DETERMINATION OF DIETARY SODIUM INTAKE AMONG THE MINISTRY OF HEALTH STAFF

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Any enquiries about or comments on this report should be directed to:

Pn Fatimah Othman
Institut Kesihatan Umum
Tel: 03- 2297 9446
Email : fatimah.oth@moh.gov.my

Pn Cheong Siew Man
Institut Kesihatan Umum
Tel: 03- 2297 9492
Email : smcheong@moh.gov.my

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RESEARCH TEAM MEMBERS

1. Fatimah Othman (Principle Investigator 1)
   Dietitian (Researcher), Institute for Public Health

2. Cheong Siew Man (Principle Investigator 2)
   Nutritionist (Researcher), Institute for Public Health

3. Dr. Tahir Bin Aris
   Director, Institute for Public Health

4. Dr. Rozlan Bin Ishak
   Deputy Director, Disease Control Division, Ministry of Health

5. Rashidah Binti Ambak
   Dietitian (Researcher), Institute for Public Health

6. Dr. Mohd Azahadi Bin Omar
   Public Health Specialist, Institute for Public Health

7. Dr Muhammad Fadhli Bin Mohd Yusoff
   Public Health Specialist, Institute for Public Health

8. Nor Azian Binti Mohd Zaki
   Dietitian (Researcher), Institute for Public Health

9. Azli Bin Baharudin
   Nutritionist (Researcher), Institute for Public Health

10. Mohd Hasnan Ahmad
    Nutritionist (Researcher), Institute for Public Health

11. Nur Shahida Binti Abdul Aziz
    Dietitian (Researcher), Institute for Public Health

12. Muslimah Yusof
    Nurse, Institute for Public Health

13. Norazizah Ibrahim Wong
    Statistician, Institute for Public Health

14. Viola Micheal
    Senior Principle Assistant Director, Disease Control Division, Ministry of Health

15. Siti Farah Zaidah Mohd Yazid
    Assistant Principal Director, Disease Control Division, Ministry of Health

16. Azhar Yusuff
    Assistant Principal Director, Disease Control Division, Ministry of Health

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4. ABBREVIATIONS

BMI – Body Mass Index
FFQ – Food Frequency Questionnaire
KAP – Knowledge, Attitude and Practices
MOH – Ministry of Health
WHO – World Health Organization
NCD- Non Communicable Disease

Abstract

Background: High level of dietary sodium is associated with elevated blood pressure and adverse cardiovascular health. The aim of this study was to determine the amount of sodium intake and identify the dietary sources of sodium among the Ministry of Health staff.

Methods: This cross-sectional study was conducted from November to December 2015, involving 1568 health staff aged 18 - 59 years old from 16 study sites. A total of 98 respondents were randomly selected from 14 State Health Departments, Ministry of Health headquarters (Putrajaya), and National Institute of Health study sites. Data collection included socio-demography, anthropometric measurements, blood pressure, two-days food diary, validated food frequency questionnaire (FFQ), 24-hour urine sodium and spot urine. Dietary sodium was assessed using Nutritionist Pro™ Nutrition Analysis Software version 6.1.0. Urine sodium was tested using ion selective electrodes diluted for sodium in Architect C system analyzer. Completeness of urine collection was based on volume > 500 ml. Data was analyzed using SPSS version 22.

Results: The mean sodium intake measured using 24-hour urine excretion was 2860 (1369) mg/day corresponding to 7.15 g sodium chloride. Prediction of 24-hour urinary sodium from the Kawasaki and Tanaka equation showed a significant but low association with the measured 24-hour urine excretion, r= 0.33, r=0.32 (p< 0.05) respectively. Dietary sodium assessed from the food diary and food frequency questionnaire was 2761(1042) mg/day and 3446 (2748) mg/day respectively. The main sources of dietary salt intake were soy sauce, fried rice, omelet, nasi lemak, and roti canai. By food groups, cooked grains and sauces were major contributors to salt intake. In regards to knowledge, attitude, and practice, most of the respondents had knowledge on serious health problems contributed by high salt intake, especially blood pressure. More than half of the respondents felt that lowering sodium intake was very important. They regularly control their sodium intake and never added salt to the food they ate at the table, but often or always added salt when cooking at home.

Conclusions: Sodium intake among health staff was higher than World Health Organization (WHO) recommendation. The current sodium intake of 6.90g to 7.15g salt / day was higher by 38% to 43% compared to 5g/day as recommended by WHO. Among health staff, soy sauce and cooked food remained the top sodium contributors. The level of knowledge and attitude of the health staff was satisfactory, but the practices towards salt reduction must be improved to achieve the target salt intake of 2000 mg/day by 2025.

Key words: 24-hour urine sodium, food diaries, sodium food frequency questionnaire, spot urine, high sodium food, knowledge, attitude and practice

1.0 INTRODUCTION

Sodium is an essential electrolyte that regulates blood volume and osmotic equilibrium in the human body. However, excessive sodium consumption can cause fluid retention and subsequently increase blood pressure. Conclusive scientific evidence connects excessive consumption of sodium with cardiovascular disease, gastric cancer, osteoporosis, cataract, kidney stones and diabetes [1]. Clinical evidence has also proven salt intake is an independent factor of blood pressure levels. By cutting down salt intake by less than 2g/day, systolic and diastolic blood pressure can be reduced to 3.47 mmHg to 1.81 mmHg, respectively [2].

The global recommendation suggests reducing salt intake to less than 5g/d (2000mg/day/person) and by at least 30% by 2025 [3]. This position has been endorsed by the United Nations High level Meeting on Non-Communicable Diseases (NCD) as Voluntary Global Targets for the prevention and control of NCDs by reducing salt as a core target [4].

Despite the health risks associated with high salt intake, the general population consumed more sodium than recommended. In 2010, global mean sodium intake among adults was 3.95 (95% CI 3.89-4.01) g/day, equivalent to 10.06 (9.88-10.21) g/d of salt. The Asian regions showed the highest intake of salt, lead by the Central Asia 5.51 (5.11-5.95) g/d, followed by Asia Pacific (Japan and South Korea) 5.00 (95% CI 9.88-10.21) g/d, (95% CI 5.11-5.95) g/d.

The Malaysian Adult Nutrition Survey (MANS, 2014) reported sodium intake as assessed using 24 - hour dietary recall among Malaysian adults, was 1935 mg [6]. A smaller scale study was conducted among the Ministry of Health staff in 2012, indicating a sodium intake of 2373 mg/day by diet recall asessment and 3429 mg/day by 24-hour urine test [7].

Many factors that lead to high dietary salt consumption. Social, culture, age, educational level, and income were known factors that determined the behavior of salt consumption[8]. Individual knowledge, attitudes, and behavior were also thought to influence salt intake. These modifiable factors, fortunately, are amendable to change[9].

Measurement of population salt consumption is the key for planning and supervising salt reduction among populations. Several methods of sodium monitoring include 24 - hour urinary sodium determination and food consumption surveys. However, sodium estimation based on food diaries, 24 - hour dietary recall, and food frequency questionnaire underestimate sodium intakes. The consumption of table salt used in cooking also tends to be misjudged [10][11].

The gold standard, 24-hour urine collection method, however is complex and expensive due to participant's burden. Typically, low response rate might arise as assessments are conducted with random community samples[12]. Due to high burden of labor and difficulty completing 24-hour urine collection, a more practical method, a spot urine test, has been prompted as an alternative method to estimate excreted sodium from 24-hour urine collection [13][14]. The equations derived from various study populations are questionable, and reliability has been poorly validated for an individual sodium intake assessment.

In Malaysia, the report of sodium intake, particularly through urine assessments, is still scarce; moreover, the utilization of spot urine as a urine assessment tool was barely adopted. Regarding the above matter, the determining sodium intake in this current study was assessed using a single 24 – hour urine excretion and spot urine method. Sodium intake was also assessed using a validated food frequency questionnaire and food diary. Knowledge, attitude, and practice of sodium intake were also explored.

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2.0 Literature review

Sodium is an essential mineral in the human body and we need 0.23 to 0.46 g/day to fulfill the body's physiological needs. However, most adult populations consumed sodium more than 2g / day as recommended by the World Health Organization. Hence, it increases the risk of cardiovascular disease, renal stones, osteoporosis, and stomach cancer development [15][16] [17]. In many Asian countries, sodium consumption was more than > 4.6 g/day (11.7 g/day salt) [18].

2.1 Sodium intake among Malaysian adults

In Malaysia, the average sodium intake among adults varies, ranging from 1935 mg/day to 3429 mg/day [6][7]. Findings consistently showed men, the East Malaysia population, Bumiputra (Sabah and Sarawak), age 30-39 years old consumed the highest sodium intake as assessed using dietary assessment [7][19]. Based on the findings, sodium intake of Malaysian adults is far lower than the average sodium intake in Asian [20]. However, as the trend of hypertension and obesity escalate in Malaysia [21], controlling sodium intake is one of the most cost effective ways to reduce the prevalence of the non-communicable diseases. In addition, sodium intake in Malaysia generally exceeded the WHO recommendation of 2g/day [22].

2.2 Knowledge, attitude and practice

Dietary behaviors are closely related to social, cultural factors, age, educational level and income factors [23]. The knowledge, attitudes, and behaviors towards dietary salt intake are thought to influence salt consumption. Therefore, identifying population level awareness of sodium control provides evidence that enables the development of effective public education initiatives. Empowering healthier dietary behavior in daily life needs mastery of both knowledge and skills. Disseminating education to population should not be limited to information on health and sodium. It also should be practical and culturally appropriate to change their diet.

2.3 Sodium asessment

a) Urinary sodium

The 24-hour urine samples is considered the "gold standard" to measure 85% - 95% of ingested sodium [24]. However, it is an inconvenient method that may render the participation for urinary assessment. A more feasible option, spot urine method, has been widely adopted in population studies [25][26]. However, it was less accurate than the 24-hour urine measurement. Studies showed large discrepancies of correlation between the 24-hour and spot urine measurement, ranging from r = -0.01 to 0.86 [27]. Two published Japanese equations Tanaka and Kawasaki, were widely used to predict the 24-hour urinary sodium excretion [28][26]. Other formulations developed for the Caucasian population like INTERSALT [29] and PAHO [30] were also commonly applied.

b) Dietary assessment

Sodium intake may also be estimated indirectly from a questionnaire or food consumption records. The measurements include 24-hour diet recall, food diaries, food duplicates, and FFQ. A bias and measurement error with this instrument may arise if food intake was underestimated

or overestimated [31]. The accuracy of the data also relies on the updated food composition databases, since a wide array of food products is available in the market [32][33]. Literatures revealed the correlation between the dietary survey and urinary sodium ranges from r = 0.09 to 0.30 [34][35].

3.0 Methodology

3.1 Study design and sampling

This cross-sectional study was conducted in 16 study sites, comprising 14 state health departments, Ministry of Health Putrajaya, and research institutes. The number of respondents for this study was calculated using the WHO matrix table (Table 3.0). Based on the recent salt study conducted among the Ministry of Health Staff in 2012 [7], the maximum difference in sodium excretion and standard deviation of sodium was 10 mmol and 70 mmol, respectively. Calculated standard deviation according to gender specification was used to determine the sample size. Table 3.1 showed the number of respondents required in this study. Based on the figures, the sample size was 1600 with an attrition rate of 10%.

A list of staff was obtained, and based on a non-proportionate sampling; 98 respondents were randomly selected from each study site. Figure 3.0, illustrates the sampling flow chart for the study.

Table 3.0 Matrix to determine sample size [30]

Maximum difference in sodium excretion to be detected (mmol/d)	Standard deviation s (SD)	Sample size n (for each age stratum)
10	10	16
10	15	35
10	20	63
10	25	98
10	30	141
10	35	192
10	40	251
10	45	318
10	50	392
10	55	475
10	60	565
10	65	663
10	70	769
10	75	883
10	80	1005

Table 3.1 Calculated samples based on the WHO matrix table.

Variables	Standard Deviation (SD)	Total estimated samples
Overall participants	70	769
Males	75	883
Females	60	565
Total (males and females)		**1448**

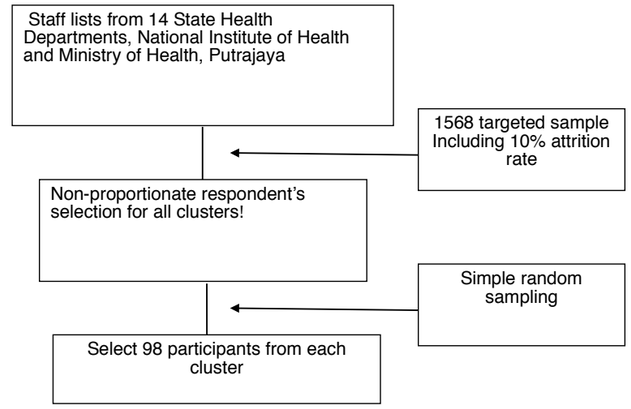

Figure 3.0: Sampling flowchart

3.2 General objectives

a) To assess the dietary salt intake and its associated factors among staff in Ministry of Health Malaysia.

Specific objectives

a) To determine the dietary sodium intake among staff using 24-hour urinary excretion and single spot urine specimen formula.
b) To determine the dietary sodium intake using 2 day food diary.
c) To identify the main sodium food sources using the food frequency questionnaire for high sodium food.
d) To identify the sodium level by socio demography factors.
e) To determine the knowledge, attitude and practices towards dietary salt intake.

3.3 Inclusion and exclusion criteria

Respondents were Ministry of Health Staff who worked in the selected studies sites. To recruit a subject, a screening questionnaire was used to check on the eligibility criteria. Respondents were excluded if they started diuretics therapy in the last two weeks, were pregnant, reported to have kidney disease, and any condition that made 24-hour urine collection difficult. Permission to conduct the study was obtained from Medical Research Ethics Committee (MREC), Ministry of health.

3.4 Data collection

Data collection was conducted between November and December 2015. Selected respondents were provided with an information sheet that explained the purpose and detail procedures of the study. If the respondents agreed to participate, they were requested to complete an informed consent form prior to the data collection. Two appointments were scheduled for each subject. Figure 3.1 illustrates the data collection flows of this study.

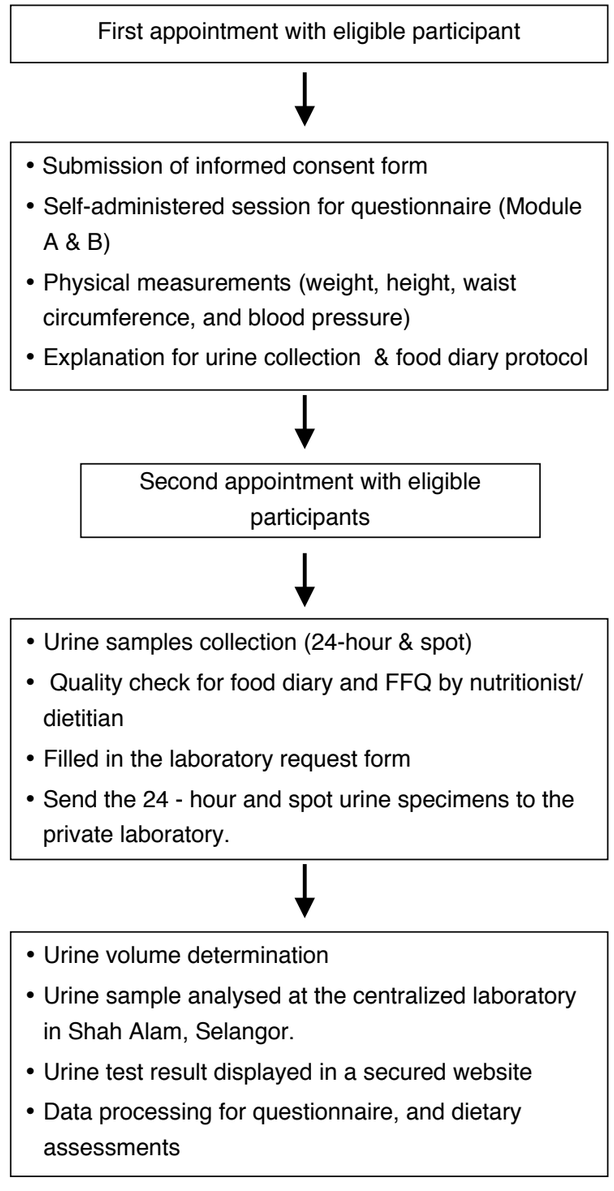

Figure 3.1: Data collection flow chart

3.5 Study instruments

a) Data collection involved questionnaire pertaining to socio demography and medical histories, anthropometric measurements, dietary intake assessment and knowledge, attitude and practice towards sodium intake. Sodium intake was determined using a single 24–hour urinary and spot urine collection. Detailed description of each data component is explained in Table 3.2.

Table 3.2: Data collection instruments

Module	Information
A	Participant's personal information
B	Medical histories
C	Knowledge, attitude and practice of sodium intake
D	Physical measurements (weight, height, and waist circumference) and blood pressure
E	Food Frequency Questionnaire
F	Two-days food Diary

Module A and B were self-administered questionnaires. They contained socio – demographic information, such as age, sex, ethnicity, and academic qualification. Medical histories, including any diuretic consumption and pregnancy status among women, were also obtained. Module C assessed the level of knowledge, attitude, and practice towards sodium using a validated questionnaire adapted from WHO.

Module D comprised of physical measurements (body weight, body height, waist circumference and blood pressure. Body weight and height were measured using a calibrated digital weighing scale and SECA stadiometer. Waist circumference was measured using a SECA measuring tape (SECA 201, Germany) Measurements were done in duplicate and a mean reading rounded to the nearest 0.1cm was computed. Weight and height was used to compute the BMI. Blood pressure was measured using a digital automatic blood pressure monitor (Omron HEM-7221) with an appropriate cuff size. Two blood pressure measurements were taken from the right arm of the seated respondents. The mean of the reading will be used for analysis.

Module E consisted a validated FFQ with a list of common high sodium content adapted from a previous study [36]. The questionnaire contained 11 food groups with 102 high sodium food items, self-administered by respondents and subsequently reviewed by the trained nutritionists / dietitians. In this FFQ, respondents filled in the number of food servings taken in day/week/month for the past one month. The estimated sodium intake was then calculated by multiplying the sodium content per serving to number of servings taken on per day basis. The following formula was used to obtain the level of sodium from the diet:
(Frequency of food item intake /day) x (portion size in gram) x (sodium content/100 g)/100) [7]

Module F contained two sets of food diaries. Participants were instructed to fill in their food intake during one weekday and one weekend. To measure correlation of sodium in intake and urine, at least one of the selected dates would be the day of 24-hour urine collection. Dietary intake was then analyzed using Nutritionist Pro™ Nutrition Analysis Software (First Data Bank, USA). For

local food dishes that were unavailable in the database, two recipes of each dish were obtained. The nutrient information from Malaysian Food Composition Tables [37] was sought, and the average of sodium, energy, and other macronutrients were entered manually in the software. Besides that, the nutrient value for processed food or packaged foods that was not available in the data was also entered manually in the software. Reported energy intake that was < 500 kcal/day or > 5000 kcal/day for women or > 8000 kcal for men was considered under or over reporting, and it was excluded from the study analysis [38].

b) 24-hour urine and spot urine collection

Urine samples of 24-hour collection and spot urine were collected to determine sodium intake. The sample was collected for 24 – hours, using a 2.5-liter collapsible urine container. Plastic cups were provided to assist female respondents in collecting urine. Respondents were instructed to discard the first urine in the morning and collect the subsequent urine until the first urine in the following morning.

For the spot urine, the respondents were asked to collect single urine excretion using a 1.5-liter urine bag immediately after completing the 24-hour urine collection in the following morning. The respondents were requested to record time of the beginning and end of urine collection on the provided label. A reminder to collect urine was given to the respondent one day earlier. The respondents' were instructed to keep the collected urine box away from heat and light before sending it to the laboratory.

Sodium and creatinine from the spot urine was used to predict the 24-hour urine sodium excretion using equations developed by Tanaka[13] and Kawasaki[26] as displayed in Table 3.3.

Table 3.3: Formula used to estimate 24-h urinary sodium excretion from spot urine sodium and creatinine level

Formulae	Predicted 24-h creatinine excretion	Predicted 24-h sodium excretion
Kawasaki [26]		23×{16.3×[(spot Na (mmol/L)÷spot Cr (mg/dayL))×(10×predicted 24-h Cr (mg/day))] 0.5}
Male	[-12.63×age (y)]+[15.12×weight (kg)] +[7.39×height (cm)]-79.9	
Female	[-4.72×age (y)]+[8.58×weight (kg)]+[5.09×height (cm)]-74.5	
Tanaka [13]	[-2.04×age (y)]+[14.89×weight (kg)]+[16.14×height (cm)]-2244.45	23×{21.98×[(spot Na (mmol/L)÷spot Cr (mg/dayL))×(10×predicted 24-h Cr (mg/day))] 0.392}

The urine samples were brought to the operational room at each study site. The samples were checked and identified before sending to an identified laboratory in Shah Alam, Selangor. In the laboratory, the urine volume was measured and 30 ml aliquot from each sample was preserved in a 4°c refrigerator before being transported to the centralized laboratory in Shah Alam, Selangor on the same day for analysis. Quality control was applied in order to assure specimens received were safe, adequate and attached with respondents' identification. A complete 24-hour urine sample was defined as urinary volume more than or equal to 500 ml, no menstruation during the collection period, and reported length of collection over 20 hours.

Sodium was determined by using ion selective electrodes diluted for sodium in Architect C, System Analyzer. An electrical potential (voltage) was developed across the membranes between the reference and measuring electrodes. The voltage is then compared to previously determined calibrator voltages and converted into ion concentration. Creatinine was measured using Kinetic Alkaline Picrate in similar analyzer. At an alkaline pH, creatinine in the sample reacts with picrate to form a creatinine-picrate complex. The rate of increase in absorbance at 500 nm due to formation of this complex is directly proportional to the concentration of creatinine in the sample.
The sodium excretion in the 24-hour urine was used to estimate total sodium intake from food. Quantification of daily sodium intake was conducted by multiplying 24 - hour sodium excretion with the factor 100/95, as sodium excretion through urine is, on average, 95 % of the total food intake [39]. The sodium value in mg unit was calculated by multiplying the sodium expressed in mmol with the molecular mass of sodium, 23 g/ mol. Sodium intake was then compared to the Malaysian dietary sodium of 2000 mg/day [40]

3. 6 Data entry and analysis

Statistical analyses were conducted using IBM SPSS version 22. Descriptive statistics was computed in either percentage or mean values with standard deviation (SD). ANOVA analysis was conducted to determine the differences of mean sodium level between several socio-demographic characteristics and the response of knowledge, attitude and practice. Correlation analysis was used to evaluate the association between dietary sodium and 24-hour urinary sodium. The prediction of the 24-hour urinary sodium was determined using equations of Tanaka and Kawasaki. The values were then evaluated for correlation against measured 24-hour urinary sodium. Significance was indicated as two-sided $p< 0.05$.

3.7 Permission and Grant

This study was reviewed and approved by the National Institute of Health and Medical Research Ethics Committee, Ministry of Health Malaysia with the registration number of NMRR-15-1290-25981 (IIR). Funding for this study was granted from National Institutes for Health (NIH), Ministry of Health Malaysia.

4.0 FINDINGS

4.1 General Findings

Among 1568 targeted respondents, 204 (13%) were not eligible and 232 (15%) refused to participate in this study. The final number of respondents was 1116 with response rate of 71.2%. Respondents from Kuala Lumpur and Perak presented the highest response rate (78%). Selangor showed the least participation with a response rate of less than 50% (Figure 4.0).

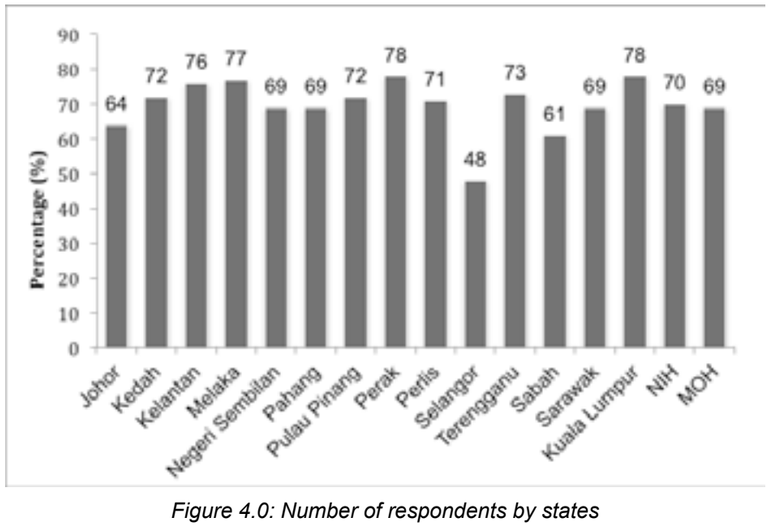

Figure 4.0: Number of respondents by states

Table 4.0 presents the general characteristics of the respondents. In this study, female respondents constituted 60% (n=671) of the sample studied compared to male, 40% (n=445). The mean age of respondents was 37 years (SD 9.4) with the respondents aged 30 – 39 years showing the highest percentage of respondents, 44% (n=493). The prevalence of respondents aged 20 – 29 years and 40 years and above were 22% (n=248) and 34% (n=375) respectively (Table 4.0). The study also indicated that the form 6/diploma achievers were the highest respondents, 40% (n=451), followed by college/university 36%, (n=406) and secondary school leavers and below, 22% (n=248).

Married respondents had the highest percentage, 79% (n=885) followed by single respondents i.e. not married and divorced/widowed/widower, 20% (n=224). In terms of ethnicity, the respondents were predominantly Malay, 86% (n=954), followed by Bumiputera Sabah, 5% (n=60), Chinese, 5% (n=51), Indian, 3% (n=30) and Bumiputera Sarawak, 2% (n=21).

Based on WHO (2006) BMI classification, more than half of the respondents 64%, (n=712) had a body weight problem (underweight, overweight and obese) with mean BMI of 26.7 kg/m². Normal weight respondents comprised of 36% (n=397) and underweight only 4% (n=46). The prevalence of overweight and obese respondents was 36% (n=402) and 24% (n=262) respectively. Both genders had high waist circumference (90.6 cm in male and 83.2 cm in female) compared to the recommended range ([41]). Blood pressure was measured and found to be in normal range. Overall health status indicated only 4.4% of respondents had diabetes and 8.8% had hypertension.

Table 4.0: General findings

		Frequency	Number (%)
Overall		1116	
Zone			
Northern		293	26.3
Southern		210	18.8
East Coast		218	19.5
Central		265	23.7
Sabah and Sarawak		130	11.6
Gender			
Male		445	39.9
Female		671	60.1
Age (years)			
20 – 29		248	22.2
30 – 39		493	44.2
40 and above		375	33.6
Academic qualification			
Secondary and below		249	22.3
Form 6/ Diploma		451	40.4
College/ University		406	36.4
Marital Status			
Married		885	79.3
Single		224	20.1
Ethnicity			
Malay		954	85.5
Chinese		51	4.6
Indian		30	2.7
Bumiputera Sabah		60	5.4
Bumiputera Sarawak		21	1.9
BMI (kg/m²)			
<18.5 (Underweight)		46	4.0
18.5 – 24.9 (Normal)		397	35.6
25.0 – 29.9 (Overweight)		402	36.0
>30.0 (Obese)		262	23.5
Health Status			
Diabetes	Yes	49	4.4
	No	1064	95.3
Hypertension	Yes	98	8.8
	No	1015	90.9
Blood Pressure			
Systolic (mm/Hg)	Mean (sd)	1104	120.86 (17.31)
Diastolic (mm//Hg)	Mean (sd)	1104	76.81 (11.30)
Waist Circumference (cm)	Mean (sd)	1101	86.19 (12.87)
Male		439	90.63 (11.57)
Female		662	83.23 (12.86)

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4.2 Estimation of the urinary sodium and creatinine

Table 4.1, displays measurement of the sodium and creatinine in 24-hour urine collection and morning spot urine. It was assumed that all sodium that was excreted in the urine came from the diet. The sodium quantification was calculated by multiplying with the factor of 100/95, due to usual sodium excretion 95% less, than actual sodium intake [24]. The measured 24-hour urinary sodium in this study was based on urine collection completeness, defined as urine volume ≥ 500 ml / day [42].

A total of 1027 samples from 1097 were analyzed after excluding samples with urine volume less than 500 ml/day. The mean urine volume was 1241 ml. The mean sodium excretion in 24-hour urine sample was higher by 20% at 2860 mg compared to 2383 mg in spot urine.

Table 4.1: 24 – hour and spot urine excretion of sodium and creatinine

Urine Sample	Mean	Standard Deviation	Median
24-hour urine (n = 1027)			
Volume (mL)	**1241**	**555**	**1130**
Sodium (mg)	2860	1369	2673
Creatinine (mg/24 hour)	1045	495	962
Spot Urine (n = 1013)			
Sodium (mg)	2383	1349	2231
Creatinine (mg)	111	73	96

4.3 Sodium excretion by study characteristics

As shown in Table 4.2, the overall 24-hour mean urinary sodium excretion was 2860 mg (SD 1369). Southern Zone showed the highest mean 24-hour sodium excretion, (3055 mg/day), followed by East Coast Zone (2902 mg/day), Central Zone (2851 mg/day), Northern (2844 mg/day), and East Malaysia (Sabah and Sarawak), (2538 mg/day). The mean of urinary sodium excretion in all zones exceeded the daily sodium recommendation of 2000 mg/day. Urinary sodium comparison by zones showed significant elevation of sodium in the Southern Zone compared with the East Malaysia. No significant different was found in the other zones.

Regarding ethnicity differences, the mean urinary sodium excretion of the Bumiputera Sarawak was significantly low, compared to Indian and Malay ethnicities. The Indian showed the highest mean sodium excretion; however, it was significantly different when compared to Bumiputera Sarawak (Table 4.2).

Out of 1027 respondents, 733 respondents (71%) excreted sodium ≥ 2000 mg/day of sodium (45% male and 55% female). The mean urinary sodium excretion among male respondents was significantly higher (3226 mg/day) compared to female, (2621 mg/day) ($p<0.001$). Nevertheless, both genders presented mean sodium excretions that exceeded the daily sodium recommendation.

There was no significant difference in the 24-hour urine sodium between the age categories. However, all age categories presented urinary sodium excretions ≥ 2000 mg sodium/ day. The age group of 30 – 39 years showed the highest mean urinary sodium excretion (2879 mg/day) followed by 20 – 29 years and 40 years and above with urinary sodium excretions of 2856 mg/day and 2838 mg/day, respectively.

There was no significant difference in sodium intake by academic qualification. Respondents with secondary school academic qualification and below had the highest mean urinary sodium excretion (2937 mg/day), followed by college or university (2903 mg/day) and Form 6 or diploma (2778 mg/day). Married respondents showed significantly higher urinary sodium (2914 mg/day), compared to single respondents (2650 mg/day), ($p<0.05$).

The mean urinary sodium excretions corresponded to the increase in BMI. There was a significant elevation of sodium excretion between overweight or obese respondents compared to their underweight and normal counterparts ($p<0.001$). Respondents with higher waist circumference also showed significant elevation of urine sodium (3053 mg/day) compared to respondents with normal waist circumference (2634 mg/day) ($p < 0.001$).

Regarding health status, there was no significant difference in the urinary sodium excretion among healthy respondents and their diabetic and hypertensive counterparts.

Table 4.2: Mean of 24-hour urine sodium excretion by study characteristics

	Frequency	Percentage (%)	Mean sodium (mg)	SD	95% CI (Lower, upper)	p-value
Overall	1027	-	2860	1369	(2776, 2944)	
Zone (n=1029)						0.031
Northern	285	27.8	2844	1404	(2681, 3007)	0.000*
Southern	192	18.7	3055	1533	(2836, 3273)	
East Coast	186	18.1	2902	1354	(2706, 3098)	
Central	246	24.0	2851	1245	(2694, 3007)	
Sabah and Sarawak	118	11.5	2538	1228	(2314, 2761)	
Gender (n=1029)						
Male	406	39.5	3226	1503	(3079, 3373)	0.915
Female	621	60.5	2621	1217	(2525, 2717)	
Age (years) (n=1026)						
20 – 29	226	22.0	2856	1431	(2669, 3044)	0.014*
30 – 39	451	43.9	2879	1358	(2753, 3005)	
40 and above	350	34.1	2838	1347	(2697, 2980)	
Marital status (n=1021)						
Single	206	20.2	2650	1324	(2469, 2832)	0.282
Married	815	79.8	2914	1379	(2819, 3009)	
Academic qualification (n=1020)						
Secondary and below	225	21.9	2937	1351	(2760, 3115)	0.012*
Form 6/ Diploma	413	40.2	2778	1316	(2651, 2906)	
College/ University	380	37	2903	1444	(2757, 3048)	

	Frequency	Percentage (%)	Mean sodium (mg)	SD	95% CI (Lower, upper)	p-value
Ethnicity (n=1027)						
Malay	873	85.0	2893	1346	(2804, 2983)	0.000*
Chinese	51	5.0	2690	1408	(2294, 3086)	
Indian	29	2.8	3183	2146	(2366, 3999)	
Bumiputera Sabah	54	5.3	2645	1217	(2312, 2977)	
Bumiputera Sarawak	20	1.9	1966	845	(1570, 2362)	
BMI (kg/m²) (n=1023)						
<18.5 (Underweight)	40	3.9	2281	933	(1983, 2580)	0.000*
18.5 – 24.9 (Normal)	359	35.0	2624	1193	(2500, 2748)	
25.0 – 29.9 (Overweight)	372	36	2932	1434	(2785, 3078)	
>30.0 (Obese)	250	24.3	3176	1470	(2993, 3359)	
Waist circumference						
Normal	422	41.9	2634	1206	(2520, 2748)	0.000*
High	586	58.1	3026	1452	(2908, 3144)	
Health Status						
Diabetes						
Yes	47	4.6	3197	1501	(2756, 3638)	0.085*
No	978	95.2	2844	1363	(2759, 2930)	
Hypertension						
Yes	93	9.1	3006	1383	(2721,3291)	0.283*
No	932	90.7	2846	1369	(2758, 2934)	

* significant at p-value<0.05

4.4 Estimation of sodium and creatinine using prediction formula

The estimated 24-hour urinary sodium and creatinine excretions were summarized in Table 4.3. Formulas used in this study were referred from Tanaka and Kawasaki [13][26]. In these equations, the spot urine sodium and creatinine were utilized to predict the 24-hour urine sodium. As showed in Table 4.3, the prediction of 24-hour urinary sodium with the Kawasaki [26] formula was higher at 4489 mg/day, compared to the predicted 3440 mg/day urinary sodium by Tanaka [13]. The predicted urinary sodium from both formulas has overestimated the measured 24- hour urinary sodium in this study, 2860 mg/day. Correlation analysis, as displayed in Table 4.4, showed there were significant and moderate relationships between the measured 24-hour and estimated urine sodium as determined by both Kawasaki and Tanaka formulas ($r = 0.32$, Tanaka; $r = 0.33$, Kawasaki). The correlation between the actual 24-hour sodium and predicted creatinine using both formulas and measured 24-hour similarly indicated moderate and stronger association, $r = 0.41$, Tanaka; $r = 0.38$ (male), $r = 0.40$ (female), $p< 0.001$.

Table 4.3: 24 - hour urine sodium and creatinine by using Kawasaki and Tanaka equations.

Estimated Parameters	N	Mean	Standard Deviation	Median
24-Hour Sodium (mg/day)				
Tanaka [13]	1004	3440	804	3379
Kawasaki [26]	1003	4489	1330	4350
24-Hour Creatinine (mg/day)				
Tanaka [13]	1020	1286	351	1264
Kawasaki [26]	1020			
Male		1671	304	1659
Female		1154	172	1143

Table 4.4: Correlation of actual and estimated 24 - hour urine sodium and creatinine

	N	Correlation with actual 24-hour urinary excretion (r)	p-value
Predicted 24-hour sodium excretion			
Tanaka [13]	1027	0.32	<0.001*
Kawasaki [26]	1027	0.33	<0.001*
Predicted 24-hour creatinine excretion			
Tanaka [13]	1027	0.41	<0.001*
Kawasaki [26]	1027		
Male		0.38	<0.001*
Female		0.40	

*Significant at p-value < 0.05

4.5 Knowledge, attitude, and practices (KAP) towards dietary salt Intake and sodium excretion

Table 4.5 shows the assessment of knowledge, attitude, and practices towards dietary salt intake and sodium excretion respectively. The responses for the questions are as below:

Question 1: Do you add salt to food at the table?
The study found more than half of the respondents, 69.7% (n=711) reported they never add salt to food at the table. Among them, 70.5% (n=434) were female and 68.6% (n=277) were male respondents. Only 0.7% (n=7) reported they always add salt to food at the table.

Question 2: In the food you eat at home, salt is added in cooking?
About 5.9% (n=60) of respondents claimed they never add salt in cooking at home, 34.4% (n=351) claimed 'often' while another 27.3% (n=278) always add salt in cooking. Among respondents who always add salt in cooking, 31.7% (n=195) were female and 20.5% (n=83) were male respondents.

Question 3: How much salt do you think you consume?
About 16% of respondents reported they consumed too much salt or far too much. A higher proportion of females, 16.8% (n=104), believed they consumed too much salt, compared to males, 12.3% (n=50). About half of the respondents, 55.1% (n=584) thought they consume salt in the right amount. About 9.7% (n=99) of respondents responded 'too little salt consumption' to the question while another 17.6% (n=180) responded 'do not know.'

Question 4: Do you think a high salt diet could cause a serious health problem? And if Yes, what sort of problem?
Most respondents 94.7%, (n=969) knew a high salt diet could cause serious health problems and acknowledged a high salt diet could lead to high blood pressure 87.4%(n=894). However, among them, just 4.5% (n=50) gave the correct answer to the medical problem related to high sodium intake. Very few respondents 1.4% (n=16) answered did not know the exact health problems resulted from a high salt diet.

Question 6: How important to you is lowering the salt/sodium in your diet?
About 62.5% (n=642) of respondents reported very important, 35.1% (n=360) answered somewhat important, and only a small portion of respondents reported not important at all, 1% (n=10). About 69.4% of female respondents and 53.7% of male respondents reported lowering the salt in the diet is very important.

Question 7: Do you do anything on a regular basis to control your salt or sodium intake?
About 61.3% (n=621) of respondents reported they controlled their salt intake. More females reported they had taken actions towards sodium reduction, 66.8% (n=409) than male, 52.9% (n=212). About one third of the respondents, 32% (n=324) reported they did nothing to control their salt intake.

Question 8: If yes, what do you do?
Subsequent observation showed most respondents did not add salt at the table, 45.8% (n=465) and avoid or minimize consumption of processed foods, 42.4% (n=430) in order to control salt consumption. Many respondents, especially females reported buying low salt/sodium food alternatives, 26.8% (n=164) and checked the salt or sodium labels on food, 22% (n=148). Some respondents also did not add salt when cooking, 11.3% (n=115) and used spices to enhance the taste of food when not using salt, 17.0% (n=173).

Table 4.5: Knowledge, Attitudes and Practices (KAP) towards dietary salt intake

Questions		Total	Men	Women
Q1. Do you add salt to food at the table?	Never	711 (69.7)	277 (68.6)	434 (70.5)
	Rarely	190 (18.6)	71 (17.6)	119 (19.4)
	Sometimes	93 (9.1)	43 (10.6)	50 (8.1)
	Often	19 (1.9)	9 (2.2)	10 (1.6)
	Always	7 (0.7)	4 (1.0)	3 (0.5)
Q2. In the food you eat at home salt is added in cooking	Never	60 (5.9)	43 (10.6)	17 (2.7)
	Rarely	143 (14.0)	77 (19.1)	66 (10.7)
	Sometimes	188 (18.4)	79 (19.6)	109 (17.7)
	Often	351 (34.4)	122 (30.2)	229 (37.2)
	Always	278 (27.3)	83 (20.5)	195 (31.7)
Q3. How much salt do you think you consume?	Far too much	13 (1.3)	4 (1.0)	9 (1.5)
	Too much	154 (15.0)	50 (12.3)	104 (16.8)
	Just the right amount	584 (55.1)	204 (50.2)	360 (58.3)
	Too little	99 (9.7)	46 (11.3)	53 (8.6)
	Far too little	14 (1.4)	7 (1.7)	7 (1.1)
	Don't know	180 (17.6)	95 (23.4)	85 (13.8)
Q4. Do you think that a high salt diet could cause a serious health problem?	Yes	969 (94.7)	366 (90.6)	603 (97.4)
	No	15 (1.5)	13 (3.2)	2 (0.3)
	Don't know	39 (3.8)	25 (6.2)	14 (2.3)
Q5. If Yes, what sort of problem?	High blood pressure	894 (87.4)	331 (81.9)	563 (91.0)
	Osteoporosis	24 (2.2)	5 (1.1)	19 (2.8)
	Stomach cancer	23 (2.1)	6 (1.3)	17 (2.5)
	Kidney stones	184 (16.5)	70 (15.7)	114 (17)
	None of the above	5 (0.4)	3 (0.7)	2 (0.3)
	All of the above	50 (4.5)	16 (3.6)	34 (5.1)
	Don't know	16 (1.4)	9 (2)	7 (1)
Q6. How important to you is lowering the salt/ sodium in your diet	Not at all important	10 (1.0)	9 (2.2)	1 (0.2)
	Somewhat important	360 (35.1)	174 (42.9)	188 (30.4)
	Very important	642 (62.5)	218 (53.7)	424 (69.4)
Q7. Do you do anything on regular basis to control your salt or sodium intake?	Yes	621 (61.3)	212 (52.9)	409 (66.8)
	No	324 (32.0)	151 (37.7)	173 (28.3)
	Don't know	68(6.7)	38 (9.5)	30 (4.9)
Q8. . If yes, what do you do?				
	Avoid/ minimize processed foods	430 (42.4)	121 (30.1)	309 (50.4)
	Look at the salt labels			
	Do not add salt at the table	204 (20.1)	61 (15.0)	143 (23.3)
	Buy low salt alternatives	465 (45.8)	170 (42.3)	295 (48.1)
	Do not add salt when cooking	240 (23.6)	76 (18.9)	164 (26.8)
	Use spices other than salt when cooking	115 (11.3)	42 (10.4)	73 (11.9)
		173 (17.0)	42 (10.4)	131 (21.4)

4.6 Estimation of dietary sodium Intake

Table 4.6 displays the overall mean sodium intake, based on food diary assessment and the associated socio-demographic factors. The overall mean of sodium intake for all zones was 2761 mg/day and it exceeded the World Health Organization (WHO) of 2000 mg/day salt recommendation.

The mean sodium intake as assessed using the food diary was highest in Sabah & Sarawak Zone (2901 mg/day), followed by Southern Zone (2855 mg/day), Northern Zone (2836 mg/day), Central Zone (2638 mg/day) and East Coast Zone (2633 mg/day)

Respondents aged 30 – 39 years old excreted the highest sodium (2849 mg/day), and the lowest was found among those age 50 – 59 years old (2642 mg/day). However, there was no significant difference of sodium intake by age categories. By gender, there was a significant difference of sodium intake between male (2927 mg/day) and female (2652 mg/day).

By ethnicity, Bumiputera Sabah had the highest sodium intake (3097 mg/day), followed by Chinese (2775 mg/day), Malay (2756 mg/day), Bumiputera Sarawak (2648 mg/day) and Indian (2273 mg/day). There was a significant difference of sodium intake between Bumiputera Sabah with Malay and Indian ethnicity. Contradictory to 24-hour urinary sodium excretion method, the sodium intake assessed using the food diary showed the least sodium intake among Indian ethnicity.

Mean sodium intake by marital status was also investigated. This study found no significant difference between married (2786 mg/day) and single (2679 mg/day) respondents. By academic qualification, there was no significant difference of dietary sodium intake across all academic achievements.

Further analysis showed no significant differences by body weight status. The dietary sodium intake was highest among overweight respondents (2803 mg/day), followed by obese (2755 mg/day), underweight (2722 mg/day) and normal body weight (2722 mg/day). A similar finding was also found among respondents with higher waist circumference. Those with higher waist circumference have higher sodium intake (2768 mg/day), compared to those with normal waist circumference (2745 mg/day). However, both findings were insignificant.

Table 4.6 Dietary sodium intake by food diary and socio demography data

	Frequency	Percentage (%)	Mean sodium (mg)	SD	95% CI (Lower,Upper)		p-value
Overall	1095	-	2761	1042	-	-	
Zone							
Northern	293	27	2836	979	2723	2948	0.015*
Southern	201	18	2855	1020	2713	2997	
East coast	215	20	2633	1107	2484	2782	
Central	257	23	2638	942	2523	2754	
Sabah & Sarawak	130	12	2901	1243	2686	3117	
Age (years)							
20-29	242	22	2729	979	2605	2853	0.076
30-39	482	44	2849	1062	2754	2944	
40-49	207	19	2688	1064	2542	2834	
50-59	165	15	2642	1036	2482	2801	

	Frequency	Percentage (%)	Mean sodium (mg)	SD	95% CI (Lower,Upper)		p-value
Gender							
Male	433	40	2927	1075	2826	3029	0.001*
Female	663	60	2652	1007	2576	2729	
Ethnicity							
Malay	936	85.4	2756	1005	2691	2820	0.013*
Chinese	51	4.7	2775	1240	2427	3124	
Indian	26	2.6	2273	762	1978	2568	
Bumiputera Sabah	60	5.5	3097	1465	2719	3476	
Bumiputera Sarawak	21	1.9	2648	811	2279	3017	
Marital status							
Married	809	79.8	2797	1075	2723	2871	0.220
Single	205	20.2	2697	918	2570	2823	
Academic qualification							
Secondary and below	242	22	2758	968	2635	2880	0.821
Form 6 / diploma	445	41	2744	1062	2645	2843	
University	402	37	2789	1065	2684	2893	
BMI (kg/m²)							
<18.49 (underweight)	45	4	2722	907	2450	2995	0.706
18.5-24.99 (normal)	391	36	2717	1122	2605	2828	
25-29.99 (overweight)	397	36	2803	1031	2701	2904	
>30 (obese)	258	24	2755	953	2638	2872	
Waist circumference							
Normal	472	44	2745	1073	2647	2842	0.714
High	613	56	2768	1020	2687	2849	

* *p*-value is significant at p-value <0.05

4.7 Estimation of sodium intake with Food Frequency Questionnaire (FFQ)

Sodium consumption was determined using a validated FFQ that reflects the past one month's sodium intake. Table 4.7 displays the mean sodium intake analyzed with FFQ and the study characteristics. Overall, the mean sodium intake was 3446 mg/day. Analysis by zone showed the respondents in the East Coast had the highest sodium intake (3671 mg/day), followed by Northern Zone (3609 mg/day), Southern Zone (3460 mg/day), Sabah and Sarawak (3259 mg/day) and Central Zone (3159 mg/day). However, there was no significant difference in sodium intake among all zones.

Males consumed higher sodium (3724 mg/day) compared to females (3263 mg/day). Younger respondents consumed more sodium than their older counterparts. Participants aged 20 – 29 years old consumed the highest amount of sodium of (4138 mg/day), followed by 30 – 39 years old (3603 mg/day), and 40 years old and older (2790 mg/day). Sodium intake in all age categories was higher than the recommended level. Significant difference in sodium intake was seen between above 40 years and other age categories (20 – 29 years and 30 – 39 years old) ($p < 0.001$).

Based on academic qualification, the secondary school group had the highest mean sodium intake (3603 mg/day) followed by the form six/diploma (3553 mg/day) and college/university (3253 mg/day). However, no significant difference was noted.

Sodium intake by BMI categories also exceeded the WHO recommendation. However, there was no significant difference in the sodium intake estimated FFQ by BMI categories. Further analysis showed there was no significant difference of sodium intake in the presence of hypertension and diabetes.

Table 4.7: Dietary sodium intake by FFQ and socio demography data

	Frequency	Percentage (%)	Mean sodium (mg)	SD	95% CI Lower, Upper)	*p*-value
Overall	1103	-	3446	2748	(3283,3608)	-
Zone (n= 1103)						
Northern	292	26	3609	2976	(3266,3952)	0.204
Southern	203	18	3460	3276	(3006,3913)	
East Coast	217	20	3671	2826	(3293,4049)	
Central	261	24	3159	2121	(2900,3418)	
Sabah and Sarawak	130	12	3259	2219	(2874,3644)	
Gender (n =1103)						
Male	437	40	3724	3041	(3439,4010)	0.000*
Female	666	60	3263	2523	(3071,3455)	
Age (year) (n = 1103)						
20 – 29	244	22	4138	3651	(3678,4599)	0.000*
30 – 39	485	44	3603	2629	(3369,3838)	
40 and above	374	34	2790	1969	(2590,2990)	
Academic qualification (n=1096)						
Secondary and below	245	22	4138	3021	(3223,3984)	0.179
Form 6/ Diploma	448	41	3603	2602	(3311,3794)	
College/ University	403	37	2790	2738	(2985,3521)	
BMI (kg/m²) (n=1098)						
< 18.5 (Underweight)	45	4	3432	2842	(2578,4286)	0.955
18.5 – 24.9 (Normal)	393	36	3513	3042	(3211,3814)	
25.0 – 29.9 (Overweight)	399	36	3429	2638	(3170,3689)	
> 30.0 (Obese)	261	24	3397	2440	(3100,3694)	
Waist circumference (n=1092)						
Normal	474	43	3489	2896	(3227,3750)	0.601
High	618	57	3401	2626	(3193,3608)	
Health status (n=1103)						
Diabetes						
Yes	48	4	3011	2298	(2344,3678)	0.263
No	1055	96	3466	2766	(3299,3633)	
Hypertension						
Yes	96	9	3251	2910	(2662,3841)	0.468
No	1007	91	3465	2733	(3296,3634)	

*p-value is significant at < 0.05

4.8 Main Sources of Sodium in the Diet

The Food Frequency Questionnaire (FFQ) used in this study contained 102 food items. Consumption of high sodium foods for the past one-month was assessed and calculated, based on its daily, weekly, or monthly intakes.

Table 4.8 demonstrated the top 20 food sources with the highest sodium consumption among respondents. Light soy sauce (Kicap cair) contributed the highest daily sodium consumption with an average intake of 225 mg/day. It was followed by fried rice nasi goreng (163 mg), omelet (telur dadar) (156 mg), (nasi lemak) (152 mg), dark soy sauce (kicap pekat) (141 mg), and Indian influenced flatbread (roti canai) (139 mg).

The consumption pattern of the top 20 high sodium foods is shown in Table 4.9. The food was ranked according to the sodium content in every 100 grams of food item. Dried shrimp (Udang kering) has the highest sodium content in 100 grams of its weight, but was not regularly consumed in the diet (n=159). Therefore, it contributed to a low sodium intake (5.1mg/day). Sauces (tomato / chili / oysters), sambal belacan, soy sauce (dark soy sauce and light soy sauce), and salted fish were among the high sodium food, mostly consumed by the respondents.

Table 4.8: Top 20 food sources with the highest sodium consumption

Food item	N	Number of participant	Mean Sodium (mg/day)	Standard Deviation
Kicap Cair	1103	458	225.3	564.0
Nasi Goreng	1103	814	162.8	356.3
Telur Dadar	1103	983	156.6	233.8
Nasi Lemak	1103	894	151.7	222.9
Kicap Pekat	1103	533	140.8	585.3
Roti Canai	1103	831	139.0	241.0
Daging Lembu Sup	1103	340	96.9	302.0
Mee Goreng	1103	738	89.6	150.2
Sos Tiram	1103	456	88.8	211.2
Sos Tomato /Cili	1103	721	86.8	208.2
Mee Segera	1103	543	84.1	225.9
Sambal Belacan	1103	666	80.3	168.4
Budu	1103	255	76.4	318.3
Nasi Ayam	1103	743	64.9	114.9
Sayur Goreng	1103	828	59.5	96.9
Bebola ikan	1103	590	51.1	138.3
Ikan Masak Sambal	1103	604	59.2	130.9
Ayam Goreng Berempah	1103	760	59.2	148.0
Kueh Teow Goreng	1103	678	57.8	104.1
Meehoon Goreng	1103	602	56.4	111.9

Table 4.9 Intake pattern of top 20 foods with high sodium content

No.	Food item	N	Sum (n)	Mean Sodium (mg/d)	Standard Deviation	Sodium/ Serving (mg)
1.	Udang Kering	1103	159	5.1	25	3363
2.	Keju	1103	388	16.4	44.1	1570
3.	Kicap Cair	1103	458	225.4	564	1460
4.	Ikan Masin	1103	458	15	41.6	1111
5.	Sos Ikan Bilis	1103	64	12.2	99.9	1068
6.	Wedges berkeju (Cheezy wedges)	1103	377	30.3	70.7	1013
7.	Mee Segera Goreng	1103	234	32.5	102.9	997
8.	Kicap Pekat	1103	533	140.8	585.3	913
9.	Makanan Segera	1103	293	24.8	69.8	881
10.	Cincaluk	1103	67	5.4	41.1	880
11.	Jeruk buah-buahan	1103	291	27.9	150.1	806
12.	Sayur Kailan Ikan Masin	1103	381	36.2	123.6	783
13.	Sotong Kering	1103	105	4.5	27.5	608
14.	Sos Tiram	1103	456	89	208.2	562
15.	Budu	1103	205	76.4	318.3	502
16.	Ham, Luncheon ayam/pork	1103	54	8.9	19.4	438
17.	Telur Masak Sambal	1103	277	22.5	76	432
18.	Sambal Belacan	1103	666	80.2	168.4	347
19.	Sayur Goreng Kicap/sos tiram	1103	267	34.3	93.5	341
20.	Sos Tomato /cili	1103	721	93	150.2	129

4.9 Sodium Intake by food groups

Table 4.10 demonstrates the mean sodium intake as assessed by food groups. Sodium from cooked food (grain products) (1112 mg/day) contributed the most to sodium consumption, followed by sauces/seasoning (736 mg/day) and meats or meat products (419 mg/day). The least consumed sodium was from spreads (19 mg/day).

Table 4.10: Sodium intake by food groups

No	Food groups	N	Mean Sodium (mg/d)	Median Sodium (mg/d)	Standard Deviation
1	Meat & products	1103	419.0	271.2	512.7
2	Fish/seafoods & products	1103	330.9	201.0	422.9
3	Eggs	1103	189.5	102.4	257.7
4	Spreads	1103	19.2	0.0	46.0
5	Kuih-muih	1103	69.9	26.4	125.7
6	Snack	1103	74.0	32.0	185.2
7	Sauces/seasonings	1103	736.0	364.1	1140.0
8	Fast foods	1103	287.8	167.3	398.2
9	Cooked foods (grain products)	1103	1110.2	846.7	1020.9
10	Cooked foods (others)	1103	165.8	91.8	251.2
11	Canned foods	1103	42.9	7.0	128.9

4.10 Correlation between dietary sodium intake and urinary sodium excretion

Correlation analysis was conducted to assess the relationship between dietary sodium intake (from food diary and FFQ) and urinary sodium excretion in 1018 and 1023 numbers of respondents, respectively. There was a small, significant, and positive correlation between 24 - hour urinary sodium and dietary sodium intake as assessed by food diary and FFQ (r=0.139, r= 0.131) (Table 4.11). Further analysis indicated a positive and significant relationship between dietary sodium intake and spot urine sodium ($p < 0.05$).

Table 4.11: Correlation between dietary sodium intake and urine sodium excretion

Sodium Intake	N	Mean	SD	Correlation			
				24-hr urinary sodium excretion (mg/day)		Spot Urine (mg/day)	
				r	*p*-value	*r*	*p*-value
Food diary	1018	2773	1046	0.14	<0.001	0.087	0.006
FFQ	1023	3393	2580	0.13	<0.001	0.076	0.016

*p-value significant <0.05

5.0: Discussion

5.1 Pattern of sodium excretion

The mean 24-hour urinary sodium excretion among health staff in this study was 2860 mg or 7.15 gm of salt, which exceeded the WHO sodium recommendation of 2000 mg/day [43]. This finding is lower than the previous study conducted among normotensive health staff in Malaysia in 2012 (3429 mg/day) [7]. The current sodium intake was also lower compared to population intake from other parts of the world. In the INTERMAP study, sodium intake in China, Japan, United Kingdom, Northern Ireland, and the USA ranged from 3,702 mg (United Kingdom) to 5,633 mg (China) [44]. In Asian countries, the salt, sauces, and seasonings added in cooking represent the major sources of sodium intake [43]. On the contrary, 75% of sodium consumption in industrialized countries comes from processed foods and food eaten away from home [45].

High sodium intake, as reported in this study, may be partly due to the prevalence of eating outside, as evidenced in the Malaysian Adult Nutrition Survey, (MANS 2014). MANS 2014 found almost half of Malaysian adults obtained food outside home [6]. Limited time to prepare meals at home and more time spent at the workplace are believed to increase the percentage of eating outside, hence increasing sodium consumption [6].

This study showed respondents from Southern Zone (Melaka, Negeri Sembilan and Johor) had the highest urinary sodium excretion, followed by the East Coast, Central, Northern and Sabah and Sarawak. This finding was contrary to an earlier study, where the Northern zone had the highest sodium intake, followed by the Sabah / Sarawak and the Southern zone [7]. This observation may be due to higher consumption of cooked food and the average BMI of the responders, compared to other zones, as observed in this study. Cooked food yielded the highest amount of sodium in this study, and the largest sodium sources were contributed by external sodium, such as table salt and soy sauce that added to it. BMI might play a role of higher sodium excretion, as it was notable as a strong predictor of urinary sodium excretion [46].

About 66.4% (73.9% males and 61.4% females) of the respondents consumed sodium excessively, and this finding was lower, compared to the previous study, which was 79% [7]. Higher sodium intake was observed among males, compared to females ($p<0.001$) and this finding was consistent with the previous study [7]. Men excrete more sodium possibly due to the higher sodium and energy consumption from the diet[18][47]. Based on the findings from MANS 2014, males consumed more sodium than females [6]. Similar observation was also observed from other studies [48][49].

In this study, there was no significant difference in the 24-hour urinary sodium excretion between age groups. However, the urinary sodium excretion among respondents aged 40 and above appeared to be slightly lower than the other age categories. Another study also reported sodium intake in adults appeared to be slightly lower after the age of 50 years than younger age [43]). In related to academic qualification, there was a higher 24-hour urinary sodium excretion in respondents with the lowest educational qualification (secondary and below) compared to the higher level. Although the finding was not statistically significant, similar findings were obtained from previous studies conducted in Malaysia [7] and in United States [50].

Besides the socio-demographic characteristics, the findings also indicated the increase of urine sodium excretions corresponded to the increase in BMI and waist circumference. Other studies reported sodium intake was influenced by body size and fatness through higher calorie intake that simultaneously increased sodium consumption [46][51].

5.2 Knowledge, attitude, and practices (KAP) towards dietary sodium Intake

Most respondents added salt in the food they cooked at home, and never added salt to the food at the table. A similar finding was observed in another study [52]. In the Asian cooking, the discreet salt sources used in cooking were mostly table salt and sauces [18].

Most respondents perceived they consumed just the right amount of salt in their daily diet. They also noted that lowering the salt or sodium in their diet is important. Most knew of the serious health problems due to high salt consumption; however, only a few could identify the associated health problems of kidney stones, stomach cancer, and osteoporosis.

Majority of the respondents reported they take regular action to control salt intake by not adding salt at the table and avoiding processed food. Even though more than half of the respondents reported regularly controlling their sodium intake, respondents should be advised on an effective way to reduce salt in cooking. Furthermore, the sodium intake was not solely determined by knowledge, attitude and practice of consumers but the other mediating roles such as cultures [23].

5.3 Sodium estimation using spot urine

In this study, the predictive 24-hour urine sodium equation obtained from Tanaka [13] and Kawasaki [26] formulas demonstrated a significant correlation to actual sodium measures (Tanaka, $r = 0.32$; Kawasaki, $r = 0.33$), $p < 0.001$. However, both Kawasaki and Tanaka estimations were higher by 20% and 50% from the actual sodium excretion. An overestimation of the predictive value was also observed in the other study [54].

We postulated the discrepancy between the 24 - hour urine sodium value and spot urine estimation might be due to the timing of spot urine collection. The urine and sodium excretion rate throughout 24 hours depends on sodium consumption patterns, such as time of day, an individual's posture, and Neuro-hormonal influences [27]. Variability in the creatinine excretion used for prediction in these formulas was influenced by body weight, age, sex, and respondents' protein intake [55].

5.4 Estimation of Sodium Intake Analyzed Through 48-Hour Food diary

This current study utilized a two-day food diary that included one weekday and one weekend assessment. Based on the analysis, dietary sodium intake as assessed by the food diary was greater than the World Health Organization (WHO) recommendation and Malaysia Dietary Guideline [43][56]. Mean sodium intake from this study was 2761 mg/day or 6.9 g/d salt, and it was slightly lower than 24-hour urinary sodium measurement.

Excessive sodium intake as assessed by food diary was also observed by other local studies [7] [19]. In most Asian countries, the average sodium intake is over 4.6 g / d [57]. High sodium intake

in this study might be contributed by the usage of table salt or salty sauces in cooking. About 60.7% of the respondents often and always add salt during cooking. Among 1116 respondents, only 20% rarely or never add salt during cooking. The higher prevalence of adding salt during cooking was also observed by a local study conducted among a sample of Chinese adults in an urban area, where 83% always add salt or sauce during cooking [58].

Estimated dietary sodium by food diary was 10% lower than 24-hour urinary sodium measured in this study. The lower estimation was also found by previous studies [49][59]. Dietary intake as assessed by food diary tends to underestimate the sodium intake, possibly to inability of the respondents to record all the food they consumed, specify the high sodium content food items, and difficulty estimating the portion size of consumed food [60].

Although there was a difference of sodium level as determined by urinary test and food diary in this study, a weak but significant correlation between dietary sodium intake and urinary sodium excretion was found ($r = 0.139$, $p < 0.01$). This correlation was slightly similar to the Finnish study with $r = 0.13$ [61]. Low correlations between dietary and urinay sodium may be due to measurement error in one or both estimates [49]. The sodium excretion rate may also vary as it was influenced by other metabolic pathways, such as sweat, faces, and others [31]. On the other hand, dietary measurement error might also reflect potential inaccuracy of the sodium database, misreporting of dietary intake, and difficulties quantifying salt or sauce added in the diet [49] [62].

5.5 Estimation of dietary sodium Intake by Food Frequency Questionnaire

The food frequency questionnaire (FFQ) is one of the most common study tools used in wide scale population based studies, as it is easy to administer and low cost. It is useful to assess intake over a longer period than dietary surveys and potentially reduce day-to-day variability of food intake. The overall mean sodium analyzed by FFQ was found to be higher (3393 mg/day) than urine analysis and food diary. However, there was a significant, small correlation to 24-hour urinary sodium ($r = 0.131$, $p < 0.01$). A similar finding was observed in other studies [63] [64] [65].

5.6 Main Sources of Sodium Intake in the Diet

This study identified the main source of sodium intake was from cooked food (grain products), followed by sauces/seasoning and meat products. Soy sauce, fried rice, omelet and nasi lemak were found to be the major sources of sodium consumption. A similar pattern was found in the previous salt study conducted among health staff, where soy sauce, fried rice, and nasi lemak were the major sources of high sodium food most consumed by the respondents [7].

The respondents, however, rarely consumed some foods with high sodium content per serving including dried shrimp, cheese, salted fish and fish sauce. Most Asian countries consume large amounts of dietary sodium from added sodium chloride in cooking and from various sauces, including soy sauce and in Japan (miso) [66], [20]. On the contrary, most sodium in European, Australian, and United States diets were obtained from processed food, spreads and sauces [32] [60].

6.0 Conclusion

Mean sodium intake among Ministry of Health Staff as assessed by 24-hour urine test and food diary were higher than the WHO recommendation (≤ 2000 mg/day). Approximately, 70% of the respondents consumed sodium (≥ 2000 mg/day). In this study, spot urine assessment to estimate the 24- hour urine sodium was moderately correlated to the 24 hour urine sodium excretion. Food items, namely, soy sauce, fried rice, omelet and nasi lemak were the major sodium contributors in the diet. Awareness of the respondents of high sodium diet and its association to serious health problems was satisfactory, but the practices towards low sodium consumption should be further encouraged.

7.0 Suggestion

Continous monitoring on sodium intake is proposed to determine the trend of sodium intake among the health staff. The 24 hour urine sodium test to determine the sodium intake shall be easily asessed by the health staff for them to monitor their sodium consumption. A holistic approach also need to be incorporated to promote a low sodium in order to meet the sodium recommendation of 2000 mg/day. The effects on high sodium consumption to cardiovascular risks, and other clinical markers associated to the diseases shall be highlighted and explored for further understanding on sodium impact to health.

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Appendix I: Borang Maklumat Kajian dan Kebenaran Responden

KAJIAN PENGAMBILAN GARAM
KAKITANGAN KEMENTERIAN KESIHATAN MALAYSIA
(MySALT 2013)

BORANG PERSETUJUAN MENYERTAI KAJIAN

Bahawa saya telah dimaklumkan dalam bahasa yang boleh difahami oleh saya mengenai penyertaan saya dalam kajian ini. Isi kandungan dan maksud maklumat telah dijelaskan kepada saya. Saya telah diberi masa dan peluang untuk bertanya tentang kajian ini dan juga borang soal selidik. Soalan yang saya tanya telah dijawab. Saya dengan ini sukarela memberi persetujuan untuk mengambil bahagian dalam kajian ini.

Dengan menandatangani borang persetujuan ini, saya mengesahkan bahawa maklumat yang saya beri adalah benar berdasarkan pengetahuan saya.

Tandatangan Responden : ..... Tandatangan Saksi : .....

Nama Responden : ..... Nama Saksi : .....

No Kad Pengenalan : ..... No Kad Pengenalan : .....

Tarikh : ..... Tarikh : .....

(Untuk salinan pejabat)

KAJIAN PENGAMBILAN GARAM
KAKITANGAN KEMENTERIAN KESIHATAN MALAYSIA
(MySALT 2013)

BORANG PERSETUJUAN MENYERTAI KAJIAN

Bahawa saya telah dimaklumkan dalam bahasa yang boleh difahami oleh saya mengenai penyertaan saya dalam kajian ini. Isi kandungan dan maksud maklumat telah dijelaskan kepada saya. Saya telah diberi masa dan peluang untuk bertanya tentang kajian ini dan juga borang soal selidik. Soalan yang saya tanya telah dijawab. Saya dengan ini sukarela memberi persetujuan untuk mengambil bahagian dalam kajian ini.

Dengan menandatangani borang persetujuan ini, saya mengesahkan bahawa maklumat yang saya beri adalah benar berdasarkan pengetahuan saya.

Tandatangan Responden : ..... Tandatangan Saksi : .....

Nama Responden : ..... Nama Saksi : .....

No Kad Pengenalan : ..... No Kad Pengenalan : .....

Tarikh : ..... Tarikh : .....

KAJIAN PENGAMBILAN GARAM
KAKITANGAN KEMENTERIAN KESIHATAN MALAYSIA
(MySALT 2015)

BORANG MAKLUMAT KAJIAN

PENGENALAN

Garam atau sodium klorida adalah sejenis mikronutrien di dalam makanan yang berperanan untuk mengawal tekanan darah serta fungsi otot dan saraf di dalam tubuh. Sehubungan itu, kajian bagi mendapatkan maklumat berkaitan pengambilan garam akan dijalankan dalam kalangan anggota Jabatan Kesihatan Negeri di seluruh Malaysia. Kajian yang dijalankan ini adalah hasil kerjasama dari Institut Kesihatan Umum, Bahagian Kawalan Penyakit dan Bahagian Pemakanan Kementerian Kesihatan Malaysia dan merupakan kesinambungan kajian pengambilan garam yang telah dijalankan pada tahun 2012. Maklumat berkaitan pengambilan garam ini adalah salah satu input bagi perancangan strategi pengurangan pengambilan garam rakyat Malaysia oleh kementerian kesihatan Malaysia.

TUJUAN

Tujuan utama kajian ini adalah untuk mengenalpasti tahap pengambilan garam harian dari makanan serta pengumuhannya di dalam air kencing. Selain itu, kajian ini juga bertujuan untuk menentukan formula penginan pengumuhan garam 24 jam dari sampel air kencing segera. Formula ini akan memudahkan pemantauan pengambilan garam di kalangan warga Malaysia dengan cara yang lebih mudah. Di samping itu, kajian ini juga bertujuan untuk mendapatkan maklumat tentang pengetahuan, amalan dan sikap terhadap pengambilan garam dalam makanan seharian. Maklumat tersebut berguna untuk merangka polisi berkaitan pengambilan garam di kalangan rakyat Malaysia dalam usaha mencegah penyakit kronik.

Sehubungan itu, anda terlebih dahulu diminta agar membaca dan memahami segala keterangan di bawah yang memberikan penerangan lanjut mengenai prosedur, manfaat dan risiko serta lain-lain aspek berkaitan dengan kajian ini.

KESAN SAMPINGAN ATAU RISIKO YANG BERKEMUNGKINAN

Tiada sebarang kesan sampingan dijangka akan timbul dari prosedur kajian ini kerana ia tidak melibatkan pengambilan darah. Pengumpulan air kencing selama 24 jam mungkin menyebabkan peserta rasa kurang selesa sepanjang tempoh tersebut.

MANFAAT PENYERTAAN KAJIAN INI

Kajian ini membolehkan anda mengetahui maklumat tentang kandungan sodium dan kalium di dalam urin serta dapat menjalani pemeriksaan asas kesihatan seperti ukur lilit pinggang, indeks jisim tubuh (IJT) dan tekanan darah.

PROSEDUR KAJIAN

a. Sekiranya anda layak dan bersetuju untuk turut serta dalam kajian ini, Borang Persetujuan Penyertaan Kajian perlu diisi.
b. Kajian ini melibatkan dua aspek pengambilan data iaitu :

I. Pengisian borang kaji selidik yang terdiri dari modul A, B, C, D, E dan F.
Modul A- Maklumat peribadi peserta
Modul B- Sejarah Kesihatan
Modul C- Soalan tentang pengetahuan, tingkah laku dan amalan pengambilan garam
Modul D- Ukuran antropometri (berat, tinggi, ukur lilit pinggang) dan tekanan darah
Modul E- Soal selidik kekerapan pengambilan makanan yang tinggi garam
Modul F- Pengisian diari makanan untuk 2 hari (1 hari bekerja, 1 hari cuti/hujung minggu)

Sebelum data diambil di dalam setiap modul, peserta akan diterangkan dengan terperinci mengenai tatacara pengambilan data terutamanya bagi modul E dan F. Semua modul tersebut perlu diisi sendiri oleh peserta kecuali modul D, dimana pengukuran antropometri akan dilakukan oleh kumpulan penyelidik yang telah dilantik dengan menggunakan alatan yang sudah dikalibrasi.

II. Pengambilan sampel urin 24 jam dan urin segera (spot urine)
Terdapat dua cara pengambilan urin yang perlu dilakukan oleh peserta iaitu urin 24 jam dan urin segera (spot urine).

Urin 24 jam : urin akan dikumpulkan sepanjang 24 jam dengan menggunakan instrumen yang akan dibekalkan oleh para penyelidik. Masa pengumpulan urin adalah bermula dari urin kedua sewaktu bangun pagi HARI PERTAMA sehingga urin pertama sewaktu bangun pagi keesokan harinya.

Urin segera (spot urine) : merujuk kepada pengumpulan urin yang dikumuhkan sejurus pengumpulan urin 24 jam tamat. Pengumpulan urin tersebut hanya dilakukan satu kali sahaja.

Peserta akan dibekalkan bekas urin 24 jam, bekas urin segera, cawan penadah dan beg untuk menyimpan urin. Maklumat terperinci tentang pengumpulan urin akan diterangkan oleh para penyelidik.

c. Dua sesi lawatan akan dijalankan bagi memastikan pengumpulan data berjalan dengan lancar.
I. **Lawatan pertama** : Penerangan kajian, agihan instrumen pengumpulan urin, pemeriksaan fizikal, pengisian Borang Persetujuan Kajian dan borang Modul A hingga E.

II. **Lawatan kedua** : Penyerahan sampel urin 24 jam dan urin segera serta diari makanan (Modul F)

TANGGUNGJAWAB PESERTA

Peserta dingatkan untuk mengekalkan corak pemakanan yang biasa dan tidak berpuasa sepanjang pengumpulan data berlangsung untuk mengelakkan sebarang masalah yang menjejaskan pengeluaran urin. Sebarang kemusykilan yang dihadapi boleh diutarakan kepada ketua penyelidik kajian atau penyelaras kajian MySalt.

PENYERTAAN DALAM KAJIAN

Penyertaan anda dalam kajian ini adalah secara sukarela dan anda tidak akan mengalami sebarang kerugian dari kajian ini. Anda juga boleh menarik diri pada bila-bila masa dan hendaklah memaklumkan kepada pihak kami dengan segera. Data yang diperolehi dari kajian ini akan dianalisa secara berkumpulan. Terdapat kemungkinan maklumat yang dikumpulkan semasa kajian ini akan dianalisa oleh pihak lain untuk tujuan menambah baik program kesihatan dari semasa ke semasa.

MAKLUMAT PESERTA AKAN DIRAHSIAKAN

Identiti anda sebagai peserta kajian adalah dirahsiakan. Segala maklumat yang bakal diperolehi akan sentiasa dirahsiakan dan hanya digunakan untuk tujuan kajian semata-mata. Keputusan ujian urin akan dimaklumkan secara individu oleh Institut Kesihatan Umum, Kementerian Kesihatan Malaysia.

HUBUNGI PENYELIDIK SEKIRANYA ADA SOALAN TAMBAHAN

Sekiranya anda mempunyai sebarang soalan mengenai kajian ini atau memerlukan keterangan lanjutan, sila hubungi:

Penyelidik Utama

Pn Fatimah Othman
Institut Kesihatan Umum
Talian: 03- 2297 9446 / 019 7940404
Email : fatimah.oth@moh.gov.my

Jika anda mempunyai sebarang pertanyaan dengan hak-hak anda sebagai peserta dalam kajian, sila hubungi Setiausaha, Jawatankuasa Etika & Penyelidikan Perubatan (MREC), Kementerian Kesihatan Malaysia di talian 03-22974032.

Appendix II: Manual Operasi Kajian Pengambilan Garam Kakitangan Kesihatan Malaysia

PENGENALAN

Penggunaan sodium yang tinggi dalam jangka masa yang panjang telah dikaitkan dengan faktor risiko utama tekanan darah tinggi, strok dan penyakit tidak berjangkit. Kajian di seluruh Negara (NHMS 1996, 2006 & 2011) mencatatkan kenaikan prevalens tekanan darah tinggi dalam kalangan warganegara Malaysia daripada 20.7% kepada 32.7% sejak tahun 2006. Kajian terbaru dalam kalangan staf Kementerian Kesihatan Malaysia (KKM) telah menunjukkan 79% staf mengamalkan pengambilan dan perkumuhan sodium yang tinggi (Rashidah et al., 2014). Purata pengambilan sodium yang diukur daripada air kencing adalah 3429 mg sodium/hari bersamaan 8.7g/hari. World Health Organization (WHO) telah menggalakkan negara-negara untuk mengurangkan purata pengambilan garam kepada <5g/hari (Campbell et al., 2010). Oleh itu, pengiraan pengambilan sodium dan pengawasan secara berterusan adalah sangat perlu sebagai strategi pengurangan garam sekaligus mengurangkan penyakit tidak berjangkit di sesebuah negara.

Manual ini disediakan untuk kegunaan pasukan pengumpul data bagi 'Kajian Pengambilan Garam dalam Kalangan Anggota Kementerian Kesihatan Malaysia'. Manual ini mengandungi penjelasan mengenai borang soal selidik dan aktiviti-aktiviti yang terlibat dalam proses penmgumpulan data. Manual ini juga memberi panduan kepada responden tentang maklumat yang terdapat dalam borang dan bagaimana mengisi maklumat yang dikehendaki.

Pengumpulan maklumat dimulakan dengan ucapan salam atau selamat kepada responden di samping menjelaskan perkara-perkara berikut kepadanya:

a) Tajuk kajian
b) Kajian dijalankan oleh Bahagian Kawalan Penyakit dan Bahagian Pemakanan dengan kerjasama Institut Kesihatan Umum, Kementerian Kesihatan Malaysia.
c) Tujuan dan maklumat kajian
d) Pengesahan dan persetujuan menyertai kajian
e) Maklumat yang dikehendaki iaitu:

i. Keterangan diri responden dan maklumat yang terkandung di dalam borang soal selidik ‘Kajian Pengambilan Garam dalam Kalangan Anggota Kementerian Kesihatan Malaysia’.

- Modul A- Maklumat peribadi
- Modul B- Sejarah kesihatan
- Modul C- Soalan ‘Pengetahuan, Tingkah Laku dan Amalan’
- Modul D- Antropometri dan ukuran tekanan darah
- Modul E- Soal selidik kekerapan pengambilan makanan tinggi garam

ii. Catatan pengambilan makanan selama 2 hari (Diari Pengambilan Makanan)

- Mencatat pengambilan makanan ke dalam diari pengambilan makanan untuk tempoh dua (2) hari iaitu satu hari bekerja dan satu hari minggu/ hari cuti. Salah satu hari yang dicatat mesti sama dengan hari pengumpulan urin 24 jam dilakukan.

iii. Sampel urin / air kencing

- Urin 24 jam
- Spot Urine

OBJEKTIF MANUAL

1. Mengenal pasti aktiviti-aktiviti sebelum, semasa dan selepas pengumpulan data di lapangan.
2. Menyampaikan panduan tentang maklumat yang terdapat dalam borang dan cara mengisi maklumat yang dikehendaki.
3. Mengenal pasti borang-borang yang digunakan sebelum, semasa dan selepas aktiviti pengumpulan data.
4. Mengenal pasti peranan dan tanggungjawab pasukan pengumpul data yang terlibat semasa pengumpulan data.

AKTIVITI PENGUMPULAN DATA

Sebelum pengumpulan data

- Pengesahan penerimaan barang-barang kajian oleh pasukan pengumpul data.
- Persediaan peralatan dan prasarana lain di lokasi kajian.
- Persediaan borang-borang kajian.
- Persediaan lokasi pertemuan dan penyimpanan bahan kajian.
- Senarai responden kajian.

Pengumpulan data *Lawatan pertama*

- Perjumpaan bersama responden.
- Maklumat kajian dan persetujuan penyertaan.
- Mengisi borang-borang.
- Penyerahan peralatan mengumpul urin.
- Pemeriksaan fizikal dan tekanan darah.

Pengumpulan data *Lawatan kedua*

- Penyerahan diari pengambilan makanan dan borang-borang kajian.
- Pemeriksaan borang-borang dan diari pengambilan makanan peserta.
- Penyerahan urin 24 jam dan 'Spot Urine' kepada pasukan pengumpul data.
- Maklumat pada label sampel urin.
- Mengisi borang perkhidmatan makmal.

Semasa pengumpulan data
Lawatan kedua

- Penghantaran sampel urin oleh kenderaan jabatan ke makmal selewat-lewatnya jam 10 pagi.
- Penyerahan dan pengesahan borang perkhidmatan makmal.

Selepas pengumpulan data

- Pemprosesan sampel urin di makmal.
- Mengembalikan borang soal selidik, diari pengambilan makanan dan salinan borang kebenaran penyertaan responden kajian ke IKU setiap 2 minggu dalam tempoh kajian.

Selepas pengumpulan data (IKU)

- Pengesahan dan pemprosesan rekod- rekod pengumpulan data
- Penganalisaan data.
- Pengesanan keputusan ujian urin.
- Makluman keputusan ujian urin kepada responden.
- Laporan kajian.

PENERANGAN MODUL

1.MENDAPATKAN PERSETUJUAN DAN MAKLUMAT DIRI RESPONDEN

Memberi penerangan yang lengkap berkaitan kajian ini dengan merujuk kepada maklumat dalam **BORANG MAKLUMAT KAJIAN**. Persetujuan responden diperolehi dengan menandatangani borang **BORANG PERSETUJUAN MENYERTAI KAJIAN** dengan persetujuan sendiri tanpa sebarang paksaan.

2.PENGISIAN MAKLUMAT MODUL- MODUL DI DALAM BORANG SOAL SELIDIK

i). MODUL A: MAKLUMAT PERIBADI

a. Tujuan

Untuk mendapatkan maklumat peribadi responden yang terpilih di Jabatan / Ibu Pejabat KKM / Institusi masing-masing.

Panduan Mengisi Borang

ID responder ditulis mengikut ruang yang disediakan seperti mana kotak berikut :

		–			

Kod Negeri Kod Peserta

Kod Negeri:

01-	Johor	09-	Perlis
02-	Kedah	10-	Selangor
03-	Kelantan	11-	Terengganu
04-	Melaka	12-	Sabah
05-	Negeri Sembilan	13-	Sarawak
06-	Pahang	14-	WP Kuala Lumpur
07-	Pulau Pinang	15-	WP Putrajaya
08-	Perak		

b. Responden hendaklah mengisi sendiri Modul A dengan maklumat berikut :

A01. Tarikh temu bual
A02. Nama
A03. Nombor Kad Pengenalan
A04. Jantina
A05. Bangsa
A06. Taraf perkahwinan
A07. Taraf pendidikan tinggi
A08. Pendapatan bulanan

ii) MODUL B: SEJARAH KESIHATAN

a. Tujuan

Borang ini digunakan untuk mengenal pasti status kesihatan responden kajian.

b. Perihal Borang

Responden dikehendaki menanda (ü) ke dalam petak kosong jenis penyakit yang dihadapi serta maklumat yang berkaitan dengan diri.

iii) MODUL C: PENGETAHUAN, TINGKAH LAKU DAN AMALAN

a. Tujuan

Borang ini digunakan untuk menilai pengetahuan, tingkah laku dan amalan responden mengenai penggunaan dan pengambilan garam.

b. Perihal Borang

Responden dikehendaki menandakan (ü) di petak kosong berkaitan pengetahuan, tingkah laku dan amalan dalam pengambilan garam.

iv) MODUL D: PENGUKURAN ANTROPOMETRI DAN UKURAN TEKANAN DARAH

1) Pengukuran Antropometri

a. Tujuan

Antropometri adalah pengukuran yang dilakukan untuk menilai saiz dan komposisi tubuh badan. Pengukuran antropometri di dalam kajian ini melibatkan ukuran berat badan, ukuran ketinggian, ukur lilit pinggang. Manakala pemeriksaan tekanan darah juga dilakukan.

b. Perihal mengukur berat

Sebelum menjalankan sebarang pengukuran, sila pastikan perkara-perkara berikut:

- Pastikan kedudukan alat penimbang teguh di atas permukaan yang rata.
- Pastikan tiada barang diletakkan di atas platform penimbang.
- Minta responden menanggalkan kasut dan barang-barang yang boleh mempengaruhi berat seperti tali pinggang, barang kemas, kunci, dompet, telefon bimbit dan lain-lain.

PERHATIAN: PASTIKAN RESPONDEN MELETAK BARANG-BARANG BERHARGA DI TEMPAT YANG SELAMAT!!

- Pastikan responden tidak memakai pakaian yang tebal (contoh : jaket, seluar jean, sari, baju panas). Minta kerjasama responden untuk menukar pakaian yang lebih ringan.

- Minta responden berdiri di atas penimbang dengan kedua-dua tangan diletakkan di kedua-dua belah badan dan mata memandang tegak ke hadapan.

- Apabila responden berdiri dalam keadaaan posisi yang baik dan bacaan yang ditunjukkan sudah stabil, baca bacaan di skala penimbang **dari arah hadapan**. Catat bacaan di borang soal selidik pada nilai terdekat 0.1 kg.

- Minta responden turun dari penimbang dan berdiri semula di atas platform untuk bacaan kedua dan catat bacaan pada borang soal selidik.

c. Perihal Mengukur Tinggi

- Pengukuran tinggi adalah menggunakan SECA Bodymeter atau sebarang pengukur ketinggian yang sesuai.

- Pastikan alat pengukur tinggi dilekatkan di dinding atau tiang yang rata (cari tempat yang sesuai seperti tiang dan pintu).

• Cara memasang:

1. Seorang anggota memegang tapak pengukur.

2. Seorang lagi anggota pembantu akan menarik pita pengukur dengan lurus secara perlahan-lahan sehingga ke bacaan ‘0’ dengan garisan merah diatasnya.

3. Beri isyarat berhenti kepada pembantu apabila sampai ke bacaan ‘0’ dengan garisan merah diatasnya. Letak tapak pengukur di atas lantai dan pastikan kedudukan mata selari dengan kedudukan angka ‘0’.

4. Dengan kadar yang segera, pembantu melekatkan pangkal pita pengukurpada dinding dan kemudian meletakkan pita pelekat ke atas pita supaya ia melekat di dinding.

5. Naikkan tapak pengukur dari lantai dengan perlahan-lahan. Pastikan pita lurus dan tapak pengukur berada dalam keadaan yang stabil.

6. Terangkan secara ringkas kepada setiap responden tentang prosedur yang akan dilakukan sebelum pengukuran.

7. Minta responden menanggalkan kasut atau selipar dan berdiri selari dengan pita pengukur.

8. Tentukan responden berdiri tegak dengan kaki yang rapat ke dinding atau tiang dengan kedua-dua belah tangan lurus ke bawah. Tumit, punggung, bahu dan belakang kepala mesti menyentuh dinding.

9. Pastikan mata responden memandang lurus ke depan. Garisan melintang dari bahagian bawah orbit mata ke lubang telinga mestilah 90 darjah kepada alat pengukur atau dinding.

10. Turunkan pengukur secara perlahan-lahan sehingga mencecah bahagian atas kepala. Tekan sedikit bahagian rambut sekiranya rambut lebat dan tebal dan minta responden menarik nafas seketika.

11. Baca ukuran pada tanda merah dan catat pada borang soal selidik. Ambil bacaan ukuran tinggi terdekat 0.1 cm. Meminta responden bergerak keluar dari alat pengukur.

12. Ulangi prosedur sama untuk mendapatkan bacaan ukuran tinggi yang kedua.

d. Perihal mengukur lilit pinggang

1. Pengukuran lilit pinggang akan dijalankan menggunakan pita pengukur.

2. Terangkan secara ringkas tentang prosedur yang akan dilakukan.

3. Sebelum pengukuran dijalankan, bincang dengan responden tempat atau ruang yang bersesuaian (mengikut keselesaan responden) untuk melakukan pengukuran.

4. Minta responden berdiri dan memakai baju di atas paras pinggang dan turunkan sedikit sahaja kain atau seluar di bawah paras pinggang.

5. Berdiri di belakang dan sebelah kanan responden, gerakkan jari perlahan-lahan dan rasa (palpate) bahagian tulang rusuk akhir responden. Rasa (palpate) pinggang untuk mengenalpasti puncak tulang ilium.

PERHATIAN : Untuk responden yang gemuk, perlu tekan sedikit untuk mengenal pasti tulang rusuk dan tulang ilium. Terangkan kepada responden prosedur ini.

6. Tandakan titik tengah (midpoint) di antara tulang rusuk akhir dengan puncak tulang ilium.

7. Tarik pita pengukur mengelilingi pinggang berdasarkan titik tengah yang telah diperolehi.

8. Pegang hujung pita yang bermula dengan nilai bacaan '0', semak dan selaraskan agar kedudukan pita pengukur lurus mengelilingi pinggang **dari pandangan sisi dan juga hadapan.**

9. Tekan butang pada pita pengukur (sekiranya perlu) untuk menyelaras kedudukan dan ketegangan pita pengukur. **Elakkan menekan pita pengukur terlalu kuat pada kulit atau pita terlalu longgar.** Catat bacaan pertama pada nilai terdekat sehingga 0.1 cm.

10. Ulangi prosedur yang sama untuk mendapatkan bacaan ukur lilit pinggang yang kedua.

2) Pengukuran Tekanan Darah

a) Tujuan

Pengukuran tekanan darah dalam kajian ini menggunakan sphygnomanometer elektronik.

Tekanan darah merujuk kepada tekanan yang dikenakan oleh darah pada pembuluh arteri ketika darah dipam oleh jantung ke seluruh anggota tubuh badan. Tekanan darah diukur dengan mengambil dua bacaan iaitu tekanan sistolik (tekanan ke atas pembuluh arteri semasa denyutan jantung) dan diastolik (tekanan semasa jantung berehat diantara pengepaman).

b) Perihal pengambilan darah

i. Masa yang paling sesuai bagi pengukuran tekanan darah adalah semasa rehat dan tenang.

ii. Pemeriksaan tekanan darah harus dilakukan seperti berikut:
- Dengan dua bacaan.
- Biarkan responden rehat selama 15 minit bagi setiap bacaan.
- Bacaan mesti diambil dengan responden berada dalam keadaan duduk dan tenang.
- Tekanan diambil pada lengan tangan.

iii. Berikan pengenalan ringkas berkaitan prosedur yang akan dilalui oleh responden tersebut.

iv. Pastikan responden berada dalam keadaan tenang, TIDAK menjalankan aktiviti yang tertera dibawah dalam masa 15 minit yang lepas :
- Senaman.
- Mengambil makanan berat.

v) MODUL E: SOAL SELIDIK KEKERAPAN PENGAMBILAN MAKANAN TINGGI GARAM (lampiran D)

a) Tujuan

Borang ini digunakan untuk menentukan saiz sajian dan jenis makanan yang diambil oleh individu dalam tempoh sebulan yang lepas.

Maklumat yang dikehendaki adalah:

- Kekerapan pengambilan sesuatu jenis makanan yang disenaraikan.
- Berapa banyak sajian yang diambil pada setiap kali makan.

b) Perihal Borang

'Borang Soal Selidik Kekerapan Pengambilan Makanan' akan digunakan secara temubual bersemuka atau diisi oleh responden sendiri. Responden diminta untuk menjawab kekerapan makanan yang diambil berasaskan pengambilan makanan dalam tempoh sebulan yang lepas.

Terdapat empat ruang utama:

- Senarai jenis makanan
- Kekerapan pengambilan dalam tempoh sehari atau seminggu atau sebulan
- Kuantiti sebenar diambil setiap kali makan
- Saiz hidangan standard

c) Senarai Jenis Makanan

Bahagian ini mengadungi 11 kumpulan makanan iaitu:

i. Daging,ayam dan produknya
ii. Ikan, hasil laut dan produknya
iii. Telur
iv. Produk sapuan
v. Kuih-muih
vi. Snek
vii. Perencah / Perasa / Sos
viii. Makanan Segera
ix. Hidangan bermasak (bijirin)
x. Hidangan bermasak (lain-lain)
xi. Makanan dalam tin

d) Amalan Pemakanan, Kekerapan Pengambilan dan Jumlah Pengambilan

Terdapat tiga kategori kekerapan makanan yang boleh dipilih untuk menggambarkan kekerapan pengambilan makanan responden iaitu:

- Berapa kali sehari
- Berapa kali seminggu
- Berapa kali sebulan

Responden perlu merekodkan kekerapan pengambilan makanan sama ada dalam sehari, seminggu atau sebulan bergantung. Bagi setiap jenis makanan, responden hanya perlu menanda satu jawapan sahaja bagi kekerapan pengambilannya (isi salah satu ruang kekerapan sahaja mengikut jawapan kekerapan pengambilan makanan tersebut).

Setiap jenis makanan telah diberikan saiz hidangan standard yang merujuk kepada kandungan sodium yang spesifik bagi makanan tersebut.

e) Contoh mengisi borang

Bagi setiap jenis makanan, responden perlu menanda satu jawapan sahaja bagi kekerapan pengambilannya.

Bil.	a) Jenis Makanan	b) Berapa kali kekerapan pengambilan makanan dalam			c) Kuantiti Sebenar diambil setiap kali makan	d) Saiz hidangan standard
		Sehari	Seminggu	Sebulan		
1	Ikan, Hasil Laut & Produknya Ikan (kari, sambal,asam)		3		1 ekor	1 ekor sederhana

PERINGATAN:

SILA BERI MASA YANG SESUAI KEPADA RESPONDEN UNTUK BERFIKIR, MENGINGATI SERTA MENJAWAB SETIAP SOALAN YANG DIBERIKAN.

VI) MODUL F: DIARI PENGAMBILAN MAKANAN/MINUMAN (lampiran E)

a) Tujuan

Borang ini digunakan untuk menentukan:

i. Pengambilan makanan seharian
ii. Jumlah pengambilan kalori dan sodium dalam sehari
iii. Makanan yang menjadi sumber sodium
iv. Corak pengambilan makanan dan minuman

b) Perihal Borang

Maklumat dari borang ini diambil berdasarkan pengambilan makanan sehari pada hari bekerja dan satu hari di hari minggu atau hari bercuti. Salah satu hari yang dicatatkan mesti sama dengan hari urin 24 jam diambil. Diari pemakanan ini dijalankan dan melibatkan beberapa peringkat, iaitu:

Peringkat 1

Mengingat masa makan dan minum, serta makanan dan minuman yang diambil.

Peringkat 2

Menulis semua makanan dan minuman yang diambil secara terperinci. Menganggarkan berapa banyak makanan dan minuman yang dimakan dan diminum.

Peringkat 3

Semakan diari makanan responden oleh Pegawai Sains Pemakanan.

- Peringkat 1: Mengingat masa makan dan minum serta makanan dan minuman yang diambil. Pada peringkat ini, responden perlu merekod semua masa makan dan minum secara berturutan bermula dari bangun daripada tidur sehingga tidur pada hari tersebut. Selain daripada makan, dapatkan juga jenis makanan dan minuman.

- Peringkat 2: Menulis semua makanan dan minuman yang diambil secara terperinci. Menganggarkan berapa banyak makanan dan minuman yang dimakan dan diminum dengan menggunakan sukatan isi rumah. Penggunaan bahan-bahan perisa makanan seperti garam / kicap / sos / belacan / kiub perasa di didalam masakan atau tambahan semasa makan harus dicatat kuantitinya dengan jelas.

- Peringkat 3: Semasa peringkat ini, pegawai perlu menggunakan 'probing skills' untuk mendapatkan penerangan berkaitan makanan dan minuman yang telah diambil termasuk cara memasak, bahan-bahan yang digunakan semasa memasak dan jenama makanan (sekiranya berkaitan). Jika makanan yang diambil responder adalah dimasak dirumah, penemubual perlu mendapatkan maklumat berkaitan jumlah garam / kicap / sos / belacan / kiub perasa yang digunakan untuk memasak bagi seluruh ahli keluarga tersebut.

a) Contoh borang yang telah diisi

Makanan/minuman

HARI : *KHAMIS* **TARIKH :** *3/10/2013*

Waktu : Tengahari	**Tempat**	**Jenis Makanan/ Minuman**	**Kuantiti**
1.00 pm	*Rumah*	*Mee Goreng dengan*	*2 Senduk bumbung*
		- telur	*1 biji*
		Ayam goreng bahagian dada	*1 ketul kecil*
		Sayur kangkung tumis air	*1/4 cawan*
		Sos tomato	*1 sudu makan*
		Milo ais	*1 cawan*
		Buah mangga	*1/2 biji*
		- dengan asam	*3 sudu teh*

Waktu : Minum petang	**Tempat**	**Jenis Makanan/ Minuman**	**Kuantiti**
5.00 pm	*Rumah*	*Biskut jenama xx*	*6 keping*
		Kopi campur dengan	*1 cawan*
		- susu pekat manis	*2 sudu teh*
		- gula	*2 sudu teh*

b) Prosedur Pengumpulan Sampel Urin 24 Jam Dan Spot Urine

1. Pra pengumpulan urin

i. Responden perlu memastikan semua perkakas yang digunakan untuk mengumpul urin telah diterima dan dalam keadaan baik. Berikut adalah senarai peralatan yang digunakan untuk mengumpul urin :

ii. Urin 24 jam : Kotak 2.5 liter (1 unit), cawan plastik 500 ml (3 unit), beg nylon

iii. (1 unit), label urin 24 jam (1 keping)

iv. Spot Urine : Beg urin 1 liter (1 unit), cawan plastik (1 unit), label Spot Urine (1 keping).

v. Responden boleh mengumpul urin pada hari yang mana proses pengumpulan urin 24 jam dan Spot Urine mudah dilakukan, sama ada ketika hari bercuti di rumah atau semasa hari bekerja.

vi. Pengumpulan urin 24 jam bermula dari urination ke dua pada hari pertama sehingga urination pertama pada hari kedua. Manakala Spot Urine diambil dari urination ke dua pada hari kedua pengumpulan data.

vii. Sekiranya responden mengalami masalah kesihatan yang menyukarkan pengumpulan urine dilakukan seperti demam dan cirit-birit, sila maklumkan kepada pasukan penyelidik untuk menunda pengumpulan urin pada hari lain.

viii. Responden adalah dilarang berpuasa pada hari pengumpulan urin dijalankan, kerana ini akan menjejaskan jumlah pengeluaran urin.

ix. Responden wanita tidak digalakkan untuk membuat pengumpulan urin pada hari kedatangan haid yang banyak.

2. Semasa pengumpulan urin

i. Responden perlu menulis nama, kad pengenalan dan ID pada label yang disediakan.

ii. Responden juga perlu mencatatkan tarikh serta masa pengumpulan urin bermula dan berakhir pada label bekas urin 24 jam dan masa serta tarikh bagi bekas Spot Urine.

iii. Pengumpulan urin 24 jam bermula dari hari pertama (urin kedua) sehingga hari kedua (urin pertama pada waktu pagi). Manakala Spot Urine dikumpul sekali iaitu pada hari kedua (urin kedua).

iv. Urin 24 jam mesti diumpulkan secara berterusan sepanjang 24 jam pada pada hari tersebut. Pada setiap kali urin dikumpulkan, pastikan masa dan tarikh dicatatkan pada label bekas pengumpul urin. Sekiranya ada sebarang urin yang tertinggal (tertumpah atau terlupa kumpul) sila catatkan masa, tarikh dalam ruang catatan pada label yang disediakan.

v. Gunakan cawan pengumpul urin untuk menadah air kencing sebelum dipindahkan ke bekas pengumpul urin 24 jam atau Spot Urine.

vi. Responden perlu memastikan bekas pengumpul urin tersebut ditutup dengan kemas dan cermat setiap kali pengumpulan dilakukan untuk mengelakkan sebarang tumpahan urin.

vii. Sekiranya responden ingin membuang air besar, pastikan urin dikumpulkan terlebih dahulu ke dalam bekas pengumpul urin.

viii. Pastikan semasa pengumpulan urin dilakukan, tiada bahan-bahan yang mencemari sampel urin seperti tisu di dalam sampel tersebut.

ix. Responden juga perlu memastikan bekas tempat pengumpulan urin disimpan di tempat yang dingin atau tidak melebihi suhu bilik (25°C).

3. Selepas pengumpulan urin

i. Semua bekas urin 24 jam dan Spot Urine yang sudah dilabelkan perlu dimasukkan ke dalam beg kalis air yang disediakan.

ii. Beg urin yang mengandungi urin 24 jam hendaklah diserahkan kepada pasukan penyelidik pada hari kedua lawatan untuk dihantar ke makmal swasta bagi tujuan pemprosesan. Manakala beg urin yang mengandungi Spot Urine juga hendaklah diserahkan kepada pasukan penyelidik pada hari yang sama. Penghantaran ke makmal adalah selewat-lewatnya jam 10.00 pagi hari tersebut.

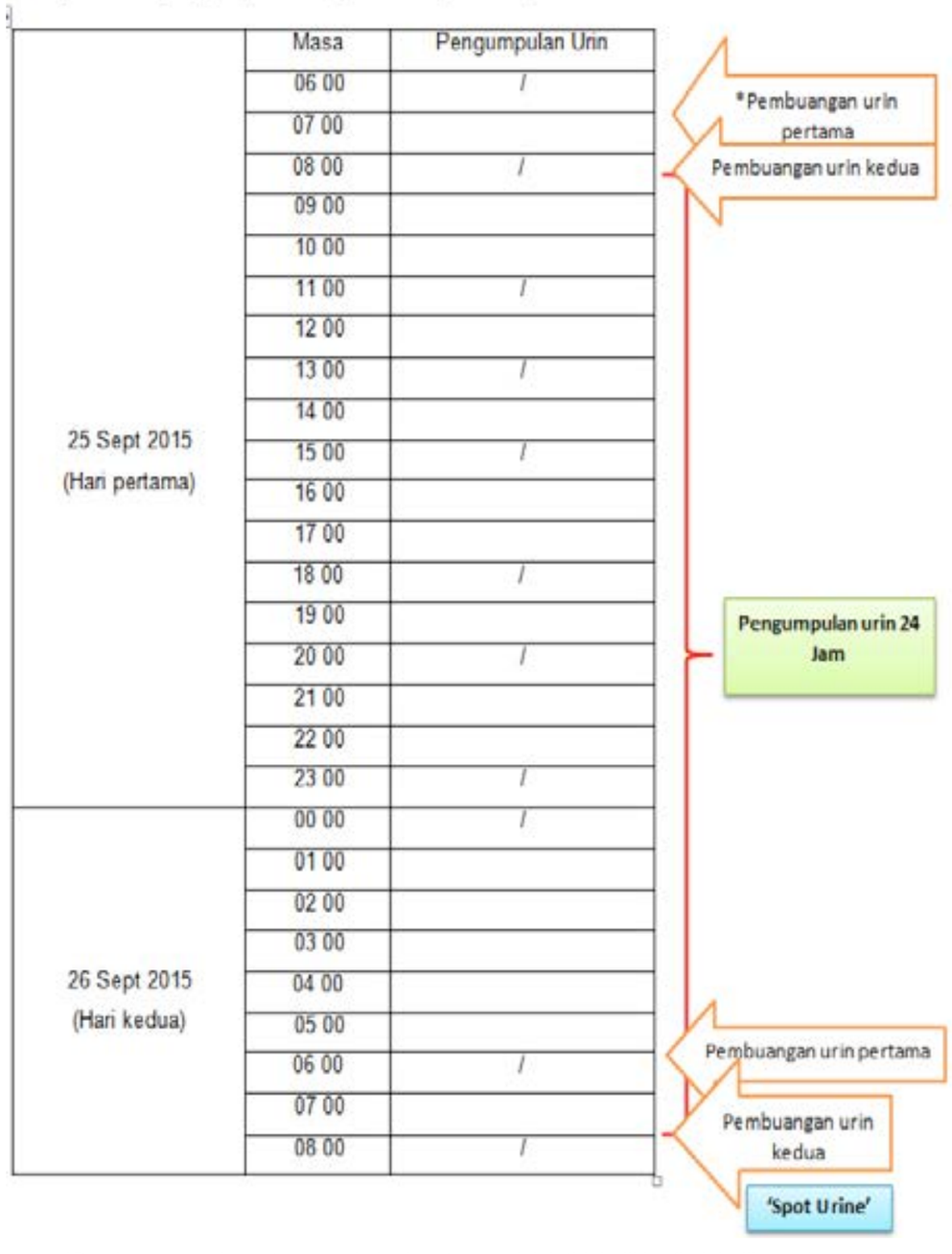
iii. Elakkan membuat pengumpulan urin sehari sebelum cuti kelepasan awam atau hari Ahad kerana, tiada penerimaan sampel urin dibuat di makmal pada hari Ahad dan hari kelepasan awam.

iv. BORANG PERMOHONAN UJIAN MAKMAL akan diisi oleh ketua kumpulan kajian bagi tujuan pengesanan sampel urin yang dihantar ke makmal yang terpilih.

v. Pemandu dalam pasukan penyelidik akan menghantar sampel Spot Urine yang dikumpul pada lawatan kedua ke makmal swasta dengan kadar yang segera untuk mengelakkan kerosakan sampel urin.

vi. Selain itu, responden dan juga pasukan penyelidik perlu memastikan sampel urin tidak terdedah kepada suhu panas atau melebihi suhu bilik (25°C) sepanjang tempoh pengumpulan sehingga penghantaran ke makmal dijalankan.

f) Contoh pengumpulan sampel urin 24 jam dan *Spot Urine* :



**Pembuangan urin pertama pada hari pertama adalah tidak dikira (boleh dibuang).*

3. SENARAI SEMAK PERALATAN LAPANGAN

a) Alat penimbang
b) Bodymeter
c) Pita pengukur
d) Sphygnomanometer elektronik
e) Urin 24 jam : Kotak 2.5 liter (1 unit), cawan plastik 500 ml (3 unit), beg nylon (1 unit), label urin 24 jam (1 keping)
f) Spot Urine : Beg urin 1 liter (1 unit), cawan plastik (1 unit), label Spot Urine (1 keping).

Figura 1 : Kotak 2.5 liter

Figura 2 : Cawan plastik 500ml

Figura 3 : Beg nylon

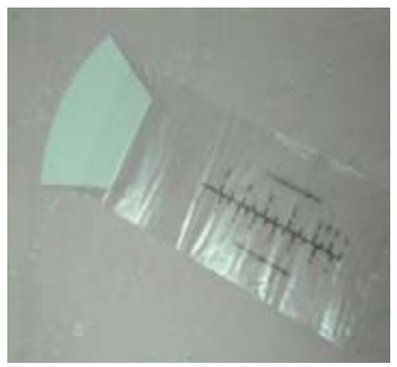


Figura 4 : Beg urin pakai buang

4. TERMA RUJUKAN ANGGOTA PASUKAN PENGUMPUL DATA

1. Pegawai Perhubungan Negeri (Liaison Officer)

Di setiap Jabatan Kesihatan Negeri dan Ibu Pejabat KKM, Pegawai Sains Pemakanan bertindak sebagai Pegawai Perhubungan Negeri (Liaison Officer). Manakala di Institut-institut Penyelidikan Kesihatan, Pegawai Penyelidik akan menggalas tanggungjawab tersebut.

Tugas dan tanggungjawab mereka adalah seperti berikut:

i. Bertindak sebagai pegawai yang akan dihubungi berkaitan 'Kajian MySalt 2015' di negeri masing-masing.

ii. Membantu proses pengumpulan maklumat dan senarai nama anggota responden kajian yang layak dari Jabatan Kesihatan Negeri/IPKKM/institut masing-masing untuk tujuan persampelan.

iii. Membantu mengenal pasti ahli-ahli pengumpul data yang terdiri dari Pegawai Sains Pemakanan (2), Jururawat / Pembantu Perubatan (2),Pemandu (1) serta melantik ketua kumpulan dalam pasukan pengumpul data tersebut.

iv. Memastikan ahli pengumpul data terpilih mendapat surat perlantikan dari Institut Kesihatan Umum dan dan mendapat pelepasan dari ketua jabatan untuk penglibatan dalam kajian MySalt 2015.

v. Mendapatkan peralatan pengukuran fizikal seperi penimbang berat badan, pengukur ketinggian, set pengukur tekanan darah dan pengukur lilit pinggang yang telah dikalibrasi.

vi. Mengenal pasti lokasi yang sesuai untuk memberi taklimat kepada responden kajian, menempatkan peralatan pengumpulan data, menemubual responden, tempat pengumpulan sampel urin sebelum ke makmal dan lokasi penyimpanan borang-borang sebelum dikembalikan ke IKU.

vii. Menghadiri mesyuarat/ bengkel / kursus yang berkaitan dengan kajian MySalt 2015. Membuat penyelarasan waktu penghantaran sampel urin ke makmal.

viii. Membuat hebahan awal dan taklimat kepada pihak terbabit tentang kajian MySalt 2015 diperingkat jabatan masing-masing.

ix. Menyelia proses pengumpulan data supaya berjalan dengan lancar sehingga kajian tamat.

x. Menyelaraskan masa dengan pihak IKU untuk mengembalikan semula borang-borang responden apabila tamat kajian.

2. Ketua Kumpulan Pasukan Pengumpul Data

Ketua kumpulan pasukan pengumpul data terdiri dari kalangan anggota Bahagian Kawalan Penyakit.

Tugas ketua pasukan pengumpul data adalah:

Pra pengumpulan data

i. Memaklumkan dan menerangkan kepada responden yang terpilih tentang kajian MySalt 2015.

ii. Merancang jadual pengumpulan data untuk kesemua responden yang terpilih sepanjang tempoh pengumpulan data.

iii. Menetapkan tarikh temujanji untuk lawatan pertama dan lawatan kedua responden.

iv. Mengenal pasti tarikh yang sesuai untuk pengambilan urin 24 jam dan Spot Urine para responden.

v. Memastikan peralatan pengukuran antropometri, pengumpulan urin dan borang-borang yang akan digunakan semasa pengumpulan data adalah lengkap dan mencukupi.

vi. Memastikan ahli pasukan pengumpul data mencukupi sepanjang pengumpulan data dijalankan. Sebarang masalah berkenaan ahli pasukan pengumpul data hendaklah dimaklumkan kepada pegawai perhubungan negeri.

Semasa pengumpulan data

i. Menerangkan prosedur kajian yang akan dijalankan kepada responden.

ii. Memastikan senarai semak pengumpulan data pada lawatan pertama dan kedua seperti yang dicatat di dalam manual kajian dipatuhi.

iii. Menyelia agihan dan pengisian borang-borang oleh responden dalam kajian.

iv. Memastikan responden memahami dengan jelas cara-cara mengisi borang dan diari yang digunakan dalam kajian.

v. Memastikan peralatan-peralatan untuk pengumpulan urin 24 jam dan Spot Urine diagihkan kepada responden. Berikut adalah peralatan yang diperlukan bagi pengumpulan urin.

vi. Prosedur pengumpulan urin diterangkan dengan jelas kepada responden pada lawatan pertama. Panduan lengkap boleh dirujuk dalam manual kajian.

vii. Memastikan pengukuran antropometri dan tekanan darah tinggi telah diambil menggunakan instrumen yang telah disediakan dan dikalibrasi serta merekodkan keputusan dalam ‘Borang Kaji Selidik Pengambilan Garam’.

viii. Memastikan responden sudah mendapat penjelasan tentang kaedah untuk merekodkan ‘Borang Kekerapan Pegambilan Makanan Tinggi Garam’ dan diari pengambilan makanan/minuman oleh Pegawai Sains Pemakanan.

ix. Memastikan urin yang sudah dikumpul untuk penghantaran ke makmal ditempatkan di tempat yang sesuai bagi mengelakkan kerosakan pada sampel.

x. Memastikan responden melabelkan dengan lengkap setiap bekas urin 24 jam dan Spot Urine dengan label yang disediakan.

xi. Memastikan masa penghantaran sampel urin 24 jam dan Spot Urine ke makmal mengikut masa yang ditetapkan.

xii. Mengesahkan borang penghantaran sampel urin ke makmal untuk tujuan verifikasi.

xiii. Memaklumkan progress pengumpulan data kepada penyelaras kajian di IKU setiap minggu. Mengisi 'BORANG PENERIMAAN REKOD KAJIAN' sebagai rekod penerimaan maklumat responden.

xiv. Memastikan borang-borang yang sudah diisi oleh responden dikumpulkan dan disusun mengikut kod ID responden untuk dikembalikan ke IKU bagi tujuan analisa dan proses selanjutnya.

3. Pegawai Sains Pemakanan

i. Menerangkan kaedah mengisi diari pengambilan makanan dan menjawab soalan kekerapan pengambilan makanan tinggi garam kepada responden.

ii. Memastikan responden memilih satu hari hujung minggu / bercuti dan satu tarikh bekerja untuk mencatat diari makanan. Salah satu hari tersebut mestilah hari yang sama pengambilan urin 24 jam dilakukan.

iii. Memastikan pengisian 'Borang Kekerapan Pengambilan Makanan' adalah merujuk kepada pengambilan makanan dalam tempoh sebulan yang lepas.

iv. Melakukan semakan terhadap diari pengambilan makanan dan 'Borang Kekerapan Pengambilan Makanan' semasa penyerahan borang dilakukan pada lawatan kedua.

4. Jururawat atau pembantu perubatan

i. Bertanggungjawab melakukan pengukuran berat, tinggi, ukur lilit pinggang dan tekanan darah responden.

ii. Memastikan peralatan yang digunakan untuk mengukur dalam keadaan baik dan dikalibrasi.

iii. Merekodkan semua bacaan pengukuran di dalam 'Modul D Borang Kajian Pengambilan Garam'.

iv. Mengagih barang-barang untuk pengumpulan urin dan memasang kotak urin 24 jam untuk diagihkan kepada responden kajian.

v. Mengagihkan borang dan menerangkan kaedah mengisi 'Borang Kajian Pengambilan Garam'.

vi. Menerima, mengurus dan menyimpan sampel urin 24 jam dan sampel Spot Urine yang diserahkan oleh responden di dalam bilik berhawa dingin atau mana-mana lokasi yang sesuai (tidak panas).

vii. Menerima, menyusun dan menyimpan borang-borang kajian yang diterima oleh responden.

viii. Mencatat ID responden di setiap borang dan label yang diserahkan kepada responden.

ix. Mengisi 'Borang Penghantaran Sampel Urin' sebelum dihantar ke makmal untuk analisa.

x. Bersama-sama dengan pemandu untuk menghantar sampel urin ke makmal.

xi. Memaklumkan sebarang masalah berkaitan pengumpulan data dengan ketua kumpulan.

5. Pemandu

i. Bertanggungjawab terus kepada ketua kumpulan kajian.

ii. Menghantar sampel urin 24 jam dan Spot Urine mengikut masa yang telah ditetapkan oleh ketua kumpulan.

iii. Memastikan sampel dalam keadaan baik semasa penghantaran ke makmal.

iv. Tugas-tugas lain yang diarahkan oleh ketua kumpulan dan Liason Officer.

Pengurusan Data MySalt 2015

Pengurusan data MySalt 2015 akan dilakukan di Institut Kesihatan Umum (IKU). Data Perlu dihantar ke IKU pada setiap hari Isnin bermula 2 November 2015 sepanjang tempoh pengumpulan data. Berikut adalah jadual penghantaran soal selidik dan sampel urin.

Jadual 1. Penghantaran soal selidik dan sampel urin dari lapangan

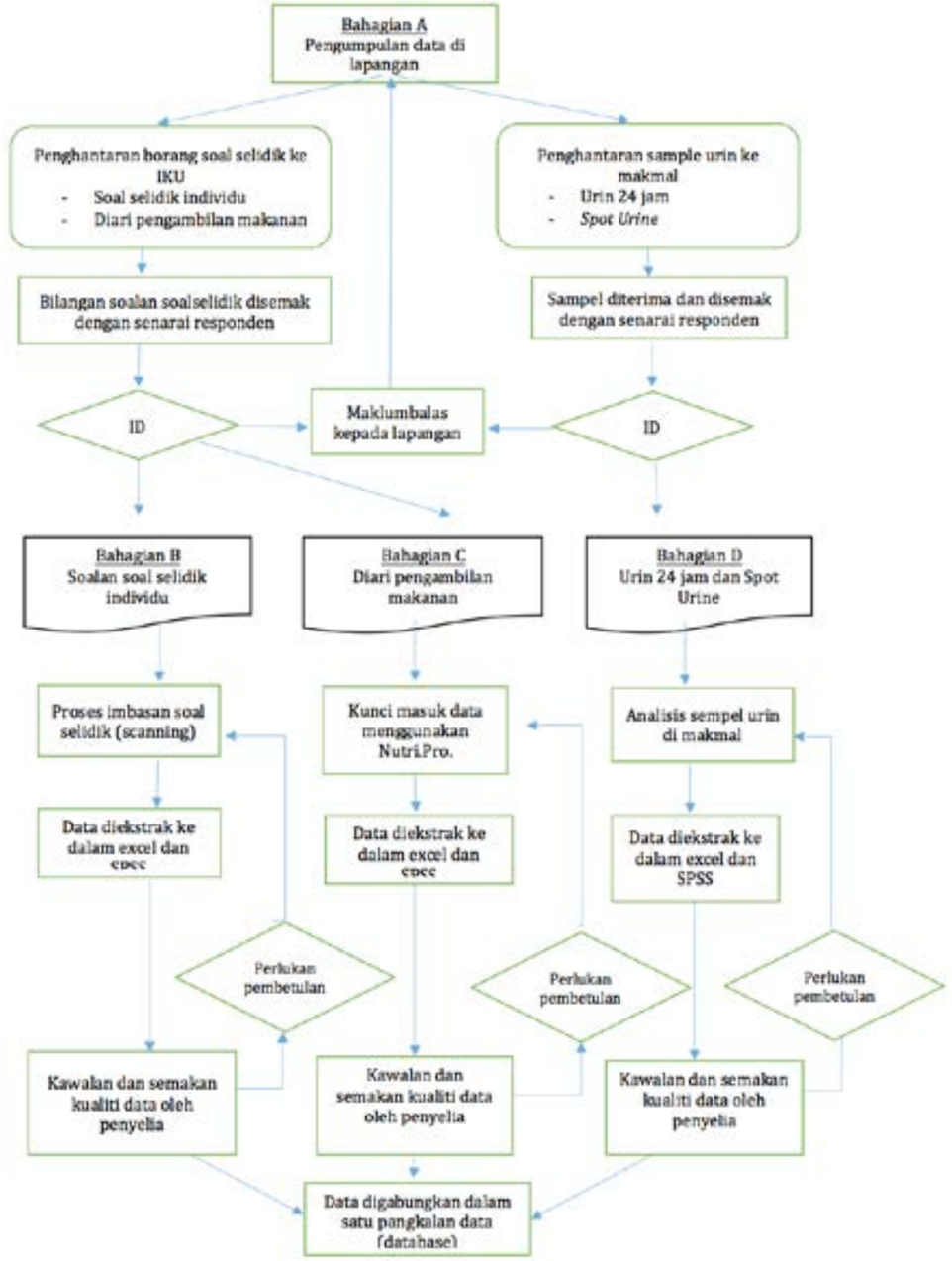
No.	Tarikh	Zon terlibat	Bil.soal selidik dihantar	Bil.sampel urin dihantar	Nama penghantar	Catatan
1	2015 2 Nov					
2	2015 9 Nov					
3	2015 16 Nov					
4	2015 23 Nov					
5	2015 30 Nov					

Secara amnya, aktiviti pengurusan data ini akan dibahagikan kepada 4 bahagian iaitu :

1. Bahagian A – Pengumpulan dan penghantaran soal selidik dari lapangan
2. Bahagian B – Analisis soal selidik individu
3. Bahagian C – Analisis diari pengambilan makanan
4. Bahagian D – Analisis sampel urin

Berikut adalah carta alir pengurusan data bermula dari pengumpulan data di lapangan hingga kewujudan pengkalan data untuk proses analisis.

Carta alir pengurusan data MySalt



Appendix III:

Borang Soal Selidik Kajian Pengambilan Garam Kakitangan Kementerian Kesihatan Malaysia 2015 (My Salt 2015)

Borang Soal Selidik
Kajian Pengambilan Garam Kakitangan
Kementerian Kesihatan Malaysia 2015
(MySalt 2015)

ID Peserta ☐☐ - ☐☐☐

Modul A - Maklumat Peribadi

A01 Tarikh ☐☐ ☐☐ 20 ☐☐
Hari Bulan Tahun

A02 Nama ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

A03 Nombor Kad Pengenalan ☐☐☐☐☐☐ - ☐☐ - ☐☐☐☐

A04 Jantina ☐ Lelaki ☐ Perempuan

A05 Bangsa ☐ Melayu ☐ Cina ☐ India ☐ Bumiputera Sabah ☐ Bumiputera Sarawak
☐ Lain-lain bumiputera ☐ Lain-lain

A06 Taraf Perkahwinan ☐ Tidak Pernah Berkahwin ☐ Berkahwin ☐ Berpisah
☐ Janda / Duda ☐ Balu

A07 Taraf Pendidikan Tinggi
☐ Tamat Darjah 6 ☐ Sarjana Muda (Ijazah)
☐ Tamat Tingkatan 3 ☐ Sarjana (Master)
☐ Tamat Tingkatan 5 ☐ Kedoktoran (PhD)
☐ Tamat Tingkatan 6 / Diploma / Sijil ☐ Lain-lain ____________

A08 Pendapatan Bulanan Individu (termasuk elaun) RM ☐☐☐☐☐ . ☐☐

Modul B - Sejarah Kesihatan

B01 Adakah anda sedang menjalani terapi untuk penyakit berikut:
☐ Penyakit Hati ☐ Penyakit Ginjal ☐ Penyakit Jantung ☐ Diabetis
☐ Terapi Diuretik ☐ Darah Tinggi ☐ Strok

B02 Adakah anda mengamalkan pemakanan khas seperti diet diabetis / rendah garam / rendah kalori
☐ Ya ☐ Tidak

B03 Adakah anda mengandung (untuk wanita)?
☐ Ya ☐ Tidak

Modul C - Pengetahuan , Tingkah Laku Dan Amalan Pengambilan Garam

C01 Adakah anda menambah garam dalam makanan yang dihidang di atas meja?
☐ Tidak Pernah ☐ Jarang-jarang ☐ Kadang-kadang ☐ Selalu ☐ Sentiasa

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C02 Dalam makanan yang anda makan di rumah, adakah garam ditambah semasa memasak?
☐ Tidak Pernah ☐ Jarang-jarang ☐ Kadang-kadang ☐ Selalu ☐ Sentiasa

C03 Berapa banyak garam yang anda rasa anda telah makan?
☐ Terlalu banyak ☐ Banyak ☐ Dalam jumlah yang berpatutan
☐ Sedikit ☐ Terlalu sedikit ☐ Tidak tahu

C04 Adakah anda terfikir bahawa pemakanan yang tinggi garam boleh menyebabkan masalah kesihatan yang serius?
☐ Ya ☐ Tidak → Terus ke C06 ☐ Tidak Tahu → Terus ke C06

C05 Jika anda jawab **Ya** pada soalan 4 di atas, apakah masalah kesihatan tersebut?
☐ Tekanan darah tinggi ☐ Osteoporosis ☐ Kanser perut ☐ Batu karang
☐ Tiada jawapan di atas ☐ Semua di atas ☐ Tidak tahu

C06 Bagaimana pentingnya bagi anda untuk mengurangkan garam dalam pemakanan anda?
☐ Tidak penting sama sekali ☐ Agak penting ☐ Sangat penting

C07 Adakah anda melakukan apa-apa tindakan secara ***rutin*** untuk mengawal pengambilan garam anda?
☐ Ya ☐ Tidak → selesai menjawab ☐ Tidak tahu → selesai menjawab

C08 Jika anda jawab **Ya** pada soalan 7, apakah yang anda lakukan?
☐ Elakkan/ kurangkan pengambilan makanan yang diproses
☐ Membaca kandungan garam pada label makanan
☐ Tidak menambah garam dalam makanan yang dihidangkan
☐ Membeli alternatif makanan yang rendah garam
☐ Tidak menambah garam semasa memasak
☐ Menggunakan rempah ratus selain garam semasa memasak

Modul D - Maklumat Antropometri & Tekanan Darah

		Bacaan Pertama	Bacaan Kedua
D01 Berat badan		☐☐☐ . ☐ kg	☐☐☐ . ☐ kg
D02 Tinggi		☐☐☐ . ☐ cm	☐☐☐ . ☐ cm
D03 Ukur lilit pinggang		☐☐☐ . ☐ cm	☐☐☐ . ☐ cm
D04 Tekanan darah	Sistolik	☐☐☐ mmHg	☐☐☐ mmHg
	Diastolik	☐☐☐ mmHg	☐☐☐ mmHg

MODUL E - SOAL SELIDIK KEKERAPAN PENGAMBILAN MAKANAN

Nama Responden : _____ **ID :** ☐☐-☐☐☐

BIL.	A. JENIS MAKANAN	B. BERAPA KALI KEKERAPAN PENGAMBILAN DALAM (ISIKAN DALAM SALAH SATU KOLUM SAHAJA			C. KUANTITI SEBENAR DIAMBIL SETIAP KALI MAKAN	D. SAIZ HIDANGAN STANDARD
		Sehari	Seminggu	Sebulan		
1	**Daging, Ayam & Produknya**					
E1001	Ayam Bakar					1 ketul sederhana
E1002	Ayam Goreng berempah					1 ketul sederhana
E1003	Ayam Gulai					1 ketul sederhana
E1004	Ayam Kari					1 ketul sederhana
E1005	Ayam Kicap					1 ketul sederhana
E1006	Ayam Masak Merah					1 ketul sederhana
E1007	Ayam Panggang					1 ketul sederhana
E1008	Ayam Rendang					1 ketul sederhana
E1009	Ayam Sup					1 ketul sederhana
E1010	Daging Kambing Kari					1 mangkuk sup
E1011	Daging Lembu Kicap					1 mangkuk sup
E1012	Daging Lembu Sup					1 mangkuk sup
E1013	Daging Lembu Masak Gulai					1 mangkuk sup
E1014	Daging Lembu Masak Rendang					1 mangkuk sup
E1015	Organ Dalaman Goreng					1 ketul
E1016	Sate Ayam					4 cucuk
E1017	Sate Daging					4 cucuk
E1018	Sup Daging					1 mangkuk sup
E1019	Tom Yam Campur					1 mangkuk sup
2	**Ikan, Hasil Laut & Produknya**					
E2001	Bebola atau Kek ikan/ udang/ sotong/ ketam					2 biji (3 cm)
E2002	Ikan Masak Sambal					1 ekor sederhana
E2003	Ikan Bilis Goreng					1 ekor sederhana
E2004	Ikan Bilis Masak Sambal					1 ekor sederhana
E2005	Ikan Kicap					1 ekor sederhana
E2006	Ikan Masam Manis					1 sudu makan
E2007	Ikan Masin					1 ekor sederhana
E2008	Ikan Panggang/Bakar					1 ekor sederhana
E2009	Ikan Sup					1 ekor sederhana
E2010	Sotong/Udang Goreng					1 senduk
E2011	Sotong/Udang Masak Sambal					2 senduk
3	**Telur**					
E3001	Telur Dadar					1 potong
E3002	Telur Masak Lemak					1 biji
E3003	Telur Masak Sambal					1 biji
E3004	Telur Masin					1 biji

BIL.	A. JENIS MAKANAN	B. BERAPA KALI KEKERAPAN PENGAMBILAN DALAM (ISIKAN DALAM SALAH SATU KOLUM SAHAJA			C. KUANTITI SEBENAR DIAMBIL SETIAP KALI MAKAN	D. SAIZ HIDANGAN STANDARD
		Sehari	Seminggu	Sebulan		
4	**Produk Sapuan**					
E4001	Keju					1 keping
E4002	Majerin / Mentega					1 sudu teh
E4003	Mentega Kacang					1 sudu teh
5	**Kuih-Muih**					
E5001	Murtabak (daging/ayam)					1 keping
E5002	Cucur Udang					1 piring
E5003	Sandwich Sardin					1 keping
E5004	Pulut Panggang					1 ketul
6	**Snek**					
E6001	Jeruk buah-buahan					5 keping
E6002	Keropok keping (ikan/udang)					5 keping (33g)
E6003	Keropok Kentang/ Bawang					1 paket / piring
E6004	Potato chip					15 keping (20g)
7	**Perencah / Perasa / Sos**					
E7001	Kicap Cair					1 sudu makan (15ml)
E7002	Kicap Pekat					1 sudu makan (15ml)
E7003	Sos (Tomato / Cili)					1 sudu makan
8	**Makanan Segera**					
E8001	Ayam Goreng Original (Drumstick/Thigh/ Ribs/ Breasts/ Wings)					1 regular
E8002	Ayam Goreng Spicy (Drumstick/Thigh/ Ribs/ Breasts/ Wings)					1 regular
E8003	Bebola Ikan/ Sotong/Daging					15 biji
E8004	Burger Ayam/ Daging/ Ikan/ Benjo					1 biji
E8005	Chicken meatball soup					1 mangkuk 160 g
E8006	Chicken Wing - Deli / Sweet & Spicy					2 ketul
E8007	Coleslow					1 mangkuk kecil
E8008	Colonel Chicken Rice					1 pinggan 170 g
E8009	Colonel/ Fillet/ Zinger/ McChicken/ Double Cheese Burger					1 regular
E8010	Kentang Goreng (French fries)					1 hidangan regular
E8011	Hotdog					1 ketul
E8012	Kentang Putar					1 cawan kecil
E8013	Nugget Ayam					1 hidangan regular (6 ketul)
E8014	Pasta 1					1 pinggan (500g)

BIL.	A JENIS MAKANAN	B. BERAPA KALI KEKERAPAN PENGAMBILAN DALAM (ISIKAN DALAM SALAH SATU KOLUM SAHAJA			C. KUANTITI SEBENAR DIAMBIL SETIAP KALI MAKAN	D. SAIZ HIDANGAN STANDARD
		Sehari	Seminggu	Sebulan		
F8015	Pizza 2					1 potong
E8016	Wedges berkeju (Cheezy wedges)					1 regular (130 g)
9	Hidangan Bermasak (Dijirin)					
E9001	Kueh Teow Goreng					1 pinggan
E9002	Laksa Penang					1 mangkuk
E9003	Laksam					1 mangkuk
E9004	Mee Goreng					1 mangkuk
E9005	Mee Jawa					1 mangkuk
E9006	Mee Kari					1 mangkuk
E9007	Mee Segera					1 mangkuk
E9008	Mee Segera Goreng					1 mangkuk
E9009	Mee Sup					1 mangkuk
E9010	Meehoon Goreng					1 mangkuk
E9011	Meehoon Sup					1 mangkuk
E9012	Nasi Ayam					1 pinggan
E9013	Nasi Briyani					1 pinggan
E9014	Nasi Dagang					1 pinggan
E9015	Nasi Goreng					1 pinggan
E9016	Nasi Kerabu					1 pinggan
E9017	Nasi Kukus					1 pinggan
E9018	Nasi Minyak					1 pinggan
E9019	Roti Canai					1 keping
10	Hidangan Bermasak (Lain lain)					
E10001	Acar sayur					
E10002	Kerabu Mangga					1 cawan
E10003	Kuah Kacang					1 cawan
E10004	Sayur Goreng					1/2 cawan (80g)
E10005	Sayur Kailan Ikan Masin					1/2 cawan
E10006	Sayur Goreng Kisap/sos tiram					1/2 cawan
E10007	Sayur Masak Lemak					1/2 cawan
11	Makanan Dalam Tin					1/2 cawan
E11001	Kacang Panggang					1 cawan
E11002	Sardin					1 ketul
E11003	Sup Berkrim (Cendawan/ayam)					1 tin
E11004	Tuna					2 sudu makan

1. Nyatakan jenis pasta seperti Chicken atau Beef Meatball Bolognese, Creamy Carbonara, Prawn OlioSpicy atau Seafood Lasagna.
2. Nyatakan jenis pizza seperti Super Supreme, Thai Seafood, Chicken Supreme, Hawaiaan Chicken, Royal Massala, Pepperoni Delight atau Vege Lover.

Appendix IV:

Diari Pengambilan Makanan

Appendix V :

Borang permohonan Ujian Makmal (Mysalt 2015)

BORANG PERMOHONAN UJIAN MAKMAL (MYSALT 2015-IKU)

No	Nama peserta	No kad pengenalan	ID Responden	Bangsa	Jantina L	Jantina P	Spesimen *24H Urine* Tarikh	Spesimen *24H Urine* Masa mula kumpul	Spesimen *24H Urine* Masa tamat kumpul	Spesimen *Spot Urine* Tarikh	Spesimen *Spot Urine* Masa kumpul	*24H Urine* Sodium & Creatinine	*Spot Urine* Sodium & Creatinine

Disahkan oleh (ketua kumpulan) : _____ : _____

Tarikh

Pegesahan makmal : _____ : _____

Tarikh

Appendix VI :

List of Liaison officers

No	Name	State
1	En Khairuinizam Baharum	Perlis
2	Pn Suriana Johari	Kedah
3	Pn Zuhaida Harun	Pulau Pinang
4	Pn Zuraini Abdullah	Perak
5	Pn Jamilah Ahmad	Melaka
6	Pn Fatimah Sulong	Negeri Sembilan
7	En Ja'afar Mohamed	Selangor
8	En Yahya Ahmad	Johor
9	Pn Zahariah Mohd Nordin	Pahang
10	Pn Puspawati Mohamed	Kelantan
11	Pn Ruhaya Salleh	Terengganu
12	En Tan Beng Chin	Sarawak
13	Cik Rafidah Yusof	Sabah
14	Pn Azah Ahmad	Wilayah Persekutuan, Kuala Lumpur
15	Dr Bariah binti Kadas	Wilayah Persekutuan, Kuala Lumpur
16	En Azhar Yusoff	Wilayah Persekutuan, Putrajaya
17	Pn. Siti Shuhailah Shaikh Abdul Rahim	Wilayah Persekutuan, Putrajaya
18	Pn Siti Farah Zaidah Mohd Yazid	Wilayah Persekutuan, Putrajaya
19	En. Mohammad Fuad b.Mohamad Annuar	Institut Kesihatan Umum and NIH