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REVIEW ARTICLE

Socioeconomic settings and food consumption patterns of 2–5-year-old children in developed countries: a scoping review

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Abstract

Introduction: Early childhood overweight and obesity, as a result of unhealthy dietary habits and sedentary life, is a growing global public health concern, particularly in Canada. There are limited data on how socioeconomic factors influence dietary habits of young children living in developed countries. **Methods:** We conducted a scoping review to examine the existing literature on how socioeconomic settings influence food consumption patterns of children 2–5 years old in developed countries. The inclusion criteria were relevant articles in the English language between 2007 and 2019. **Results:** From the initial 1854 articles, only 12 articles from Europe, Canada, and the United States met the inclusion criteria. There are differences in eating patterns of preschool-aged children based on parental education, whereas income level did not have a clear influence on dietary patterns. The existing studies suffer from a variety of limitations that limit a cohesive conclusion. **Conclusion:** Studies with children 2–5 years old are scarce. Parental education seems to influence the dietary habits of young children, whereas the role of income is not clear. There is a need for further high-quality research, preferably longitudinal studies, to inform health promotion initiatives and preventive strategies to facilitate healthy growth and development in young children.

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Introduction

A healthy diet in childhood can help ensure adequate childhood development. This includes motor skills, cognitive and language skills, and social skills (Black et al. 2015). It also aids in the prevention of childhood obesity. The nutritional composition and quality of diets during the early years are critical for setting the life course trajectory of health as they predict childhood overweight and obesity, which leads to adult obesity (Biro and Wien 2010), and are foundational to lifelong dietary habits (Black and Hurley 2007).

Both childhood and adult obesity continue to be a global public health concern (Biro and Wien 2010; Abarca-Gómez et al. 2017). In 2016, approximately 41 million children under the age of 5 years were overweight or obese, predisposing them to comorbidities such as asthma, increased fracture risk, early onset of antecedents of cardiometabolic diseases, and premature death and disability in adulthood (World Health Organization 2016). In light of the continued obesity crisis, a full understanding of potential preventative factors, such as healthy diets in the early years, is essential.

Indeed, in an effort to combat childhood obesity and mitigate the associated risk, the World Health Organization (WHO) set out a number of recommendations including the need for children to eat a healthy diet for proper childhood development (World Health Organization 2016).

Childhood overweight and obesity still remains more common in high-income countries (Min et al. 2018). One important dietary factor influencing nutritional health in high-income countries is the socioeconomic setting (Darmon and Drewnowski 2008). The socioeconomic setting is comprised of factors including household income, parental education, and affluence of the home, neighborhood, and occupation (Darmon and Drewnowski 2008). Studies have identified parental socioeconomic status (SES) to be salient in predicting diet quality of older children (Zarnowiecki et al. 2014). From research on the factors predicting food consumption patterns in children, it is clear that there are disparate and distinct influencing factors between younger and older children (Zarnowiecki et al. 2014; Luybli et al. 2019). The importance of parental SES to diet quality in preschool children is less clear and it should not be assumed that the factors influencing eating behaviours in older children are the same as those of younger children. For example, previous research indicates that as children transition to adolescence they have increasing autonomy over their food choices (Fitzgerald et al. 2010), whereas preschool children rely heavily on the food choices of their parents (Scaglioni et al. 2018). Factors such as convenience and cost of food and time constraints also influence adolescents' food consumption (Fitzgerald et al. 2010). We would not expect these factors to have the same influence on preschoolers' dietary intake; however, literature on the topic is scarce. Similarly, there is adequate literature including scoping reviews and meta-analyses on predictors of diet quality in preschool children in low-income countries, but we cannot assume that the factors will be the same in high-income countries, yet there is little literature with which to compare. Identifying the factors influencing the diet and nutrition of preschool children in high-income countries has the potential to enhance child health and ensure healthy eating across the life course and, in doing so, offset incidence of childhood and adult obesity.

We have undertaken this scoping review to ascertain existing literature, summarize study findings, and identify gaps in the evidence pertaining to how socioeconomic settings influence food consumption patterns of children 2–5 years old. To address these aims, we identified our research question as, "What does the literature suggest on how socioeconomic settings influence food consumption patterns of children 2–5 years old in developed countries?" To our knowledge, there have been no scoping or systematic reviews on this topic.

Methods

Scoping reviews are used to approach broad areas of research to identify gaps in the literature, clarify the key concepts, and help inform practice and testing in the field (Joanna Briggs Institute) (Peters et al. 2020). We used Arksey and O'Malley's (2005) six-step methodological framework to guide this scoping review. Their framework includes: (*i*) identifying the research question; (*ii*) identifying relevant studies; (*iii*) carefully selecting studies; (*iv*) charting the data; (*v*) collating, summarizing, and reporting the results; and (*vi*) consultation.

Study selection

We identified relevant articles using three electronic databases including Medline, the Cumulative Index to Nursing and Allied Health Literature (CINHAL), and Public Health Database. These databases were selected after multiple consultations with a University of Saskatchewan librarian expert in scoping reviews.

The search terms included: feeding behavior or diet or dietary behavio* AND socioeconomic factors OR income OR educational status OR social determinants of health OR occupations OR employment AND urban/or rural population OR area of residence. The inclusion and exclusion criteria was modelled after Zarnowiecki et al.'s (2014) study that looked at differing SES in children aged 9–13 years old. The inclusion criteria were: (*i*) children aged 2–5 years old, although due to varying definitions of preschoolers, 6-year-olds were also included; (*ii*) investigate influencers of child dietary patterns in relation to at least one indicator of socioeconomic factors (education, income, employment status, social class, area-level SES); (*iii*) studies conducted on humans; (*iv*) full-text papers published in peer-reviewed journals in the English language, papers that were published between 1 January 2007 and 17 September 2019; (*v*) studies conducted in developed countries that are classified as high-income, using the World Bank Group (2016) definition: a country with a gross national income per capita of $12 236 USD or more. High-income country filters were applied in CINHAL and Public Health Database. Papers were limited to the indicated period in the interest of staying aligned with stage 5 of the nutrition transition. In developed countries, the food environment has transitioned through several patterns over time: (stage 1) a hunter-gather diet; (stage 2) early agriculture where famine was prevalent; (stage 3) end of famine; (stage 4) overeating foods high in energy but containing more fat, sugar and processed foods; and finally (stage 5) behaviour change to combat chronic conditions (Popkin 2006). This "nutrition transition" has been linked with the rise in noncommunicable diseases like obesity (Popkin and Gordon-Larsen 2004; Popkin 2017). The rise in overweight and obesity rates in most developed countries suggest that the early1990s was the shift into stage 4 (Popkin 2006). The chronic conditions that we are currently treating and attempting to prevent is the stage of present society. Stages in the nutrition transition prior to 2007 are not within the scope of this review as the aim of this review was to look at the most current literature relevant to present-day health complications. Exclusion criteria included: (*i*) no statistical analysis approaches reported; (*ii*) studies not involving children aged 2–6 year old; (*iii*) studies not conducted on humans; (*iv*) studies in languages other than English, with no English translation; (*v*) studies where diet was not the primary concern of the study; (*vi*) studies investigating dietary intake correlates in relation to eating disorders; (*vii*) studies involving special groups of participants, for instance, overweight/obese children, or ill individuals; (*viii*) papers in low-SES groups only, with no comparison among groups of different SES; and (*ix*) studies conducted in countries that are classified as low-income, lower-middle-income, or upper-middle-income using the 2016 World Bank definition (countries with a gross national income of less than $12 235 USD per capita). Covidence systematic software (Veritas Health Innovation, Melbourne, Australia, 2019) was the screening tool used for this review.

Charting the data

We analyzed selected articles by charting study characteristics and key points. **Table 1** illustrates the extracted data including: the first author, origin country, sample size and population, study design, methods, outcomes, and key findings relevant to the research question.

Summarizing and reporting the results

After charting the data, key themes and knowledge gaps were identified using a narrative synthesis by two of the co-authors (SMA, EBT). Key themes such as high parental education, low parental education, parental income, location, and other socio-demographic factors were reported. A stakeholder consultation was not held due to the low yield and logistical constraints.

Results

The primary search yielded 1854 articles. We removed 182 duplicates and removed 1634 articles after the title and abstract screening. Five records were added after hand searching. We screened

Table 1. Summary chart of selected articles.

Study	Sample size and study population	Study design	Methodology/ methods	SES indicator	Nutrition outcomes	Key findings related to the research question
Fisk et al. (2011)	$n = 1640$, 3-year-old children	Cross-sectional	Interview administered FFQ, PCA	Education level Deprivation score based on mother's address Employment status Food security score Birth order Maternal marital status	Prudent diet score	Maternal diet is highly related to child's diet. Higher quality diets were more common in children with mothers who had a higher level of education and who lived in less deprived areas.
Huybrechts et al. (2011)	$n = 696$, 2.5–6.5-year-old children	Cross-sectional	3-day food diaries, parental questionnaire	Educational level Employment status Family size	Calcium and vitamin D intake	A higher calcium intake was associated with higher maternal and paternal education as well as increased family size.
Kristiansen et al. (2013)	1999: $n = 17202007$: $n = 1674$ 2-year-old Norwegian children	Longitudinal	Semi-quantitative FFQ, including child and parent characteristics, PCA	Number of children Maternal marital status Employment status Education level	Dietary patterns	1999: Higher parental education levels were associated with lower scores for the unhealthy pattern and higher scores for a healthier pattern. 2007: As paternal educational level increased, the mean score for the healthy pattern significantly increased. Higher maternal education was associated with lower mean scores for the baby food pattern.
Lioret et al. (2008)	3–6 years: $n = 340$ (7–11 years: $n = 408$)	Cross-sectional	7-day food record, self-reported, and face-to-face questionnaires	Occupational level	Food intake and physical activity	The identified healthy eating pattern showed a positive but non-significant relationship with SES.
Mcgowan et al. (2012)	$n = 434$, primary caregivers of 2–5-year-old children	Cross-sectional	Parent-report community survey	Education level	Fruit and vegetable consumption and snacks and sweetened beverage consumption	Maternal intake biggest predictor of child's intake. One of the predictors of children's consumption of non-core drinks was lower parental education level.
Pabayo et al. (2012)	$n = 2015$, 4–5-year-old children	Cross-sectional	FFQ	Postal codes for neighbourhood-level SES	Dietary intake	Children from poorer backgrounds were significantly more likely to consume foods excessively high in calories at least once a week. Children from higher SES neighbourhoods were significantly less likely to consume foods to be chosen least often than were children from lower SES neighbourhoods.
Sotos-Prieto et al. (2015)	$n = 2062$ 3–5-year-old children and their parents, $n = 1949$	Cross-sectional	Validated questionnaires	Education level Family size Family income	Dietary habits Physical activity habits	Higher parental educational level and income status were associated significantly with a higher KIDMED score

(*continued*)

Table 1. (*concluded*)

Study	Sample size and study population	Study design	Methodology/ methods	SES indicator	Nutrition outcomes	Key findings related to the research question
Torres-Luque et al. (2018)	$n = 363$, 3–5-year-old children	Cross-sectional	KIDMED index	Urban or rural place of residence	Adherence to the Mediterranean diet	No association between place of residence and AMD was found.
Fogarty et al. (2007)	2003: $n = 5606$; 2004: $n = 5111$; 2005: $n = 3382$	Longitudinal	Parentally completed questionnaires	Parental post code	Fruit intake	Proportion of children eating fruit daily increased in the intervention group compared to the control Once children in intervention region, ceased to participate, the proportion of eating fruit daily decreased to less than the control region Those living in more deprived areas ate less fruit at baseline in both regions. In the intervention region both more and less deprived ate more fruit
Kant and Graubard (2013)	2–5-year-old sub-group: $n = 12\,403$	Cross-sectional	National Health and Nutrition Examination Survey (NHANES) 1971–1974 to 2003–2008	Poverty income ratio (uses family income and poverty threshold) Educational level	Dietary and meal behaviour	The reported energy intake and amount of foods and beverages increased over time in the lowest poverty income ratio group only; in 2003–2008, both energy intake and amount of foods and beverages decreased with increasing poverty income ratio. The percent energy from all beverages declined over time in the 2 higher PIR categories.
Camara et al. (2015)	$n = 974$ children at 2, 3 and 5 years	Longitudinal	Self-reported questionnaires completed by mothers at different stages in follow-up, FFQ, PCA	Maternal marital status Educational level Occupational level Maternal working time Family income Presence of older sibling	Dietary patterns	Adherence to guidelines were positively and independently associated with both maternal and paternal education The adherence to a diet composed of processed and fast foods seemed to be determined by maternal variables (younger age, lower education), financial disadvantage, the presence of older sibling(s) and less structured childcare arrangements
Mak et al. (2013)	1.5–3 years: $n = 219$ 4–6 years: $n = 192$	Cross-sectional	4-day food diary	Occupational level	Fruit and vegetable intake	Factors other than HH SES may be important in driving food practices and decisions to provide fruits and vegetables to children Children from HH where fruits and vegetables were frequently bought have fruit frequency available at home, infrequently eat takeaway, and have higher fruits and vegetables consumption

Note: FFQ, Food Frequency Questionnaire; PCA, principal component analysis; AMD, adherence to the Mediterranean diet; PIR, poverty income ratio; HH, high-income household; SES, socioeconomic status; KIDMED score represents the child's AMD.

43 full-text articles for eligibility of which 31 articles were excluded due to the study design or outcomes not meeting the inclusion criteria. A final 12 articles were selected for this review. This process can be seen in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram, **Fig. 1** (Moher et al. 2009).

Characteristics of the studies

The characteristics of studies included in this analysis are presented in **Table 1**. Studies originated from Belgium (Huybrechts et al. 2011), Canada (Pabayo et al. 2012), France (Lioret et al. 2008; Camara et al. 2015), Norway (Kristiansen et al. 2013), Spain (Sotos-Prieto et al. 2015; Torres-Luque et al. 2018), the United Kingdom (Fogarty et al. 2007; Fisk et al. 2011; Mcgowan et al. 2012; Mak et al. 2013), and the United States (Kant and Graubard 2013). Four of the articles had a longitudinal study design (Fogarty et al. 2007; Kristiansen et al. 2013; Mak et al. 2013; Camara et al. 2015). The remaining nine studies were cross-sectional (Lioret et al. 2008; Fisk et al. 2011; Huybrechts et al. 2011; Mcgowan et al. 2012; Pabayo et al. 2012; Kant and Graubard 2013; Mak et al. 2013;

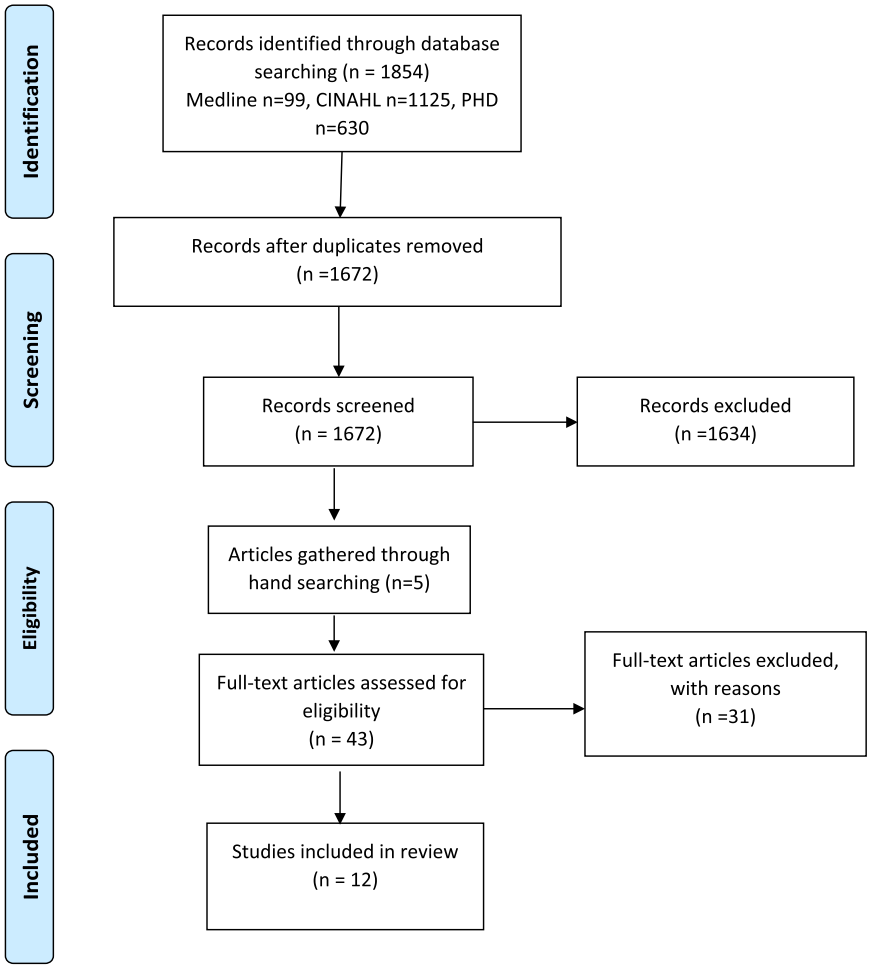

Fig. 1. PRISMA flow chart showing the review and article selection process. Figure adapted from Moher et al. (2009).

Sotos-Prieto et al. 2015; Torres-Luque et al. 2018). In regards to the longitudinal studies, the follow-up periods were, two years (Fogarty et al. 2007; Mak et al. 2013), four years (Camara et al. 2015), and eight years (Kristiansen et al. 2013). The data collection for all studies occurred between 1971 and 2018.

Study population

All studies included preschool-aged children from high-income developed countries. Children were between the ages of 2 and 6 years. All the studies included a parental survey or interview about SES variables except for two that used postal codes (Fogarty et al. 2007; Pabayo et al. 2012), and one that considered participants' residence in rural or urban areas. Parents either filled out Food Frequency Questionnaires (FFQs), food diaries, or questionnaires on diet quality for themselves and (or) their child(ren). Studies took place via preschools/schools (Fogarty et al. 2007; Huybrechts et al. 2011; Mcgowan et al. 2012; Rideout et al. 2015; Sotos-Prieto et al. 2015; Torres-Luque et al. 2018), hospitals (Camara et al. 2015), the parent's home (Lioret et al. 2008; Fisk et al. 2011; Kant and Graubard 2013; Mak et al. 2013), public health units (Pabayo et al. 2012), or by mail (Kristiansen et al. 2013). Sample sizes ranged from 340 (Lioret et al. 2008) to 12 403 (Kant and Graubard 2013) with nearly equivalent total male (n = 13 051) and total female (n = 2767) participants. The sample size for males and females are only approximations, as one of the articles did not distinguish between males and females.

Dietary intake measures

Dietary intake and dietary behaviour were collected using FFQs, food diaries, and surveys completed by parents/guardians or caregivers. One study examined child (3–5 years) self-report data in addition to parent-reported data (Sotos-Prieto et al. 2015). From the information collected, dietary data were assessed by either fruit and vegetable intake (Fogarty et al. 2007; Mcgowan et al. 2012; Mak et al. 2013), food intake (Lioret et al. 2008; Pabayo et al. 2012), dietary habits (Kant and Graubard 2013; Sotos-Prieto et al. 2015), dietary score (Fisk et al. 2011; Torres-Luque et al. 2018), micronutrient intake (Huybrechts et al. 2011), or dietary patterns derived from principal component analysis (Fisk et al. 2011; Kristiansen et al. 2013; Camara et al. 2015).

Socioeconomic status measures

Parental education was the most common indicator of socioeconomic status in the selected articles. Two studies used parental occupation as the sole indicator of socioeconomic status (Lioret et al. 2008; Mak et al. 2013). One study used the UK National Statistics Socioeconomic Classification (NSSEC5) as an SES household indicator, which is a standardized measure in the United Kingdom (Mak et al. 2013). The NSSEC5 uses employment relations and conditions surrounding occupation to determine socioeconomic status (Great Britain Office for National Statistics 2005). One study assigned high SES to those with executive or professional jobs, middle SES to employees or technician jobs, and low SES to other jobs or the unemployed (Lioret et al. 2008). One study used a combination of parental education, occupation, employment, household income, presence of an older sibling, and childcare arrangements (Camara et al. 2015). Postal code was used by two studies to indicate SES (Fogarty et al. 2007; Pabayo et al. 2012). Lastly, family income as an indicator of SES was used in three of the studies, in combination with at least one other SES indicator such as parental educational level (Kant and Graubard 2013; Camara et al. 2015; Sotos-Prieto et al. 2015).

Location

Our search yielded one article that explored the effect of urban and rural location to diet (Torres-Luque et al. 2018). The results of the study indicated that there were no differences in adherence to the Mediterranean diet between urban and rural areas in Spain. The small number of studies

did not allow us to draw any conclusions regarding the potential associations between urban and rural location and dietary patterns of preschool-aged children. From the studies that focused on SES, there were no mentions of the distribution of participant residence in terms of rural or urban, and only one study suggested that their findings might be limited to urban settings (Sotos-Prieto et al. 2015).

Assessing association between socioeconomic status and diet

A higher parental education was significantly associated with a healthier diet and dietary behaviours (Fisk et al. 2011; Huybrechts et al. 2011; Kristiansen et al. 2013; Mak et al. 2013; Camara et al. 2015; Sotos-Prieto et al. 2015), whereas a lower parental education was significantly associated with unhealthy dietary patterns (Mcgowan et al. 2012; Camara et al. 2015). Preschool-aged children of parents with the highest educational status had a lower energy intake from snacking, had a healthier eating score, and consumed more fruit and vegetables (Kant and Graubard 2013; Sotos-Prieto et al. 2015). Those who came from deprived neighbourhoods tended to consume excess calories (Pabayo et al. 2012; Kant and Graubard 2013).

The association between income and diet were less clear as the relevant studies used proxies to collect income data (Fogarty et al. 2007; Pabayo et al. 2012) and in other studies, income data were not collected. In the three studies that did collect income data, a higher income was associated with a healthier diet (Kant and Graubard 2013; Camara et al. 2015; Sotos-Prieto et al. 2015). Three studies used occupation as an indicator of SES. Two of the three found no significant association between occupation and diet (Lioret et al. 2008; Camara et al. 2015). The third study did find a relationship between high SES (indicated by occupation) and higher fruit and vegetable intake, suggestive of a healthier diet, in children (Mak et al. 2013).

Other socio-demographic factors

Three studies included family size when collecting sociodemographic data. One study found that increased calcium was significantly associated with increased family size (Huybrechts et al. 2011). The Norwegian study found that there was a significant association between the unhealthy dietary pattern and parity (Kristiansen et al. 2013). The other study, while reporting family size, did not further investigate family size and diet quality (Sotos-Prieto et al. 2015). In census data collection, family size is used to calculate poverty, thus it could be an important factor to consider when looking at SES (American Psychological Association 2020). Other parental and family characteristics such as maternal age and childcare arrangements may influence dietary patterns in young children and were included in some of the studies we reviewed (Fisk et al. 2011; Huybrechts et al. 2011; Kristiansen et al. 2013; Sotos-Prieto et al. 2015) but were outside the scope of this review.

Gaps in the literature

Nine out of the 12 articles were cross-sectional, indicating that there is a lack of high-quality study designs looking into the influence of SES on preschoolers' dietary patterns. Causation cannot be derived from cross-sectional analysis; thus, more quasi-experimental or randomized controlled trials are needed as further evidence. Many of the studies we reviewed included interventions targeting low-income or deprived populations; however, there was no comparison or control groups included that would allow for a more meaningful quantification of the effect of low SES on preschoolers' dietary quality. Many of the studies exploring SES in preschoolers are concerned with childhood obesity and only included diet as a covariate. There were very few studies that looked at dietary intake as an outcome of SES in preschoolers.

Discussion

To our knowledge, this is the first scoping review to collate the existing data, summarize the current understanding, and identify the gaps in the literature pertaining to how SES determines the eating patterns of preschool aged children in high-income countries. We found that, while a myriad of papers exist, exploring the relationship between eating patterns and SES in older children and adolescents, studies with children 2–5 years of age are scarce, and there is a need for further research in this population. Based on the findings from the 12 papers identified involving younger children, we suggest that a positive relationship exists between parental education and diet quality in developed countries. The relationship between income and preschool diet quality was not clear.

Education

The results suggest that both high maternal education (Smithers et al. 2011) and paternal education (Camara et al. 2015) influence healthier eating patterns in preschoolers. In support of our findings, a Canadian study conducted with fifth graders found that parents that were socio-economically advantaged tended to encourage and support their children to eat healthy (and be physically active) more so than their socio-economically disadvantaged counterparts (Simen-Kapeu and Veugelers 2010). An unhealthy diet was associated with low maternal education, in addition to younger maternal age, household financial disadvantage, presence of older siblings, and being cared for by someone other than their mother at home (Camara et al. 2015). This is not surprising as similar findings were found in the NHANES national survey in the United States in which children with parents in the lowest educational category were more likely to consume a greater proportion of their energy intake from snacking and obtain an eating score associated with an unhealthy diet (Kant and Graubard 2013).

As such, nutrition and dietary education for parents with young children may be a key intervention strategy for targeting childhood obesity, particularly for parents with lower educational attainment or lower income. For example, a nutrition education randomized controlled trial conducted in low-income parents showed improved nutrition behaviour changes, including feeding their children, after this trial (Dollahite et al. 2014). Preschoolers' dietary intake is likely fully dependent on what their parents provide them to eat, indicating that parental nutritional knowledge may be an important factor contributing to preschoolers' dietary patterns.

Income

The results were inconclusive regarding parental income and eating patterns, which was unexpected as a consistent relationship has been found in adults (Patrick and Nicklas 2005; Darmon and Drewnowski 2008). For example, two review studies found that higher quality diets are generally consumed by highly educated and more affluent people whereas a lower diet quality was more common in those with a limited education and income (Patrick and Nicklas 2005; Darmon and Drewnowski 2008). Another study in the United States, looking at purchasing patterns based on household income, found that people from lower income households purchased lower quality foods than those from high-income households (French et al. 2019). This suggests that those from low-income households consume a diet with limited nutritional quality, whereas high-income households consume more nutritional diets (French et al. 2019). There is a lack of evidence supporting or refuting the impact of family income on preschoolers' diet. We suggest that this may be because most studies identified used a combination of income and education to indicate SES. As such, we were unable to parse the independent effect of income on preschoolers' diet. This observation is the second gap identified in the literature and further research is needed to clarify the role of income on dietary patterns of preschoolers.

Other than increasing household income, it is incredibly challenging at the level of the individual to make changes that would greatly improve their diet quality. A strategy to address food insecurity due to limited resources is through policy and public programs. In the United States, there are programs such as the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) that have potentially decreased the prevalence of child food insecurity by approximately 20% (Kreider et al. 2016). However, for WIC specifically, program participation is low likely due to structural barriers (Liu and Liu 2016). Although such initiatives can improve diet, it can be difficult to foresee flaws of programs and policies; thus, it is important to conduct pilot projects and ensure that researchers and policymakers have strong partnerships.

Gap in evidence about preschoolers

In a systematic review conducted on children aged 9–13 years, the authors found that parents with low socioeconomic status were less likely to model healthy eating behaviours than parents with a high socioeconomic status (Zarnowiecki et al. 2014). However, these findings were based on children aged 9–13 years. While the relationships may be similar in preschoolers, there is a need for evidence-based interventions able to confirm this. The lack of studies in preschool children is particularly concerning because it has been demonstrated that the early years between 2 and 5 are pivotal for the development and establishment of lifelong health behaviours (Mikkila et al. 2005). For example, a prospective longitudinal study found that the strongest indicator of foods liked by 8-year-old children was based on the foods liked at 4 years of age (Skinner et al. 2002). It is evident that food preference for healthy foods is formed in the early years (Nicklaus et al. 2005).

In the context of developed countries, a vast number of young children attend childcare where they can consume up to two-thirds of their daily diet. A US-based study suggests that children tend to consume healthier diets in childcare than at home (Sisson et al. 2017). Additionally, data from the Healthy Start/Départ Santé project in Canada suggest that parental SES did not impact child uptake of nutrition education encouraging healthy eating behaviours (Anstruther and Vatanparast 2018). This may warrant implementation of funding programs for childcare enrolment and centres to ensure that children are consuming a healthy diet. However, more research examining if healthy eating behaviours learned in childcare could mitigate potential unhealthy behaviours learned in the home environment is needed.

Limitations

This study is not without its limitations. Only English studies were included as the main reviewers (SMA and EBT) speak only English, which may have led to a selection bias. Our review looked only at developed countries as the diet and SES relationship is likely to be different from that found in developing countries. For example, a systematic review on dietary patterns and socioeconomic factors in children aged 2–19 years old living in high-, medium-, and low-income countries, found that there tended to be unhealthy dietary patterns in the more affluent groups in medium-income countries (not significant), whereas the results were inconclusive in low-income countries (Hinnig et al. 2018). Alternatively, in high-income countries, higher parental education was associated with a healthy dietary pattern and lower education with an unhealthy pattern (Hinnig et al. 2018) and that a higher income correlated with a lower adherence to the unhealthy dietary pattern (Hinnig et al. 2018). Thus, the context surrounding dietary patterns and SES in developed and developing countries differ considerably. Lastly, we did not proceed with the sixth step of Arksey and O'Malley's (2005) framework due to the limited yield and logistical constraints.

A limitation of the studies included in this review was that assessment methods were inconsistent. There is not a standardized way to measure diet quality, so it is difficult to make a cohesive

conclusion. Additionally, FFQs, food diaries, and surveys are prone to recall bias and subjectivity, but other methods would not have been as feasible given the large sample sizes in each of the studies. Similarly, varying indicators were used to measure SES across studies, meaning that a low SES in one study may be deemed a moderate SES in another study. As there is no gold standard for measuring SES, it is difficult to compare studies objectively, both within and between countries. Regarding dietary assessment methods, future studies should consider using a weighted food intake/food waste method as it has shown to be the most accurate measure in children aged 0.5–4 years (Burrows et al. 2010).

Conclusion

This scoping review suggests that there are differences in eating patterns of preschool-aged children based on parental education while income level did not have a clear influence on dietary patterns. More high-quality studies, such as longitudinal studies and randomized controlled trials, targeting this age group are warranted. A standardized measure of SES and higher-quality dietary assessment methods would contribute to a more comprehensive analysis of SES and dietary patterns. Lastly, the lack of literature on preschool-aged children is particularly concerning considering that these years comprise a critical learning period. Learning healthy behaviours from the early years, especially those from a low SES household, could enhance healthy eating habits throughout the life course, and reduce future burden of diet-related noncommunicable diseases such as overweight and obesity.

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Author contributions

SMA and HV conceived and designed the study. SMA and EB-T performed the experiments/collected the data. SMA, EB-T, and HV analyzed and interpreted the data. SMA contributed resources. SMA, EB-T, and HV drafted or revised the manuscript.

Competing interests

The authors have declared that no competing interests exist.

Data availability statement

All relevant data are within the paper.

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