ORIGINAL ARTICLE

LIMITED HEALTH LITERACY AND ITS ASSOCIATED FACTORS AMONG OVERWEIGHT AND OBESE HOUSEWIVES LIVING IN KLANG VALLEY LOW COST FLATS: FINDINGS FROM THE MY BODY IS FIT AND FABULOUS AT HOME (MYBFF@HOME) STUDY

Siti Nurbaya Shahrir[1], Khadijah Shamsuddin[1], Noor Safiza Mohamad Nor[2], Cheong Siew Man[2], Mohd. Azahadi Omar[2], Mohamad Hasnan Ahmad[2] and Rashidah Ambak[2]

[1]Department of Community Health, Universiti Kebangsaan Malaysia Medical Centre, Jalan Yaacob Latif, Bandar Tun Razak, 56000 Cheras, Kuala Lumpur, Malaysia
[2]Institute for Public Health, Ministry of Health Malaysia, Jalan Bangsar, 50590 Kuala Lumpur

Corresponding author:
Khadijah Shamsuddin
Email: khadijah@ppukm.ukm.edu.my, drnurbaya@moh.gov.my

ABSTRACT

Limited health literacy is highly associated with poor health status. The concept of health literacy in public health relates to the concern that people with lower health literacy were also less likely to engage in health promoting behaviours. This is an analysis on health literacy and its associated factors among housewives and also a sub analysis of the Malaysian My Body is Fit and Fabulous at Home (MyBFF@home) study involving 328 overweight and obese housewives living in low cost flats in Klang Valley, part of a weight loss programme recruited using convenient sampling. Health literacy was measured using the Malay version of Newest Vital Sign (NVS) test with scores ranging from 0 to 6. Total score of ≤2 indicate limited health literacy and total scores of >2indicate adequate health literacy. Descriptive analysis, chi-square test and multiple logistic regression were used to analyse the data.The mean(SD) NVS score was 1.07(1.19) with most (87.5%) housewives having limited health literacy. Factors that were significantly associated with limited health literacy were older age of 45 to 59 years old (p = 0.040), primary education and below (p = 0.001) and absence of internet connectivity (p = 0.001). In the final model, absence of internet connectivity (OR 2.61; 95%CI 1.31 to 5.22) was associated with limited health literacy. Majority of the housewives have limited health literacy and providing internet connectivity to housewives may increase their health literacy.

***Keywords**: housewives, health literacy, low cost flats, Newest Vital Sign, obese*

INTRODUCTION

Health literacy is defined as the degree of which individuals have the capacity to obtain, process and understand basic health information and services needed to make appropriate health decisions[1]. Limited health literacy is highly associated with poor health status and remains a formidable barrier to improving health outcomes[2,3]. Health literacy is an outcome of health promotion and the concept of health literacy has also found its way into public healthwith an interest that people with lower health literacy are also less likely to engage in health promoting behaviours[4,5].

Poor general literacy is surprisingly common in developed countries ranging from 7% to 47% and are higher in developing countries[6].Although health literacy is linked to general literacy, due to the complexity of the health care system[7], limited health literacy can also be seen among those with adequate literacy[3]. Therefore, the prevalence of limited literacy is even higher when considered in a health context (Murray et al. 2008). World Health Organization (WHO) Commission on the Social Determinants of Health has identified literacy as having a central role in determining inequities in health[8], but public discourse on the relationship between literacy and health remains poor (Hayes et al. 2007).The Health Literacy Survey on costs of low health literacy to the health system conducted by the United States Department of Education National Assessment of Adult Literacy (NAAL) shows the enormous cost of low health literacy estimated at upper bound of USD238 billion, and trillions of dollars over the long-term[9].

The National Health and Morbidity Surveys (NHMS) 2015 studied health literacy using NVS among the Malaysian population and found that only 6.6% of the adult population had adequate level of health literacy (4to 6 total score).A cross-sectional study among 208 caregivers in Malaysia, where 70.7% of its participants were female, examined their health literacy using NVS and found that the mean(SD) NVS score was also very low at 0.54(0.099) with only 5.8% had adequate health literacy (NVS score 4 to 6)[12]. Both studies found no significant difference between gender[11,12].Otherwise, studies on health literacy among women in Malaysia are limited. This low health literacy levels may be one of the

contributing factors of the high prevalence of obesity in Malaysia with repeated NHMS indicated a steady rise in the prevalence of obesity in Malaysian adults, from 4.4% in 1996 to 15.1% in 2011 to 17.7% in 2015[10,11]. According to the findings of NHMS in 2011, women have a higher mean body mass index (BMI) of 25.2 kg/m^2 compared to 24.8 kg/m^2 for men[10]. In addition, the latest national study found that Malaysian women also have a higher prevalence of obesity (20.6%) compared to men (15.0%)[11]. Obesity prevalence is also higher among home makers (23.7%), as compared to other occupations[11].

Although health literacy can be measured by Rapid Estimate of Adult Literacy in Medicine (REALM), Test of Functional Health Literacy in Adults (TOFHLA) and Health Activity Literacy Scale (HALS), Newest Vital Sign (NVS) is preferred to be used for public health programmes as it can be administered quickly compared to the other screening tools[3].

Socio demographic factors that have been found to be associated with health literacy level are sex, age, race, education level, income and marital status[2,13,14]. These evidence support the Causal Pathway between Limited Health Literacy and Health Outcomes framework as illustrated in Figure 1[15].Self perception of health and presence of chronic condition were also found to be associated with health literacy levels[13] which makes BMI[15] and strong family history of NCD to have association with health literacy levels.

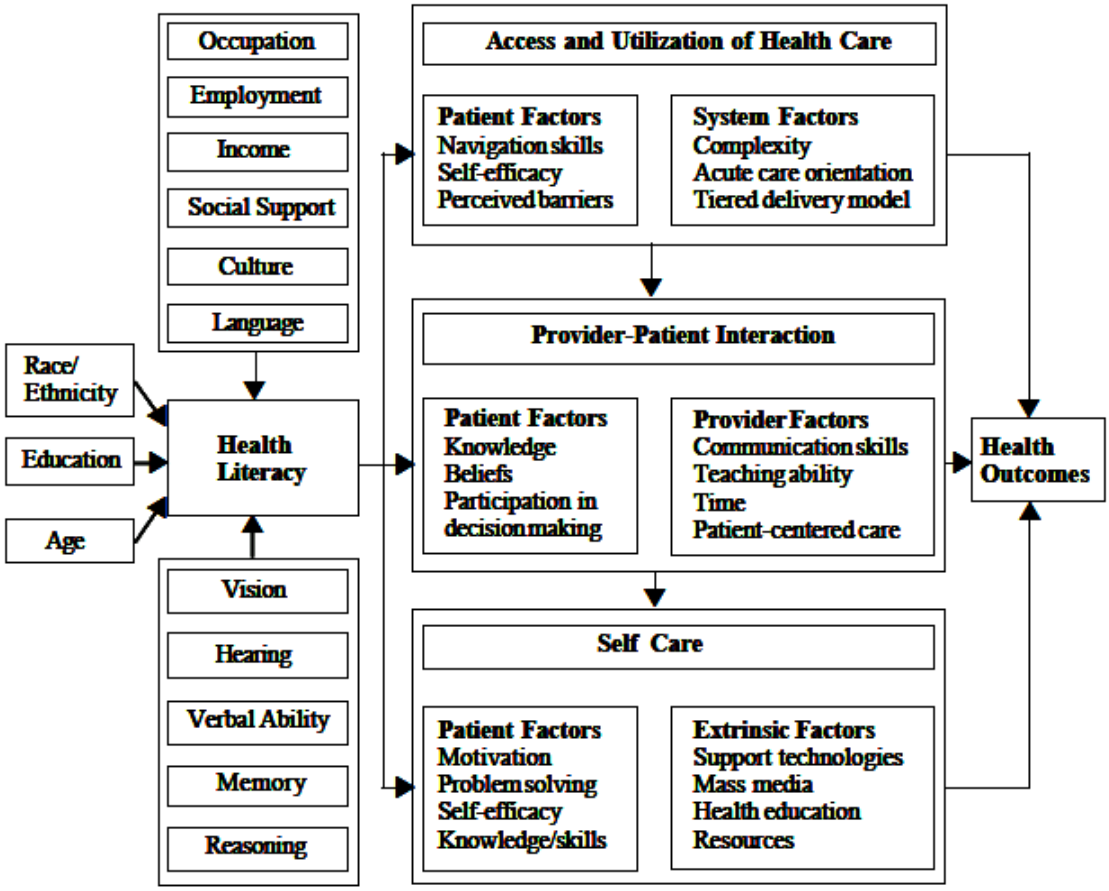

Figure 1: Causal Pathway between Limited Health Literacy and Health Outcomes framework by Paasche-Orlow 2007

We hypothesised that race, household income, age, education level, number of children, social support, internet connection, BMI, family history of NCD and presence of joint pain are associated with the level of health literacy among housewives. The objectives of this study are to assess limited health literacy levels and its associated factors among obese and overweight housewives in public low-cost flats in Klang Valley, Malaysia.

METHOD

This is a sub analysis of the My Body is Fit and Fabulous at home (MyBFF@home) study. The MyBFF@home is a community weight loss intervention, quasi experimental study among housewives in Klang Valley, Malaysia.A total of 328 eligible housewives were recruited from 14 public low cost flats in Klang Valley by convenient sampling. Detailed descriptions of the MyBFF@home study have been reported previously[16].

The inclusion criteria for the participants were obese and pre-obese BMI more than 23kg/m^2womenaged 18-59 years old, have been staying at home for at least six months prior to the recruitment, with or without a part-time job defined as less than six hours per day, with no history of diabetes and cardiovascular diseases and not on any weight loss management programmes. Exclusion criteria were participants who had limitation for physical activities (physical disability or bed ridden), pregnant and smokers.

Measurement

Sociodemographic characteristics and family health history

A set of pre-tested interviewed questionnaire was used for data collection. Information including race, household income, age, education level, number of children in the household and family health history of diseases such as hypertension, heart disease, diabetes and stroke among close relatives were collected from face-to-face interviews.

Body weight, height and BMI

Body weight was measured twice to the nearest 0.1 kg with a digital weighing scale (Tanita HD319, Japan). Participants were measured in light clothing and no shoes. Body height was also measured twice using SECA Body meter to the nearest 0.1 cm from the participant's head to toe in an upright standing position with five points of his body touching the wall. The reported body weight and height were the average values from two readings.

Newest Vital Sign (NVS) - Malay version

Health literacy among respondents were assessed using a pre-tested interview questionnaire based on NVS Malay version translated from the originalWeiss et al 2005 6-item English version of the NVS by using back-forward translation.This tool was also chosen due to its nutrition component that was more relevant to an obesity intervention programme[3]. Face validity and content validity were established during pre-testing. Cronbach's alpha coefficient was 0.75 for all six items and there was no significant difference between test and re-test scores. Participants answered reading and computational questions based on an ice cream food label. Participants obtained one score for each correct answer and total score ranged from zero to six. Health literacy levels were classified into limited health literacy (0-1 total score), possible limited health (2-3 total score) and adequate health literacy (4-6 total score)[17]. For this analysis, the levels of health literacy were dichotomized into two categories which were limited health literacy (≤2total score) and adequate health literacy (>2total score).

Statistical analysis

Bivariable chi-square analysis of the NVS score data comparing health literacy against race, educational level, parity, joint pain, social support, internet connection, household income, BMI and family history of NCD was done followed by multiple logistic regression. Data was analysed using IBM SPSS Statistics software version 22. The level of significance was set at 95% with p value < 0.05.

RESULTS

Sociodemographic and health characteristics

Table 1 shows the sociodemographic, health and environmental factors distribution among participants in this study. From the total of 328 housewives participated in this study at baseline, most 289(88.1%) of the participants were Malays. The household incomes of the housewives in this study were between RM300.00 to RM 9,000.00 per month. One third, 106(32.3%) of the participants have a household income less than RM1,500.00 which is below the poverty line. Most 258(78.7%) of the housewives in this study were obese and only 70(21.3%) of them were pre-obese. Two thirds, 215(65.6%) of them have family history of NCD. A total of 179(54.6%) respondents reported of having social support for weight loss and 127(38.7%) of participants have internet access.

The NVS score

The median score was low at 1, mode score was 0 and mean (SD) score was 1.07 (1.19). According to the standard NVS classification by Weiss et al 2005, 243 (74.1%) of housewives had the likelihood of limited literacy (0 - 1 total score), 67 (20.4%) had possible limited literacy (2 - 3 total score) and 18 (5.5%) had adequate health literacy (4 - 6 total score). For this analysis, most 287 (87.5%) of the housewives had limited health literacy (≤2 total score) and only 41 (12.5%) had adequate health literacy (>2 total score). Visual inspection of the histogram, normal Q-Q plots and box plots showed that the NVS scores were skewed to the right. Skewness was at 1.341 (SE = 0.135) and Kurtosis was 1.659 (SE = 0.268).

The mean (SD) completing time of the NVS test was 11.39 (10.06) minutes. The most correctly answered was question 5 which concerns the allergy to peanuts where 168 (51.2%) of the participants gave the right answer. Only 14 participants reached up to question 7, however no one was able to answer it correctly.

Table 1: Sociodemographic, health and environmental **factors associated with health literacy distribution (N=328 except for household income)**

Variables	Distribution	
	n	%
Sociodemographic characteristic		
Race		
Malay	289	88.1
Non-Malay	39	11.9
Age (years)		
18-44	200	61.0
45-59	128	39.0
Education		
Primary and below	53	16.2
Secondary and above	275	83.8
Household income (RM)		
(N=325)		
< 1,500.00	106	32.6
1,500.00 – 2,500.00	151	46.5
> 2,500.00	68	20.9
Parity		
0-4	242	73.8
>4	86	26.2
Health status		
BMI		
Pre-obese (23.0-27.4)	70	21.3
Obese class I (27.5 – 34.9)	185	56.4
Obese class II and above (>35.0)	73	22.3
Joint pain		
Yes	221	67.4
No	107	32.6
Family history of NCD		
Yes	215	65.6
No	113	34.5
Environment		
Social support		
Yes	179	54.6
No	149	45.4
Internet connection		
Yes	127	38.7
No	201	61.3

Bivariable and multivariable analysis

The power for all the bivariables analyses were between 0.77 to 1.00. Based on the chi-square analysis in Table 2, factors significantly associated with limited health literacy were older age of 45 to 59 years old (p = 0.040) and absent of internet connectivity (p = 0.001). Education level was significantly associated with limited literacy when it was re-categorized as (1) primary education and below and (2) secondary education and above (p = 0.001). All the three significant factors in the chi-square analysis were included in the multiple logistic regression analysis. The final model shows that absence of internet connectivity (OR 2.61; 95%CI 1.31 to 5.22) among these housewives was associated with limited health literacy (Table 3).

DISCUSSION

The housewives in this study showed a low average health literacy level of 1.07. However, the caregiver study by Chan et al. 2015 reported a lower average health literacy level at0.54. This higher average of health literacy may be due to this housewives population are all from the urban area and the caregivers are from tertiary hospitals from northern Malaysia which are a mixed population of urban and rural dwellers. The NHMS 2015 also reported a significant higher percentage of adequate health literacy among urban dwellers 7.8% (95% CI: 6.6, 9.3) compared to rural dwellers 2.3% (95% CI: 1.7, 3.1). In other countries, health literacy level for this group is similar to the adults in the Lower Mississippi Delta with lowest annual income of <USD5,000.00 per annum at mean (SD) 1.84 (2.04)[19]. In Turkey, the NVS score was taken among government outpatient clinic women in metropolitan city saw a higher health literacy score of 2.35 (1.57)[20]. The NVS average among Korean immigrant diabetic patients also had a higher mean (SD) score at 2.3 (1.68)[21].

Table 2: Factors associated with limited health literacy (N=328 except for household income).

	Limited health literacy		Adequate health literacy		x^2	p-value
	n	%	n	%		
Race						
Malay	252	89.7	37	12.8	0.204	0.652
Non-Malay	35	87.2	4	10.3		
Age (years)						
18-44	169	84.5	31	15.5	4.217	*0.040
45-59	118	92.2	10	7.8		
Education						
Secondary and below	250	87.7	35	12.3	0.096	0.804
Tertiary and above	37	86.0	6	14.0		
Household income (N=325)						
< 1,500.00	96	90.6	10	9.4	1.223	0.542
1,500.00 – 2,500.00	130	86.1	21	13.9		
> 2,500.00	59	86.8	9	13.2		
Parity						
0-4	211	87.2	31	12.8	0.081	0.776
>4	76	88.4	10	11.6		
Social support						
Yes	154	86.0	25	14.0	0.775	0.379
No	133	89.3	16	10.7		
Internet connection						
Yes	101	79.5	26	20.5	12.043	*0.001
No	186	92.5	15	7.5		
BMI						
Pre-obese (23.0-27.4)	58	82.9	12	17.1	2.189	0.534
Obese class I (27.5 – 34.9)	164	88.6	21	11.4		
Obese class II (35.0 – 39.9)	55	90.2	6	9.8		
Obese class III (≥40)	10	83.3	2	16.7		
Joint pain						
Yes	193	87.3	28	12.7	0.018	0.894
No	94	87.9	13	12.1		
Family history of NCD						
Strong						
Weak	107	82.9	22	17.1	4.631	0.099
No	76	88.4	10	11.6		
	104	92.0	9	8.0		

*P < 0.05 for chi-square test

This study found only 5.5% of the housewives have adequate health literacy (4 - 6 total score). This percentage is similar to the nationally represented NHMS 2015 study at 6.6% and in the caregivers study by Chan et al, 2015 at 5.8%. On the other hand, this study and the NHMS 2015 study showed a very high percentage of participants having the likelihood of limited literacy (0 - 1 total score) of 74.1% and 78.0% respectively.Here we can see that all 3 health literacy assessments done in Malaysia using NVS shows that only less than 7% of participants were having adequate health literacy and two of these studies showed that the majority of the participants score was within a small range of 0 to 1.Therefore, NVS assessments done among Malaysians haveidentified a huge risk group of low health literacy within its population. However, other tools should be developed to further stratify this huge group to identify a smaller subgroup that would be more susceptible for a possible intervention to increase health literacy. This information would be very useful and applicable in a limited resource setting where intervention for a big percentage of the population is not feasible.

In recent years, the understanding of health literacy has broadened to also involve the simultaneous use of a more complex and interconnected set of abilities, such as reading and acting upon written health information, communicating needs to health professionals, and understanding health instructions[22]. A systematic review and integration of definitions and models by Kristine Sørensen et al 2012 on

health literacy and public health has developed an integrative conceptual model containing 12 dimensions referring to the knowledge, motivation and competencies of accessing, understanding, appraising and applying health-related information within the healthcare, disease prevention and health promotion setting, respectively. This model can potentially serve as a conceptual basis for developing more health literacy measurement tools, capturing the different dimensions of health literacy within the healthcare, disease prevention and health promotion settings[22].

This study shows that education is associated with better health literacy. As many lower income housewives do not have high education level, available adult classes can include specific teachings on how to do self-monitoring of weight, diet and physical activity and topics related to health literacy for housewives to improve their health literacy may ultimately increase their health outcomes.

Table 3: Factors associated with limited health literacy among obese and overweight women in low cost flats (using multiple logistic regression)

Factors	Adj OR	95% CI	p-value
Age			
45-59	1.64	0.76-3.55	0.209
18-44	1.00		
Education			
Secondary and below	1.101.00	0.421-2.864	0.848
Tertiary and above			
Internet connection			
No			
Yes	2.97	1.494-5.899	*0.002
	1.00		

*p < 0.05

Health literacy level was significantly higher among housewives aged 44 years old and younger. Similarly, health literacy was markedly reduced after 4th decade seen among adult primary healthcare patients in Detroit, Michigan and Belgrade, Serbia[13,14]. This may be due to the education received by the younger age group were more suited with the current environment in hand. Therefore, older women in this population should be expected to have limited health literacy in health programmes and services. Income was associated with health literacy levels in several studies [2,14,15]. No significant relationship between household income and health literacy level in this analysis were seen, may be because this whole population has a similar low standard of living even though some reported middle income economic status.

The multiple logistic regression shows a final model with only internet connectivity being a significant factor associated with health literacy. It was interesting that when most of the housewives have low household income of less than RM 2,500.00, there was up to one third of them who had internet access. Although lower literacy is associated with a decrease in internet use[23], at the same time, it is also a known technology method that address the barrier of low literacy[24]. Therefore, this study indicates that providing internet connectivity may be a potential mitigating strategy for low health literacy housewives to improve their health outcomes. To make internet more accessible to housewives, housewives should be facilitated to use the internet centres (Pusat Internet 1 Malaysia) that has been set up by the Malaysian government in urban poor settlements around Malaysia. Promotion targeting low income housewives to use available self-monitoring and health educational online applications like MyNutriDiari by the Nutrition Division MOH Malaysia may help to increase health literacy among this group.

Participants in this study were of low and middle-income population, mostly Malay overweight and obese-housewives from public low-cost flats in Klang Valley, Malaysia. They do not represent all the housewives in Klang Valley. However, due to its special setting, profiling of such group is beneficial to guide policy makers in implementing an effective and sustainable weight loss programme for this venerable group of women. With most of these housewives were obese and having family history of NCDs, it makes this group of housewives having higher risk of developing NCDs in the future, therefore, a specific weight loss intervention for them is very relevant.

CONCLUSION

As a conclusion, majority of low income obese and overweight housewives living in low cost flats have limited health literacy. Therefore, any intervention for them should to be designed for

limited and low health literacy individuals. Providing internet connectivity to housewives may help increase their health literacy, mitigating the effects of limited health literacy.

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no competing interests.

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AUTHOR CONTRIBUTIONS

Conceived and designed the experiments: SNBS, NSMN, MAO, CSM and RA. Analysed the data SNBS, MAO and MHA. Wrote the first draft of the manuscript SNBS. Contributed to the writing of the manuscript: SNBS, KS, NSMN, MAO, CSM, RA and MHA. Agree with manuscript results and conclusions: SNBS, KS, NSMN, MAO, CSM, RA and MHA. Jointly developed the structure and arguments for the paper: SNBS, KS, NSMN, MAO, CSM, RA and MHA. Made critical revisions and approved final version: SNBS, KS, NSMN, MAO, CSM, RA and MHA. All authors reviewed and approved of the final manuscript.

DISCLOSURES AND ETHICS

As a requirement of publication authors have provided to the publisher signed confirmation of compliance with legal and ethical obligations including but not limited to the following: authorship and contributorship, conflicts of interest, privacy and confidentiality and (where applicable) protection of human and animal research subjects. The authors have read and confirmed their agreement with the ICMJE authorship and conflict of interest criteria. The authors have also confirmed that this article is unique and not under consideration or published in any other publication, and that they have permission from rights holders to reproduce any copyrighted material. Any disclosures are made in this section. The external blind peer reviewers report no conflicts of interest.

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