


# Self-reported non-communicable diseases and associated socio-demographic status among ethnic minority populations in Vietnam, 2019

Health Psychology Open  
July-December 2020: 1–7  
© The Author(s) 2020  
Article reuse guidelines:  
sagepub.com/journals-permissions  
DOI: 10.1177/2055102920954707  
journals.sagepub.com/home/hpo  


Hoang Van Minh<sup>1</sup>, Khuong Quynh Long<sup>1</sup>,  Nguyen Thanh Ha<sup>1</sup>,  
Doan Thi Thuy Duong<sup>1</sup>, Tran Trung<sup>2</sup>, Hoang Thi Huong<sup>3</sup>,  
Nguyen Van Huan<sup>4</sup>, Tran Thi Tuyet Hanh<sup>1</sup>, Vu Thi Hoang Lan<sup>1</sup>,   
Nguyen Mai Huong<sup>5</sup>, Luu Thi Kim Oanh<sup>1</sup>,  
Nguyen Thi Thu Trang<sup>1</sup>, Cao Huu Quang<sup>1</sup>,  Nguyen Duc Thanh<sup>1</sup>,  
Bui Thi My Anh<sup>1</sup> and Bui Thi Thu Ha<sup>1</sup>

## Abstract

The aim of this study was to report the prevalence of self-reported non-communicable diseases among ethnic minority populations in Vietnam and related factors. A total of 5033 individuals aged 15 years and older who belonged to ethnic minority populations from 12 provinces in Vietnam completed a household survey. The overall prevalence of self-reported non-communicable diseases was 12.4% (95% CI: 11.5%–13.4%). Cardiovascular diseases were the most prevalent, followed by diabetes. Ethnicity was shown to have an independently significant correlation to having any non-communicable diseases. Older people, near-poor and non-poor people had significantly higher odds of having non-communicable diseases as compared to younger and poor people.

## Keywords

associated factors, ethnic minority, non-communicable diseases, socio-demographic status, Vietnam

## Introduction

Non-communicable diseases (NCDs) include a wide range of preventable diseases that have a long natural history. The main types of NCDs are cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes (Ackland et al., 2003; World Health Organization, 2005). NCDs kill 41 million people globally each year, which is equivalent to 71% of all annual global deaths. More than three quarters of these NCD deaths occurred in low- and middle-income countries; it is expected that the number of deaths from NCDs will continue to increase rapidly over the next decade, with low- and middle-income countries continuing to carry the heaviest burden (Strong et al., 2005; World Health Organization, 2005, 2018).

Vietnam, like other developing countries, has experienced rapid economic growth, urbanization, and an aging

population, all of which contribute to an increased burden of NCDs (Son et al., 2012; Vietnam Ministry of Health and Health Partnership Group, 2014; World Health Organization, 2014). In fact, NCDs accounted for 318,000 deaths (72% of total deaths), 6.7 million years of life lost (56% of total years of life lost), and 14 million disability-adjusted life years lost (66% of disability-adjusted life year lost) in

<sup>1</sup>Hanoi University of Public Health, Hanoi, Vietnam

<sup>2</sup>Vietnam Academy for Ethnic Minorities, Hanoi, Vietnam

<sup>3</sup>Vietnam National University, Hanoi, Vietnam

<sup>4</sup>Committee on Ethnic Minority Affairs of Vietnam, Hanoi, Vietnam

<sup>5</sup>General Office for Population and Family Planning, Hanoi, Vietnam

## Corresponding author:

Khuong Quynh Long, Hanoi University of Public Health, 1A Duc Thang Road, Duc Thang Ward, North Tu Liem District, Hanoi 10000, Vietnam.  
Email: kql@huph.edu.vn



Vietnam in 2010 (World Health Organization, 2018). The rising burden of these chronic conditions and combinations of chronic conditions in Vietnam has led to an increased demand for health care and other social services (Van Minh et al., 2014; Vietnam Ministry of Health, 2014).

Vietnam has 53 ethnic minority groups (besides the “Kinh” majority group) that account for 14.2 million people—14.7% of the total Vietnamese population. These ethnic minority populations live mainly in the country’s Northern mountain and Central highlands regions, and they generally experience poorer economic, education, and health conditions (General Statistics Office, 2019). Furthermore, while Vietnam had, as of 2015, achieved almost all of its Millennium Development Goals (MDGs), for ethnic minorities in the country, these MDG indicators remain far below target levels (Committee on Ethnic Minority Affairs of Vietnam, 2015) and the gaps between ethnic minorities and the majority population in Vietnam continue to widen (The World Bank Group, 2019).

Moreover, while there has been some research on the prevalence of NCDs among general populations, there remains a lack of detailed analysis of the magnitude of NCDs and associated socio-demographic status among ethnic minority populations in Vietnam. In this paper, we report the prevalence of self-reported NCDs—with a focus on the four main types of NCDs: cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes—among ethnic minority populations from 12 Vietnamese provinces in 2019; we also identify socio-demographic correlates of these conditions.

## Methods

### Study design

This was a cross-sectional study based on a household survey.

### Study participants and settings

The study participants were individuals aged 15 years old and over who belong to an ethnic minority group in one of 12 provinces located in the four socio-demographic regions of Vietnam in which most ethnic populations live, including the (1) Northern midland and mountainous region: Lai Chau province (La Hu ethnicity), Ha Giang province (Mong ethnicity), Cao Bang province (Tay ethnicity), and Quang Ninh province (Dao ethnicity); (2) North central and Central coast region: Binh Dinh province (Ba Na ethnicity), Quang Tri province (Bru Van Kieu ethnicity), Thua Thien Hue province (Ta Oi ethnicity), and Ninh Thuan province (Cham Ninh Thuan ethnicity); (3) Central highland region: Kon Tum province (Gie Trieng ethnicity) and Dak Lak province (Mnong ethnicity); (4) Mekong delta region: An Giang province (Cham An Giang ethnicity) and Soc Trang province (Khmer ethnicity).

### Sample size and sampling

The number of participants included in this study from each ethnicity was estimated to be 384 (based on a formula for estimating the proportion of people who used health services in the last 12 months at 50%, a significance level of 95%, and absolute precision of 5%). To account for the design effect due to cluster sampling (as all eligible individuals in each household were interviewed), the sample size for each ethnicity was increased by 1.5 times, for a total of 576. The total sample size required to study 12 ethnicities in 12 provinces was estimated to be 6912 people (from about 1400 households). One to two communes with the highest numbers of people belonging to the target ethnic minority populations (e.g. La Hu people in Lai Chau province) were chosen from each selected province, based on consultations with local health authorities. The households included in the study were randomly selected from a list of all of the households in each selected commune; all eligible members of the chosen households were surveyed.

### Data collection

Data were collected through personal household interviews conducted by local health collaborators who could speak both Vietnamese and the local language. The data collectors were also familiar with the culture of the ethnic population in the chosen communes, and they attended two days of training in both classroom and field settings. Data quality was controlled in the field by supervisors and by the investigators of this study.

### Study instrument and measurements

A structured questionnaire was used to collect information on self-reported NCDs and socio-demographic information.

**Dependent variables.** Self-reported NCDs: Respondents were asked if they had been informed by a health worker that they had any major NCDs, including cardiovascular disease, cancer, diabetes, or chronic pulmonary diseases. The total number of chronic diseases reported by participants was calculated by summing the number of positive responses to these questions.

**Independent variables.** The participants’ socio-demographic characteristics were assessed by ethnicity, age, gender, educational level, languages spoken, work status, religion, and their present economic condition.

### Statistical method

Descriptive and analytical statistics were carried out using Stata 16 software (Stata Corporation). Proportions of the variables of interest, together with a corresponding 95% CI,

were calculated and multivariate logistic regression modeling was performed to examine the probability of having any chronic disease of interest in relation to risk factors and socio-demographic status. The variables that were included in the model were determined based on the literature review and the author's knowledge of the ethnic minority population in Vietnam. A significance level of  $p < 0.05$  was used.

### Ethical considerations

The protocol of this study was approved by the Scientific and Ethical Committee in Biomedical Research, Hanoi University of Public Health (No 435/2018/YTCC-HD3, dated 01/10/2018). All study participants were asked for their consent before collecting data, and all were aware of their rights to withdraw from the study at any time without consequences.

## Results

### Socio-demographic characteristics of the study participants

Of the 5172 people aged 15 years old and over who were selected in the study area, 5033 responded to the survey (a response rate of 97.3%). The socio-demographic characteristics of the study participants are described in Table 1. More women (55.3%) than men (44.7%) were included in the final study sample, and nearly half (45.9%) of the participants were between 15–34 years old. About one quarter (27.7%) of the respondents had no education (and were considered to be illiterate), but 93.7% of them could speak Vietnamese. The proportion of study respondents who did not have employment was 13.4%, and one third (29.4%) of the study subjects belonged to a religion. The percentages of poor and near-poor people were 16.8% and 11.7%, respectively.

### Prevalence of self-reported non-communicable diseases

Table 2 presents the prevalence (and 95% CI) of self-reported NCDs (i.e. cardiovascular disease, diabetes, chronic pulmonary diseases, and cancer) among the study participants. The overall prevalence of self-reported NCDs among those participants who reported having at least one of the main four NCDs was 12.4% (95% CI: 11.5%–13.4%). Cardiovascular diseases (hypertension, heart, and circulatory conditions) were found to be the most prevalent (8%, 95% CI: 7.2–8.8%), followed by diabetes (4.6%, 95% CI: 4.0–5.2%). Only 0.7% (95% CI: 0.5–0.9%) and 0.1% (95% CI: 0.01–0.3%) of the study respondents reported having chronic pulmonary diseases or cancer, respectively.

As shown in Table 3, the prevalence of NCDs was lowest among the Mong and La Hu people (3.2% and

**Table 1.** Socio-demographic characteristics of the study participants.

Socio-demographic characteristics	n (%)
<b>N</b>	<b>5033</b>
<b>Ethnicity</b>	
La Hu	496 (9.9)
Cham An Giang	438 (8.7)
Cham Ninh Thuan	352 (7.0)
Dao	446 (8.9)
Gie Trieng	353 (7.0)
KhMer	385 (7.6)
Mong	404 (8.0)
Ba Na	369 (7.3)
Mnong	388 (7.7)
Tay	424 (8.4)
Ta Oi	462 (9.2)
Bru Van Kieu	428 (8.5)
Others	88 (1.7)
<b>Sex</b>	
Men	2248 (44.7)
Women	2785 (55.3)
<b>Age</b>	
15–24	1142 (22.7)
25–34	1168 (23.2)
35–44	973 (19.4)
45–54	371 (7.4)
55–64	534 (10.6)
65+	838 (16.7)
<b>Education</b>	
Illiterate	1393 (27.7)
Primary	1010 (20.1)
Secondary	1465 (29.1)
High school	1163 (23.1)
<b>Can speak the Vietnamese language</b>	
No	318 (6.3)
Yes	4715 (93.7)
<b>Work status</b>	
Student	441 (8.8)
Having a job	3916 (77.8)
Jobless	676 (13.4)
<b>Religion</b>	
No	3552 (70.6)
Yes	1481 (29.4)
<b>Economic status</b>	
Poor	845 (16.8)
Near poor	588 (11.7)
Non-poor	3600 (71.5)

3.4% respectively). Furthermore, while the prevalence of NCDs was similar in men and women, the prevalence of NCDs did increase with age, especially among people aged 55–64 years and those aged 65 years and over (24.7% and 32.6%, respectively). NCDs were more prevalent among people with only primary education and those with

**Table 2.** Prevalence of self-reported non-communicable diseases among ethnic minority populations.

Prevalence of self-reported non-communicable diseases	Prevalence	Lower bound of 95%CI	Upper bound of 95%CI
Having one among the four studied NCD	12.4	11.5	13.4
Cardiovascular diseases	8.0	7.2	8.8
Diabetes	4.6	4.0	5.2
Chronic pulmonary diseases	0.7	0.5	0.9
Cancer	0.1	0.05	0.3

**Table 3.** Distribution of self-reported non-communicable diseases among ethnic minority populations by their socio-demographic status.

Socio-demographic status	Prevalence	Lower bound of 95%CI	Upper bound of 95%CI
<b>Ethnicity</b>			
La Hu	3.4	1.8	5.0
Cham An Giang	16.9	13.4	20.4
Cham Ninh Thuan	15.3	11.6	19.1
Dao	8.1	5.5	10.6
Gie Triêng	21.0	16.7	25.2
KhMer	21.8	17.7	26.0
Mong	3.2	1.5	4.9
Ba Na	12.7	9.3	16.1
Mnong	9.3	6.4	12.2
Tay	5.4	3.3	7.6
Ta Oi	24.5	20.5	28.4
Bru Van Kieu	10.3	7.4	13.2
Others	12.5	5.5	19.5
<b>Sex</b>			
Men	12.0	10.6	13.3
Women	12.8	11.6	14.1
<b>Age</b>			
15–24	5.3	4.0	6.5
25–34	5.7	4.3	7.0
35–44	6.1	4.6	7.6
45–54	9.7	6.7	12.7
55–64	24.7	21.1	28.4
65+	32.6	29.4	35.8
<b>Education</b>			
Illiterate	20.4	18.3	22.5
Primary	13.6	11.5	15.7
Secondary	7.6	6.3	9.0
High school	8.0	6.4	9.6
<b>Can speak the Vietnamese language</b>			
No	20.8	16.3	25.2
Yes	11.9	11.0	12.8
<b>Work status</b>			
Student	6.3	4.1	8.6
Having a job	10.1	9.1	11.0
Jobless	30.2	26.7	33.6
<b>Religion</b>			
No	10.7	9.7	11.7
Yes	16.6	14.7	18.5
<b>Economic status</b>			
Poor	7.1	5.4	8.8
Near poor	13.3	10.5	16.0
Non-poor	13.6	12.4	14.7

no education (13.6% and 20.4%, respectively). Moreover, NCDs were more common among people who could not speak Vietnamese (20.8%) and among those who belonged to a religion (16.6%). Finally, those participants who fell into the near-poor and poor socio-economic categories were found to have a higher prevalence of NCDs (13.3% and 13.6%, respectively).

### Association between NCDs and socio-demographic status

The multivariate logistic analysis of the association between having one or more NCDs of interest and the participants' socio-demographic status is shown in Table 4. After controlling for other variables in the model, it was found that ethnicity, age, and economic status were independently significant correlates of having an NCDs. With regard to ethnicity, study participants who were part of the Cham An Giang, Cham Ninh Thuan, Gie Trieng, Khmer, Ba Na, Mning, Tay, or Bru Van Kieu ethnic populations had significantly higher odds of having an NCD as compared to those of La Hu ethnicity. In terms of age, older people (those aged 35–44, aged 55–64, and especially those aged 65 years and over) had significantly higher odds of having an NCD (OR = 2.14, 6.04, and 8.67, respectively) compared to those between the ages of 15–24. Regarding economic status, those who were considered to be near-poor and non-poor had significantly higher odds of having an NCD (OR = 1.52 and 1.53) as compared to those who were considered to be poor.

### Discussion

To the best of our knowledge, this is the first paper examining the magnitude and socio-economic correlates of NCDs among ethnic minority populations in Vietnam. The evidence generated from this paper can support the Government of Vietnam's efforts to evaluate the current targeted program for health and population for the period of 2016–2020. It may also contribute valuable information with regard to the development of the government's plan for socio-demographic development investments in areas that have high numbers of ethnic minorities, as well as in mountainous and disadvantaged areas, for 2021–2025. In the current context of global health, the results of this research would be of value to the international community as a whole. This study also sheds light on the issue of equity in Vietnam and other low- and middle-income countries.

The overall 12.4% prevalence of NCDs found in this study indicates that conditions have already affected ethnic minority populations in Vietnam, and this supports the findings from a 2013 study conducted among Kinh people (who account for the majority—nearly 85%—of the Vietnamese population) in a non-slum area in Hanoi capital that reported

**Table 4.** Multivariate logistic analyses of association between having of any NCD of interest with socio-demographic status of the study participants.

Socio-demographic status	OR	95%CI
<b>Ethnicity</b>		
La Hu	Ref	
Cham An Giang	4.26***	2.15–8.42
Cham Ninh Thuan	4.13***	1.99–8.00
Dao	1.84	0.97–3.36
Gie Trieng	8.24***	4.36–15.58
KhMer	6.24***	3.39–11.23
Mong	0.99	0.46–2.10
Ba Na	5.41***	2.87–9.74
Mning	2.36**	1.23–4.42
Tay	1.36	0.68–2.59
Ta Oi	9.88***	5.62–17.01
Bru Van Kieu	2.81**	1.52–5.18
Others	3.50**	1.48–8.12
<b>Sex</b>		
Men	Ref	
Women	0.98	0.81–1.18
<b>Age</b>		
15–24	Ref	
25–34	1.05	0.70–1.57
35–44	1.18	0.78–1.80
45–54	2.14**	1.35–3.59
55–64	6.04***	4.15–9.36
65+	8.67***	6.02–13.21
<b>Education</b>		
Illiterate	Ref	
Primary	0.91	0.70–1.17
≥ Secondary school	0.97	0.66–1.18
<b>Can speak Vietnamese language</b>		
No	Ref	
Yes	1.20	0.84–1.71
<b>Work status</b>		
Student	Ref	
Having a job	1.00	0.63–1.64
Jobless	1.59	0.96–2.69
<b>Religion</b>		
No	Ref	
Yes	0.87	0.61–1.22
<b>Economic status</b>		
Poor	Ref	
Near poor	1.52*	1.03–2.28
Non-poor	1.53*	1.08–2.12

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

an NCD prevalence of 11.6% (the study included the same four major NCDs included in the current study) (Kien et al., 2017). It is of note, however, that the overall prevalence of NCDs found in our study is lower than the 39% reported by research conducted among the Kinh population of a rural area in the north of Vietnam in 2005 (Minh et al., 2008).



Furthermore, recent research has also revealed higher self-reported NCDs among the Kinh population in one urban area (27%) and one rural area (22%) of Vietnam (Supakul et al., 2019). One reason for this difference is that the other study included other NCDs such as chronic joint problems, chronic digestive conditions, chronic urinary diseases, etc. Further to this, our qualitative survey revealed that individuals who belong to an ethnic minority population tend to feel shy when asked to discuss their health problems (unpublished report).

The current study also found that the prevalence of self-reported NCDs varied significantly across ethnic minority populations (from 3.2% among Mong people to 24.5% among the Ta Oi). In fact, socio-demographic and health and health-seeking behaviors were found to be quite varied between different specific ethnic minority populations in Vietnam (General Statistics Office, 2019; The World Bank Group, 2019). Furthermore, the geographical conditions and climate vary widely between the study areas; for example, study participants of La Hu ethnicity, Mong ethnicity, Tay ethnicity, and Dao ethnicity had an NCD prevalence of less than 6%. The participants who belonged to these ethnic groups were from the Northern Midland and Mountainous Region, which are high above sea level in comparison to other areas. In addition, habits and customs related to NCD risk factors, such as drinking, smoking habits, health-care-seeking behaviors and attitudes, and health problem reporting behavior (i.e. levels of openness with regard to sharing health information with others) may also contribute to these differences. The relationship between habits, customs and NCDs among ethnic minorities should be investigated in further studies.

The findings of the present study also indicate that increasing age is associated with a higher occurrence of chronic diseases. The fact that chronic diseases were more prevalent among older people is in concordance with the findings of a previous Vietnamese survey (Minh et al., 2008; Vietnam Ministry of Health, 2003), as well as other international publications (Dalstra et al., 2005; Glover et al., 2004; Verbrugge and Patrick, 1995; Yach et al., 2005). In the current study, economic status was found to be significantly associated with the probability of having at least one NCD, with those who fall into the near-poor and non-poor categories reporting higher levels of NCDs. This differs from the findings of previous studies involving Kinh people that found an inverse relationship between economic status and self-reported NCDs (Kien et al., 2017; Minh et al., 2008). Reasons for these differences should be further investigated in the future.

There are some methodological limitations of this study that must be taken into consideration. First, self-reported morbidity might not be reliably accurate due to recall bias, and the study subjects only gave a rough estimate. Second, as this is a cross-sectional study, the causal association between NCDs, socio-demographic considerations and

differences in habits and customs between ethnic populations cannot be examined. Third, the number of NCDs included in the study may have influenced the results, and it has been shown that estimates regarding the prevalence of NCDs differ greatly (Fortin et al., 2012). Finally, this study was not originally intended to investigate NCDs among the populations surveyed in this research.

In summary, this study's findings indicate that NCDs are quite common among the ethnic minority populations of rural Vietnam and that there is an association between NCDs and the socio-demographic status of a given population. Given these results, it is clear that actions must be taken to reduce levels of NCDs in ethnic minority areas. As this constitutes a preliminary study of NCDs in ethnic minority populations, further, more specific studies on NCDs among ethnic minority populations are necessary to provide more compelling evidence of the epidemiological aspects of NCDs in Vietnam and in low- and middle-income countries.

### Acknowledgements

The authors would like to acknowledge the support of the Committee on Ethnic Minority Affairs of Vietnam. We thank On Zhi Xiang and Kelvin O from Republic Polytechnic University of Singapore for editing the language content of this paper.




### Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

### ORCID iDs

Khuong Quynh Long  <https://orcid.org/0000-0002-1232-6230>  
 Vu Thi Hoang Lan  <https://orcid.org/0000-0001-8528-357X>  
 Cao Huu Quang  <https://orcid.org/0000-0002-4921-9068>

### Data Availability

Data is available upon request to the corresponding author.

### References

- Ackland M, Choi BCK and Puska P (2003) Rethinking the terms non-communicable disease and chronic disease. *Journal of Epidemiology and Community Health* 57(11): 838–839.
- Committee on Ethnic Minority Affairs of Vietnam (2015) *Report on Action Plan For Implementing Annual Development Objectives in Ethnic Minority Areas In vietnam*. Hanoi: Committee on Ethnic Minority Affairs of Vietnam.
- Dalstra JA, Kunst AE, Borrell C, et al. (2005) Socioeconomic differences in the prevalence of common chronic diseases: An overview of eight European countries. *International Journal of Epidemiology* 34(2): 316–326.

- Fortin M, Stewart M, Poitras ME, et al. (2012) A systematic review of prevalence studies on multimorbidity: Toward a more uniform methodology. *Annals of Family Medicine* 10(2): 142–151.
- General Statistics Office (2019) *The 2019 Vietnam National Population and Housing Census*. Hanoi: General Statistics Office.
- Glover JD, Hetzel DM and Tennant SK (2004) The socioeconomic gradient and chronic illness and associated risk factors in Australia. *Australia and New Zealand Health Policy* 1(1): 8.
- Kien VD, Van Minh H, Giang KB, et al. (2017) Socioeconomic inequalities in self-reported chronic non-communicable diseases in urban Hanoi, Vietnam. *Global Public Health* 12(12): 1522–1537.
- Minh HV, Huong DL and Giang KB (2008) Self-reported chronic diseases and associated sociodemographic status and lifestyle risk factors among rural Vietnamese adults. *Scandinavian Journal of Public Health* 36(6): 629–634.
- Son PT, Quang NN, Viet NL, et al. (2012) Prevalence, awareness, treatment and control of hypertension in Vietnam—results from a national survey. *Journal of Human Hypertension* 26(4): 268–280.
- Strong K, Mathers C, Leeder S, et al. (2005) Preventing chronic diseases: How many lives can we save? *Lancet* 366(9496): 1578–1582.
- Supakul S, Park HY, Nguyen BN, et al. (2019) Prevalence differences in major non-communicable diseases in a low- middle income country: A comparative study between an urban and a rural district in Vietnam. *Journal of Global Health Science* 1(2).
- The World Bank Group (2019) *Drivers of Socio-Economic Development Among Ethnic Minority Groups in Vietnam*. Washington DC: The World Bank Group.
- Van Minh H, Do YK, Bautista MA, et al. (2014) Describing the primary care system capacity for the prevention and management of non-communicable diseases in rural Vietnam. *The International Journal of Health Planning and Management* 29(2): e159–e173.
- Verbrugge LM and Patrick DL (1995) Seven chronic conditions: Their impact on US adults' activity levels and use of medical services. *American Journal of Public Health* 85(2): 173–182.
- Vietnam Ministry of Health (2003) *Vietnam National Health Survey 2001-2002*. Ministry of Health Vietnam: Hanoi.
- Vietnam Ministry of Health (2014) *The Joint Annual Health Review 2014 (JAHR 2014): Strengthening prevention and control of NCDs*. Vietnam Ministry of Health: Hanoi.
- Vietnam Ministry of Health and Health Partnership Group (2014) *Joined Annual Health Review: Strengthening Prevention and Control of Non-communicable Disease*. Hanoi: Vietnam Ministry of Health.
- World Health Organization (2005) *Preventing Chronic Diseases - a Vital Investment*. Geneva: World Health Organization.
- World Health Organization (2014) *Global Status Report on Non-communicable Diseases 2014*. Geneva: World Health Organization.
- World Health Organization (2018) *Noncommunicable Diseases Country Profiles 2018*. Available at: [https://www.who.int/nmh/countries/2018/vnm\\_en.pdf](https://www.who.int/nmh/countries/2018/vnm_en.pdf).
- Yach D, Kellogg M and Voute J (2005) Chronic diseases: An increasing challenge in developing countries. *Transactions of The Royal Society of Tropical Medicine and Hygiene* 99(5): 321–324.