MATERNAL KNOWLEDGE AND PRACTICES OF FACTORS ASSOCIATED WITH OBESITY OF CHILDREN UNDER FIVE

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KEYWORDS

ABSTRACT

Early activity and eating patterns can lead to obesity and determine patterns later in life. Research on activity and food parenting practices for young children is scarce.	childhood obesity, children under five years, maternal food knowledge, maternal food practices, activity of children		
The aim of this article is to describe the knowledge and practices that may lead to obesity in mothers and children under the age of five at seven public health centres in the Eastern Cape. A quantitative study with a convenience sample of 142 mothers was used. Fieldworkers assisted mothers in completing a questionnaire. Excel (2016) and SPSS version 28.0 were used for descriptive statistics, and Pearson Chi-square tests determined associations.	Ms M Kramer ORCID ID: 0009-0003-8599-5202 Department of Nursing Science Faculty of Health Sciences Nelson Mandela University Port Elizabeth 6001 South Africa Email: Mercia.kramer@mandela.ac.za		
From the results, none of the mothers met the recommendations for daily moderate activity; only 14.7% of the children were moderately active, while 32% demonstrated excessive television time. Food is most often boiled (83.8%) with salt added (54.9%). Sweet snacks (34.4%), sugar-sweetened beverages (31.6%) and savoury snacks (44.4%) were consumed often. Fruit and vegetables were	Department of Human Nutrition and Dietetics Faculty of Health Sciences Nelson Mandela University Port Elizabeth 6001 South Africa Email: Annelie.gresse@mandela.ac.za * Corresponding author		
eaten once or more daily by only 49.3% and 13.4% of the children, respectively. Emphasis on preparing food at home and eating fruit and vegetables in educational programmes is encouraged. This can assist mothers in gaining the correct knowledge and skills, to prevent obesity in children and later in life.	Prof S James ORCID ID: 0000-0002-4507-0657 Department of Nursing Science Faculty of Health Sciences Nelson Mandela University Port Elizabeth 6001 South Africa Email: Sindisiwe.james@mandela.ac.za		

Maternal knowledge and practices of factors associated with obesity of children under five

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INTRODUCTION

Globally, an estimated 38.2 million children under the age of five years were overweight or obese in 2019 (World Health Organization (WHO), 2020). In South Africa, overweight and obesity during childhood and adolescence are rising (Otitoola et al. 2020). According to Child Gauge (Shung-King et al. 2019), 13% of South Africa's children under five years old were overweight in 2016. Childhood obesity and overweight are likely to persist into later life and can lead to health problems such as hypertension, cardiovascular diseases, type 2 diabetes mellitus and some cancers (Patel et al. 2018). In addition, these conditions are also associated with adverse psychosocial effects and lower educational attainment (Klingberg et al. 2019).

During the first five years, children learn what, when and how much to eat based on the transmission of cultural and familial beliefs, attitudes and practices. Many factors in the family's lifestyle can, therefore, influence young children's dietary behaviour and the

development of obesity, including activity patterns and sedentary behaviour, in addition to food intake patterns such as poor food choices and preferences of parents (Scaglioni et al. 2018). Patel and co-workers (2018) and Muhasriady and Tiwari (2024) indicated that the education, knowledge and practices of parents are some of the leading environmental factors associated with the development of overweight and obesity in childhood. Although most mothers know that good practices will lead to the prevention of obesity, without the correct knowledge they do not know what to do (Hudaib et al. 2024). These practices include involvement of children in food choices, praise of correct food choices, use of food to control negative emotions, use of food-based threats and bribes, restriction of specific food items, and meal and snack routines that can encourage or discourage high energy intake. Mkhize and Sibanda (2020) and Majija (2024) indicated that insufficient knowledge of nutrition and child feeding, which can limit the intake of nutrient-dense foods, were some of the primary factors that negatively influence the feeding practices of mothers. However, a paucity of literature exists on understanding knowledge and practices the mothers' regarding factors leading to obesity in young children in South Africa (Mkhize & Sibanda 2020). Such knowledge can assist in compiling recommendations for the South African National and Provincial Departments of Health regarding the assistance that mothers need to limit obesity in children under five years of age.

Based on the results of a study done as an interprofessional project in the Faculty of Health Sciences, Nelson Mandela University, this article aims to describe the knowledge and practices of mothers in at seven public health centres in Nelson Mandela Bay Health District (NMBHD) regarding some of the factors that may lead to obesity in mothers and children under the age of five. Knowledge in this regard may contribute to a better understanding of the consequences of changes in dietary lifestyle during the rapid change from a traditional to a Westernised diet (nutrition transition) (McLaren *et al.* 2022) in the province.

RESEARCH DESIGN AND METHODS

A quantitative, cross-sectional survey was used for data collection.

Population, sample and recruitment

The population for the study was mothers and pregnant women over the age of 18 years from all cultural groups who attended the antenatal care clinic at any one of the seven public community health centres in NMBHD (Nelson Mandela Bay Metropolitan 2021) on the days of data collection. As the research intended to determine the knowledge and practices of mothers specifically, the antenatal care clinics were chosen and not paediatric clinics, as it is often the caregiver (such as the grandparent) and not the mother who brings the children to the paediatric clinics.

For sample size, using Yamane's formula (Uakarn, Chaokromthong & Sintao 2021), 288 mothers were considered the population for the three months of the study. An allowable error of 5%, with a non-responsive rate of 20%, were used in the calculation. Therefore, the minimum sample size was 130 but 142 mothers took part in the study.

To recruit participants, all mothers present on data collection days in the various clinics were asked to enrol after information about the study was given to them by trained fourth-year nursing, psychology and dietetics students who served as fieldworkers. Those who agreed, completed the consent form and then received the questionnaire.

Data collection procedure and instruments

Data was collected with a self-administered questionnaire (translated into English, Afrikaans and isiXhosa) from March to May 2022. It was adapted from four previously used questionnaires and a literature study (Patel et al. 2018; Scaglioni et al. 2018; Audin & Ellahi 2019; Otitoola et al. 2020). The questionnaire, with mostly closed questions, focused on information about knowledge of healthy lifestyle practices (with emphasis on food preparation and intake) and the mother's feeding practices. In addition to the biographical information (section A), section B concentrated on food security, activity and weight, section С concentrated on breastfeeding and early nutrition and the last section (section D) concentrated on food intake of the older children and mothers. It used a five point verbal Likert scale. Where necessary, the fieldworkers assisted the mothers by reading the questions and entering their answers on the questionnaire. After completion, the fieldworkers collected the questionnaires and checked for missing data while the mothers were still at the clinic.

Data analysis

The responses and dietary scores of the questionnaire were coded, cleaned and captured onto Microsoft Excel 2016 MSO spreadsheets (16.0.4639.100) and analysed with SPSS version 28 (2021) for descriptive data (mean, mode, median of actual numbers and percentages, standard deviation) and inferential data with Pearson chi-square tests analyse the categorical to data and determining whether the observed frequencies differ significantly from expected frequencies with a 95% confidence value (p < 0.05) (Van Horn & Beto, 2019).

Pilot study

To contribute to the validity and reliability of

the study, as none of the four questionnaires that were used to compile the questionnaire for this study, was used on the same or even a similar population, a pilot study was done, even thou the four questionnaires were validated in their respective studies. Five participants in one community health centre assisted in ensuring that the questions were understood and determined the approximate time that it would take to complete the questionnaire. Some changes were made to the questionnaire, so the pilot study data was not included in the main study data.

Ethics

The study was approved by the Research Ethics Committee (Humans) of the university (H20-HEA-NUR-025), where the study was conducted, and the Eastern Cape Department of Health. The principles of the Belmont Report were upheld (LoBiondo-Wood *et al.* 2018). Participants were informed of their right to refuse to participate, withdraw from the study, or choose not to answer a specific question, without any adverse effect. Participants were also informed about the measures taken to ensure anonymity and

confidentiality and completed the questionnaires in a separate cubicle away from the clinic's activities. Participants consented after receiving verbal and written information about the study. No compensation was given to the participants as they had to come to the clinic for routine immunisations or check-ups and they therefore did not incur any additional costs. COVID-19 regulations were adhered to according to the procedures followed by the community health centres (Nelson Mandela University, 2019).

RESULTS

Biographical information

Most of the 142 mothers who participated in the study (97.9%) were pregnant at the time of the visit as data was collected at the antenatal care of the centres. The majority (56.3%) were older than 30 years (range 20–49 years) and completed their secondary school education (64.8%), while 28.9% had a post-matric qualification. Most mothers (65.5%) reported having only one child but they may have visited the clinic while pregnant with the

TABLE 1: ACTIVITY LEVELS OF MOTHERS AND CHILDREN UNDER FIVE YEARS OF AGE

Activity in the last week		n (%)	n (%)	n (%)	
		Mothers	Mothers when not pregnant	Children	p-value
Hard physical work	Total	38 (26.8)	44 (31.0)	34 (23.9)	
	<u><</u> 5 days	24 (63.2)	*	17 (50.0)	0.940
	> 5 days	11(29.0)	*	13 (38.2)	0.040
	Do not know how many days	3 (7.9)	*	4 (11.8)	
Moderate physical activities (not walk- ing)	Total	63 (44.4)	72 (50.7)	68 (47.9)	
	<u><</u> 5 days	45 (71.5)	*	33 (48.5)	0.287
	> 5 days	14 (22.2)	*	26 (38.2)	
	Do not know how many days	4 (6.3)	*	9 (13.2)	
Walking for at least 10 minutes	Total	88 (62.0)	81 (57)	50 (35.2)	
	<u><</u> 5 days	54 (61.3)	*	37 (74.0)	0.206
	> 5 days	21 (23.9)	*	3 (6.0)	0.300
	Do not know how many days	13 (14.8)	*	10 (20.0)	
Watching televi- sion	Total	110 (77.5)	89 (62.7)	89 (62.7)	
	≤ 5 days	28 (25.5)	*	20 (22.5)	0.744
	> 5 days	69 (62.7)	*	57 (64.0)	
	Do not know how many days	13 (11.8)	*	12 (13.5)	
* Determent inclu	ided as the present methors a	ould not corroctly d	agariba thaga activitie	a when not progr	ant

* Data was not included as the pregnant mothers could not correctly describe these activities when not pregnant.

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Activity	Choice of responses	n (%)
Where does the food for your children come from? (Participants could choose	Cook at home	119 (83.8)
	Fast food (such as fried chicken, hamburgers) once or more per week	12 (8.5)
	Prepared food (such as vetkoek, stews) once or more per week	9 (6.3)
	The children eat at school/ pre-school	13 (9.2)
	No answer given	8 (5.6)
What method of cooking is used the most? (Some gave	Boiling or steaming	119 (83.8)
	Frying	12 (8.5)
	Baking	5 (3.5)
	Roast over the fire or barbeque	2 (1.4)
nore than one answer)	Roast or grill in the oven	5 (3.5)
	Microwave	1 (0.7)
	Sugar	42 (29.6)
What is added to the food to	Salt	78 (54.9)
make the food tasty?	Fat such as margarine, butter	46 (32.4)
(Participants could choose	Herbs such as parsley, thyme	53 (37.3)
more than one option)	Spices such as cinnamon	30 (21.1)
	Nothing is added	13 (9.2)
	Cooked of boiled	88 (62.0)
For shildren under five, what is	Fried	4 (2.8)
the best way to serve vegeta- bles?	Raw or fresh	14 (9.9)
	Cooked mixed with other foods	28 (19.7)
	Frozen, canned	1 (0.7)
	No answer given	7 (4.9)

TABLE 2: FOOD PREPARATION AND BUYING PRACTICES OF MOTHERS

second child.

Level of activity of mothers and children

The mothers and their children were asked about physical activity and television watching (Table 1).

There was no significant difference between total hard physical labour done between pregnant and non-pregnant women (p = 0.840). While mothers were still moderately active during pregnancy, not many were for more than five days per week. Only 14.7% of the children were moderately active for at least 120 minutes daily. A significant difference was found between the level of education and participation in moderate activities, with mothers with a higher education level reported participating more (p = 0.008) as well as their children (p = 0.027). Older mothers walked significantly less than younger mothers (p = 0.024).

Mothers reported long hours of watching

television, 62.7% reported that they watched television more than five hours per week, excluding time that they spent on other devices. Thirty-two per cent of the children watched television for more than five hours at a time. Mothers with a higher level of education and their children watched significantly more television (p = <0.001).

Food preparation and buying

Table 2 summarises the practices of themothersregarding foodpreparationandbuying.

It is encouraging that food is still cooked at home by 83.8% of the mothers (n = 119) and that fast foods are only bought frequently by 8.5% of the households (n = 12). Boiling of food was the most popular as preparation method (83.8%; n = 119). Salt was frequently added to food for taste (54.9%; n = 78). Only a few mothers (11.3%; n = 14) believed that giving them fresh, raw vegetables is the best way for their children to eat them.

Question asked	Choice of responses		n (%)
	Never		17 (12.0)
	Once a week or less		90 (63.3)
Frequency of eating sweets	Once a day or less		22 (15.5)
	More than once a day		6 (4.2)
	No answer given		7 (4.9)
	Foods high in fat		54 (38.0)
	Vegetables		2 (1.4)
Itama that is/ara not good for shildran (Mara	Sweets		82 (57.7)
then one choice was possible)	Cold drinks (sugar sweetened)		114 (80.3)
than one choice was possible).	Cake		81 (57.0)
	Fruit		2 (1.4)
	No answer given	No answer given	
	Never		36 (25.4)
	< once a month		22 (15.5)
Frequency drinking sugar sweetened beverag-	< once a week		30 (21.1)
es	1 – 6 times per week		35 (24.6)
	Every day		10 (7.0)
	No answer given		9 (6.3)
	Never		2 (1.4)
	Less than once a month		4 (2.8)
	Less than once a week		4 (2.8)
Frequency of children eating fresh fruit?	1 – 6 times per week		52 (36.6)
	Every day		70 (49.3)
	No answer given		10 (7.0)
		Starchy	Other
	Never	5 (3.5)	6 (4.2)
Frequency of children eating, starsby and other	Less than once a month	4 (2.8)	7 (4.9)
vegetables	Less than once a week	12 (8.5)	22 (15.5)
vegetables	1 – 6 times per week	83 (58.5)	79 (55.7)
	Every day	28 (19.7)	19 (13.4)
	No answer given	10 (7.0)	9 (6.3)
Frequency of eating sweet snacks	Never		10 (7.0)
	Less than once a month		31 (21.8)
	Less than once a week		40 (28.2)
	4 – 6 times per week		40 (28.1)
	Every day		9 (6.3)
	No answer given		12 (8.5)
Frequency of eating savoury snacks	Never		7 (4.9)
	Less than once a month		25 (17.6)
	Less than once a week		37 (26.1)
	1 – 6 times per week		57 (40.2)
	Every day		6 (4.2)
	No answer given		10 (7.0)

TABLE 3: KNOWLEDGE AND PRACTICES OF MOTHERS REGARDING INTAKE OF SELECTED FOOD ITEMS

Intake of selected food items

Table 3 reports mother's knowledge and practices regarding the intake of selected food items. Practices and items often associated with overweight and obesity are described (Raymond & Morrow 2020), but not the whole dietary intake due to a lack of space.

Most mothers knew they should limit their children's intake of sweets (75.3%; n = 107) and sugar-sweetened beverages (62.6%; n = 88), but a third (31.6%; n = 45) reported that their children drink sugar-sweetened

beverages more than once a week, with some every day. A few still excluded fruit and vegetables from the diet (4.2%; n = 6) and only half of the mothers (49.3%; n = 70) gave their children fruit or vegetables daily.

DISCUSSION

Level of activity of mothers and children

Pregnant mothers should do at least 150 minutes of moderate-intensity physical activity daily throughout the week (Bull et al. 2020). The mothers in this study did not meet these levels and may not set a good example for their children. Young children's motor skills are positively related to vigorous physical activity, and their manual dexterity skills are inversely related to screen time (Webster et al. 2019). With the low percentage of children that reached the recommended 120 minutes per day of moderate activity for preschool children, recommended by Webster et al. (2019), it is clear that the change to a Westernised lifestyle negatively influences the activity levels of women and children. Popkin et al. (2020) concur and attribute the problem to factors such as activity-saving technology and improvement in transport. This change can increase the incidence of obesity in children affect and adversely their development.

Food preparation and buying

The variety in food preparation methods and ingredients that improve taste, was limited. The addition of salt may also increase the incidence of hypertension, especially in people with obesity (Raymond & Morrow 2020). Although some lack of variety can be attributed to a lack of resources (Chakona 2020), mothers seem to know what is healthy for their children. However, they may not have enough knowledge or the correct knowledge and do not know how to apply it in practice.

Intake of selected food items

As a result, more energy-dense starchy foods were prepared and in this study mothers did very little to improve the taste of vegetables and protein foods, most of the time only salt was used to enhance taste. Fresh vegetables' taste and nutrient value are well known to be superior to any processed product and often have less energy than dishes prepared with added ingredients (Scheule & Frye 2020). It is also a quick and easy way to get food on the table. To prevent obesity, children should be taught early to eat fresh vegetables and fruit (Draper *et al.* 2019).

If children are taught from a young age that they should limit the consumption of foods high in energy and low in other nutrients (foods high in sugar, fat and refined carbohydrates), they may limit consumption later in life. Preferences for sweet and fat tastes are also associated with such foods. These taste preferences may contribute to overweight and obesity in children later in life (Mkhize & Sibanda 2020; Sobek et al. 2020). Mothers realise the potential danger of consuming too many sweets, but some will still provide them (Sobek et al. 2020). Regarding savoury snacks, mothers may not always realise that the high fat and refined carbohydrate content of savoury snacks can be as an important factor in the development of obesity as the sugar in sweet snacks.

In this study, it seems as if the South African Government's initiative to limit the intake of sugar-sweetened beverages has had some success, as the high daily intake of such beverages that was previously reported for most young children (Audain *et al.* 2019), was limited in this study. However, mothers may not understand the importance of limiting these high-energy, low-nutrient rich items and the direct link between these beverages and obesity and diabetes mellitus (Sobek *et al.* 2020). In addition, although it is clear that most mothers know that fruit and vegetables are good for their children, none have followed the general recommendation of five portions of fruit and vegetables daily (Raymond & Morrow 2020). The low socioeconomic level of the population may play a role in the low intake of fruit and vegetables, but fruit and vegetables in season are cheaper and readily available. With the correct guidance, mothers may realise they can buy fruits and vegetables in season instead of sweet and savoury snacks and sugar-sweetened beverages.

CONCLUSION

This article describes some of mothers' knowledge and practices that lead to obesity in children under the age of five.

Programmes to encourage physical activity and less screen time in this community will benefit the children's development and contribute to preventing obesity in both the parents and children. Further research on how limiting screen time in low-resource areas with a high incidence of crime that limits free access to outdoor activities, is necessary.

Food preparation can improve by adding herbs grown cheaply at home. This will increase the taste and variety, decrease salt intake, and, in turn, decrease the intake of energy-dense foods. Although they may know, the practices of the mothers indicated a lack of understanding of the potential danger of foods high in sugar and other refined carbohydrates and high in fats, particularly saturated fats, that can lead to obesity. The information in this study can be used to develop educational programmes with a practical component and basic cooking classes emphasising the use and preparation of fruit and vegetables can assist mothers in understanding how to prevent obesity in children and later in life. Such programmes can be offered as an extension of the services

at the community health centres and may contribute much to the prevention of obesity in children in this community.

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AUTHOR CONTRIBUTIONS

All authors contributed to the study's conception and design. MK and AG prepared materials and collected data. MK, AG and the biostatistician analysed the data. The university provided funding and resources were provided. AG wrote the first draft, and all authors read and commented on all versions of the manuscript. All authors read and approved the final manuscript.

CONFLICT OF INTEREST

None to declare

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