Health Literacy and the Role of Related Factors in Food Handlers: Based on a Cross-Sectional Study in Regional Malaysia

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ABSTRACT

Background and Objectives: Research on food handlers has predominantly focused on food safety, neglecting the importance of health literacy. Health literacy plays a pivotal role in equipping an individual with healthy lifestyle and work practices. This study aims to assess the health literacy level of food handlers and evaluate determinants influencing their health literacy.

Materials and Methods: A cross-sectional study was conducted in May-August 2023 involving 274 food handlers from 46 food outlets in Kota Marudu, Sabah, Malaysia chosen from cluster random sampling. A validated questionnaire, the Health Literacy Survey Short Form 12 (HLS-SF12) was employed to assess health literacy levels alongside sociodemographic, medical illness, healthy lifestyle practices, food handling training and recent typhoid vaccination status. The inclusion criteria are food handlers working at registered food premises, aged 18 and above. The exclusion criteria are those unable to read or comprehend English or Malay language. Frequency and percentages were used to describe the studied population while chi-square and logistic regression to determine factors associated with health literacy.

Results: The majority of participants were Malaysians, female, married and possessed a secondary level of education. Among participants, 67.9% possessed good health literacy while 32.1% had low health literacy. Multiple logistic regression analysis revealed that education and under the healthy lifestyle practices factors; the annual medical examinations were significantly associated with health literacy. Food handlers who did not undergo annual medical examinations (adjusted Odds Ratio: 2.429, 95% Confidence Intervals: 1.007-5.863, p-value=0.048) and with education level below secondary (adjusted Odds Ratio: 11.305, 95% Confidence Intervals: 5.735-22.287, p<0.001) were significantly associated with low health literacy.

Conclusion: Promoting routine medical check-ups and having sustainable health education tailored according to educational background will enhance health literacy among food handlers, effectively empowering to make well-informed choices, thereby improving adherence to food safety protocols and promoting positive health outcomes.

Paper Type: Research Article

Keywords: Food Handling, Health Literacy, Healthy Lifestyle, Health Promotion.

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Introduction

Non-communicable diseases (NCDs) account for 41 million deaths annually which makes up to 71% of all fatalities worldwide (1). Among the primary contributors to NCDs worldwide are unhealthy diets and unhealthy lifestyle choices which are the primary causes of obesity, high blood lipids, elevated blood glucose and raised blood pressure (1). These conditions significantly increase the risk of cardiovascular disease, one of the leading causes of premature death worldwide (1). One in every eight people are living with obesity worldwide (2). In Malaysia, one in two adults is overweight or obese, leading to heart disease, diabetes and hypertension which collectively drive over 80% of premature deaths from NCDs (3).

Urbanization and an increase in working women have driven demand for food outlet services, shifting food practices from home cooking to eating out (4). In Malaysia, this shift has made the food service sector in Malaysia very appealing (5). However, more harmful eating habits had resulted from this, with the odds of being obese higher among people who ate out more than for those who ate out less frequently (Odds Ratio: 3.53; 95% Confidence Intervals: 1.69-7.37) (6). Eating away from home is often associated with consumption of foods that are high in energy, fat, sugar, salt but less in fruits, vegetables and micronutrients (4, 7). Due to greater caloric and fat intakes as well as their lack of micronutrients, meals bought outside have been determined to be a risk factor for malnutrition and cardiovascular illnesses (8). A recent study in Malaysia that analysed 94 street food types found highest content of sugar, sucrose, fructose, glucose, and maltose in deserts prepared by food handlers compared to snacks and main meals (9). Another study found that more than two thirds of respondents ate out and this habit related to poor diet quality such as high calories and high salt intake (5).

Food handlers play a crucial role in ensuring food safety and quality, impacting public health significantly. They are involved in food preparation, storage, and service which directly impacts food safety and quality (10, 11). Health literacy is essential for food handlers to acquire, understand, evaluate and apply health information to make informed decisions that support healthcare utilization, disease prevention and health promotion (12). Studies have shown a link between health literacy and various health conditions, emphasizing the need for food handlers to adopt healthy practices to prevent foodborne illnesses and maintain food safety standards (13-16). The health of food handlers can influence not only their well-being but also the quality and safety of food prepared for public consumption.

Socioeconomic and lifestyle factors exert a profound influence on health literacy and health outcomes among food handlers. Studies indicate that food handlers from lower socioeconomic backgrounds experience higher rates of communicable conditions such as tuberculosis, anaemia and skin infections, while those from higher socioeconomic backgrounds are more likely to suffer from NCDs such as hypertension and diabetes (15). Furthermore, substance use is prevalent among food handlers, with 54.7% engaged in smoking or alcohol consumption, and a significant percentage also using drugs (11, 17). These unhealthy lifestyle practices

may increase the risk of food contamination, as behaviours like smoking can facilitate the transfer of pathogens during food handling (17). Such conditions indicate the need for improved health literacy among food handlers to reduce occupational health risks and enhance food safety.

Given the health risks associated with low health literacy and unhealthy lifestyle practices among food handlers, this study aims to assess the health literacy level of food handlers and identify factors associated with their health literacy. With limited studies available on this topic, particularly in Malaysia where low health literacy is highest in Sabah state, 43.2% (3), this study seeks to fill this knowledge gap. By exploring health literacy among food handlers, this research intends to inform interventions that improve food safety practices and promote healthier lifestyles among this critical workforce, thereby benefiting both the public and healthcare personnel.

Materials and Methods

Study Design, Setting, and Population

A cross-sectional study was conducted from May 2023 to August 2023 at food premises in Kota Marudu, Sabah, Malaysia. The inclusion criteria for the study were food handlers aged 18 and above, any citizen and working at food premises registered under the Food Safety Information Malaysia (FOSIM). The exclusion criteria are those unable to read or comprehend English or Malay language. Brief discussions about the study were done with potential participants. Once participants met all the criteria, including informed consent and willingness to participate, they are formally included in the sample. If agreeable to participate, a participant information sheet was given and written informed consent was obtained for each participant. Then, a maximum duration of 15 minutes was allocated to answer the HLS-SF-12 questionnaire. Participants will exit the study upon completing the self-reported questionnaire, or earlier if they choose to withdraw or if they experience circumstances such as work-related obligations or health issues that prevent them from completing the questionnaire.

Kota Marudu, a regional area is situated approximately 130 km from Kota Kinabalu city and is one of the districts in Sabah with the highest incidence of absolute poverty in Malaysia (18). Lower health literacies are often found in the lower-income group (12). Additionally, the number of food premises in the district has been growing over the years due to migration and increased buying power among the people (19).

Sample Size Calculation and Sampling Method

The sample size was calculated using Epi Info software version 7.2.5.0. The expected population size was approximately 700 food handlers working at food premises in Kota Marudu listed under FOSIM. The expected frequency was 43.2%, considering the prevalence of low health literacy in Sabah (3), with a confidence level of 95% and a margin of error of 5%. Setting the design effect at 1, the minimum sample size calculated was 245 food handlers. Including a 10% non-response rate, the final sample size calculated was 270 people. Another comparison for sample size was made using significant odds ratios for age, income, and education, resulting in a highest calculated sample size including non-response rate is 254 (20,21). Therefore, the

sample size of 270 was used, based on prevalence.

Cluster random sampling method was applied as the sampling method for the study. A total of 222 existing food outlets in district were assigned numbers based on the numbering list in the FOSIM website (https://fosim.moh.gov.my/fssm/public/home). Then, 50 food outlets were selected based on randomly generated numbers from www.random.org. All food handlers from each selected food outlet were approached to participate in the survey.

Instrument

A self-administered questionnaire was used as the data collection instrument. The questionnaire had three sections: A, B, and C. Section A included an informed consent form and a brief introduction to the study. Section B covered sociodemographic factors (age, gender, marital status, citizenship, ethnicity, education, employment type, monthly income), medical illness, healthy lifestyle practices, food handling training, and recent typhoid vaccination status.

Some of the examples of questions asked in Section B as follows:

i) What is your highest formal education level?

ii) Have you attended food handling training?

iii) Do you undergo annual medical check-ups?

iv) Have you had typhoid vaccination in the last 3 years?

Section C featured the Health Literacy Survey Short Form 12 (HLS-SF-12) to assess health literacy. This tool was developed based on the longer HLS-EU-Q47 questionnaire. The original HLS-SF-12 and Malay version were developed and validated in six Asian countries (22) including Malaysia, showing high reliability (Cronbach's alpha of 0.85), good criterion validity, adequate item-scale convergent validity and a good model data fit across all populations studied (22). Many research in Malaysia as well as international studies were carried out using this tool (20, 23-26). Permission was been obtained from the author of the instrument to be used in this study.

The HLS-SF-12 has 12 questions with each domain consists of 4 questions and the questionnaire responses are based on a four-point Likert scale, with point 1 denoting very difficult, point 2 denoting reasonably difficult, point 3 denoting reasonably easy, and point 4 denoting very easy. The mean health literacy score for each participant was calculated from the total score of all three primary domains: healthcare, disease prevention and health promotion. The health literacy index was calculated using the formula: Index = (Mean − 1) x (50/3) (22). Index is the specific index calculated, mean as the average score of health literacy of each participant, 1 is the minimal possible value of the mean (leading to a minimum value of the index of 0), 3 is the range of the mean, and 50 is the selected maximum value of the new metric (22). As a result, an index value is obtained with 0 denoting the lowest health literacy and 50 denoting the highest health literacy (27). The health literacy was then categorized into two categories, with index score <34 as "Low Health Literacy" and index score ≥34 as "Good Health Literacy" (23).

In Section C, each question in the HLS-SF-12 starts with: On a scale from very easy to very difficult, how easy would you say it is to…

i) Find information on treatments of illnesses that concerns you?

ii).Judge which everyday behaviour (such as drinking and eating habits, exercise etc.) related to your health?

iii) Understand why you need health screenings (such as breast examination, blood sugar test, blood pressure)?

iv) Understand information in the media (such as internet, newspaper, magazines) on how to get healthier?

Statistical Analysis

Data were analysed using SPSS software version 26.0. Descriptive statistics, such as frequency and percentage used to describe the study population. The normality of continuous variables were tested by the Q-Q plot, histogram and box plot. Chi-Square or Fisher's Exact Test used to examine associations between categorical variables and health literacy levels while Independent T-test for continuous parametric variables. In order to draw meaningful results, each variable like citizenship, ethnicity, marital status and education were categorized into two groups.

In simple logistic regression analysis, independent variables that have p-value <0.25 were included in multiple logistic regression model. Multiple logistic regression analysis using forward likelihood ratio (LR) method was employed to determine factors associated with health literacy, with results presented as adjusted odds ratios (aOR) with 95% confidence intervals (CI). A p-value < 0.05 was considered statistically significant. Model fit were assessed by Hosmer-Lemeshow test, classification table and ROC curve analysis.

Results

A total of 280 food handlers from 46 food outlets who fulfilled the inclusion and exclusion criteria were approached and 274 people consented to participate in the study giving a response rate of 98%. All participants who consented completed the survey. During analysis, there were no missing data but 2 duplicate data were identified and removed. The age was normally distributed hence presented as mean with standard deviation. The scores for each domain like healthcare, disease prevention and health promotion are not normally distributed, thus presented as median with interquartile range in Table 1. The participant's age ranged from 18 to 72 years old with the mean age of 35 years. Majority of food handlers were Malaysians, 89.4% female, 59.5% and the natives (Bumiputera Sabah) (Table 2). Overall, the participants were found to be practising a healthy lifestyle and majority did not have medical illness.

Majority of the participants shown to have good health literacy level, 67.9% whereas the remaining 32.1% shown to have low health literacy levels (Figure 1). When comparing the three domains of health literacy, the median scores were same across healthcare, disease prevention and health promotion (Table 1). A median score of 13 indicates that the central tendency of health literacy for healthcare, disease prevention, and health promotion is towards the higher end of the scale. Those with low health literacy have a higher average age (38.95 years) compared to those with good health literacy (33.10 years). Higher percentage of Malaysians (93.5%) have good health literacy whereas 19.3% of non-Malaysians fall into the low health literacy

category (Table 3). Among the natives (Bumiputera Sabah) population, 91.9% exhibit good health literacy. The non-natives (non-Bumiputera Sabah) group showed an inverse trend, with a higher percentage in the low health literacy.

Table 1. Median score of health literacy domains

Domain of Health Literacy (HLS-SF-12)	Median score, Interquartile Range (IQR)
Health care	13 (11.5 - 14.5)
Health promotion	13 (11.5 - 14.5)
Disease prevention	13 (11.5 - 14.5)

Table 2: The Characteristics of the Study Participants (N=274)

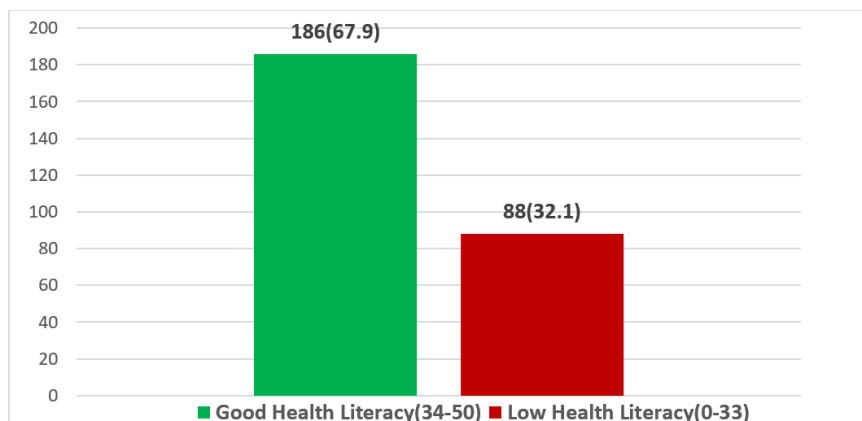| Variable	Characteristics	N	%
Age	Mean ± SD	35±12	-
Gender	Male	111	40.5
	Female	163	59.5
Marital status	Single	103	37.6
	Married	158	57.7
	Divorced/Widow	13	4.7
Citizenship	Malaysia	245	89.4
	India	15	5.5
	Indonesia	8	2.9
	Philippines	6	2.2
Ethnicity/Race	Bumiputera Sabah	240	87.6
	Chinese	2	0.7
	Filipino	6	2.2
	Indian	17	6.2
	Indonesian	8	2.9
	Malay	1	0.4
Education level	Primary	47	17.2
	Secondary	212	77.4
	Tertiary	3	1.1
	No education	12	4.4
Employment type	Employer	25	9.1
	Employee	249	90.9
Monthly income	≤RM2,000	253	92.3
	> RM2000	21	7.7
Annual medical checkup	Yes	245	89.4
	No	29	10.6
Smoking status	Yes	36	13.1
	No	238	86.9
Alcohol intake	Yes	7	2.6
	No	267	97.4
Exercise	≥3 times per week	1	0.4
	<3 times per week	273	99.6
Medical illness	Yes	23	8.4
	No	251	91.6
Food handling training	Yes	224	81.8
	No	50	18.2
Typhoid vaccination	Yes	243	88.7
	No	31	11.3

Fig. 1. Frequency (%) Distribution of Participants by Good Health Literacy and Low Health Literacy (n=274)

Table 3. Characteristics of the Study Participants Grouped by Health Literacy

Variable	Characteristics	Health literacy level (N=274)		p value*
		Low a (N=88)	Goodb (N=186)	
Age	Mean ± SD	38.95±14.383	33.10±10.212	0.001c
Citizenship	Malaysian	71(80.7%)	174(93.5%)	0.001d
	Non-Malaysian	17 (19.3%)	12(6.5%)	
Gender	Male	38(43.2%)	73(39.2%)	0.536d
	Female	50(56.8%)	113(60.8%)	
Marital status	Married	51(58.0%)	107(57.5%)	0.947d
	Single/Divorced/Widow	37(42.0%)	79(42.5%)	
Ethnicity/Race	Bumiputera Sabah	69(78.4%)	171(91.9%)	0.002d
	Non-Bumiputera Sabah	19(21.6%)	15(8.1%)	
Education level	>Primary education	44(50.0%)	171(91.9%)	<0.001d
	≤Primary education	44(50.0%)	15(8.1%)	
Employment type	Employer	8(9.1%)	17(9.1%)	0.990d
	Employee	80(90.9%)	169(90.9%)	
Monthly income	≤RM2,000	81(92.0%)	172(92.5%)	0.901d
	>RM2000	7(8.0%)	14(7.5%)	
Annual medical checkup	Yes	73(83.0%)	172(92.5%)	0.017d
	No	15(17.0%)	14(7.5%)	
Smoking status	Yes	11(12.5%)	25(13.4%)	0.830d
	No	77(87.5%)	161(86.6%)	
Alcohol intake	Yes	3(3.4%)	4(2.2%)	0.684e
	No	85(96.6%)	182(97.8%)	
Exercise	<3 times per week	88(100.0%)	185(99.5%)	1.000e
	≥3 times per week	0(0.0%)	1(0.5%)	
Medical illness	Yes	11(12.5%)	12(6.5%)	0.092d
	No	77(87.5%)	174(93.5%)	
Food handling training	Yes	66(75.0%)	158(84.9%)	0.047d
	No	22(25.0%)	28(15.1%)	
Typhoid vaccination	Yes	75(85.2%)	168(90.3%)	0.214d
	No	13(14.8%)	18(9.7%)	

a Low health literacy, b Good health literacy ,c Independent t-test,d Chi square test,e Fisher's Exact Test

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Six independent variables which are age, citizenship, ethnicity, education level, annual medical check-up and food handling training were significant in univariable analysis and included in the final model (Table 4). In multiple logistic regression (Table 5), annual medical check-up and education level were significantly associated with low health literacy after adjusting for age, ethnicity, citizenship and food handling training. Study participants who do not undergo annual medical check-ups were 2.4 times likely to have low health literacy compared to those who did annual medical check-up (95% CI: 1.01-5.86, p-value=0.048). Meanwhile, food handlers who received education lesser than secondary level (i.e., primary education or no formal education) had 11.3 times the odds to have low health literacy compared to those who are educated at secondary or tertiary level (95% CI: 5.74-22.29, p<0.001).

Table 4. Factors Associated with Low Health Literacy (HLS-SF score < 34) using Simple Logistic Regression Analysis

Variable	Characteristics	Crude OR (95% CI)	p value
Age		1.042 (1.019-1.065)	<0.001
Citizenship	Non-Malaysian	3.472 (1.577-7.641)	0.002
	Malaysian	1.00	
Gender	Female	1.176 (0.703-1.968)	0.536
	Male	1.00	
Marital status	Married	0.983 (0.588-1.642)	0.947
	Single/Divorced/Widow	1.00	
Ethnicity/Race	Non-Bumiputera Sabah	3.139 (1.509-6.530)	0.002
	Bumiputera Sabah	1.00	
Education level	≤Primary education	11.400 (5.815-22.349)	<0.001
	>Primary education	1.00	
Employment type	Employee	1.006 (0.417-2.429)	0.990
	Employer	1.00	
Monthly income	≤RM2,000	0.942 (0.366-2.423)	0.901
	> RM2000	1.00	
Annual medical checkup	No	2.524 (1.159-5.497)	0.020
	Yes	1.00	
Smoking status	Smoker	0.920 (0.431-1.966)	0.830
	Ex-smoker/Non-smoker	1.00	
Alcohol intake	Yes	1.606 (0.352-7.335)	0.541
	No	1.00	
Exercise	≥3 times per week	0.000	1.000
	<3 times per week	1.00	
Medical illness	Yes	2.071 (0.876-4.900)	0.097
	No	1.00	
Food handling training	No	1.881 (1.004-3.524)	0.049
	Yes	1.00	
Typhoid vaccination	No	1.618 (0.754-3.472)	0.217
	Yes	1.00	

Table 5. Factors Associated with Low Health Literacy (HLS-SF score <34) using Multiple Logistic Regression Analysis

Variable	Characteristics	Crude OR (95% CI) a	Adjusted OR (95% CI) b	p-valueb
Annual medical checkup	No	2.524 (1.159-5.497)	2.429(1.007-5.863)	0.048*
	Yes	1.00	1.00	
Education level	≤Primary education	11.400 (5.815-22.349)	11.305(5.735-22.287)	<0.001*
	>Primary education	1.00	1.00	

a Simple logistic regression, b Multiple logistic regression using Forward LR method, *Significant at p <0.05

There were no multicollinearity problems identified. The Hosmer-Lemeshow test had p-value = 0.542 (no difference in predicted value from observed values), classification table (overall model able to correctly classify 78.5% cases) and area under the ROC curve (model able to discriminate 72.6% of cases) which were all significant in indicating that the model fits well.

Discussion

The findings on proportion of good health literacy among the study population was higher compared to previous studies done across diverse populations. For instance, two local studies revealed considerably higher percentages of low health literacy among diabetes patients, 65.3% and asthmatic, 60.5% attending basic healthcare settings (28, 29). A community survey among obese and overweight women in low-cost apartments indicated an even higher prevalence of low health literacy, 87.5% (30). The prevalence of low health literacy is similar to that seen in several other nations such as Sri Lanka (32.5%) and Ireland (40%) (31, 49). Usually, geographical disparities of health literacy are observed, with rural inhabitants generally demonstrating lower health literacy compared to their urban counterparts (3,32). Limited access to health-related information and healthcare services in rural regions is probably a contributing factor to low health literacy. However, this was not the case in Kota Marudu where outreach health initiatives were intensified by the District Health Office especially in response to the challenges posed by the COVID-19 pandemic and this may have led to improved health literacy levels. In fact, face-to-face interactions were a success when health education and promotion activities were provided especially to rural people. A qualitative study in Sabah reported that rural communities prefer face-to-face interaction for acquiring health information since it permits direct involvement with health officials where individuals may raise questions and seek explanation (33).

This study showed that food handlers who received primary education or no formal education were significantly associated with low health literacy. This finding is congruent with other studies from Malaysia, Europe and Asia which consistently showed that greater education level improves individual's capacity to comprehend and use health information (20, 23, 28, 34-37). A study from Ghana found that there is a positive correlation between higher education and increased levels of health literacy in individuals who have completed senior high school and tertiary education (36). The reason why majority of the respondents in this study are educated at secondary level and above is probably due to better access to public schools in Kota Marudu district and increased awareness on

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the importance of education. Individuals with more education are less likely to need help with official documentation or comprehending instructions from healthcare experts (36). Therefore, it is important for healthcare workers to do health promotions tailored to the education level. Policies to uplift the education level especially among the disadvantaged groups must be enacted. Integrating health literacy education into school curriculum, improving the access and condition of educational institutions, providing educational assistance and good internet connectivity are some of the means to achieve this goal.

The fact that the scores for healthcare, disease prevention and health promotion are identical indicate that the participants possess similar levels of understanding and competence in these domains which could be a result of education that have levelled out health literacy across the domains. Interventions should be designed to cater uniformly across these three domains. For example, a session on healthcare could cover topics such as choosing healthcare providers and communicating with doctors. Disease prevention and health promotion workshops could focus on lifestyle changes and preventive behaviours. Also, develop content that reflects the cultural practices, dietary habits and language of the target audience, as culturally relevant materials tend to be more engaging and effective in communicating health messages.

Infusing health literacy skills in worker's training may improve their health literacy levels (38). Therefore, the current food handling training contents should be improvised by adding the health literacy

elements with an emphasis on healthy cooking practices as well. The significance of regular medical screening in our study corroborates with previous international studies in Nigeria and Japan that have shown that those who have yearly medical check-ups tend to have good health literacy (39, 40). Regular medical check-ups for food handlers are essential to ensure food safety and avoid the spread of illnesses to customers. Often, food handlers do not get medical check-ups due to cost issues and lack of awareness (39). Regular exposure to healthcare services plays a role in the acquisition of health literacy abilities, such as competency in understanding medical jargon and evaluating health-related information in a perceptive manner (41). Workers with low health literacy levels often do not undergo regular medical examinations due to various factors, including their living conditions, job demands, and the availability of primary care doctors. A significant proportion of food handlers with low health literacy in this study did not undertake annual medical examinations, likely due to the demanding nature of their jobs. These workers frequently operate in environments characterized by low-income, long working hours and physical labour, where medical check-ups are not prioritised. Additionally, limited awareness of available healthcare services, such as free or subsidized health screenings, may also contribute to this issue. The Industrial Safety and Health Act in Japan has made mandatory for all companies in Japan to conduct an annual health check-up for their employees and the health check-up or cancer screening rate was 81.6% among the employees, which is considerably higher compared to non-

workers (62.9%; p-value < 0.001) (40). Hence, through incentivizing efforts from government and employers, implementing annual medical check-ups may significantly contribute to the encouragement of employees to use the preventive healthcare services. A one stop centre for training and general medical check-up for food handlers might be a way forward to achieve this.

The majority of the study's respondents were female and this finding aligns with prior international studies that point out the higher prevalence of female working in food-handling professions and their tendency to consistently uphold the standards of personal and food hygiene (39, 42). The average age of the food handlers in this study was 35 years old, suggesting a slightly older cohort compared to a study in Sarawak, Malaysia, 30.9 years (43). This is probably attributed to differences in sampling methods or evolving demographic patterns over time. The close proximity of Sabah to Philippines and Indonesia could potentially be a factor in attracting migrant workers into the food industry as we have Indonesian and Philippine citizens in this study. The diversified ethnics in Sabah especially among the natives (Bumiputera Sabah) that hold higher proportion of respondents with the inclusions of ethnics like Chinese, Indian, Malay, Indonesian and Filipinos reflects the uniqueness of the sample population compared to other studies (23,44). In this study, most respondents had received at least secondary school education are supported by similar findings on food handlers from other local studies (45-47) and even study from developed country like Italy (48). However, the proportion of those educated secondary and above, 77.4% is noticeably greater compared to previous local health literacy studies where education levels were lower among the participants (28, 29).

Study Limitations and Strengths: Some of the limitations of the study is that since this is a cross-sectional study, only associations may be found and causality cannot be assumed. Using self-reported instruments in this study may introduce information bias due to potential over- or under-reporting by participants. The study did not include participants who are unable to read or comprehend either Malay or English which may affect the generalisability of the results. This study appears to be among the few that is exploring health literacy and its associated factors among food handlers. The outcomes of the current research are applicable to food handlers from rural communities, indigenous, multilingual and low-income communities in developing countries. Since the food handlers holds the responsibility in delivering safe and quality food to the public, identifying their health literacy levels and the associated factors will guide stakeholders to develop appropriate interventions to enhance their health literacy.

Conclusions

Promoting routine medical check-ups and tailored health education programs based on educational backgrounds are potential effective strategies that can improve the health literacy among food handlers. Improving their health literacy could potentially reduce the burden of the healthcare system and ultimately leading to improved public health outcomes.

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