FACTORS OF HOUSEHOLD SODIUM CONSUMPTION BEHAVIOR : A PILOT STUDY BANG YI RONG SUBDISTRICT, SAMUT SONGKHRAM PROVINCE, THAILAND

Kanokporn Somporn[1], Wanwimon Mekwimon Kingkaew[2], Nopadol Thongaram[3], Niwat Songsin[4]

[1,2,4]Department of Community Public Health, College of Allied Health Sciences, Suan Sunandha Rajabhat University

[3]Sirindhorn College of Public Health Suphanburi Province

E-mail: Kanokporn.So@ssru.ac.th[1], Wanwimon.Me@ssru.ac.th[2], Nopadol.Th@ssru.ac.th[3]

**Corresponding author, E-mail: Niwat.so@ssru.ac.th[4]*

ABSTRACT

Sodium is a natural mineral that the body cannot produce itself and must be obtained from food. It is an ingredient in many foods, with sodium chloride or table salt being the most commonly consumed. This cross-sectional descriptive study aimed to examine factors (predisposing, enabling, and reinforcing) affecting household consumption behavior of sodium-containing foods in Bang Yi Rong Subdistrict, Bang Khonthi District, Samut Songkhram Province. The sample consisted of 255 households, with data collected using a questionnaire and analyzed using descriptive statistics and multiple regression.

Results found that factors impacting household sodium consumption behavior included knowledge, enabling factors, and reinforcing factors. These jointly predicted 13.50% of the variation in household sodium intake behavior ($p < .05$). The findings will be useful for future campaigns to modify health behaviors and reduce household sodium consumption.

Keywords: Sodium, Health Behavior, Predisposing factors, Enabling factors, Reinforcing factors

INTRODUCTION

Sodium is a natural mineral the body cannot produce and must obtain from food (Ekkantong et al., 2018). Sodium is a component of many foods, with sodium chloride (table salt) being the most popular (Tonkhunsung & Sakboonya-run, 2023). Salt intake should not exceed 1 teaspoon or 5 grams per person per day, equivalent to under 2,000 mg of sodium, to avoid adverse health effects (Food and Drug Administration, 2022). While multiple factors contribute to hypertension, the most significant one that greatly impacts blood pressure is excessive sodium consumption. The prevalence of chronic non-communicable diseases is a major public health problem, with rates tending to increase. It is a leading cause of death, affecting families, the economy and society (Temkaew et al., 2022).

Globally, populations in various countries consume salt and sodium beyond daily requirements (WHO recommends under 2,000 mg of sodium per day). Assessing salt and sodium intake via 24-hour urine collection, the WHO gold standard, found sodium consumption of 4,202 mg/day in American men and 3,272 mg/day in women. In the UK, it was 3,818 mg in men and 3,013 mg in women. In South Africa, 3,112 mg in men and 3,393

mg in women. In Southeast Asia in 2008, over 7.9 million people died from NCDs, 3.6 million from cardiovascular disease. 34% of deaths occurred before age 60, with key risk factors being hypertension and high salt/sodium intake, which clearly elevates blood pressure. In 2008, 1 in 3 Southeast Asian adults had hypertension (Bureau of Non-Communicable Diseases, Department of Disease Control, Ministry of Public Health, 2016).

In Thailand, a 2007 survey found Thais consumed sodium chloride mainly from condiments, accounting for 80.3% of total sodium chloride intake. When converted to sodium amounts (40% of sodium chloride), Thais consumed a high 4,351.7 mg of dietary sodium per person per day (Bureau of Non-Communicable Diseases, Department of Disease Control, Ministry of Public Health, 2016). Lakchai Srinuan-yuang et al.'s (2007) study by the Bureau of Non-Communicable Diseases, Department of Disease Control found daily life factors related to eating behaviors in terms of meal frequency and food sources, especially purchasing ready-made foods more than cooking. A 2009 Department of Health survey on sodium chloride consumption in Thai households by the Nutrition Division found Thais get salt (sodium chloride) from 2 sources:

1. Sodium chloride-containing seasoning products used in household cooking. Fish sauce was most used (96.39%), followed by salt, light soy sauce, shrimp paste, seasoning powders, oyster sauce, fermented fish sauce, seasoning sauces, curry paste, dark soy sauce and bouillon cubes at 91.53%, 64.59%, 63.17%, 61.60%, 61.42%, 41.36%, 35.68%, 33.41%, 32.30%, and 30.88% respectively (Nutrition Division, Department of Health, Ministry of Public Health, 2020).

2. Consumption of sodium chloride-containing foods and products. The top 5 most consumed were instant noodles with seasoning (59.68%), followed by canned fish, steamed mackerel, chili pastes, and salted fish at 48.85%, 47.20%, 44.93%, 37.43% (Nutrition Division, Department of Health, Ministry of Public Health, 2020).

Salt (sodium chloride) intake has a direct linear relationship with hypertension incidence and death from cardiovascular disease (Trinwutthipong, 2021). Most risk factors stem from incorrect health behaviors such as inappropriate eating like excessive sodium consumption (Boonmee, 2022).

Data from Samut Songkhram Provincial Public Health Office (2023) for fiscal years 2018-2023 covering its 3 districts (Mueang Samut Songkhram, Bang Khonthi, Amphawa), showed Bang Khonthi had the highest hypertension rates, followed by Amphawa and Mueang. Morbidity rates and ages 60+ per population were:

2018 - Morbidity: 24.67%, 19.22%, 16.58%. Age 60+: 60.04%, 55.18%, 54.01% 2019 - Morbidity: 25.15%, 19.98%, 17.36%. Age 60+: 60.62%, 55.60%, 54.41% 2020 - Morbidity: 25.69%, 20.59%, 17.87%. Age 60+: 60.93%, 55.82%, 54.24%

2021 - Morbidity: 26.04%, 20.74%, 18.13%. Age 60+: 60.42%, 55.17%, 53.26% 2022 - Morbidity: 26.71%, 21.01%, 18.24%. Age 60+: 60.42%, 55.05%, 53.27% 2023 (as of June 15, 2023) - Morbidity: 59.92%, 21.25%, 18.56%. Age 60+: 26.81%, 55.06%, 53.29%

As shown, sodium adversely affects the body, causing kidney deterioration as they excrete sodium. Prolonged sodium overconsumption beyond bodily needs leads to edema, which if chronic, results in high blood pressure, kidney disease, and cardiovascular disease. Literature reviews found key variables related to sodium consumption behaviors were age,

education level, average monthly household income, occupation, knowledge of salt/sodium intake, and access to information/prompts to reduce sodium intake, all associated with salty food consumption behaviors risking hypertension.

Recognizing the significance of sodium intake issues in Bang Yi Rong Subdistrict, Bang Khonthi District, Samut Songkhram Province and its impact on at-risk hypertensive behaviors and illness costs burdening descendants, the researchers were interested in studying household sodium consumption behaviors in the area. Findings will guide health promotion hospitals in planning to educate and reduce sodium consumption behaviors among residents for better future outcomes.

OBJECTIVES

Study factors (predisposing, enabling, reinforcing) affecting household consumption behavior of sodium-containing foods in Bang Yi Rong Subdistrict, Bang Khonthi District, Samut Songkhram Province.

METHODOLOGY

This cross-sectional descriptive research used questionnaires to collect data. The population was 578 households in Bang Yi Rong Subdistrict, Bang Khonthi District, Samut Songkhram Province. The sample size of 255 households was determined using Krejcie & Morgan's formula (1970). Multi-stage sampling was employed to proportionally allocate the number of samples in each stratum, followed by simple random sampling until reaching the calculated number per village.

Inclusion criteria:

1. One household cook aged 18+
2. Able to communicate and write in Thai
3. Resided in Bang Yi Rong Subdistrict for over 1 year
4. Agreed to participate

Exclusion criteria:

1. Unwilling to participate
2. Did not reside in Bang Yi Rong Subdistrict

Research Instruments

A questionnaire was used, consisting of 5 parts:

Part 1: 7 general respondent information questions on gender, age, education, occupation, average monthly income, underlying diseases, household cooking. Multiple choice and fill-in-the-blank.

Part 2: Predisposing factor questionnaire on sodium consumption knowledge. Multiple choice - correct = 1 point, incorrect = 0 points. Single answer. Overall interval scale measurement. Scores interpreted using Bloom's Learning for Mastery referenced grading divided into 3 levels (Bloom, 1975).

Part 3: Enabling factor questionnaire on access to food sources and convenience foods. Multiple choice questions and 3-level rating scale. Single answer.

Part 4: Reinforcing factor questionnaire on receiving sodium consumption information and family/close person relationships regarding sodium intake. Multiple choice and 3-level rating scale. Single answer.

Part 5: Sodium consumption behavior questionnaire covering cooking, purchasing, and eating sodium-containing foods. Multiple choice and 3-level rating scale. Single answer.

Instrument Quality Check

The questionnaire's reliability was tested using Cronbach's alpha coefficient for internal consistency. Cronbach (1990) set the acceptable value at 0.7 (Kijpreedaborisut, 2006). The revised questionnaire was piloted with 30 people in a similar population and environment in Bang Nok Khwaek Subdistrict, Bang Khonthi District, Samut Songkhram Province before use with the actual sample. Cronbach's alpha for the entire questionnaire was 0.87.

Ethical Considerations

This research project was certified by the Human Research Ethics Committee of the Research and Development Institute of a Rajabhat University, code COA. 1-044/2023, on September 21, 2023.

Data Analysis

Data were checked for completeness and analyzed using a software package as follows:

1. Descriptive statistics to describe respondents' personal factors - frequency, percentage, mean, standard deviation.
2. Inferential statistics to find factors affecting household sodium consumption behavior in Bang Yi Rong Subdistrict, Bang Khonthi District, Samut Songkhram Province using multiple regression analysis.

RESULTS

1. General information: The sample were 255 household cooks aged 18+ residing in Samut Songkhram Province. Most were female (66.2%), average age 46 years (SD=14.48), primary education (24.4%), farmers (41.3%), average income under 20,000 baht (52.9%), no underlying diseases (60.4%), and cooked their own meals (72.4%).
2. Linear analysis using multiple regression (enter method): Independent variables were knowledge, perception, enabling and reinforcing factors. The dependent variable was household sodium consumption behavior in Bang Yi Rong Subdistrict, Bang Khonthi District, Samut Songkhram Province.

Household sodium consumption behavior = 1.230 + 0.199 x1 - 0.098x2 + 0.251x3 + 0.201 x4

Where: sig = significant at .05 level

R^2 = coefficient of determination

SE = sampling error

B = unstandardized regression coefficient

β = standardized regression coefficient

t = t-test statistic

The equation components were knowledge, enabling and reinforcing factors. These jointly predicted 13.50% of the variation in household sodium consumption behavior ($p < .05$).

DISCUSSION

Linear analysis using multiple regression (enter method) found household sodium consumption behavior in Bang Yi Rong Subdistrict, Bang Khonthi District, Samut Songkhram Province = 1.230 + 0.199 x1 - 0.098x2 + 0.251x3 + 0.201 x4, comprising knowledge, enabling and reinforcing factors.

For sodium consumption knowledge, the sample had a good foundation for selecting healthier foods. Orem's self-care deficit theory believes people can continuously care for themselves through a learning process and reflection to meet self-care needs. Thus, those who choose proper foods demonstrate self-care abilities, integrating it as part of their daily lifestyle (Orem, 2001; Sureewan Siladlao et al.,2021).

Multiple regression also revealed enabling and reinforcing factors impacted household sodium consumption behaviors. Overall enabling factors were high. Family relationships and close persons had the highest mean, followed by access to information. Support from community leaders and neighbors promoted favorable behaviors. This aligned with Rujiwattanakorn's (2013) study on sodium intake in hypertensive patients which found low social support for reducing salty food consumption. They perceived family as a source of emotional, appraisal and tangible social support, while health personnel provided informational support, significantly related to daily sodium intake ($p < 0.03$). It also concurred with Maneetup & Dansikaew's (2017) study on salt consumption in hypertensive patients in Thang Khwang Subdistrict, Waeng Noi District, Khon Kaen Province which found key factors supporting patients in appropriately lowering salt intake were family, peer patient groups, and community.

REFERENCES

Bloom, B. S. (1975). Taxonomy of Education. David McKay Company Inc.

Boonmee, D. (2022). Relationship between health literacy and health behavior among population at risk of hypertension, Ko Samui District, Surat Thani Province. Journal of Research and Innovation in Health, 5(2), 153-166.

Bureau of Non-Communicable Diseases, Department of Disease Control, Ministry of Public Health. (2016). Strategy to reduce salt and sodium consumption in Thailand 2016-2025 [Internet]. Retrieved May 15, 2023, from http://thaincd.com/document/file/non-communicable-disease/ยุทธศาสตร์ลดบริโภคและโซเดิมฯ.pdf

Charuwattanapong, C., et al. (2018). Food consumption behavior of people in Rata Panyang Subdistrict, Yaring District, Pattani Province. Chalermkarnchana Journal, 5(2), 108-118.

Cronbach, L. J. (1990). Essentials of Psychology Testing. Harper.

Ekkantong, P., et al. (2018). Sodium content in popular foods of Northeastern Thailand. Journal of Health and Nursing Education, 24(2), 6-17.

Food and Drug Administration. (2022). Health problems of Thais from salty (sodium) consumption [Internet]. Retrieved May 1, 2023, from https://oryor.com/media/video/media_printing/1767

Kijpreedaborisut, B. (2006). Statistics for research analysis (4th ed.). Chulalongkorn University Press.

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. Educational and Psychological Measurement, 30, 607-610.

Maneetup, K., & Dansikaew, S. (2017). Situation of salt consumption among hypertensive patients in Thang Khwang Subdistrict, Waeng Noi District, Khon Kaen Province. Nursing and Health Care Journal, 35(4), 139–149.

Muthum, A., & Loka, S. (2020). Salty food consumption behavior of diabetic patients in Nong Khla Health Promoting Hospital area, Senangkhanikhom District, Amnat Charoen Province [Internet]. Retrieved June 10, 2023, from http://www.amno.moph.go.th/amno_new/files/1p9.pdf

Nutrition Division, Department of Health, Ministry of Public Health. (2020). Recommended daily nutrient intake for Thais 2020 [Internet]. Retrieved May 15, 2023, from https://nutrition2.anamai.moph.go.th/th/dri/176096

Orem, D. E. (2001). Nursing concepts of practice (6th ed.). Mosby, Inc.

Rujiwattanakorn, D. (2013). Sodium consumption of hypertensive patients [Master's thesis in Science]. Mahidol University.

Samut Songkhram Provincial Public Health Office. (2023). Important non-communicable disease morbidity [Internet]. Retrieved May 30, 2023, from https://citly.me/AhywE

Srinuan-yuang, L., Wongjinda, P. T., & Apichanakunchai, T. (2007). Situation of sodium chloride consumption in the Thai population [Internet]. Retrieved May 15, 2023, from http://thaincd.com/document/file/download/paper-manual/download1no167.pdf

Sureewan Siladlao, S., Saikaew, T., Mekwimonkingkaew, W., Wongpitak, K., & Promsorn, T. (2021). Factors affecting nutritional eating behaviors among students at Suan Sunandha Rajabhat University, Samut Songkhram Education Center. Journal of Science and Technology Sisaket Rajabhat University, 1(1), Jan-Jun 21.

Temkaew, Y., et al. (2022). Success and failure factors in building health literacy to reduce salt consumption, Ban Pa Hiang community, Mueang District, Lampang Province. Journal of Community Public Health, 8(01), 28-28.

Thirakunprit, P. (2016). Factors affecting household sodium consumption behavior in Bang Mak Subdistrict, Kantang District, Trang Province [Bachelor of Public Health (Community Health)]. Sirindhorn College of Public Health, Trang.

Tonkhunsung, K., & Sakboonya-run, B. (2023). Sodium consumption of the Thai population from 24-hour urinary sodium assessment: A cross-sectional study. Journal of Health Science, 32(1), 5-18.

Trinwutthipong, K. (2021). Effects of a salt reduction program among suspected hypertension groups in Health Region 7. The Office of Disease Prevention and Control 9th Nakhon Ratchasima Journal, 27(3), 43-52.