

Exploring food consumption strategies amidst financial constraints among overweight and obese Malaysian women from low-income households: A qualitative study

Nur Nadia Mohamed¹ & Abdul Jalil Rohana^{2*}

¹Dietetics Programme, School of Health Sciences, Universiti Sains Malaysia, Kubang Kerian 16150, Malaysia; ²Department of Community Medicine, School of Medical Sciences, Universiti Sains Malaysia, Kubang Kerian 16150, Malaysia

ABSTRACT

Introduction: Numerous studies have shown that individuals from low-income households are more susceptible to being overweight or obese, despite financial constraints. This study aimed to explore food consumption experiences of overweight and obese women from low-income households amidst financial constraints.

Methods: A qualitative study was conducted among overweight and obese women from low-income households in Peninsular Malaysia. In-depth interviews were audio-recorded and transcribed verbatim. Data were coded manually and analysed using thematic analysis based on Braun & Clarke's method. **Results:** A total of 27 Malay women aged 27–52 years old were interviewed. Four major themes emerged from in-depth interviews related to strategies of food consumption during financial constraints at different levels based on the socio-ecological model. **Conclusion:** Multi-level food consumption strategies during financial constraints may contribute to overweight and obesity among individuals from low-income households. Tackling obesity in this demographic requires a holistic, multi-level approach encompassing individual, household, community, and policy interventions.

Keywords: low socioeconomic status, Malaysia, obesity, qualitative research, women

INTRODUCTION

The global prevalence of overweight and obesity (OW/OB) has demonstrated a consistent upward trend since 1975 (NCD Risk Factor Collaboration, 2017). It is a matter of concern because individuals with OW/OB are susceptible to non-communicable diseases (Zatońska *et al.*, 2021), which in turn can lead to an increase in global mortality prevalence (WHO, 2018).

In the past, OW/OB was more prevalent in affluent households (Sobal & Stunkard, 1989). However, in present times, it has become one of the global health issues among people from the low socioeconomic groups (Griffith, 2022). Although the aetiology of OW/OB is complex and multifactorial, it is typically caused by excessive food consumption and low energy expenditure (Meneguetti *et al.*, 2019). Low income is often

*Corresponding author: Prof Dr Rohana Abdul Jalil
Department of Community Medicine, School of Medical Sciences, Universiti Sains Malaysia,
Kubang Kerian 16150, Malaysia
Tel: (6)09-7676637; E-mail: rohanajalil@usm.my
doi: <https://doi.org/10.31246/mjn-2025-0017>

associated with poor-quality diets, such as ultra-processed foods, which are cheap, hyperpalatable, and accessible due to ubiquitous marketing (Kumar, Kulkarni & Rathi, 2022). In Malaysia, the risk of OW/OB among women has been reported to be increasing in impoverished households (Mariapun, Ng & Hairi, 2018).

According to Story *et al.* (2008), food consumption is influenced by individual factors, social, physical, and macro-level environments, as depicted in the socio-ecological model. The socio-ecological model allows researchers to explore how financial constraint can affect the food intake of individuals from low-income households. This model has been adopted by Seligman & Berkowitz (2019) to understand how people deal with food insecurity.

To date, evidence on food consumption strategies amidst financial constraints among low-income Malaysian households is still lacking. There is a critical need to explore the coping strategies adopted in response to food insecurity, particularly those related to food consumption, as some strategies may inadvertently increase the risk of OW/OB. In many households, women are primarily responsible for food purchasing and meal preparation. Given their disproportionate vulnerability to OW/OB, it is essential to understand how their food purchasing and preparation are shaped by limited resources and household responsibilities, which may unintentionally contribute to this health risk.

Therefore, this study was conducted to explore the experiences of Malaysian women with OW/OB from low-income households, focusing on how financial constraints influence their coping mechanisms to food insecurity. The socio-ecological model was chosen as the theoretical framework for this study.

MATERIALS AND METHODS

Study design

A qualitative study was conducted among overweight or obese (OW/OB) Malay women from low-income households in Peninsular Malaysia. Ethical approval was obtained from the Human Research Ethics Committee of Universiti Sains Malaysia (USM/JEPeM/17110579).

Study participants

Participants were OW/OB Malay women [Body Mass Index (BMI) of at least 25 kg/m² and above] from low-income households, which was defined as the bottom 40% (B40) of the income distribution in Malaysia or having a total household income of less than RM 3,860 (Economic Planning Unit, 2015). Malay women were selected based on a previous study demonstrating that Malay adults have a higher risk of being OW/OB than other ethnic groups (Nordin *et al.*, 2020).

Participants were recruited from three regions in Peninsular Malaysia: 1) East Coast (Kelantan); 2) Northern (Kedah, Penang, and Perak); and 3) Central (Selangor and Federal Territory of Kuala Lumpur) regions. Data collection was not conducted in the Southern region, Sarawak, and Sabah because data saturation had been reached.

Both purposive and snowball sampling methods were implemented. Participants were purposely selected at the initial stage based on the inclusion and exclusion criteria. Through the snowball approach, participants were then asked after their interviews to suggest other potential candidates who met the criteria and were able to cooperate and participate in this study.

Data collection

Prior to data collection, village headmen and community leaders were contacted to acquire their approval in gathering information from their respective

vicinity. They also assisted in identifying women who met the study criteria and had the potential to participate in the study voluntarily. During the initial visit, the study protocol was explained to the women. If they were interested in the study, verbal informed consents were acquired. In order to confirm that they met the study criteria, weight was measured using an electronic flat scale (SECA 872, Hamburg, Germany) and height was assessed with a portable stadiometer (SECA 217, Hamburg, Germany). BMI was calculated.

An appointment was scheduled individually to carry out a face-to-face interview. They were given freedom to choose the interview location where they felt comfortable and had privacy. Written informed consents were obtained from the participants on the day of the interview. Their names were anonymised throughout the data collection process and in publications.

Semi-structured interview guides were used during interviews to maintain uniformity in the answers provided by the participants. Questions and topics outlined in the interview were designed to cover a wide range of themes and perspectives. Three pre-tests were conducted to assist the interviewer in gaining experience, acquiring skills, and testing the effectiveness of the interview guide. The interview guides used in this study are shown in Table 1.

Interviews were conducted in the Malay language and lasted 50-60 minutes each session. Probing questions such as “why”, “how”, and “can you elaborate further on that” were used to acquire additional information from the participants. Every interview was transcribed verbatim and coded before the following interview. Data saturation was achieved after 27 interviews. At the end of the interview, each participant was given a small token of appreciation.

Table 1. Semi-structured interview guides

| <i>Item</i> | <i>Questions</i> |
|-------------|---|
| 1. | Please tell me about your daily food intake. |
| 2. | How do you spend money on household expenditures? |
| 3. | Have you ever experienced a lack of money to eat food? |
| 4. | What do you do when you do not have enough food or money to buy food? |

The rigour of this study was ensured using credibility, transferability, dependability, and confirmability, as suggested by Lincoln & Guba (1985). Credibility was enhanced by member checking, peer debriefing, referential adequacy, and triangulation. Member checking was performed by randomly choosing four participants to check the transcripts and asking whether the data coded and interpreted by the researcher matched their thoughts. Peer debriefing was conducted by involving two debriefers (a content expert with a nutrition background and a qualitative research expert) to review the transcripts, codes, and themes. The strategy used in the referential adequacy was attaching the interview quotes to the emerging themes. In addition, two types of triangulation strategies proposed by Patton (2015) were applied to enhance the study’s credibility. Firstly, the data were triangulated by interviews with the participants and field observation. The other triangulation strategy was investigator triangulation, which involved other research team members in reading, reviewing and coding the transcripts.

In this study, transferability was assured using purposive sampling and providing thick descriptions of the study context. Participants were purposely selected among OW/OB women from low-income households to share their experiences regarding the

Table 2. Characteristics of the participants (*N*=27)

| No. | Name | Age (years) | Highest education level | Occupation | Monthly household income (RM) | States/federal territories |
|-----|------|-------------|-------------------------|----------------|-------------------------------|----------------------------|
| 1. | MA | 49 | Primary | Maid | 1,700 | Kelantan |
| 2. | KR | 38 | Secondary | Cleaner | N/A | Kelantan |
| 3. | KN | 45 | Secondary | Food seller | N/A | Kelantan |
| 4. | KI | 40 | Secondary | Cleaner | 1,100 | Kelantan |
| 5. | KA | 41 | Primary | Homemaker | 900 | Kelantan |
| 6. | CY | 27 | Secondary | Homemaker | 1,500 | Kelantan |
| 7. | KW | 38 | Secondary | Homemaker | 2,800 | Kelantan |
| 8. | NB | 41 | Primary | Food seller | 3,000 | Kelantan |
| 9. | KH | 32 | Tertiary | Homemaker | 2,500 | Kelantan |
| 10. | KS | 46 | Secondary | Food seller | 1,000 | Kedah |
| 11. | KL | 47 | Tertiary | Food seller | N/A | Penang |
| 12. | KZ | 47 | Secondary | Fish seller | 800 | Penang |
| 13. | NL | 43 | Secondary | Masseuse | 2,000 | Kedah |
| 14. | SS | 32 | Secondary | Clerk | N/A | Kedah |
| 15. | NK | 38 | Secondary | Homemaker | 800 | Kelantan |
| 16. | NA | 47 | Secondary | Cleaner | 1,000 | Selangor |
| 17. | AS | 38 | Tertiary | Cleaner | 1,880 | Perak |
| 18. | SZ | 44 | Primary | Cleaner | 2,850 | Perak |
| 19. | SM | 44 | Secondary | Cleaner | 1,500 | Selangor |
| 20. | KU | 50 | Secondary | Tailor | 2,100 | Selangor |
| 21. | KF | 43 | Primary | Food seller | 2,500 | Selangor |
| 22. | LB | 52 | Secondary | Food seller | 1,500 | Selangor |
| 23. | SW | 37 | Secondary | Homemaker | 1,900 | Selangor |
| 24. | SJ | 30 | Secondary | Factory worker | 2,500 | Selangor |
| 25. | KM | 48 | Primary | Homemaker | N/A | Selangor |
| 26. | SR | 45 | Secondary | Homemaker | N/A | Kuala Lumpur |
| 27. | MM | 38 | Tertiary | Clerk | 3,700 | Kuala Lumpur |

topic of this study; a detailed description was provided regarding participants' characteristics and the data collection process, including its duration and location. The dependability of this study was established through the application of audit trails, where field notes and memos were used to describe the location and community of the study area. The interview transcripts were also accessible to other researchers. Besides that, the procedure was recorded for checking by the research teams to achieve confirmability.

Data analysis

Data were analysed using thematic analysis (Braun & Clarke, 2006). Each interview was transcribed verbatim based on the participants' dialect. Later, the transcripts were read and re-read by the researchers. Braun & Clarke (2006) stressed that this step is important for researchers to immerse themselves in the data and familiarise themselves with the depth and breadth of the text. Notes and ideas for coding were written on the transcripts.

Manual coding was preferred over electronic coding because it helped

Table 3. Themes and sub-themes emerged from the interviews

| Themes | Sub-themes |
|-----------------------|--|
| Individual strategies | <ul style="list-style-type: none"> • Preferences • Additional employment |
| Household strategies | <ul style="list-style-type: none"> • Home food preparation • Purchase of groceries • Delay payment of bills |
| Community strategies | <ul style="list-style-type: none"> • Social support |
| Policy strategies | <ul style="list-style-type: none"> • Food assistance programme |

researchers to familiarise themselves with the data (Braun & Clarke, 2006). It was also suitable for the current study with a small number of participants (Saldaña, 2016). The codes were developed from theory, raw data, research questions, or objectives. Each transcript was read a few times and given as many codes as possible to indicate ideas or concepts.

After the coding process, the codes were sorted into potential themes and organised through a mind map. A thematic map was developed to determine the connection between the codes and themes. Not all codes were used to develop themes; some codes may form sub-themes, be refined, or be discarded. Later, the themes were reviewed by reading all the coded data extracts and the whole data set. After that, every theme was refined with a clear definition and names were generated. Finally, findings from the thematic analysis were reported.

RESULTS

Characteristics of the participants

A total of 27 Malay women were recruited for in-depth interviews. More than half of the participants were aged 40–49 years ($n=15$), completed secondary education level ($n=17$), employed in multiple sectors ($n=18$), and lived in medium-sized households ($n=16$). The characteristics of the participants are presented in Table 2.

Strategies of food consumption during financial difficulties

Four mutually exclusive themes emerged from the interviews, reflecting the multiple strategies women from low-income households used to consume food during financial constraints. Based on the socio-ecological model, these themes were divided into individual, household, community, and policy strategies. The themes and sub-themes identified from the interviews are summarised in Table 3.

Theme 1: Individual strategies

i. Preferences

Throughout the interviews, most women admitted that they preferred to purchase cheaper foods. They always purchased in bulk because it was more convenient and cost-saving. They exemplified some of the low-cost foods kept at home, such as anchovies, salted fish, and instant noodles. As mentioned by Mrs SW:

“At the end of the month, I will buy Maggi (instant noodles). We will eat Maggi. My husband and our children will eat it with rice.” (Mrs SW, 37 years, housewife)

Although women preferred to purchase fresh foods, such as vegetables, they typically bought them in small quantities due to their shorter shelf life compared to processed foods. Moreover, fresh

fruits and vegetables are expensive. As described by Mrs KW:

“Sometimes, vegetables do not last long. For example, if I buy brinjals today, I will cook them today. I do not buy brinjals in large quantities. Never.” (Mrs KW, 38 years, housewife)

Some women shared that they would purchase poor-quality or less preferred foods to save money because these types of foods were inexpensive. For instance, Mrs KA claimed that she often bought low-quality foods because it was more value for money.

“When I buy rejected (poor-quality) eggs, I can get 30 eggs for RM 5. We can eat a lot.” (Mrs KA, 41 years, housewife)

ii. Additional employment

Some employed mothers, including Mrs NA, confessed that they had to work multiple jobs because their income from a single job was inadequate to meet their budgetary needs. Mrs NA is a cleaner at a public university. She mentioned that she would accept any part-time jobs offered to have an additional income.

“Sometimes, I sell recycled papers. Sometimes, people ask me to clean their houses.” (Mrs NA, 47 years, cleaner)

Theme 2: Household strategies

Apart from individual strategies to consume food during financial constraints, women also employed household-level strategies to manage food consumption.

i. Home food preparation

During financial constraints, many women mentioned that they would cook

and eat whatever food that was available at their homes, such as anchovies and eggs. One woman said:

“I always stock anchovies in the refrigerator. If I have nothing to eat, I still have anchovies in the refrigerator. My children do not care what dishes I prepare for them. Rice is a must. If anchovies are available, I cook anchovies. They also eat eggs if I cook eggs.” (Mrs KU, 50 years, tailor)

Some women also said that they had to reduce the number and types of dishes prepared during mealtime. In the interview with Mrs NK, she shared her experience of how she prepared food when her family had limited food at home.

“I will only cook one type of dish. For instance, fried eggs. Fried eggs with soy sauce. My children like ‘budu’ (anchovy sauce). I only cook staple food.” (Mrs NK, 38 years, housewife)

ii. Purchase of groceries

During grocery purchasing, some women described that they would plan their expenditure and compare costs across several retailers to get the best deal. They also would purchase products with promotional prices because these were more economical.

According to Mrs KA:

“Sometimes, when I go to X, I will check the price. My eldest son always gets mad. He asked, what do I want to buy? I will check every product. I want to know which one is cheaper. Then, I will look at my shopping list.” (Mrs KA, 41 years, housewife)

iii. Delayed payment of bills

Besides that, a few women also mentioned that they had to postpone the payment of utility bills and house rentals when they have a tight budget. As told by Mrs KI:

“Every two months, I will spend RM 200 on house rentals. Yes, every two months. My house rental fee only cost RM 100. The owner of the house will come to get the money if I do not pay the rental fee after two months.” (Mrs KI, 41 years, cleaner)

Theme 3: Community strategies

In addition to household strategies, study participants also utilised community strategies to manage food intake when they have limited financial resources.

i. Social support

Living in financial difficulties with uncertain sources of income led some women to seek financial assistance from their relatives and friends. Mrs KS, who is a food seller, admitted that she was left with no choice except to borrow money or food from her relatives or friends. As said by Mrs KS:

“I will ask my relatives to borrow their money. What else am I supposed to do?” (Mrs KS, 46 years, food seller)

A few women recounted that their friends and relatives often gave food or money without expecting anything in return because they understood their financial situation. For instance, Mrs SW described that her neighbours always gave food to her family whenever they had extra food.

“When my neighbours cook food, they will give some to us. For example, yesterday she made

doughnuts. She gave it to us.” (Mrs SW, 37 years, housewife)

Theme 4: Policy strategies

Women in this study also relied on policy strategies to cope with food insecurity when they experienced limited money to purchase and consume food.

i. Food and financial assistance programmes

Many women stated that their families received financial and food assistance from the Department of Social Welfare and the State Islamic Regional Council. In the interview, Mrs SM described that she received food assistance in the form of ‘*zakat*’ (alms) from the Islamic Regional Council. Every month, her family will get a provision of basic foods, such as cooking oil, rice, sugar, and flour.

“Every month, I receive 5 kg of flour, 15 kg of rice, 5 kg of cooking oil, and 3 kg of sugar.” (Mrs SM, 44 years, cleaner)

DISCUSSION

This study sought to understand how OW/OB women from low-income households consumed their foods during financial constraints. They were found to apply multi-level strategies (individual, household, community, and policy) in food consumption when they experienced limited financial resources.

Preference for low-cost and poor-quality foods was frequently reported by the participants amidst financial constraints. This finding is in agreement with Zorbas *et al.* (2023), who demonstrated that people from low-income households tend to purchase the cheapest and most affordable foods during financial stress. Individuals from low-income households cannot afford to buy fresh and healthy foods, which are usually expensive (Herforth *et al.*, 2020).

For that reason, they often choose low-cost and poor-quality foods, which are normally higher in calories, sugar and fat (Headey & Alderman, 2019).

Living with financial hardship urged some participants to obtain additional financial resources by doing multiple jobs. A side hustle is one of the coping strategies to improve poverty (Scott, Edwards & Stanczyk, 2020), eventually improving household food insecurity. However, owing to work demands and hectic schedules, many skip meals, have irregular meals or are unable to have mealtimes with their families. These unhealthy dietary behaviours are associated with OW/OB (Saneei *et al.*, 2016).

In this study, home food preparation was perceived to be more cost-effective than takeaway foods. Home-prepared dishes can be considered healthier than takeaway foods because the latter is associated with high trans-fat and poor diet quality (Moyeda-Carabaza *et al.*, 2023). However, foods prepared at home do not always translate into healthier food intake. Our findings indicated that financial constraints led participants to prepare low-cost meals, which may still be high in calories and low in nutritional value. Consequently, they are still exposed to the risk of being OW/OB.

Apart from that, amidst restricted finances, participants reduced the number and types of dishes prepared during mealtimes as a coping strategy towards food insecurity. However, this strategy possibly hinders them from eating a well-balanced diet. This finding may support a previous study, which found that one in three Malaysian adults from low-income households have eaten an insufficient quantity and variety of foods (Ahmad *et al.*, 2020). This is of concern because a lack of variety in food intake increases the risk of OW/OB in the future (Mulu Birru *et al.*, 2021).

Planning for expenditure is a good strategy to prevent unnecessary purchases. A previous study by Dubowitz *et al.* (2015) suggested that using a shopping list was significantly associated with increased diet quality and reduced BMI of individuals from low-income households. Study participants from this study claimed that they would purchase products with promotional prices. Both planning for expenditure and purchasing promotional products are cost-saving approaches. However, price promotion is common for unhealthy food products (Davies *et al.*, 2023). Thus, it may attract those from low-income households to purchase unhealthy foods and beverages, which are cheaper than fruits and vegetables.

Borrowing money from relatives and friends to buy food was also mentioned as one of the strategies used to consume food during financial difficulties. It is a common coping strategy applied by those from low-income households who experience food insecurity (Biadgilign, 2023). Evidence has shown that being in debt is linked to poor mental health (Amit *et al.*, 2020), which can then lead to excessive body weight (Michels, 2021).

Many women in this study mentioned that they received financial and food assistance from the government. These programmes can help those from low-income families meet their basic needs and reduce food insecurity. Even so, Smith & Gregory (2023) suggested that these programmes have minimal impact on the nutritional quality of daily diets. A study in the United States discovered that participants of the Supplemental Nutrition Assistance Program (SNAP) purchased more sugar-sweetened beverages than non-SNAP participants (Gustafson, 2017). The types and quality of foods received and purchased by using the money from assistance programmes in this country are still unknown.

The socio-ecological model used in this study was beneficial in understanding the food consumption of low-income women during financial constraints. This model acknowledged that food consumption was not merely influenced by individual strategies, but also included household, community, and policy strategies. For instance, during financial difficulties, women did not merely rely on cheaper, processed foods (individual strategy), but also considered home food preparation (household strategy), social support (community strategy), or food assistance programmes (policy strategy) to address food insecurity.

In terms of strength, the current study is considered a pioneer qualitative study in understanding the food consumption of those who have insufficient financial resources for food expenses in the household. The strategies used by the participants to consume food during financial constraints might explain the main reason for putting on weight despite living in poverty. In addition, the socio-ecological model also allowed researchers to explore multiple strategies adopted by low-income individuals in food consumption, which led to favourable energy-dense foods despite the availability of healthier options.

Nevertheless, this study has some limitations. Participants of this study were Malay women, specifically. Since Malaysia is a multi-ethnic country, the voices of women from other ethnic groups might contribute new knowledge and interesting findings related to food consumption in low-income households.

CONCLUSION

The findings of this study demonstrated that multi-level strategies were applied by low-income women to consume food

when they had insufficient financial resources. Despite these efforts, many were still incapable of having nutritious foods and tended to be exposed to the threat of OW/OB. These findings can provide information for healthcare professionals and policymakers to implement strategies and policies that can support low-income women to consume healthy foods. For instance, subsidising healthy foods could help low-income households make healthier food choices. The government could expand existing food subsidy programmes, such as the *MyKasih* Programme, to include a wider range of nutritious foods and ensure that healthier options are both available and affordable to those struggling with financial constraints. Besides, these findings can also facilitate the design of suitable intervention strategies for individuals in socially disadvantaged groups.

Acknowledgement

We would like to thank Universiti Sains Malaysia for the USM Bridging Grant (grant number: 304/PPSP/6316152) and the Research University Individual (RUI) Grant (grant number: 1001/PPSP/8012255) for financial supports.

Authors' contributions

Mohamed NN, principal investigator, led the data collection, prepared the draft of the manuscript, and reviewed the manuscript; Rohana AJ, conceptualised and designed the study, advised on the data analysis and interpretation, and reviewed the manuscript.

Conflict of interest

No conflict of interest.

References

- Ahmad MH, Selamat R, Salleh R, Abdul Majid NL, Zainuddin AA, Mohd Abu Bakar WA & Aris T (2020). Food insecurity situation in Malaysia: Findings from Malaysian Adult Nutrition Survey (MANS) 2014. *Malays J Public Health Med* 20(1):167–174. doi: 10.37268/mjphm/vol.20/no.1/art.553

- Amit N, Ismail R, Zumrah AR, Mohd Nizah MA, Tengku Muda TEA, Tat Meng EC, Ibrahim N & Che Din N (2020). Relationship between debt and depression, anxiety, stress, or suicide ideation in Asia: A systematic review. *Front Psychol.* 11:1–17. doi: 10.3389/fpsyg.2020.01336
- Biadgilign S (2023). Coping strategies to mitigate food insecurity at household level: Evidence from urban setting in Addis Ababa, Ethiopia. *Inquiry* 60:469580231206263. doi: 10.1177/00469580231206263
- Braun V & Clarke V (2006). Using thematic analysis in psychology. *Qual Res Psychol* 3(2):77–101. doi: 10.1191/1478088706qp063oa
- Davies T, Coyle D, Shahid M, Pettigrew S, Wu JH & Marklund M (2023). Packaged foods purchased on price promotion in Australia. *Appetite* 180:106352. doi: 10.1016/j.appet.2022.106352
- Dubowitz T, Cohen DA, Huang CY, Beckman RA & Collins RL (2015). Using a grocery list is associated with a healthier diet and lower BMI among very high-risk adults. *J Nutr Educ Behav* 47:259–264. doi: 10.1016/j.jneb.2015.01.005
- Economic Planning Unit (2015). *Eleventh Malaysia Plan (2016 - 2020): Anchoring growth on people*. Economic Planning Unit, Prime Minister's Department, Putrajaya, Malaysia.
- Griffith R (2022). Obesity, poverty and public policy. *Econ. J.* 132: 1235–1258. doi: 10.1093/ej/ueac013
- Gustafson A (2017). Shopping pattern and food purchase differences among Supplemental Nutrition Assistance Program (SNAP) households and Non-supplemental Nutrition Assistance Program households in the United States. *Prev Med Rep* 7:152–157. doi: 10.1016/j.pmedr.2017.06.005
- Headey DD & Alderman HH (2019). The relative caloric prices of healthy and unhealthy foods differ systematically across income levels and continents. *J Nutr* 149(11):2020–2033. doi: 10.1093/jn/nxz158
- Herforth A, Bai Y, Venkat A, Mahrt K, Ebel A & Masters WA (2020). *Cost and affordability of healthy diets across and within countries. Background paper for the state of food security and nutrition in the world 2020*. Rome, Italy: Food and Agriculture Organization.
- Kumar GS, Kulkarni M & Rathi N (2022). Evolving food choices among the urban Indian middle-class: A qualitative study. *Front Nutr* 9:1–12. doi: 10.3389/fnut.2022.844413
- Lincoln YS & Guba EG (1985). Establishing trustworthiness. *Naturalistic Inquiry*. Sage Publications, Newbury Park, London.
- Mariapun J, Ng CW & Hairi NN (2018). The gradual shift of overweight, obesity, and abdominal obesity towards the poor in a multi-ethnic developing country: Findings from the Malaysian National Health and Morbidity Surveys. *J Epidemiol.* 28(6):279–286. doi: 10.2188/jea.JE20170001
- Meneguetti BT, Cardoso MH, Ribeiro CFA, Felício MR, Pinto IB, Santos NC, Carvalho CME & Franco OL (2019). Neuropeptide receptors as potential pharmacological targets for obesity. *Pharmacol Ther* 196:59–78. doi: 10.1016/j.pharmthera.2018.11.002
- Michels N (2021). Poor mental health is related to excess weight via lifestyle: A cross-sectional gender-and age-dependent mediation analysis. *Nutrients* 13(2):1–13. doi: 10.3390/nu13020406
- Moyeda-Carabaza AF, Githinji P, Nguyen B & Murimi M (2023). The influence of frequent consumption of foods-away-from-home on the total diet quality and weight status among faculty and staff. *J Am Coll Heal* 71(1):292–299. doi: 10.1080/07448481.2021.1891081
- Mulu Birru G, Eshete Tadesse S, Hassen Abate K, Mekonnen TC & Genetu Chane M (2021). Malnutrition in school-going adolescents in Dessie town, South Wollo, Ethiopia. *J Nutr Metab* 2021:4898970. doi: 10.1155/2021/4898970
- NCD Risk Factor Collaboration (2017). Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: A pooled analysis of 2416 population-based measurement studies in 128.9 million children, adolescents, and adults. *Lancet* 390(10113):2627–2642. doi: 10.1016/S0140-6736(17)32129-3
- Nordin N, Zahid Z, Ismail Z, Yassin SM, Mohd Nawawi H & Sheikh Hussin SA (2020). Determination of the obesity prevalence and its associated factors among community in Selangor, Malaysia: An ordinal logistic regression approach. *Indones J Electr Eng Comput Sci* 19:428–434. doi: 10.11591/ijeecs.v19.i1.pp428-434
- Patton MQ (2015). *Qualitative research and evaluation methods: Integrating theory and practice*. (4th edn.). SAGE Publications, California.
- Saldaña J (2016). *The coding manual for qualitative researchers*. SAGE Publications Inc, California.

- Saneei P, Esmailzadeh A, Keshteli AH, Feizi A, Feinle-Bisset C & Adibi P (2016). Patterns of dietary habits in relation to obesity in Iranian adults. *Eur J Nutr* 55(2):713–728. doi: 10.1007/s00394-015-0891-4
- Scott J, Edwards K & Stanczyk A (2020). Moonlighting to the side hustle: The effect of working an extra job on household poverty for households with less formal education. *Fam Soc* 101(3):324–339. doi: 10.1177/1044389420910664
- Seligman HK & Berkowitz SA (2019). Aligning programs and policies to support food security and public health goals in the United States. *Annu Rev Public Health* 40:319–337. doi: 10.1146/annurev-publhealth-040218-044132
- Smith TA & Gregory CA (2023). Food insecurity in the United States: Measurement, economic modeling, and food assistance effectiveness. *Annu Rev Resour Economics* 15:279–303. doi:10.1146/annurev-resource-101422-090409.
- Sobal J & Stunkard AJ (1989). Socioeconomic status and obesity: A review of the literature. *Psychol Bull* 105(2):260–275. doi: 10.1037/0033-2909.105.2.260
- Story M, Kaphingst KM, Robinson-O'Brien R & Glanz K (2008). Creating healthy food and eating environments: Policy and environmental approaches. *Annu Rev Public Health* 29:253–272. doi: 10.1146/annurev-publhealth.29.020907.090926
- WHO (2018). *Noncommunicable Diseases Country Profiles 2018*. World Health Organization, Geneva, Switzerland.
- Zatońska K, Psikus P, Basiak-Rasała A, Stępnicka Z, Gaweł-Dabrowska D, Wołyniec M, Gibka J, Szuba A & Połtyn-Zaradna K (2021). Obesity and chosen non-communicable diseases in pure poland cohort study. *Int J Environ. Res Public Health* 18(5):2701. doi: 10.3390/ijerph18052701
- Zorbas C, Browne J, Chung A, Peeters A, Booth S, Pollard C, Allender S, Isaacs A, Hawkes C & Backholer K (2023). Shifting the social determinants of food insecurity during the COVID-19 pandemic: The Australian experience. *Food Secur* 15(1):151–170. doi: 10.1007/s12571-022-01318-4.