



Overweight and obesity among adolescent refugees and migrants arriving in Australia: A review of the literature

Overweight and obesity is a major public health issue in Australia affecting both adults and children with significant consequences for health and well-being. Refugee and migrant groups are also at risk of experiencing overweight and obesity. Evidence from refugee health screening programs indicates that rates of overweight and obesity among refugee and migrant adolescents who have recently arrived in Australia are increasing. The literature review presented in this report aimed to investigate the evidence available for overweight and obesity among refugee and migrant adolescent populations who have recently arrived in their resettlement country. The research evidence available for overweight and obesity among adolescent refugees and migrants was found to be minimal. However, the studies included in the review provide some insight into the complex factors that may contribute to overweight and obesity among adolescent refugees and migrants, and point towards the potential significance of this health issue.



Health
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Overweight and obesity among adolescent refugees and migrants arriving in Australia: A review of the literature

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ABOUT SEaRCH

The South Eastern Sydney Research Collaboration Hub (SEaRCH) a partnership between the UNSW Sydney Centre for Primary Health Care and Equity (CPHCE) and the South Eastern Sydney Local Health District.

CPHCE is a research centre within the Faculty of Medicine, UNSW Sydney, that has been undertake primary health care since 1996. South Eastern Sydney Local Health District is a statutory authority responsible for 8 public hospitals and a range of community-based health services covering a culturally and linguistically diverse population of over 830,000 people.

SEaRCH's role is to strengthen the planning and delivery of evidence-based primary health and integrated care. We undertake research, evaluation and capacity building activities to strengthen primary health care and address health inequities, with the aim of contributing to better, fairer health in the community.

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OVERWEIGHT AND OBESITY AMONG ADOLESCENT REFUGEES AND MIGRANTS ARRIVING IN AUSTRALIA: A REVIEW OF THE LITERATURE

BACKGROUND

THE HEALTH ISSUE

Overweight and obesity is widely accepted as a significant public health issue in Australia requiring attention from health professionals and policy makers. In 2014–15, 63% of adult Australians were overweight or obese (Australian Institute of Health and Welfare (AIHW), 2017). With significant consequences for health and well-being, including diabetes, high blood pressure, heart disease, asthma and osteoarthritis, (AIHW, 2017a, cited in AIHW, 2017) and high costs to the health system, the implementation of evidence-based and effective health interventions to address overweight and obesity is becoming increasingly important.

Overweight and obesity is not a health issue that only affects adults. In 2014–15, 27% of Australian children and adolescents aged 5–17 years were overweight or obese, continuing the upward trend from 21% in 1995 (AIHW, 2017). Overweight and obese children are at greater risk of becoming adults who are obese, and of developing chronic diseases at a younger age (Sahoo et al. 2015, cited in AIHW, 2017). Obese children are also at risk of psychosocial problems and lower academic achievement (Singh et al. 2008; Singh et al, 2012, cited in Akbulut et al. 2014). Addressing overweight and obesity during childhood and adolescence is essential to improving future health and well-being.

OVERWEIGHT AND OBESITY AMONG ADOLESCENT REFUGEES AND MIGRANTS

Adolescents and young people make up a significant portion of refugees and migrants. Half of the world's refugees are children and in 2015, 37 million international migrants were aged between 10 and 24 years (UNICEF 2016). It has been recognised that overweight and obesity is a health problem experienced by refugee and migrant groups. However, the research studies that have been conducted on the nutritional status of refugee children have often focused on undernutrition in young children aged five years or less. Few studies report on older children and/or assess overnutrition (Dawson-Hahn, 2016a; Dawson-Hahn, 2016b).

“Overweight and obesity is influenced by a complex interplay of individual, environmental, and societal factors...” (AIHW 2017, p. 5) and migrants from low and middle-income countries who settle in developed countries are known to be at high risk of obesity (Renzaho et al. 2008, cited in Cyril et al. 2016). Theories described in the literature provide some insight into the development of overweight and obesity among migrant and refugee populations. The healthy immigrant effect proposes that immigrants arrive in a *“favourable state of health”* and that over time their health declines and converges with that of their host nation (Newbold 2006, cited in Wahi et al. 2014, p. e239). Immigrants adopt the habits and lifestyle of their host population, known as acculturation, increasing their risk of adverse health outcomes (Newbold 2006, cited in Wahi et al. 2014). *“Acculturation refers to the process of cultural exchange that occurs when two distinct cultures come into contact, resulting in changes to features of both the migrating and host cultures”* (Berry 2001, cited in Renzaho et al. 2012, p. 741). There is evidence to indicate that the process of acculturation is associated with overweight and obesity among both adults and children who have migrated from low and middle income countries to industrialised countries (Renzaho et al. 2008; Delavari et al. 2013; Lara et al. 2005; Rosas et al. 2011; Ike-Chinaka 2013, cited in Renzaho et al. 2015). A recent paper by Zulfiqar et al (2018) aimed to investigate overweight/obesity in children aged 4 to 11 years and its association

with known behavioural risk factors, by immigrant status. The analysis included the socioeconomic development of the origin country of the participants. The findings indicated that immigrant children originating from low and middle income countries experienced higher rates of overweight and obesity, suggesting that origin country could be a factor in overweight and obesity among immigrant children. However, it should be noted that the analysis included children who were second and third generation immigrants and born in Australia (Zulfiqar et al. 2018).

Evidence from NSW programs

Refugee health screening programs from NSW are reporting increasing trends in the number of newly arrived refugee and migrant young people who are experiencing overweight and obesity. Data from the Intensive English Centre (IEC) school screening program delivered in South Eastern Sydney Local Health District (SESLHD) has shown that the percentage of young people arriving overweight or obese has increased from 22% in 2011, to 31% in 2017 (SESLHD, 2018). There was a similar trend across four IECs in metropolitan Sydney between 2011 and 2015, with the percentage of enrolled refugee and migrant young people (11 years to 19.5 years) who arrived either overweight and obese increasing from 22.1% in 2011 to 33.7% in 2015 (Kang, 2015).

Significant gaps currently exist within the services for newly arrived young people from refugee and migrant backgrounds to address prevention of rapid weight gain during the post arrival period, and interventions for overweight or obesity. The proposed IEC Healthy Lifestyles Project will begin to address these service gaps through the development and delivery of an integrated set of co-designed health promotion interventions that aim to increase engagement of school students in health promoting initiatives and behaviours (IEC Healthy Lifestyles Project Proposal, 2017).

Recognising this change in the patterns of overweight and obesity among newly arrived adolescents and young people to NSW, and the increased risk of overweight and obesity among refugees and migrants, a literature review was conducted which aimed to investigate the evidence available for overweight and obesity among refugee and migrant adolescent populations who have recently arrived in their resettlement country. It is anticipated that the findings of this review could be used to further inform service providers and policy makers about the health and service needs of refugee and migrant adolescents and young people arriving into NSW.

METHODS

LITERATURE SEARCHES

The aim of the review was to determine the research evidence available for overweight and obesity among refugee and migrant adolescent populations who have recently arrived in their resettlement country.

The following selection criteria were established to guide the inclusion of evidence. These criteria were determined during a discussion between the authors and according to the aim and purpose of the review.

1. Published from 2012 to current.
2. Published in English.
3. High income countries: including Australia, New Zealand, Canada, United Kingdom (UK), and United States (US).
4. Population group: adolescent refugees or migrants aged 11 to 18 years who have recently arrived in their resettlement country.

5. Health issue: Overweight, obesity and/or weight gain.

Overweight, obesity and weight gain among newly arrived adolescent refugees appears to be an emerging issue in Australia. A timeframe of 2012 to current was chosen to focus on the most recent information regarding this trend. The countries chosen have similarity to the Australian context, as well as to the background of refugees arriving in Australia.

SEARCH STRATEGY

Seven core sources^{4-6,10,16-18} were identified as a starting point for the review. These sources were identified from an introductory search using the Clinical Information Access Portal (CIAP). The reference lists from these core sources were hand searched to identify other papers that met the review inclusion criteria. Some core sources did not meet the criteria for inclusion in the review but contributed information to the background section and the rationale for conducting the review.

Potential search terms for use in the Medline and Google Scholar searches were obtained from the core source papers. These terms were refined based on the inclusion criteria and discussed by the authors to determine the final list. The final search terms used in the Medline search are provided in Box 1. The Google Scholar search was conducted using combinations of the search terms provided in Box 2.

Online E-newsletters published by the NSW Refugee Health Service include a list of recent citations relevant to refugee health (NSW Refugee Health Service, 2018). Editions from January 2013 to September 2018 were reviewed for relevant publications that met the inclusion criteria.

The literature searches, data extraction and analysis were undertaken by RK during October and November 2018. Citations identified during each search were screened by title and then abstract. If a citation met the inclusion criteria based on the abstract, the full paper was obtained and reviewed against the criteria to determine if the paper should be included in the review.

Few publications met all the inclusion criteria and therefore an inclusive approach was taken toward the assessment and inclusion of papers. Papers were included when they met the majority of the criteria and contributed relevant information toward understanding the health issue. There were a number of publications identified which focused on Mexican and/or Latino migrant farm workers in the US. Whilst some of these papers included adolescents and young people, this particular experience of migration was considered to be significantly different to that of refugees and migrants arriving in Australia and these papers were not included for this reason. A number of studies included participant groups with a broad age category for paediatric participants, for example 2 – 18 years. The findings from these studies were only included if the results had been stratified into age categories to identify participants from an adolescent age group.

Box 1. Medline search terms

Medline search: Conducted 17.10.2018

1. exp Adolescent Health/
2. adolescent*.mp.
3. exp Pediatrics/
4. paediatric*.mp.
5. child*.mp.
6. exp Child Health/
7. youth.mp.
8. young people.mp.
9. exp Refugees/
10. refugee*.mp.
11. migrant*.mp.
12. exp "Emigrants and Immigrants"/
13. asylum seeker.mp.
14. newly arrived.mp.
15. exp Body Mass Index/
16. body mass index.mp.
17. BMI.mp.
18. exp PEDIATRIC OBESITY/
19. exp OBESITY/
20. obese*.mp.
21. exp OVERWEIGHT/
22. exp Body Weight/
23. overweight.mp.
24. exp Weight Gain/
25. weight gain.mp.

Box 2. Google Scholar search terms

Google Scholar search: 13.10.2018

1. refugee
2. migrant
3. immigrant
4. asylum seeker
5. children
6. adolescent
7. youth
8. weight
9. body mass index
10. BMI
11. obesity
12. overweight

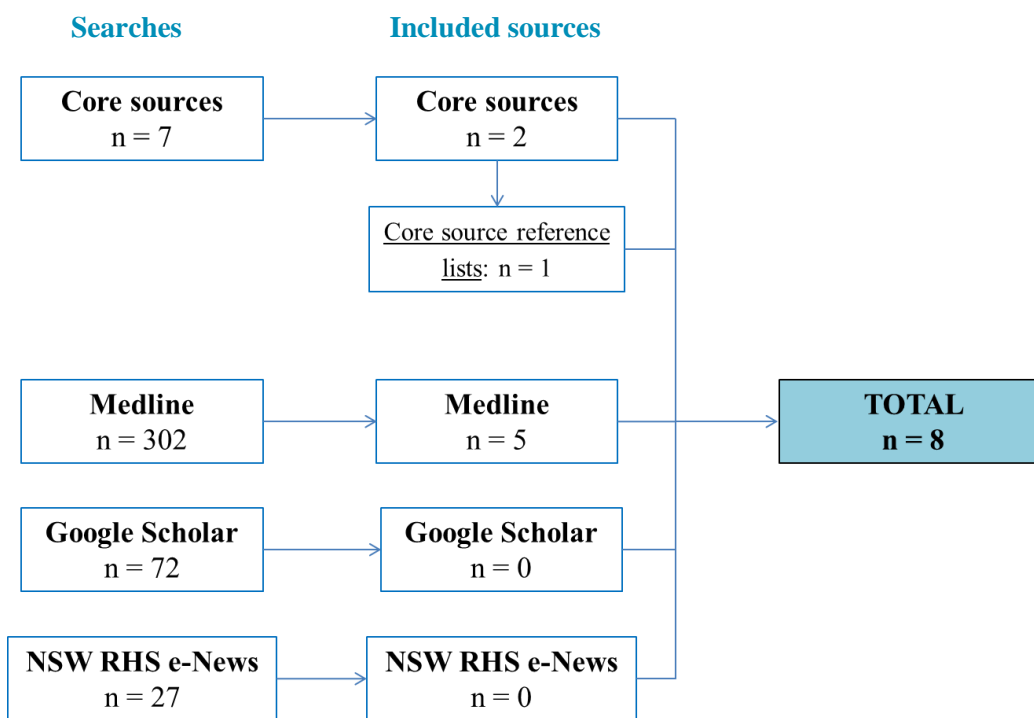
DATA EXTRACTION

Data from the included publications were extracted and summarised into tables. The information documented included title; date of publication; country; details of the participant group for example age, study setting, country of birth/origin, length of stay in host country; the aim(s) of the study; methodology; and results.

RESULTS

Eight publications were included in the review. The flowchart in Figure 1 presents an overview of the results from the various literature searches. Two publications were included from the original core sources and one publication was identified from the review of the reference lists of the core sources. A further five publications were added from publications identified from the Medline search. No further publications were identified from the Google Scholar searches or the review of citations available within the NSW Refugee Health Service e-News online publication.

Figure 1. Flowchart of literature searches



An overview of the characteristics of the papers included in the review is presented in Table 1. The included papers (n=8) were published between 2012 and 2017. The majority of papers (n=5) were from Australia, with the remaining papers coming from the US (n=1), Canada (n=1) and Jordan (n=1). The paper from Jordan was included because the research examined Iraqi refugees who were to be re-settled in the US. Study participants included refugees and immigrants from a variety of backgrounds including Africa, South East Asia and Iraq. The majority of papers (n=7) included participants from African backgrounds. Five of the eight papers included participants within the adolescent age group only. Three papers included parents and/or families with adolescent children. Another three quantitative studies did not focus specifically on the adolescent refugees and immigrants, however, the analysis and results provided data within an adolescent age category of relevance to the review.

A broad range of research methods were used across the included papers. Half of the papers (n=4) included quantitative research methods such as the analysis of health survey data, chart reviews or screening data. Two

papers included qualitative research methods such as semi-structured interviews and focus groups. One paper described the development of an intervention using a community-partnered participatory approach and another paper described a mixed methods evaluation of a screening program (n=1).

Table 1. Characteristics of included papers

Author/title	Year	Country	Participant characteristics	Study aims	Source type/method
Wahi et al. <i>Body mass index among immigrant and non-immigrant youth: Evidence from the Canadian Community Health Survey. Canadian Journal of Public Health, 105(4):e239-e244.</i>	2014	Canada	<ul style="list-style-type: none"> Immigrant and non-immigrant youth aged 12-19 years (n=63,509) Immigrant: foreign-born (1st generation immigrant). Non-immigrant: Canadian born. Mean number of years (SD) immigrant youth had lived in Canada was 7.1 (4.1) years. 	<ul style="list-style-type: none"> Examine differences in BMI and prevalence of overweight /obesity between immigrant versus non-immigrant youth. Identify the extent to which lifestyle and socio-demographic factors account for between-group differences. 	<ul style="list-style-type: none"> Quantitative: Analysis of data from repeated, cross-sectional surveys of the Canadian Community Health Survey including self-reported weight and height and construction of BMI z-score.
Cyril et al. <i>Relationship between body mass index and family functioning, family communication, family type and parenting style among African migrant parents and children in Victoria, Australia: a parent-child dyad study. BMC Public Health, 16:707.</i>	2016	Australia	<ul style="list-style-type: none"> African parents (n=284) and their children (n=284) aged 12-17 years, from migrant and refugee backgrounds. Average length of stay in Australia was 5.76 (3.37) years for children and 7.3 (4.91) years for parents. 	<ul style="list-style-type: none"> To examine the difference between children's and parental perception of family functioning, family communication, family type and parenting styles and their relationship with BMI. 	<ul style="list-style-type: none"> Quantitative: Measurement of height and weight. Calculation of BMI. Questionnaires were used to measure family functioning, family communication, family type and parenting style.
Sandell et al. <i>Health Status and Anthropometric Changes in Resettled Refugee Children. Journal of Pediatric Gastroenterology & Nutrition, 65(5):569-73.</i>	2017	United States	<ul style="list-style-type: none"> Two cohorts of refugees aged 0–18 years. Cohort A: Predominantly from South East Asia. Included more African representatives than cohort B. Initial visit during 2007-2009. Cohort B: Predominantly from South East Asia. Initial visit during 2013. 	<ul style="list-style-type: none"> To report on the health and nutritional status of paediatric refugees and track changes in nutritional status. 	<ul style="list-style-type: none"> Quantitative: Retrospective chart review of health and nutritional status. Cohort A: Initial, 1-year, and 5-year visits data. Cohort B: Initial, 1-month, and 1-year visits data.
Yanni et al. <i>The health profile and chronic diseases comorbidities of US-bound Iraqi refugees</i>	2013	Jordan	<ul style="list-style-type: none"> US-bound Iraqi refugees screened at International Organization for Migration (IOM) 	<ul style="list-style-type: none"> To describe the health profile of US-bound Iraqi refugees screened by the IOM in Jordan during 	<ul style="list-style-type: none"> Quantitative: Review and analysis of refugee screening data. Text searches, calculations of

Author/title	Year	Country	Participant characteristics	Study aims	Source type/method
<i>screened by the International Organization for Migration in Jordan: 2007-2009. Journal of Immigrant Minority Health, 15:1-9.</i>			clinics (n=18,990).	2007-2009.	frequencies and proportions, Chi-square tests, calculation of BMI.
Woodland et al. <i>Evaluation of a school screening programme for young people from refugee backgrounds. Journal of Paediatrics and Child Health, 52:72-79.</i>	2016	Australia	<ul style="list-style-type: none"> Refugee young people aged 11-19.5 years (n=294). Countries of birth by WHO region included Eastern Mediterranean, South East Asia, Africa, Western Pacific and Europe. 	<ul style="list-style-type: none"> Describe the development of the Optimising Health and Learning Program. Report on the evaluation of the program. 	<ul style="list-style-type: none"> Process and impact evaluation of a nurse-led screening program using a mixed methods approach including quantitative and qualitative data collection.
Mude & Mwanri. <i>Barriers to Participation in Physical Activity Among South Sudanese Children in South Australia. Family and Community Health, 39(4):293-300.</i>	2016	Australia	<ul style="list-style-type: none"> Parents (n=8) (three fathers and five mothers) from a South Sudanese background with at least one child aged 5-14 years. Participants had previously lived in a refugee camp and had lived an average of 5 years (range 1.5-8 years) in South Australia. 	<ul style="list-style-type: none"> To explore the perspectives of South Sudanese parents in relation to barriers and enablers of participation in physical activity among their children aged 5-14 years. 	<ul style="list-style-type: none"> Qualitative: Face-to-face semi-structured interviews conducted in English or Juba Arabic.
Renzaho et al. <i>Intergenerational Differences in Food, Physical Activity, and Body Size Perceptions Among African Migrants. Qualitative Health Research, 22(6): 740-754.</i>	2012	Australia	<ul style="list-style-type: none"> Refugees and migrants from the Horn of Africa, focusing on the Sudanese (South Sudan), Somali, and Ethiopian migrant groups (n=48). Adolescents aged 12-17 years and parents. Length of stay in Australia ranged from approx. 5-9 years. 	<ul style="list-style-type: none"> To explore differences in adolescent and parent perspectives toward behaviours related to body-size perceptions, eating, and physical activity behaviours among refugees and migrants from the Horn of Africa living in Victoria, Australia. 	<ul style="list-style-type: none"> Qualitative: 18 individual interviews and three focus groups to generate concepts to explain how Horn of Africa migrants culturally construct body size, eating, and physical activity.
Renzaho et al. <i>The Healthy Migrant Families Initiative: development of a culturally competent obesity prevention intervention for African migrants. BMC Public Health,</i>	2015	Australia	<ul style="list-style-type: none"> Sub-Saharan African (SSA) families with children aged 12-17 years. 	<ul style="list-style-type: none"> To develop a culturally-competent obesity prevention program for SSA families with children aged 12-17 years using a community- 	<ul style="list-style-type: none"> An intervention was developed using a community-partnered participatory approach. The results of three pilot studies were used to

Author/title	Year	Country	Participant characteristics	Study aims	Source type/method
15:272.				partnered participatory approach.	inform the intervention content.

A summary of the findings from the included (n=8) papers is presented in Table 2.

Table 2. Summary of findings

Author/title	Results	Implications
<p>Wahi et al. <i>Body mass index among immigrant and non-immigrant youth: Evidence from the Canadian Community Health Survey. Canadian Journal of Public Health, 105(4):e239-e244.</i></p>	<p><u>Immigrant youth</u></p> <ul style="list-style-type: none"> Lower z-BMI by 0.44 compared to non-immigrant youth ($p<0.001$). Length of time in Canada was associated with higher z-BMI scores and increased odds of overweight/obesity. z-BMI increased by 0.02 for every year respondents had resided in Canada. Consumed fruits and vegetables less frequently. Were more likely to live in households receiving government income assistance. <p><u>Non-immigrant youth</u></p> <ul style="list-style-type: none"> 21.8% were overweight/ obese, compared to 18% of immigrant youth ($p<0.001$). Lifestyle and socio-demographic factors did not account for differences between immigrant and non-immigrant youth. 	<p><u>Implications for health</u></p> <ul style="list-style-type: none"> Canadian immigrant youth increase their risk of becoming overweight and/or obese over time residing in Canada. <p><u>Implications for interventions</u></p> <ul style="list-style-type: none"> Consumption of fruit and vegetables is a possible modifiable risk factor that could be considered by intervention programs aiming to prevent overweight and obesity in this population group.
<p>Cyril et al. <i>Relationship between body mass index and family functioning, family communication, family type and parenting style among African migrant parents and children in Victoria, Australia: a parent-child dyad study. BMC Public Health, 16:707.</i></p>	<p><u>Prevalence of overweight</u></p> <ul style="list-style-type: none"> Children: 24.6 % (95 % CI: 19.8, 30.1) Parents: 45.6 % (95 % CI: 39.8, 51.5) <p><u>Prevalence of obesity</u></p> <ul style="list-style-type: none"> Children: 9.8 % (95 % CI: 6.7, 13.9) Parents: 24.4 % (95 % CI: 19.7, 29.8) <p><u>Associations with BMI and obesity</u></p> <ul style="list-style-type: none"> A positive relationship between poor family functioning and child BMI. An inverse relationship between consensual family type and child BMI. Older age and parental BMI positively associated with childhood obesity. Length of stay in Australia inversely associated with childhood obesity. Child BMI positively associated with poor family functioning. Child BMI inversely associated with conversation orientation type of family communication and consensual family type. 	<p><u>Implications for interventions</u></p> <ul style="list-style-type: none"> Child BMI was significantly associated with family-related factors. Implications for childhood obesity prevention programs among African migrants: <ul style="list-style-type: none"> Consider pre-migration experiences Need to be family-based and include an intergenerational approach. Address the differences between parents and children in their perceptions of family dynamics. Incorporate understanding of family functioning, communication, type and parenting styles.
<p>Sandell et al. <i>Health Status and Anthropometric Changes in Resettled Refugee Children. Journal of Pediatric Gastroenterology & Nutrition, 65(5):569-73.</i></p>	<ul style="list-style-type: none"> Subjects were stratified by age of arrival in the US (before and after 10 years of age). There was no evidence for age-specific differences. The findings were similar in both cohorts: Chronic malnutrition was present. 	<p><u>Implications for interventions</u></p> <ul style="list-style-type: none"> The data used in this study were extracted from the records of a community health centre with a particular focus on refugee health and outreach. Services include onsite translators, extensive outreach programs and

Author/title	Results	Implications
	<ul style="list-style-type: none"> • HFA z-scores were low at the initial visit but improved over time. • BMI z-scores were normal at the initial visit and increased over time, but did not reach overweight or obesity levels. • The percentage of children who developed overweight or obesity was minimal when compared to the US population. 	<p>the promotion of culturally appropriate diets for refugee populations. This may explain why this cohort of refugee children appeared to fair better than refugee children resettled in other areas.</p>
<p>Yanni et al. <i>The health profile and chronic diseases comorbidities of US-bound Iraqi refugees screened by the International Organization for Migration in Jordan: 2007-2009. Journal of Immigrant Minority Health, 15:1-9.</i></p>	<p><u>Adolescent group 12-19 years:</u></p> <ul style="list-style-type: none"> • 360 (15.2%) were overweight (BMI \geq 85 to < 95% for age). • 241 (10.2%) were obese (BMI \geq 95% for age). • The prevalence of obesity among Iraqi children and teens (2-19 years old) was lower than for their US peers (BMI for age 11.0% vs. 16.9%, respectively). 	<p><u>Implications for interventions</u> Suggestions for post-arrival screening:</p> <ul style="list-style-type: none"> • Measure skinfold thickness • Assess diet, health and physical activity for children and teens. • Provide counselling and intervention strategies.
<p>Woodland et al. <i>Evaluation of a school screening programme for young people from refugee backgrounds. Journal of Paediatrics and Child Health, 52:72-79.</i></p>	<ul style="list-style-type: none"> • Programme partners and participants reported satisfaction with the programme. • Over 90% of IEC students from a refugee background participated in the program. <p><u>Health screening:</u> Included dental problems, vision/hearing impairment, weight status, vitamin deficiencies.</p> <ul style="list-style-type: none"> • 90% of participants screened positive for at least one health condition. • 80% screened positive for 2+ conditions. <p>Participants requiring further assessment:</p> <ul style="list-style-type: none"> • 23 (7.8%) underweight • 56 (19.1%) overweight/obese 	<p><u>Implications for health</u></p> <ul style="list-style-type: none"> • High rates of health conditions were identified among adolescent refugees, including overweight and obesity. <p><u>Implications for interventions</u></p> <ul style="list-style-type: none"> • There is a need for routine screening among this group.
<p>Mude & Mwanri. <i>Barriers to Participation in Physical Activity Among South Sudanese Children in South Australia. Family and Community Health, 39(4):293-300.</i></p>	<p>Narratives were categorised into six themes:</p> <ol style="list-style-type: none"> 1. Unsafe neighbourhood, environment, and perceived danger 2. The influence of government policies regarding children 3. Acculturation/changed lifestyle after migration eg. technology, lost opportunity for incidental physical activity 4. Individualism and collectivism: cultural clash in parenting styles 5. Negative societal attitudes toward South Sudanese children 6. Influence of low socioeconomic status among parents 	<p><u>Implications for health and interventions</u></p> <ul style="list-style-type: none"> • A number of environmental, socioeconomic, and cultural barriers were identified that can limit participation in physical activity among South Sudanese children including distrust of the surrounding neighbourhood and social isolation. • Increased physical activity may be facilitated by the creation of supportive and inclusive environments for children to participate.
<p>Renzaho et al. <i>Intergenerational Differences in Food, Physical Activity, and Body Size Perceptions Among African Migrants. Qualitative Health Research, 22(6): 740-754.</i></p>	<p>Major themes:</p> <ol style="list-style-type: none"> 1. Food and physical activity 2. Preference of body size and social expectations 3. Perceived consequences of various body sizes. <ul style="list-style-type: none"> • Incongruence between parents and children relating to body size perception, food, and physical activity. • Parents may seek to reinforce and maintain traditional values and beliefs regarding body size perception. • Most parents preferred large body sizes and did not perceive any health consequences if 	<p><u>Implications for health</u></p> <ul style="list-style-type: none"> • Differences in acculturation may explain differences between parents and their children regarding body size perceptions and health consequences. • The intergenerational acculturation gap appeared to contribute to poor relationships between parents and their children; ineffective feeding practices; and personal, inter-generational, and intra-familial conflicts. • The eating behaviours of adolescent

Author/title	Results	Implications
	<p>children weren't obviously sick or teased at school.</p> <ul style="list-style-type: none"> Parents lacked awareness and knowledge about the health consequences associated with diet and being overweight, and the health benefits of physical activity. Children may be more likely to integrate and rapidly acquire new cultural values eg. being slim to be accepted by their peers. Young people often rejected traditional foods and received money to purchase lunch. They were likely to snack on high-energy, low-nutrient foods at school canteens and/or to skip meals. 	<p>participants in this study predispose them to risk factors for obesity, and chronic diseases related to obesity, during adulthood.</p> <p><u>Implications for interventions</u></p> <ul style="list-style-type: none"> Address intergenerational challenges to improve targeting and delivery of settlement programs. Link obesity prevention programs with settlement programs to address acculturation issues and inter-generational conflicts. Focus on improving parents' knowledge about healthy eating and the benefits of physical activity, and dispel myths about the causes of chronic diseases related to obesity. Increase the emphasis on improving relationships between parents and their children, with a focus on conflict resolution.
<p>Renzaho et al. <i>The Healthy Migrant Families Initiative: development of a culturally competent obesity prevention intervention for African migrants. BMC Public Health, 15:272.</i></p>	<p>Pilot results:</p> <ul style="list-style-type: none"> Obesity identified as a significant health issue among SSA children. Drivers of obesity were related to inter-generational differences in parenting beliefs, family functioning, health literacy and lifestyle in a new culture. Inconsistent discipline and lack of parental supervision were accounted for a significant proportion of variance in children's BMI. The Healthy Migrant Families Initiative was developed to assist African families in their transition to life in a new country. Parents are the target group for the intervention. <p>Intervention goal: "to promote healthy eating and physical activity levels among children by strengthening family cohesion, enhancing family resilience, and promoting whole family lifestyle change."</p>	<p>The program was not evaluated as part of this study.</p> <p><u>Implications for interventions</u></p> <ul style="list-style-type: none"> Consider and address the role of family and parental factors within interventions that address overweight and obesity among adolescent refugees.

PREVALENCE OF OVERWEIGHT AND OBESITY AMONG ADOLESCENT REFUGEES AND MIGRANTS

Five of the included studies provided data on body mass index (BMI), overweight and obesity for refugees and immigrants in the adolescent age group. However, due to the limited number of studies, and the substantial differences between the cohorts of participants, it is difficult to draw definite conclusions about the prevalence of overweight and obesity from the results of these studies.

Two studies reported on changes in BMI and the prevalence of overweight and obesity over time. Wahi et al. (2014) examined BMI among immigrant and non-immigrant youth in Canada, and found that 18% of Canadian immigrant youth were overweight or obese, in comparison to 21.8% of non-immigrant youth. However, length of time residing in Canada was associated with higher z-BMI scores and increased odds of overweight or obesity among immigrant youth (Wahi et al. 2014). A second study investigated changes in BMI z-scores among two cohorts of refugees aged 0 to 18 years from South East Asia and Africa (Sandell et al. 2017). While BMI z-scores were normal at the initial visit and increased over time, participants did not reach a level of overweight or obesity, and the percentage of children who developed overweight or obesity was minimal in comparison to the US population. These findings were similar for participants who had

arrived in the US before 10 years of age, and for older participants who had arrived after 10 years of age (Sandell et al. 2017).

Three studies provided cross-sectional data on the prevalence of overweight and obesity. Yanni et al (2013) reviewed BMI data from a large cohort of Iraqi refugees prior to their resettlement in the US. The prevalence of overweight and obesity among refugees aged 12 to 19 years was 15.2% and 10.2% respectively; lower than for children in the US aged 2 to 19 years (Yanni et al. 2013). A second Australian study including a cohort of 284 African migrant adolescents aged 12 to 17 years reported the prevalence of overweight and obesity to be 24.6% and 9.8% respectively (Cyril et al. 2016). These findings suggest that this refugee cohort, who had been residing in Australia for an average of approximately six years, were experiencing similar rates of overweight and obesity to children from the general Australian population (AIHW, 2017). Similarly, a health screening intervention for newly arrived refugees from IECs in Australia (Woodland et al. 2016) found that 19.1% of participants in the program required intervention for either overweight or obesity. However, unlike the findings from Canada, length of stay in Australia among African migrant adolescents was inversely associated with childhood obesity meaning that participants who had resided in Australia for a longer period of time had a lower BMI (Cyril et al. 2016).

FACTORS THAT MAY CONTRIBUTE TO THE DEVELOPMENT OF OVERWEIGHT AND OBESITY AMONG ADOLESCENT REFUGEES

Four studies, all from Australia, provided some insight into the complex web of factors that may predispose adolescent refugees and migrants to becoming overweight and/or obese. These studies discuss the significance of parental and family relationships and functioning, as well as a number of social, cultural and economic factors to health behaviours, such as physical activity and eating habits (Mude & Mwanri, 2016; Renzaho et al. 2015; Renzaho et al. 2012).

Mude & Mwanri (2016) describe a range of factors, from a parental perspective, that affected the participation of South Sudanese children aged 5 to 14 years, from a refugee background, in physical activity. Fear and distrust about neighbourhood safety; changes to lifestyle and parenting styles as a result of migration; negative societal attitudes toward South Sudanese children; and socioeconomic status, all worked to limit the capacity and opportunity for children to participate in physical activity.

Renzaho et al (2012) explored the perspectives of refugee and migrant adolescents and parents in relation to body-size perceptions, eating, and physical activity. This research was used to inform the development of the Healthy Migrant Families Initiative (HMFI), which was the focus of Renzaho et al (2015). Parents often preferred larger body sizes and demonstrated a lack of knowledge about the effect of diet, weight and physical activity on health. Children were more likely to acquire cultural values and behaviours that were aligned with their peers, such as the need to be slim. They also skipped meals, rejected traditional foods, and snacked on high-energy, low nutrient foods at school canteens (Renzaho et al. 2012). The results of pilot studies used to inform the HMFI identified obesity as a significant health issue for sub-Saharan African children, and inter-generational differences in parenting beliefs, family functioning, health literacy and lifestyle in a new culture as having a role in the development of obesity (Renzaho et al. 2015). The findings of Cyril et al. (2016) provide further evidence to support the influence of family-related factors on child BMI reporting a positive relationship between poor family functioning and child BMI, as well as associations with family type and family communication.

POTENTIAL IMPLICATIONS FOR PRACTICE: INTERVENTIONS TO ADDRESS OVERWEIGHT AND OBESITY AMONG ADOLESCENT REFUGEES

The findings of these studies point toward a number of potential implications for consideration by health professionals and health services working with adolescent refugees and migrants.

The results about prevalence of overweight and obesity are limited and inconclusive. However, there is some evidence to suggest that adolescents and young people from refugee and immigrant backgrounds arrive in their resettlement countries with high rates of health conditions, including overweight and obesity (Woodland et al. 2016), and can also be at risk of becoming overweight and/or obese post-arrival (Wahi et al. 2014). Renzaho et al. (2012) identified eating behaviours, such as snacking on high-energy, low nutrient foods, that may predispose young people to risk factors for obesity, and related chronic diseases, during adulthood. These findings suggest a need for health screening programs and appropriate interventions for addressing overweight and obesity among adolescent refugees and migrants. However, further research and health screening data is required to provide more reliable evidence to inform such interventions and programs, and to determine future health implications.

The studies investigating the role of parents and families suggest there is a need for family-based interventions that adopt an intergenerational approach (Cyril et al. 2016). The HMFII provides an example of such an intervention, being delivered to parents and aiming to “*promote healthy eating and physical activity levels among children by strengthening family cohesion, enhancing family resilience, and promoting whole family lifestyle change*” (Renzaho et al. 2015). However, an evaluation for the success of this intervention was not provided as part of this paper. Family dynamics, communication and functioning; relationships between parents and children; and acculturation issues, appear to be factors in the development of overweight and obesity among adolescent migrants and refugees, and should be considered in the development of interventions that seek to address this issue (Cyril et al. 2016; Renzaho et al. 2012).

The multiple environmental, socioeconomic, and cultural barriers identified by Mude & Mwanri (2016), also suggest the need for interventions to go beyond the delivery of health programs that provide education about risk factors for overweight and obesity. Broader issues, such as social isolation, also need to be considered, and suggest a need for community-based responses and the creation of supportive and inclusive environments for children to increase their physical activity and reduce the risk of obesity (Mude & Mwanri, 2016).

The potential implications for research and practice from the findings of this review should also be considered against the changing demographic profile of the refugee population currently arriving in Australia. The studies included in the review provide information about previous cohorts of refugees and migrants which are likely to be of a different background to those currently being resettled. For example, the studies from Australia predominantly included cohorts of refugees and migrants from African backgrounds, and may not be reflective of the cohorts of refugees currently being resettled in Australia who are accessing and receiving care from health services.

CONCLUSION

The research evidence available describing overweight and obesity among newly arrived adolescent refugees and migrants is limited and for this reason it is not possible to draw concrete conclusions from this review. The included papers do provide some evidence to suggest that overweight and obesity is an important health issue for young refugees and migrants, and requires the attention of health services. However, further research is needed to provide more conclusive evidence about prevalence and the associated risk factors relevant to this group of young people. The included studies describe a number of complex factors that may contribute to and increase the risk of overweight and obesity among adolescent refugees and migrants. These factors suggest a need for targeted health interventions and present a challenge for policy makers and health professionals as they seek to improve health within this diverse group of young people.

LIMITATIONS

The findings of this review are limited by the small number of papers that were included, and there is a need for further research on this topic. There were limited resources and time available for conducting the literature searches, and for the review and synthesis of the included papers. This should be considered in the interpretation and use of these review findings. There may be other papers and documents available relevant to this health issue that have not been included in this particular review.

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