

PREVALENCE AND PREDICTORS OF RECENT ILLNESS AND INJURY AMONG THE MALAYSIAN POPULATION

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Abstract. The World Health Organization (WHO) estimates that injury will be the second leading cause of morbidity of disease burden worldwide by the year 2020. We conducted a community-based survey to determine the prevalence of recent illness and injury, in Malaysia. The survey was a cross sectional population-based household survey conducted using face to face interviews. The information was on self-reported recent illness and injury (SRRII) over the previous 2 weeks. This study was conducted during April - August 2006 and as a part of the third National Health and Morbidity Survey of Malaysia. A total of 56,710 respondents were interviewed with a response rate of 98.2% (55,660/56,710). The overall prevalence of combined SRRII was 23.6%; for injuries the prevalence was 3.1%. The groups with the highest SRRII were children 0-5 years old (31.2%), males (24.3%), Indians (26.9%), those with secondary education level (22.9%), those earning RM 1,000/month (25.0%) and rural dwellers (25.5%). Age, sex, ethnicity, and locality were significantly associated with SRRII while monthly household income and educational level were marginally associated. On multivariate analysis, age, gender, race, ethnicity, education, income and locality were significantly associated with SRRII. The most common reported recent illness was related to the respiratory system (42.0%). The information obtained from this survey is useful to policy makers in the Ministry of Health to review and strengthen existing health programs.

Keywords: epidemiology, recent illness, injury, accidents, Malaysia

INTRODUCTION

The World Health Organization (WHO) has predicted injuries will be the second leading cause of morbidity worldwide by the year 2020 (Murray and Lopez, 1996; Stone *et al*, 2001). Injuries caused by home accidents and agricultural work-site accidents are the leading

cause of disability in India (Patel, 2009). Recent illness and injury impose a large burden of disease in Malaysia. Maddem (2000) defined recent illness as an illness or injury experienced within the previous 2 weeks, including long-term conditions. Self Reported Recent Illness/Injury (SRRII) can be used as a predictor of mortality and morbidity (Gerdtham *et al*, 1999).

Kleinman (1988) defined illness as the subjective experience of poor health and manifests itself as somatic or psychological symptoms, but may stem from mul-

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tiple sources, including cognitive and social processes, and may or may not reflect the presence of an underlying disease. A person may experience ill health with no underlying disease and conversely he or she may suffer from an underlying disease without perceiving himself or herself as ill (Jurges *et al*, 2008). The health of an entire population is determined by aggregating data collected about individuals.

In the absence of comprehensive or absolute measures of health of a population, average lifespan, prevalence of preventable disease or deaths and availability of health services serve as indicators of health status. Some commonly used measures of population health status are morbidity and mortality measures. It has been argued that the role of health status measures in the assessment of medical care are of limited value in assessing the performance of health care professionals and institutions because of confounding factors, error in data collection and chance. However, health status measures should be incorporated as outcome measures in clinical trials since they can provide information on how individuals and institutions can improve performance and give health policy makers information about the effectiveness of interventions. Health status indicators can be divided into two types: self perceived health status and ill-health (in particular the prevalence of recent and/or long-term conditions) (Madden, 2000).

The aim of this study was to obtain community-based data on the patterns of recent illness/injuries to enable the Ministry of Health to review programs, strategies and allocate resources. The objectives of this study were to determine the prevalence rates of recent illness/injury among different geographic and

socio-economic sub-groups, the association between socio-economic variables and the prevalence of recent illness/injury in the general population.

MATERIALS AND METHODS

A cross sectional community household survey, part of a nationwide survey conducted every decade, was carried out throughout Malaysia during April - August 2006. SRRII was one of the areas studied in this survey. Recent illness was defined as any perceived illness present during the previous 2 weeks which required the person to limit their daily duties at school, work, home or free time. A short recall period was used to minimize recall bias. A face to face interview using a pre-tested questionnaire was conducted after consent was obtained from the respondents. For respondents aged ≤ 12 years, their parents/guardians were interviewed. If the respondent could not immediately recall an illness or injury, the interviewers probed them to trigger the memory. They were asked whether or not they had any recent illness or injury from a given list of health problems (Table 1).

SPSS version 16 (SPSS, Chicago, IL) with a complex sample add-on module was used to analyze the data. Population estimates expressed in proportions and rates were used in the analysis, and computation of standard errors was incorporated to provide a range of estimates with a 95% confidence interval. Prevalence rates, calculated by dividing the number of respondents with the health problem by the population at risk at the time of measurement (*ie*, all respondents interviewed), were used to estimate the magnitude of the health problem.

Table 1
List of health problems.

System	Symptoms	System	Symptoms
Respiratory	Cough with phlegm Fever Blood stained phlegm Blocked nose Sneezing Asthma Noisy breathing Dry cough	ENT	Mouth ulcers Discharge from ears Decreased hearing Sore throat Bleeding gums Toothache Bleeding from nose Foreign body - specify Noise in the ears Cannot hear Pain in ears Pain in nose Bleeding ears Pus in the nose
Gastrointestinal	Distension of abdomen Diarrhea Yellowness of urine Yellowness of eyes Loss of weight Vomiting Stomach pain Blood in stools Blood in vomitus Nausea Flatulence Loss of appetite	Eyes	Watery eyes Discharge from eyes Decreased vision Blindness Color blindness Night blindness Cataract Redness of eyes Injury to eye(s) Swelling eyes Painful eyes Foreign body in eyes
Renal/Urinary	Pain when passing urine Unable to pass urine Blood in urine Pus in urine Stones in urine Passing a lot of urine Backache Passing little urine	Skin	Itchy skin Sores Rashes Peeling of skin Redness of skin Burns/scald Swelling on skin Fungus infection
Cardiovascular	Chest pain Heart attack Fainted Pain moving to little finger Chest pain on exercising Difficulty in breathing on climbing stairs Giddiness Chest discomfort Palpitations Difficulty in breathing on lying down Bluish fingers and lips	Muscular-skeletal	Broken bones Pain in bones Pain in joints Muscular pain Swelling bone Sprain Cramps Numbness
Psychiatry/ Nervous system	Nightmares See things which are not there Hear things which are not there Weakness in limbs/face Numbness in limbs/face Disturbance in speech Disturbance in gait Change of sleep pattern Cannot feel Feel sad Mood changes Fell down Injured head Unconscious Fits Cannot move body Swelling in the head Bleeding on the head Feel like dying	Gynecological	Discharge from vagina Pain in vaginal area Bleeding per vagina Excessive periods Pain during periods Itchiness in vaginal area No menstrual periods Swelling in vaginal area
		Non-specific symptoms	Pain Headache Swelling legs Swelling other areas Loss of appetite Tiredness Overweight Underweight Discharge Bleeding Fever

RESULTS

General findings

A total of 56,710 respondents were interviewed in this survey with a response rate of 98.2% (55,660/56710). Sixty-eight point two percent of respondents were ≤ 40 years old, 53.0% were females, 56.8% were Malays and 19.5% were Chinese, 63.3% were rural residents, 32.6% had secondary education and 34.5% had a monthly household income < RM 1,000 (Table 2).

Recent illness and injury by socio-demographic variables

The combined estimated prevalence of recent illness/injury was 23.6% (95% CI 22.9-24.3), of which 96.9% (95% CI 96.5-97.2) was due to recent illness and 3.1% (95% CI 2.8-3.5) due to injury. The prevalence of SRRII was highest among children 0-5 years old (31.2%) and nearly equally distributed among the other age groups. Males had a significantly higher prevalence of SRRII (24.3%) than females. Indians, one of the three main ethnic groups in Malaysia had the highest prevalence of SRRII (26.9%). By level of education, the highest prevalence of SRRII was among those with secondary education (22.9%) followed closely by those with primary education (22.7%). By income, those earning < RM 1,000/month (26.6%) had the highest prevalence of SRRII. By residence, a higher prevalence of SRRII was found among rural dwellers (25.5%) than urban dwellers (Table 3).

Bivariate analysis

On bivariate analysis, age, gender, ethnicity and residence were significantly associated with the prevalence of SRRII while level of education and income were only marginally associated; All age groups were associated with SRRII. Males were 1.08 times more likely to have a SRRII than

Table 2
Frequency distribution of socio-demographic characteristics of respondents.

Variable	Respondents	
	n (%)	
Age group (years) ^a		
0-5	7,290	(12.5)
6-10	6,788	(11.5)
11-20	10,589	(18.3)
21-40	14,804	(25.9)
41-60	12,595	(22.1)
≥ 61	4,604	(7.8)
Sex		
Male	26,709	(47.0)
Female	30,001	(53.0)
Ethnicity		
Malay	32,494	(56.8)
Chinese	10,251	(19.5)
Indian	4,415	(8.4)
Other bumis	7,092	(11.2)
Others	2,458	(4.1)
Highest level of education		
None	11,244	(19.3)
Primary	15,071	(26.4)
Secondary	18,235	(32.6)
Tertiary	3,378	(6.3)
Not applicable	8,288	(14.5)
Monthly household income (RM)		
<1,000	19,891	(34.5)
1,000-1,999	15,228	(28.0)
2,000-3,999	12,823	(24.5)
$\geq 4,000$	6,629	(13.0)
Residence		
Rural	32,734	(63.3)
Urban	23,976	(36.7)

^aNot applicable- those <6 years old

females. Malays, Indians, Bumiputras and others were more likely to have a SRRII than Chinese. Rural dwellers were 1.18 times more likely to have an SRRII than urban dwellers. Respondents with primary or secondary education had more likelihood to have an SRRII than those

Table 3
Prevalence of recent illness/injury by socio-demography, locality and crude odds ratios (OR).

Variable	n	%	95% CI (Prevalence)		OR	95% CI (OR)
			Lower (%)	Upper (%)		
Overall	5,6710	23.6	22.9	24.3	-	-
Age						
0-5	2,265	31.2	29.8	32.6	1.91	1.77 - 2.06
6-10	1,486	22.2	21.0	23.5	1.20	1.10 - 1.30
11-20	2,879	27.5	26.4	28.7	1.60	1.50 - 1.70
21-40	3,163	21.4	20.6	22.3	1.15	1.08 - 1.22
41-60 ^a	2,415	19.2	18.3	20.1	-	-
≥61	1,078	23.5	22.1	24.9	1.29	1.19 - 1.40
Gender						
Male	6,466	24.3	23.5	25.2	1.08	1.04 - 1.13
Female ^a	6,827	22.9	22.1	23.7	-	-
Ethnicity						
Malay	8,128	25.3	24.4	26.3	1.73	1.38 - 1.90
Chinese ^a	1,677	16.4	15.3	17.6	-	-
Indian	1,164	26.9	24.8	28.1	1.88	1.65 - 2.14
Other bumis	1,854	26.4	24.7	28.2	1.83	1.52 - 2.06
Others	470	18.6	16.7	20.8	1.17	1.00 - 1.37
Level of education						
None	2,396	21.5	20.6	22.6	1.04	0.94 - 1.16
Primary	3,400	22.7	21.8	23.6	1.12	1.01 - 1.23
Secondary	4,186	22.9	22.0	23.8	1.13	1.02 - 1.24
Tertiary ^a	705	20.8	19.3	22.5	-	-
Monthly household income (RM)						
<1,000	4,894	25.0	24.0	26.1	1.14	1.03 - 1.25
1,000-1,999	3,504	23.0	22.0	24.1	1.02	0.92 - 1.12
2,000-3,999	2,971	23.1	22.0	24.3	1.02	0.93 - 1.13
≥4,000 ^a	1,495	22.7	21.2	24.3	-	-
Residence						
Rural	5,989	25.5	24.3	26.7	1.18	1.09 - 1.28
Urban ^a	7,304	22.4	21.6	23.3	-	-

^aReference group

with tertiary education. Those with a monthly income < RM1,000 were more likely to have an SRRII than the reference group (Table 3).

Multivariate analysis

Multivariate analysis was carried out to determine the variables associated with

SRRII after adjusting for confounders. Age, gender, ethnicity, level of education, income and location of residence were significantly associated with SRRII (Table 4).

Prevalence of SRRII by anatomical system

The prevalence of illness was highest for the respiratory system (42.0%; 95%CI

Table 4
Multivariate analysis of recent illness/
injury.

Variable	Adjusted OR	95% Confidence interval	p-value
Age group (years)			
0-5	1.62	1.35 - 1.96	<0.001
6-10	1.29	1.16 - 1.43	
11-20	1.57	1.47 - 1.67	
21-40	1.12	1.04 - 1.19	
41-60 ^a	-	-	
≥61	1.41	1.30 - 1.55	
Gender			
Male	1.07	1.03 - 1.11	0.002
Female ^a	-	-	
Ethnicity			
Malay	1.65	1.56 - 1.81	<0.001
Chinese ^a	-	-	
Indians	1.89	1.66 - 2.15	
Other bumis	1.75	1.84 - 1.99	
Others	1.22	1.03 - 1.43	
Level of education			
None	0.83	0.74 - 0.94	<0.001
Primary	0.99	0.89 - 1.11	
Secondary	1.02	0.92 - 1.13	
Tertiary ^a	-	-	
Monthly household income (RM)			
<1,000	0.95	0.86 - 1.06	0.049
1,000-1,999	0.88	0.80 - 0.98	
2,000-3,999	0.93	0.84 - 1.03	
≥4,000 ^a	-	-	
Residence			
Rural	1.09	1.00 - 1.19	<0.049
Urban ^a	-	-	

^aReference group

41.0 - 43.0) followed by non-specific symptoms (25.7%; 95%CI 24.6 - 26.7), other systems (17.1%, 95% CI 16.2-18.1) and ENT (4.1%; 95%CI 3.8-4.5) (Table 5).

Distribution of SRRII by anatomical system and socio demographic profile

The prevalence of respiratory illness was almost evenly distributed among the

age groups but was highest among the 21-40 year old age group (44.2%), females (40.0%), Malays (44.4%), those with tertiary education (45.9%) and those with a monthly income ≥ RM4,000. There was no significant difference between rural and urban dwellers for respiratory illness. The highest prevalence for abdominal illness was among the 11-20 years old age group (3.4%), females (3.1%), Chinese (4%), those with secondary education (4.4%), those with a monthly income RM1,000 - 1,999 (3.4%) and among rural residents (3.3%). The highest prevalence of ENT related illnesses was the 21-40 years old age group (6.4%), females (4.5%), Chinese (4.4%) and those with a monthly income of RM 1,000 - 3,999 (4.4%). For muscular-skeletal illnesses, the highest prevalence was significant among the oldest age group of 61 years old and above (7.9%), among males (3.3%), Indians (3.6%), those with primary education (4.4%) and those with a monthly income earning of <RM1,999 (3.0%). Rural dwellers had a significantly higher SRRII. The highest prevalence of injuries was in the 11-20 years old age group (4.8%), among males (4.4%), Chinese (4.5%), those with no education (3.6%), those with a monthly income level of RM1,000-1,999 (3.7%) and those living in urban areas (3.5%) (Table 6).

DISCUSSION

A health interview survey, such as that carried out in this study, is a common technique used to evaluate national health (National Health Interview Survey of the USA, 2010; European Core Health Interview Survey, 2010). It is the best source of data on the demographics (Breslin *et al*, 2005), social health (Anitua and Esnaola, 2000), health seeking behavior (Tipping and Segall, 1995), mortality (Dahl *et al*,

Table 5
Prevalence of recent illness/injury by anatomical system.

Anatomical system	<i>n</i>	<i>N</i>	Estimate (%)	95%CI
Respiratory	5,608	2,055,631	42.0	41.0 - 43.1
Gastrointestinal	390	141,226	2.9	2.6 - 3.3
Urinary/renal	19	6,506	0.1	0.1 - 0.2
Cardiovascular	42	14,898	0.3	0.2 - 0.4
Psychiatric/nervous	40	15,041	0.3	0.2 - 0.4
Ear, nose and throat	556	202,359	4.1	3.8 - 4.5
Eye	60	20,898	0.4	0.3 - 0.6
Skin	134	47,947	1.0	0.8 - 1.2
Musculoskeletal	369	136,329	2.8	2.5 - 3.1
Gynecological	12	4,276	0.1	0.1 - 0.2
Non-specific symptoms ^a	3,466	1,256,015	25.7	24.7 - 26.7
Injuries	410	153,375	3.1	2.8 - 3.5
Other systems ^b	2,229	838,254	17.1	16.2 - 18.1
Total	13,335	4,892,756	100.0	-

n = Number of respondents; *N* = Number of estimated population

^aSymptoms not specific to any system mentioned in Table 1.

^bBlood, endocrine etc

2004), morbidity prevalence (Kunst *et al*, 1995) and the use of health facilities with economic correlations (Bernstein *et al*, 2003).

In the NHMS III, SRRII data was combined, in contrast to NHMS II (Institute for Public Health, 1996). Therefore, for most variables, the results were not comparable. However, the overall prevalences for combined recent illnesses and injuries and injuries alone for both surveys were available and could be compared. The combined prevalence of recent illness and injury for NHMS III was 23.6% which was lower than in NHMS II (29.5%). This could be due to increased awareness created by health education, promotion of personal hygiene and hand washing activities promoted by the Ministry of Health (MOH), Malaysia, the private sector and non-governmental organizations during the epidemic of SARS and the

global epidemic of H1NI. This, coupled with various public health programs, such as healthy lifestyle campaigns, prevention of food and waterborne diseases, and influenza-like (ILI) surveillance introduced by the MOH over the past few years has further improved morbidity (Ministry of Health Malaysia, 2008). Five media campaigns (5M) carried out in 2007, healthy lifestyle, anti-smoking, HIV/AIDS prevention, prevention of dengue and healthy cafeteria guidelines (reduce sugar, reduce salt, reduce oil, add vegetables and fruits to your diet) have had an impact on the prevalence of morbidity (Ministry of Health Malaysia, 2007). Our findings were much higher than the global prevalence of poor health of 9.8% (Subramaniam *et al*, 2010).

The prevalence of injuries in NHMS III was 3.1%; slightly higher than NHMS II which was 2.6%. Our study did not

Table 6
Distribution of recent illness/injury by anatomical systems and socio-demographic variables.

Variable	Respiratory		Abdomen		ENT		Musculo		Injuries	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Age (years)										
0-5	42.1	40.0 - 44.2	2.1	1.6 - 2.8	1.5	1.1 - 2.2	0.2	0.0 - 0.5	3.8	3.0 - 4.7
6-10	40.6	38.1 - 38.1	2.9	2.1 - 3.9	3.2	2.4 - 4.2	1.1	0.7 - 1.8	4.5	3.6 - 5.8
11-20	43.9	42.1 - 45.8	3.4	2.8 - 4.1	4.5	3.8 - 5.3	2.8	2.2 - 3.5	4.8	4.1 - 5.7
21-40	44.2	42.5 - 46.0	3.3	2.8 - 4.0	6.4	5.6 - 7.4	2.3	1.9 - 2.9	2.5	2.0 - 3.1
41-60	43.9	41.9 - 46.9	2.8	2.2 - 3.5	5.0	4.2 - 6.0	5.0	4.2 - 6.0	1.5	1.1 - 2.1
≥61	40.8	37.8 - 43.8	2.7	1.9 - 3.8	2.5	1.7 - 3.6	7.9	6.4 - 9.7	1.8	1.2 - 2.8
Gender										
Male	42.1	40.0 - 43.3	2.8	2.4 - 3.2	3.9	3.5 - 4.4	3.3	2.8 - 3.7	4.4	3.9 - 4.9
Female	44.0	42.8 - 45.2	3.1	2.7 - 3.6	4.5	4.1 - 5.1	2.5	2.1 - 2.9	2.1	1.8 - 2.5
Ethnicity										
Malays	44.4	42.9 - 45.1	2.7	2.3 - 3.1	4.3	3.9 - 4.8	3.0	2.7 - 3.4	3.3	2.9 - 3.7
Chinese	41.5	39.1 - 43.9	4.0	3.1 - 5.1	4.4	3.5 - 5.5	2.9	2.1 - 3.8	4.5	3.6 - 5.6
Indian	41.0	38.2 - 43.9	2.4	1.6 - 3.4	4.2	3.2 - 5.5	3.6	2.6 - 4.8	2.4	1.7 - 3.5
Other bumis	42.8	40.5 - 45.1	3.9	3.1 - 4.9	3.7	2.9 - 4.6	1.9	1.3 - 2.6	2.3	1.7 - 3.1
Others	38.5	34.1 - 43.1	1.8	0.9 - 3.5	4.3	2.7 - 6.7	1.7	0.8 - 3.5	2.5	1.4 - 4.4
Level of education										
None	40.5	38.5 - 42.6	3.2	2.5 - 4.0	3.0	2.4 - 3.8	2.9	2.3 - 3.7	3.6	2.9 - 4.4
Primary	43.7	42.0 - 45.4	2.7	2.2 - 3.3	4.4	3.7 - 5.1	4.5	3.8 - 5.3	3.3	2.7 - 3.9
Secondary	44	42.5 - 45.6	4.4	2.2 - 4.0	5.8	5.1 - 6.6	3.2	2.7 - 3.8	2.8	2.3 - 3.3
Tertiary	45.9	42.2 - 49.6	3.2	2.1 - 4.8	7.2	5.5 - 9.3	2.3	1.4 - 3.8	2.2	1.3 - 3.7
Monthly household income (RM)										
<1,000	42.6	41.2 - 44.0	2.5	2.1 - 3.0	4.1	3.5 - 4.7	3.0	2.5 - 3.5	3.2	2.8 - 3.8
1,000-1,999	40.9	39.3 - 42.6	3.4	2.8 - 4.0	4.4	3.8 - 5.1	3.0	2.5 - 3.5	3.7	3.1 - 4.4
2,000-3,999	43.6	41.8 - 45.4	3.1	2.5 - 3.8	4.4	3.7 - 5.2	2.4	1.9 - 3.0	2.9	2.3 - 3.5
≥4,000	48.0	45.4 - 50.6	3.1	2.3 - 4.1	4.2	3.3 - 5.4	2.8	2.0 - 3.8	2.9	2.1 - 3.9
Residence										
Urban	43.1	41.9 - 44.2	2.7	2.4 - 3.1	4.3	3.9 - 4.8	2.6	2.2 - 3.0	3.3	2.9 - 3.7
Rural	43.0	41.8 - 44.3	3.3	2.9 - 3.8	4.2	3.7 - 4.7	3.3	2.9 - 3.8	3.1	2.7 - 3.6

95% CI = 95% Confidence interval

look into the type and place of injury; hence, not much can be said about what contributed to the higher prevalence of injury. However, with reference to the 10 principal causes of hospitalization at the Ministry of Health hospitals in Malaysia for 2007 and 2008; accidents ranked third (Ministry of Health Malaysia, 2007 and 2008); this could have contributed to the higher prevalence. In the module on In-

juries in NHMS III, the incidence rate of injuries at schools was highest at 7.0%, which calls for further strengthening of the present injury prevention program integrated into the school health program of the MOH, Malaysia.

Our study shows the highest prevalence of recent illness/injuries was in the 0-5 years old age group at 31.2%. This could be due to an immature immune

status in this age group, which makes them more vulnerable to infections. Malaysia has a relatively young population, 41.4% of its total population of 27.7 million people in 2008 comprised of individuals ≤ 20 years old (Ministry of Health Malaysia, 2008). Our findings were in contrast to a study from Australia where the number of health conditions increased with increasing age (Australian Bureau of Statistics, 2004-2005). In this same study in Australia, females reported better health across all ages (Australian Bureau of Statistics, 2004-2005), similar to our study, where males had a higher prevalence of SRRII. A possible reason for this difference could be females may have a culturally different way of perceiving illness.

Respondents with tertiary education had the lowest prevalence of SRRII. A possible reason could be individuals with the highest educational level are better informed about their health and practice a healthier lifestyle. A study done by Furnee *et al* (2008) showed individuals with higher education reported better health. Likewise people with no formal education were at a disadvantage in terms of knowledge regarding health and accessing treatment. Our study showed the prevalence of SRRII was highest among those with primary and secondary levels of education (23.4% and 23.5%, respectively). These findings are similar to those from Australia where those with a post-school qualification reported better health than those with no formal education (Australian Bureau of Statistics, 2004-2005). A study done in 48 countries showed there was a difference in reporting health status by educational level. Europeans with a higher education level were more likely to report a given health status negatively (D'Uvvo *et al*, 2008).

Indians, a minority group in Malay-

sia, had the highest prevalence of SRRII (28.2%). This group is disadvantaged, being mostly employed in the lower class labor force, which is predisposed to infections and accidents. A similar finding was seen in Australia (Australian Bureau of Statistics, 2004-2005) among indigenous Australians who were twice as likely to report poor health than non-indigenous Australians. Studies by Williams (2005) and Jackson (2005) have shown there are inequalities in self reported health among minority populations.

Rural areas had a significantly higher prevalence of recent illness and injury compared to urban locations (25.5% and 22.4%, respectively). This is similar to the findings of the World Health Survey (Subramaniam *et al*, 2010) which found differences in how individuals perceived their health, depending on whether they lived in urban or rural locations and had different levels of health awareness and expectations. Rural dwellers might have less opportunity to receive health information and technologies, leaving them at a disadvantage in seeking treatment at hospitals, possibly causing them to seek traditional treatment instead.

Those with a monthly household income <RM1,000 had a significantly higher prevalence of SRRII (34.5%) than those with the highest income level of >RM4,000. This is probably due to the fact that people with little money to obtain healthy food and live in healthy conditions were more likely to contract infections. An Australian study revealed people with a higher socio-economic level reported better health than those with a lower socio-economic level (Australian Bureau of Statistics, 2004-2005). A study done in Britain, Denmark, Germany and the USA found those in average and advantaged social classes had similar health,

but those from disadvantaged cases had poorer health (Sacker *et al*, 2009).

Although on bivariate analysis, income and education were only marginally associated with SRRII, on multivariate analysis age, gender, ethnicity, education, income and locality were significantly associated with the prevalence of SRRII. A meta-analysis of 40 studies found a strong association between education and health; people with higher levels of education reported better health (Furnee *et al*, 2008). Ethnicity was also found to be strongly associated with health in a study done in Sweden (Wiking, 2004). A study done by Von Dem Knesebeck *et al* (2006) showed there was a significant association between socio-economic status and health.

The prevalence of recent illness in this study was about eight times higher than that of injury. Illnesses related to the respiratory system (highest at about 42%) were the most common among the 11-20 years old age group. Respiratory illness ranked fourth among the top ten causes of admissions in government hospitals in Malaysia (Ministry of Health Malaysia, 2008). A study from Australia also found respiratory conditions were commonly reported conditions among children <15 years old (17%), among those 15-24 years old (28%) and among those ≥ 65 years old (Australian Bureau of Statistics, 2007-2008). In a household survey conducted in the United States, 72% of respondents reported a recent non-influenza related respiratory tract infection (Fendrick *et al*, 2003). In developing countries morbidity due to respiratory tract infections may be as severe as in industrialized countries. For children <5 years old, these infections are the leading cause of death (Denny, 1995).

The health interview survey has its

weaknesses. If an illness has not been medically attended to, diagnostic information is lacking. In the case of medically attended conditions, diagnostic precision is limited by the respondent's memory of medically/diagnostic terms mentioned by the physician and is influenced by his or her perceptions. Asymptomatic illnesses are entirely missed. Household surveys require enumerators to gather information. Respondents who are not at home when the enumerator passes by require the enumerator to make a follow-up visit. Other problems include the refusal of respondents to be interviewed. Self-reported health is a common measure of health status, however it is not the same as being examined by a physician. It is an individual's perception of his/her health and cannot determine variations in health status among countries, but can be used to evaluate health disparities within countries. A study done in Sweden showed Swedish people tend to over rate their health status while those in Germany tend to under rate it (Jurges, 2008).

This SRRII survey identified subgroups of the population requiring attention to improve their health. Existing health services provided by the Ministry of Health, such as Maternal and Child Health Services, School Health Programs, and Rural Health Water Supply and Sanitation ("BAKAS") need to be strengthened. An emphasis on the young, adolescents and the elderly must be continued by strengthening specific programs for these groups to achieve a comprehensive health service. The accident prevention program needs to be strengthened further to enhance existing outpatient care and emergency services to manage acute illnesses and injuries.

In conclusion, in spite of having a well organized, systematic health care

delivery service in the country, the problem of SRRII remains an important public health challenge in Malaysia. There is a need to review and strengthen existing health programs to achieve the vision of the Ministry of Health, Malaysia.

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