



Review article

Physical activity participation among Arab immigrants and refugees in Western societies: A scoping review

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ABSTRACT

Insufficient physical activity (PA) is the fourth prime risk factor for numerous non-communicable diseases. Arab immigrants and refugees (AIR) are at elevated risk for low or no participation in PA due to socio-cultural and ecological factors. This scoping review examined PA prevalence, knowledge, attitudes as well as barriers vs. facilitators to PA engagement across life domains among AIR in Western countries. A systematic search strategy was implemented across five automated databases (PubMed, Embase, Medline, Sociology Database and Transportation Research Board) to locate pertinent English language papers. Seventy-five articles were included in this study, and stakeholder consultation was conducted to validate the findings. The US and Europe are substantially ahead of Canada, Australia, and New Zealand in AIR-PA research. Despite showing positive attitudes and sound knowledge of PA recommendations, AIR exhibited a low PA engagement prevalence, revealing a knowledge-compliance gap. The prevalence of sufficient PA was lowest in the US (11–22%), whereas Europe showed the highest figures (26–45%). Personal barriers to PA participation involved mainstream language illiteracy and limited exercise skills, whereas improved PA literacy was a significant facilitator. Family responsibility and cultural restrictions were common psychosocial/cultural barriers, whereas social support and culturally-sensitive resources were powerful facilitators. Poorly maintained pedestrian/cyclist infrastructure was a leading environmental barrier amongst AIR in North America, but not Europe. Longitudinal and community-engaged AIR-PA research is needed, and intersectoral collaboration is required to inform tailored interventions and inclusive policies, fostering AIR and other vulnerable populations' exercise participation and improving their health and well-being.

1. Introduction

Inadequate physical activity (PA) is a major global public health problem and the fourth leading behavioral risk factor for multiple non-communicable diseases (NCDs) such as cardiovascular disease and diabetes (Smith et al., 2017). Adequate PA is defined as weekly participation in ≥ 150 min of moderate-intensity activity or ≥ 75 min of vigorous-intensity activity or an equivalent combination of both (WHO, 2019a). Globally, approximately 3.2 million deaths and 13.4 million disability-adjusted life-years (DALYs) are attributable to inadequate PA annually (WHO, 2019b). North America and Europe experience annual physical inactivity related DALYs of about 1.1 and 2.3 million, respectively. In 2013, the annual total health care and societal costs of physical

inactivity exceeded international \$28.5 and \$15.5 billions in North America and Europe, respectively (Ding et al., 2016).

Immigrants are at elevated risk for low/no participation in PA across life domains (occupational or work-related PA, domestic or housework-related PA, transportation-related or transport PA (TPA), and recreational or leisure-time PA (LTPA)), due to socio-economic and ecological influences (Kobrosly, 2019). Reduced participation in adequate PA likely contributes to the observed decline in the physical and mental health of initially healthy immigrants, which is known as “the Healthy Immigrant Effect” (Newbold, 2006). The numbers of Arab immigrants and refugees (AIR) in Western countries have been increasing exponentially due to political/economic instability in the Arab world (Sweileh, 2018). There are about 4.6 million AIR in North America, and

Abbreviations: AIR, Arab immigrants and refugees; DALYs, disability-adjusted life-years; LTPA, leisure time physical activity; NCDs, non-communicable diseases; PA, physical activity; TPA, transport physical activity.

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0.3 million in Australia and New Zealand, constituting around 1.3 and 1.2% of the total populations, respectively (Arab American Institute (AAI), 2018; ABS, 2017; Statistics Canada, 2019; Statistics NZ, 2019). France, Germany and the UK are leading AIR-receiving European countries, hosting about 7.7 million AIR that collectively represent around 3.5% of these nations' population (Insee, 2015; NABA, 2013; Statista, 2018).

Insufficient PA participation is of particular concern among AIR who embody distinct cultural beliefs/values and previously lived in socio-physical environments that spontaneously enhanced their PA levels through, for example, limited access to labor-saving devices, high social capital, and accessibility of farmlands (Eldoumi and Gates, 2019). In leisure time, AIR would rely on active commuting (walking) to visit their neighbors/friends in their home country (Wilson and Renzaho, 2015). Different neighborhood features in Western countries (e.g., poor weather conditions, reliance on personal automobiles) may be associated with reduced PA participation and sedentary behavior among AIR as compared to other immigrant groups and the broader population. For instance, AIR in the US exhibited significantly lower sufficient PA prevalence compared to white, non-Hispanic immigrants (11 vs. 19%, respectively) (Snyder et al., 2013). In Sweden, the prevalence of adequate LTPA was lowest among AIR (50%) relative to Yugoslavian (62%) and Polish (69%) immigrants as well as the Swedish majority population (81%) (Lindström and Sundquist, 2001). Furthermore, AIR in England showed considerably lower prevalence of sufficient total PA than the general population (38 vs. 71%, respectively) (Mcewen et al., 2008).

Despite the well-established benefits of PA for reversing the trends of declining health in the years following immigration, there is a gap in the present knowledge of the trends and factors influencing AIR's PA participation. Previous reviews on immigrants' PA lacked the adoption of a systematic search strategy, and included different ethnic/culturally diverse immigrants (e.g., Latino, Asians and Arabs), which may have affected the comparability of the results (Caperchione et al., 2009; Langøien et al., 2017). El Masri et al. (2021) conducted an AIR-specific systematic review to explore factors influencing AIR's PA participation, however, the review only synthesized the qualitative evidence. Furthermore, El Masri et al. (2021) did not address the impact of detected factors on different PA domains, which is crucial to design effective PA interventions.

This scoping review aims to thoroughly investigate AIR's PA prevalence (i.e., proportion of AIR who engage in sufficient PA) and influences affecting their PA participation to direct future AIR-PA research and evidence-informed interventions. This review's particular objectives are to: 1) examine AIR's PA prevalence across different domains, 2) investigate AIR's perceptions, knowledge, preferences and attitudes towards PA, and 3) explore barriers vs. facilitators to AIR's PA participation.

2. Methodology

This study employed a scoping review methodology to examine the range/scope of the available literature on AIR's PA participation, producing a thorough synthesis of the existing pertinent evidence and identifying the current gaps in knowledge/research. The six-stage scoping framework delineated by Arksey and O'Malley (2005) was exploited, while following PRISMA guidelines (Tricco et al., 2018).

2.1. Formulating the research question

The following review question was developed to scope the literature: *What are the physical activity prevalence and factors influencing physical activity participation by Arab immigrants/refugees in Western societies?*

2.2. Searching for relevant studies

A systematic search strategy was developed and implemented by two

authors (SE and BN) to locate pertinent records. Within the research question, three main concepts were determined: physical activity, Arab and immigrant. Five electronic databases (PubMed, Embase, Medline, Sociology Database and Transportation Research Board) were searched from inception (1950s, 1974, 1946, 1985 and 1922, respectively) to February 2020, using seventy-five search terms/phrases (Appendix A). A manual search of other sources (Google Scholar, eligible papers' reference lists and first/corresponding authors) was also conducted.

2.3. Study selection

The following inclusion and exclusion criteria were employed to screen titles/abstracts of all returned articles and assess potentially pertinent articles (Fig. 1). Only English articles from Europe, North America, Australia, or New Zealand were included. Studies were considered eligible if they addressed PA prevalence, knowledge, perceptions, preferences, attitudes, or barriers vs. facilitators to PA participation among AIR. All study designs and age/gender groups were eligible and either subjectively or objectively assessed PA (across all domains) were included. Theses/dissertations were eligible for inclusion. Only studies of AIR from any of the 22 Arab league nations were eligible (World Population Review, 2020). Studies investigating epidemiology of NCDs linked to physical inactivity or associations between PA and obesity/insulin sensitivity were excluded.

Discussions were held to tackle any disagreements between the authors.

2.4. Data charting

A charting tool, specifically developed in Microsoft Excel for the purpose of this study, was used to extract pertinent data from the eligible articles. This involved authorship, study design, investigated PA domains, AIR participants, destination countries, and key findings.

2.5. Evidence synthesis and reporting of findings

All data were numerically synthesized to reveal any research gaps and to facilitate effective reporting. Three major themes were established to categorize the extracted data and explicitly address the review's objectives. In order to help make the findings beneficial for future PA research, policymaking and practice, the study's implications were also addressed.

2.6. Consulting stakeholders

A consultation was conducted with six stakeholders providing fitness/PA services to AIR in North America and Europe to validate the review's findings and link research to practice. Three stakeholders are based in Canada, with two of them additionally providing online fitness services to AIR in the US and Europe (Table 1).

About 80% of the consultants are females. A convenience sampling technique was employed to select the consulted individuals. Eligibility criteria involved possessing a minimum of three-year experience in providing fitness/PA services to AIR in Western countries. The consultation exercise started with virtually presenting the review's aim/objectives, methods and main findings. This was followed by the consultants filling out a short survey that explored their professional perspectives about the study's findings. The consultation's output was considered through an informative summary within this scoping study's results. Ethical clearance was granted by the University Ethics Board and all consultants provided informed voluntary consent.

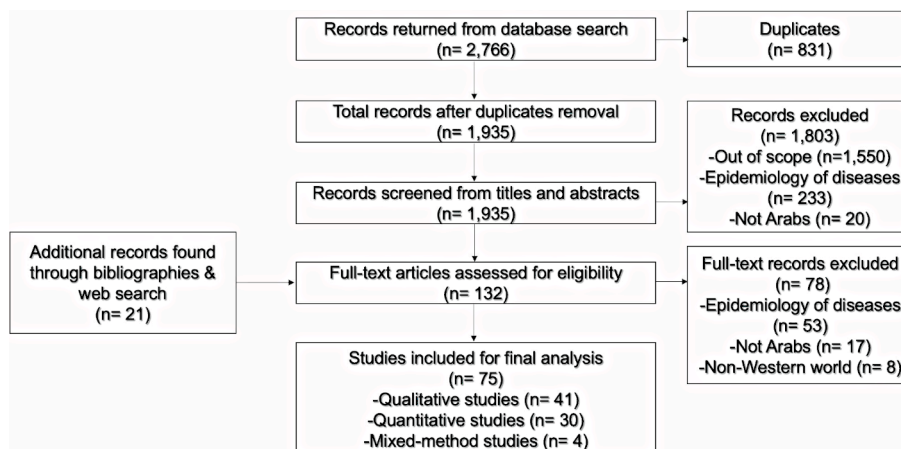


Fig. 1. Flow diagram of the eligible articles.

Table 1
Characteristics of the consulted stakeholders.

Consultant number	Gender	Current location	Other notes
Consultant 1	Male	Ontario, Canada	Online fitness services to AIR in other provinces in Canada and the US
Consultant 2	Female	Alberta, Canada	Online fitness services to AIR in other provinces in Canada, the US and Europe
Consultant 3	Female	Ontario, Canada	Online fitness services to AIR in other provinces in Canada, the US and Europe
Consultant 4	Female	ROI/Northern Ireland	Previous experience with AIR in England
Consultant 5	Female	ROI/Northern Ireland	N/A
Consultant 6	Female	England, UK	N/A
Frequency	Male: Female (17:83)	Canada: ROI: England (50:33:17)	N/A

Abbreviations: AIR: Arab immigrants and refugees; N/A: non-available; ROI: Republic of Ireland.

3. Results

3.1. Characteristics of the eligible studies

In total, 2766 records were returned from the database search, besides 21 additional articles found through the manual search. Seventy-five articles were included (Fig. 1). Most studies were performed in the US (44%) and Europe (36%) (Appendix B). Around 41% of the studies recruited AIR from mixed Arabic countries. Somalia was the most common country of origin (28%), followed by Iraq (12%). Over half of the studies (53%) employed qualitative methods. About 90% of the eligible quantitative studies employed a cross-sectional design. LTPA was the most commonly explored PA domain (65%), followed by TPA (47%). Only a quarter of the studies that measured PA used objective methods.

3.2. PA prevalence

Forty-one studies examining AIR’s PA prevalence were included. These explored prevalence of total PA and separate PA domains.

3.2.1. Total PA

AIR exhibited a low prevalence of adequate total PA (Table 2).

In Europe, the prevalence of AIR’s participation in sufficient PA was

in the range of 26–45% on self-reporting and 11–17% when assessed objectively. The prevalence of adequate PA among AIR in Australia was assessed in only two studies by Alzubaidi et al. (2015) and Astell-Burt et al. (2013), showing relatively higher results (35 and 66%, respectively). AIR in the US, on the other hand, exhibited the lowest prevalence of sufficient self-reported total PA (11–22%). Only two studies compared the prevalence of both subjectively and objectively measured PA, revealing significant differences (34 vs. 17% and 22 vs. 6%, respectively) (Alasagheirin and Clark, 2017; Arvidsson et al., 2013). Finally, AIR living in the US and Australia considered themselves sedentary/not doing enough PA (Berggren et al., 2017; Caperchione et al., 2011; Tami et al., 2012; Wilson and Renzaho, 2015).

3.2.2. Separate PA domains

Across Western countries, AIR reported low prevalence of sufficient domain-specific PA (Table 2). AIR women in Europe reported the lowest prevalence of sufficient LTPA (25–32%) (Hosper et al., 2008). Two Swedish surveys revealed that AIR women had significantly lower sufficient LTPA prevalence (self-reported), relative to AIR men (30 vs. 52% and 32 vs. 63, respectively) (Lecerof et al., 2011; Lindström and Sundquist, 2001). Likewise, qualitative studies showed that AIR women did not (or slightly) participate in LTPA (Devlin et al., 2011; Eldoumi, 2017; Gele et al., 2015; Marinescu et al., 2013; Persson et al., 2014; Guerin et al., 2003). AIR women also felt that they do not do enough domestic PA (Sulaiman et al., 2007).

AIR adults in the US reported low prevalence of sufficient TPA and occupational PA, representing 44 and 33%, respectively (Qahoush et al., 2010). Qualitative studies also showed limited PA participation across both domains (El Masri et al., 2020; Kahan, 2011; Lunn, 2014; Wieland et al., 2015). AIR adolescents in the Netherlands exhibited low prevalence of adequate TPA and LTPA (33 and 39%, respectively) (Mäki-Opas et al., 2014). AIR parents also reported that their children do not perform sufficient sports nor actively commute to schools (Condon and McLean, 2016; Dawson-Hahn et al., 2020; Greves et al., 2007; Mude and Mwanri, 2016).

3.3. Knowledge, preferences and attitudes

This theme included 32 articles addressing AIR’s knowledge and attitudes to PA participation. These were extensively discussed under three subthemes: knowledge/perceptions, PA preferences and attitudes/perceived benefits.

3.3.1. Knowledge and perceptions

Qualitative studies revealed a sound knowledge of PA recommendations for health among AIR (Berggren et al., 2017; Olaya-Contreras et al., 2019), though El Masri et al. (2020) found limited awareness.

Table 2
Prevalence of adequate physical activity participation across different domains.

Author, date	Study design	AIR participants' characteristics, destination & native countries	PA tool	Assessed PA domain (s)	Prevalence ^{a, b}
Alasagheirin and Clark, 2017, 2018	CSS	54 children, 61% girls, \bar{x} age = 10.1, US, Sudan	PAQ-C & pedometer	Total PA	22%
Alzubaidi et al., 2015	CSS	393 adults, 50% F, \bar{x} age = 58, Australia, mixed ^c	Self-reported questionnaire	Subjective Objective Total PA	6% 35%
Arvidsson et al., 2013	CSS	599 adults & elderly, 58% M, \bar{x} age = 47, Sweden, Iraq	Self-reported questionnaire & accelerometry	Total PA	34%
Arvidsson et al., 2015	CSS	493 adults & elderly, 58% M, \bar{x} age = 46, Sweden, Iraq	Accelerometry	Subjective Objective Total PA	17% 11%
Astell-Burt et al., 2013	CSS	978 adults aged ≥ 45 , Australia, Lebanon	Self-reported questionnaire	Total PA	66%
Gele and Mbaililaki, 2013	CSS	208 adults, 55% F, Norway, Somalia	IPAQ	Total PA	41%
Jonsson et al., 2012	CSS	525 adult women, 40% aged 18–34, Sweden, Iraq	IPAQ	LTPA	27%
Kahan, 2007	CSS	214 adult students, 54% F, \bar{x} age = 21, US, mixed ^c	Pedometer	Total PA	36%
Kahan, 2009	CSS	214 adult students, 54% F, \bar{x} age = 21, US, mixed ^c	Pedometer	Total PA	36% (44%M, 29%F)
Lecerof et al., 2011	CSS	579 adults, 53% F, 50% aged 27–42, Sweden, Iraq	Self-reported questionnaire	LTPA	40% (52%M, 30%F)
Lindström and Sundquist, 2001	CSS	101 adults & elderly, 56% F, Sweden, mixed ^c	Self-reported questionnaire	LTPA	44% (63%M, 32%F)
Mäki-Opas et al., 2014	CSS	476 adolescents, \bar{x} age = 14.4, Netherlands, Morocco	Self-reported questionnaire	LTPA, TPA	39, 33%
Mcewen et al., 2008	CSS	62 adults, UK, Somalia	Self-reported questionnaire	Total PA	38%
Qahoush et al., 2010	CSS	180 adult women, \bar{x} age = 37.6, US, mixed ^c	IPAQ	TPA, OPA	44, 33%
Sarsour et al., 2010	CSS	353 adults (90%) & elderly, 57% F, US, mixed ^c	Self-reported questionnaire	Total PA	11%
Siddiqui et al., 2017	RCT	96 adults, 53% F, \bar{x} age = 48, Sweden, Iraq	IPAQ	Total PA	45%
Snyder et al., 2013	CSS	456 adults (90%) & elderly, 48% F, US, mixed ^c	Self-reported questionnaire	Total PA	11%
Södergren et al., 2010	CSS	553 adult women, \bar{x} age = 43, Sweden, Iraq	IPAQ	Total PA	35%
Torp et al., 2015	CSS	114 adults, \bar{x} age = 35, Sweden, Somalia	IPAQ	Total PA	26%

Abbreviations: AIR: Arab immigrants and refugees; CSS: cross-sectional study; F: females; IPAQ: international physical activity questionnaire; LTPA: leisure-time physical activity; M: males; OPA: occupational physical activity; PA: physical activity; PAQ-C: physical activity questionnaire for children; RCT: randomized controlled trial; TPA: transport physical activity; \bar{x} age = mean age. ^a adequate PA for adults or elderly is defined as weekly participation in ≥ 150 min of moderate-intensity activity or ≥ 75 min of vigorous-intensity activity or an equivalent combination of both. ^b adequate PA for children/adolescents aged 5–17 years is defined as participation in 60 min per day of moderate-to-vigorous intensity PA. ^c AIR from mixed Arab countries.

Healthcare providers were the main source of PA information. AIR in Sweden were able to distinguish between types of moderate PA (e.g., walking) and vigorous PA (e.g., hiking uphill) (Lecerof et al., 2011). AIR adults, nonetheless, were unfamiliar with PA participation beyond the work, domestic or transport domains (Caperchione et al., 2011; Nicolaou et al., 2012; Persson et al., 2014). AIR lacked knowledge of necessary skills to engage in different LTPA types (e.g., gymnastics) and were unfamiliar with exercise/fitness equipment (Devlin et al., 2012; Eldoumi, 2017; Kahan, 2011; Marinescu et al., 2013; Njeru et al., 2016; Södergren et al., 2008). On the other hand, AIR youth were knowledgeable of the skills required to participate in different sports (e.g., soccer) (Berggren et al., 2017; Rothe et al., 2010).

AIR perceived exposure to the sun to be essential to benefit from any undertaken PA through sweating and recognized that cold weather in Western societies makes any performed PA worthless for health (Berggren et al., 2017; Devlin et al., 2012, 2011; Mcewen et al., 2008).

3.3.2. PA preferences

Walking was the most preferable PA type among AIR (Berggren et al., 2017; Eldoumi, 2017; Persson et al., 2014; Wieland et al., 2015, 2013). About 80% of women participants of an American survey by Qahoush et al. (2010) cited walking as the most favorable type of PA for transportation and leisure. AIR women delineated that walking was the most familiar PA that requires no specific skills, besides being cost-free and culturally acceptable (Eldoumi and Gates, 2019; Sulaiman et al., 2007). AIR women mentioned that swimming, cycling, gymnastics and dancing would be preferable LTPA if they received adequate training by women coaches/trainers (Persson, 2015; Qahoush, 2006; Wieland et al., 2011). Basketball, soccer and sledding were the most favorable PA options

among AIR children (Rothe et al., 2010).

3.3.3. Attitudes and perceived benefits

AIR exhibited positive attitudes towards PA (Eldoumi, 2017; Greves et al., 2007; Wieland et al., 2015, 2013). AIR expressed motivation to learn/develop different LTPA skills/techniques to increase their exercise levels (Berggren et al., 2017; Kay, 2006; Olaya-Contreras et al., 2019). Approximately 96% and 78% of participants in studies by Guerin et al. (2003) and Eldoumi and Gates (2019), respectively, were motivated to improve their exercise skills and engage in more LTPA.

AIR perceived PA as beneficial for physical health and mental/psychosocial wellbeing (El Masri et al., 2020) (Table 3).

Prevention of cardiovascular disease and diabetes was the most common perceived physical health benefit. AIR realized the importance of PA for weight management/loss. AIR considered PA to be useful for enhancing blood circulation and in turn, improving their cognitive functioning. Increasing life expectancy was among the perceived benefits of PA. Distress management, enhancing quality sleep, and depression prevention were the most commonly perceived mental health benefits. Around 40% of AIR participants of a study by Eldoumi (2017) recognized PA as protective against depression. Improved self-confidence was a commonly perceived psychosocial benefit of PA. AIR perceived participation in structured exercise/fitness classes to be helpful for their integration into the mainstream society.

3.4. Barriers and facilitators to PA

This theme involved 60 articles addressing 21 barriers and 15 facilitators to PA participation. These were categorized into three main

Table 3
Perceived benefits of physical activity amongst Arab immigrants/refugees.

Author, date	Study design	AIR participants' characteristics, destination & native countries	Physical health benefits				Mental and psychosocial benefits				
			(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(E)
Berggren et al., 2017	QIF	13 adults aged ≥18, 62% F, US, Somalia	✓	✓			✓	✓	✓	✓	✓
Caperchione et al., 2011	QF	29 adult women, \bar{x} age = 39, Australia, mixed ^a	✓				✓				
Devlin et al., 2012, 2011	QF	30 adult women, \bar{x} age = 39, US, Somalia	✓	✓	✓	✓	✓	✓			
Eldoumi and Gates, 2019	MM	447 mothers aged 18–40, US, mixed ^a	✓	✓	✓		✓	✓		✓	
Gele et al., 2015	QI	30 adult women aged ≥25, Norway, Somalia	✓								
Greves et al., 2007	QF	18 adults, US, Somalia	✓	✓			✓	✓			✓
Hashimoto-Govindasamy and Rose, 2011	QI	12 adult women, \bar{x} age = 31, Australia, Sudan									✓
Marinescu et al., 2013	QF	12 women, US, Somalia	✓	✓	✓		✓				✓
Mcewen et al., 2008	QF	65 adults, UK, Somalia	✓				✓				
Nicolaou et al., 2012, 2011	QF	22 AIR aged 16–48, Netherlands, Morocco	✓	✓							
Olaya-Contreras et al., 2019	QF	33 adults, 58% F, Sweden, Iraq	✓	✓							
Persson et al., 2014	QF	26 women aged 17–67, 54% married, Sweden, Somalia			✓				✓		
Qahoush et al., 2010	CSS	180 adult women, \bar{x} age = 37.6, US, mixed ^a	✓	✓	✓						
Rothe et al., 2010	QF	61 adults (71%) & adolescents, 84% F, US, Somalia	✓	✓				✓			
Södergren et al., 2008	QF	23 women aged 28–61, Sweden, Iraq	✓				✓				
Sulaiman et al., 2007	QF	20 adults & elderly, \bar{x} age = 58.8, Australia, mixed ^a	✓								
Tami et al., 2012	QIF	22 mothers aged < 45, US, mixed ^a	✓				✓				
Wieland et al., 2011	MM	14 adult women aged ≥22, US, Somalia	✓				✓				✓
Wieland et al., 2015, 2013	QF	62 adults & adolescents, 47% F, US, mixed ^a	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wilson and Renzaho, 2015	QF	31 adults & adolescents, Australia, mixed ^a		✓							

Abbreviations: AIR: Arab immigrants and refugees; CSS: cross-sectional study; F: females; L: life expectancy; M: males; MM: mixed method; PA: physical activity; QF: qualitative focus groups; QI: qualitative interviews; QIF: Mixed qualitative interviews and focus groups; \bar{x} age = mean age. ^a AIR from mixed Arab countries.

categories: personal/AIR's socio-economic factors, psychosocial/cultural factors, and neighborhood environment factors.

3.4.1. Personal and AIR's socio-economic factors

Poverty/financial issues and unemployment were major barriers to AIR's PA participation across domains through different pathways, including not affording gym memberships and childcare facilities to leave their kids during PA participation (Table 4).

Socioeconomic status was significantly positively related to LTPA among AIR (Snyder et al., 2013). Poor physical health limited AIR's PA participation across all domains. Mainstream language illiteracy was a common barrier to PA participation among AIR. This was particularly critical for LTPA, whose related training (e.g., controlling treadmill speed) usually provided by mainstream-language speaking trainers. Low Swedish language proficiency was significantly negatively associated with LTPA among AIR in Sweden (Jonsson et al., 2012). Unawareness of available PA resources and unfamiliarity with different exercise modalities were common barriers to LTPA and TPA (Table 4). Low self-efficacy and limited motivation/interest, due to prior exposure to war trauma, were common barriers to LTPA.

Improved PA skills/literacy through PA training sessions/education programs in AIR's native language was a major facilitator to LTPA and TPA (Table 5).

Perceived health benefits, improved self-efficacy, and self-motivation fostered AIR's PA participation across all domains.

3.4.2. Psychosocial and cultural factors

Family responsibilities and time constraints were major barriers to LTPA and TPA, particularly among AIR women (Table 4). The time pressure barrier was mentioned by around 60% of the participants in both studies by Qahoush et al. (2010) and Hussien (2007). Non-culturally sensitive resources and cultural clothing restrictions were additional major barriers that hindered AIR's LTPA participation. AIR explained that exercising in mixed-gender facilities and wearing short/

tight-fitting clothing were not culturally acceptable behaviors (El Masri et al., 2020; Persson et al., 2014). Low social support and perceived discrimination/racism limited AIR's participation in LTPA and TPA (Table 5). The discrimination/racism barrier was particularly common amongst AIR women who wore the visible *hijab* (a veil worn by Muslim women).

Social/family support was a major facilitator that enhanced AIR's LTPA and TPA participation through various pathways, including companionship when exercising, looking after each other's children and having supportive family members that encourage active living (Table 5). Perceived social support was a significant positive predictor for LTPA among AIR in Canada (Kobrosly, 2019). Similarly, parental support was significantly positively associated with LTPA and TPA among AIR children in Europe (Labree et al., 2014). Provision of culturally acceptable programs was a powerful facilitator to LTPA. Finally, wider community cohesion enhanced AIR's LTPA and TPA participation through increasing social capital (e.g., spreading the word about available resources, creating community-based carpooling and organizing community walking/cycling groups).

3.4.3. Neighborhood environment factors

Overreliance on vehicles and telephones in Western countries was a major barrier to TPA among AIR, who previously relied on active commuting for communication with their relatives/friends, living within a walking distance in their home countries (Table 4). Over-dependence on labor-saving devices (e.g., vacuum cleaners) was also a major barrier to domestic PA. Poor weather conditions and lack of safety from crime, traffic and dog attacks were key barriers to TPA and outdoor LTPA. Inaccessibility of leisure facilities/parks and strict child policy, restricting children's outdoor play without close supervision, were major barriers to LTPA among AIR and their children. Inaccessible transportation systems hindered AIR's attendance of LTPA classes/programs, whereas inaccessible community services (e.g., schools, malls) minimized their TPA participation. Poorly maintained pedestrian/

Table 4
Barriers to physical activity participation across different domains amongst Arab immigrants/refugees.

Author, date	Study design	AIR participants' characteristics, destination & native countries	Personal & AIR's socioeconomic					Psychosocial & cultural				Neighborhood environment											
			(A)	(B)	(C)	(D)	(E)	(F)	(G)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)
Abou-Rizk and Rail, 2013 Berggren et al., 2017	QI QIF	20 F aged 18–25, Canada, Lebanon 13 adults aged ≥18, 62% F, US, Somalia		L, T					L, T										L, T				O
Caperchione et al., 2011	QF	29 adult F, \bar{x} age = 39, Australia, mixed ^a		L, T	L, T		L	L, T	L, T		L	L, T				L		L, T					T
Dagkas and Benn, 2006 Dawson-Hahn et al., 2020	QI QF	(NA) F aged 13–21, UK, mixed ^a 27 adult parents, US, mixed ^a								L	L	L							L, T				T
Devlin et al., 2012, 2011 Eldoumi, 2017	QF MM	30 adult F, \bar{x} age = 39, US, Somalia 447 mothers aged 18–40, US, mixed ^a			L	L	L	L	L		L				L				L, T				D
El Masri et al., 2020	QF	28 adults, 71% F, \bar{x} age = 45, Australia, mixed ^a	L			L	To, L	To	To	To, L	L	To			L	L			To, L				T
El Masri et al., 2021	SR	15 studies of adult AIR	To, L	To, L	L	L	To	To	To, L	To	To	To, L			L				To	To	To	To, L	D, L
Gele et al., 2015	QI	30 adult F aged ≥25, Norway, Somalia	L, T	L, T	L, T	L, T	L		L, T	L, T	L								L, T	L, T			
Greves et al., 2007 Guerin et al., 2003	QF QI	18 adults, US, Somalia 27 adult F, \bar{x} age = 33, NZ, Somalia	T			T				T					T	T			T	T	T		
Halliday et al., 2014	QF	33 adults/adolescents, Australia, Somalia				L									L, T				L, T				T, D
Hamzeh and Oliver, 2012 Hashimoto-Govindasamy and Rose, 2011	QI QI	3 girls aged 14–17, UK, mixed ^a 12 adult F, \bar{x} age = 31, Australia, Sudan	L			L				L		L				L	L						
Hosper et al., 2008	CSS	170 F aged 15–30, Netherlands, Morocco		L		L	L	L	L		L												L
Hussien, 2007	CSS	60 adult F, \bar{x} age = 39, Canada, mixed ^a				To	To	To	To	To	To	To			To								
Jadalla et al., 2015	CSS	297 adults, 56% F, \bar{x} age = 39, US, mixed ^a	L																				
Jonsson et al., 2012	CSS	525 adult F aged ≥18, Sweden, Iraqi	L																				
Kahan, 2009	CSS	214 adults, 54% F, \bar{x} age = 21, US, mixed ^a				To						To											
Kahan, 2011	QF	21 adults, 57% F, \bar{x} age = 22, US, mixed ^a			L, T					L, T	L	L, T			L, T	L							T
Kay, 2006 Kobrosly, 2019	QI CSS	1 girl, UK, NA 376 adults (96%) & elderly, 55% M, Canada, mixed ^a					L				L	L											
Lunn, 2014	MM	145 adults, 47% F, \bar{x} age = 35, US, Somalia									L				L, T				L, T				T
Marinescu et al., 2013	QF	12 F, US, Somalia			L, T	L, T				L, T	L, T	L			L, T	L	L		L, T	L, T	L, T		D
Mcewen et al., 2008	QF	65 adults, UK, Somalia										L											T

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Table 5
Facilitators to physical activity participation across different domains amongst Arab immigrants/refugees.

Author, date	Study design	AIR participants' characteristics, destination & native countries	Personal & AIR's socioeconomic			Psychosocial & cultural			Neighborhood environment									
			(A)	(B)	(C)	(A)	(B)	(C)	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)		
Abou-Rizk & Rail, 2013 Aqtash, 2007; Aqtash & Van Servellen, 2013	QI CSS	20F aged 18–25, Canada, Lebanon 120 adults & elderly, 59% M, \bar{x} age = 42, 89% married, US, mixed ^a		L		To	To											
Berggren et al., 2017	QIF	13 adults aged ≥ 18 , 62% F, US, Somalia	L, T	To			L, T	L, T										
Caperchione et al., 2011	QF	29 adult F, \bar{x} age = 39, Australia, mixed ^a	L, T	To			L, T		L			L, T						
Dagkas and Benn, 2006	QI	(NA) F aged 13–21, UK, mixed ^a	L				L		L									L
Devlin et al., 2012, 2011	QF	30 adult F, \bar{x} age = 39, US, Somalia	L		L		L	L	L			L						
Eldoumi, 2017	MM	447 mothers aged 18–40, US, mixed ^a							L									L
El Masri et al., 2020	QF	28 adults, 71% F, \bar{x} age = 45, Australia, mixed ^a		To	To		To, L		L			L	L					L
El Masri et al., 2021	SR	15 studies of adult AIR	L	To			To, L		To, L									L
Gele et al., 2015	QI	30 adult F aged ≥ 25 , Norway, Somalia	L, T	L, T			L, T	L, T	L			L						L
Greves et al., 2007	QF	18 adults, US, Somalia					T	T		T		T						T
Guerin et al., 2003	QI	27 adult F, \bar{x} age = 33, NZ, Somalia	L, T					L, T	L			L						L, T
Halliday et al., 2014	QF	33 adults/adolescents, Australia, Somalia	L, T	To	L, T		L, T	L, T										L
Hashimoto-Govindasamy & Rose, 2011	QI	12 adult F, \bar{x} age = 31, Australia, Sudan	L				L	L	L			L	L					
Hosper et al., 2008	CSS	170F aged 15–30, Netherlands, Morocco		L			L		L									
Kahan, 2011	QF	21 adults, 57% F, \bar{x} age = 22, US, mixed ^a	L, T	L, T			L, T	L, T	L		L, T		T			L	L	
Kay, 2006	QI	1 adolescent girl, UK, NA	L				L		L									
Kobrosly, 2019	CSS	376 adults (96%) & elderly, 55% M, Canada, mixed ^a		L			L											
Labree et al., 2014	CSS	66 children, 56% M, \bar{x} age = 9, Netherlands, Morocco					L, T											L
Lunn, 2014	MM	145 adults, 47% F, \bar{x} age = 35, US, Somalia							L									
Mäki-Opas et al., 2014	CSS	476 children, \bar{x} age = 14, Netherlands, Morocco								L, T		T						
Marinescu et al., 2013	QF	12F, US, Somalia	L, T				L, T	L, T	L			L, T						L, T
Martin et al., 2008	CSS	348 children, 51% F, \bar{x} age = 12, US, mixed ^a			L		L											
Méjean et al., 2009	LS	147 adult M, \bar{x} age = 50, France, Tunisia					To											
Mohamed et al., 2014	QIF	20 adult M aged ≥ 24 , US, Somalia	L, T	L, T			L, T	L, T										L
Murray et al., 2015	PV	8 adult F, \bar{x} age = 46, US, Somalia	L, T				L, T	L, T	L, T	L, T	L, T	T	L, T	L, T		L	L, T	L, T
Murray et al., 2017	QF	40 adult F, \bar{x} age = 46, US, Somalia	L, T				L, T	L, T	L, T	L, T	L, T	T	L, T	L, T		L	L, T	L, T
Nakamura, 2002	QI	1 adult F, Canada, Lebanon							L									
Nicolaou et al., 2012	QF	22 aged 16–48, Netherlands, Morocco							L									
Olaya-Contreras et al., 2019	QF	33 adults, 58% F, Sweden, Iraq		L, T			L, T	L, T	L									L
Persson, 2015	QF	26F aged 17–67, Sweden, Somalia					L, T	L, T	L									L, T
Qahoush et al., 2010	CSS	180 adult F, \bar{x} age = 37.6, US, mixed ^a	To		To				L									
Renzaho et al., 2011	QIF	(NA) adults/adolescents, Australia, mixed ^a	L, T				L, T											
Rothe et al., 2010	QF								L									L

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future research and policy/practice. This would help public health professionals and policy makers develop tailored PA-promoting programs and policies, enhancing AIR's PA participation.

4. Discussions

This scoping review explored PA prevalence and influences affecting AIR's PA participation to direct future PA research/programs and inform requisite policy change towards developing PA-friendly environments. Most eligible studies adopted either qualitative or cross-sectional design (90%), underscoring a gap in mixed-method and longitudinal/analytical research. The US and Europe are considerably ahead of Canada and Australia in AIR-PA research.

Our study highlights the low prevalence of adequate PA across domains among AIR in Western countries. Although AIR reported sound knowledge of PA recommendations, their PA participation was below the recommended levels, revealing a knowledge-compliance gap. The prevalence of AIR's participation in adequate total PA was higher in Europe than the US (26–45% vs. 11–22%, respectively). These notable differences in PA levels can be in part attributed to the unsafe/poorly maintained pedestrian/cycling infrastructure in the US compared to Europe (Pucher and Buehler, 2016). In 2010, cyclist and pedestrian fatalities per 100 million cycled/walked kilometers were significantly higher in the US than Germany (4.7 and 9.7 vs. 1.3 and 1.9, respectively) (Buehler and Pucher, 2016). Our review showed that the prevalence of adequate PA among AIR was even lower when assessed objectively (11–17% in Europe), indicating potential bias in self-reported data (Sylvia et al., 2013). We believe that the objectively measured PA data are more reliable than the self-reported figures, although most PA measurement devices have some limitations to consider (e.g., primarily measuring locomotor activity) (Lee and Shiroma, 2014). Combination of both self-reported and objective measures is the most recommended way to improve data reliability. The review produced limited domain-specific PA prevalence data, and those particularly focused on LTPA in Europe. AIR women reported the lowest prevalence of sufficient LTPA (25–32%). Arab women usually experience more cultural/religious restrictions to LTPA participation than men (Guerin et al., 2003). Furthermore, the common exclusive housekeeper role among AIR limits their ability to engage in leisure exercises.

Our study showed that positive attitudes towards PA were not enough to increase AIR's PA levels. The study revealed numerous barriers and facilitators that need to be addressed to enhance AIR's PA participation. Mainstream language illiteracy and limited PA skills were common personal barriers to LTPA and TPA among AIR. Similar findings were found among other ethnic immigrants in Europe and North America (Langøien et al., 2017). Inability to communicate in the mainstream language reduces immigrants' accessibility to PA-related information, including techniques and places to exercise (Horne et al., 2012). Linguistically sensitive PA programs enhanced AIR's LTPA and TPA participation. Poverty was a major socioeconomic barrier to AIR's LTPA participation. Similar findings were reported among other multi-ethnic immigrants in the Netherlands (de Munter et al., 2012). Financial restraints are a common immigration stressor that limit immigrants' ability to pay for gyms/fitness centres memberships or purchase sportswear/equipment.

Family responsibility was a key psychosocial barrier to LTPA and TPA participation among AIR women. Across many cultures, women hold substantial responsibility for housekeeping and childcare. This role, however, often becomes more demanding following immigration due to various migration stressors (e.g., language issues) (Kalavar et al., 2005). Social support and community cohesion helped address the family commitment issues among AIR women, enhancing their PA participation beyond the domestic domain. Cultural restrictions hindered AIR women's LTPA participation. This barrier was also cited among other non-Arab Muslim immigrant women (Pakistani) in Europe (Horne et al., 2012). Practising Muslim women share the same cultural/

religious prohibitions that restrict them from wearing tight/short sports clothing in public and require them to wear *hijab*, minimizing their PA levels (Nakamura, 2002). Provision of culturally tailored PA programs/resources (e.g., women-only hours) helped tackle the cultural restriction barrier, enabling AIR to increase their exercise levels.

Poorly maintained pedestrian/cyclist infrastructure was a key environmental barrier to leisure and transport walking/cycling among AIR in North America, but not Europe. Indeed, these are also common barriers to PA among general populations in North America (Salvo et al., 2018). Nine of the top ten cities in the 2019 Bicycle Cities Index (assessed based on different criteria, including presence of quality infrastructure) were European ones, with Hangzhou (China) being the only non-European city, ranking seventh on this list (Richter, 2019). Lack of safety from crime/traffic reduced AIR's participation in TPA and leisure walking/cycling. Similar findings were noted among other immigrant subgroups and the wider population across Western countries (Jongeneel-Grimen et al., 2014; Langøien et al., 2017). Inaccessibility of farms was a key environmental barrier to occupational PA among AIR. Many Arabs consider farming/gardening to not only be a key source of income, but also a considerable way for being physically active, food secure and psychologically well (Wieland et al., 2015). Overreliance on labor-saving equipment and living in non-spacious apartments/houses limited AIR women's domestic PA. Many AIR previously lived in vast houses in their home countries with no/limited access to labor-saving technology, which required them to be physically active at home (Nicolaou et al., 2012). Given that labor-saving household appliances have become an integral part of the Western lifestyle, technology barriers may be challenging to address (Liu, 2019). Therefore, intense effort should be focused on addressing the more manageable barriers, such as the limited PA skills and limited availability of *hijab* sportswear, to increase AIR's participation in other domain-specific PA types.

5. Strengths and limitations

This scoping review addressed PA participation across domains among AIR in Western countries, which has thus far been limitedly researched. Since there are no gold standards for database selection in the conduct of scoping reviews and given the focus of our research topic, we systematically searched five databases of health and social sciences. A stakeholder consultation was implemented to validate the study's findings. Only English records were eligible, which may have led to excluding potential non-English European papers. The quality of the eligible studies was not examined to include a substantial range of peer-reviewed and grey literature evidence and study designs. Over half of the studies that assessed PA prevalence used self-reported questionnaires, making our findings subject to recall and/or social desirability bias (Elshahat et al., 2020).

6. Conclusions and future directions

AIR-PA research in Western countries is limited, with Canada and Australia far behind Europe and the US. Most evidence in this area comes from qualitative and cross-sectional studies, indicating a gap in longitudinal and mixed-method research. Despite having positive attitudes and sound knowledge of PA recommendations, AIR showed low adequate PA prevalence across life domains, revealing a knowledge-compliance gap. Distinct barriers to PA included cultural restrictions, discrimination, limited PA skills and family responsibility, whereas improved PA literacy, social support, culturally sensitive programs and increased safety measures were powerful facilitators.

We propose the conduct of community-engaged, mixed-method research to examine PA prevalence and factors affecting AIR's PA participation across life domains. Nationwide longitudinal research, with sub-group analyses (e.g., age, gender, religion, socioeconomic status) is also recommended to trustworthily identify PA determinants. For the assessment of PA, we suggest the use of both validated self-

reported and objective measures to improve data reliability. We also recommend the development of evidence-based, culturally sensitive PA-promoting interventions addressing the to-be-explored factors hindering AIR's PA participation. Feasibility studies and evaluation research should be implemented for any interventions before scaling up.

This review recommends actions for consideration by ministries, government agencies and non-governmental institutions to enhance AIR and other vulnerable populations' PA participation. Recommendations include providing assistance fund devoted to recreational activities among low-income families, and developing linguistically appropriate, PA-oriented databases to help raise AIR's awareness/navigation of the available resources. Providing employment opportunities for Arab trainers in fitness facilities can facilitate effective communication, improving AIR's PA skills/literacy. Incentivizing sport clothing industry/companies to produce *hijab* sportswear and encouraging fitness facilities to provide "all women-only hours" can enhance any concerned women's PA participation. Enhancing opportunities for community/urban farming can help AIR increase their PA levels. Finally, investing in

pedestrian/cyclist-friendly infrastructure can increase all populations' PA participation, including AIR.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. . The search terms operated in the automated databases

<p>Concept 1 "physic* active*" OR PA OR exercise* OR exert* OR "physic* fit*" OR cycl* OR bik* OR, danc* OR gym* OR stretch* OR walk* OR jog* OR run* OR LTPA OR TPA OR DPA OR OPA OR "leisure-time physical activit*" OR "travel physical activit*" OR "domestic physical activit*" OR "occupational physical activit*" OR swim* OR garden* OR "weight lift*" OR "strength train*" strengthen* OR yoga OR "resistance train*" OR "circuit weight train*" OR "aerobic train*" OR sport*</p>	<p>Concept 2 "Middle East*" OR "North Africa*" OR Arabia* OR Arab* OR Arabic OR Syria* OR Palestin* OR Yemen* OR Somal* OR Egypt* OR Leban* OR Iraq* OR Jordan* OR Sudan* OR Oman* OR Liby* OR Tunisia* OR Algeria* OR Morocco* OR Kuwait* Saudi Arabia* OR KSA OR Bahrain* OR Qatar* "United Arab Emirates" OR UAE OR Mauritan* OR Djibout* OR Comor*</p>	<p>Concept 3 immigrant* OR migrant* OR refugee* OR asylum* OR immigration* OR migration* OR newcomer* OR emigration* OR emigrant* OR relocate* OR resettle* OR displac*</p>
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Appendix B. . Characteristics of the included studies

*Figures are not additive because some studies examined more than one PA domain. Abbreviations: AIR: Arab immigrants and refugees; DPA: domestic physical activity; LTPA: leisure-time physical activity; OPA: occupational physical activity; PA: physical activity; TPA: travel physical activity; RCT: randomized controlled trail.

Study category	Number of studies n (%)
<i>Country of authorship</i>	
US	33 (44%)
Sweden	13 (18%)
Australia	10 (13%)
Netherlands	5 (7%)
UK	5 (7%)
Canada	4 (5%)
Norway	2 (3%)
New Zealand	1 (1%)
France	1 (1%)
Mixed different Western countries	1 (1%)
<i>Native country of AIR</i>	
Mixed different Arabic countries	30 (41%)
Somalia	21 (28%)
Iraq	9 (12%)
Sudan	5 (7%)
Morocco	5 (7%)
Lebanon	3 (4%)
Tunisia	1 (1%)
<i>Study Design</i>	
Cross-sectional survey	27 (37%)
Focus group study	23 (31%)
Qualitative interviews	9 (12%)
Focus group & interviews	7 (9%)
Mixed method study	4 (5%)

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Study category	Number of studies n (%)
RCT	2 (3%)
Photovoice	1 (1%)
Longitudinal survey	1 (1%)
Systematic review	1 (1%)
<i>Year of publication</i>	
2001–2007	11 (14%)
2008–2013	32 (43%)
2014–2020	32 (43%)
<i>Investigated PA domains*</i>	
LTPA	49 (65%)
TPA	35 (47%)
DPA	17 (23%)
OPA	11 (14%)
Total PA	30 (41%)
<i>PA assessment</i>	
Subjective only	15 (75%)
Objective only	3 (15%)
Subjective & objective	2 (10%)
<i>Article type</i>	
Full journal article	60 (81%)
Conference proceeding	7 (9%)
Thesis/dissertation	7 (9%)
Report	1 (1%)

References

- Abou-Rizk, Z., Rail, G., 2013. "Judging a body by its cover": Young Lebanese-Canadian women's discursive constructions of the "healthy" body and "health" practices. *J. Immigr. Minor. Heal.* 16 (1), 150–164. <https://doi.org/10.1007/s10903-012-9757-5>.
- Alasagheirin, M., Clark, K., 2017. Physical activity characteristics of Sudanese immigrant children. *Int. J. Nurs. Clin. Pract.* 4 <https://doi.org/10.15344/2394-4978/2017/247>.
- Alasagheirin, M.H., Clark, M.K., 2018. Skeletal growth, body composition, and metabolic risk among North Sudanese immigrant children. *Public Health Nurs.* 35 (2), 91–99. <https://doi.org/10.1111/phn.12386>.
- Alzubaidi, H., Mc Narmara, K., Kilmartin, G.M., Kilmartin, J.F., Marriott, J., 2015. The relationships between illness and treatment perceptions with adherence to diabetes self-care: a comparison between Arabic-speaking migrants and Caucasian English-speaking patients. *Diabetes Res. Clin. Pract.* 110 (2), 208–217. <https://doi.org/10.1016/j.diabres.2015.08.006>.
- Aqtash, S.-A.H., 2007. Determinants of health-promoting lifestyle behaviors among Arab immigrants from the region of the Levant. PhD thesis. University of California.
- Aqtash, S., Van Servellen, G., 2013. Determinants of health-promoting lifestyle behaviors among arab immigrants from the region of the levant. *Res. Nurs. Health* 36 (5), 466–477. <https://doi.org/10.1002/jor.v36.510.1002/nur.21555>.
- Arab American Institute (AAI), 2018. Demographics. <<https://www.aaiusa.org/demographics>>, (accessed date: 15 Feb 2020).
- Arksey, H., O'Malley, L., 2005. Scoping studies: towards a methodological framework. *Int. J. Soc. Res. Methodol.* 8 (1), 19–32. <https://doi.org/10.1080/1364557032000119616>.
- Torp, A.J., Berggren, V., Erlandsson, L.-K., Westergren, A., 2015. Weight status among Somali immigrants in Sweden in relation to sociodemographic characteristics, dietary habits and physical activity. *Open Public Health J.* 8 (1), 10–16. <https://doi.org/10.2174/1874944501508010010>.
- Arvidsson, D., Leijon, M., Sundquist, J., Sundquist, K., Lindblad, U., Bennet, L., 2013. Cross-cultural validation of a simple self-report instrument of physical activity in immigrants from the Middle East and native Swedes. *Scand. J. Public Health* 42 (3), 255–262. <https://doi.org/10.1177/1403494813514143>.
- Arvidsson, D., Lindblad, U., Sundquist, J., Sundquist, K., Groop, L., Bennet, L., 2015. Vigorous physical activity may be important for the insulin sensitivity in immigrants from the Middle East and native Swedes. *J. Phys. Act. Heal.* 12 (2) <https://doi.org/10.1123/jpah.2013-0222>.
- Astell-Burt, T., Feng, X., Croteau, K., Kolt, G., 2013. Influence of neighbourhood ethnic density, diet and physical activity on ethnic differences in weight status: a study of 214,807 adults in Australia. *Soc. Sci. Med.* 93C, 70–77. <https://doi.org/10.1016/j.socscimed.2013.06.006>.
- Australian Bureau of Statistics (ABS), 2017. Census of population and housing: Reflecting Australia - stories from the census. <[https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by Subject/2071.0~2016~Main Features~Cultural Diversity Article~60](https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20701.0~2016~Main%20Features~Cultural%20Diversity%20Article~60)>, (accessed 12 Jan 2020).
- Berggren, K., Gerardi, M., Mueller, L., 2017. The impact of a community based exercise program on Somali immigrants residing in subsidized housing in Minnesota. *Physical Therapy Faculty Scholarship.* 23. <https://sophia.stkate.edu/pt_fac/23/>.
- Buehler, R., Pucher, J., 2016. Trends in walking and cycling safety: recent evidence from high-income countries, with a focus on the United States and Germany. *Am. J. Public Health* 107 (2), e1–e7. <https://doi.org/10.2105/AJPH.2016.303546>.
- Caperchione, C.M., Kolt, G.S., Mummery, W.K., 2009. Physical activity in culturally and linguistically diverse migrant groups to Western society. *Sport. Med.* 39 (3), 167–177. <https://doi.org/10.2165/00007256-200939030-00001>.
- Caperchione, C.M., Kolt, G.S., Tennent, R., Mummery, W.K., 2011. Physical activity behaviours of Culturally and Linguistically Diverse (CALD) women living in Australia: a qualitative study of socio-cultural influences. *BMC Publ. Health* 11 (1), 26. <https://doi.org/10.1186/1471-2458-11-26>.
- Condon, L.J., McLean, S., 2016. Keeping pre-school children healthy: a qualitative study of the experiences of parents who have migrated to the UK. A370 LP-A370 Arch. Dis. Child. 101.
- Dagkas, S., Benn, T., 2006. Young Muslim women's experiences of Islam and physical education in Greece and Britain: a comparative study. *Sport. Educ. Soc.* 11 (1), 21–38. <https://doi.org/10.1080/13573320500255056>.
- Dawson-Hahn, E., Koceja, L., Stein, E., Farmer, B., Grow, H.M., Saelens, B.E., Mendoza, J., et al., 2020. Perspectives of caregivers on the effects of migration on the nutrition, health and physical activity of their young children: a qualitative study with immigrant and refugee families. *J. Immigr. Minor. Heal.* 22 (2), 274–281. <https://doi.org/10.1007/s10903-019-00905-6>.
- de Munter, J.S.L., Agyemang, C., Brewster, L.M., Stronks, K., van Valkengoed, I.G.M., 2012. The association of leisure-time physical activity and active commuting with measures of socioeconomic position in a multiethnic population living in the Netherlands: results from the cross-sectional SUNSET study. *BMC Publ. Health* 12 (1), 815. <https://doi.org/10.1186/1471-2458-12-815>.
- Devlin, J.T., Dhalac, D., Suldan, A.A., Jacobs, A., Guled, K., Bankole, K.A., 2011. Determinants of physical activity among Somali women living in Maine. *J. Immigr. Minor. Heal.* 14 (2), 300–306. <https://doi.org/10.1007/s10903-011-9469-2>.
- Devlin, J., Duncanson, E., Cook, W., Kolawole, B., Suldan, A., Dhalac, D., et al., 2012. Determinants of physical activity among refugee Somali women living in Maine. *US. In: 140th the American Public Health Association's Annual Meeting.* <<https://apha.confex.com/apha/140am/webprogram/Paper256800.html>>.
- Ding, D., Lawson, K.D., Kolbe-Alexander, T.L., Finkelstein, E.A., Katzmarzyk, P.T., van Mechelen, W., Pratt, M., 2016. The economic burden of physical inactivity: a global analysis of major non-communicable diseases. *Lancet* 388 (10051), 1311–1324. [https://doi.org/10.1016/S0140-6736\(16\)30383-X](https://doi.org/10.1016/S0140-6736(16)30383-X).
- Eldoumi, H., 2017. Healthy eating and physical activity among Arab Muslim mothers of young children living in the U.S.: Barriers and influences of culture, acculturation and religion. PhD thesis. Oklahoma State University.
- Eldoumi, H., Gates, G., 2019. Physical activity of Arab Muslim mothers of young children living in the United States: barriers and influences. *Ethn. Dis.* 29 (3), 469–476. <https://doi.org/10.18865/ed.29.3.469>.
- El Masri, A., Kolt, G.S., George, E.S., 2020. The perceptions, barriers, and enablers to physical activity and minimising sedentary behaviour among Arab-Australian adults aged 35 to 64 years. *Health Promot. J. Austr.* <https://doi.org/10.1002/hpja.345>.
- El Masri, A., Kolt, G.S., George, E.S., 2021. A systematic review of qualitative studies exploring the factors influencing the physical activity levels of Arab migrants. *Int. J. Behav. Nutr. Phys. Act.* 18 (1), 2. <https://doi.org/10.1186/s12966-020-01056-w>.
- Elshahat, S., O'Rourke, M., Adlakh, D., Angkurawaranon, C., 2020. Built environment correlates of physical activity in low- and middle-income countries: a systematic review. *PLoS ONE* 15 (3) e0230454.

- Gele, A., Torheim, L., Pettersen, S., Kumar, B., 2015. Beyond culture and language: access to diabetes preventive health services among Somali women in Norway. *J. Diabetes Res.* 2015 (2), 1–9. <https://doi.org/10.1155/2015/549795>.
- Gele, A.A., Mbalilaki, A.J., 2013. Overweight and obesity among African immigrants in Oslo. *BMC Res. Notes* 6 (1), 119. <https://doi.org/10.1186/1756-0500-6-119>.
- Greves, H.M., Lozano, P., Liu, L., Busby, K., Cole, J., Johnston, B., 2007. Immigrant families' perceptions on walking to school and school breakfast: a focus group study. *Int. J. Behav. Nutr. Phys. Act.* 4 (1), 64. <https://doi.org/10.1186/1479-5868-4-64>.
- Halliday, J., Green, J., Mellor, D., Gumbie, M., de Courten, M., Renzaho, A., 2014. Developing programs for African families, by African families engaging African migrant families in Melbourne in health promotion interventions. *Fam. Community Health* 37 (1), 60–73. <https://doi.org/10.1097/FCH.0000000000000011>.
- Hamzeh, M., Oliver, K., 2012. Because I am Muslim, I cannot wear a swimsuit: Muslim girls negotiate participation opportunities for physical activity. *Res. Q. Exerc. Sport* 83 (2), 330–339. <https://doi.org/10.5641/027013612800745167>.
- Hashimoto-Govindasamy, L.S., Rose, V., 2011. An ethnographic process evaluation of a community support program with Sudanese refugee women in western Sydney. *Heal. Promot. J. Aust.* 22 (2), 107–112. <https://doi.org/10.1071/HE11107>.
- Horne, M., Skelton, D., Speed, S., 2012. Attitudes and beliefs to the uptake and maintenance of physical activity among community dwelling South Asian 60–70 year-olds: a qualitative study. *Publ. Health* 126, 417–423.
- Hosper, K., Nierkens, V., van Valkengoed, I., Stronks, K., 2008. Motivational factors mediating the association between acculturation and participation in sport among young Turkish and Moroccan women in the Netherlands. *Prev. Med.* 47 (1), 95–100. <https://doi.org/10.1016/j.ypmed.2008.02.024>.
- Hussien, S.M., 2007. Impact of a culturally sensitive lifestyle intervention on reducing risk factors for type 2 diabetes in Arab Canadian Muslim women. PhD thesis. University of Western Ontario.
- Insee, 2015. Immigrés, étrangers. <<https://www.insee.fr/fr/statistiques/3633212#consulter>>, (accessed date: 12 Feb 2020).
- Jadalla, A., Hattar-Pollara, M., Schubert, C., 2015. Acculturation as a predictor of health promoting and lifestyle practices of Arab Americans: a descriptive study. *J. Cult. Divers.* 22 (1), 15–22.
- Jongeneel-Grimen, B., Droomers, M., van Oers, H.A.M., Stronks, K., Kunst, A.E., 2014. The relationship between physical activity and the living environment: a multi-level analyses focusing on changes over time in environmental factors. *Health Place* 26, 149–160. <https://doi.org/10.1016/j.healthplace.2013.12.003>.
- Jonsson, L.S., Palmer, K., Ohlsson, H., Sundquist, J., Sundquist, K., 2012. Is acculturation associated with physical activity among female immigrants in Sweden? *J. Public Health* 35 (2), 270–277. <https://doi.org/10.1093/pubmed/dfs091>.
- Kahan, D., 2007. Overweight and its relationship to Middle Eastern American college students' sociodemographics and physical activity. *Res. Q. Exerc. Sport* 78 (3), 248–256. <https://doi.org/10.1080/02701367.2007.10599422>.
- Kahan, D., 2009. Quantity, type, and correlates of physical activity among American Middle Eastern university students. *Res. Q. Exerc. Sport* 80 (3), 412–423. <https://doi.org/10.1080/02701367.2009.10599579>.
- Kahan, D., 2011. Arab American college students' physical activity and body composition: reconciling Middle East-West differences using the socioecological model. *Res. Q. Exerc. Sport* 82 (1), 118–128. <https://doi.org/10.1080/02701367.2011.10599728>.
- Kalavar, J.M., Kolt, G.S., Giles, L.C., Driver, R.P., 2005. Physical activity in older Asian Indians living in the United States. *Act. Adapt. Aging* 29 (1), 47–67. https://doi.org/10.1300/J016v29n01_04.
- Kay, T., 2006. Daughters of Islam: Family influences on Muslim young women's participation in sport. *Int. Rev. Sociol. Sport* 41 (3–4), 357–373. <https://doi.org/10.1177/1012690207077705>.
- Kobrosly, S., 2019. Socioeconomic determinants of physical activity among adult Arab immigrants in Edmonton, Alberta. PhD thesis. Walden University.
- Labree, W., Lötters, F., van de Mheen, D., Rutten, F., Rivera Chavarría, A., Neve, M., Rodenburg, G., Machielsen, H., Koopmans, G., Foets, M., 2014. Physical activity differences between children from migrant and native origin. *BMC Publ. Health* 14 (1), 819. <https://doi.org/10.1186/1471-2458-14-819>.
- Langoen, L.J., Terragni, L., Rugseth, G., Nicolau, M., Holdsworth, M., Stronks, K., Lien, N., et al., 2017. Systematic mapping review of the factors influencing physical activity and sedentary behaviour in ethnic minority groups in Europe: a DEDIPAC study. *Int. J. Behav. Nutr. Phys. Act.* 14 (1) <https://doi.org/10.1186/s12966-017-0554-3>.
- Lecerof, S.S., Westerling, R., Moghaddassi, M., Östergren, P.-O., 2011. Health information for migrants: the role of educational level in prevention of overweight. *Scand. J. Publ. Health* 39 (2), 172–178. <https://doi.org/10.1177/1403494810395824>.
- Lee, I.-M., Shiroma, E.J., 2014. Using accelerometers to measure physical activity in large-scale epidemiological studies: issues and challenges. *Br. J. Sports Med.* 48 (3) <https://doi.org/10.1136/bjsports-2013-093154>, 197 LP – 201.
- Lindström, M., Sundquist, J., 2001. Immigration and leisure-time physical inactivity: a population-based study. *Ethn. Health* 6 (2), 77–85. <https://doi.org/10.1080/13557850120068405>.
- Liu, S., 2019. US home appliance industry - Statistics & facts. <<https://www.statista.com/topics/2843/home-appliance-industry-in-the-us>>, (accessed date: 15 Apr 2020).
- Lunn, L.M., 2014. The social determinants of refugee health: An integrated perspective. PhD thesis. Vanderbilt University.
- Mäki-Opas, T.E., de Munter, J., Maas, J., den Hertog, F., Kunst, A.E., 2014. The association between physical environment and cycling to school among Turkish and Moroccan adolescents in Amsterdam. *Int. J. Public Health* 59 (4), 629–636. <https://doi.org/10.1007/s00038-014-0565-7>.
- Marinescu, L., Sharify, D., Krieger, J., Saelens, B., Calleja, J., Aden, A., 2013. Be active together: Supporting physical activity in public housing communities through women-only programs. *Prog. Community Heal. Partnerships* 7 (1), 57–66. <https://doi.org/10.1353/cpr.2013.0003>.
- Martin, J.J., McCaughy, N., Shen, B., 2008. Predicting physical activity in Arab American school children. *J. Teach. Phys. Educ.* 27 (2), 205–219. <https://doi.org/10.1123/jtpe.27.2.205>.
- McEwen, A., Straus, L., Ussher, M., 2008. Physical inactivity among a UK Somali population. *J. Public Health* 30 (1), 110. <https://doi.org/10.1093/pubmed/fdm075>.
- Méjean, C., Traissac, P., Eymard-Duvernay, S., Delpeuch, F., Maire, B., 2009. Influence of acculturation among Tunisian migrants in France and their past/present exposure to the home country on diet and physical activity. *Public Health Nutr.* 12 (6), 832–841. <https://doi.org/10.1017/S136898008003285>.
- Mohamed, A.A., Weis, J.A., Sia, I.G., Wieland, M.L., 2012. Perceptions of physical activity among Somali men. *J. Gen. Intern. Med.* 27, S271.
- Mohamed, A.A., Hassan, A.M., Weis, J.A., Sia, I.G., Wieland, M.L., 2014. Physical activity among Somali men in Minnesota: barriers, facilitators, and recommendations. *Am. J. Mens. Health* 8 (1), 35–44. <https://doi.org/10.1177/1557988313489132>.
- Mude, W., Mwanri, L., 2016. Barriers to participation in physical activity among South Sudanese children in South Australia. *Fam. Community Health* 39 (4), 293–300. <https://doi.org/10.1017/S136898008003285>.
- Murray, K., Mohamed, A., Dawson, D., Syme, M., Abdi, S., Barnack-Tavariis, J., 2015. Somali perspectives on physical activity: photovoice to address barriers and resources in San Diego. *Prog. Community Heal. Partnerships* 9 (1), 83–90. <https://doi.org/10.1353/cpr.2015.0011>.
- Murray, K.E., Ermias, A., Lung, A., Mohamed, A.S., Ellis, B.H., Linke, S., Kerr, J., Bowen, D.J., et al., 2017. Culturally adapting a physical activity intervention for Somali women: the need for theory and innovation to promote equity. *Transl. Behav. Med.* 7 (1), 6–15. <https://doi.org/10.1007/s13142-016-0436-2>.
- Nakamura, Y., 2002. Beyond the hijab: Female Muslims and physical activity. *Women Sport Phys. Act. J.* 11, 21–48. <https://doi.org/10.1123/wspaj.11.2.21>.
- National Association of British Arabs (NABA), 2013. Arabs and Arab league population in the UK. <https://web.archive.org/web/20140529130456/http://naba.org.uk/library/reports/census_2011.html> (accessed 15 Feb 2020).
- Newbold, B., 2006. Chronic conditions and the healthy immigrant effect: Evidence from Canadian immigrants. *J. Ethn. Migr. Stud.* 32 (5), 765–784. <https://doi.org/10.1080/13691830600704149>.
- Nicolaou, M., Benjelloun, S., Van Dam, R.M., Seidell, J.C., Stronks, K., Doak, C.M., 2011. Socio-cultural determinants of body weight and weight related behavior. A qualitative study of female Moroccan migrants in The Netherlands and their compatriots in Morocco. *Obes. Rev.* 12, 80.
- Nicolaou, M., Benjelloun, S., Stronks, K., van Dam, R., Seidell, J., Doak, C., 2012. Influences on body weight of female Moroccan migrants in the Netherlands: a qualitative study. *Health Place* 18 (4), 883–891. <https://doi.org/10.1016/j.healthplace.2012.03.001>.
- Njeru, J.W., Formea, C.M., Osman, A., Goodson, M., Hared, A., Capetillo, G.P., et al., 2016. Diabetes knowledge, attitudes and behaviors among Somali and Latino immigrants. *J. Immigr. Minor. Heal.* 18 (6), 1432–1440. <https://doi.org/10.1007/s10903-015-0335-5>.
- Olaya-Contreras, P., Balcker-Lundgren, K., Siddiqui, F., Bennet, L., 2019. Perceptions, experiences and barriers to lifestyle modifications in first-generation Middle Eastern immigrants to Sweden: a qualitative study. *BMJ Open* 9 (10), e028076. <https://doi.org/10.1136/bmjopen-2018-028076>.
- Persson, G., Mahmud, A.J., Hansson, E.E., Strandberg, E.L., 2014. Somali women's view of physical activity – a focus group study. *BMC Womens. Health* 14 (1), 129. <https://doi.org/10.1186/1472-6874-14-129>.
- Persson, G., 2015. Somali women's view of physical activity—a focus group study. *Physiotherapy* 101, e1198–e1199. <https://doi.org/10.1016/j.physio.2015.03.2125>.
- Pucher, J., Buehler, R., 2016. Safer cycling through improved infrastructure. *Am. J. Publ. Health* 106 (12), 2089–2091. <https://doi.org/10.2105/AJPH.2016.303507>.
- Qahoush, R., 2006. Physical activity patterns in Southern California Arab populations. PhD thesis. University of California.
- Qahoush, R., Stotts, N., Alawneh, M.S., Froelicher, E.S., 2010. Physical activity in Arab women in Southern California. *Eur. J. Cardiovasc. Nurs.* 9 (4), 263–271. <https://doi.org/10.1016/j.ejcnurse.2010.03.002>.
- Renzaho, A.M.N., McCabe, M., Swinburn, B., 2011. Intergenerational differences in food, physical activity, and body size perceptions among African migrants. *Qual. Health Res.* 22 (6), 740–754. <https://doi.org/10.1177/1049732311425051>.
- Richter, F., 2019. The world's most bicycle-friendly cities. <<https://www.statista.com/chart/18206/most-bicycle-friendly-cities-worldwide/>>, (accessed date: 8 Jul 2020).
- Rothe, E., Holt, C., Kuhn, C., McAteer, T., Askari, I., O'Meara, M., Sharif, A., Dexter, W., 2010. Barriers to outdoor physical activity in wintertime among Somali youth. *J. Immigr. Minor. Heal.* 12 (5), 726–736. <https://doi.org/10.1007/s10903-009-9287-y>.
- Salvo, G., Lashewicz, B., Doyle-Baker, P., McCormack, G., 2018. Neighbourhood built environment influences on physical activity among adults: A systematized review of qualitative evidence. *Int. J. Environ. Res. Public Health* 15 (5). <https://doi.org/10.3390/ijerph15050897> pii: E897.
- Sarsour, L., Tong, V.S., Jaber, O., Talbi, M., Julliard, K., 2010. Health assessment of the Arab American community in Southwest Brooklyn. *J. Community Health* 35 (6), 653–659. <https://doi.org/10.1007/s10900-010-9260-7>.
- Siddiqui, F., Kurbasic, A., Lindblad, U., Nilsson, P.M., Bennet, L., 2016. Effects of a culturally adapted lifestyle intervention on cardio-metabolic outcomes: a

- randomized controlled trial in Iraqi immigrants to Sweden at high risk for Type 2 diabetes. *Metabolism* 66, 1–13. <https://doi.org/10.1016/j.metabol.2016.10.001>.
- Siddiqui, F., Koivula, R., Kurbasic, A., Lindblad, U., Nilsson, P., Bennet, L., 2018. Physical activity in a randomized culturally adapted lifestyle intervention. *Am. J. Prev. Med.* 55 (2), 187–196. <https://doi.org/10.1016/j.amepre.2018.04.016>.
- Smith, M., Hosking, J., Woodward, A., Witten, K., MacMillan, A., Field, A., Baas, P., Mackie, H., 2017. Systematic literature review of built environment effects on physical activity and active transport – an update and new findings on health equity. *Int. J. Behav. Nutr. Phys. Act.* 14 (1) <https://doi.org/10.1186/s12966-017-0613-9>.
- Snyder, R., Lyon, N., Hertel, E., Moran, S., Miller, C.E., Lyon-Callo, S., et al., 2013. Health risk behaviors among Arab adults within the state of Michigan. <https://www.michigan.gov/documents/mdch/Health_Risk_Behavior_Full_Arab_491350_7.pdf>, (Accessed date: 8 Apr 2020).
- Södergren, M., Hylander, I., Törnkvist, L., Sundquist, J., Sundquist, K., 2008. Arranging appropriate activities: Immigrant women's ideas of enabling exercise. *Women's Heal. Issues* 18 (5), 413–422. <https://doi.org/10.1016/j.whi.2008.05.001>.
- Södergren, M., Sundquist, K., Johansson, S.-E., Sundquist, J., Hagströmer, M., 2010. Associations between health-enhancing physical activity and country of birth among women. *J. Phys. Act. Heal.* 7 (5), 613–621. <https://doi.org/10.1123/jpah.7.5.613>.
- Statista, 2018. Anzahl der Ausländer in Deutschland nach Herkunftsland von 2016 bis 2018. <<https://de.statista.com/statistik/daten/studie/1221/umfrage/anzahl-de-r-auslaender-in-deutschland-nach-herkunftsland/>>, (accessed date: 8 Feb 2020).
- Statistics Canada, 2019. Immigration and ethnocultural diversity highlight tables, 2016 census <<https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/hlt-ft/imm/index-eng.cfm>>, (accessed date: 7 Feb 2020).
- Statistics NZ, 2019. 2018 Census population and dwelling counts. <<https://www.stats.govt.nz/information-releases/2018-census-population-and-dwelling-counts>>, (accessed date: 18 Feb 2020).
- Sulaiman, N., Furler, J., Hadj, E., Corbett, H., Young, D., 2007. Stress, culture and “home”: Social context in Turkish and Arabic-speaking Australians' views of diabetes prevention. *Heal. Promot. J. Aust.* 18 (1), 63–68. <https://doi.org/10.1071/HE07063>.
- Sweileh, W.M., 2018. Global research output in the health of international Arab migrants (1988–2017). *BMC Publ. Health* 18 (1), 755. <https://doi.org/10.1186/s12889-018-5690-4>.
- Sylvia, L., Bernstein, E., Hubbard, J., Keating, L., Anderson, E., 2013. A practical guide to measuring physical activity. *J. Acad. Nutr. Diet.* 114 (2), 199–208. <https://doi.org/10.1016/j.jand.2013.09.018>.
- Tami, S., Reed, D., Boylan, M., Anisa, M., 2012. Assessment of the effect of acculturation on dietary and physical activity behaviors of Arab mothers in Lubbock, Texas. *Ethn. Dis.* 22, 192–197.
- Guerin, P.B., Diiriye, R., Corrigan, C., Guerin, B., 2003. Physical activity programs for refugee Somali women: Working out in a new country. *Women Health* 38 (2), 83–99. https://doi.org/10.1300/J013v38n01_06.
- Tricco, A.C., Lillie, E., Zarin, W., O'Brien, K.K., Colquhoun, H., Levac, D., et al., 2018. PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. *Ann. Intern. Med.* 169 (7), 467–473. <https://doi.org/10.7326/M18-0850>.
- WHO, 2019a. Physical activity and adults. <https://www.who.int/dietphysicalactivity/factsheet_adults/en/>, (accessed date: 28 Feb 2020).
- WHO, 2019b. Physical inactivity: A global public health problem. <https://www.who.int/dietphysicalactivity/factsheet_inactivity/en/>, (accessed date: 28 Feb 2020).
- Wieland, M., Weis, J., Palmer, T., Goodson, M., Loth, S., Omer, F., et al., 2011. Physical activity and nutrition among immigrant and refugee women: a community-based participatory research approach. *Women's Heal. Issues* 22 (2), e225–e232. <https://doi.org/10.1016/j.whi.2011.10.002>.
- Wieland, M.L., Tiedje, K., Meiers, S.J., Mohamed, A.A., Formea, C.M., Ridgeway, J.M., Sia, I.G., 2013. Perspectives on physical activity among immigrants and refugees to minnesota. *J. Gen. Intern. Med.* 28, S144–S145.
- Wieland, M.L., Tiedje, K., Meiers, S.J., Mohamed, A.A., Formea, C.M., Ridgeway, J.L., et al., 2015. Perspectives on physical activity among immigrants and refugees to a small urban community in Minnesota. *J. Immigr. Minor. Heal.* 17 (1), 263–275. <https://doi.org/10.1007/s10903-013-9917-2>.
- Wilson, A., Renzaho, A., 2015. Intergenerational differences in acculturation experiences, food beliefs and perceived health risks among refugees from the Horn of Africa in Melbourne, Australia. *Publ. Health Nutr.* 18 (1), 176–188. <https://doi.org/10.1017/S1368980013003467>.
- Witty-Merrin, A., Joshi, M., Dawes, J., Mein, G., 2018. Impact of bicycle provision on the health of refugees in London: a qualitative study. *Lancet* 392, S94. [https://doi.org/10.1016/S0140-6736\(18\)32185-8](https://doi.org/10.1016/S0140-6736(18)32185-8).
- World Population Review, 2020. Arab countries 2020. <<http://worldpopulationreview.com/countries/arab-countries/>>, (accessed 14 February 2020).