Available online: http://journal.ipb.ac.id/index.php/jgizipangan ***J. Gizi Pangan, January 2024, 19(Supp.1):87-94***
Accredited based on DGHE, Republic of Indonesia No. 28/E/KPT/2019
ISSN 1978-1059 EISSN 2407-0920

Knowledge, Attitude and Behavior of Dietary Salt Intake among Staff at a Public University in Selangor

Mohd Ramadan Ab Hamid[1,2*], Azni Afifah Mat Jani[1]
[1]Centre for Dietetics Studies, Faculty of Health Sciences, Universiti Teknologi MARA, Puncak Alam campus, 42300 Selangor, Malaysia, Integrated Nutrition
[2]Integrated Nutrition Science and Therapy Research Group (INSPiRE), Faculty of Health Sciences, Universiti Teknologi MARA, Puncak Alam Campus, 42300 Selangor, Malaysia

ABSTRACT

This study examines knowledge, attitude and behavior related to dietary salt intake among UiTM Puncak Alam staff. A cross-sectional study was conducted among 300 UiTM Puncak Alam staff. Respondents were recruited conveniently to complete a self-administered questionnaire that provides information on knowledge, attitude and behavior related to dietary salt. Descriptive statistics were used to report the survey findings. Results showed that most of the respondents (95.7%) had a knowledge that overeating salt could damage their health. However, only 35.7% of the respondents recognized the daily recommendation of salt intake and 40.0% of them were able to identify the difference between salt and sodium. Regarding attitude, only 28.3% of respondents believed their salt intake would exceed dietary guidelines. In practice, 31.4% of respondents controlled their salt intake by avoiding consuming processed food, and 18.0% referred to salt labels on food packages. This study showed that UiTM Puncak Alam staff was knowledgeable on particular aspects of salt. However, their attitudes are less favorable, and they need to improve their practices toward dietary salt intake to achieve target salt intake.

Keywords: attitude, behavior, hypertension, salt, knowledge

INTRODUCTION

Sodium chloride (NaCl), called 'salt', is an essential micronutrient that stimulates salty taste. Sodium chloride provides many functions, especially in improving food's sensory properties by increasing saltiness, reducing the bitterness in food, and other flavor effects (Li *et al.* 2022). While sodium is essential for normal human functioning, current dietary sodium intake far exceeds the recommended level for good health (Patel & Joseph 2020). The 2017 Recommended Nutrient Intake for Malaysia recommends that people aged nine years and above consume less than 1,500 mg of sodium daily (RNI 2017). A previous study that investigates the dietary intake of salt among Malaysian found that the sodium intake was 1,696 mg per day, which exceeded the recommended intake of 1500mg per day (Lee & Wan Muda 2019). In addition, based on the Malaysia National Health and Morbidity Survey 2019, it was found that 6.4 million people of Malaysians are suffers from hypertension (Institute for Public Health (IPH) 2019).

Based on a previous study, there is clear evidence of a strong positive relationship between sodium intake and blood pressure. Overconsumption of dietary sodium is highly associated with increased blood pressure or hypertension, a risk factor for cardiovascular diseases (Grillo *et al.* 2019). In Malaysia, the leading cause of Cardiovascular Disease (CVD) death in 2016 was coronary artery disease at 13.2% followed by stroke at 6.9% (Sazlina *et al.* 2020). Excess dietary sodium consumption has also been linked to numerous other adverse health effects, including gastric cancer, the development of chronic kidney disease, and osteoporosis (Strazzullo 2014). Reducing dietary salt intake reduces cardiovascular diseases, including hypertension and can lower the mortality rate (Unger *et al.* 2020). Therefore, many efforts are directed at developing and implementing strategies to reduce dietary salt intake.

Nutrition knowledge and beliefs are related to diet quality. Individuals with poor nutrition knowledge tend to consume low-quality diets, including a high-salt diet. A study also

[*]**Corresponding Author:** email: ramadan7230@uitm.edu.my
(Received 09-08-2023; Revised 22-09-2023; Accepted 27-10-2023; Published 31-01-2024)

found that the rate of awareness and control of hypertension improved over time. However, when compared with other countries, Malaysian awareness and control of hypertension were still low (Naing *et al.* 2016). Awareness programs and activities, including World Salt Awareness Week, were introduced, specific tools were developed, and the Ministry of Health Malaysia introduced intervention programs to improve the knowledge, attitude, and behavior related to dietary salt intake among ministry staff and the public. They also introduced the "Salt Reduction Strategies to Prevent and Control NCD (non-communicable diseases), 2015–2020" policy which aims to reduce the mean salt intake among the public. As a result, this study aimed to evaluate consumers' knowledge, attitude and behavior before developing strategies to reduce dietary salt intake among consumers.

METHODS

Design, location, and time

A cross-sectional study design was employed in Universiti Teknologi MARA (UiTM) Selangor, Puncak Alam Campus, from July until October 2019.

Sampling

The sample size was estimated using an equation proposed by Krejcie and Morgan (1970). It was decided to have a total sample of 462 respondents in case of dropouts and incomplete questionnaires. A convenient sampling method was used to reach each participant. A total of 500 questionnaires were distributed to UiTM Puncak Alam staff, and 300 questionnaires were retained for analysis of the knowledge, attitude and behavior related to dietary salt intake among respondents after eliminating 65 questionnaires that were found to be incomplete. Only 300 respondents successfully participated in this study.

Data collection

A multicomponent questionnaire was used in this study. The questionnaire was adopted from The Victorian Survey-Knowledge, Attitude and Behaviors related to Dietary Salt Intake questionnaire (Grimes *et al.* 2017). It was pilot tested in 15 adults to test the reliability of the questionnaire. The questionnaires were distributed to the staff at the faculties in UiTM Puncak Alam. Staff were appointed as liaison officers to help the researchers inform and distribute the questionnaire to the respective faculties. Ethical clearance and official permission were obtained from Universiti Teknologi MARA (UiTM) Research Ethics Committee (REC/418/19). Oral consent was obtained before enrolling in the study. The subjects' privacy and the confidentiality of the data was maintained.

Data analysis

All data were collected and analyzed using IBM SPSS software package version 21.0. Descriptive statistics, mean, standard deviation and proportion were used to describe respondent characteristics and responses to each question. The mean and the standard deviation were used for expressing the quantitative variables, and the relative frequencies and their percentage were used for describing categorical values variables.

RESULTS AND DISCUSSION

A total of 300 respondents agreed to complete the survey. Just over three-quarters (77.7%) of the sample were female, and the majority (96.3%) were Malay. The respondents' age were grouped into five groups: age group between 18 and 24 were 5.3%; between 25 and 34 years were 25.0%; between 35 and 44 years were 45.3%; between 45 and 54 years were 19.7% and those with age between 55 and 56 were 4.7%. By ethnicity, 96.3% were Malay and 3.7% were non-Malay (Table 1).

Most respondents (95.7%) knew overeating salt could damage their health (Table 2). Almost half (44.3%) of the respondents knew that most salt in the diet comes from processed foods. Nearly half (40%) of respondents could correctly identify the relationship between salt and sodium. Almost four-fifths (78%) believed Malaysians eat either far too much or too much salt. However, slightly more than a third (35.7%) of respondents could correctly identify the recommended maximum amount of salt to eat daily. Less than a third (28.3%) of respondents believed their salt intake would exceed dietary guidelines.

Figure 1 shows participants' level of agreement on a range of attitudes related to salt intake. Slightly more than two-thirds (67.7%) of respondents agreed that specialty salts are higher

Table 1. Socio-demographic characteristics of study participants (n=300)

Characteristics	n	%
Gender		
Female	233	77.7
Male	67	22.3
Age		
18–24	16	5.3
25–34	75	25.0
35–44	136	45.3
45–54	59	19.7
55–56	14	4.7
Ethnicity		
Malay	289	96.3
Non-Malay	11	3.7
Education level		
STPM /Certificate/Diploma	89	29.7
Degree	107	35.7
Master	59	19.7
PhD	45	15.0
Work experience		
Less than one year	13	4.3
1–3 year	36	12.0
4–6 year	34	11.3
More than six year	217	72.3
Income		
RM 2,000–RM3,000	85	28.3
RM 3,001–RM4,000	62	20.7
RM 4,001–RM5,000	61	20.3
RM 5,000 and above	92	30.7

than regular table salt. Approximately four-fifths (80%) of the respondents agreed that salt should be added to food to make it tasty. Similarly, most (85%) believed their health would improve if they reduced the amount of salt in their diet. Sixty-four percent of respondents reported that it was hard to understand sodium information displayed on food labels. Less than two-thirds (61.7%) agreed that finding low-salt options when eating out was challenging. Similarly, less than two-thirds (63.7%) of respondents decided that laws should limit the amount of salt added to manufactured foods.

The level of public concern regarding food-related issues was relatively high, with 44–57% of respondents reporting that they were either very or extremely concerned with each food-related issue (Figure 2). More than a third (36.3%) of respondents were very worried about the calories in food. In total, less than half (44%) of the respondents were very concerned about the amount of fat in food and half (50.3%) were very concerned about the amount in food. Sugar and salt were the nutrients of most concern. In contrast, more than half (57%) of the respondents were very concerned about the amount of sugar in food. More than half (53.6%) were very or highly worried about the amount of salt in food.

Figure 3 shows the respondents' behavioral practices to reduce salt intake performed in the past month. Within the total sample, the most commonly reported behaviors to lower salt intake in the past month included avoiding eating packaged food (31.4%), using spices/herbs instead of salt when cooking (28.4%), avoiding eating food from takeaway stores (28.0%), avoid eating food from fast food restaurants (27.7%) and purchased salt-reduced foods (26.0%), these behaviors were reported by about a third of the sample. Fewer respondents, about less than one-fifth, reported using the sodium information on food labels (18.0%) and asked to prepare meals without salt when eating out (10.7%).

In this study, Knowledge, Attitude, and Behaviours (KAB) toward dietary salt intake was assessed. The finding of this study revealed that, in general, UiTM Puncak Alam staff are knowledgeable and specific aspects of salt-related knowledge are well understood among them. Most respondents were aware of the harmful effect of excess dietary salt intake on health, including the link with other health conditions such as raised blood pressure and coronary heart diseases. However, fewer were aware of the connection between excessive dietary salt consumption and other health conditions; notably, almost a third of respondents did not identify stroke as a health risk related to excessive dietary salt consumption. However, the findings from present study is contradict with another research that found the majority participants of Malay elderly had fair and poor knowledge on sodium and hypertension (Haron *et al.* 2020). Fewer were aware of its connection with other health conditions related to excessive salt consumption, such as stroke

Table 2. Knowledge about dietary salt

Questions and answers	n (%)
Do you think that overeating salt could damage your health?	
Yes	287 (95.7)
No	7 (2.3)
Don't know	6 (2.0)
What is the relationship between salt and sodium?	
They are the same	78 (26.0)
Salt contains sodium	120 (40.0)
Sodium contains salt	39 (13.0)
Don't know	63 (21.0)
Which of the following do you think is the primary source of salt in the diet?	
Salt added during cooking or at the table	102 (34.0)
Salt from processed foods such as bread, sausages and cheese	133 (44.3)
Salt from natural food sources	54 (18.0)
Don't know	11 (3.7)
In general, how much salt do you think Malaysian eat?	
Far too much	41 (13.7)
Too much	193 (64.3)
Just the right amount	63 (21.0)
Too little	1 (0.3)
Far too little	2 (0.7)
Health professionals recommend that we should eat no more than a certain amount of salt each day. How much salt do you think this is?	
3 g (about 1/2 a teaspoon)	67 (22.3)
5 g (about one teaspoon)	107 (35.7)
8 g (about one and 1/2 teaspoons)	25 (8.3)
10 g (about two teaspoons)	29 (9.7)
15 g (about three teaspoons)	10 (3.3)
Don't know	62 (20.7)
How do you think your daily salt intake compares to the amount of salt recommended by health professionals?	
I eat less salt than recommended	65 (21.7)
I eat about the right amount of salt	107 (35.7)
I eat more salt than recommended	85 (28.3)
I don't know	43 (14.3)

and stomach cancer. The message that high salt consumption can cause serious health problems such as high blood pressure, kidney disease, and coronary heart disease is reaching the public. Still, there is a need to raise greater awareness of stroke risk, particularly given that stroke were one of the leading cause of death in Malaysia.

Most respondents were aware that most Malaysians consume too much salt daily, and most respondents perceived they consumed

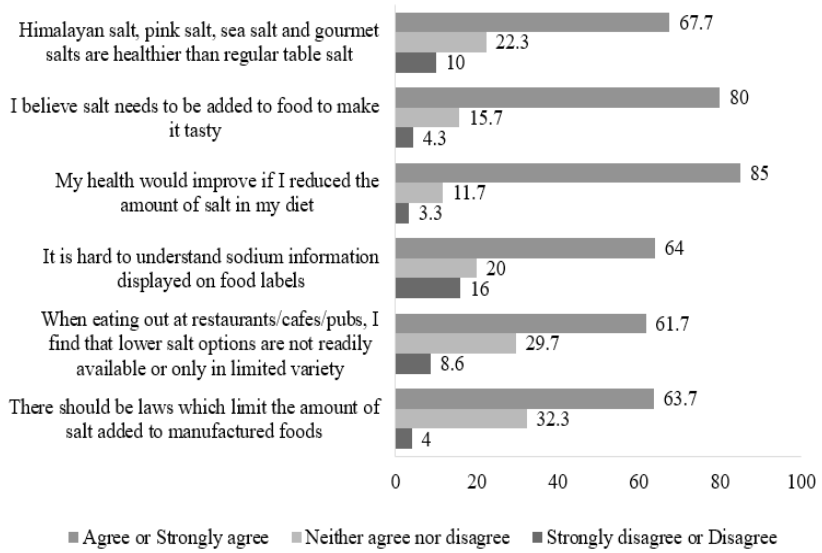

Figure 1. Percentage level of agreement with attitude statement related to salt intake (n=300)

about the right amount of salt in their daily diet. However, this study showed that less than half (35.7%) of respondents needed clarification on the recommendation of salt intake in a day. At the same time, less than a third (28.3%) of respondents believed their daily salt intake would exceed the recommendations. In contrast, a study in China found that, among 7512 participants, the 65.7% knew consuming less salt can reduce blood pressure and 71.1% had knowledge of the complications of taking more than the recommended salt intake (Du *et al.* 2022).

Consumers believe they consume the right amount of dietary sodium daily because they may underestimate their daily salt intake. This may happen for at least two reasons. Firstly, their knowledge of dietary salt recommendations was poor. Secondly, consumers may still be unaware of or underestimate dietary salt sources hidden across the food supply and daily food items (Grimes *et al.* 2017). Thus, awareness should be raised on recognizing foods that contribute high salt to the diet. In addition, about 85% of respondents believed their health would improve

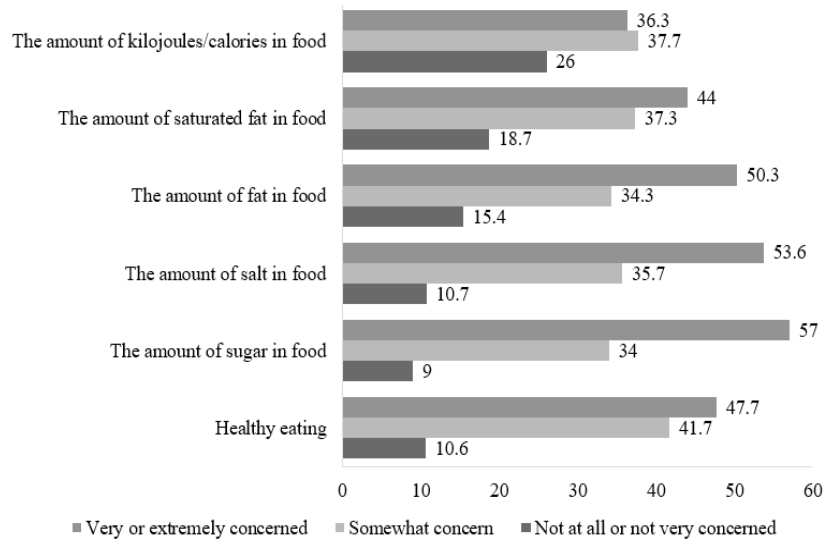

Figure 2. Percentage level of public concern for food-related issues (n=300)

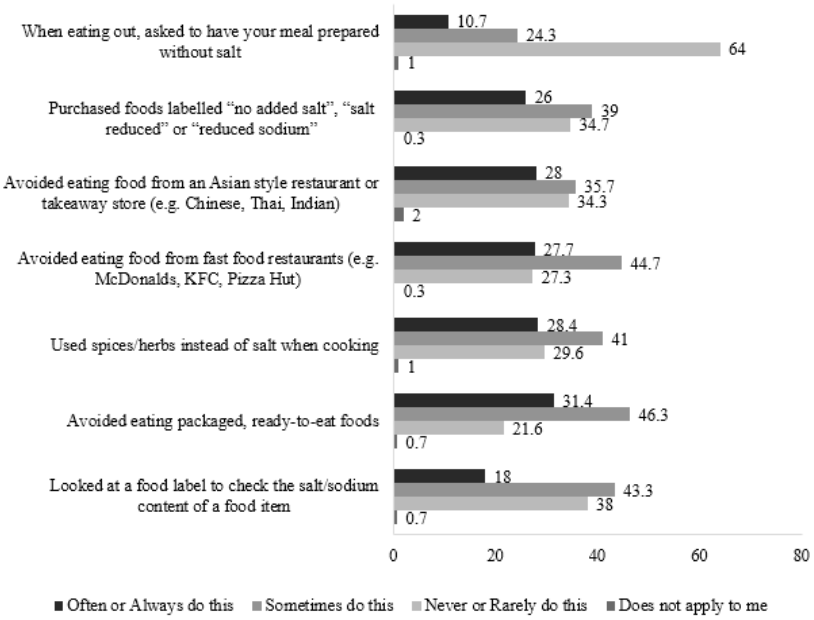

Figure 3. Behavioral practices to reduce salt intake performed in the past month (n=300)

if they reduced salt in their diet. This may explain why more than half (53.6%) of the respondents were concerned about the amount of salt in their diet. Yet, it is still alarming that nearly half of the respondents were somewhat or not very concerned about the amount of salt in their diet. However, there was clear evidence that related excess consumption of dietary salt to an increased risk of getting non-communicable diseases. This finding shows that UiTM Puncak Alam Staff were less concerned about dietary salt issues.

Knowledge and attitude influence the practice of dietary salt intake of an individual. A prior research investigation in Sharjah, UAE, revealed that the level of knowledge among university students concerning salt and sodium was notably limited. Additionally, a lower proportion of students indicated their willingness to adopt measures aimed at reducing salt and sodium intake in their diets (Cheikh Ismail *et al.* 2019). Hence, shifting consumers' attitudes to concern about dietary salt intake may be an important factor in changing salt-related behavior. The finding in this study revealed that less than two-thirds of respondents reported difficulty understanding sodium content on food labels. In Malaysia, regarding nutrition labels concerning sodium labelling, according to the Malaysian Food Act 1983, sodium may be declared on the label, the amount present is shown in mg per 100 g or 100 mL or per package if the package contains only a single portion and per serving as shown on the label. This requires consumers to do a manual calculation to determine the salt content of food. However, only 40% of the respondents knew the difference between salt and sodium. This indicates that it would be challenging for the consumers to interpret how sodium content relates to overall salt intake.

Food labels play an important role to guide consumers to choose healthier products. A systematic review strongly indicates the food labels do indeed lead to a significant improvement in the healthiness of the diets selected by consumers (Shangguan *et al.* 2019). It is also recommended to establish a consumer-friendly nutrition labelling system that includes salt on the front of the pack or uses traffic light labelling as these will indicate the level of salt in each food packaging. This study finding also shows that only ten% of respondents could correctly identify that there were no health differences between regular table salt and other salt. This indicates that accurate food choice information is not reaching consumers. Hence, it is essential to raise awareness in enabling customers to understand

food labels correctly and have accurate food choice information.

The Malaysia Institute of Public Health show that the major contributor of sodium in the Malaysian diet is cooked food (IPH 2016). Individuals often find it challenging to regulate their salt consumption when dining out, as the latest study indicated that participants observed a scarcity of options for low-sodium foods when dining at restaurants. When eating out, consumers frequently encounter difficulties in making health-conscious choices, and this is partly due to the absence of detailed nutritional information and other important criteria (Bray *et al.* 2019). The increasing amount of sodium consumption may be due to changes in people's lifestyles, from home to outside meals. This indicates that the food and beverage industry is one of the critical factors for increasing salt awareness and future salt reduction programs.

Overall, the task of influencing and changing dietary behavior is challenging. Thus, a collaborative multidisciplinary approach is required to implement successful reduction of dietary sodium consumption strategies. They need to construct interventions targeting improving knowledge, attitude and behavior and focusing on other determinants of diet quality, such as motivation and intention, by providing a supportive environment for salt reduction. This can be done by the government and food industry by reducing processed food and restaurant food sodium content rather than consumer behavior. The government should apply standard purchased food items to have a sodium limit, and the food industries should produce foods within the limit. There should also be a labelling system that uses traffic light labelling as these will indicate the salt level in each food packaging.

CONCLUSION

The findings demonstrate that UiTM Puncak Alam staff in this survey are knowledgeable. However, attitudes are less favorable, and behaviors related to dietary salt intake could be improved. Public awareness of the link with other health conditions related to excessive salt consumption is still low. There is a need to raise awareness of salt-related health risks, as it is one of Malaysia's leading causes of death. Public concern about dietary salt is still low as many people remain unaware of their salt intake, where the majority underestimate their daily sodium consumption and minimize the extent of salt content across the food supply and list of everyday food items that are high in salt content.

ACKNOWLEDGEMENT

The authors thank healthcare facilities at the university who granted permission for data collection.

DECLARATION OF CONFLICT OF INTERESTS

The authors declared no potential conflicts of interest with respect to the research, authorship, and publication of this article.

REFERENCES

Bray J, Hartwell H, Price S, Viglia G, Kapuściński G, Appleton K, Saulais L, Perez-Cueto FJA, Mavridis I. 2019. Food information presentation: consumer preferences when eating out. Br Food J 121(8):1744–1762. https://doi.org/10.1108/bfj-09-2018-0605

Cheikh Ismail L, Hashim M, Jarrar AH, Mohamad MN, Saleh ST, Jawish N, Bekdache M, Albaghil H, Kdsi D, Aldarweesh D *et al.* 2019. Knowledge, attitude, and practice on salt and assessment of dietary salt and fat intake among University of Sharjah students. Nutr 11(5):941. https://doi.org/10.3390/nu11050941

Du X, Fang L, Xu J, Chen X, Bai Y, Wu J, Wu L, Zhong J. 2022. The association of knowledge, attitudes and behaviors related to salt with 24-h urinary sodium, potassium excretion and hypertensive status. Sci Rep 12(1): 13901. https://doi.org/10.1038/s41598-022-18087-x

Grillo A, Salvi L, Coruzzi P, Salvi P, Parati G. 2019. Sodium intake and hypertension. Nutr 11(9):1970. https://doi.org/10.3390/nu11091970

Grimes CA, Kelley SJ, Stanley S, Bolam B, Webster J, Khokhar D, Nowson CA. 2017. Knowledge, attitudes and behaviours related to dietary salt among adults in the state of Victoria, Australia 2015. BMC

Public Health 17(1):1–16. https://doi.org/10.1186/s12889-017-4451-0

Haron H, Kamal NF, Yahya HM, Shahar S. 2020. Knowledge, Attitude and Practice (KAP) of Malay elderly on salt intake and its relationship with blood pressure. Front Public Health 8:559071. https://doi.org/10.3389/fpubh.2020.559071

[IPH] Institute for Public Health. 2016. Determination of Dietary Sodium Intake among the Ministry of Health Staff. Kuala Lumpur (KL): Ministry of Health.

[IPH] Institute for Public Health. 2019. National Health and Morbidity Survey communicable diseases: Risk factors and other health problems. https://iptk.moh.gov.my/images/technical_report/2020/4_Infographic_Booklet_NHMS_2019_-_English.pdf [Accessed 6th June 2021].

Krejcie RV, Morgan DW. 1970. Determining sample size for research activities. Educ Psychol Meas 30(3):607–610.

Lee YY, Wan Muda WAM. 2019. Dietary intakes and obesity of Malaysian adults. Nutr Res Pract 13(2):159–168. https://doi.org/10.4162/nrp.2019.13.2.159

Li X, Alu A, Wei Y, Wei X, Luo M. 2022. The modulatory effect of high salt on immune cells and related diseases. Cell Prolif 55(9):e13250. https://doi.org/10.1111/cpr.13250

Naing C, Yeoh PN, Wai VN, Win NN, Kuan LP, Aung K. 2016. Hypertension in Malaysia: An analysis of trends from the national surveys 1996 to 2011. Medicine (Baltimore) 95(2):e2417. https://doi.org/10.1097/MD.0000000000002417

Patel Y, Joseph J. 2020. Sodium intake and heart failure. Int J Mol Sci 21(24). https://doi.org/10.3390/ijms21249474

Sazlina SG, Sooryanarayana R, Ho BK, Omar MA, Krishnapillai AD, Mohd Tohit N, Inche Zainal Abidin S, Ariaratnam S, Ahmad NA. 2020. Cardiovascular disease risk factors among older people: Data from the National Health and Morbidity Survey 2015. Plos One 15(10):e0240826. https://doi.org/10.1371/journal.pone.0240826

Shangguan S, Afshin A, Shulkin M, Ma W, Marsden D, Smith J, Saheb-Kashaf M, Shi P, Micha R, Imamura F *et al.* 2019. A Meta-analysis of food labeling effects on consumer diet behaviors and industry practices. Am J Prev Med 56(2):300–314. https://doi.org/10.1016/j.amepre.2018.09.024

Unger T, Borghi C, Charchar F, Khan NA, Poulter NR, Prabhakaran D, Ramirez A, Schlaich M, Stergiou GS, Tomaszewski M *et al.* 2020. 2020 International society of hypertension global hypertension practice guidelines. Hypertension 75(6):1334–1357. https://doi.org/10.1161/HYPERTENSIONAHA.120.15026