8.
 28. Quandt SA, Arcury TA, Early J, et al (2004). Household food security among Latino farmworkers in North Carolina. *Public Health Rep*, 119(6):568-76.
 29. Emiral GO, Onsuz MF, Metintas S (2017). Evaluation of validity-reliability of Turkish version of the household food security survey short form. *J Clin Anal Med*, 8(Suppl 4): 284-8.
 30. Öztaş D, Kurt B, Koç A, et al (2018). Living conditions, access to healthcare services, and occupational health and safety conditions of migrant seasonal agricultural workers in the Çukurova. *J Agromedicine*, 23(3):262-9.
 31. Oommen AM, Abraham VJ, George K, et al (2016). Prevalence of risk factors for non-communicable diseases in rural & urban Tamil Nadu. *Indian J Med Res*, 144(3): 460-71.
 32. Tareen MF, Shafique K, Mirza SS, et al (2011). Location of residence or social class, which is the stronger determinant associated with cardiovascular risk factors among Pakistani population? A cross sectional study. *Rural Remote Health*, 11(3): 1700.