

## Research Article

# Factors that Hinder Adherence to Physical Activity and a Healthy Diet among Palestinian Non-Communicable Disease Patients: A Qualitative Study

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**Received:** May 30, 2022; **Accepted:** June 08, 2022;**Published:** June 15, 2022**Abstract**

**Background:** Non-communicable diseases (NCDs) tend to be long-term and are caused by genetic, physiological, environmental, and behavioral factors. Palestine is undergoing an epidemiological transition. It is estimated nearly two out of three elderly Palestinians suffer from NCDs. This study aimed to identify the barriers to practicing physical activity and eating a healthy diet among Palestinian non-communicable disease patients.

**Methods:** This qualitative study was carried out from September 2020 to November 2020 among ten NCDs patients who received care in five governmental primary healthcare centers in the Gaza Strip. A semi-structured interview guide was developed and used to collect data based on the health belief model and the theory of planned behavior. Data analysis was performed using the thematic analysis method. The Consolidated Criteria for Reporting Qualitative research Checklist (COREQ) was used to report the data.

**Results:** The data analysis led to the identification of two main categories, factors affecting the practice of PA, healthy diet, and barriers to adherence to healthy behaviors. The interviewees had a positive attitude towards healthy behaviors. The main barriers to PA practice were lack of accessibility to materials, lack of social support, and a lack of reminders. Also, factors as lack of accessibility to the materials, a lack of social support, and a lack of self-efficacy were the most common barriers to eating a healthy diet.

**Conclusion:** NCD patients understand the importance and benefits of practicing healthy behaviors, but in the absence of basic infrastructure and a supportive community, their awareness may not translate into actions.

**Keywords:** Adherence, Non-communicable diseases (NCDs), Physical activity (PA), Healthy diet

**Abbreviations**

NCDs: Non-Communicable Diseases, WHO: World Health Organization, MOH: Ministry of Health, UNRWA: United Nations Relief and Work Agency, NGOs: Non-Governmental Organizations, PEN: Package of Essential Non Communicable Disease Interventions.

**Introduction**

Non-communicable diseases (NCDs) are caused by genetic, physiological, environmental, and behavioral factors [1,2]. It is estimated that the main types of NCDs were responsible for more than forty million deaths annually [3]. The behavioral risk factors for the major types of NCDs are tobacco and alcohol use, unhealthy diet, and physical inactivity [3]. At present, there is widespread scientific evidence that these factors contribute significantly to NCDs morbidity and mortality [4].

Palestine is undergoing a rapid epidemiological transition [5]. Gaza Strip is part of Palestine characterized by a high densely populated zone, and the total number of Gaza Strip inhabitants is about two million [6]. Cardiovascular diseases remain the first

leading cause of death among the population of Palestine, cancer was the second leading cause [7].

The World Health Organization established a package of essential NCDs interventions (WHO-PEN), which is considered the lowest set of interventions to address the main types of NCDs [2]. Since 2013, the implementation process started to WHO-PEN in government primary healthcenters [8]. In addition, the WHO-PEN 2 protocol is an essential tool in practical implementation, which is concerned with the healthy behaviors for NCDs patients [2,9].

A study conducted in primary health care centers in Gaza Strip showed that 87.5% of health providers claimed that they are sometimes or always adherence to teaching NCDs patients healthy behaviors in terms of physical activity, 80.5% in terms of a healthy diet [10]. In contrast, 54.5% and 49.3% of NCD patients claimed to have received advice on physical activity and a healthy diet [11]. There are many quantitative studies of professionals' and patients' adherence and perceived barriers to health behaviors, but little is known qualitatively about this issue. This study aimed to identify the barriers to practicing physical activity and eating a healthy diet

among Palestinian non-communicable disease patients.

## Materials and Methods

### Study Design

The current qualitative semi-structured interview study was carried out from September 2020 to November 2020 in Gaza Strip. The Consolidated Criteria for Reporting Qualitative research Checklist (COREQ) was used to report the data [12].

### Sampling and Participants

The five PHCs were selected purposively from the Gaza Strip. One center in each governorate according to inclusion criteria: (1) had all the health education about the healthy behaviors suggested by the WHO-PEN 2 protocol, and (2) were classified as having low adherence to healthy behaviors according to the quantitative part of the study [13,14].

### Participants

Participants were recruited from the five selected primary health care centers. The patients' inclusion criteria were (1) An adult patient with one of the main types of NCDs (2) registered and treated at the five selected PHCs. The preliminary list of potential contributors was gathered based on the experience of the first author, a researcher who has worked in the Palestinian health sector for more than 10 years and has a background in Public Health and epidemiology. To achieve the diversity of experiences of the contributors to the study, considerations were taken with regards to differences in gender, age, smoker status, educational level, duration of the disease of NCDs, and labor status.

Patients awaiting follow-up were invited to participate in the study. After signing the consent form, face-to-face interviews were conducted immediately after the patient received care in a quiet location outside of PHCs. Each interview included one author and one participant. The sample size was determined according to data saturation, that is, at the point where no new matters emerged from the experiences of the participants. After 10 participants, saturation was reached, and data saturation was ensured.

### Interview Guide and Data Collection

Data were collected using a semi-structured in-depth interview guide. The guide was developed based on the Health Belief Model (HBM) and Theory of Planned Behavior (TPB) [15,16]. Based on HBM and TPB, there were seven main determinants of human behaviors include perceived self-efficacy, perceived social acceptability, perceived action efficacy, cues for action, accessibility of materials, perceived susceptibility, and perceived severity [15,17]. Certain questions related to some main significant and insignificant previous quantitative results were involved [14]. The interview guides were developed and used to confirm that data on the identical overall areas were gathered from each participant, whereas permitting a degree of freedom and adaptability in getting the material from the participants [18]. The guide of the interview consisted of 21 open-ended questions evaluating the health education provided by healthcare professionals', trust healthcare professionals' recommendations, applicability healthcare professionals' recommendations, patient perspective about the effect of the healthcare professionals' recommendations in health outcome, and the seven main determinants of human

behaviors. Demographic questions were included at the end of the interview guide.

The participants' interviews were carried out by the first author (AHA). The interviews were conducted in a quiet location outside primary health care centers with an average time from 35-45 minutes. All interviews were conducted in the Arabic language. At the beginning of each interview, participants were given a complete summary of the aim of the study, meeting session plan, and issues of confidentiality.

### Trustworthiness

Trustworthiness was covered by carefully collecting the study sample, and looking for a wide range of differences within the sample, interviewees were contacted to verify the accuracy of the researcher guesses about the transcripts, each transcript was checked several times, and during the analysis phase, the researcher analyzed the data in each transcript independently with another Ph.D. a public health researcher, and in case of any discrepancies, a third expert consulted.

### Data Analysis

The interviews were audio-recorded, and data were transcribed verbatim to simplify analysis. All transcriptions were carried out by the first Author; each transcript was checked several times. The thematic analysis approach has been used to analysis of the data, which consists of the following steps 'familiarization', 'identifying a thematic framework', 'indexing', 'charting', and 'mapping, and interpretation' [19,20].

### Familiarization

The researcher himself familiarized the whole interviews information via reading the transcripts of the interviews several times. A summary was developed for each Interview [21].

### Identifying a Thematic Framework

The researcher went back over the summaries and listed the keynotes/themes, which had been drawn up at the familiarization stage. A preliminary framework has been developed based on the health belief model and theory of planned behavior.

### Indexing

Indexed (coded) has been done for all data according to the thematic framework. Indexing references were recorded in the margin of the transcript as a reference point. Sections of data were indexed with one or more codes (cross-indexing) wherever proper [22]. The first author indexed the transcribed interviews with codes connected to the thematic framework [22,23]. After that, the coded text was discussed with another Ph.D. public health researcher, and the coding was modified to be proper. When needed, another researcher was consulted.

### Charting

Thematic charting was used to draw up an image of the whole data. Data were elevated and rearranged in a table (Excel) to allow the researcher to look at experiences and issues across the data set, not only the transcribed interviews. We drew up charts for thematic analysis, where data for each theme were collected from all episodes of interview transcripts. After that, we compared and examined the opinions of each interviewee across various themes (looking across

the rows) and the opinions of various interviewees about each theme (looking across the columns).

### Mapping and Interpretation

Main themes that were established from index points were then collected and mapped (sub-ordinate themes into super-ordinate categories). The thematic framework was reorganized in the process of the analysis.

### Ethics Approval

This study is part of a project that approved by the Palestinian Helsinki Ethical Committee of Research (PHRC/HC/599/19) and the Ethics Committee of Tehran University of Medical Sciences (Code: IR.TUMS.REC.1398.349). Written informed consent was obtained from the interviewees before the data collection.

## Results

### Characteristics of the Study Participants

The interviews from the five governorates of the Gaza Strip. One center in each governorate and two participants from each center. Table 1 shows the characteristics of the interviewees, the ten in-depth interviews included six males and four females, all the interviewees are above forty years old, and three of the interviewed males were smokers.

The data analysis led to the identification of two main categories, including factors affecting the practice of PA, healthy diet, and barriers to adherence to healthy behaviors.

### Factors Influence Practice of PA and Healthy Diet

**Attitude related factors:** Most interviewees agreed that healthy behaviors are the best proper ways to control NCDs. Most of the interviewees reported that they received at least one time of instructions to practice healthy behaviors from physicians or nurses and they believed that the healthcare professionals are well qualified to provide counseling on healthy behaviors based on scientific evidence and their experiences.

**Perceived benefits or action efficacy:** The interviewees recognized that by adhering to healthy behaviors, their disease would be under control and believed that healthy behaviors had a positive impact on physical, psychological, and well-being.

*“...The practice of physical activity led to meeting other people in*

*the community who are doing the same, which leads to the build of new friends and new interests.” (P9).*

**Perceived severity and perceived risk:** There is consensus among patients interviewed that their disease is a serious health condition, and without, practice healthy behaviors, their health status will be worse and they will complain from dangerous complications.

*“...My doctor said that HTN is called a silent killer and without reduce the salt, fat, and oil, my condition will be worse.” (P 4).*

*“...Without attending a regular physical activity, eat a healthy diet, I will become obese, my investigations will be abnormal, I will need more visits to the hospital.” (P 2).*

**Barriers to adherence to healthy behaviors:** Table 2 demonstrated the main barriers to PA practice were lack of accessibility to materials, lack of social support, and a lack of reminders. Also, factors as lack of accessibility to materials, a lack of social support, and a lack of self-efficacy were the most common barriers to eating a healthy diet.

### Perceived Barriers in Terms of Access to Materials

**In terms of taking regular physical activity,** most of the participants claimed that there are inadequate playgrounds and roads to walk and cycle. They believed that the lack of suitable areas for practicing physical activity was one of the main problems they faced and prevented them from planning to practice physical activity.

*“...I can't imagine how I can do regular physical activity in the refugee camps, where the road near my house is only one meter wide, and there are no special areas for physical activity.” (P5).*

**In terms of eating a healthy diet,** most of the interviewees reported that they are dependent on food aids from the UN, and they are often unable to purchase the recommended fruits and vegetables. Participants argued that in recent years, there are occurrence profit organizations that support healthy diets and prepare healthy meals for sale but that they do not have the financial ability to buy these products.

*“...I have five children in the schools; my priority is to provide basic things for their learning.” (P6).*

### Lack of Social Support

**In terms of regular physical activity,** Interviews believed that community acceptance is essential and they needed social support to

**Table 1:** Characteristics of the interviewees (n=10).

ID	Age/Year	Gender	Smoking status	Labor status	Education level	Years of NCDs	NCDs Type
P1	58	Male	Smoker	Unemployed	Secondary school	12	CVD
P2	62	Female	Non-smoker	Retired	Bachelor degree	16	HTN
P3	61	Female	Non-smoker	Retired	Diploma	11	Asthma
P4	50	Male	Smoker	Unemployed	Secondary school	10	HTN
P5	54	Female	Non-smoker	Employee	Master degree	8	DMT1
P6	65	Male	Non-smoker	Retired	Bachelor degree	6	DMT1+HTN
P7	45	Female	Non-smoker	Employee	Bachelor degree	4	DMT2
P8	62	Male	Non-smoker	Retired	Diploma	15	HTN
P9	52	Male	Non-smoker	Employee	Bachelor degree	14	HTN
P10	68	Male	Smoker	Retired	Secondary school	8	DMT1+HTN

CVD: Cardiovascular disease, HTN: Hypertension, DMT1: Diabetes mellitus Type1, DMT2: Diabetes mellitus Type2

**Table 2:** Main barriers to adherence to healthy behaviors.

	Domain Framework	Themes/subthemes	Health Behavior Domain	Codes
1-	Perceived barriers in terms of access to materials	Insufficient access to materials	- Physical activity - Healthy diet	- In adequate facility - Lack of suitable areas - Financial dependence - Prioritizing the children's basic needs - Lack of facility
2-	Social support	Inadequate social support	- Physical activity - Healthy diet	- Female/ Poor family support - No environment supports - Cultural issues/A community habits of consuming foods - Social activities/A traditions of eating in family meetings or ceremonies - The non-acceptance of healthy diets by other
3-	Cues to action	Lack of reminder to action	- Physical activity	- Heavy daily work - The lack of time for practice PA - Food preferences/ Breaking habits
3-	Self-efficacy	lack of self-efficacy	- Healthy diet	- Financial strain - Increasing fruits and vegetables consumption is difficult - Healthy food taste - The popularity of fried foods in the community

enhance their efforts towards regular physical activity, interviewees also argued about family and community support, male participants claimed that their families understood and accepted practice physical activity in the community setting, some women interviewed claimed that it is culturally unacceptable to see women running in the street and they have poor family support.

*“...In eastern countries, males can do as they want, and women must be under the eyes of society.” (P 7).*

*“...It is socially unacceptable to see women running in the street.” (P 5).*

**In terms of eating a healthy diet**, the interviewed participants reported that some cultural and dietary behaviors are difficult to change, some traditional foods are recognized as ceremonial meals and it is impossible to go to the party and not eat the meal, it would be considered disrespectful. Other interviewees stated that it is inappropriate to prepare different types of meals for lunch or breakfast at home at the same time.

*“...When I cook low-salt food, my husband says he doesn't want to eat hospital food.” (P2).*

*“...In Palestinian society, spiced rice is usually cooked with meat at a wedding ceremony, and it is a manner of disrespectful not to eat the meal.” (P 1).*

**Lack of Reminder to Action**

The third perceived barrier to regular physical activity was the lack of reminders to action, most of the people interviewed reported that NCD patients like any other member of society are living under the stress of life, participating in daily life events, taking care of children, going to work, and household duties, all these events can play a major role in forgetting regular practicing of physical activity.

**Self-Efficacy**

The third perceived barrier to eating a healthy diet was the lack of self-efficacy; most participants reported that it is difficult to adhere to a healthy diet due to their food preference, cost, and availability of

food options. Most of them believe that healthy meals which include low-salt foods, a large amount of fruit and vegetable, limited fast food are considered unpleasant. They believed that they could not completely change their favorite food so easily. Many traditional foods are part of everyday life as salt, meat, and fat.

*“...In the Palestinian community, breakfast or dinner is traditionally prepared from outside the home and usually includes fried potato or traditional fried falafel.” (P 2).*

**Discussion**

This qualitative research aims to identify the barriers to practicing physical activity and eating a healthy diet among NCDs patients. The study is based on widespread and commonly used frameworks [15,16,24]. In general, the interviewees had a positive attitude towards healthy behaviors, realized that through adherence to healthy behaviors their illness would be under control, and believed that healthy behaviors had a positive impact on physical, mental, and social well-being. There is consensus among participants that non-communicable disease is a serious health condition. The main barriers to being active were a lack of accessibility to materials, a lack of social support, and a lack of reminders, and the main barriers to eating a healthy diet were lack of accessibility to materials, a lack of social support, and a lack of self-efficacy. Our study results are compatible with studies that identified lack of materials and lack of social support as the main barriers to practicing healthy behaviors [25-27]. A previous qualitative study conducted among coronary heart disease patients showed that the inability to afford the exercise they enjoy, and financial barriers to accessing it as major barriers to physical activity [28]. In the Palestinian context, The possible explanation for the lack of accessibility of materials is that the Gaza Strip has been below siege for more than 14 years, which has affected the whole aspects of life, with more than half of the inhabitants suffering from poverty, and 79% of the people had received aids [29]. More than two-thirds of Gaza's are dependent on food aids [30], it's difficult for individuals facing these challenges to purchase the appropriate equipment for physical activity or to attend gyms regularly, to purchase various suggested



diets such as different types of fruits, vegetables, a certain type of oil or meat, and to go to see health professionals for checkups. The lack of social support, any attempts to transform into healthy behaviors from individuals will occur in a social setting [31], thus, it's assumed that the community can encourage adherence by providing support to activities [32], Activities that include family support can have better compliance outcomes among patients [33]. A study conducted demonstrated that social support is rising a period of physical activity by about 44% [34]. This study demonstrates that males 'participants claimed that their families understood and accepted practicing physical activity in the community setting, but females claimed that they need social support as lack of family and community support is a barrier to regular physical activity and a healthy diet.

There is a need for programs such as exercises classes, healthy cooking classes, and walking groups focused on developing and maintaining relationships between females that might help decrease the social isolation described by some females, and may eventually enhance healthy behaviors. The third perceived barrier to regular physical activity was the lack of reminders to action, our results are compatible with previous studies which identified lack of reminders to action as one of the main barriers to adherence to healthy behaviors [26,35].

The interviewees discussed the heavy daily activity and being outside the home or in the work as other reasons for being physically inactive. The third perceived barrier to eating a healthy diet was the lack of self-efficacy. The lack of self-efficacy in studies was defined as the most determinant of healthy behaviors [36,37], Feeling powerless or if a person thinks they can't modify the behavior, they won't even try to modify it [38,39]. The evidence displayed that the initial phase of change toward healthy behaviors is significant to increase self-efficacy, so, success in the initial phase will raise the self-efficacy and the failure will raise the frustration over individuals [38]. Consequently, the individuals who are educated to begin with simple and reachable healthy behaviors can build-up self-confidence and be more effective to change toward healthy behaviors [40].

One potential limitation of this study was that only the views of NCD patients were included in the study. The views of health care providers must be investigated in future studies.

## Conclusion

NCD patients understand the importance and benefits of practicing healthy behaviors, but in the absence of basic infrastructure and a supportive community, their awareness may not translate into actions. The national authority needs to administer various pragmatic strategies that target perceived barriers. There is an urgent need to raise public awareness of healthy behaviors for the whole community as well as for patients with chronic diseases.

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## References

1. Organization W.H. Global action plan for the prevention and control of non communicable diseases 2013-2020. 2013: World Health Organization.
2. Organization W.H. WHO package of essential non communicable (PEN) disease interventions for primary health care. 2020.
3. Organization W.H. Assessing national capacity for the prevention and control of non communicable diseases: report of the 2019 global survey. 2020.
4. Lawrence J Fine, G Stephane Philogene, Robert Gramling, Elliot J Coups, Sarbajit Sinha. Prevalence of multiple chronic disease risk factors: 2001 National Health Interview Survey. *American journal of preventive medicine*. 2004. 27(2): 18-24.
5. Abdeen H. Chronic diseases in Palestine: the rising tide. *Bridges*, 2006. 2: 4-7.
6. West LJS. *Palestinian Central Bureau of Statistics (PCBS)*. 2018.
7. Center PHI. *Health Annual Report, Palestine 2016*. Ministry of Health, Palestine, 2017.
8. WHO, *Palestine Health Profile 2015*. 2015.
9. Organization W.H. *Implementation tools: package of essential non communicable (PEN) disease interventions for primary health care in low-resource settings*. 2013.
10. Ahmed Hassan Albelbeisi, Ali Albelbeisi, Abdel Hamid El Bilbeisi, Mahmoud Taleb, Amirhossein Takian, et al., *Barriers of Adherence among Palestinian Healthcare Professionals towards the Protocol of Health Education and Counselling on Healthy Behaviours for Non-Communicable Diseases*. *Ethiopian Journal of Health Sciences*, 2021. 31(1): 73-84.
11. Ahmed Hassan Albelbeisi, Ali Albelbeisi, Abdel Hamid El Bilbeisi, Amany El Afifi. *Do Patients with Major Non-Communicable Diseases Receive Advice on Health Behaviors from Healthcare Professionals in the Gaza Strip, Palestine?* *Ethiopian Journal of Health Sciences*. 2022. 32(1): 45-54.
12. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International journal for quality in health care*. 2007; 19(6): 349-357.
13. Ahmed Hassan Albelbeisi, Ali Albelbeisi, Abdel Hamid El Bilbeisi, Amirhossein Takian, Ali Akbari-Sari. *Capacity of Palestinian primary health care system to prevent and control of non-communicable diseases in Gaza Strip, Palestine: A capacity assessment analysis based on adapted WHO-PEN tool*. *The International Journal of Health Planning and Management*. 2020; 35(6): 1412-1425.
14. Ahmed Hassan Albelbeisi, Ali Albelbeisi, Abdel Hamid El Bilbeisi, Mahmoud Taleb, Amirhossein Takian, et al. *Barriers toward the practice of healthy behaviors among patients with non-communicable diseases in Gaza Strip, Palestine*. *SAGE Open Medicine*. 2021. 9: 20503121211029179.
15. Ajzen I. *The theory of planned behavior*. *Organizational behavior and human decision processes*. 1991. 50(2): 179-211.
16. Janz NK, MH Becker. *The health belief model: A decade later*. *Health education quarterly*. 1984; 11(1): 1-47.
17. Rosenstock IM. *The health belief model and preventive health*

- behavior. Health education monographs. 1974; 2(4): 354-386.
18. Kvale S. Interviews: An introduction to qualitative research interviewing. 1994: Sage Publications, Inc.
19. Ritchie J, et al. Analysing qualitative data. 1994.
20. Ritchie J, L Spencer. Qualitative data analysis for applied policy research in *Analyzing qualitative data*. 2002. Routledge. 187-208.
21. Miles MH, AM. Qualitative data analysis: an expanded sourcebook. 1994. London: Sage.
22. Pope C, S Ziebland, N Mays. Analysing qualitative data. *BMJ*. 2000. 320(7227): 114.
23. Ritchie JS. Qualitative data analysis for applied policy research. By Jane. 'Analysing qualitative data' (pp.173-194). 1994: London: Routledge.
24. Dele O Abegunde, Bakuti Shengelia, Anne Luyten, Alexandra Cameron, Francesca Celletti, et al. Can non-physician health-care workers assess and manage cardiovascular risk in primary care? *Bulletin of the World Health Organization*. 2007; 85(6): 432-440.
25. AlQuaiz AM, SA Tayel. Barriers to a healthy lifestyle among patients attending primary care clinics at a university hospital in Riyadh. *Annals of Saudi medicine*. 2009; 29(1): 30-35.
26. Ghimire S, N Shrestha, K Callahan. Barriers to dietary salt reduction among hypertensive patients. *Journal of Nepal Health Research Council*. 2018; 16(2): 124-130.
27. Ghimire S. Barriers to diet and exercise among Nepalese type 2 diabetic patients. *International scholarly research notices*. 2017; 2017: 1273084.
28. Michelle C Rogerson, Barbara M Murphy, Stephen Bird, Tony Morris. "I don't have the heart": a qualitative study of barriers to and facilitators of physical activity for people with coronary heart disease and depressive symptoms. *International Journal of Behavioral Nutrition and Physical Activity*. 2012; 9: 140.
29. Ahern ME. West Bank and Gaza-Economic Monitoring Report to the Ad Hoc Liaison Committee. 2017. The World Bank.
30. Belov K. Running for human rights in Palestine. *Green Left Weekly*. 2018; (1202): 15-17.
31. Ann-Marie Rosland, Edith Kieffer, Barbara Israel, Marvis Cofield, Gloria Palmisano, et al. When is social support important? The association of family support and professional support with specific diabetes self-management behaviors. *Journal of general internal medicine*. 2008; 23(12): 1992-1999.
32. DiMatteo MR. Social support and patient adherence to medical treatment: a meta-analysis. *Health psychology*. 2004; 23(2): 207.
33. Mayberry LS, CY Osborn. Family support, medication adherence, and glycemic control among adults with type 2 diabetes. *Diabetes care*. 2012; 35(6): 1239-1245.
34. Heath G, et al. Increasing physical activity; a report on recommendations of the Task Force on Community Preventive Services. 2001.
35. Juliet M Foster, Tim Usherwood, Lorraine Smith, Susan M Sawyer, Wei Xuan, et al. Inhaler reminders improve adherence with controller treatment in primary care patients with asthma. *Journal of Allergy and Clinical Immunology*. 2014; 134(6): 1260-1268. e3.
36. Desharnais R, J Bouillon, G Godin. Self-efficacy and outcome expectations as determinants of exercise adherence. *Psychological Reports*. 1986; 59(3): 1155-1159.
37. B A Brady, C M Tucker, P A Alfino, D G Tarrant, G C Finlayson. An investigation of factors associated with fluid adherence among hemodialysis patients: a self-efficacy theory based approach. *Annals of Behavioral Medicine*. 1997; 19(4): 339-343.
38. Bandura A. Self-efficacy: toward a unifying theory of behavioral change. *Psychological review*. 1977; 84(2): 191.
39. Marianne E Gee, Asako Bienek, Norman R C Campbell, Christina M Bancej, Cynthia Robitaille, et al. Prevalence of, and barriers to, preventive lifestyle behaviors in hypertension (from a national survey of Canadians with hypertension). *The American journal of cardiology*. 2012; 109(4): 570-575.
40. Akke K van der Bij, Miranda G H Laurant, Michel Wensing. Effectiveness of physical activity interventions for older adults: a review. *American journal of preventive medicine*. 2002. 22(2): 120-133.