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The role of social determinants on unhealthy eating habits **in an urban area in Mexico**: A qualitative study in low-income mothers with a young child at home

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ABSTRACT

Overweight and obesity are a severe public health problem in Mexico. National policies to fight unhealthy eating have been implemented but they don't target social and family environment determinants. Our study aimed to gain a deeper understanding of the determinants of unhealthy eating by exploring the perspectives and experiences of low-income Mexican women with a young child at home. We conducted a purposeful sampling to include participating kindergartens in Morelos, México. Women with a child enrolled in the kindergarten were invited to focus group discussions. Afterward, women with specific profiles were invited to in-depth interviews. During analysis we applied Dahlgren and Whitehead's model of social determinants of health (SDH). Overall, we found that participants have unhealthy habits, for example: low variability in consumption patterns, regular sugar-sweetened beverages intake and insufficient fruit and vegetable intake. **By low variability we mean frequently consumed products (on most days of the week) limited to a restricted food set.** As for the determinants of unhealthy habits, we found at the community level that families encourage unhealthy eating. At the household and work level, tight schedules for food preparation determine unhealthy eating. And, at a socio-economic level, lack of access and money constraints shape unhealthy habits. Unhealthy habits are determined by factors on multiple levels and using an SDH approach can be an effective way to inform comprehensive strategies targeting the overweight and obesity epidemic in Mexico and other low- and middle-income countries.

1. Introduction

Over the past decades, the globe has experienced an epidemiological transition, during which chronic diseases, for which unhealthy eating habits are a risk factor, overtook infectious diseases as the leading causes of morbidity and mortality (Lim et al., 2012). **This trend, which is expected to continue to rise during the next decades, entails large human, social and economic costs which add pressure (such as increasing disability, loss of quality of life and health-care expenses) on already overstretched health and social care systems** (Cawley & M, 2012; Harvard T.H. Chan School of Public Health, n.d.). **Overweight and obesity not only are the leading risk factors for chronic diseases, such as metabolic diseases and some cancers** (Malik, V. S., Popkin, B. M., Bray, G. A., Després, J. P., & Hu, 2010)**; but they usually are preventable factors** (World Health Organization (WHO), 2003)**and should therefore be targeted if the upward trend in chronic disease morbidity and mortality is to be abated** (Webber et al., 2014).

These chronic diseases can increase disability, loss of quality of life and health-care expenses (Cameron et al., 2012; Grimble, 2010; Ramón-Arbués et al., 2018). In Mexico, they are a severe public health threats, as 75% of adults 20 years and older are overweight or obese (Instituo Nacional de Salud Pública, 2018). High intake of sugar-sweetened beverages (SSB) and high-calorie foods are among important determinants of the overweight and obesity epidemic (Popkin, 1999; Popkin & Gordon-Larsen, 2004). SSB and high-calorie foods represent 26% of the total daily energy intake in Mexico (9.8% for SSB and 16% for non-basic foods high in energy density) (Aburto et al., 2016).

Consequently, the Mexican government has established national-level strategies with the goal of diminishing unhealthy eating. Based on the National Strategy for the Prevention of Diabetes and Obesity

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(2012–2017), in recent years several policies have been implemented including fiscal policies on SSB and energy-dense nutrient-poor products, school regulations to restrict the supply of these products, regulations on food marketing targeted to children (Secretaría de Salud, 2013) and a new front-of-pack labelling on processed foods that provides quick and clear information on the content of the critical nutrients, which was implemented in October 2020 (DOF - Diario Oficial de la Federación, 2019).

Although international evidence has shown that determinants of unhealthy eating targeted by these policies, such as accessibility and knowledge on healthy food choices, are key for an adequate diet (Brug, 2009; Scaglioni et al., n.d.), the impact of such policies on such policies is yet unknown. These determinants, such as accessibility and knowledge have likewise been the target of a program in Mexico where students are encouraged to take up a healthy lifestyle—the National Action Program at Schools (*Programa de Acción en el Contexto Escolar, PACE*). This program integrates health promotion and education through promoting physical activity and ensuring access to food and beverages that facilitate a proper diet within schools by regulating food sold in schools (Arroyo & Carrete, 2018). However, an evaluation of the *PACE* showed that students still lacked the skills to make healthy food choices and they are not provided the regulatory minutes of physical activity (Arroyo & Carrete, 2018). Therefore, additional interventions are needed to facilitate and promote the uptake of a healthy diet.

In particular, research has underlined the importance of targeting social relationships and family environment determinants, as these have a significant role in influencing unhealthy habits. **For example, two studies conducted to investigate the social influence on intake patterns, found that informants associate different food types with different social contexts: participants tended to associate and consume healthy food with family and junk food with friends** (Guidetti et al., 2015)**. As for the influence of family environment on unhealthy eating a** systematic review of qualitative studies on parental perceptions regarding healthy behaviors for preventing overweight and obesity in young children concluded that, because of the intergenerational influences on parental health beliefs and knowledge, health promotion strategies may be more effective if directed at the extended family (Pocock et al., 2010). As for the Mexican context, a study addressing the influence of socioeconomic determinants on the development of overweight and obesity in the mother-child binomial found a significant association between intergenerational transmission of obesity and socioeconomic aspects, such as income of the mother (Arredondo et al., 2020). Another Mexican study found that the metabolic profile of obese children had improved after their mothers had participated in an intervention promoting healthy eating (López-Contreras et al., 2020).

Evidence has shown that social determinants of health (SDH) such as social and family context and economic stability are associated with unhealthy eating. For example, research shows that highest income groups, with higher levels of education, and living in more advantaged neighborhoods, are more likely to eat a healthy and balanced diet and have better health outcomes. On the other hand, people living in remote and/or socioeconomically disadvantaged areas are less likely to buy healthy food (Turrell et al., 2002) and more likely to be overweight or obese and more likely to die from chronic diseases (Friel, 2015).

Considering the important influence of social and family factors on unhealthy eating, the association between socio-economic disadvantaged groups and energy-dense-nutrient-poor products intake patterns and the limited evidence available in low and middle-income settings (Darmon and Drewnowski, 2008)**; our study aimed to gain a deeper understanding of the determinants of unhealthy eating by exploring the perspectives and experiences of low-income Mexican women with a young child at home. By understanding their perspectives on their diet and their experiences regarding preparing healthy food, we** aimed **to obtain information that will enable us to design tailored interventions and comprehensive strategies targeting the unhealthy eating in low-socioeconomic urban areas in Mexico.**

2. Methods

2.1. Recruitment of participants

The institute of basic education of the state of Morelos (IEBEM) provided contact information of potentially eligible kindergartens located in marginalized areas (in order to reach the target population). We decided to work within marginalized areas to ensure a broad collection of SDH that might influence unhealthy eating given that determinants, such as socioeconomic constraints, are strongly associated with unhealthy eating habits (high calorie-dense-nutrient-poor products intake) (Pechey et al., 2015)**. All kindergartens that were invited to participate accepted to be part of the project.**

A criterion sampling was conducted to recruit women who had at least one child enrolled in one of the four participating kindergartens eligible; there were no other inclusion or exclusion criteria. The kindergarten's staff and research team invited women to participate, they explained the study and collected contact information of women who expressed their interest to participate in the study. Afterward, through snowball sampling, women helped inviting more potential participants. Women interested in participating shared their contact information which was transferred to a contact list. From this list, research team members randomly selected women and contacted them. All contacted women by the research team agreed to participate in one of the 4 focus groups discussions (FGD).

2.2. Data collection

Semi-structured guidelines were used for both the interviews and the FGDs to explore determinants of unhealthy eating habits by exploring the following topics: daily eating habits, determinants of food choices and interest in changing/improving eating habits. FGDs and interviews were carried out by research assistants trained in qualitative methods. **FGDs and interviews facilitators were a female MD, MSc and a female MD**. During the FGDs, one researcher served as coordinator and another as an observer of the FGDs. **The observer helped taking field notes during and/or after the FGD and interviews. To ensure reflexivity, researchers conducting FGD and interviews kept journals throughout the sessions and were always conducted with more than one research team members present.** All FGD participants also answered a brief questionnaire to collect their sociodemographic data and information on their food and beverage consumption habits. Afterward, the individual, in-depth interviews were scheduled. **Interviews took 1 h and FGD 45 min.** The FGDs and interviews were conducted at the kindergartens. Participation was voluntary; all participants provided a signed informed consent; and the study was approved by the Ethics Committee from the National Institute of Public Health of Mexico.

2.3. Data analysis

All audio-recordings from interviews and focus groups were transcribed verbatim and uploaded into MAXQDA, a qualitative analysis software. Data underwent a **conventional** qualitative content analysis (Hsieh HF, 2005). **This approach aims to avoid preconceived categories and instead follows an inductive category development. First, the data was reviewed to identify emerging codes, with which an initial codebook was created that included definitions for each code.** Next, two researchers carried out an intercoder agreement exercise to refine the codebook and coding procedure: 10% of interviews were coded, seeking an agreement equal to or above 80%. **Once this was accomplished, using MAXQDA 11 Plus, a qualitative analysis**

software, we proceeded to code all data, afterward, the codes and clusters were grouped according to the different levels of Dahlgren and Whitehead's SDH (social determinants of health) model (Dahlgren & Whitehead, 1991a)**, and these were re-examined to ensure coherence and consistency.**

The SDH model describes the main influences on health as a series of interdependent levels, one on top of the other, in the following order: constitutional (age, sex and genetics), individual (e.g., knowledge, beliefs and personal habits), social and community (family, friends, neighbors and local community), housing and work (housing, education, healthcare access, industry-related work activities, etc.), and structural (general socio-economic, cultural and environmental conditions) (Dahlgren & Whitehead, 1991b). Constitutional factors, the first level of SDH, also play a role in health, but FGD and interviews did not delve into these because they are fixed factors over which there is little control for behavioral interventions(Dahlgren & Whitehead, 1991b).

The participant quotes presented in this paper were translated from Spanish to English with equivalence in meaning and tone using the recommended back-translation method. This method first requires that a bilingual individual translates the quote into the target language, and another bilingual individual then translates the material back into the original language. This process is iterated to check for quality and to make adjustments in the translation (Brislin RW, 2011).

3. Results

We summarize the findings of the study in five broad themes: 1) participants' characteristics and eating habits, 2) determinants at the individual level, 3) determinants at the social and community level, 4) determinants at the housing and work level, 5) determinants at the socioeconomic level.

3.1. Participants' characteristics and eating habits

Here we describe general characteristics of the participants, the low variability in consumption patterns, inadequate vegetable and fruit intake, and regular SSB intake and indulgement.

This qualitative study took place from May to June 2018. In total, four FGDs were organized with 30 women (between six and eight women per FGD). In addition, 10 women accepted the invitation for an in-depth interview. Participants' mean age was 30.5 years, ranging from 22 to 50 (Table 1).

a) ***Low variability in consumption patterns.*** When asking about the women's and their families' dietary habits, we found little variability in the foods consumed. Women consistently reported purchasing and cooking filling foods such as rice, beans and tortillas. As one informant mentioned: *"At home, I always have to have rice and beans. I mean, it's something my kids […] ask to eat almost every day" (P_17)*. Additionally, products preferred by children were purchased to minimize food waste, most of which are calorie-dense-nutrient-poor products: industrialized cereals, pastries, dairy desserts (such as sweetened yogurt) and industrialized sugar-sweetened milk beverages. Such foods were consumed on a daily basis, with new foods rarely being introduced to the diet.

b) ***Inadequate vegetable and fruit intake.*** Regarding vegetables intake, women reported incorporating a small proportion of vegetables into their diets; around a third of the participants (30%) mentioned they consume a maximum of two servings per day and almost half or the participants (46.6%) reported not eating vegetables on a daily basis (Table 2). When compared to vegetable intake, women reported consuming more fruit, and some stated that their vegetable consumption was indeed insufficient: *"If there's something I would like for us to consume more at home, it'd be vegetables, and something to be less frequently consumed, it'd be soda" (P1)*. It is worth noting however that a proportion of fruits are consumed in beverages known as "aguas frescas", which are fruit drinks usually flavored with an excessive amount of added sugar.

c) ***Regular SSB intake.*** Women were asked the number of days in a week they consume SSB; 44.8% reported drinking SSB once a week (Table 2). Participants reported during FGD that soft drinks, "aguas frescas," and industrialized sugar-sweetened fruit drinks were the most consumed beverages. Most women (79%) indicated consuming SSB to accompany their food; for example, with snacks such as industrialized sweet pastries, chips and also Mexican traditional dishes such as *mole* (i.e., a sauce based on chili peppers), beef broth, enchiladas, etc. One-woman comments on this that *"If we have a meal that we really enjoy, for example, enchiladas or something similar, then we feel it deserves to be served with soda" (P25)*. Respondents stated that they enjoy drinking sodas with such dishes because it enhances

Table 1
Participant characteristics (n = 30).

PERSONAL CHARACTERISTICS (n = 30)	
Age (mean)	30.5 years
Last school grade completed	
Primary	16.7%
Junior high	63.3%
High school	13.3%
University or higher	6.7%
Marital status	
Single	3.3%
Married or in union	90%
Separated or divorced	6.7%
HOUSEHOLD CHARACTERISTICS (N = 30)	
Income (MXN per month)	
Less than 2,500	50%
2,500–5,000	33.3%
5,000–10,000	13.3%
10,000–15,000	33.3%
Household size (mean)	4.6

Table 2
Food and beverage consumption and beliefs (n = 30).

Fruit, vegetable and SSB consumption (n = 30)	Proportion
Fruit consumption (pieces per day)	
1–2	43.3%
2–3	46.6%
3–4	10%
Vegetable consumption (pieces per day)	
None	46.6%
1–2	30%
2–3	13.3%
3–4	10%
SSB consumption in the last 7 days (glass per day)	
0	31%
1	44.8%
2–4	6.9%
5–6	17.2%
7 or more	0%
Reason for consuming SSB	
Quenching thirst	6.9%
Accompanying food	79.3%
Sharing time with others	6.9%
Preparing alcoholic beverages	6.9%
Knowledge about which diseases relate with SSB consumption	
Diabetes	80%
Obesity	63.3%
Dental caries	63.3%
Overweight	63.3%
High blood pressure	33.3%
Osteoporosis	20%
Depression	3.3%
Dementia	3.3%
No related disease	10%
Desire to stop SSB consumption	80%

their taste. As one informant said: *"Things taste better with Coke" (P13)*.

d) ***Indulging oneself.*** Some products were repeatedly associated as comfort foods and sweet pastries were highlighted among the most frequently consumed foods to please oneself. Participants commented on how the consumption of pastries is very common at home, and that all household members enjoy eating them, including the children. As numerous participants discussed: *"Personally, I'm a big fan of flour, of cookies and sweet pastries. It's hard for me to resist […] my dad is also very fond of sweets" (P2); "We always crave [sweet] bread, we really like [sweet] bread" (P18); "Even if I have fruit at hand or vegetables I could eat […] I always seek sweet bread […] my weakness is sweet bread" (P20); "It would help if there were less pastries in the house so that I could stop eating them […] so that it would not be so difficult for me" (P2);* and *"As a child I always had [sweet] bread and milk, that is how I got used to it " (P14)*.

Similarly, drinking SSB was often associated with happiness or as a comfort beverage. For example, one informant speaking about her son commented that *"He is happy when he drinks soda and fruit drinks"(P19)*. Another woman discussed how her partner drinks SSB to relax after arriving home from work: *"When my husband gets home, he says, 'Let's go buy some Coke and have a drink'" (P24)*. Other women reported consuming soft drinks to help themselves forget personal difficulties: *"Soft drinks, no, we don't drink them […] just Coke […] if we want to feel better." (P3)*.

3.2. Determinants at the individual level

For determinants at the individual level, we describe participants' knowledge, their perception about the cost of healthy food, and willingness to change their diet.

a) ***Insufficient knowledge.*** Participants did have some basic knowledge about the negative consequences associated with SSB overconsumption. They reported that SSB intake predisposes to diseases such as obesity, overweight and dental caries, among others (Table 2). An informant remarked on this that *"Soda […] makes you gain weight. That's what I was reading on the internet, […] I would like to consume less [soda]" (P1)*.

Additionally, women emphasized that they did not know enough healthy recipes: *"It's sometimes quite difficult because you do not have any more recipes" (P21)*.

Children were also identified as frequent consumers of industrialized sweetened fruit juices and mothers or other family members as the main providers of these beverages. This was because sweetened fruit juices were considered by families to be more appropriate or healthier for younger children, as opposed to soft drinks. Quoting two informants, "*Sometimes I would rather give him a Boing [processed juice] […] than a cola"* (*P2*); and "Well, the older boy asks for Coke and we give him some, but the young child […] he knows he can't have Coke, only juice" *(P8)*.

b) ***Believing healthy eating is expensive.*** Regarding beliefs on healthy eating practices, women repeatedly expressed thinking that a healthier diet implies higher costs. An informant commented that *"It is more expensive for me to be on a diet than eating what I am used to, so I better stick to it" (P22)*.

c) ***Willingness to change.*** Although not a determinant of unhealthy eating (the focus of this study), it is worth noting that 80% of women reported the desire to stop SSB consumption (Table 2). Additionally, several women expressed a desire to improve their eating habits or for their children to increase their consumption of fruit and vegetables. As a participant mentioned: "*We eat vegetables but […] I wish […] they'd [her children] eat more vegetables" (P5)*.

3.3. Social and community level

Regarding the determinants at the social and community level, we report on how some family members encourage unhealthy eating, on how unhealthy habits are established during family gatherings.

a) ***Families encourage unhealthy eating.*** We identified in the informants' discourse that family members encouraged both the consumption of industrialized products and SSB during family gatherings (i.e., grandparents encouraging children, mothers-in-law encouraging daughters-in-law, husbands encouraging partners); which was a barrier for habit changes. For example, grandparents were repeatedly identified as the family members that encourage unhealthy habits and provide high-energy and low-nutritional food and SSB. Informants comment on this that *"My mother-in-law really likes Coke [laughs], […] she invites me, she says 'Come on, let's have a Coke" [laughs] and we drink one' (P1)*; and "*Even worse in the evenings, yes, yes, he [husband] arrives and then we go shopping and he goes, 'Would you like some Coke?' and I go, 'No'; but then he buys it and then I drink* [laughter]" (P19).

Specifically, snacks were often used by families as a reward for children. For instance, an informant reported encouraging children to eat lunch by offering ice cream in return: *"[Quoting her child] 'Can I have an ice cream?'. [Answering her child] Yes, I will give you the ice cream, but you must eat first" (P14)*. Also, during special occasions or as a simple gesture of affection, some children are given sweets, ice cream, SSB and/or high calorie, low-nutrient processed products by their families. In participants' words: *"My husband […] would bring her [daughter] a chocolate egg, as a treat"* (P5); *"[…] these [fried foods] yes […] my parents buy them, they buy them for their grandchildren, […] around twice a week they do eat Doritos or Cheetos" (P7)*.

b) ***Unhealthy eating during family gatherings.*** It is important to point out that many of the Mexican traditional dishes that are usually accompanied with soft drinks are eaten to celebrate, and generally involve family gatherings. For instance, several participants described how their daily eating routines often change during the weekends due to family meetings. During these gatherings, women and their family members consume foods or beverages that they do not usually eat at home during week days. During these family gatherings, informants mentioned buying high-calorie prepared foods, such as pizza, fried chicken, tacos, or other Mexican traditional "antojitos". One source stated that *"Usually on weekends […] we have dinner or lunch with my mother-in-law […] [other times] we have the option to eat outside […] tacos or Kentucky Chicken" (P5)*.

c) ***Feedback from partners and friends.*** A barrier that repeatedly emerged within the women's discourse when asked about their desire to change unhealthy habits were negative and discouraging comments from their partners or friends. This is relevant considering that 90% of the participants were married or living in a consensual union (Table 1). Some women reported that, whenever they had tried to improve lifestyle habits, their partners or close friends reacted by stating that the driver behind women's willingness to change such unhealthy habits was the desire to look better for someone else or even presumed infidelities: *"Some people I know keep saying the reason I like taking Zumba lessons is 'cause I want to look hotter […] but they're wrong, I take Zumba lessons because I want to be healthier" (P16)*. Other women reported how their partners' comments encouraged them to continue with unhealthy behaviours. One woman, discussing the comments she received from her partner when trying to improve her lifestyle, stated:

"My partner, when I would come back from the gym […] he would make a lot of comments … in fact, he would tell me 'gain more weight, five more

kilos, ten more' […] or he would encourage me to drink chips and soda." (P9)

A woman even discussed how machismo (dominant men behaviours over women) impacted on their partner's perspective about the women's transitioning towards healthier lifestyles:

"Mexican men are machistas [macho men]; for example, if we [women] dress up, they'll [men] think we are likely flirting with someone else. Or if we [women] try to lose some weight, odds are we are trying to look good for a man." (P7).

3.4. Housing and work level

Here we explore participants' time for food preparation.

a) ***Tight schedule for food preparation.*** The majority of women had a low educational level (80% had only finished junior high school or less), most participants helped with providing income and all were responsible for taking care of the household and the children (average size 4.6 people. Therefore, the women had limited time for food preparation due to their many daily activities. Commenting on all the activities that are part of their daily routines, some respondents stated:

"I spend most of my time with my children, […] I wake them up […], I feed them breakfast, I come here [kindergarten] […] then I go home to cook lunch, at twelve o'clock I'm here again [kindergarten], then we're home again and doing homework." (P7)

As a consequence of their tight schedule, the women reported preference for quick and easy to prepare foods, such as sausages and ham, both reported to be eaten almost daily for breakfast. As one informant stressed her preferences for cooking quick-prep meals for her family, *"We buy it for emergencies, for when […] you have to go out and you don't have time to cook, there's the bread and the ham" (P3).*

3.5. Socio-economic level

In this section we explore access to food and money constraint.

a) ***Lack of access.*** We identified lack of access as a determinant for unhealthy habits. For many informants, it was not possible to obtain all food products that will be consumed at home at the same place, so they had to visit different establishments with a limited budget. This implies more time spent on searching and obtaining the products. One informant illustrates this as follows:

"I go to the Adolfo Lopez Mateos Market. That's where I buy all my vegetables and, for example, […] I buy meat here [her neighbourhood], […] I like to buy vegetables there, because it's cheaper, […] We go to Bodega Aurrera or to Sam's [supermarkets] to buy beans, rice, tuna, oil, oats, all that." (P9)

b) ***Money constraints.*** About half of the participants earned less than $2,500 MXN a month (125 USD) (Table 1), which was below the urban poverty line by income ($3265 MXN a month by person in June 2018) (CONEVAL, 2021). Money constraints determined food choice and purchasing behaviours that often result in less healthy food choices. Informants noted that economic constraints determined to a large extent the lack of variety and quality of the food they choose to purchase for their homes. Given these constraints, women used certain strategies that enable them to increase the variety of foods they purchase with a limited budget. For example, some women reported buying only seasonal food as a strategy to save money: *"I get the children what is, um, affordable […] Now is the season of manila mangoes […], and guava, […] so I get some" (P14).* Women also reported reducing meat intake as a money-saving yet undesirable strategy. An informant commented that *"The flanker steak, that one is too expensive to even smell […] because it's two hundred pesos/kilo […] not enough money for that" (P14).*

"I go to the market once a week, […] the next day my husband gives me my allowance, because the money flies away, […] the first two or three days I try to give them meat, and the rest of the days, I use the zucchini, the cheapest thing." (P15)

An additional issue linked to economic constraints is the fact that several women reported not having sufficient budget to purchase groceries at a weekly basis. Instead, they receive small, daily incomes, and therefore purchase household products on a daily basis. Given that every day women will spend time getting supplies, often from different establishments, they have a limited amount of time spare for cooking and resort to pre-made meals or quick recipes (which are not always nutritious). As one informant outlines: *"We shop daily […] I can't buy like that [weekly], I can' t go to a supermarket or go to the market and bring all week supplies" (P8).*

4. Discussion

In general, we found unhealthy habits such as low variability in consumption patterns, inadequate vegetable and fruit intake, and regular SSB intake. Other studies have likewise reported that most of the Mexican population (over 70%) consume less than the recommended daily amounts of fruits and vegetables (Ramírez-Silva I, Rivera JA, Ponce X, 2009). This highlights the need for developing national strategies aiming to increase the overall daily intake of fruits and vegetables (Luszczynska et al., 2007). Moreover, plenty of evidence highlights the large consumption of SSB in Mexico (Barquera et al., 2008; Lopez-Olmedo et al., 2016; Colchero, Rivera, Popkin, 2018; Stern et al., 1999, 2014).

Eating habits were determined by factors on multiple levels (i.e., individual, social and community, housing and work, and socio-economic level). At the individual level, unhealthy eating was driven by the desire to indulge oneself with unhealthy products (comfort foods), as well as by the belief that healthy eating is costly. When it comes to knowledge, women in our study correctly identified SSB and industrialized pastries as unhealthy, but they did not identify other foods they consume regularly as unhealthy (e.g., industrialized fruit juices, or traditional Mexican meals which are usually fried and consumed with large amounts of sour cream and cheese). Promotional campaigns should therefore raise awareness about the content of certain food products in order to enable people to evaluate a meal based on its content. **The campaign could include a basket of affordable healthy food to help them purchase cheaper options, such as seasonal fruits.**

Regarding the social and community level, an important insight from this study is the major role that families play in poor eating habits. Family gatherings were considered by our participants as rituals that encourage high-calorie and large-portion food consumption. In contrast to our findings (Coe et al., 2018), one study on Hispanic mothers living in USA stated that family food rituals may play a role in healthful eating, as rituals slowdown eating and may lead to lower food consumption. They asserted that these rituals could serve as leverage points for interventions designed to promote healthy eating behaviors (Coe et al., 2018). In addition, the women in our study repeatedly identified family members as those encouraging unhealthy eating, inviting them for drinking SSB or eating highly processed food. This again contrasts with an Italian study about the impact of family and friends on food consumption patterns, which reported that participants tended to associate healthy food consumption when eating with family yet junk food with

friends (Guidetti et al., 2014). Particularly in children, our findings suggest that they are more likely to be indulged by their grandparents, who have them eat processed or sugar-rich products, and use food as an indulging strategy. One study in China reported similar results, identifying grandparents as the main contributors to childhood obesity (Li et al., 2015). They found that children who were mainly cared for by their grandparents were more likely to be overweight/obese and to consume more sugar-added drinks and unhealthy snacks than children who were mainly cared for by their parents or other adults (Li et al., 2015). Taken together, these results highlight the importance for interventions to address the eating dynamics present in families. **Our findings may be different to studies in other countries as the culinary and eating habits may play different roles, particularly for low-income families deprived, constrained to purchase the food they would prefer. Also, because it illustrates the Mexican culture and how the family and friends have a strong influence over unhealthy habits.**

Unhealthy eating was also influenced by factors on the housing/work and structural levels. At the housing and work level, on a consistent basis, women were responsible for most household chores and thus had limited time available for grocery shopping and food preparation. **Gender unequal involvement in household chores by women and men has consistently been reported in studies. Involvement in household chores is higher in women than in men, and the perception of partner involvement is lower in women than in men (Cerrato, 2018). These findings are in line to what other authors have reported overseas (Seguin et al., 2014) and in Mexico (Arredondo et al., 2020). As a result, women have to optimize the unpaid work-time they will spend on house chores, and resort instead to easy-to-cook time-saving foods (e.g., rice and beans, fast foods or pre-made meals), which may result in lack of variation in diets and high-calorie-nutrient-poor products intake. The presence of more men sharing more fully in domestic duties for an extended period of time could have the potential to create a sea change in gendered norms — at home and at work. For example, women that report having equal partners at home are more successful at work (Harvard Business Review, 2021).**

As for the socio-economic level, the women pointed out access and monetary barriers to healthy heating. Another Mexican study on the determinants of overweight and obesity in the mother-child dyad likewise concluded that dietary patterns characterized by the consumption of processed foods are influenced by economic constraints and lack of access and availability of healthy foods (Arredondo et al., 2020). As for socio-economic level, women pointed out access and monetary barriers to healthy eating. Another Mexican study on the determinants of overweight and obesity in the mother-child dyad likewise concluded that dietary patterns characterized by the consumption of processed foods are influenced by economic constraints and lack of access and availability of healthy foods (Arredondo et al., 2020). **Food insecurity, which is an important SDH refers to the uncertainty, lack of, or inability to acquire nutritious food in a safe and socially acceptable manner due to economic constraints is associated with unhealthy dietary patterns and obesity (Agriculture USDo, 2015). There is evidence pointing out that the association between food insecurity and obesity is strongest for women (Morales & Berkowitz, 2016). Though we did not specifically explore food insecurity, many respondents reported economic uncertainty (they receive a limited amount of money on a daily basis to purchase that day's household groceries), which limits them from planning and diversifying food purchases, even to easily access a sufficient number of vegetables per day (as stated in Table 2). In addition, purchasing food supplies on a daily basis reduces women's available time, meaning that they must shop in nearby establishments where fresh or good quality products are not always available. This economic uncertainty and time constraints thus encourages women for easy-to-prepare food recipes (pre-made or fast-food recipes), which are generally poorly nutritious.**

Also, unhealthy eating was linked to partner's negative feedback and, specifically, "machismo" (i.e., a set of attitudes and behaviours that unjustly violate the dignity of women in comparison to men (Comisión Nacional para Prevenir y Erradicar la Violencia Contra las Mujeres, 2016)), which can be placed at the social (romantic relationships) and structural (gender roles) levels. Machismo, typically associated with ideas of aggressiveness, violence and dominance over women, can be a barrier to changing eating and physical activity habits for women. First, most women have to combine household activities, childcare and helping providing an income and so have limited time to buy and cook the food. In addition, whenever women decided to use this scarce spare time for self-care, such as for physical activities, they frequently faced opposition from their husbands. On this topic, a study about Mexican-origin male perspectives regarding diet-related behaviors reported that the adherence to traditional gender roles influences masculinity-driven preferences for unhealthy food over fruits and vegetables(Valdez et al., 2017). To achieve interventions which genuinely enable habit changes in women and their families, women and men must be provided with resilience tools to cope with the machismo that they face from partners and other family members (Valdez et al., 2017).

Although extensive evidence exists on the association between the SDH and unhealthy eating habits, less evidence is available in low and middle-income settings. Given the association between socio-economic disadvantaged groups and energy-dense-nutrient-poor products intake patterns (Darmon and Drewnowski, 2008), our study focused on a low socio-economic population with the aim of delving into their perspectives on their eating habits. Understanding the determinants of unhealthy eating both the design and implementation of tailored health strategies and/or interventions aimed to improve eating patterns in low-socioeconomic urban areas in Mexico. Given the heterogeneity of the population and the barriers that current health programs or campaigns face to reach specific population groups such as disadvantaged groups (i.e. through large social media campaigns), different tailored approaches are needed.

5. Strategies to address unhealthy eating determinants

Having identified the key SDH which prevent women from improving their and their family's consumption habits within a Mexican urban and low-socioeconomic context; as part of the analysis of this study, brainstorming sessions were held among the research team to outline comprehensive strategies for addressing such determinants. **All research team members had equal opportunities to participate, using a free-flowing approach idea were quickly generated and were recorded written down on a blackboard. This process stopped when ideas became redundant or infrequent. All recorded ideas were reviewed for duplication. Remaining ideas where then evaluated.** Although eating habits can be addressed by health policy interventions, efforts at several other SDH levels could be more effective or complement policy changes such as 'sugar taxes'(Dahlgren & Whitehead, 1991b). In consequence, the following proposed interventions take into account SDH factors from multiple levels:

a) ***Spaces/platforms for sharing healthy food preparation options and decision-making tools that facilitate healthy food consumption.*** Given that many women lack time to purchase healthy food, or don't have the knowledge on how to prepare healthy dishes, community spaces or digital platforms could be created to improve to knowledge and share recipes, or tips on how to prepare healthy meals, taking into consideration availability and access to healthy food. These platforms could also be designed to promote the involvement of all family members in the choice and preparation of food, providing tools that facilitate the decision-making process, for example: by sending messages or images showing purchasing options for different

budgets; create audiovisual contents attractive to all family members to promote healthy eating habits; design new ways of presenting healthy food to consumers using virtual applications, commercials, interactive manuals and guides, etc. We identified the use of mobile applications (WhatsApp), social networks (YouTube, Facebook, etc.), and face-to-face workshops, as tools for this social exchange for healthy food preparation. Studies have indeed found that food recommenders have the potential to positively influence the eating habits of users (Freyne & Berkovsky, 2010; Trattner & Elsweiler, 2017). Also, a study on decision-making processes of young adult women with children discussed that interventions may find success when framing messages to motivate healthy decisions; such as protecting the health of children. This study also finds that promoting practical strategies that can be adapted from those already in use, such as pre-planning and budgeting for healthy meals can improve home food environments (Raskind et al., 2017).

b) ***Food trucks and community gardens: resources to increase access to healthy food.*** **As families face difficulties to access healthy foods, have economic and time constraints influencing unhealth diets,** different community resources can promote and facilitate access to food or healthy snacks, such as a "healthy food truck". This truck would promote and sell ready-to-eat fruits and vegetables in a way that consumers could begin to associate a positive mood with heathy products intake (similar to the usually positive feelings associated with ice-cream trucks). Another strategy would be to encourage the use of community gardens, which could contribute to increasing the availability and consumption of fruit and vegetables, while helping the family finances by marketing the products or exchanging them with other families. For example, a study about home gardens to increase vegetable intake and food security in California, found that growing food in community and home gardens can contribute to food security by helping provide access to fresh vegetables and increasing consumption of vegetables by gardeners and their families (Algert et al., 2016).

c) ***"Conscious parenting" workshops: relationship between adult caregivers and children to encourage healthy consumption.*** **As parents or caregivers use calorie-dense-nutrient-poor products as reward for children,** workshops can be conducted with parents and grandparent caregivers to teach them different ways to reward infants, show them affection, teach them limits and live/play with them without the use of unhealthy food. In addition, these workshops are intended to involve children in the decision-making on food and during preparation, as well as to promote community bonding among caregivers. According to evidence-based recommendations of the development of obesity prevention school programs targeted at preschool children, the most successful interventions have parental components; also, evidence suggests that increasing the physical activity levels of caregivers (as role models) increases the physical activity levels of young children (Summerbell et al., 2012).

6. Limitations and strengths

As we were interested in exploring the participants' perceptions regarding unhealthy habits, futures studies should explore in depth about their healthy habits and how to fortify them. A limitation of this study is that the participants all had similar sociodemographic characteristics (i.e., women of low socioeconomic status). While this allowed us to reach data saturation that is transferrable to similar contexts, the perspectives from different profiles (e.g., teachers, grandmothers, or other key actors for influencing family's eating habits) were not included. Nevertheless, this study's strength is its focus on low-income mothers specifically with a young child at home, given that they have a central role in Mexican family's eating habits (particularly during children's younger ages), the high prevalence of poverty in Mexico and the link between poverty and unhealthy eating (Lemos Figueroa et al., 2018; Shamah-Levy et al., 2014). This study therefore provides insights from key informants on the interdependent SDH at multiple levels associated with unhealthy eating habits, including opportunities for potential comprehensive strategies designed to improve such habits.

Ethics approval and consent to participate

An informed consent was obtained from all participants. This informed consent stressed confidentiality, prior to the participants involvement to the study. The Institutional Review Board (Ethics Committee) at the Mexican National Institute of Public Health (IPF Code 36278019) approved the study. Participants were compensated for transportation costs.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

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Authors' contributions

MAC: Participated in the conception and design of the study, helped with interpretation of the data and critically reviewed the manuscript. LM: Carried out data collection and analysis, assisted with interpretation of the data and drafted the manuscript. HV: Assisted with interpretation of the data, and critically reviewed the manuscript. SB: Participated in the conception and design of the study and critically reviewed the manuscript.

Declaration of competing interest

The authors declare that they have no competing interests.

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