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Philippine Institute for Development Studies  
*Surian sa mga Pag-aaral Pangkaunlaran ng Pilipinas*

## Inequities in Noncommunicable Diseases

*Valerie Gilbert T. Ulep et al.*

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## Inequities in Non-Communicable Diseases

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### Abstract

This report presents the findings of the research conducted by the Philippine Institute for Development Studies (PIDS) on leading non-communicable diseases. With the collaborative efforts of World Health Organization (WHO) and Food and Nutrition Research Institute (FNRI), this research project was conducted to supplement the Department of Health's initiative in crafting a national strategy in the prevention and control of non-communicable diseases.

This study presents evidences on mortality, morbidity, some social determinants and inequities. Using different secondary data sets like the National Nutrition Survey, National Demographic and Health Survey, Death Registry from National Statistics Office, Family Income and Expenditure Survey and other information obtained from other studies were analysed to come up with a unified and comprehensive study that depicts the true picture of NCDs epidemic in the country.

**Keywords: Non-communicable diseases, Cardio-vascular Diseases, Cancer, Diabetes mellitus, risk factors, social determinants, inequity**

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\*The researchers would like to thank Food and Nutrition and Research Institute for their collaborative support.

## Executive Summary

The main findings are listed below:

- This study ascertains the growing dominance of NCDs as major causes of death in emerging economies. In 2007, majority of deaths in the Philippines are attributed to NCDs.
- Results of the analysis shows a negative correlation between poverty incidence and crude death rate of major NCDs ( $R=-0.44$ ;  $p$  value: 0.000). In other words, as poverty incidence of a province increases the crude death rate of major NCDs (CVDs, diabetes and malignancies) decreases. Nevertheless, the result should not lead policy makers in a perception that NCDs are diseases of the affluent. The result of 'crude' ecologic analysis may be undermined, and supports for more validated empirical evidence through age-sex standardization of mortality data from National Statistics Office and usage of micro-data to analyse the effect of wealth on mortality and morbidity attributed to NCDs.
- However, NCDs are more likely to occur in the richer population as ascertained by the higher prevalence of hypercholesterolemia, diabetes mellitus and obesity compared to their poorer counterparts. Multivariate regression analyses of 2008 National Nutrition Survey also validated this result. Interestingly, other risk factors of NCDs like smoking (including second hand smoking) and high salt consumption are leaning towards the poorer population, while other indicators have no difference across socio-economic groups (i.e. hypertension). The negative relationship of wealth and several NCDs indicator is commonly found in most emerging countries like India and China. In contrast to developed countries, NCDs are afflicting the poorer segments the population.
- As noted, NCDs indicators in the country show that NCDs are more likely to affect the richer population. However, there is also growing concern that NCDs are now shifting to the poorer segments, specifically the urban poor. Given the expanding domestic economy and related processes (i.e. globalization and trade, urban migration and urban concentration of employment, etc), it points to the growing non-resilience of the poor population. Analysis of several NCD indicators shows the higher vulnerabilities of urban poor population compared to their counterparts in rural areas (i.e. high consumption and expenditure of unhealthy diet).

- It is well known that NCDs like cardio-vascular diseases and diabetes are more likely to occur in older age group. However, there is also a concern on the ‘risky’ practices of young adolescents (i.e. higher consumption of unhealthy food and smoking).
- In terms of NCD-related consultation, health service delivery is highly segmented in nature. Poor population would visit public and non-hospital facilities while their richer counterparts would tend to visit private hospitals. In general, majority of the population visit private health facilities for their NCD-related consultation.
- In terms of policy, the Department of Health issued the Administrative Order: 2011-003. (National Policy on the Prevention of Non-communicable Lifestyle-related Diseases). This laudable policy piece outlines the general position of the agency in terms of NCD mitigation. However, this policy should harness a more specific, synchronized and sustainable strategy targeting primarily the poor segments of population.
- There is a wide experience in scanning other specific laws on trade, physical activity, tobacco, alcohol and unhealthy food regulation. With regard to tobacco control, the country has strong national position in controlling for tobacco, though several features are still needed (i.e. amendment of sin tax laws, graphic warnings). For regulation of unhealthy diet and alcohol, there are no comprehensive laws on these domains. If present, they are scattered and highly dependent on local government units. The effectiveness of these existing laws is another matter.

## Recommendation

- As noted, NCDs are more likely to occur in richer population. However, this should not make policy makers and managers to be complacent. Looking NCDs as diseases of the affluent restrict programmatic and financial investments in mitigating and preventing NCDs. Given the expanding domestic economy which might change the consumption and expenditure patterns increase the vulnerability of population regardless of socio-economic class. The low inclusive economic growth may also exacerbate the problems of NCDs among the poor. In this regard, the Department of Health should craft specific, multi-sectoral and sustainable strategy in mitigating the problems of NCDs especially the poor population.

## Acronyms

AO-Administrative Order  
ASEAN-Association of Southeast Asian Nations  
ATIGA-ASEAN Trade in Goods Agreement  
BAS-Bureau of Agricultural Statistics  
BMI-Body Mass Index  
BP-Blood Pressure  
BPO-Business Process Outsourcing  
CI-Confidence Interval  
COD-Cause of Death  
CSC-Civil Service Commission  
CVD-Cardio-vascular Diseases  
DHS-Demographic and Health Survey  
DM-Diabetes mellitus  
DOH-Department of Health  
DOH-Department of Health  
DOLE- Department of Labour and Employment  
DTI-Department of Trade and Industry  
DUIC-Drivers Under the Influence of Alcohol Act  
FDA-Food and Drug Administration  
FDI-Foreign Direct Investments  
FIES-Family Income and Expenditure Survey  
FNRI-Food and Nutrition Research Institute  
GATS-Global Adult Tobacco Survey  
GDP-Gross Domestic Product  
GNI-Gross National Income  
ILO-International Labour Organization  
LGU-Local Government Units  
MDRP-Maximum Drug Retail Price  
MMDA-Metro Manila Development Authority  
NCDs-Non-communicable Diseases  
NEDA-National Economic Development Authority  
NCR-National Capital Region  
NNS-National Nutrition Survey  
NSCB-National Statistical Coordination Board  
NSO-National Statistics Office  
PANA-Philippine Association of National Advertisers  
PCA-Principal Component Analysis  
PCSO-Philippine Charity Sweepstakes Office  
PIDS-Philippine Institute for Development Studies  
RA-Republic Act  
RHUs-Rural Health Units  
SES-Socio-economic Status  
TTC-Transnational Tobacco Companies  
UN-United Nations  
WB-World Bank  
WHO-World Health Organization  
WTO-World Trade Organization

## Contents

|   |    |
|---|----|
| Background.....   | 1  |
| Objectives of study .....   | 2  |
| Methodology.....  | 2  |
| Conceptual approach in understanding social determinants of NCDs..... | 2  |
| NCD epidemic in emerging economies .....                              | 5  |
| Status of NCD mortality and morbidity in the Philippines .....        | 7  |
| a.    Cardio-vascular diseases.....                                   | 9  |
| b.    Cancer .....  | 11 |
| c.    Diabetes .....  | 13 |
| Determinants of NCDs .....  | 15 |
| The role of macroeconomic and macro-social factors on NCDs .....      | 16 |
| A.    Economic growth.....  | 16 |
| B.    Economic flows .....  | 18 |
| C.    Advancement in technology .....                                 | 20 |
| Vulnerabilities .....   | 21 |
| A.    Body Mass Index (BMI) .....                                     | 21 |
| B.    Total blood cholesterol.....                                    | 25 |
| C.    Hypertension .....  | 28 |
| Exposures .....   | 31 |
| A.    Unhealthy diet .....  | 31 |
| B.    Smoking.....  | 44 |
| C.    Alcohol consumption .....                                       | 46 |
| D.    Physical inactivity.....  | 47 |
| E.    Barriers in health service delivery and health financing .....  | 48 |
| Policy scanning.....  | 53 |
| Trade policies .....  | 53 |
| Tobacco control policies .....  | 56 |
| Alcohol regulation policies.....                                      | 60 |
| Food regulations .....  | 61 |
| Physical activity.....  | 62 |
| Access to medicine.....   | 63 |
| Recommendations .....   | 64 |
| Bibliography.....   | 67 |

## List of Tables

|   |    |
|---|----|
| Table 1. Distribution of deaths, by cause and gender, 2008.....   | 9  |
| Table 2. Distribution of CVD deaths by type and sex, Philippines, 2008. ....  | 10 |
| Table 3. Prevalence of Diabetes mellitus among adults 20 years old and above, by age group and sex, Philippines, 2008. ....   | 14 |
| Table 4. Prevalence of Diabetes mellitus among adults 20 years old and above, by socio-economic status, urbanization and educational attainment, Philippines, 2008. ....          | 15 |
| Table 5. Prevalence of Diabetes mellitus among adults 20 years old over, by urban and rural poor, Philippines, 2008. ....   | 15 |
| Table 6. Quantity of food import and export, Philippines, 1994-2010.....  | 19 |
| Table 7. Prevalence of obesity among adults 20 years old and above, by age group and sex, Philippines, 2008. ....   | 22 |
| Table 8. Prevalence of obesity among adults 20 years old and above, by urbanization and educational attainment, Philippines, 2008.....  | 22 |
| Table 9. Prevalence of obesity among adults 20 years old and above, by urban and rural poor, Philippines, 2008. ....  | 23 |
| Table 10. Regression results of BMI and different predictors.....   | 24 |
| Table 11. Prevalence of high total Cholesterol (> 240 mg/dl) among adults 20 years old and above, Philippines, 2008. ....   | 25 |
| Table 12. Prevalence of high cholesterol among adults 20 years old and above, by socio-economic status, urbanization and educational attainment, Philippines, 2008. ....          | 26 |
| Table 13. Prevalence of high cholesterol among adults 20 years old and above, by urban and rural poor, Philippines, 2008. ....  | 26 |
| Table 14. Regression results of total cholesterol and different predictors. ....  | 27 |
| Table 15. Prevalence of hypertension by single visit BP among adults 20 years and above, by age Philippines, 2008. ....   | 28 |
| Table 16. Prevalence of hypertension by single visit BP among adults 20 years and above by socio-economic status, urbanization and educational attainment, Philippines, 2008..... | 29 |
| Table 17. Prevalence of hypertension by single visit BP among adults 20 years and above by urban and rural poor, Philippines, 2008.....   | 29 |
| Table 18. Regression results of hypertension and different predictors.....  | 30 |
| Table 19. Average daily food consumption per capita per day, by socio-economic status, Philippines, 2008. ....  | 31 |
| Table 21. Mean intake of oil among adults 20 years and above, by socio-economic status, urbanization and educational attainment, Philippines, 2008. ....                          | 33 |
| Table 22. Mean intake of oil among adults 20 years and above, by socio-economic status, urbanization and educational attainment, Philippines, 2008. ....                          | 33 |
| Table 23. Mean intake of soft drinks in grams per day among adults 20 years and above, Philippines, 2008..  | 42 |
| Table 24. Mean intake of soft drinks in grams per day among adults, 20 years and above by socio-economic status, urbanization and educational attainment, Philippines, 2008.....  | 42 |
| Table 25. Mean salt intake in grams per day among adults 20 years and above, by age, Philippines, 2008.....   | 43 |
| Table 26. Mean salt intake in grams per day among adults, 20 years and above by socio-economic status, urbanization and educational attainment, Philippines, 2008. ....           | 43 |
| Table 27. Prevalence of current smokers among adults 20 years and above, by age, Philippines, 2008. ....  | 44 |



|  |    |
|--|----|
| Table 28. Prevalence of current smokers among adults 20 years and above, by socio-economic status, urbanization and educational attainment, Philippines, 2008. ....                              | 45 |
| Table 29. Prevalence of adults 15 years and older who are exposed to tobacco smoke at home, by sex, age, socio-economic status, Philippines, 2009. ....  | 46 |
| Table 30. Prevalence of current alcohol drinkers among adults 20 years and above, Philippines, 2008. ....  | 46 |
| Table 31. Prevalence of current alcohol drinking among adults 20 years and above, by socio-economic status, urbanization and educational attainment, Philippines, 2008. ....                     | 47 |
| Table 32. Prevalence of work or occupation related physical activity among adults 20 years and above, Philippines, 2008. ....  | 47 |
| Table 33. Prevalence of work or occupation related physical activity among adults 20 years and above, by socio-economic status, urbanization and educational attainment, Philippines, 2008. .... | 48 |
| Table 34. Travel time going to health facility during NCD consultation.....  | 51 |
| Table 35. Summary of trade-related laws. ....  | 55 |
| Table 36. Summary of vital components of RA 9211.....  | 57 |
| Table 37. Tobacco excise tax. ....   | 58 |
| Table 37. Summary of policies related to tobacco control. ....   | 59 |
| Table 38. Vulnerable population segments .....   | 65 |

## Table of Figures

|  |    |
|--|----|
| Figure 1. Priority public health conditions analytical framework. ....   | 3  |
| Figure 2. Priority public health conditions knowledge network framework.....   | 4  |
| Figure 3. Number of deaths, by cause and country income classification, 2008.....  | 5  |
| Figure 4. Estimated annual growth rates of infectious and NCD mortality, by world region, ..... 2002-2030. ....                | 6  |
| Figure 5. Conceptual concentration of burden of NCDs. ....   | 7  |
| Figure 6. Crude death rates of common NCDs, by province, Philippines, 2005.....  | 8  |
| Figure 7. Distribution of population diagnosed with myocardial infarction, by age, 2008.....                                   | 11 |
| Figure 8. Distribution of population with diagnosed coronary heart disease, age, 2008. ....                                    | 11 |
| Figure 9. Distribution of deaths due to malignancies, Philippines, 2008.....   | 12 |
| Figure 10. Distribution of deaths due to malignancies, males, Philippines, 2008. ....  | 12 |
| .....  | 12 |
| Figure 11. Distribution of deaths due to malignancies, females, Philippines, 2008.....   | 13 |
| Figure 12. Distribution of deaths due to Diabetes mellitus, Philippines, 2008. ....  | 14 |
| Figure 13. Crude death rate due to NCDs vs. GNI per capita, Philippines, 1980-2005.....  | 17 |
| Figure 14: Poverty incidence and crude death rate of common NCDs, Philippines, 2005. ....                                      | 18 |
| Figure 15. Quantity of imported food products in kilograms, Philippines, 1994-2010. ....                                       | 19 |
| Figure 16. Number of employed person by major occupation group, Philippines, 2002-2010. ....                                   | 20 |
| Figure 17. Percentage of population that eats at take away restaurants at least once a week, by selected countries, 2004. .... | 34 |
| Figure 18. Expenditure of food consumed at home vs. outside home, Philippines, 1994-2006.....                                  | 35 |
| Figure 19. Share of food eaten outside home expenditure on total food expenditure, Philippines, 2009.....                      | 36 |
| .....  | 36 |
| Figure 20. Share of food outside home expenditure on total food expenditure, by rural and urban poor, Philippines, 2009. ....  | 36 |
| Figure 21. Share of food outside home expenditure on total food expenditure, by income decile, NCR, Philippines, 2009. ....    | 37 |
| Figure 22. Advertising time per hour of children's program by selected countries, 2004. ....                                   | 38 |
| Figure 23. Share of selected food expenditure on total expenditure, Philippines, 1994-2006. ....                               | 39 |
| Figure 24. Mean intake in grams, by major food classification and age, Philippines, 2008. ....                                 | 40 |
| Figure 25. Mean intake in grams, by major food classification and socio-economic status, Philippines, 2008. ....               | 40 |
| .....  | 40 |
| Figure 25. Mean intake in grams per day, by major food classification and rural and urban poor, Philippines, 2008. ....        | 41 |
| Figure 26. Distribution of facility visited during a NCD-related consult, Philippines, 2008. ....                              | 49 |
| Figure 27. Distribution of facility visited during a NCD-related consult among the poor (Q1 and Q2) Philippines, 2008. ....    | 50 |
| Figure 28. Distribution of facility visited during a NCD-related consult among the non-poor (Q3-Q5), Philippines, 2008. ....   | 50 |
| Figure 29. Sources of financing during NCD consultation, Philippines. 2008. ....   | 52 |

## Background

Infectious and pregnancy-related morbidities are still major health problems in the country. However, there is a noticeable epidemiologic shift from infectious to non-communicable diseases (NCDs) over the years. NCDs are broad classification of medical conditions which are non-infectious in nature. In general, they have relatively slow and long prognosis compared to infectious diseases. In 2007, seven of the ten leading causes of death are non-communicable in etiology. Twenty percent (20%) of the total deaths are due to heart diseases followed by cerebrovascular diseases (11%) and malignant neoplasms (10%). The continuous dominance of NCDs as the leading cause of death is expected in the next few years (World Health Organization, 2011; National Statistics Office, 2007).

The growing problem of NCDs should push policy makers to craft effective strategy to mitigate the enormous economic and social costs they bring. According to World Health Organization, cardio-vascular diseases, stroke and diabetes are estimated to reduce the Gross Domestic Product (GDP) from 1-5 percent in low and middle countries (World Health Organization, 2011; Abegunde & Stanciole, 2006). In response to the growing threat, institutions like World Health Organization have already conceptualized general frameworks on the prevention and control of NCDs.

Prevention and control of NCDs is complex. It entails rigorous identification of different risk factors that exacerbates their occurrence. NCDs occur as a result of accumulated and synergistic effect of biological, environmental and social risk factors. Analyses of different risk factors would lead to the identification of different points of intervention in the disease process. Though several studies have been made in the past, there are no comprehensive and updated analyses on social determinants of NCDs. These analyses are useful in the development of multi-sectorial framework for monitoring, prevention and control of these diseases. In this light, the aim of the study is to gather wide range of information on leading NCDs, from mortality, morbidity and their social determinants. This study utilized different secondary data sets like National Nutrition Survey, National Demographic and Health Survey, Family Income and Expenditure Surveys and other relevant data. Scanning of existing laws and policies related to NCDs was also performed.

## Objectives of study

This study is part of the bigger initiative of the Department of Health and World Health Organization in developing a national strategy in combating non-communicable diseases, primarily their social determinants.

The objective of this study is to analyze mortality, morbidity and risk factors attributed to NCDs. This study attempts to present the disparity of NCDs across socio-demographic variables (e.g. socio-economic status, education, urbanity, gender and other relevant indicators that posit inequity). Macro-level perspectives (e.g. economic growth, urbanization, trade practices) were also discussed as one way to generally explain the growing burden of NCDs burden in the country. Lastly, a policy scanning was performed to determine the current position and pace of the country in terms of NCD prevention and control.

## Methodology

The researchers used quantitative and qualitative methods. For quantitative analysis, different secondary micro-data sets like National Nutrition Survey (NNS), Demographic Health Survey (DHS) and Family Income and Expenditure Survey (FIES) were used. Both bivariate and multivariate analyses were performed to present the different risk factors of major non-communicable diseases.

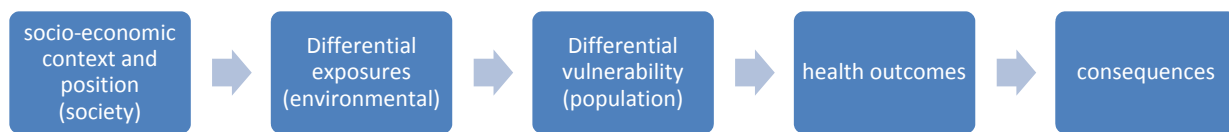
For the qualitative component of the study, policies related to non-communicable diseases of different agencies like Department of Health, Food and Drugs Administration (FDA), Philippine Health Insurance Corporation (PhilHealth) and other legislated law (if possible) were scanned. Guidelines and policies of World Health Organization (WHO) and World Trade Organization (WTO) were also covered.

## Conceptual approach in understanding social determinants of NCDs

Unlike infectious diseases where *necessary cause* is easier to identify (e.g. TB bacilli is a necessary cause of Tuberculosis), NCDs have multiple factors that epidemiologists can hardly identify and quantify. The occurrence of NCDs is the cumulative and synergistic effects of biological and social factors. Biological factors include genetic predispositions and viral organisms (e.g. HPV linkage with cervical cancer). On the other hand, social determinants are social and economic conditions which predispose them to NCDs (Beaglehole & Yach, 2003; Miranda, Kinra, Casas, Smith, & Ebrahim, 2008; Rothman & Greenland, 2005)

To better understand the complexities, the **Priority Public Health Conditions Knowledge Network Framework**<sup>10</sup> was adopted to organize and categorize their social determinants. The framework (figure 1) depicts a multi-level interaction of different factors starting from the societal to individual factor levels. The value of organizing and analyzing social determinants in a systematic manner would lead to an easier appreciation of the causal pathway and determination of different point interventions later on (World Health Organization, 2010).

**Figure 1. Priority public health conditions analytical framework.**



- **Societal and political structures**, particularly, government, social and macroeconomic policies, culture and societal values are important factors in determining the magnitude and distribution of wealth and commodities. The high level of unequal distribution of resources may lead to high disparity in risk factors exposure, and eventually on health outcomes. The issue of unequal distribution of social provisions is not a sole concern of the health sector per se but an issue needed to be addressed by all sectors in the government. In this regard, the context of relating societal and political dynamics posits the need of a multi-sectorial approach in understanding and analyzing health occurrence like non-communicable diseases.
- The high levels of inequality in a society as a result of societal, political and market structures may provide **differential exposure to environmental risk factors**. For example, people with higher socio-economic status consume more fast food because of their higher disposable income and higher exposure to media advertisement. On the other hand, poorer segments are more at risk of stressful behavior. Also, they lack physical access to healthcare providers which exacerbates the manifestation of physical vulnerabilities.
- The accumulation of environment and social risk factors may lead to **differential physical vulnerability**. As an example, the high level of consumption of food outside home (risk factor) may

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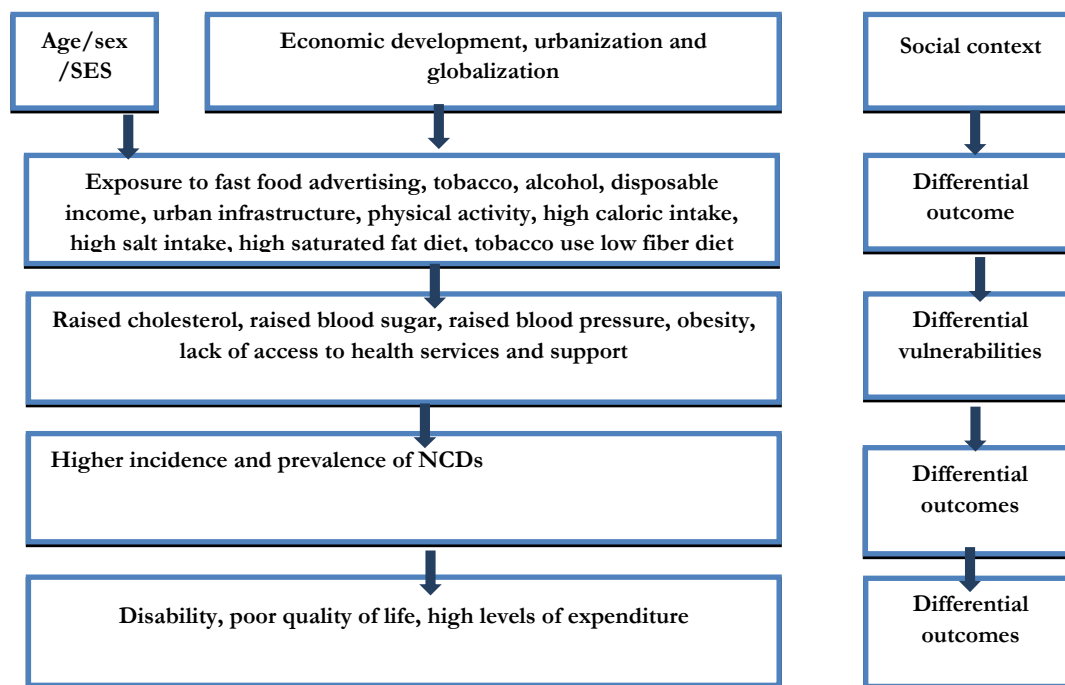
<sup>10</sup> Framework used by WHO

then lead to obesity. It is noteworthy that similar levels of exposure across social groups do not translate into equal risk of occurrence of vulnerabilities or disease. The occurrence is also dependent on other factors and the exposure duration.

- As a result of synergistic effect of vulnerabilities, **health outcomes** for a particular segment of social class can be manifested as higher incidence, frequent recurrence and higher case fatality rate. The result of differential health outcomes should be the main concern of the government to address. Equity in health care ideally implies that everyone in need of health care receives it regardless of social position. The result should be the reduction of all systematic differences in health outcomes.
- Disparity in health outcomes may lead also to variation in **health consequences**. That is why a social class with high incidence of a particular disease may suffer higher loss of productivity, disability, impoverishment or poor quality of life.

In summary, the conceptual pathway can be best illustrated by the figure below. The framework presents that NCDs is preceded by interaction of different levels of factors and vulnerabilities.

Figure 2. Priority public health conditions knowledge network framework

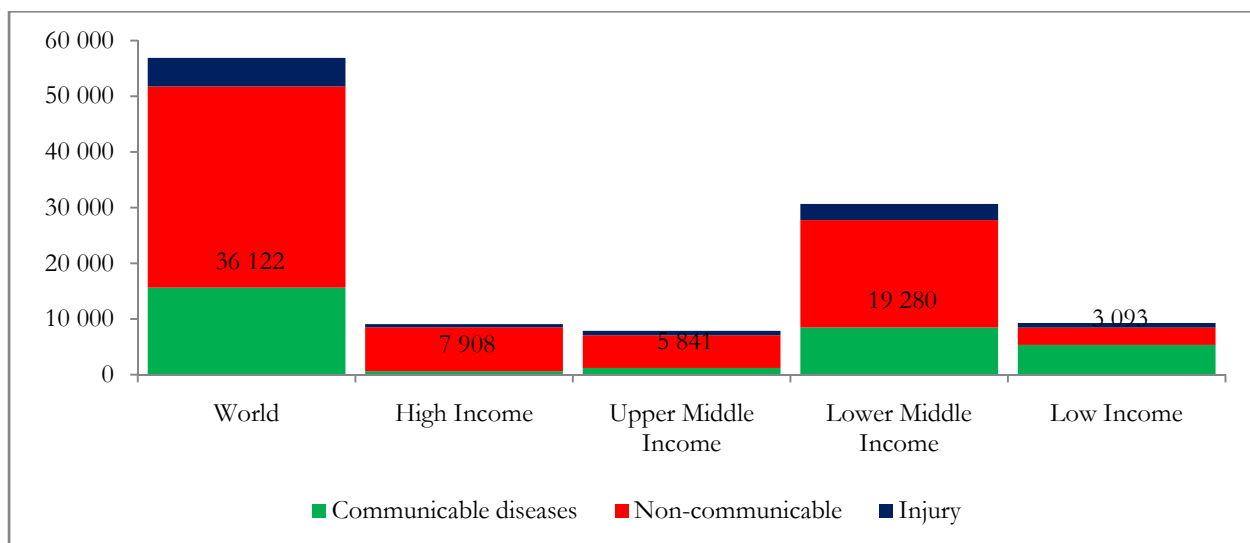


Source: World Health Organization

## NCD epidemic in emerging economies

NCD burden presents a growing threat in both developed and developing nations. In middle income countries, 25 million deaths were attributed to NCDs or 65percent of the total deaths while high income countries were estimated to have 8 million deaths or 87percent of the total deaths (Figure 3). The lower share of deaths in middle income countries due to NCDs compared to high income countries ascertains other lingering problems of infectious diseases that need to be addressed sustainably(World Health Organization, 2011; Magnusson, 2007).

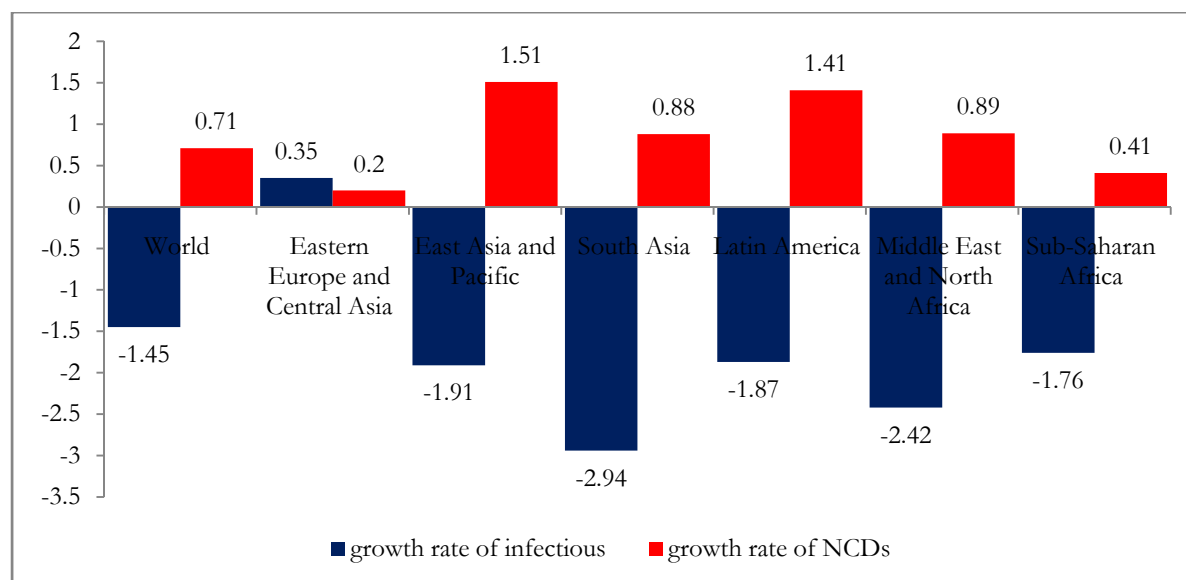
**Figure 3. Number of deaths, by cause and country income classification, 2008.**



*Source: World Health Organization*

Currently, the burden of NCDs is highlighted especially in the developing world. It was estimated that the share of death attributed to NCDs may reach 80 percent in low and middle income countries in ten years. In a study conducted by Stuckler (2008), developing Asia posted to have the highest annual growth rate of mortality due to NCDs (1.51 percent)(Stuckler, 2008).

**Figure 4. Estimated annual growth rates of infectious and NCD mortality, by world region, 2002-2030.**



Source: Stuckler, D (2008).

It is a common perception that NCDs are diseases of the affluent. Mortality and risk factor indicators in low and middle income countries suggest that NCDs affect the richer population more compared to their poorer counterparts. However, these diseases are getting complex every day which posits the non-resilience of any population group. Looking these diseases as diseases of the affluent may create misguided policy intervention and restricts health investments on NCDs. Focused on the lingering problem of infectious diseases and oblivious on the growing threat of NCDs, low and middle income countries may be caught off guard on the growing disease burden (World Health Organization, 2006; Vellakkal, 2009).

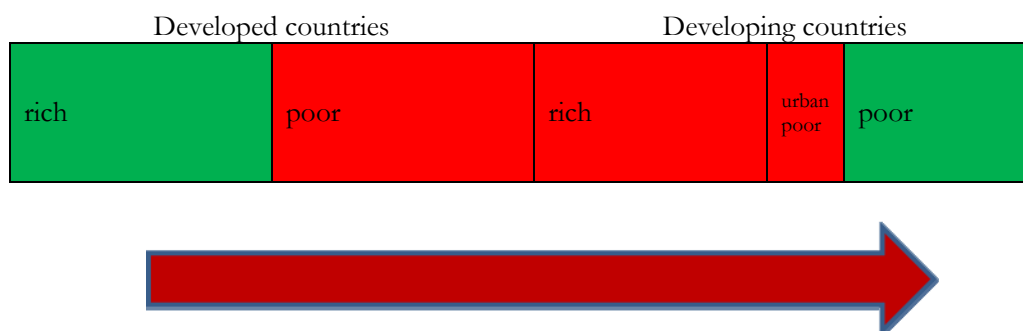
In contrast, NCDs in developed nations are leaning towards the poorer population. In figure 5, we can conceptually organize the concentration of burden in developed and developing world. The shift of NCDs from developed to developing countries initially affects the richer population due to variety of factors like disposable income, employment, exposure to advertisement, among others. However, due to rapid urbanization and economic growth in emerging economies, it is highly possible that even the poorer segments can be affected in the long run (World Health Organization, 2006).

In fact, there is strong evidence on the non-resilience of the urban poor population on NCDs. The increasing risk among the urban poor population can be attributed to different factors like higher level of stress due to physical and environmental pollution (e.g. overcrowding and noise), the rampant consumption of unhealthy diet (e.g. pre-cooked food sold in the streets) and the lack of access to health service which left their physical vulnerabilities undiagnosed (Uusitalo, Pietinen, & Puska, 2002). The fast rate of migration from



rural areas to highly urbanized cities due to localized concentration of labour opportunities increases the pool of poor in urban areas.

**Figure 5. Conceptual concentration of burden of NCDs.**



*Source: This study.*

## Status of NCD mortality and morbidity in the Philippines

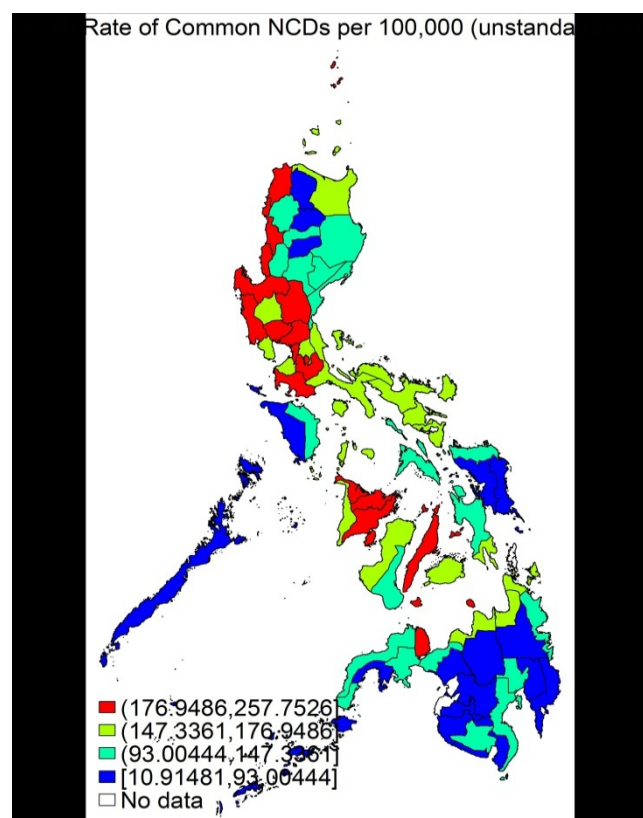
Majority of the total deaths now can be attributed to non-communicable diseases. In 2007, seven of the ten leading causes of death are non-communicable in etiology. Twenty percent (20 percent) of the total deaths are due to heart disease followed by cerebrovascular diseases (11percent) and malignant neoplasms (cancer) (10 percent) (NSO, 2007).

Figure 6<sup>11</sup> shows the wide variation of crude death rates caused by common NCDs (cardio-vascular diseases, cancer and diabetes mellitus) across provinces. A higher crude death rate is concentrated in National Capital Region (NCR), nearby provinces in Region IV-A and III (e.g. Laguna and Pampanga) and some provinces in the Visayas region (e.g.Cebu). Low crude death rate can be found in most provinces of Mindanao (Southern part of Philippines).

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<sup>11</sup> Deaths rates are not standardized due to lack of individual level age and sex variables in the mortality data set. Unstandardized data may not take into account the variation of age and sex across provinces which make geographical comparison a bit tricky. Remember that some provinces may have younger population. This problem should caution readers when comparing provinces.

Figure 6. Crude death rates of common NCDs, by province, Philippines, 2005.



*Data Source: Philippine Health Statistics 2005. Common NCDs include CVD, diabetes and cancers.*

Majority of deaths were attributed to cardio-vascular diseases (44%) and malignancy (14%). A noticeable variation if deaths are further disaggregated by sex. The shares of cardio-vascular diseases, diabetes and malignancy on total deaths are higher in females while the shares of chronic respiratory disease and accidents and injuries are higher in males. The difference between females and males can be attributed to variation of risk factors. For example, females have more mortality due to diabetes because they have higher risk of insulin resistance due to hormonal and physiologic dynamics. On the other hand, males have higher share on accidents and chronic respiratory diseases because of their higher involvement on behaviors that known to increase the risk of NCDs (e.g. smoking and reckless driving).

**Table 1. Distribution of deaths, by cause and gender, 2008.**

| Disease classification   | Total   |       | Male    |       | Female  |        |
|--|---------|-------|---------|-------|---------|--------|
|  | N       | %     | N       | %     | N       | %      |
| <b>infectious diseases (A,B,J22)</b>   | 81,821  | 17.7% | 46,465  | 17.3% | 35,356  | 18.3%  |
| <b>Cancer (C00-D48)</b>  | 49,047  | 10.6% | 25,341  | 9.4%  | 23,706  | 12.3%  |
| <b>Diabetes(E10-E14)</b>   | 22,778  | 4.9%  | 11,034  | 4.1%  | 11,744  | 6.1%   |
| <b>CVDs (I00-I99)</b>  | 152,964 | 33.1% | 86,042  | 32.0% | 66,922  | 34.7%  |
| <b>Chronic lower respiratory diseases (J40-J67)</b>  | 21,870  | 4.7%  | 15,188  | 5.7%  | 6,682   | 3.5%   |
| <b>Accidents (V01-Y89)</b>   | 35,522  | 7.7%  | 28,915  | 10.8% | 6,607   | 3.4%   |
| <b>Chronic liver diseases and cirrhosis (K70-K74)</b>                                      | 6,774   | 1.5%  | 5,293   | 2.0%  | 1,481   | 0.8%   |
| <b>Mental disorder (F01-F99)</b>   | 762     | 0.2%  | 579     | 0.2%  | 183     | 0.1%   |
| <b>Malnutrition (E40-E64)</b>  | 2,453   | 0.5%  | 1,094   | 0.4%  | 1,359   | 0.7%   |
| <b>Maternal and child health related (O00-P96)</b>   | 14,296  | 3.1%  | 7,537   | 2.8%  | 6,759   | 3.5%   |
| <b>ill-defined ( R )</b>   | 16,010  | 3.5%  | 8,048   | 3.0%  | 7,962   | 4.1%   |
| <b>Other NCDs (D50-D89; E01 -E07; E15; E16; E22-E88 ;G00-G96; H; J,remainingK;L;M;N;Q)</b> | 57,284  | 12.4% | 33,228  | 12.4% | 24,056  | 12.5%  |
| <b>ALL</b>   | 461,581 |       | 268,764 | 1     | 192,817 | 100.0% |

*Source: Authors' calculation of National Statistics Office mortality data for 2008.*

#### **a. Cardio-vascular diseases**

Cardio vascular diseases (CVD), a group of diseases that involves the heart and vascular system is responsible for 137,000 deaths in 2007 (NSO, 2007). Atherosclerosis (e.g. ischemic heart disease, cerebro-vascular disease, diseases of the aorta and arteries including hypertension and peripheral vessels), the leading cause of CVD is a complex pathological process in the walls of blood vessels that develops over many years. In atherosclerosis, fatty material and cholesterol are deposited inside the lumen of medium- and large-sized blood vessels (World Health Organization, 2011).

Table 2 shows the frequency of deaths that were classified as CVD. Blockage of blood vessels is the leading cause of mortality under cardio-vascular diseases (e.g., cerebro-vascular disease, myocardial infarction). Small portion of the total CVD deaths can be attributed to rheumatic heart disease and other possible forms of congenital disorders. The table also posits a strong possibility of misclassification of the primary cause of death (COD) related to CVD. The high level of ill-defined description of heart diseases and the inclusion of vague COD (e.g. angina pectoris) suggest a better movement to standardize mortality reporting.

Like most of the major NCDs, cardio-vascular diseases, particularly atherosclerosis are functions of accumulated effects of biological (e.g. genetics), social and environmental risk factors. The known social and environmental risk factors of CVDs are also shared with other non-communicable diseases like diabetes

mellitus and certain cancers. These factors include sedentary lifestyle, unhealthy diet, hazardous drinking of alcohol and tobacco use. CVDs are also linked to other physical vulnerabilities like hypertension, high blood sugar and cholesterol and obesity (WHO, 2011).

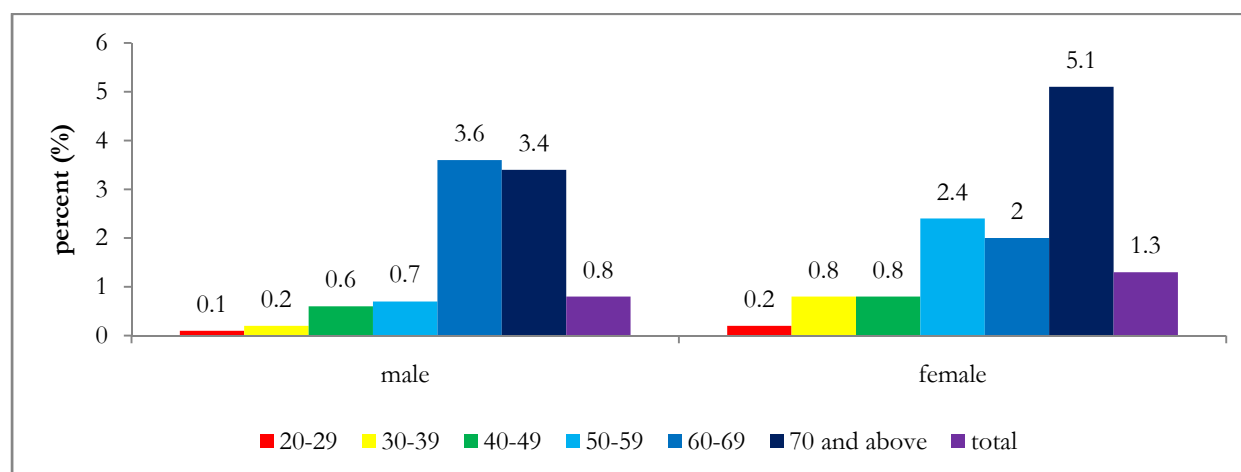
**Table 2. Distribution of CVD deaths by type and sex, Philippines, 2008.**

| Cardiovascular Disease                                     | Total  | Male   | Female |
|--|--------|--------|--------|
| Cerebrovascular disease                                    | 51,275 | 28,911 | 22,364 |
| Acute myocardial infarction                                | 37,199 | 23,440 | 13,759 |
| Disease of pulmonary circulation and other heart diseases  | 19,541 | 10,332 | 9,209  |
| Hypertension without heart involvement                     | 18,078 | 9,959  | 8,119  |
| Other forms of ischemic heart disease                      | 15,380 | 7,842  | 7,538  |
| Complications and ill-defined description of heart disease | 5,458  | 2,695  | 2,763  |
| Chronic rheumatic heart disease                            | 2,107  | 884    | 1,223  |
| Atherosclerosis  | 2,106  | 889    | 1,217  |
| Aortic aneurysm and dissection                             | 554    | 343    | 211    |
| Angina pectoris  | 440    | 255    | 185    |
| Other diseases of arteries, and arterioles                 | 421    | 237    | 184    |
| Other and unspecified disorders of circulatory             | 207    | 141    | 66     |
| Hypertension with heart involvement                        | 96     | 58     | 38     |
| Venous thrombosis and embolism                             | 53     | 30     | 23     |
| Acute rheumatic fever                                      | 49     | 26     | 23     |

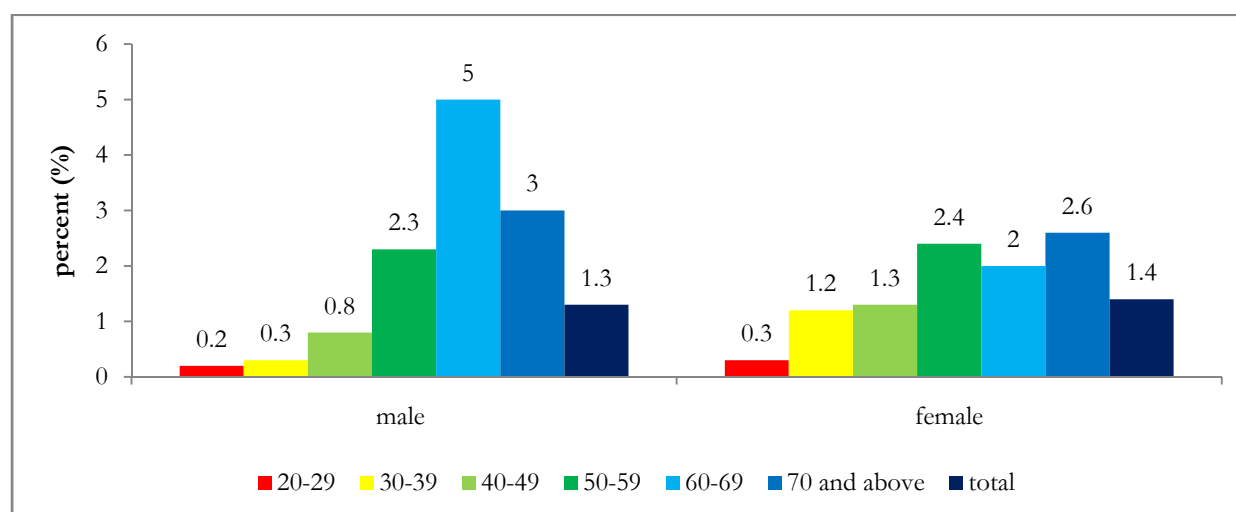
*Source: Authors' calculation of NSO Mortality data for 2008*

With regard to morbidity, no existing data set at the national level that attempts to disaggregate detailed information on cardio-vascular diseases. The National Nutrition Survey only captures two general CVD related morbidities--myocardial infarction and coronary heart disease. In 2008, the prevalence of **diagnosed** myocardial infarction and coronary heart disease are both one percent. The occurrence of cardio-vascular diseases varies by age and sex. In figures 7 and 8, it is noteworthy that females have higher prevalence of diagnosed myocardial infarction while males have higher prevalence of diagnosed coronary heart disease. The prevalence of both diseases increases along with age.

**Figure 7. Distribution of population diagnosed with myocardial infarction, by age, 2008.**



**Figure 8. Distribution of population with diagnosed coronary heart disease, age, 2008.**



*Source: Authors' calculation of National Nutrition Survey, 2008.*

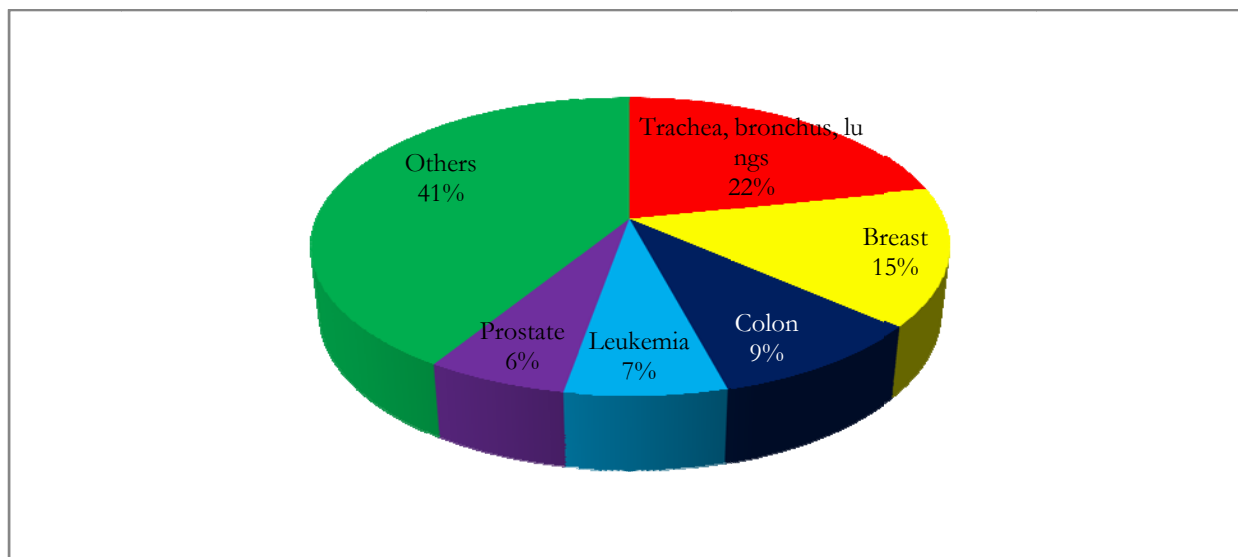
## **b. Cancer**

Cancer (malignant tumors or neoplasms) is a broad group of diseases that affect any part of the body. The feature that makes cancer lethal is the abnormal proliferation of abnormal cells beyond their usual location (metastasis). In 2008, cancer is responsible for the 7.6 million deaths worldwide (World Health Organization, 2011). In the Philippines, cancer is the second leading cause of death accounted for 44,000 deaths in 2007 (NSO, 2007).

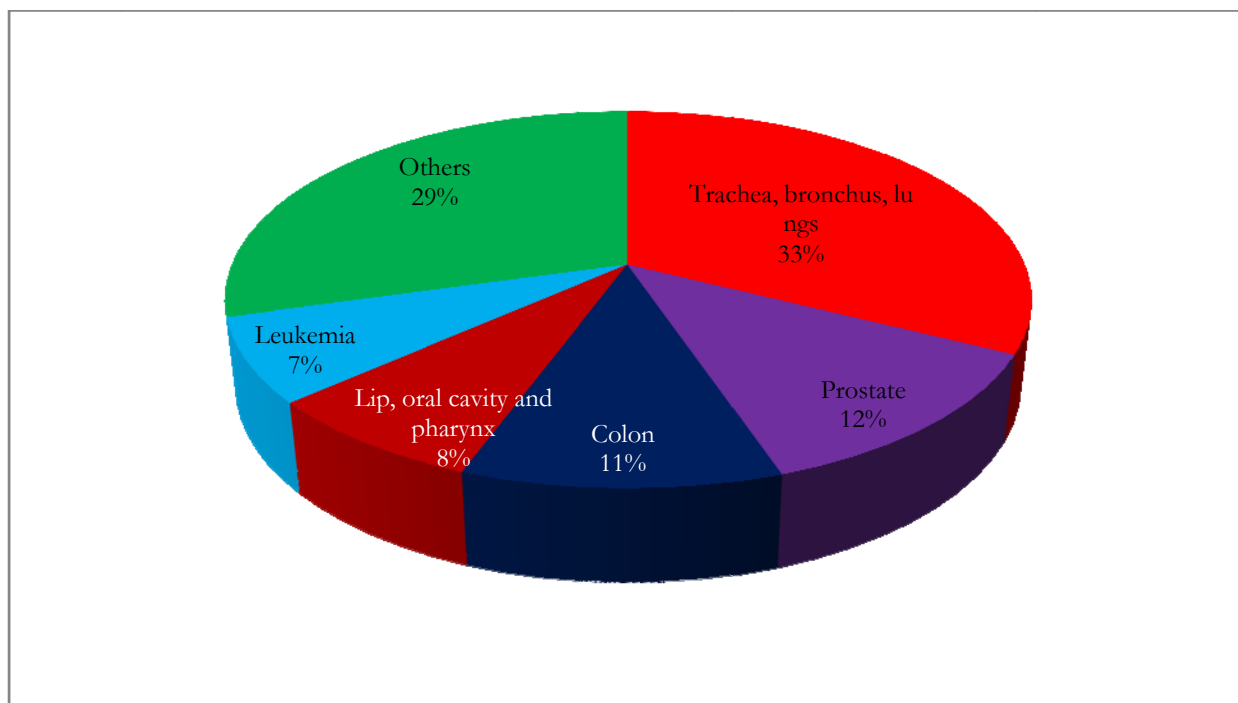
Using NSO mortality data, approximately 40 percent of the cancer deaths reported have no indication of malignancy site. Excluding those observations, figure 9 presents that cancer of the respiratory system

(trachea, bronchus and lungs), breast and colon are the leading types of cancers. Among males, cancer of the respiratory system (trachea, bronchus and lungs), prostate and colon are the predominant type while cancers of the breast, respiratory system and colon are common among females (Figures 10 and 11).

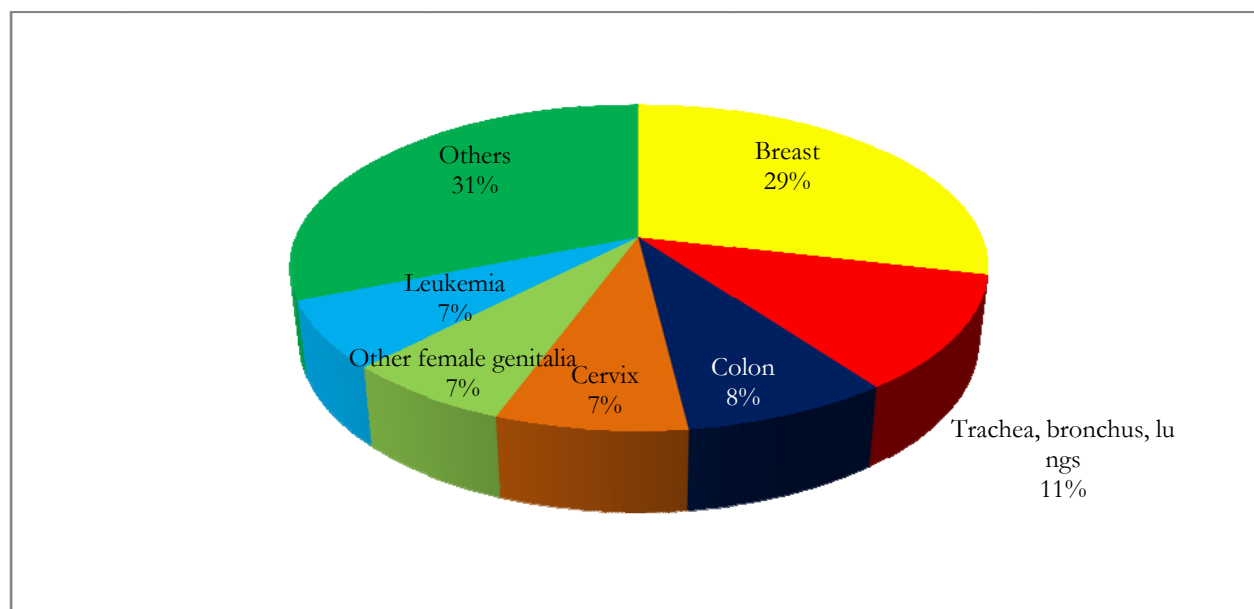
**Figure 9. Distribution of deaths due to malignancies, Philippines, 2008.**



**Figure 10. Distribution of deaths due to malignancies, males, Philippines, 2008.**



**Figure 11. Distribution of deaths due to malignancies, females, Philippines, 2008.**



*Source: Authors' calculation of NSO Mortality data for 2008.*

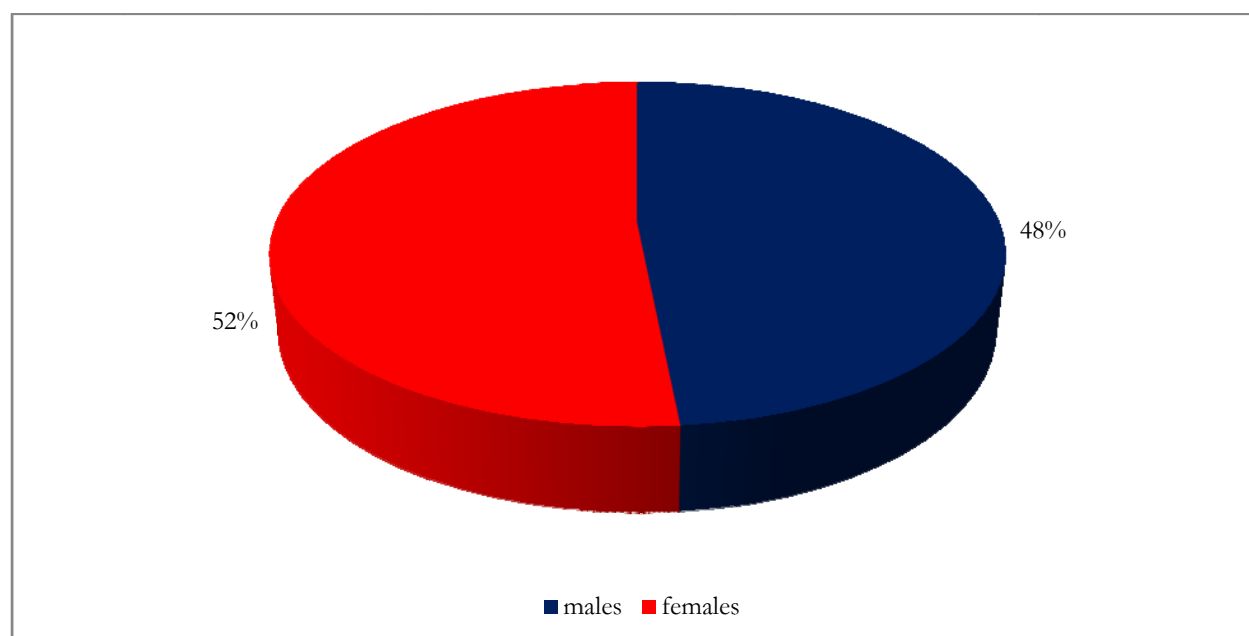
### c. Diabetes mellitus

Diabetes mellitus is a chronic disease that occurs when the human body does not produce enough insulin or when they cannot effectively use the produced insulin. Insulin is a hormone that regulates the blood sugar. Chronic hyperglycemia (high sugar levels in the blood) is associated with the long-term consequences of diabetes that include damage and dysfunction of the cardiovascular system, eyes, kidneys and nerves. The complications of diabetes are often divided into two groups: micro-vascular (retinopathy, nephropathy, and neuropathy) and macro-vascular (ischemic heart disease, stroke, peripheral vascular disease).

In general, there are two kinds of diabetes-- *Type 1* and *Type 2*. Ninety percent of total diabetes is clinically classified as type 2. It is important to understand that risk factors are different for type 1 and 2. Type 1 has strong linkage on genetics while type 2 has similar risk factors and physical vulnerabilities with other NCDs. This includes obesity, decreased physical activity and unhealthy diets, with hypertension and dyslipidemia (Wild, 2004; World Health Organization, 2011)

In 2004, an estimated 3.5 million people died worldwide from consequences of high blood sugar. In the Philippines, 21,000 deaths were attributed to the disease in 2007 (Figure 12). The number of deaths is almost equal for males and females (WHO, 2011; NSO, 2011).

**Figure 12. Distribution of deaths due to Diabetes mellitus, Philippines, 2008.**



*Source: Authors' calculation of NSO Mortality data for 2008.*

With regard to morbidity, approximately 5percent of the adult population (20 years old and older) had a blood sugar of more than 125 mg/dl, one of recommended cut-off values to diagnose diabetes mellitus. Table 3 shows that females have slightly higher prevalence of diabetes mellitus compared to males (4 percent to 5.5 percent).

Among females, there is a noticeable positive relationship between age and prevalence of diabetes mellitus. As female age increases, the prevalence of diabetes also increases. However, the prevalence decreases after a certain age group.

**Table 3. Prevalence of Diabetes mellitus among adults 20 years old and above, by age group and sex, Philippines, 2008.**

| Variable    | Category | Total |          | Male |          | Female |          |
|-------------|----------|-------|----------|------|----------|--------|----------|
|             |          | %     | 95% CI   | %    | 95% CI   | %      | 95% CI   |
| Philippines |          | 4.8   | 4.2-5.4  | 4.0  | 3.2-4.8  | 5.5    | 4.6-6.3  |
| Age         | 20-29    | 0.4   | 0.0-0.7  | 0.3  | 0.1-0.8  | 0.4    | 0.02-1.0 |
|             | 30-39    | 3.2   | 2.0-4.3  | 2.5  | 1.1-3.9  | 3.8    | 2.1-5.5  |
|             | 40-49    | 5.7   | 4.4-7.0  | 6.0  | 4.1-8.0  | 5.4    | 3.7-7.1  |
|             | 50-59    | 9.0   | 7.0-11.1 | 7.8  | 5.2-10.3 | 10.0   | 7.2-12.8 |
|             | 60-60    | 9.1   | 6.8-11.4 | 6.8  | 3.8-9.8  | 10.9   | 7.5-14.3 |
|             | 70-up    | 4.4   | 2.4-6.4  | 2.2  | 0.02-4.3 | 5.9    | 2.9-9.0  |

*Source: Author's calculation of NNS 2008.*



Table 4 also shows a variation of diabetes mellitus prevalence across socio-economic class. Using educational attainment and socio-economic status<sup>12</sup>(Filmer & Pritchett, 2001) as welfare indicator, the prevalence of diabetes increases as socio-economic status and educational status increases. The higher prevalence of diabetes mellitus among the affluent population follows the same pattern of some developing countries wherein there is a positive relationship between socio-economic status and diabetes mellitus (WHO, 2011).

**Table 4. Prevalence of Diabetes mellitus among adults 20 years old and above, by socio-economic status, urbanization and educational attainment, Philippines, 2008.**

| Characteristics     | Category     | Total      |            |            | Male       |            |            | Female     |            |            |
|---------------------|--------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
|                     |              | %          | 95% CI     |            | %          | 95% CI     |            | %          | 95% CI     |            |
|                     |              |            | Lower      | Upper      |            | Lower      | Upper      |            | Lower      | Upper      |
| <b>Total</b>        |              | <b>4.8</b> | <b>4.2</b> | <b>5.4</b> | <b>4.0</b> | <b>3.2</b> | <b>4.8</b> | <b>5.5</b> | <b>4.6</b> | <b>6.3</b> |
| <b>SES</b>          | Poorest      | 1.8        | 1.0        | 2.5        | 1.4        | 0.5        | 2.3        | 2.2        | 1.1        | 3.4        |
|                     | Poor         | 3.0        | 2.0        | 4.1        | 2.2        | 1.0        | 3.4        | 3.9        | 2.3        | 5.5        |
|                     | Middle       | 3.5        | 2.5        | 4.5        | 3.0        | 1.6        | 4.4        | 3.9        | 2.5        | 5.3        |
|                     | Rich         | 6.4        | 4.9        | 7.8        | 5.4        | 3.3        | 7.6        | 7.1        | 5.2        | 9.0        |
|                     | Richest      | 8.1        | 6.4        | 9.8        | 6.7        | 4.3        | 9.2        | 9.1        | 6.8        | 11.5       |
| <b>Urbanization</b> | urban        | 5.6        | 4.6        | 6.5        | 4.5        | 3.2        | 5.7        | 6.4        | 5.2        | 7.7        |
|                     | rural        | 3.7        | 3.0        | 4.4        | 2.9        | 2.0        | 3.8        | 4.6        | 3.5        | 5.6        |
| <b>Educational</b>  | no education | 2.6        | 0.3        | 4.9        | 1.7        | -0.7       | 4.1        | 3.6        | -0.5       | 7.7        |
| <b>Attainment</b>   | elementary   | 4.6        | 3.6        | 5.5        | 2.9        | 1.8        | 3.9        | 6.0        | 4.6        | 7.5        |
|                     | secondary    | 4.4        | 3.5        | 5.3        | 3.9        | 2.7        | 5.1        | 4.9        | 3.4        | 6.4        |
|                     | tertiary     | 5.3        | 4.2        | 6.4        | 4.7        | 3.1        | 6.4        | 5.8        | 4.2        | 7.3        |

*Source: Author's calculation of NNS 2008.*

By synergistically combining socio-economic status and urbanity, it can be noticed that the urban poor have higher prevalence of Diabetes mellitus compared to their counterparts in rural areas. The variation is more obvious among females while the prevalence among males is relatively the same.

**Table 5. Prevalence of Diabetes mellitus among adults 20 years old over, by urban and rural poor<sup>13</sup>, Philippines, 2008.**

| Diabetes          | Total      |            |            | Male       |            |            | Female     |            |            |
|-------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
|                   | %          | 95% CI     |            | %          | 95% CI     |            | %          | 95% CI     |            |
|                   |            | Lower      | Upper      |            | Lower      | Upper      |            | Lower      | Upper      |
| <b>Rural poor</b> | <b>2.2</b> | <b>1.5</b> | <b>3.0</b> | <b>1.8</b> | <b>0.8</b> | <b>2.8</b> | <b>2.8</b> | <b>1.6</b> | <b>3.9</b> |
| <b>Urban poor</b> | <b>2.9</b> | <b>1.5</b> | <b>4.2</b> | <b>1.8</b> | <b>0.5</b> | <b>3.2</b> | <b>3.9</b> | <b>1.8</b> | <b>6.0</b> |

*Source: Author's calculation of NNS 2008.*

<sup>12</sup>Since the National Nutrition Survey did capture neither income nor expenditure, socio-economic status was derived using Principal Component Analysis (PCA). PCA calculates socio-economic scores using the seven tangible household assets namely, refrigerator, television, radio, electricity, motorcycle, telephone, electric fan, car, range, washing machine and movie player

<sup>13</sup>Households are considered urban poor if they belong to Q1 and Q2, and living in urban areas (not necessarily highly urbanized areas). The NNS cannot be used to disaggregate the estimates by highly urbanized cities due to limited sample size.

## Determinants of NCDs

### The role of macroeconomic and macro-social factors on NCDs

Macroeconomic and social factors can generally explain the high participation of the population on risky activities and behaviors which exacerbate their occurrence. Stuckler (2008) argues that the growing NCD can be best explained by the structural concepts of globalization which are (a) economic growth, (b) economic flows and (c) technological change.

#### A. Economic growth

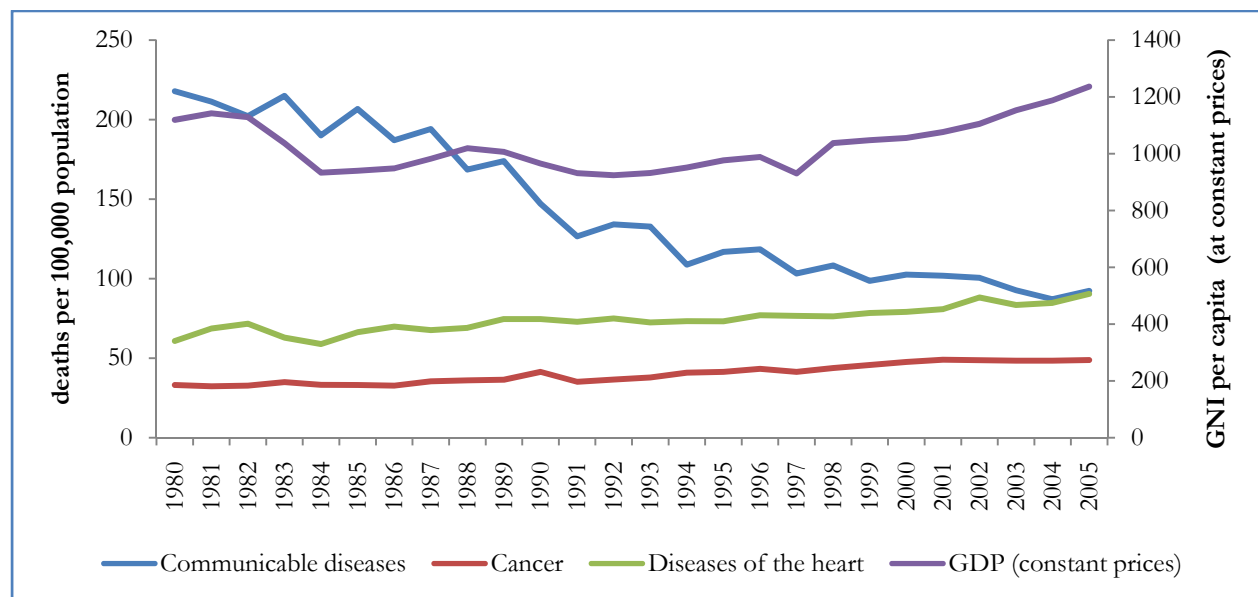
Arguably, the growing burden of NCDs in most emerging countries in Asia can be attributed to the processes of strong economic activity. As the population's income level increases, people's behavior, consumption and expenditure change. Rapid growth open doors to modify a population's risk just as their lifestyle catch up to their new found wealth. This scenario is a growing trend in China, India and other countries in ASEAN like Indonesia and the Philippines (Stuckler, 2008; Vellakal, S, 2009).

Though most nations are experiencing problems on NCDs, it is more highlighted in emerging economies. The rapid economic growth in developing countries significantly changed the societal structures in communities and households. In communities, urbanization is fast increasing. In Asia, including the Philippines, the growth of urbanization is more than 50 percent. To cope with the fast pace in urban areas, many people resorted to dietary and lifestyle changes. The growing participation of women in labor market has also significantly changed the dietary consumption and expenditure patterns of households. Currently, many households especially in the urban areas resort to food outside home since mothers do not have time any more in preparing food for their families. Traditionally, mothers are expected to perform major domestic roles like food preparation (Uusitalo, Pietinen, & Puska, 2002; Cohen B. , 2004; Cohen B. , 2006).

Another the possible reasons are the strong and aggressive marketing strategy of multinational companies in emerging economies. For example, people in the developing countries now have this perception that eating in restaurants and fast foods are part of the modern and affluent lifestyle instead of eating vegetables and root crops which are healthier. Rapid urbanization and rising employment in concentrated areas in developing countries can also explain the variation. On the other hand, people in developed countries like Europe buy more healthy foods and spend more time exercising as their income levels rise. If this is the case, NCD deaths in developed countries can be attributed primarily to frailty and ageing population (Stuckler, 2008; Cutler, Glaeser, & Shapiro, 2003)

In the Philippines, crude death rates attributed to major NCDs like diseases of the heart and cancer are increasing over time in contrast to decreasing death rate of infectious diseases (Figure 13). The figure also shows the positive relationship between crude death rate of common non-communicable diseases and increasing economic activity (gross national income). Though economic growth in the country is in slower pace compared to other countries in the region, there were significant improvements in the macroeconomic conditions over the years. However, the growing NCDs can also be attributed to improvements in diagnosis and recording of diseases which might mask the true trend of epidemiologic shift. As mentioned in some studies, there was enough evidence suggesting that poor areas are more likely to misclassify the cause of death (P. & Chalapati, 2001).

**Figure 13. Crude death rate due to NCDs vs. GNI per capita, Philippines, 1980-2005.**

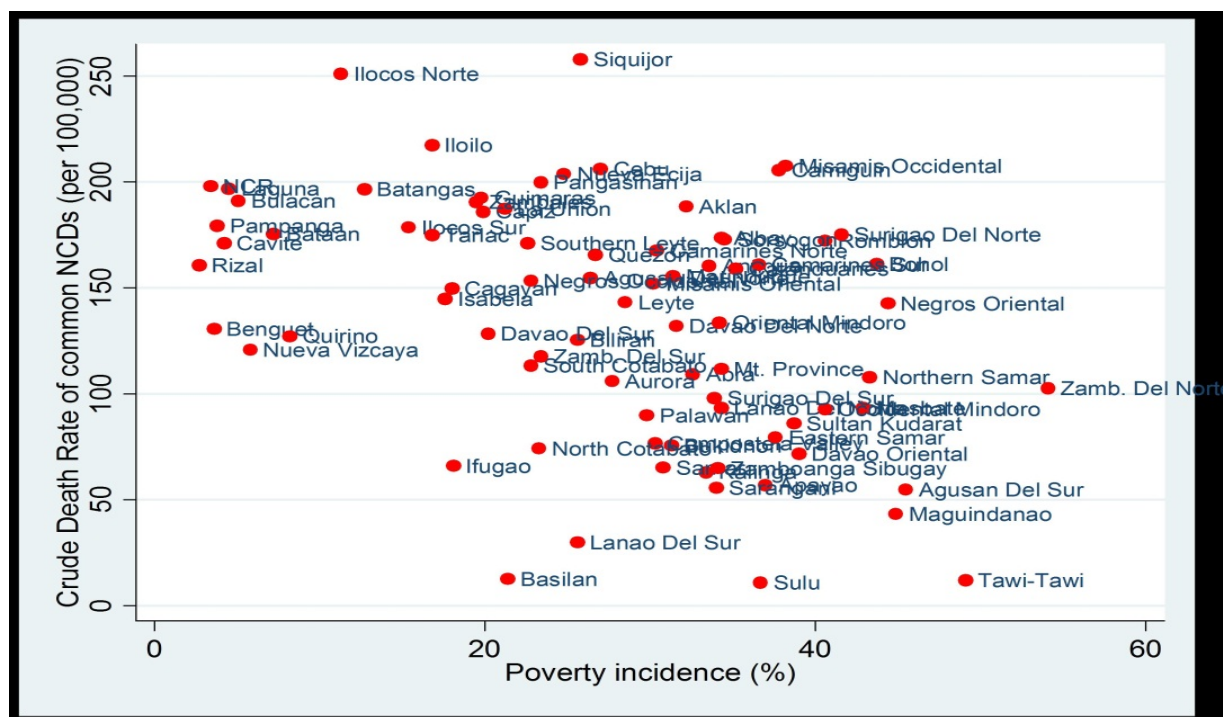


Source: Philippine Health Statistics and World Bank.

Rapid economic growth drives many of the population out from poverty. Analysis between poverty incidence and crude death rate attributed to major NCDs clearly depicts strong negative correlation ( $R = -0.44$ ,  $p$  value = 0.000). As poverty incidence decreases, the crude death rate attributed to major NCDs increases. Take the case of NCR and nearby provinces like Laguna, Cavite and Pampanga. These provinces have low poverty incidence but the crude death rates are high. In contrast, provinces in Mindanao have high levels of poverty incidence but the crude death rates are low compared to the national levels (World Bank, 2011; Department of Health, 2005; National Statistical Coordination Board, 2006)<sup>14</sup>.

<sup>14</sup>The problem with crude death rates is, we are not sure with this relationship you are seeing. Provinces might have low death rates because its population is younger. It is noteworthy that higher fertility rates are also associated with poverty.

Figure 14: Poverty incidence and crude death rate of common NCDs, Philippines, 2005.



Source: Authors calculation of CDR using NSO Mortality data of 2005 and Poverty incidence was adopted from NSCB.

## B. Economic flows

Philippines committed to free trade liberalization as one way to boost economic growth. Under the free trade liberalization, countries can now ship goods, materials and services beyond their political and economic boundaries. Undoubtedly, it has positive impact on employment, competitive prices of goods and enhances the quality and quantity of the labor force. Its negative effects on health outcomes especially in developing countries are still poorly understood. Some literature would argue that lowering trade barriers is directly associated with increased imports which then, in most cases, leads to greater availability of goods including tobacco, alcohol and processed foods. As these goods become more readily available and increasingly affordable – and social trends continue to favor convenience and transitional foods – the burden of NCDs continues to grow (Rayner, Hawkes, Lang, & Bello, 2007).

Before 1940's, many countries were self-sufficient, but during the “era of development,” countries had become more reliant on imports, with impact on diet and food supply chain dynamics (Rayner, Hawkes, Lang, & Bello, 2007). In the Philippines, the quantity of import is more than twice the export, ascertaining the country's reliance on imported food items. In addition, there was a significant increase in the quantity of imported food like meat, dairy products and oils in the past two decades (Table 6). In meat and related

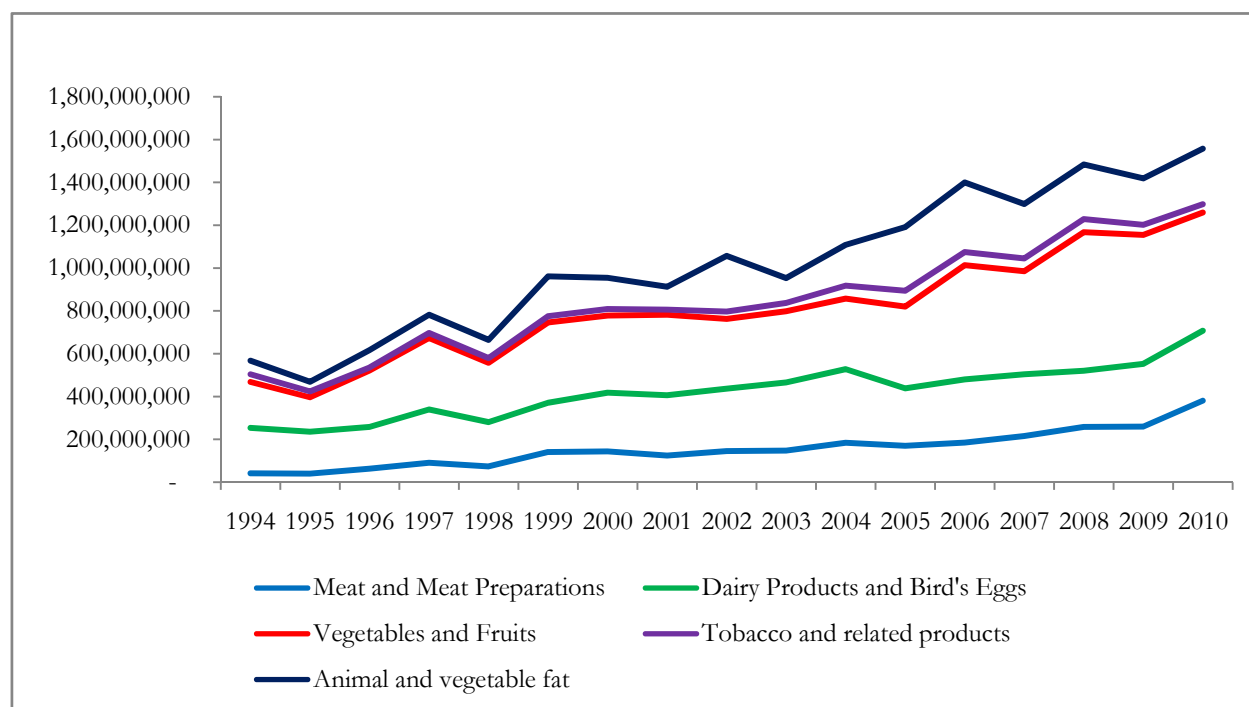
preparations, the country imported 41 million kilograms in the early 90's compared to 381 million kilograms in 2010, a 32 percent annual increase. A similar pattern was also observed in other food items especially animal and vegetable fat. The rising quantity of imported food items maybe driven by burgeoning population. However, pieces of evidence show that there were also an increase in food consumption per capita(Bureau of Agricultural Statistics, 2010).

**Table 6. Quantity of food import and export, Philippines, 1994-2010.**

| Food Items                            | Import                  |                         | Export                  |                         |
|---------------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
|                                       | 2010 Quantity (kg) '000 | Growth rate (1994-2010) | 2010 Quantity (kg) '000 | Growth rate (1994-2010) |
| Food and live animals (TOTAL)         | <b>8,921.78</b>         | <b>10.8%</b>            | <b>3,515.97</b>         | <b>1.5%</b>             |
| <b>Meat and Meat Preparations</b>     | 380.77                  | 31.8%                   | 10.34                   | 101.2%                  |
| <b>Dairy Products and Bird's Eggs</b> | 326.56                  | 5.5%                    | 34.74                   | 71.2%                   |
| <b>Fish and Fish Preparations</b>     | 171.13                  | 3.9%                    | 177.17                  | 2.8%                    |
| <b>Cereal and Cereal Preparations</b> | 4,856.08                | 9.4%                    | 52.28                   | 31.0%                   |
| <b>Vegetables and Fruits</b>          | 552.06                  | 12.6%                   | 2,266.19                | 2.1%                    |
| Tobacco and related products          | 39.00                   | 0.8%                    | 56.94                   | 15.9%                   |
| Animal and vegetable fat              | 258.98                  | 19.3%                   | 1,379.00                | 5.9%                    |

*Source: Calculation of data from Bureau of Agricultural Statistics, 2010.*

**Figure 15. Quantity of imported food products in kilograms, Philippines, 1994-2010.**



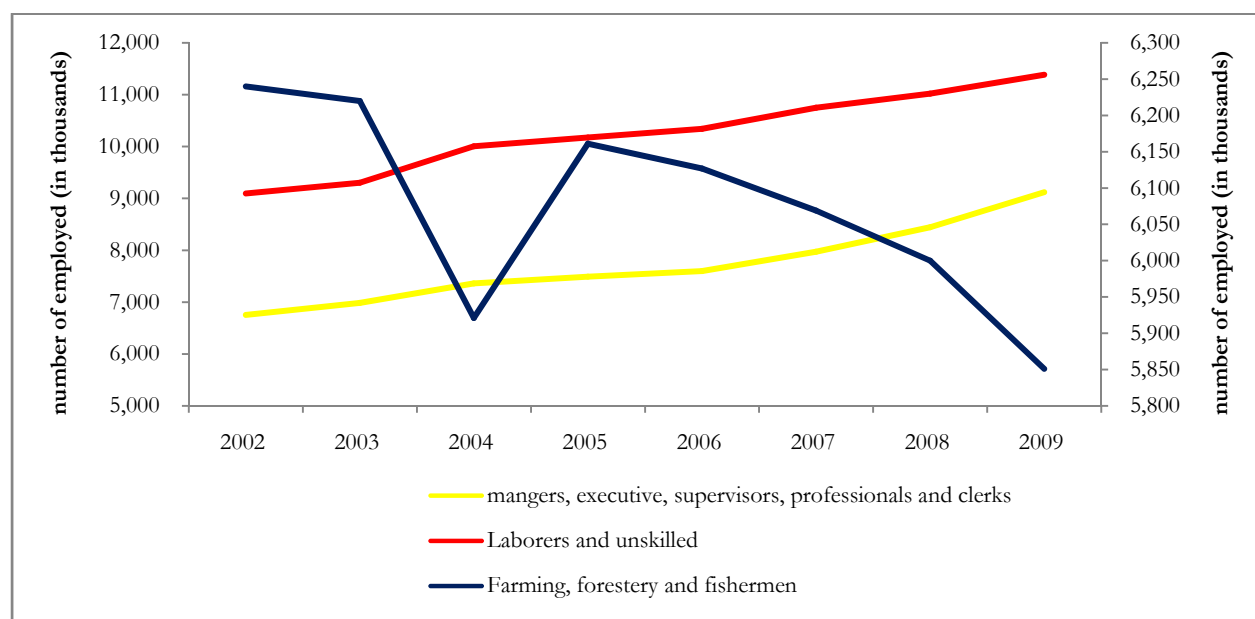
*Source: Bureau of Agricultural Statistics, 2010*

Aside from the effect on inflow of goods, several mechanisms characterized by FDI in food processing and retail commercial promotion of food may alter the supply chain and the consumption patterns (Stuckler, 2008; Rayner, Hawkes, Lang, & Bello, 2007).

### C. Advancement in technology

In addition to economic growth and economic flows, advancement in technology is part of the bigger picture. As societies mature and grow, labor shifts from agricultural to a more intellectual production. Consequently, work becomes increasingly sedentary (Stuckler, 2008). In the Philippines, there is a noticeable decline in number of people working on the agriculture sector while there is an increase in the number of employees in “intellectual” industries like banking, finance and healthcare. The increasing number of laborers and unskilled workers posits growing demand in other industries highly related to macroeconomic growth like infrastructure (Department of Labor and Employment).

**Figure 16. Number of employed person by major occupation group, Philippines, 2002-2010.**



*Source: Department of Labor and Employment*

As technology advances in society, work also becomes more concentrated in a specific area. A case in point is the growing business outsourcing industry in the country. The burgeoning opportunities in BPO industries which are highly concentrated in major cities drive many people from rural to urban areas. Consequently, the high urbanization rate will then affect food and lifestyle dynamics. In urban settings where food production is concentrated, manufacturers take advantage of economies of scale. This leads to lower prices encouraging people to eat outside the home. Urbanization may also promote physical inactivity as a result of fast and convenient transport system (Stuckler, 2008).

## Vulnerabilities

This section presents different indicators of vulnerabilities of non-communicable diseases. By definition, vulnerabilities are intermediate factors of certain exposures and the actual disease<sup>15</sup>. According to World Health Organization, Body Mass Index (BMI), hypertension, high serum or blood cholesterol and high fasting blood sugar are the major indicators under vulnerabilities. It is important to note that these indicators are shared risk factors of major NCDs like cardio-vascular disease and certain cancers.

### A. Body Mass Index (BMI)

Body Mass Index (BMI) is a number calculated from a person's weight and height. BMI provides a reliable indicator of body fatness and is used to screen for weight categories. Similar to WHO recommended cut-off point, a BMI of 30 or more is considered obese. It is proven in many studies that obesity as ascertained by high BMI is associated with many diet-related chronic diseases including diabetes mellitus, cardiovascular disease, stroke, hypertension and certain cancers (World Health Organization, 2011).

Inherent to non-communicable diseases, the occurrence of obesity is relative contributions of both genetics and environmental factors. Genetics can contribute 30-40 percent variance in BMI while environmental factors can contribute 60-70 percent variance. However, epidemiological studies suggest that even in population with a certain gene prone to obesity but living in a traditional lifestyle (less consumption of animal fat, low caloric density intake, eat more complex carbohydrates and have greater energy expenditure from physical labor), still have significantly lower risk of obesity (Pi-Sunyer, 2002).

Obesity is increasing in an alarming rate in both developing and developed nations (Mortell, Khan, Hughes, & Grummer-Strawn, 2000). In the Philippines, the prevalence of obesity among adult population (20 years old-up) is 3.7% for males and 6.6% for females. The prevalence is highly associated with age following a “bell shape” relationship. Prevalence of obesity increases along with age then decreases after reaching a certain age period (Table 7).

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<sup>15</sup>There are instances wherein vulnerabilities can also be the actual disease. For example, diabetes can be the disease but it is also an important vulnerability factor that exacerbates the occurrence of other diseases like CVDs.

**Table 7. Prevalence of obesity among adults 20 years old and above, by age group and sex, Philippines, 2008.**

| Variable           | Category | Total      |                | Male       |                | Female     |                |
|--------------------|----------|------------|----------------|------------|----------------|------------|----------------|
|                    |          | %          | 95% CI         | %          | 95% CI         | %          | 95% CI         |
| <b>Philippines</b> |          | <b>5.2</b> | <b>5.0-5.4</b> | <b>3.7</b> | <b>3.5-4.0</b> | <b>6.6</b> | <b>6.3-6.9</b> |
| <b>Age group</b>   | 20-29    | 2.9        | 2.6-3.1        | 2.2        | 1.9-2.6        | 3.6        | 3.1-4.1        |
|                    | 30-39    | 6.1        | 5.7-6.5        | 4.9        | 4.4-5.4        | 7.3        | 6.7-7.9        |
|                    | 40-49    | 6.8        | 6.4-7.2        | 5.0        | 4.4-5.5        | 8.4        | 7.8-9.0        |
|                    | 50-59    | 6.3        | 5.8-6.7        | 4.2        | 3.6-4.8        | 8.0        | 7.3-8.6        |
|                    | 60-60    | 4.6        | 4.1-5.2        | 2.4        | 1.8-3.0        | 6.4        | 5.6-7.2        |
|                    | 70-up    | 2.4        | 1.9-2.9        | 1.2        | 0.6-1.7        | 3.2        | 2.4-3.9        |

*Source: NNS 2008.*

Affluence and urbanity have been linked with obesity especially in developing countries. Analysis by socio-economic status shows positive relationship between obesity and common used socio-economic indices. The prevalence of obesity increases along with socio-economic status and educational attainment, while higher prevalence of obesity was found in urban areas compared to rural areas (table 8).

**Table 8. Prevalence of obesity among adults 20 years old and above, by urbanization and educational attainment, Philippines, 2008.**

| Characteristics     | Category     | Total      |            |            | Male       |            |            | Female     |            |            |
|---------------------|--------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
|                     |              | %          | 95% CI     |            | %          | 95% CI     |            | %          | 95% CI     |            |
|                     |              |            | Lower      | Upper      |            | Lower      | Upper      |            | Lower      | Upper      |
| <b>Total</b>        |              | <b>5.2</b> | <b>5.0</b> | <b>5.4</b> | <b>3.7</b> | <b>3.5</b> | <b>4.0</b> | <b>6.6</b> | <b>6.3</b> | <b>6.9</b> |
| <b>SES</b>          | Poorest      | 1.1        | 0.5        | 1.7        | 0.8        | 0.1        | 1.4        | 1.5        | 0.5        | 2.5        |
|                     | Poor         | 2.5        | 1.6        | 3.3        | 1.1        | 0.3        | 1.9        | 3.8        | 2.3        | 5.3        |
|                     | Middle       | 5.0        | 3.8        | 6.2        | 4.5        | 2.8        | 6.2        | 5.5        | 3.7        | 7.3        |
|                     | Rich         | 6.2        | 4.8        | 7.6        | 6.6        | 4.5        | 8.7        | 5.9        | 4.1        | 7.7        |
|                     | Richest      | 7.9        | 6.4        | 9.4        | 6.6        | 4.6        | 8.5        | 8.9        | 6.8        | 11.0       |
| <b>Urbanization</b> | urban        | 5.7        | 4.8        | 6.6        | 5.1        | 3.8        | 6.3        | 6.2        | 5.0        | 7.4        |
|                     | Rural        | 3.6        | 2.9        | 4.3        | 2.7        | 1.9        | 3.5        | 4.5        | 3.5        | 5.5        |
| <b>Educational</b>  | no education | 0.5        | -0.4       | 1.4        | 0.9        | -0.9       | 2.7        | 0.0        | 0.0        | 0.0        |
| <b>Attainment</b>   | elementary   | 3.6        | 2.8        | 4.4        | 2.4        | 1.4        | 3.4        | 4.6        | 3.3        | 5.8        |
|                     | secondary    | 4.9        | 4.0        | 5.9        | 3.5        | 2.2        | 4.7        | 6.3        | 5.0        | 7.7        |
|                     | tertiary     | 6.3        | 5.1        | 7.4        | 6.8        | 5.0        | 8.7        | 5.8        | 4.4        | 7.2        |

*Source: NNS 2008.*



**Table 9. Prevalence of obesity among adults 20 years old and above, by urban and rural poor, Philippines, 2008.**

| Obesity           | Total |        |       | Males |        |       | Females |        |       |
|-------------------|-------|--------|-------|-------|--------|-------|---------|--------|-------|
|                   | %     | 95% CI |       | %     | 95% CI |       | %       | 95% CI |       |
|                   |       | Lower  | Upper |       | Lower  | Upper |         | Lower  | Upper |
| <b>Rural poor</b> | 1.6   | 1      | 2.2   | 0.6   | 0.2    | 1.1   | 2.5     | 1.4    | 3.6   |
| <b>Urban poor</b> | 2.4   | 1.3    | 3.5   | 1.6   | 0.2    | 2.8   | 3.2     | 1.4    | 4.9   |

*Source: NNS 2008.*

Multivariate regression analysis was performed to predict the possible factors that decreases or increases body mass index. Stepwise regression analysis would allow us to measure the independent relationships controlling for other independent variables. Body Mass Index, in continuous measurement is the dependent variable while wide range of socio-demographic characteristics and consumption patterns were included as independent variables.

Table 10 presents the different significant variables associated with BMI. The positive coefficient is interpreted as unit increase of BMI in every unit change of an independent variable while the negative coefficient is interpreted as decrease in every unit of BMI in every unit change in the independent variables. Take the case of age, if all other variables are constant, there is an increase in BMI as age increases to 30-39 and 40-49 years old but there is a decrease in BMI as age further increases to 60-69 and 70 and up.

Other socio-demographic characteristics like sex and socio-economic status are important predictors of BMI. If other variables are fixed, females have higher average unit increase of BMI relative to males while a unit increase in socio-economic scores positively increases BMI. For other significant variables, the direction of their coefficients is shown in table 10.

**Table 10. Regression results of BMI and different predictors.**

| Variable                               | Category                  | Coef   | p value | Lower limit | Upper limit |
|--|---------------------------|--------|---------|-------------|-------------|
| <b>Age (ref 20-29)</b>                 | 30-39                     | 0.951  | 0.000   | 0.541       | 1.361       |
|  | 40-49                     | 0.704  | 0.001   | 0.290       | 1.118       |
|  | 50-59                     | 0.186  | 0.436   | -0.281      | 0.653       |
|  | 60-69                     | -0.725 | 0.016   | -1.317      | -0.133      |
|  | 70-up                     | -1.278 | 0.002   | -2.094      | -0.462      |
| <b>Sex(ref: males)</b>                 | Sex                       | 0.606  | 0.001   | 0.240       | 0.972       |
| <b>Socio-economic scores</b>           | Socio-economic scores     | 0.335  | 0.000   | 0.263       | 0.407       |
| <b>Cholesterol (mg/dl)</b>             | cholesterol (mg/dl)       | 0.912  | 0.000   | 0.753       | 1.070       |
| <b>Sugar level(ref: less than 110)</b> | FBS (110-125 mg/dl)       | 0.548  | 0.183   | -0.258      | 1.354       |
|  | FBS (more than 125 mg/dl) | 0.881  | 0.013   | 0.183       | 1.579       |
| <b>Region(ref: Region 1)</b>           | Cagayan Valley            | 1.212  | 0.003   | 0.405       | 2.018       |
|  | Central Luzon             | 0.762  | 0.038   | 0.042       | 1.482       |
|  | Bicol Region              | 0.384  | 0.347   | -0.416      | 1.183       |
|  | Western Visayas           | 0.896  | 0.023   | 0.122       | 1.670       |
|  | Central Visayas           | 1.298  | 0.000   | 0.570       | 2.026       |
|  | Eastern Visayas           | 1.446  | 0.001   | 0.567       | 2.325       |
|  | Zamboanga Peninsula       | 1.261  | 0.005   | 0.388       | 2.135       |
|  | Northern Mindanao         | 1.678  | 0.000   | 0.829       | 2.528       |
|  | Davao Region              | 0.779  | 0.088   | -0.116      | 1.674       |
|  | SOCCSKSARGEN              | 1.523  | 0.000   | 0.699       | 2.348       |
|  | NCR                       | 0.804  | 0.022   | 0.117       | 1.491       |
|  | CAR                       | 1.502  | 0.006   | 0.436       | 2.568       |
|  | ARMM                      | 0.295  | 0.638   | -0.933      | 1.522       |
|  | CARAGA                    | 1.180  | 0.022   | 0.173       | 2.186       |
|  | CALABARZON                | 1.470  | 0.000   | 0.772       | 2.169       |
|  | MIMAROPA                  | 0.989  | 0.043   | 0.033       | 1.944       |
| <b>Alcohol(ref: never)</b>             | current alcohol drinker   | 0.073  | 0.738   | -0.353      | 0.499       |
|  | past alcohol drinker      | 0.497  | 0.010   | 0.116       | 0.877       |
| <b>Smoking(ref: non-smokers)</b>       | Past smoker               | -0.575 | 0.001   | -0.921      | -0.230      |
|  | Current smoker            | 0.427  | 0.048   | 0.004       | 0.850       |
| <b>Hypertension(ref: normal)</b>       | High normal               | 0.371  | 0.036   | 0.025       | 0.718       |
|  | Pre-hypertension          | 1.091  | 0.000   | 0.645       | 1.538       |
|  | Hypertension              | 1.377  | 0.000   | 1.013       | 1.741       |
| <b>Physical activity</b>               | Physical activity         | -0.267 | 0.098   | -0.584      | 0.050       |
| <b>Total energy (kcal)</b>             | Total energy (kcal)       | 0.001  | 0.000   | 0.000       | 0.001       |
| <b>History of obesity</b>              | History of obesity        | 1.060  | 0.000   | 0.710       | 1.409       |

*Source: Author's calculation of NNS 2008.*

## B. Total blood cholesterol

The World Health Organization included high serum cholesterol as important risk factor of major non-communicable diseases. Excessive cholesterol in the blood can deposit overtime so that the arteries become narrower and blood flow to the heart is blocked. Biological and lifestyle changes are important factors that contribute in the development of hypercholesterolemia. Some studies noted that lowering the total serum cholesterol is an ideal strategy for reducing the burden of cardio-vascular diseases (World Health Organization, 2011; Fuller, Stevens, Wang, & Group, 2001).

In the Philippines, 7.3 percent of adult males and 12.8 percent of females have hypercholesterolemia or excessively high levels of blood cholesterol ( $\geq 240$  mg/dl). The prevalence of hypercholesterolemia is highest in the age group 50-59 years old. Among females, the prevalence is 25 percent compared to 13 percent of their male counterparts (Table 11).

**Table 11. Prevalence of high Total Cholesterol (> 240 mg/dl) among adults 20 years old and above, Philippines, 2008.**

| Variable           | Category | Total       |                 | Male       |                | Female      |                  |
|--------------------|----------|-------------|-----------------|------------|----------------|-------------|------------------|
|                    |          | %           | 95% CI          | %          | 95% CI         | %           | 95% CI           |
| <b>Philippines</b> |          | <b>10.2</b> | <b>9.3-11.2</b> | <b>7.3</b> | <b>6.2-8.3</b> | <b>12.8</b> | <b>11.5-14.1</b> |
| <b>Age</b>         | 20-29    | 4.0         | 2.9-5.2         | 4.3        | 2.6-6.0        | 3.7         | 2.2-5.2          |
|                    | 30-39    | 6.4         | 5.0-7.7         | 6.3        | 4.3-8.2        | 6.4         | 4.6-8.3          |
|                    | 40-49    | 10.0        | 8.3-11.7        | 7.7        | 5.5-9.8        | 12.2        | 9.6-14.7         |
|                    | 50-59    | 20.0        | 17.2-22.8       | 13.0       | 9.7-16.3       | 25.5        | 21.6-29.4        |
|                    | 60-60    | 15.6        | 12.5-18.5       | 7.0        | 3.7-10.2       | 22.5        | 18.1-26.9        |
|                    | 70-up    | 12.4        | 9.2-15.5        | 7.9        | 3.3-12.4       | 15.5        | 11.0-20.0        |

*Source: Author's calculation of NNS 2008.*

Disaggregating the prevalence of hypercholesterolemia by socio-economic status, the prevalence increases as the socio-economic status increases. There is a similar trend if educational attainment is used as indicator to measure welfare. The prevalence of hypercholesterolemia increases along with educational attainment (Table 12).

**Table 12. Prevalence of high cholesterol among adults 20 years old and above, by socio-economic status, urbanization and educational attainment, Philippines, 2008.**

| Characteristics     | Category     | Total       |            |             | Male       |            |            | Female      |             |             |
|---------------------|--------------|-------------|------------|-------------|------------|------------|------------|-------------|-------------|-------------|
|                     |              | %           | 95% CI     |             | %          | 95% CI     |            | %           | 95% CI      |             |
|                     |              |             | Lower      | Upper       |            | Lower      | Upper      |             | Lower       | Upper       |
| <b>Total</b>        |              | <b>10.2</b> | <b>9.3</b> | <b>11.2</b> | <b>7.3</b> | <b>6.2</b> | <b>8.3</b> | <b>12.8</b> | <b>11.5</b> | <b>14.1</b> |
| <b>SES</b>          | Poorest      | 4.7         | 3.3        | 6.0         | 2.9        | 1.4        | 4.4        | 6.7         | 4.5         | 8.8         |
|                     | Poor         | 6.7         | 5.3        | 8.2         | 3.9        | 2.4        | 5.4        | 9.6         | 7.2         | 11.9        |
|                     | Middle       | 8.1         | 6.5        | 9.8         | 6.1        | 4.1        | 8.0        | 10.0        | 7.7         | 12.4        |
|                     | Rich         | 12.5        | 10.4       | 14.5        | 10.1       | 7.2        | 13.1       | 14.2        | 11.5        | 17.0        |
|                     | Richest      | 17.3        | 14.9       | 19.7        | 14.4       | 11.3       | 17.6       | 19.4        | 16.2        | 22.6        |
| <b>Urbanization</b> | Urban        | 11.9        | 10.5       | 13.3        | 9.4        | 7.8        | 10.9       | 13.9        | 11.9        | 15.9        |
|                     | Rural        | 8.0         | 7.0        | 9.1         | 5.3        | 4.0        | 6.5        | 10.8        | 9.2         | 12.3        |
| <b>Educational</b>  | No education | 5.8         | 2.4        | 9.2         | 2.0        | -0.4       | 4.3        | 9.9         | 3.5         | 16.4        |
| <b>Attainment</b>   | Elementary   | 8.3         | 7.0        | 9.6         | 3.7        | 2.5        | 4.9        | 12.3        | 10.3        | 14.2        |
|                     | Secondary    | 9.6         | 8.3        | 11.0        | 8.3        | 6.5        | 10.0       | 11.0        | 9.0         | 13.1        |
|                     | Tertiary     | 13.1        | 11.2       | 15.1        | 11.3       | 8.7        | 13.9       | 14.5        | 12.0        | 17.0        |

*Source: Author's calculation of NNS 2008.*

Rapid urbanization has been associated with high blood cholesterol levels. In the Philippines, the prevalence of hypercholesterolemia is relatively higher in urban areas. Analyzing the levels of hypercholesterolemia among the poor urban poor, the prevalence is higher compared to their rural counterparts.

**Table 13. Prevalence of high cholesterol among adults 20 years old and above, by urban and rural poor, Philippines, 2008.**

| hypercholesterolemia | Total |        |       | Male |       |       | Female |    |      |
|----------------------|-------|--------|-------|------|-------|-------|--------|----|------|
|                      | %     | 95% CI |       | %    | %     |       | 95% CI | %  |      |
|                      |       | Lower  | Upper |      | Lower | Upper |        | LL | UL   |
| <b>Rural poor</b>    | 5.4   | 4.2    | 6.6   | 3.2  | 1.9   | 4.5   | 7.9    | 6  | 9.8  |
| <b>Urban poor</b>    | 6.4   | 4.7    | 8.2   | 3.9  | 1.9   | 6     | 8.9    | 6  | 11.8 |

*Source: Author's calculation of NNS 2008.*

Using stepwise multivariate regression analysis, table 14 presents the different significant predictors of total cholesterol. Taking the case of age, if all other variables are constant, there is an increase in total cholesterol as age increases.

Other socio-demographic characteristics like sex, socio-economic status and urbanity are important predictors of total cholesterol. If other variables are fixed, females have higher average unit increase of total cholesterol relative to males while a unit increase in socio-economic scores positively increases total cholesterol. People living in rural areas have lower average decrease compared to people living in urban areas. For other significant predictors, the direction of their coefficients is shown in table 14.

**Table 14. Regression results of total cholesterol and different predictors.**

| Variable                               | Category                  | Coefficient | p value | Lower limit | Upper limit |
|--|---------------------------|-------------|---------|-------------|-------------|
| <b>BMI</b>                             | BMI                       | 1.99        | 0.00    | 1.73        | 2.25        |
| <b>Age (ref 20-29)</b>                 | 30-39                     | 9.11        | 0.00    | 6.12        | 12.10       |
|  | 40-49                     | 14.44       | 0.00    | 11.39       | 17.49       |
|  | 50-59                     | 26.95       | 0.00    | 23.58       | 30.32       |
|  | 60-69                     | 27.33       | 0.00    | 23.29       | 31.36       |
|  | 70-up                     | 26.47       | 0.00    | 21.57       | 31.36       |
| <b>Sex (Ref: males)</b>                | Sex                       | 8.47        | 0.00    | 6.21        | 10.73       |
| <b>Socio-economic scores</b>           | Socio-economic scores     | 1.21        | 0.00    | 0.62        | 1.80        |
| <b>Educational attainment</b>          | Primary                   | 5.85        | 0.10    | -1.04       | 12.75       |
|  | Secondary                 | 11.29       | 0.00    | 4.22        | 18.36       |
|  | Tertiary                  | 15.11       | 0.00    | 7.79        | 22.44       |
| <b>Urbanity(ref: urban)</b>            | Urbanity                  | -2.72       | 0.02    | -4.98       | -0.45       |
| <b>Sugar level(ref: less than 110)</b> | FBS (110-125 mg/dl)       | 4.65        | 0.12    | -1.18       | 10.48       |
|  | FBS (more than 125 mg/dl) | 15.65       | 0.00    | 11.14       | 20.16       |
| <b>Region</b>                          | Cagayan Valley            | -6.75       | 0.04d   | -13.22      | -0.28       |
|  | Central Luzon             | -5.49       | 0.04    | -10.73      | -0.25       |
|  | Bicol Region              | 7.40        | 0.02    | 1.39        | 13.40       |
|  | Western Visayas           | -4.33       | 0.13    | -9.89       | 1.24        |
|  | Central Visayas           | -5.82       | 0.03    | -11.19      | -0.45       |
|  | Eastern Visayas           | -4.21       | 0.18    | -10.31      | 1.89        |
|  | Zamboanga Peninsula       | -12.92      | 0.00    | -19.53      | -6.31       |
|  | Northern Mindanao         | -12.37      | 0.00    | -18.70      | -6.04       |
|  | Davao Region              | -8.93       | 0.00    | -14.94      | -2.92       |
|  | SOCCKSARGEN               | -12.62      | 0.00    | -19.06      | -6.19       |
|  | NCR                       | 1.16        | 0.66    | -3.97       | 6.30        |
|  | CAR                       | -3.72       | 0.38    | -12.12      | 4.67        |
|  | ARMM                      | 7.79        | 0.08    | -1.02       | 16.61       |
|  | CARAGA                    | -10.90      | 0.00    | -18.26      | -3.53       |
|  | CALABARZON                | -1.99       | 0.45    | -7.19       | 3.20        |
|  | MIMAROPA                  | -5.66       | 0.14    | -13.07      | 1.75        |
|  | current alcohol drinker   | -5.39       | 0.00    | -8.42       | -2.37       |
|  | past alcohol drinker      | -1.22       | 0.34    | -3.70       | 1.26        |
|  | High normal               | 5.70        | 0.00    | 3.12        | 8.28        |
|  | Pre-hypertension          | 6.61        | 0.00    | 3.23        | 9.99        |
|  | Hypertension              | 11.71       | 0.00    | 9.03        | 14.39       |
| <b>total fat (g)</b>                   | total fat (g)             | 0.13        | 0.00    | 0.08        | 0.17        |

*Source: Author's calculation of NNS 2008.*

### C. Hypertension

Hypertension plays a major role in the development of cardio-vascular diseases. Stable blood pressure has been associated with about 40 percent reduction of stroke and 15 percent reduction on myocardial infarction. In addition, hypertension often co-exist with other risk factors like diabetes, hypercholesterolemia, smoking, obesity and tobacco use which exacerbates the risk of cardio-vascular diseases (World Health Organization and International Society of Hypertension Writing Group, 2003).

In the Philippines, 29 percent of males in the country are considered hypertensive while 22 percent among females. Table 15 shows that the prevalence of hypertension is higher among older age group. The prevalence of hypertension among population aged 50 years old and above would range from 40-56 percent. The prevalence of hypertension among males in the younger age group (20-29 years old) is much higher than females (17 percent vs. 4.6 percent).

**Table 15. Prevalence of hypertension by single visit BP among adults 20 years and above, by age Philippines, 2008.**

| Variable           | Category | Total       |                  | Male        |                  | Female      |                  |
|--------------------|----------|-------------|------------------|-------------|------------------|-------------|------------------|
|                    |          | %           | 95 CI LL         | %           | 95 CI LL         | %           | 95 CI LL         |
| <b>Philippines</b> |          | <b>25.3</b> | <b>24.2-26.6</b> | <b>29.1</b> | <b>27.4-31.0</b> | <b>22.2</b> | <b>20.9-23.6</b> |
| <b>Age</b>         | 20-29    | 10.4        | 8.8-11.7         | 17.0        | 14.2-19.4        | 4.7         | 3.3-6.0          |
|                    | 30-39    | 17.5        | 15.5-19.7        | 21.5        | 18.7-25.1        | 14.2        | 11.5-16.5        |
|                    | 40-49    | 31.0        | 28.6-33.8        | 35.8        | 32.2-39.5        | 26.5        | 23.8-30.2        |
|                    | 50-59    | 45.0        | 41.6-47.9        | 48.9        | 43.9-53.2        | 41.8        | 37.7-46.0        |
|                    | 60-60    | 48.9        | 45.1-52.9        | 43.9        | 38.6-50.1        | 53.0        | 47.7-57.8        |
|                    | 70-up    | 53.5        | 48.3-58.0        | 50.0        | 42.1-57.3        | 55.8        | 49.4-61.5        |

*Source: Author's calculation of NNS 2008.*

Disaggregation of the prevalence of hypertension by socio-economic status shows that the prevalence of hypertension has no discernable pattern on socio-economic status. This is ascertained by educational attainment wherein no pattern of decrease nor increase in hypertension in relation to educational attainment (Table 16).

**Table 16. Prevalence of hypertension by single visit BP among adults 20 years and above by socio-economic status, urbanization and educational attainment, Philippines, 2008.**

| Characteristics     | Category     | Total       |             |             | Male        |             |             | Female      |             |             |
|---------------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|                     |              | %           | 95% CI      |             | %           | 95% CI      |             | %           | 95% CI      |             |
|                     |              |             | Lower       | Upper       |             | Lower       | Upper       |             | Lower       | Upper       |
| <b>Total</b>        |              | <b>25.3</b> | <b>24.2</b> | <b>26.6</b> | <b>29.1</b> | <b>27.4</b> | <b>31.0</b> | <b>22.2</b> | <b>20.9</b> | <b>23.6</b> |
| <b>SES</b>          | Poorest      | 24.4        | 21.9        | 27.0        | 25.1        | 21.7        | 28.5        | 23.7        | 20.3        | 27.1        |
|                     | Poor         | 23.8        | 21.4        | 26.1        | 25.1        | 21.9        | 28.4        | 22.5        | 19.3        | 25.6        |
|                     | Middle       | 25.1        | 22.9        | 27.3        | 29.0        | 25.6        | 32.5        | 21.6        | 18.7        | 24.5        |
|                     | Rich         | 27.6        | 25.0        | 30.2        | 34.7        | 30.4        | 38.9        | 22.5        | 19.6        | 25.4        |
|                     | Richest      | 25.9        | 23.2        | 28.5        | 32.6        | 28.1        | 37.1        | 21.0        | 18.0        | 24.0        |
| <b>Urbanization</b> | Urban        | 24.3        | 22.8        | 25.9        | 29.4        | 26.8        | 31.9        | 20.4        | 18.7        | 22.2        |
|                     | Rural        | 26.6        | 24.9        | 28.3        | 29.0        | 26.7        | 31.4        | 24.4        | 22.4        | 26.4        |
| <b>Educational</b>  | no education | 26.2        | 19.8        | 32.5        | 30.3        | 21.1        | 39.6        | 21.7        | 14.2        | 29.1        |
| <b>Attainment</b>   | Elementary   | 31.8        | 29.8        | 33.9        | 31.0        | 28.1        | 33.8        | 32.6        | 29.8        | 35.4        |
|                     | Secondary    | 22.3        | 20.6        | 24.0        | 26.5        | 23.7        | 29.3        | 18.4        | 16.4        | 20.5        |
|                     | Tertiary     | 23.1        | 21.1        | 25.2        | 31.7        | 28.3        | 35.1        | 17.0        | 14.7        | 19.3        |

*Source: Author's calculation of NNS 2008.*

Looking at the status in highly urbanized areas like NCR, a similar pattern can also be observed. The level of hypertension is not skewed towards specific group of socio-economic class.

**Table 17. Prevalence of hypertension by single visit BP among adults 20 years and above by urban and rural poor, Philippines, 2008.**

| Hypertension      | Total |        |       | Total |        |       | Total |        |       |
|-------------------|-------|--------|-------|-------|--------|-------|-------|--------|-------|
|                   | %     | 95% CI |       | %     | 95% CI |       | %     | 95% CI |       |
|                   |       | Lower  | Upper |       | Lower  | Upper |       | Lower  | Upper |
| <b>Rural poor</b> | 24.9  | 22.7   | 27.1  | 25.3  | 22.4   | 28.2  | 24.5  | 21.6   | 27.4  |
| <b>Urban poor</b> | 22.4  | 19.7   | 25.1  | 24.8  | 20.8   | 28.8  | 20.2  | 16.6   | 23.9  |

*Source: Author's calculation of NNS 2008.*

Table 17 shows the result of stepwise logistic regression. Among the following socio-demographic characteristics: sex, educational attainment and socio-economic status, only age and sex are significant predictors. Assuming all variables are held constant, the odds of having hypertension are lower among females. With regard to age, the odds of having hypertension are higher among older age compared to 20-29 age group. Table 18 depicts in detail other significant variables and the direction of their coefficients.

**Table 18. Regression results of hypertension and different predictors.**

| Variable                                 | Category                  | coefficient | p value | Lower limit | Upper limit |
|--|---------------------------|-------------|---------|-------------|-------------|
| <b>Total cholesterol (g)</b>             | Total cholesterol         | 0.01        | 0.00    | 0.00        | 0.01        |
|  | BMI                       | 0.08        | 0.00    | 0.06        | 0.10        |
| <b>Age group (ref 20-29)</b>             | 30-39                     | 0.33        | 0.01    | 0.08        | 0.57        |
|  | 40-49                     | 1.04        | 0.00    | 0.81        | 1.27        |
|  | 50-59                     | 1.56        | 0.00    | 1.32        | 1.80        |
|  | 60-69                     | 1.98        | 0.00    | 1.71        | 2.24        |
|  | 70-up                     | 2.27        | 0.00    | 1.96        | 2.58        |
|  | Sex (ref: males)          | -0.47       | 0.00    | -0.63       | -0.30       |
| <b>Sugar level (ref: below 110mg/dl)</b> | FBS (110-125 mg/dl)       | 0.63        | 0.00    | 0.26        | 0.99        |
|  | FBS (more than 125 mg/dl) | 0.24        | 0.09    | -0.04       | 0.52        |
| <b>Region (ref: Region 1)</b>            | Cagayan Valley            | -0.19       | 0.34    | -0.59       | 0.20        |
|  | Central Luzon             | -0.46       | 0.02    | -0.83       | -0.09       |
|  | Bicol Region              | 0.34        | 0.08    | -0.04       | 0.72        |
|  | Western Visayas           | -0.18       | 0.35    | -0.55       | 0.20        |
|  | Central Visayas           | 0.38        | 0.04    | 0.03        | 0.73        |
|  | Eastern Visayas           | -0.22       | 0.25    | -0.60       | 0.16        |
|  | Zamboanga Peninsula       | 0.15        | 0.47    | -0.26       | 0.56        |
|  | Northern Mindanao         | 0.07        | 0.72    | -0.33       | 0.47        |
|  | Davao Region              | 0.13        | 0.49    | -0.25       | 0.52        |
|  | SOCCSKSARGEN              | -0.18       | 0.38    | -0.58       | 0.22        |
|  | NCR                       | -0.25       | 0.15    | -0.59       | 0.09        |
|  | CAR                       | 0.42        | 0.04    | 0.01        | 0.82        |
|  | ARMM                      | -0.32       | 0.24    | -0.86       | 0.22        |
|  | CARAGA                    | 0.27        | 0.18    | -0.12       | 0.67        |
|  | CALABARZON                | -0.27       | 0.14    | -0.63       | 0.09        |
|  | MIMAROPA                  | -0.06       | 0.79    | -0.49       | 0.37        |
| <b>Alcohol(ref: never)</b>               | current alcohol drinker   | 0.32        | 0.00    | 0.11        | 0.53        |
|  | past alcohol drinker      | -0.12       | 0.19    | -0.29       | 0.06        |
| <b>Smoking (ref: never)</b>              | Past smoker               | -0.24       | 0.01    | -0.42       | -0.06       |
|  | Current smoker            | -0.05       | 0.62    | -0.25       | 0.15        |
| <b>Total fat (g)</b>                     | total fat (g)             | -0.01       | 0.00    | -0.01       | 0.00        |
| <b>Total meat (g)</b>                    | total meat (g)            | 0.00        | 0.00    | 0.00        | 0.00        |
| <b>History of high blood</b>             | History of high blood     | 0.37        | 0.00    | 0.24        | 0.51        |

*Source: Author's calculation of NNS 2008.*



## Exposures

Following the framework mentioned in the earlier section, exposures are the predecessors of vulnerabilities. In this study, exposure includes the following: unhealthy diet, smoking, alcohol consumption and exposure to advertisement. Barriers to physical and financial components of health care are also discussed under this section.

### A. Unhealthy diet

Dietary and nutrition are important factors in the promotion of good health. Its pertinent role in the occurrence of non-communicable diseases is well established. As modifiable risk factors, these therefore occupy prominent position in the prevention and control of non-communicable diseases (WHO; 2011).

Accompanied by economic development, the quality and quantity of food consumption have changed drastically in emerging economies like the Philippines. Studies have shown that there was a noticeable shift towards high fat, refined carbohydrates and low fiber diet. In current nutrition studies, one of the ways to measure dietary transitions is to observe per capita food consumption expressed in kcal over time. In developing and transition economies, the average per capita food consumption is expected to increase in a faster rate compared to developed and industrialized countries (Uusitalo, Pietinen, & Puska, 2002; Organization, 2003).

In the Philippines, the average consumption which is 1835 kcal per day is way below the average food consumption per capita of the world. Table 19 shows that there is slight variation in the food consumption across quintiles. The average daily consumption in terms of kcal among the poorest is slightly lower than the first and second quintiles. Looking at the food quantity, the lower quintiles would tend to have higher consumption of carbohydrates but lower in proteins. In terms of fat consumption, the higher quintile has higher average consumption compared to their poorer counterparts.

**Table 19. Average daily food consumption per capita per day, by socio-economic status, Philippines, 2008.**

| Quintile | Food consumption (kcal) | Protein (grams) | Carbohydrates (grams) | Fat (grams) |
|----------|-------------------------|-----------------|-----------------------|-------------|
| Poorest  | 1689.1                  | 50.7            | 326.8                 | 17.8        |
| Poor     | 1797.1                  | 56.7            | 335.7                 | 23.9        |
| Middle   | 1882.8                  | 59.3            | 341.8                 | 29.3        |
| Rich     | 1834.1                  | 61.5            | 317.1                 | 33.9        |
| Richest  | 1940.3                  | 66.7            | 317.2                 | 43.7        |

*Source: Author's calculation of NNS 2008.*

## 1. Saturated oil

Saturated oil is usually found in animal fat and some plant oils. Though there are inconsistencies among epidemiologic studies that links high consumption of saturated fat increases risk of CVDs, saturated oil is still considered as an important risk factor of major non-communicable diseases. The World Health Organization included saturated oil along with trans-fats as one of unhealthy diet that needs to be controlled (Aschero, 1996; World Health Organization, 2011; Siri-Tarino, Sun, & R., 2010).

Table 20 shows the daily consumption of saturated oil by age group and sex. It can be observed that the intake of saturated oil is very high among younger age group. The average consumption of population aged 20-29 years old is almost half compared to the oldest age group (70-up).

**Table 20. Mean intake of oil in grams per day among adults 20 years and above, Philippines, 2008.**

| Characteristics    | Category | Total      |                | Male        |                 | Female     |                |
|--------------------|----------|------------|----------------|-------------|-----------------|------------|----------------|
|                    |          | Mean       | 95% CI         | Mean        | 95 % CI         | Mean       | 95% CI         |
| <b>Philippines</b> |          | <b>9.4</b> | <b>8.9-9.9</b> | <b>10.0</b> | <b>9.3-10.7</b> | <b>8.8</b> | <b>8.3-9.4</b> |
| <b>Age</b>         | 20-29    | 11.2       | 10.0-12.3      | 11.4        | 9.8-13.0        | 11.0       | 9.6-12.4       |
|                    | 30-39    | 9.8        | 8.9-10.6       | 10.5        | 9.4-11.6        | 9.1        | 8.2-10.0       |
|                    | 40-49    | 9.6        | 8.7-10.5       | 9.9         | 8.7-11.2        | 9.3        | 8.2-10.3       |
|                    | 50-59    | 8.9        | 8.0-9.9        | 9.6         | 8.3-10.9        | 8.4        | 7.4-9.4        |
|                    | 60-69    | 7.2        | 6.2-8.2        | 8.5         | 6.9-10.1        | 6.2        | 5.3-7.1        |
|                    | 70-up    | 6.2        | 4.9-7.5        | 6.3         | 4.4-8.2         | 6.1        | 4.8-7.5        |

*Source: Author's calculation of NNS 2008.*

The average consumption of saturated oil is relatively higher among population with higher level of education and socio-economic status. Higher intake of saturated oil was also found among urban population compared to their counterparts living in rural areas. However, the urban poor population also consumes high levels of saturated. Their average daily consumption of oil among the urban poor is higher than the national average (tables 21 and 22).

**Table 21. Mean intake of oil among adults 20 years and above, by socio-economic status, urbanization and educational attainment, Philippines, 2008.**

| Characteristics     | Category     | Total      |            |            | Male        |            |             | Female     |            |            |
|---------------------|--------------|------------|------------|------------|-------------|------------|-------------|------------|------------|------------|
|                     |              | Mean       | 95% CI     |            | Mean        | 95% CI     |             | Mean       | 95% CI     |            |
|                     |              |            | Lower      | Upper      |             | Lower      | Upper       |            | Lower      | Upper      |
| <b>Total</b>        |              | <b>9.4</b> | <b>8.9</b> | <b>9.9</b> | <b>10.0</b> | <b>9.3</b> | <b>10.7</b> | <b>8.8</b> | <b>8.3</b> | <b>9.4</b> |
| <b>SES</b>          | Poorest      | 8.1        | 6.9        | 9.3        | 8.8         | 7.4        | 10.3        | 7.2        | 6.0        | 8.4        |
|                     | Poor         | 9.0        | 7.4        | 10.5       | 9.8         | 7.8        | 11.9        | 8.1        | 6.7        | 9.5        |
|                     | Middle       | 8.9        | 7.9        | 9.9        | 9.7         | 8.3        | 11.0        | 8.1        | 7.1        | 9.1        |
|                     | Rich         | 8.9        | 8.0        | 9.8        | 9.2         | 8.2        | 10.3        | 8.6        | 7.5        | 9.7        |
|                     | Richest      | 11.7       | 10.7       | 12.7       | 12.5        | 11.2       | 13.8        | 11.2       | 10.1       | 12.3       |
| <b>Urbanization</b> | urban        | 10.0       | 9.3        | 10.7       | 10.6        | 9.7        | 11.6        | 9.5        | 8.7        | 10.3       |
|                     | rural        | 8.7        | 8.0        | 9.4        | 9.4         | 8.4        | 10.3        | 8.0        | 7.3        | 8.8        |
| <b>Educational</b>  | no education | 7.2        | 5.2        | 9.2        | 7.4         | 4.8        | 10.1        | 6.9        | 4.1        | 9.7        |
| <b>Attainment</b>   | elementary   | 8.0        | 7.2        | 8.8        | 9.3         | 8.2        | 10.5        | 6.9        | 6.2        | 7.6        |
|                     | secondary    | 9.4        | 8.7        | 10.0       | 9.9         | 9.0        | 10.9        | 8.7        | 8.0        | 9.5        |
|                     | tertiary     | 11.4       | 10.5       | 12.4       | 11.4        | 10.3       | 12.5        | 11.5       | 10.3       | 12.7       |

*Source: Author's calculation of NNS 2008.*

**Table 22. Mean intake of oil among adults 20 years and above, by socio-economic status, urbanization and educational attainment, Philippines, 2008.**

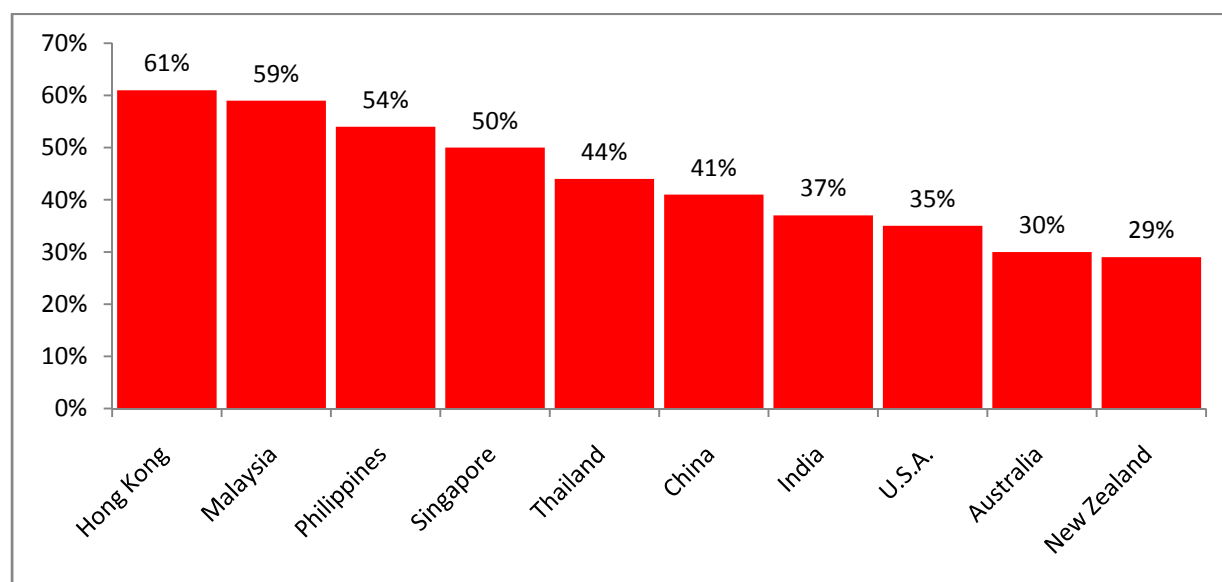
| Oil               | All  |        |       | Males |        |       | Females |        |       |
|-------------------|------|--------|-------|-------|--------|-------|---------|--------|-------|
|                   | Ave. | 95% CI |       | Ave.  | 95% CI |       | Ave.    | 95% CI |       |
|                   |      | Lower  | Upper |       | Lower  | Upper |         | Lower  | Upper |
| <b>Rural poor</b> | 8.5  | 7.4    | 9.6   | 9.4   | 8      | 10.8  | 7.6     | 6.5    | 8.7   |
| <b>Urban poor</b> | 8.6  | 6.5    | 10.7  | 9.3   | 6.6    | 12    | 7.9     | 6.1    | 9.7   |

*Source: Author's calculation of NNS 2008.*

## **2. Fast food**

It is becoming more common to eat meals away from home or to eat pre-cooked food in restaurants. In the Philippines, foodservice sales are currently valued at approximately US\$3 billion, increasing by an estimated 15%-20% per year in the past decade (Food Export). The growing market for fast food chain can also be ascertained by consumer study showing that the Philippines ranked third as the heaviest consumers of fast food in the world. Majority of heaviest consumers are in developed and emerging markets in Asia (AC Nielsen, 2004).

**Figure 17. Percentage of population that eats at take away restaurants at least once a week, by selected countries, 2004.**

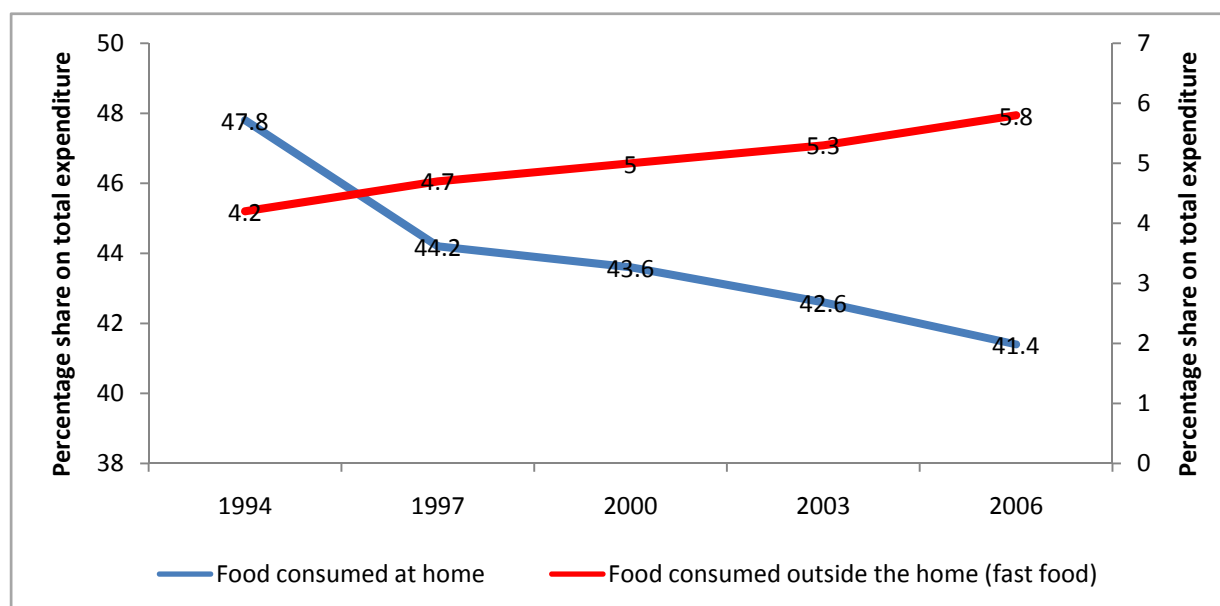


*Source: AC Nielsen Consumer Survey Report 2004.*

In many studies, increase prevalence of vulnerabilities like obesity has been linked by many investigators to increase frequency of outside home eating. Food prepared outside the home is generally high in refined carbohydrates and saturated fat. In a study by Haddad (2003) in selected countries, saturated fat content of food consumed at home has dropped significantly, whereas the fat content in fast foods and street food remains high. Moreover, outside eating as a frequent practice is highly dangerous because of its high association with sedentary lifestyle and other forms of unhealthy habits. This form of dietary transition can be explained by the different factors like rapid urbanization, economic growth and employment. Ultimately, the growing participation of women in the labor force had also driven many families to utilize fast and convenient way of eating (Haddad, 2003; Uusitalo, Pietinen, & Puska, 2002; Orfanos, 2007).

Using expenditure as an indicator, the share of “food outside the home expenditure” to total expenditure is drastically increasing while expenditure on food prepared at home is decreasing (Figure 18).

Figure 18. Expenditure of food consumed at home vs. outside home, Philippines, 1994-2006.

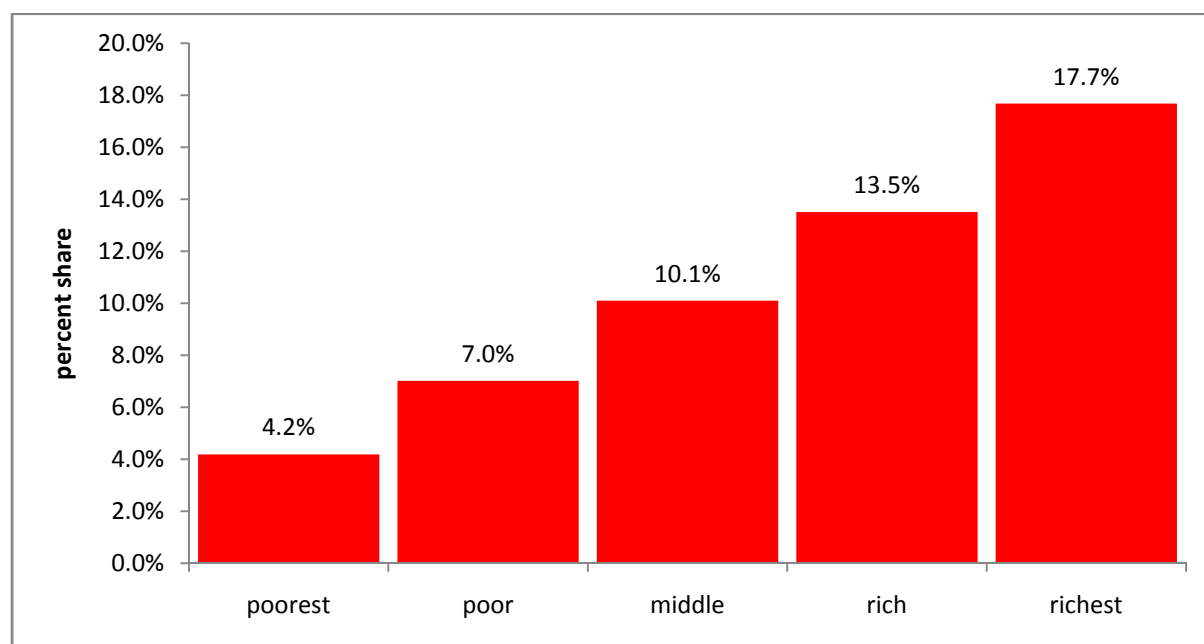


Source: *Family Income and Expenditure Survey*

Eating outside home may be a common practice among the affluent population. If we base on food expenditure, the richer population spends higher share of food outside home on their total food expenditure compared to their poorer counterparts (Figure 19). However, this may not be reflective enough since it is always best to couple this analysis with quantity of consumption. If we try to synergistically analyze urbanity and wealth index, figure 20 shows that urban poor<sup>16</sup> spends 8 percent of their total food expenditure on food outside home compared to 5 percent of their poor counterparts.

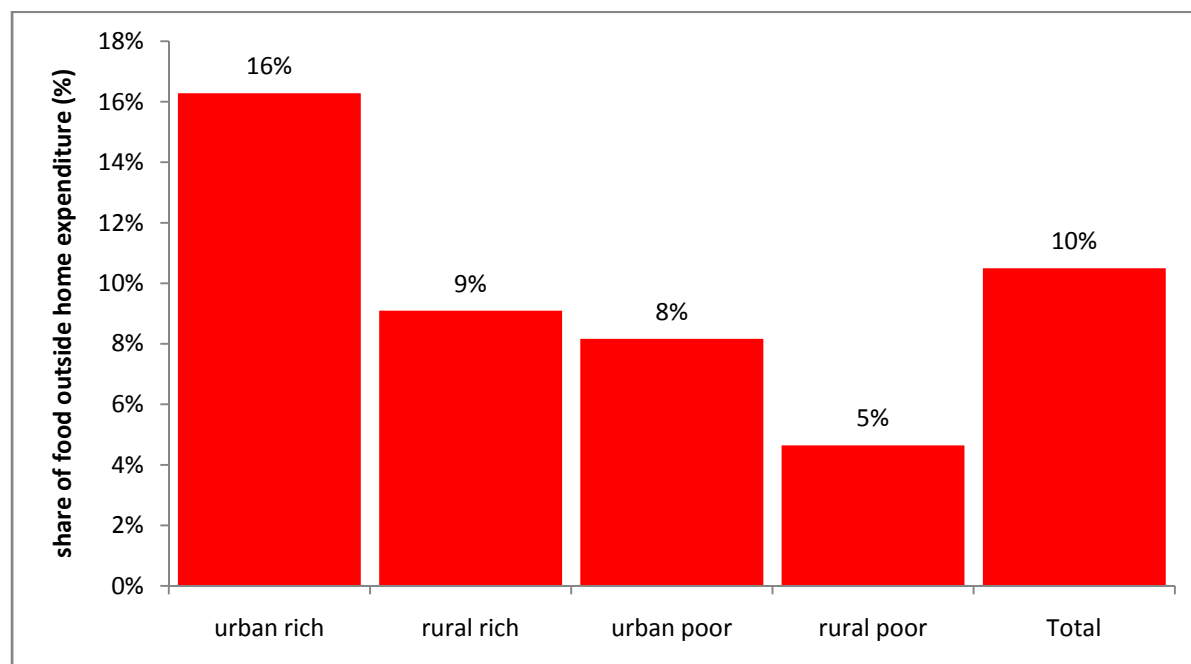
<sup>16</sup> Households are classified as urban poor if they belong to first two wealth quintiles and if they live in urban areas based on NSO classification.

**Figure 19. Share of food eaten outside home expenditure on total food expenditure, Philippines, 2009.**



*Source: Family Income and Expenditure Survey*

**Figure 20. Share of food outside home expenditure on total food expenditure, by rural and urban poor, Philippines, 2009.**

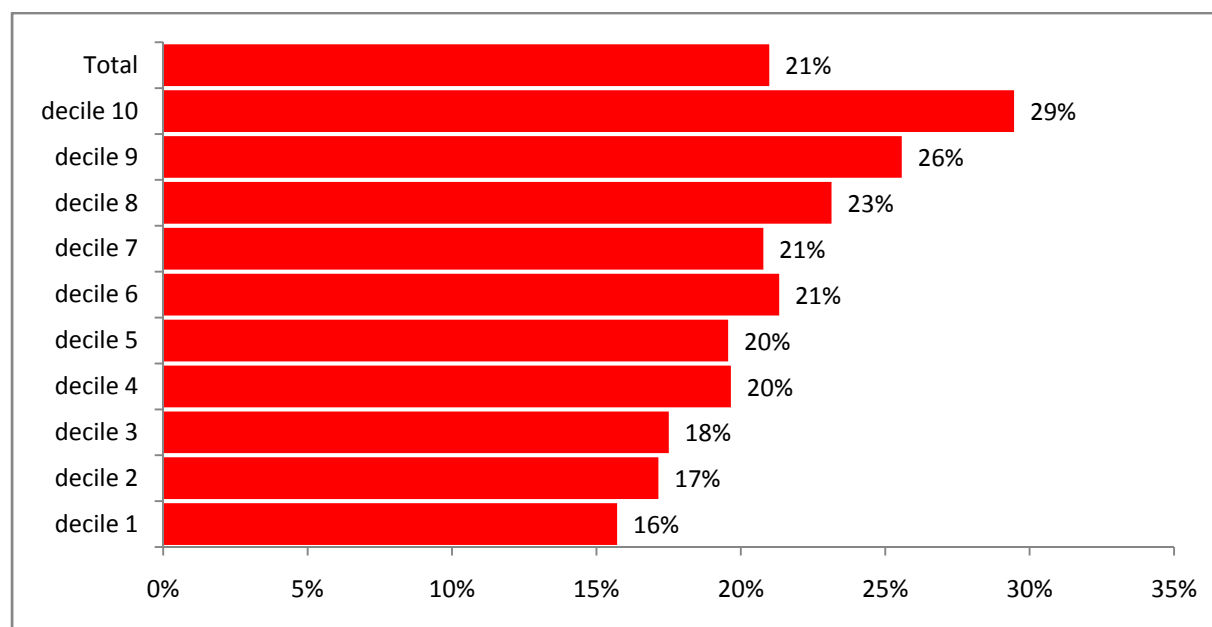


*Source: Family Income and Expenditure Survey*

It is hypothesized that population in predominantly urban regions is more prone to outside home eating. Food purchases outside the home tend to be more processed. Fast food restaurants tend to attract consumers from the richer segment. Among the urban poor dwellers, street foods are significant source of food, both in terms of energy intake and food expenditure (Uusitalo et al, 2002).

In National Capital Region (Metro Manila), the share of food outside the home on total food expenditure is 100 percent higher than the national average (10 percent vs. 21 percent). The share of food outside the home expenditure has a positive relationship with the income deciles. Affluent households tend to have higher share compared to households that belong to lower deciles<sup>17</sup>. However, it is important to note that even the lower decile groups which can be assumed as the urban poor, have high level of expenditures compared to the national estimates (16 percent for the lowest decile).

**Figure 21. Share of food outside home expenditure on total food expenditure, by income decile, NCR, Philippines, 2009.**



*Source: Family Income and Expenditure Survey*

<sup>17</sup> Income deciles were calculated based on the income of NCR households and the researchers did not include households of other regions in the ranking

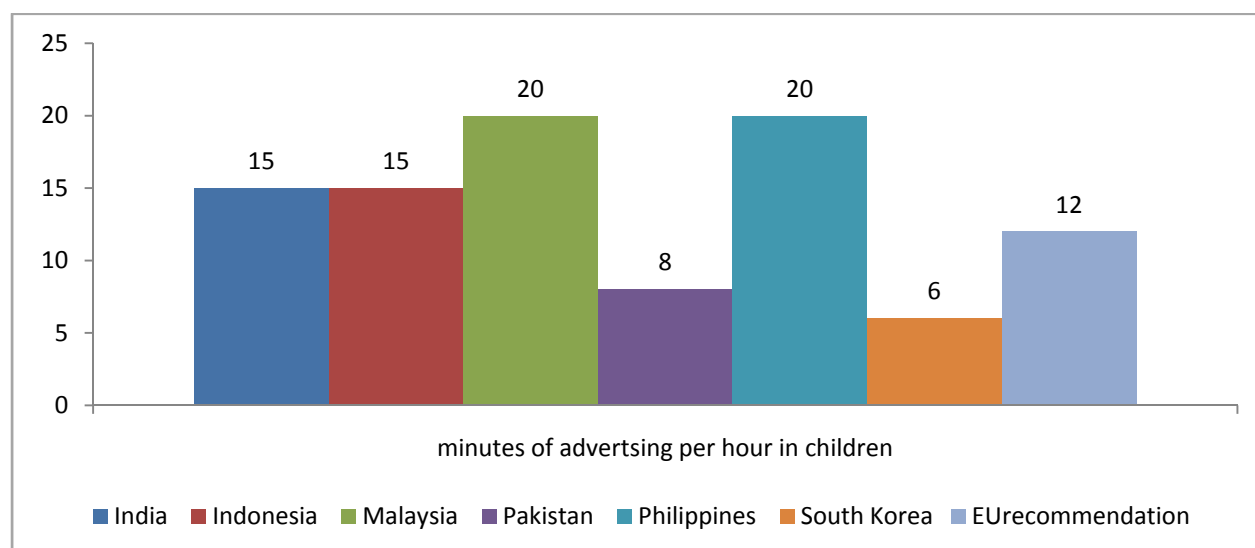
### 3. Unhealthy food advertising

Many factors contribute to the risk of developing physical vulnerabilities associated with NCDs. One of these is the way how unhealthy food is marketed or endorsed. A handful of studies have demonstrated the adverse effects of advertising on the consumption and perception on unhealthy food items (International, The Junk Food Generation: A multi-country survey of the influence of television advertisements on children, 2004).

Manufacturers of unhealthy food items, mostly multinational companies, can easily promote their products in low and middle income countries. This can be attributed to lesser knowledge of advertising and the lingering perception of western food brands as part of superior and modern lifestyle. Moreover, in a country where there are lax policies in controlling food advertising and marketing, manufacturer of unhealthy food items have started to capitalize on this loophole by promoting their products especially to younger age groups. Most manufacturers of unhealthy food have used variety of promotional activities from event sponsorships, celebrity endorsements; freebies in fast foods (e.g. kid meals in McDonalds and Jollibee), movie or show tie-ins and television and radio advertising (Consumer International, 2008).

In most developing countries like the Philippines, marketing and endorsement of unhealthy diet are not properly regulated. The inability of a governing body to regulate messages and themes can mislead especially the younger population groups. In a study conducted by Nielsen, one third of an hour of children television show in the country is allotted to advertising. It is noteworthy that Jollibee, Nestle, San Miguel and Monde Nissin Biscuits are the biggest sponsors of food advertising in the country (AC Nielsen 2004).

**Figure 22. Advertising time per hour of children's program by selected countries, 2004.**



Source: AC Nielsen 2004.

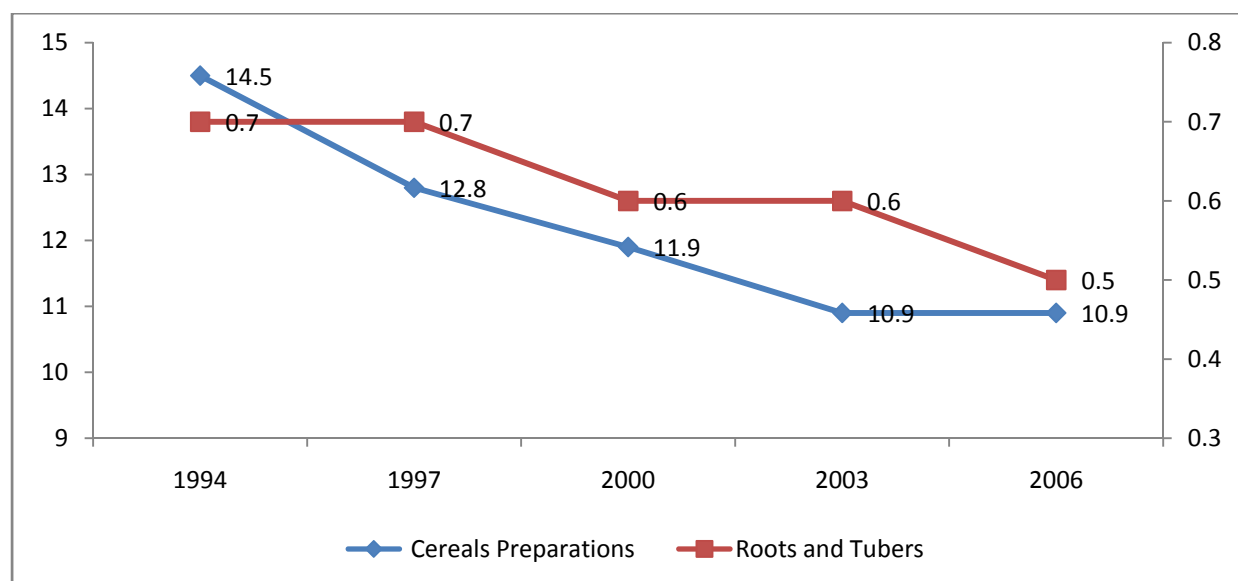


#### 4. Fiber and meat consumption

Dietary fiber, comprising non-digestible carbohydrate naturally occurring in plants, has been associated with reduced incidence of several non-communicable diseases like cardio-vascular diseases and certain cancers. Potential benefits include effect on serum cholesterol levels, postprandial glucose, insulin sensitivity and blood pressure (Ness & Powles, 1997).

Dietary transition is common in developing countries. In the Philippines, there is a noticeable decrease on the expenditure share of healthy and pre-cooked staple food like root crops and cereals and decreasing share of pre-cooked and processed foods (Uusitalo, Pietinen, & Puska, 2002; Haddad, 2003).

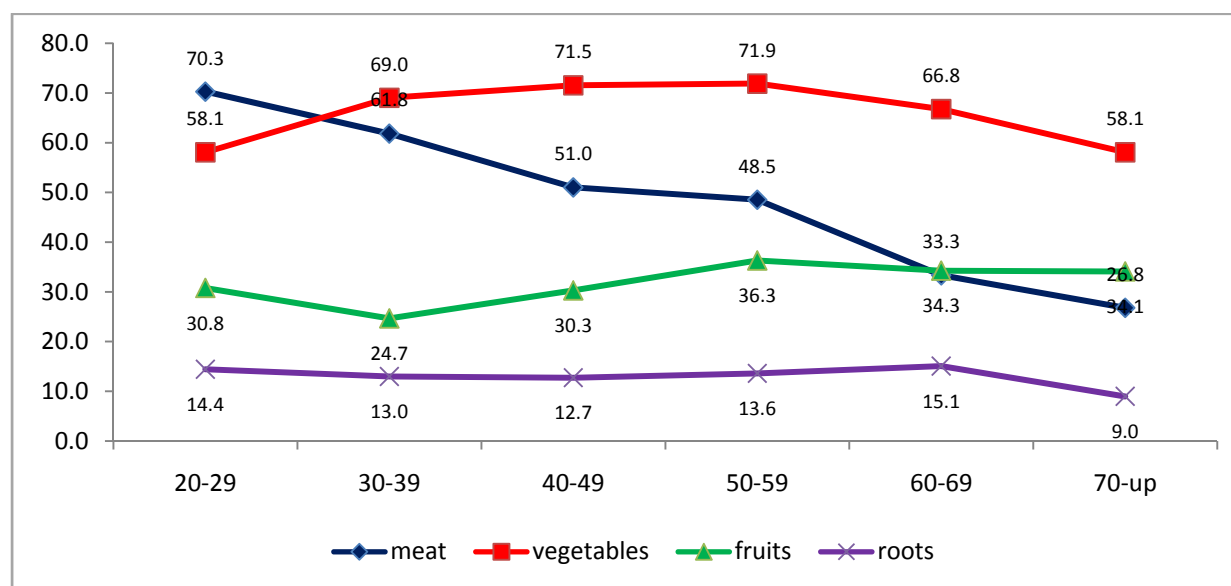
**Figure 23. Share of selected food expenditure on total expenditure, Philippines, 1994-2006.**



*Source: Family Income and Expenditure Survey*

There is a wide variation of meat and fiber consumption across socio-economic status and age groups. The youngest age group (20-29 years old) consumes more meat than vegetables. The consumption of meat decreases as age increases while vegetable consumption is relatively lower in the extreme age groups. With regard to fruit and root crops, there is no noticeable pattern across age group.

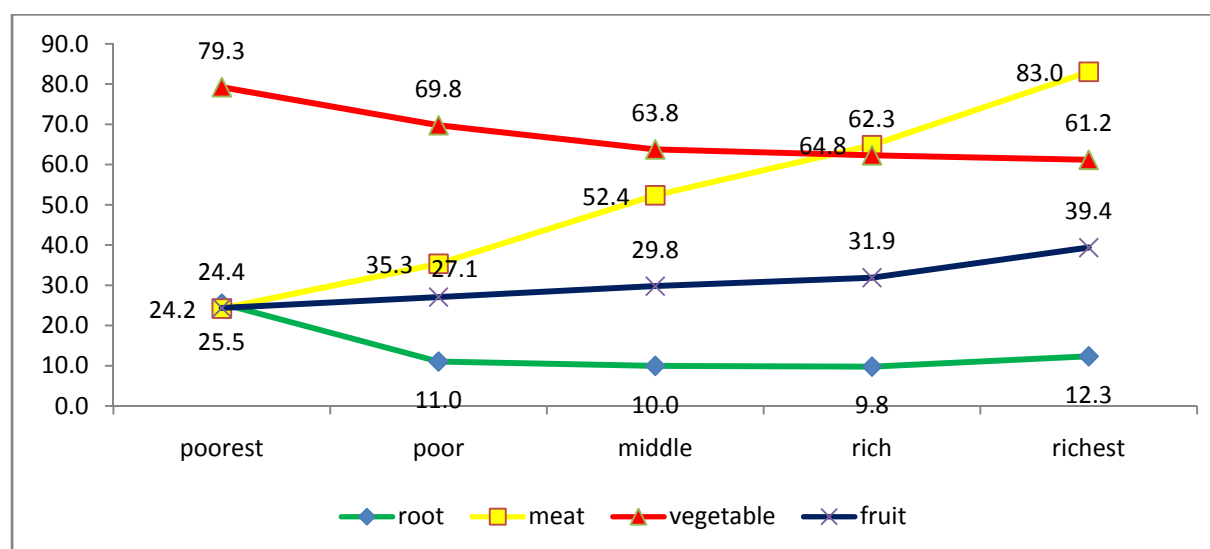
**Figure 24. Mean intake in grams, by major food classification and age, Philippines, 2008.**



Source: Author's calculation of NNS data, 2008.

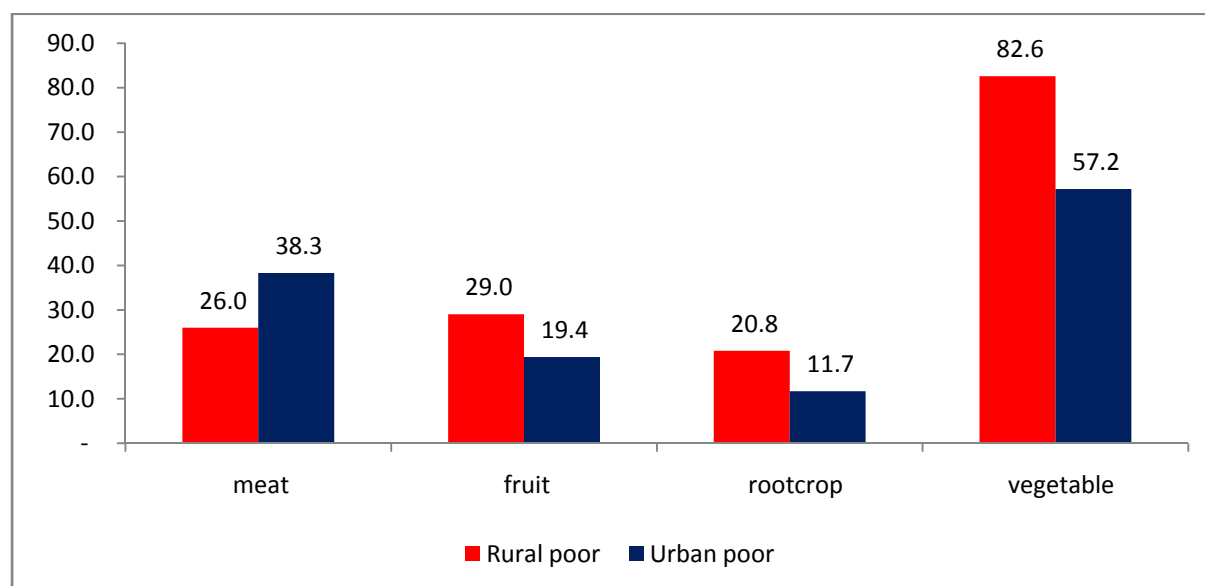
Looking at the average consumption of staple food by socio-economic status, meat and fruit consumption increases as socio-economic status increases. In contrast, the consumption of vegetables decreases as socio-economic status increases. There is no noticeable pattern of root crop consumption across socio-economic status but it is still relatively low compared to other items.

**Figure 25. Mean intake in grams, by major food classification and socio-economic status, Philippines, 2008.**



Source: Author's calculation of NNS data, 2008.

**Figure 25. Mean intake in grams per day, by major food classification and rural and urban poor, Philippines, 2008.**



## *5. Sugar*

The association between diet that is high in saturated fats and sugar with obesity and other NCDs has led to the identification of extremely fatty, sweet and salty western-style food as risk factor. Concern has been focused particularly on carbonated drinks.

Though the country's soft drinks industry is facing bottlenecks because of noticeable shift from carbonated drinks to other ready-to-drink quenchers and healthier fluid alternatives, it is still anticipated to grow modestly. The total size of soft drinks market in the country was estimated at 8,580 million liters in 2007, with an anticipated growth of almost 8 percent in 2008(Macabasco, 2008).

The average daily consumption of soft drink per capita is 21 grams. The consumption of soft drink increases as age increases. The high consumption of unhealthy items like soft drinks among the younger generation reflects their consumption practices towards other unhealthy food. The unhealthy practices of the younger generations may not be reflected in the short term but this has implications in later adult life.

**Table 23. Mean intake of soft drinks in grams per day among adults 20 years and above, Philippines, 2008.**

| Characteristics    | Category | Total       |                  | Male        |                  | Female      |                  |
|--------------------|----------|-------------|------------------|-------------|------------------|-------------|------------------|
|                    |          | Mean        | CI               | Mean        | CI               | Mean        | CI               |
| <b>Philippines</b> |          | <b>50.3</b> | <b>46.4-54.2</b> | <b>53.4</b> | <b>48.2-58.6</b> | <b>47.4</b> | <b>42.9-51.9</b> |
| <b>Age</b>         | 20-29    | 74.0        | 64.5-83.5        | 74.7        | 63.7-85.7        | 73.3        | 60.2-86.4        |
|                    | 30-39    | 57.6        | 50.4-64.8        | 61.1        | 49.5-72.7        | 54.2        | 46.2-62.1        |
|                    | 40-49    | 52.0        | 45.3-58.7        | 58.1        | 48.3-67.9        | 46.2        | 37.5-54.9        |
|                    | 50-59    | 39.5        | 32.6-46.3        | 37.7        | 27.7-47.7        | 40.9        | 32.8-48.9        |
|                    | 60-60    | 23.4        | 16.4-30.4        | 23.1        | 13.0-33.3        | 23.6        | 16.0-31.2        |
|                    | 70-up    | 14.7        | 9.8-19.6         | 10.9        | 3.6-18.3         | 17.1        | 11.2-22.9        |

*Source: Author's calculation of NNS data, 2008.*

High consumption of carbonated soft drinks is also noted in higher quintile groups. However, the soft drinks industry is moving towards the poorer segments of the population as they introduced affordable soft drinks which even the poorest of the poor can buy.

**Table 24. Mean intake of soft drinks in grams per day among adults, 20 years and above by socio-economic status, urbanization and educational attainment, Philippines, 2008.**

| Characteristics     | Category     | Total       |             |             | Male        |             |             | Female      |             |             |
|---------------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|                     |              | Mean        | 95% C.I     |             | Mean        | 95% CI      |             | Mean        | 95% CI      |             |
|                     |              |             | Lower       | Upper       |             | Lower       | Upper       |             | Lower       | Upper       |
| <b>Total</b>        |              | <b>50.3</b> | <b>46.4</b> | <b>54.2</b> | <b>53.4</b> | <b>48.2</b> | <b>58.6</b> | <b>47.4</b> | <b>42.9</b> | <b>51.9</b> |
| <b>SES</b>          | Poorest      | 19.2        | 14.3        | 24.0        | 21.1        | 14.6        | 27.6        | 16.9        | 11.5        | 22.4        |
|                     | Poor         | 33.5        | 27.7        | 39.3        | 36.6        | 28.7        | 44.4        | 30.4        | 23.5        | 37.3        |
|                     | Middle       | 44.1        | 36.7        | 51.4        | 53.9        | 43.0        | 64.7        | 34.4        | 26.4        | 42.3        |
|                     | Rich         | 59.4        | 51.7        | 67.0        | 68.5        | 55.6        | 81.4        | 52.5        | 44.7        | 60.3        |
|                     | Richest      | 86.5        | 75.0        | 98.1        | 87.4        | 71.9        | 102.9       | 85.9        | 72.2        | 99.6        |
| <b>Urbanization</b> | Urban        | 60.3        | 54.9        | 65.6        | 65.7        | 57.9        | 73.5        | 55.8        | 49.5        | 62.2        |
|                     | Rural        | 39.0        | 33.4        | 44.7        | 41.0        | 33.9        | 48.0        | 37.1        | 30.9        | 43.3        |
| <b>Educational</b>  | no education | 12.5        | 2.5         | 22.6        | 14.9        | -2.5        | 32.2        | 10.1        | 0.7         | 19.5        |
| <b>Attainment</b>   | elementary   | 25.1        | 21.1        | 29.1        | 27.4        | 21.3        | 33.4        | 23.2        | 19.0        | 27.3        |
|                     | Secondary    | 53.0        | 47.5        | 58.5        | 60.9        | 52.9        | 68.9        | 44.6        | 38.2        | 50.9        |
|                     | Tertiary     | 81.8        | 73.1        | 90.6        | 79.5        | 68.7        | 90.3        | 83.6        | 72.2        | 95.1        |

*Source: Author's calculation of NNS data, 2008.*

## 6. Salt consumption

High salt consumption has been linked to other vulnerabilities which are known to be risk factors of cardiovascular diseases.

Using the National Nutrition Survey (NNS) data, the poorest quintiles would tend to consume excessive amount of salt compared to other quintile groups. However, given the limitations of the data set, there is no

exact way on how to estimate the amount of salt being consumed in prepared food. It is known that food like junk foods have high level of salt content. In addition, certain regions use excessive amount of salty condiments which are high in salt (e.g. fish sauce). This caveat would be impossible for researchers to estimate the exact amount of salt consumed.

High consumption of salt was observed among population 70 years old and above. With regard to socio-economic status, the average daily consumption of salt is relatively high among poorest quintile. This was also ascertained in the educational attainment. The population with no education has the highest level of salt consumption. This can be attributed to the lack of refrigeration among the poor which force them to use large amounts of salt to preserve their food longer.

**Table 25. Mean salt intake in grams per day among adults 20 years and above, by age, Philippines, 2008.**

| Characteristics    | Category | Total      |                | Male       |                | Female     |                |
|--------------------|----------|------------|----------------|------------|----------------|------------|----------------|
|                    |          | Mean       | CI             | Mean       | CI             | Mean       | CI             |
| <b>Philippines</b> |          | <b>3.3</b> | <b>2.4-4.1</b> | <b>3.6</b> | <b>2.3-4.8</b> | <b>3.0</b> | <b>2.2-3.8</b> |
| <b>Age</b>         | 20-29    | 1.1        | 0.5-1.8        | 0.8        | 0.3-1.4        | 1.4        | 0.2-2.6        |
|                    | 30-39    | 4.0        | 1.9-6.0        | 4.3        | 1.1-7.5        | 3.7        | 1.3-6.0        |
|                    | 40-49    | 2.8        | 1.5-4.1        | 3.8        | 1.5-6.1        | 1.8        | 0.8-2.9        |
|                    | 50-59    | 4.3        | 1.9-6.7        | 4.7        | 1.0-8.3        | 4.0        | 1.5-6.5        |
|                    | 60-69    | 2.2        | 0.6-3.7        | 3.0        | -0.1-6.1       | 1.5        | 0.2-2.9        |
|                    | 70-up    | 8.6        | 3.5-13.6       | 8.8        | 2.0-15.5       | 8.4        | 1.7-15.2       |

*Source: Author's calculation of NNS data, 2008.*

**Table 26. Mean salt intake in grams per day among adults, 20 years and above by socio-economic status, urbanization and educational attainment, Philippines, 2008.**

| Characteristics               | Category     | Total      |            |            | Male       |            |            | Female     |            |            |
|-------------------------------|--------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
|                               |              | Mean       | 95% CI     |            | Mean       | 95% CI     |            | Mean       | 95% CI     |            |
|                               |              |            | Lower      | Upper      |            | Lower      | Upper      |            | Lower      | Upper      |
| <b>Total</b>                  |              | <b>3.3</b> | <b>2.4</b> | <b>4.1</b> | <b>3.6</b> | <b>2.3</b> | <b>4.8</b> | <b>3.0</b> | <b>2.2</b> | <b>3.8</b> |
| <b>SES</b>                    | Poorest      | 12.6       | 8.1        | 17.0       | 14.8       | 8.5        | 21.1       | 9.9        | 6.6        | 13.3       |
|                               | Poor         | 1.4        | 0.9        | 2.0        | 1.4        | 0.6        | 2.1        | 1.5        | 0.6        | 2.3        |
|                               | Middle       | 1.1        | 0.3        | 2.0        | 0.8        | -0.1       | 1.8        | 1.5        | 0.3        | 2.7        |
|                               | Rich         | 1.6        | 0.5        | 2.6        | 0.8        | 0.0        | 1.5        | 2.1        | 0.6        | 3.7        |
|                               | Richest      | 1.3        | 0.2        | 2.5        | 0.5        | -0.1       | 1.1        | 1.9        | 0.1        | 3.8        |
| <b>Urbanization</b>           | Urban        | 1.0        | 0.5        | 1.6        | 0.6        | 0.2        | 1.0        | 1.4        | 0.5        | 2.3        |
|                               | Rural        | 5.8        | 4.1        | 7.5        | 6.6        | 4.1        | 9.0        | 5.0        | 3.5        | 6.4        |
| <b>Educational Attainment</b> | no education | 10.3       | 3.6        | 17.1       | 12.0       | 1.1        | 22.9       | 8.6        | 0.8        | 16.4       |
|                               | Elementary   | 6.2        | 4.3        | 8.2        | 7.7        | 4.5        | 10.9       | 5.0        | 3.5        | 6.5        |
|                               | Secondary    | 1.6        | 0.9        | 2.3        | 1.2        | 0.5        | 2.0        | 1.9        | 0.7        | 3.1        |
|                               | Tertiary     | 1.1        | 0.3        | 2.0        | 0.8        | 0.1        | 1.4        | 1.4        | 0.1        | 2.8        |

*Source: Author's calculation of NNS data, 2008.*

## B. Smoking

Many epidemiologic studies demonstrated the devastating effects of smoking on health. On NCDs, tobacco use is considered as one of the commonly shared risk factors of major NCDs like cardio-vascular disease, certain cancers and diabetes mellitus. Smoking is also linked with chronic obstructive pulmonary disease and injuries. Thus, mitigating smoking can significantly reduce various forms of illness. The detrimental effect of smoking is not solely found in smokers. Many studies have also implicated the dangers of second hand smoking on health.

In the Philippines, almost 30.9percent of the adult population is current smokers and 14 percent used tobacco in the past. Majority of adult male population are current smokers (53 percent). Interestingly, the prevalence of smoking in different age groups is relatively the same.

**Table 27. Prevalence of current smokers among adults 20 years and above, by age, Philippines, 2008.**

| Variables          | Category | Total       |                  | Male        |                  | Female      |                  |
|--------------------|----------|-------------|------------------|-------------|------------------|-------------|------------------|
|                    |          | %           | 95 CI LL         | %           | 95 CI LL         | %           | 95 CI LL         |
| <b>Philippines</b> |          | <b>31.0</b> | <b>29.7-32.0</b> | <b>53.2</b> | <b>51.1-54.8</b> | <b>12.5</b> | <b>11.3-13.6</b> |
| <b>Age</b>         | 20-29    | 31.1        | 28.7-33.6        | 57.7        | 53.8-61.4        | 8.6         | 6.6-10.8         |
|                    | 30-39    | 30.2        | 27.8-32.2        | 53.2        | 49.4-57.2        | 10.8        | 8.3-12.7         |
|                    | 40-49    | 33.0        | 30.4-35.2        | 55.5        | 51.5-58.9        | 12.1        | 9.4-14.6         |
|                    | 50-59    | 32.6        | 29.4-35.2        | 54.6        | 48.9-58.4        | 15.3        | 12.7-18.8        |
|                    | 60-60    | 28.2        | 24.1-31.8        | 45.0        | 39.0-51.3        | 14.8        | 10.8-17.9        |
|                    | 70-up    | 27.1        | 22.8-31.4        | 32.9        | 26.0-40.2        | 23.2        | 17.8-28.2        |

*Source: Author's calculation of NNS data, 2008.*

With regard to socio-economic status, there is an inverse relationship between socio-economic status and the prevalence of tobacco use. Same pattern was also observed on educational attainment.

**Table 28. Prevalence of current smokers among adults 20 years and above, by socio-economic status, urbanization and educational attainment, Philippines, 2008.**

| Characteristics     | Category     | Total       |             |             | Male        |             |             | Female      |             |             |
|---------------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|                     |              | %           | 95% CI      |             | %           | 95% CI      |             | %           | 95% CI      |             |
|                     |              |             | Lower       | Upper       |             | Lower       | Upper       |             | Lower       | Upper       |
| <b>Total</b>        |              | <b>31.0</b> | <b>29.7</b> | <b>32.0</b> | <b>53.2</b> | <b>51.1</b> | <b>54.8</b> | <b>12.5</b> | <b>11.3</b> | <b>13.6</b> |
| <b>SES</b>          | Poorest      | 39.9        | 37.1        | 42.7        | 61.0        | 57.2        | 64.9        | 19.0        | 15.8        | 22.2        |
|                     | Poor         | 36.4        | 33.9        | 38.8        | 59.7        | 56.0        | 63.4        | 15.3        | 12.5        | 18.1        |
|                     | Middle       | 29.7        | 27.1        | 32.3        | 50.8        | 46.7        | 54.9        | 11.3        | 8.9         | 13.7        |
|                     | Rich         | 25.3        | 22.9        | 27.7        | 47.6        | 43.2        | 52.1        | 9.0         | 6.9         | 11.2        |
|                     | Richest      | 24.8        | 22.0        | 27.6        | 45.5        | 41.0        | 49.9        | 9.6         | 6.8         | 12.4        |
| <b>Urbanization</b> | Urban        | 28.9        | 27.2        | 30.6        | 50.4        | 47.7        | 53.1        | 12.2        | 10.5        | 14.0        |
|                     | Rural        | 33.1        | 31.5        | 34.7        | 55.5        | 53.0        | 58.1        | 12.7        | 11.2        | 14.2        |
| <b>Educational</b>  | no education | 41.3        | 34.3        | 48.3        | 58.9        | 49.3        | 68.4        | 22.8        | 13.9        | 31.6        |
| <b>Attainment</b>   | elementary   | 35.1        | 33.1        | 37.1        | 56.1        | 53.1        | 59.1        | 17.7        | 15.5        | 19.8        |
|                     | secondary    | 31.5        | 29.7        | 33.3        | 55.4        | 52.3        | 58.5        | 10.0        | 8.1         | 11.8        |
|                     | tertiary     | 23.7        | 21.6        | 25.7        | 44.8        | 41.2        | 48.4        | 8.3         | 6.5         | 10.1        |

*Source: Author's calculation of NNS data, 2008.*

Aside from the high prevalence of smokers in the country, a big portion of the population is also exposed to second hand smoking especially at home. Using the Global Adult Tobacco Survey, almost half of adult population are exposed to tobacco (National Statistics Office and Department of Health, 2009). Many studies have proven the negative effects of second hand smoking on health. In a study of Barnoya and Glantz, second hand smoke increases the risk of coronary heart disease by 30%. This effect is larger than one would expect on the basis of the risks associated with active smoking and the relative doses of tobacco smoke delivered to smokers and nonsmokers (Barnoya, MPH, & Glantz, 2005).

Exposure to tobacco smoke varies can be a function of socio-demographic characteristics. A case in point is socio-economic status. It appears that adults belonging to poor household are more likely to be exposed to tobacco smoke (National Statistics Office and Department of Health, 2009).

**Table 29. Prevalence of adults 15 years and older who are exposed to tobacco smoke at home, by sex, age, socio-economic status, Philippines, 2009.**

| Variable       | Category | Smoking is allowed at home |              | Smokes inside the home at least once daily |             | Smokes inside the home at least once daily |              |
|----------------|----------|----------------------------|--------------|--|-------------|--|--------------|
|                |          | %                          | 95% CI       | %  | 95% CI      | %  | 95% CI       |
| <b>Overall</b> |          | 48.8                       | 46.5 - 51.1  | 39.6                                       | 37.9 - 41.2 | 54.4                                       | 52.5 - 56.3  |
| <b>Gender</b>  | Male     | 50.9                       | 48.3 - 53.5  | 43.1                                       | 41.0 - 45.2 | 58.1                                       | 55.9 - 60.4  |
|                | Female   | 46.7                       | 44.2 - 49.2  | 36   | 34.0 - 38.0 | 50.6                                       | 48.4 - 52.8  |
| <b>Age</b>     | 15-24    | 47.9                       | 44.6 - 51.2  | 38.3                                       | 35.6 - 41.0 | 53.1                                       | 50.1 - 56.2) |
|                | 25-44    | 48.7                       | 46.0 - 51.4) | 40.5                                       | 38.3 - 42.6 | 55.2                                       | 52.9 - 57.5  |
|                | 45-64    | 50                         | 46.6 - 53.4  | 40   | 37.1 - 43.0 | 54.3                                       | 51.2 - 57.4  |
|                | 65+      | 49.4                       | 44.2 - 54.7  | 37.8                                       | 33.1 - 42.5 | 54.9                                       | 50.2 - 59.5  |
|                |          |                            |              |  |             |  |              |
| <b>SES</b>     | Poorest  | 64.3                       | 59.6 - 69.0  | 53.6                                       | 50.0 - 57.3 | 74.8                                       | 71.7 - 77.8  |
|                | Richest  | 44.1                       | 37.9 - 50.2  | 30.4                                       | 25.0 - 35.7 | 48.7                                       | 42.3 - 55.1  |

*Source: Global Adult Tobacco Survey, 2009*

### C. Alcohol consumption

Alcohol is causally linked (to varying degrees) to eight different cancers. Similarly, alcohol use is associated detrimentally with many cardiovascular outcomes, including hypertension, stroke and atrial fibrillation and other cardiovascular outcomes. Alcohol is furthermore linked to various forms of liver disease (particularly with fatty liver, alcoholic hepatitis and cirrhosis) and pancreatitis (Parry, Patra, & Rehm, 2011).

In the Philippines, the prevalence of hazardous drinkers is relatively high in the young and mid-age adults. The prevalence decreases as age approaches 70 years old. The prevalence of hazardous drinkers is relatively higher compared to females.

**Table 30. Prevalence of current alcohol drinkers among adults 20 years and above, Philippines, 2008.**

| Variables          | Category | Total       |                  | Male        |                  | Female     |                 |
|--------------------|----------|-------------|------------------|-------------|------------------|------------|-----------------|
|                    |          | %           | 95 CI LL         | %           | 95 CI LL         | %          | 95 CI LL        |
| <b>Philippines</b> |          | <b>26.9</b> | <b>25.7-28.1</b> | <b>47.5</b> | <b>45.5-49.5</b> | <b>9.8</b> | <b>8.8-10.8</b> |
| <b>Age</b>         | 20-29    | 26.5        | 24.3-28.7        | 47.2        | 43.4-51.0        | 9.0        | 7.2-10.8        |
|                    | 30-39    | 30.3        | 27.9-32.7        | 54.2        | 50.2-58.2        | 10.4       | 8.2-12.6        |
|                    | 40-49    | 30.7        | 28.3-33.1        | 52.8        | 48.6-57.0        | 10.2       | 7.8-12.6        |
|                    | 50-59    | 27.0        | 24.0-30.0        | 47.6        | 42.8-52.4        | 10.8       | 8.2-13.4        |
|                    | 60-60    | 19.8        | 16.8-22.8        | 32.8        | 27.6-38.0        | 9.5        | 6.7-12.3        |
|                    | 70-up    | 14.0        | 10.6-17.4        | 23.3        | 17.1-29.5        | 7.8        | 4.4-11.2        |

*Source: Author's calculation of NNS data, 2008.*



With regard to socio-economic and educational status, there is no discernable trend on the prevalence of hazardous drinkers. The prevalence is relatively the same across socio-economic groups.

**Table 31. Prevalence of current alcohol drinking among adults 20 years and above, by socio-economic status, urbanization and educational attainment, Philippines, 2008.**

| Characteristics     | Category     | Total       |             |             | Male        |             |             | Female     |            |             |
|---------------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|------------|------------|-------------|
|                     |              | %           | 95% CI      |             | %           | 95% CI      |             | %          | 95% CI     |             |
|                     |              |             | Lower       | Upper       |             | Lower       | Upper       |            | Lower      | Upper       |
| <b>Total</b>        |              | <b>26.9</b> | <b>25.7</b> | <b>28.1</b> | <b>47.8</b> | <b>45.5</b> | <b>49.5</b> | <b>9.5</b> | <b>8.8</b> | <b>10.8</b> |
| <b>SES</b>          | Poorest      | 28.8        | 26.1        | 31.5        | 46.6        | 42.5        | 50.8        | 11.2       | 8.8        | 13.6        |
|                     | Poor         | 26.6        | 24.0        | 29.2        | 48.3        | 44.0        | 52.5        | 7.1        | 5.1        | 9.0         |
|                     | Middle       | 28.9        | 26.5        | 31.3        | 49.8        | 45.9        | 53.7        | 10.6       | 8.3        | 12.9        |
|                     | Rich         | 26.0        | 23.4        | 28.7        | 47.2        | 42.7        | 51.6        | 10.6       | 8.3        | 12.9        |
|                     | Richest      | 24.6        | 22.1        | 27.1        | 46.8        | 42.2        | 51.3        | 8.4        | 6.3        | 10.5        |
| <b>Urbanization</b> | urban        | 25.8        | 24.1        | 27.4        | 47.1        | 44.2        | 50.0        | 9.3        | 7.9        | 10.7        |
|                     | rural        | 28.2        | 26.4        | 29.9        | 48.4        | 45.8        | 51.0        | 9.8        | 8.3        | 11.3        |
| <b>Educational</b>  | no education | 17.5        | 12.0        | 23.1        | 29.7        | 20.8        | 38.7        | 4.7        | 0.7        | 8.8         |
| <b>Attainment</b>   | elementary   | 27.1        | 25.1        | 29.1        | 46.4        | 43.3        | 49.5        | 11.1       | 9.3        | 12.9        |
|                     | secondary    | 28.6        | 26.8        | 30.4        | 50.0        | 47.1        | 52.8        | 9.2        | 7.6        | 10.8        |
|                     | tertiary     | 25.1        | 23.0        | 27.3        | 48.1        | 44.5        | 51.8        | 8.3        | 6.5        | 10.1        |

*Source: Author's calculation of NNS data, 2008.*

#### D. Physical inactivity

Physical inactivity is one of the most important risk factors of certain NCDs like cardio-vascular diseases. Technology and economic incentives tend to discourage physical activity. Technology allows people to perform daily function with reduced energy expenditure and economics, by paying more for sedentary jobs compared to active work (Haskell, 2007).

**Table 32. Prevalence of work or occupation related physical activity among adults 20 years and above, Philippines, 2008.**

| Variables          | Category | Total       |                  | Male        |                  | Female      |                  |
|--------------------|----------|-------------|------------------|-------------|------------------|-------------|------------------|
|                    |          | %           | 95 CI LL         | %           | 95 CI LL         | %           | 95 CI LL         |
| <b>Philippines</b> |          | <b>23.7</b> | <b>22.0-25.4</b> | <b>23.8</b> | <b>21.8-25.8</b> | <b>23.6</b> | <b>20.9-26.2</b> |
| <b>Age</b>         | 20-29    | 20.4        | 17.2-23.7        | 20.3        | 16.3-24.3        | 20.6        | 15.1-26.2        |
|                    | 30-39    | 26.5        | 23.2-29.9        | 27.4        | 23.4-31.4        | 24.8        | 19.2-30.3        |
|                    | 40-49    | 23.2        | 20.1-26.3        | 22.7        | 18.9-26.4        | 24.1        | 18.9-29.3        |
|                    | 50-59    | 26.1        | 22.2-30.1        | 26.0        | 20.9-31.1        | 26.3        | 20.2-32.3        |
|                    | 60-60    | 22.6        | 16.6-28.5        | 22.1        | 15.0-29.1        | 23.4        | 14.0-32.8        |
|                    | 70-up    | 17.5        | 9.5-25.6         | 19.9        | 10.0-29.9        | 13.6        | 2.3-24.9         |

Source: Author's calculation of NNS data, 2008.

The nature of physical activity can either be in the form of occupational or leisure. In the Philippines, the proportion of adequate physical activity due to occupation is higher among poorer segment. In contrast, the prevalence of adequate physical activity due to leisure is higher in richer population. Same pattern can be observed if educational attainment is used as welfare indicator. There is also wide variation between urban and rural. Higher prevalence of adequate physical activity due to occupation was found among population living in rural areas.

**Table 33. Prevalence of work or occupation related physical activity among adults 20 years and above, by socio-economic status, urbanization and educational attainment, Philippines, 2008.**

| Characteristics     | Category     | Total |        |       | Male |        |       | Female |        |       |
|---------------------|--------------|-------|--------|-------|------|--------|-------|--------|--------|-------|
|                     |              | %     | 95% CI |       | %    | 95% CI |       | %      | 95% CI |       |
|                     |              |       | Lower  | Upper |      | Lower  | Upper |        | Lower  | Upper |
| <b>Total</b>        |              | 23.7  | 22.0   | 25.4  | 23.8 | 21.8   | 25.8  | 23.6   | 20.9   | 26.2  |
| <b>SES</b>          | Poorest      | 26.9  | 23.2   | 30.7  | 27.9 | 23.5   | 32.2  | 24.8   | 18.7   | 30.9  |
|                     | Poor         | 22.5  | 19.0   | 26.0  | 22.4 | 18.3   | 26.4  | 22.8   | 16.8   | 28.8  |
|                     | Middle       | 22.0  | 18.4   | 25.7  | 22.7 | 18.2   | 27.2  | 20.8   | 14.8   | 26.8  |
|                     | Rich         | 23.5  | 19.6   | 27.3  | 22.9 | 18.1   | 27.7  | 24.3   | 18.3   | 30.4  |
|                     | Richest      | 23.1  | 19.1   | 27.0  | 21.3 | 16.2   | 26.5  | 24.9   | 19.2   | 30.6  |
| <b>Urbanization</b> | Urban        | 21.8  | 19.4   | 24.3  | 20.7 | 17.7   | 23.7  | 23.6   | 19.6   | 27.5  |
|                     | Rural        | 25.1  | 22.8   | 27.4  | 25.8 | 23.1   | 28.6  | 23.6   | 19.9   | 27.2  |
| <b>Educational</b>  | no education | 30.1  | 19.9   | 40.3  | 30.2 | 18.8   | 41.7  | 29.9   | 11.8   | 48.0  |
| <b>Attainment</b>   | elementary   | 25.1  | 22.4   | 27.9  | 25.6 | 22.2   | 28.9  | 24.3   | 19.9   | 28.6  |
|                     | secondary    | 23.4  | 20.7   | 26.1  | 23.0 | 19.9   | 26.2  | 24.3   | 19.5   | 29.1  |
|                     | Tertiary     | 20.9  | 17.7   | 24.0  | 20.5 | 16.3   | 24.6  | 21.3   | 16.6   | 26.0  |

Source: Author's calculation of NNS data, 2008.

#### E. Barriers in health service delivery and health financing

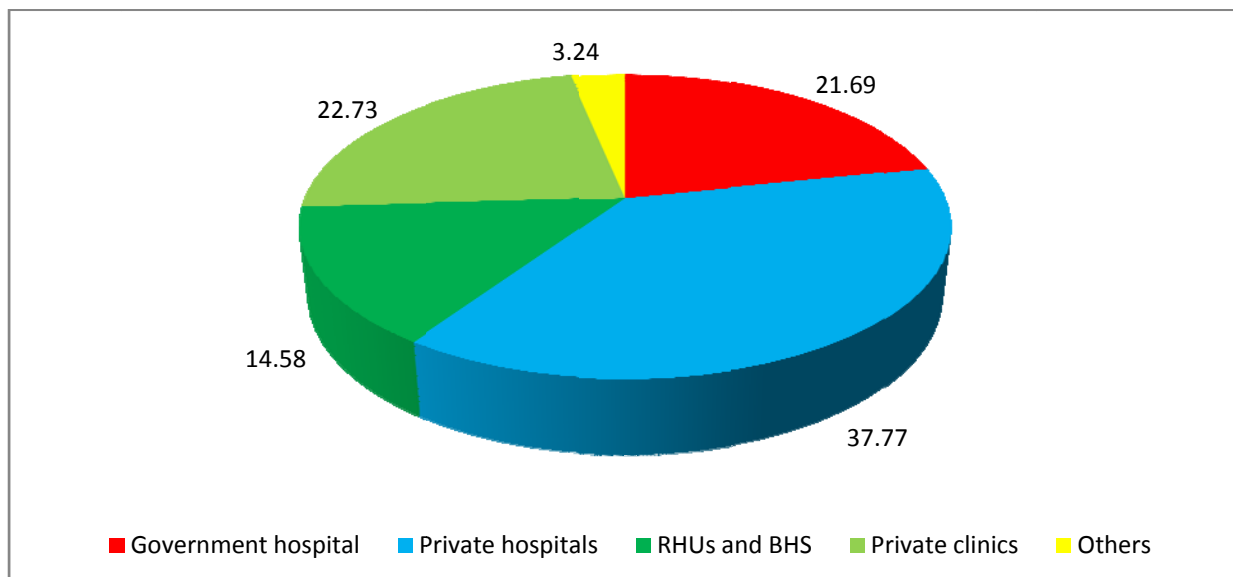
Presence of bottlenecks in health service delivery and financing can ultimately derail the health status of the population. Primary health care units such as the Rural Health Units and Barangay Health Stations should also be responsible for the NCDs preventive programs. Institutional problems of the health system are most felt during the curative phase of the disease. Prognosis of NCDs is longer and slower that financial and physical requirements are needed to be addressed both at the preventive and curative phases of NCDs.

### 1. Health service delivery

Using the National Demographic Health Survey, majority of the population who visited health facility for a NCD-related consult went to private hospitals and clinics (figure 26). In the Philippines, the service delivery is highly segmented system. As ascertained by the figures 27 and 28, the poorer segment of the population utilize more government facilities like government hospitals and primary health care centers like Rural Health Units (RHUs) and *Barangay Health Stations* while the affluent segment would tend to utilize private health facilities during NCD-related consultations.

One of the interesting results is the higher outpatient visit in hospitals compared to non-hospitals (clinics, RHUs and BHU). Though there are no studies that determine initial contact (referral systems) or the severity of the disease (maybe for cancer and end stage NCDs), there is a strong notion that patient with simple cases would go directly to hospitals for outpatient visits and bypass clinics and level 1 hospitals. As a result, hospitals become crowded with primary cases that hinder them to accommodate patients that need true inpatient care (Lavado et al, 2011).

**Figure 26. Distribution of facility visited during a NCD-related consult, Philippines, 2008.**

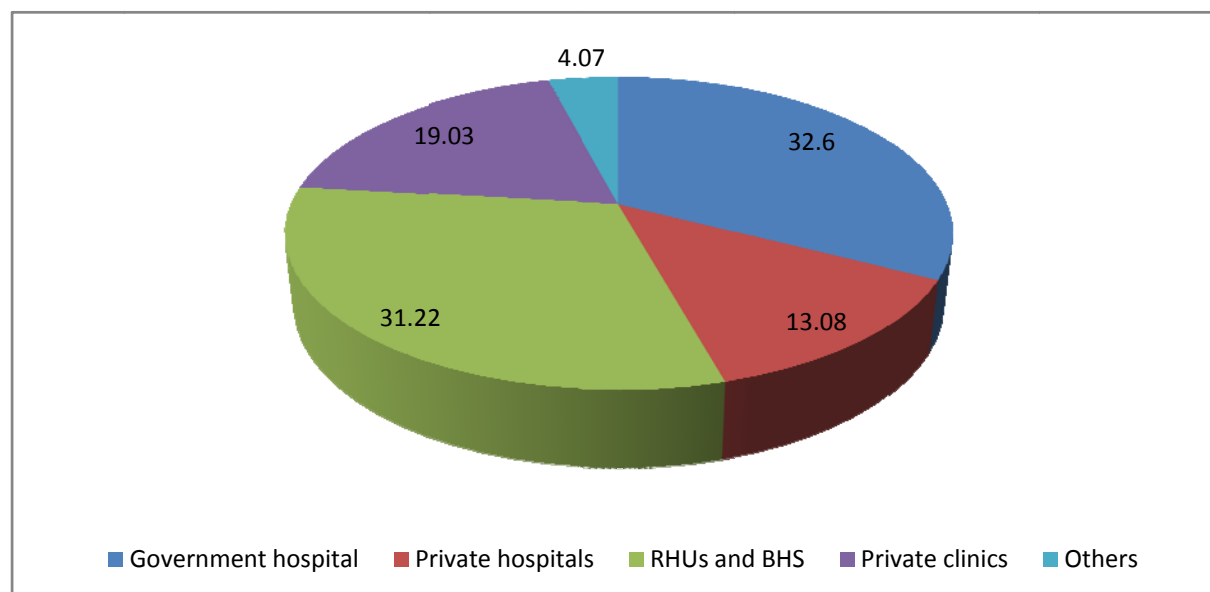


*Source: Author's calculation of NDHS data.*

The perceived dismal quality of public hospitals in the Philippines drives richer population to utilize private hospitals. As noted, higher NCD was observed among the richer segment of the population. The inefficiency of safety net schemes for the poor may have also contributed to the highly segmented market. The heavy reliance on out-of-pocket spending even among the poor prevents them from utilizing private facilities when

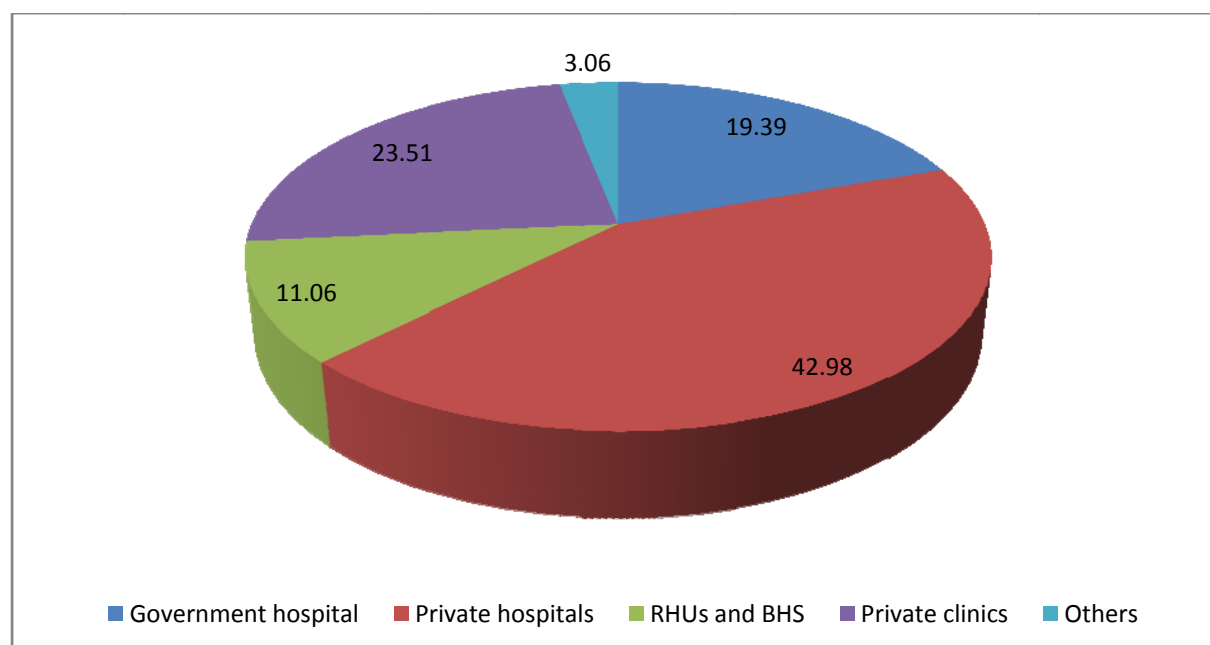
they want to. A recent study shows that PhilHealth has not improved financial access of the poor(Lavado & Ulep, 2011).

**Figure 27. Distribution of facility visited during a NCD-related consult among the poor (Q1 and Q2)Philippines, 2008.**



*Source: Author's calculation of NDHS data.*

**Figure 28. Distribution of facility visited during a NCD-related consult among the non-poor (Q3-Q5), Philippines, 2008.**



*Source: Author's calculation of NDHS data*

It is also interesting to examine the travel time of patients to health facilities during consultation. It is hypothesized that shorter duration of travel from their house to health facility increases their chances of better access and compliance. Patients with NCDs need regular visits due to constant monitoring of clinical indicators (e.g. FBS or blood pressure). Travel time varies by urbanity and region. It can be noticed that regions like National Capital Region, Region X and CALABARZON have shorter travel duration. This can be attributed to the high concentration of health facilities in these regions. On the other hand, travel time in ARMM region is more than twice that of National Capital Region.

Similar trend was also noticed as far as urbanity is concern. Urban areas would tend to have shorter travel time from house to health facility compared to rural areas. One of the caveat of this analysis is the inclusion of patients who cannot access as they forego care due to physical and financial barriers.

**Table 34. Travel time going to health facility during NCD consultation.**

| Region            | Total | Urban | Rural |
|-------------------|-------|-------|-------|
| Ilocos Region     | 31.6  | 23.0  | 36.8  |
| Cagayan           | 49.9  | 50.7  | 49.4  |
| Central Luzon     | 35.2  | 33.4  | 37.7  |
| Bicol             | 30.6  | 23.8  | 33.2  |
| Western Visayas   | 36.8  | 25.6  | 44.3  |
| Central Visayas   | 43.3  | 31.1  | 53.8  |
| Eastern Visayas   | 63.6  | 56.4  | 65.6  |
| Zamboanga         | 61.5  | 78.7  | 46.8  |
| Northern Mindanao | 27.9  | 27.9  | 28.0  |
| Davao Peninsula   | 47.0  | 35.5  | 53.4  |
| SOCCSKSARGEN      | 31.4  | 22.6  | 35.1  |
| CARAGA            | 45.6  | 66.5  | 36.2  |
| NCR               | 28.0  | 28.0  |       |
| CAR               | 63.3  | 41.8  | 76.1  |
| ARMM              | 82.7  | 72.2  | 88.0  |
| CALABARZON        | 31.8  | 26.2  | 44.5  |
| MIMAROPA          | 42.0  | 30.0  | 47.9  |
| Philippines       | 38.7  | 32.2  | 45.3  |

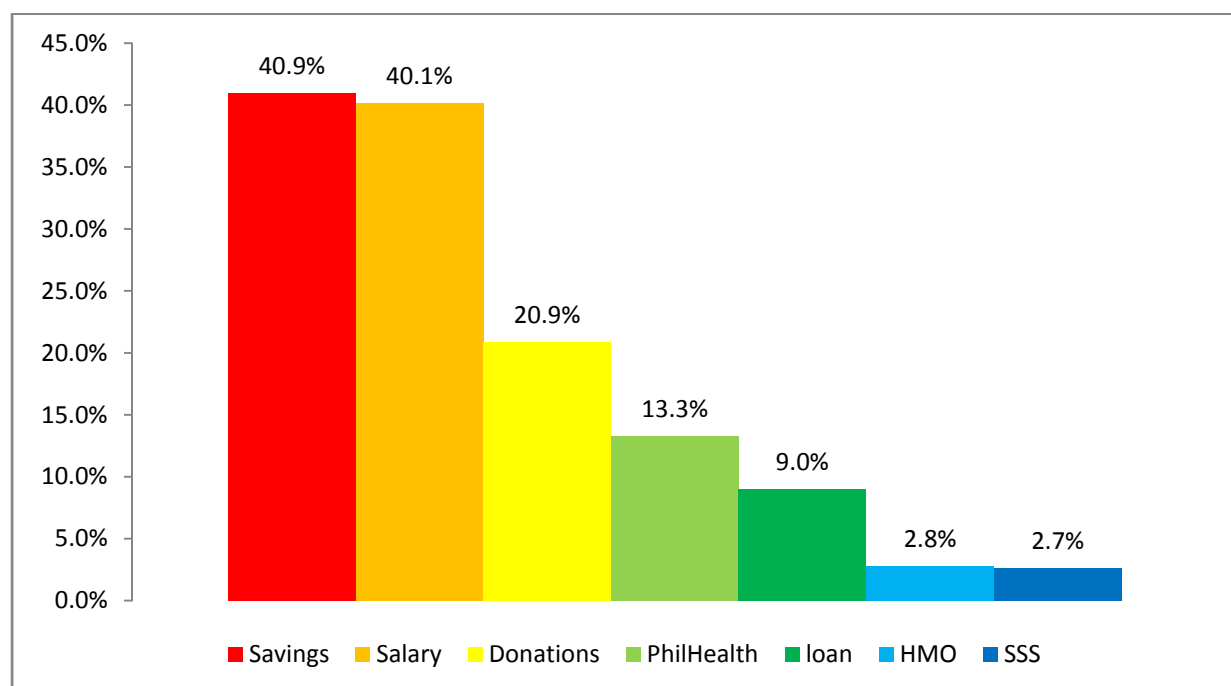
*Source: Author's calculation of NDHS data.*

## 2. Health financing

Health financing is critical for NCDs especially for the curative phase of the disease. Patients with NCDs (e.g., cancer and complications of cardio-vascular disease) need constant and regular visit to doctors. Thus, the burden of health payments is very high in NCDs.

In the country, different sources of financing are being used. The major source of financing during an NCD consultation to a health facility is still out of pocket. Figure 29 shows that almost 40 percent of those who had NCD-related consultations utilized any form of out-of-pocket expenditures like savings, salary or loans. Almost 20 percent also relied on donations. Donations can be through the Philippine Charity Sweepstakes Office (PCSO) or local government leaders. Utilization of insurance based financing is minimal in the country. Only 13 percent of those who visited facility used their PhilHealth benefits while only 3 percent used other forms of private insurance.

**Figure 29. Sources of financing during NCD consultation, Philippines. 2008.**



*Source: Author's calculation of NDHS data.*

## Policy scanning

In 2011, the Department of Health issued the Administrative Order no.003 (*National Policy on the Prevention of Non-communicable Lifestyle-related Diseases*). This laudable policy piece would lay foundation for future national strategy in mitigating NCDs. Specifically, this policy affirms and ascertains the general role of the Department of Health in adopting community-based approach in the targeting lifestyle-related NCDs. Moreover, it links other stakeholders in this national campaign. This policy would open doors for a more specific, synchronized and sustainable programs on NCDs specifically targeting the health inequities.

Despite the presence of a national policy, it is deemed necessary to scanned and teased out other related policies. Policies that have significant connection on NCD control and prevention were also discussed. The following domains were tackled: (1) trade policies, (2) tobacco regulations, (3) alcohol regulation, (4) food regulation and (5) physical activity and (6) physical access to medicine.

## Trade policies

Since 1980s, the Philippines has opened its economy to foreign markets through several trade reform programs. Consequently, it established a network of free trade agreements (FTAs) with several countries. At the time of writing, the country, as member of the Association of Southeast Asian Nations (ASEAN), has existing FTA's with Japan, China, Korea, Australia-New Zealand, European Union and India.

As part of the “global village,” the Philippines acceded to the WTO as a founding member in 1995. In view thereof, it considerably lowered import restrictions and expanded trade. ASEAN is one of the top trading partners of the Philippines along with Japan, China, and US. In 2009, according to the National Statistical Coordination Board, trade between the Philippines and ASEAN member countries amounted to US \$16,812,730; followed by the US with US \$11, 901,731; Japan with US \$11,571,752; and China with US \$6,741,341. Primary imports of the Philippines include electronic products, mineral fuels, machinery fabrics, grains, chemicals and plastic (NSCB, 2009).

If trade liberalization is left unchecked by domestic regulation, it may increase certain unhealthy consumption habits, which in turn may lead to an increase in the prevalence of NCDs. In general, WTO rules do not distinguish between ‘bad’ or ‘good’ products. Thus, legal products that are detrimental to health such as tobacco may ‘benefit’ trade liberalization.

The developing world is currently experiencing rapid shifts in food availability and consumption brought about by what has been termed as “nutrition transition” (Popkin, 2001; Thow & Hawkes, 2009). Local diets

are giving way to rising consumption of fatty foods and sweeteners and at the same time physical activity levels decline.

One of the threats brought by trade liberalization is that it allows entry of low-cost processed and unhealthy foods (oily and fatty foods), cigarettes and alcohol to the country. As the Philippines progressively liberalized its trade in goods, it may reduce tariffs on alcohol as part of its WTO commitments. The significant reduction in tariff may in effect increase alcohol and tobacco consumption for transnational tobacco companies (TTCs) and multinational corporations (MNCs) to sell these goods in prices attractive to consumers. Thus, this may have significant health implications particularly on risk factors associated with non-communicable diseases. As such, the rapidly growing burden of NCDs in the Philippines is also driven by the negative effects of globalization. Unfair trade and irresponsible marketing, rapid and unplanned urbanization and increasingly sedentary lifestyles of Filipinos may well contribute to the detriments of globalization.

Under the Tariff and Customs Code of 1978, the President, upon the recommendation of National Economic and Development Authority (NEDA), may modify import duties for the promotion of foreign trade. This modification may mean a decrease in the tariffs of goods imported by the Philippines. Consequently, the country, as a signatory to ASEAN Trade in Goods Agreement (ATIGA), had agreed to reduce tariffs on goods traded within the ASEAN region. For example, transnational tobacco companies (TTCs) that have long established their bases in Singapore, Philippines, Indonesia and Malaysia, would enjoy a very low import tax giving them competitive advantage in the market.

Tobacco epidemic has been escalating in developing countries where there is significantly growing market of tobacco due to the decline of such in the developed countries. The shift of capital of TTCs from west to east because of globalization has also put forth several other factors of global expansion. First, many developing countries voluntarily open up their economies to acquire jobs and foreign investment. TTCs take advantage of the cheap land, labor and transport, tax exemption and lifting of import duties that these countries offer in exchange of putting their bases. Second, political and economic clouts to pry open the closed markets in Asia. For example, accession to WTO requires a unanimous vote of all 134 members, pressure from the TTCs home governments to relax the rules in exchange of getting a support for membership in WTO. Finally, TTCs try to get away from the prospect of stricter regulation at home and try to shield an increasing proportion of their assets from litigation (Chitanondth 2000, Magnusson 2007).

Multilateral as well as regional trade agreements played significant roles in increasing the consumption of tobacco and alcohol through tariff reduction. Without an offsetting consumption tax on these commodities, trade liberalization can indeed increase tobacco and alcohol intake. Studies have also shown the strong link between increased tobacco consumption and free trade and tobacco-related foreign direct investment (Beaglehole and Yach 2003).



Under Philippine import laws, it is the responsibility of the importer to ensure that any product entering the country's customs territory is in full compliance with Philippine health and phytosanitary regulations. The enforcing authorities will check for compliance by inspecting the goods and relevant import/export documentation and decide on whether the goods may enter the Philippines.

All imported food and agricultural products are required to comply with the Philippines' food health and phytosanitary laws. In general, none of these products is allowed to enter the Philippines if it is deemed to pose a danger to human life or well-being, either directly or indirectly.

**Table 35. Summary of trade-related laws**

| <b>Laws</b>   | <b>Provisions/Remarks</b>  |
|---|--|
| <b>Presidential Decree No. 1464</b><br><b>Tariff and Customs Code of 1978</b>         | <p>Empowers the President of the Republic of the Philippines, upon the recommendation of the National Economic and Development Authority, to modify import duties for the promotion of foreign trade.</p> <p>Covers imported articles subject to duty(tariff)</p> <p>Includes prohibited importations (i.e. weapons of war, written or printed materials of an obscene or immoral character, adulterated and misbranded articles of food among others)</p> <p>Rates of import duty to all products imported directly or indirectly by all foreign countries which include live animals, meat and edible meat offal, fish and other aquatic invertebrates, dairy products, fruits and vegetables, coffee, tea, mate and spices; cereals; animal or vegetable fats and oils; beverages, vinegar; tobacco and manufactured tobacco substitutes; sugar; minerals; pharmaceutical products; fertilizers; soap and perfume; printed books and other products of printing industry; and textile.</p> <p>The Tariff Commission and Bureau of Customs are the implementing agencies in coordination with DTL.</p> |
| <b>Republic Act No. 3720 (RA 3720)</b><br><b>Food, Drug and Cosmetics Act of 1967</b> | <p>to ensure the safety and purity of foods, drugs and cosmetics made available to the public</p>  |

|   |  |
|---|--|
|   | <p>under this Act, the Bureau of Food and Drugs was made responsible for the safety of processed food products and oversees the control of the manufacture and sale of processed foods, where the major concerns are adulteration and mislabeling of food products; and surveillance of imported food products at legal port entry.</p>  |
| <p><b>Republic Act No. 4109</b><br/> <b>An Act To Convert The Division Of Standards Under The Bureau Of Commerce Into A Bureau Of Standards, To Provide For The Standardization And/Or Inspection Of Products And Imports Of The Philippines And For Other Purposes</b></p> | <p>The Bureau of Product Standards, under DTI, covers inspection, sampling, testing and certification mark of both locally produced and imported products prior to market distribution.</p>  |
| <p><b>Republic Act No. 8800</b><br/> <b>Safeguard Measures Act</b></p>  | <p>Protects the local industries by providing general safeguard measures against a serious threat brought by increased imports</p> <p>Provides penalties for violation, investigation, and actions to be taken in the case thereof</p> <p>It shall apply to all products being imported into the country irrespective of source</p> <p>The Tariff Commission will be the lead agency along with the Secretary of Trade and Industry and Agriculture concerning non-agricultural and agricultural products respectively</p> |

## Tobacco control policies

Spearheaded by Department of Health, significant policies on tobacco control were institutionalized in the last decade. The issue of effectiveness of existing tobacco control policies is a different matter and it requires advance methodological designs for proper evaluation. Thus, it would not be discussed in this study.

One of the most important pieces of legislation is the RA 9211 of 2003 which sets regulations on the use and promotion of tobacco products. The intention of the law is to decrease the devastating effects of tobacco use,

eliminate second hand smoking and promote early cessation. Necessary features of an ideal tobacco control policy such as restrictions on advertising, promotions and prohibitions are well articulated in the law. However, other provisions like tobacco graphic warning and wider scope of smoking restrictions in public areas are not included. There is a pending house bill (SB 2340) of Pia Cayetano that mandates all tobacco companies to put graphic health warnings on tobacco products.

Though the law includes prohibition of tobacco use in public areas, it only captures selected establishments. Section 5 of the act prohibits smoking in public places such as centers of youth activity including schools, elevators and stairwells, locations where fire hazards are present, within public and private hospitals and other medical facilities, public conveyances and facilities such as transport terminals, train and bus stations, restaurants and conference halls, and food preparation areas. Currently, a court ruling prohibits agencies like MMDA to apprehend smokers in major streets of Metro Manila since this is not beyond the scope of the provision (MMDA, 2011).

**Table 36. Summary of vital components of RA 9211**

|  |                      |
|--|----------------------|
| RA 9211 of 2003  | Present or absent    |
| <b>Prohibitions in public areas</b>  | Present but selected |
| <b>Warning on labels</b>   | Present              |
| <b>Visual warning</b>  | Not present          |
| <b>Restriction on minor</b>  | Present              |
| <b>Advertising regulations</b>   | Present              |
| <b>Promotional regulation</b>  | Present              |
| <b>Programs to mitigate the effects on tobacco growers and manufacturers</b> | Present              |

In terms of tobacco tax policy, the RA 8240 stipulates the imposition of excise tax in all tobacco products. The tax policy of tobacco in the country is quite complex. The amount of tax is highly dependent on the nature and preparation of tobacco products. Currently, President Aquino pushes the passage of sin taxes which would change the mechanism on how the government taxes tobacco and alcohol. Under the proposed sin taxes law, there would be an automatic adjustment of the tax rates using the relevant NSO-established tobacco and alcohol indexes, which will track inflation (table 35).

Prior to the RA 9211, the Department of Health had already inked landmark policy pieces to control tobacco. The first tobacco-related department law is Administrative Order no. 56 of 2001. The main objective of this policy is to mandate all manufacturers to put health warning in all tobacco. This guideline on packaging was eventually included in the provisions of RA 9211 in 2003.

Important administrative orders them followed after the passage of the Tobacco Regulation Act. DOH expressed their commitment in the WHO-Tobacco Free Initiative, crafting guidelines in health promotions, building smoke cessation clinics and support groups. In 2009, the DOH also issued the AO 0010 which aims to prohibit smoking within the perimeter of DOH, DOH-attached agencies and all health facilities.

The Department of Education is also committed in prohibiting tobacco use and promotion in public schools as ascertained by Department Order no. 73 of 2010.

**Table 37. Tobacco excise tax**

| Products   | Imposed tax  |
|--|--|
| <b>Tobacco twisted by hand or reduced into a condition to be consumed in any manner other than the ordinary mode of drying and curing</b><br><br><b>Tobacco prepared or partially prepared with or without the use of nay machine or instruments or without being pressed or sweetened</b><br><br><b>Fine-cut shorts and refuse, scraps, clippings, cuttings, stems and sweepings of tobacco</b> | P0.75 on each kilogram   |
| <b>On tobacco specially prepared for chewing so as to be unsuitable for use in any other manner, on each kilogram, Sixty centavos</b>  | P0.60 on each kilogram   |
| <b>Cigars</b>  | One peso (P1.00) per cigar   |
| <b>Cigarettes Packed by Hand</b>   | (P0.40) per pack   |
| <b>Cigarettes Packed by Machine</b>  | (1) If the net retail price (excluding the excise tax and the value-added tax) is above Ten pesos (P10.00) per pack, the tax shall be Twelve pesos (P12.00) per pack;<br><br>(2) If the net retail price (excluding the excise tax and the value-added tax) exceeds Six pesos and fifty centavos (P6.50) but does not exceed Ten pesos (P10.00) per pack, the tax shall be Eight pesos (8.00) per pack;<br><br>(3) If the net retail price (excluding the excise tax and the value-added tax) is Five pesos (P5.00) but does not exceed Six pesos and fifty centavos (P6.50) per pack, the tax shall be Five pesos (P5.00) per pack;<br><br>(4) If the net retail price (excluding the excise tax and the value-added tax) is below Five pesos (P5.00) per pack, the tax shall be One peso (P1.00) per pack; |

*Source: Bureau of Internal Revenue*

**Table 37. Summary of policies related to tobacco control.**

| Law   | Provisions  |
|---|---|
| Administrative Order No. 56 of 2001: Guidelines on Labeling and Advertising (DOH)   | <ul style="list-style-type: none"> <li>• The package of cigarette for sales and distribution within the country should bear the statement: “Warning: Cigarette smoking is dangerous to health.”</li> <li>• FDA will lead implementing agency in full coordination of DTI.</li> </ul>  |
| Republic Act 9211-Tobacco Regulation Act of 2003  | <ul style="list-style-type: none"> <li>• Smoking shall be absolutely prohibited in designated public places areas.</li> <li>• Prohibitions of retail, sell and distribution in minor.</li> <li>• The sale or distribution of tobacco products is prohibited within one hundred (100) meters from any point of the perimeter of a school, public playground or other facility frequented particularly by minors.</li> <li>• All tobacco products should include the statement in their packages: “Warning: Cigarette smoking is dangerous to health”</li> <li>• Restrictions in print media advertising</li> <li>• Total restriction in TV and outdoor advertising is prohibited by 2007.</li> <li>• Ban on sponsorship and other forms of tobacco promotions</li> <li>• Programs and project under the law: <ol style="list-style-type: none"> <li>1. Programs that would help tobacco farmers (e.g. alternative cropping)</li> <li>2. Smoke-free universities</li> <li>3. Programs that would help displaced tobacco factory workers</li> <li>4. Promulgation of Department of Education on the rules and regulations in the incorporation of anti-tobacco programs in curricula.</li> </ol> </li> </ul> |
| Administrative Order No 0010 of 2009: Rules and Regulations Promoting a 100% Smoke-free Environment (DOH)   | <ul style="list-style-type: none"> <li>• Smoke free environment in all health facilities, DOH and its attached agencies</li> <li>• The ban of sales and promotions near areas mentioned.</li> <li>• Preferential on non-smokers for plantilla positions</li> </ul>  |
| Administrative Order No. 122 of 2003: A Smoking Cessation Program to Support the National Tobacco Control Program and Promotion of Healthy Life (DOH) | <ul style="list-style-type: none"> <li>• DOH supports the WHO Tobacco –Free Initiative</li> <li>• DOH shall promote technical assistance to health facilities, LGUs, schools and other agencies supporting the program</li> <li>• Guidelines in the conduct of health education about tobacco</li> </ul>  |

|  |  |
|--|--|
|  | <ul style="list-style-type: none"> <li>• Building smoke cessation clinics. For DOH hospitals they are incorporated in the outpatient department.</li> <li>• Creation of Smokers' Family Support Group</li> </ul>   |
| Administrative Order No. 004 of 2007: National Tobacco Control Program (DOH) | <ul style="list-style-type: none"> <li>• DOH is committed in program to eliminate the dependence on tobacco products.</li> <li>• Programs that would eliminate second hand smoking (e.g. smoking in public areas)</li> <li>• Ensure of public disclosure of the toxic contents of tobacco</li> <li>• National and local network building</li> <li>• Ensure surveillance of tobacco –related indicators</li> <li>• Promotion of research</li> <li>• Resource mobilization (e.g. donor funds)</li> </ul> |

## Alcohol regulation policies

Unlike tobacco, alcohol control policies are not well articulated. If present, they are highly dependent on laws of local government units. Most of the national laws that pertain to alcohol control usually aim to eliminate road traffic injuries. As enshrined under Section 53 of Republic Act 4136 also known as Land Transportation Act and Traffic Code, driving any form of vehicle that are under the influence of alcohol and narcotics. However, this old law with lax provisions has not been useful enough because of the lack of teeth (e.g. small fines and the identification of drunk drivers are not included).

In 2010, the congress also legislated the Drivers Under the Influence of Alcohol Act (DUIC). The objective of the law is to give more teeth on the existing traffic code. Under the new law, a person can be charged for drunk driving if operating a motor vehicle while intoxicated with alcohol at levels where the driver's mental and motor skills are impaired or when blood alcohol concentration level is zero point zero six (0.06) or more. The bill also requires applicants for driver's licenses to complete a course on driving and safety matters that will include the effects of alcohol consumption on the ability to operate a motor vehicle and the hazards of driving under the influence of alcohol. All drivers involved in vehicular accidents that result in death or physical injuries of a serious nature will be subjected to chemical tests to determine the presence and concentration of alcohol in their bloodstream.

Another important piece of legislation is prohibition of alcohol to a certain vulnerable segment of the population. According to WHO documents, like many other countries in the world, minors in the Philippines

(18 years below) are not allowed to drink alcohol. Several house and senate bills that are currently filed seek stricter provisions with regard to underage drinking. For example, Senator Revilla's proposed house bills would tend to penalize minors caught drinking by obliging them to perform community service while fine would be imposed to establishments. The creation of anti-underage drinking body was also proposed to monitor the implementation of the law.

The WHO proposes that countries craft policies which would restrict and regulate alcohol drinking to vulnerable population. Though underage drinking laws are now in the House and Senate, there is no law that restricts alcohol to other vulnerable population like pregnant women. Neither is there any law that controls and regulates alcohol promotions and advertising. After exhaustive scanning of policies from 1980-2010, there is no existing comprehensive and specific policy in the side of Department of Health that depicts a national framework with regard to alcohol control.

## Food regulations

The Philippines has diverse food regulations and standards. In general, the Food and Drug Administration and Department of Science and Technology are the key agencies that release pertinent food regulation policy. Due to the inherent wide scope of food regulations, specific and relevant guidelines/policies which the World Health Organization recommends are discussed below:

1. *Establish and implement food-based dietary guidelines and support the healthier composition of food.*

There are a lot of existing guidelines that promotes healthier food composition in the country. One example is the Food Nutrition and Research Institute's Daily Nutritional Guide Pyramid. The Food and Nutrition Research Institute (FNRI) has developed a food pyramid, a simple and easy-to-follow daily eating guide for Filipinos. The food guide pyramid is a graphic translation of the current "Your Guide to Good Nutrition" based on the usual dietary pattern of Filipinos in general. The usual Filipino diet consists mainly of rice. It contributes to the largest share of carbohydrates in the diet together with bread, corn and root crops such as sweet potato, cassava and "gabi."

Though there are existing guidelines that promote healthier composition of food, there is no legal and solid framework on how this would be disseminated.

2. *Framework and/or mechanisms for promoting the responsible marketing of foods and non-alcoholic beverages to children (none), in order to reduce the impact of foods high in saturated fats, trans-fatty acids, free sugars, or salt.*

The Department of Health has proposed different mechanisms to promote responsible food marketing. These include food certification to control salt and fats, consolidation of Sangkap Pinoy in “Wise Choice Stamp” using CODEX standard, and the front pack labelling displaying what nutrients are included.

Regulations on fast foods are still on the advocacy stage. There is no legislation yet to control foods high in saturated fats, trans-fatty acids, or salt. It is still the discretion of these food companies whether they would adhere to the promotion of healthy foods to be offered in their respective food chains.

There is no agency in the country regulating advertisement of unhealthy foods and beverages except one which is composed of the advertisers themselves. The Philippine Association of National Advertisers (PANA) is a non-stock organization comprising every major industry in the country. Since it is self-regulating, the FDA, even if it has police power, cannot impose what advertisement should not be shown on television, print and other forms of media (except for clinical claims).

Hence, three problems/challenges arise concerning food regulation. These include the absence of national framework, accountability and conflict of interest. The issue of whether what agency is authorized or legally mandated to monitor and regulate food advertisement must be resolved. Finally, resolution on conflict of interest between the advertisers and the regulating office is equally important.

## Physical activity

Policies and laws regarding promotion of physical activity are limited. At present, there is no policy or national framework promoting healthy lifestyle through physical activity. Nonetheless, the Department of Health has prepared a draft administrative order on physical activity program adopted from the WHO guidelines. The Department commissioned the University of the Philippines College of Human Kinetics to develop a module on physical activity program for different age group and employment in the context of current Philippine setting. What is lacking, however, is the provision of suitable program for specific risk factors of NCDs (i.e. physical activity or exercise advisable for people with heart disease, diabetes, etc.).

On the other hand, the Civil Service Commission has issued Memorandum Circular No. 8, s. 2011 reiterating Memorandum Circular No. 38, s. 1992, regarding the Physical and Mental Fitness Program for Government Personnel. The CSC also issued MC No. 6, s. 1995 which requires all agencies to adopt “The Great Filipino Workout” to form part of the National Physical Fitness and Sports Development Program for government employees. The MC specifically provides the allotment of reasonable time for regular physical fitness exercise



which is one (1) hour each week for the conduct of health awareness program and twenty (20) minutes daily for wellness or fitness program (MC No. 8, s. 2011, [www.csc.gov.ph](http://www.csc.gov.ph)). In addition, the Department of Health in collaboration with the International Labour Organization (ILO) and the Department of Labor and Employment (DOLE), developed a module to promote healthy lifestyle in workplace. The baseline survey was conducted by the Ateneo de Manila University wherein it highlighted the role of the private sector in the promotion of physical activity.

Policy promoting physical activity is hypothesized to be highly dependent on local government ordinances and private sector initiative. Since it is believed that health promotion is not prescriptive, LGUs can modify, add or remove certain requirement/s to best suit their localities.

Though physical activity programs are drastically increasing, it is necessary that agencies like DOH should issue position and guidelines enshrined into formal policies for sustainability and strict implementation. The Department or the national government in general, should proactively pursue these programs and policies for them not to continue to be in the pipeline.

## Access to medicine

The Philippines has variety of national and department policies that would make medicines particularly for NCDs cheap and accessible. Existing laws include price ceiling of major drugs for cardio-vascular diseases and cancers, treatment packs and social insurance benefits that can directly benefit NCD patients.

In 2009, Republic Act (RA) 9502, an act providing for cheaper and quality medicines was enacted. This law includes a provision that imposes price ceiling for widely used heart and cancer medicines like Amlodipine, Atorvastatin, Cytarabine and Doxorubicin. The Maximum Drug Retail Price (MDRP) is imposed on all retail outlets, public or private, including drugstores, hospitals and hospital pharmacies, health maintenance organizations, convenience stores, supermarkets, and other sources. About 90 percent compliance rate among 40,000 drugstores and hospital pharmacies had been reported months after implementation. A significant decline in prices of drugs was observed in the pharmaceutical industry since the regulation of price has been applied (Picazo, 2011).

Policies on social insurance benefits can also improve health care access especially to people suffering from NCD-related illnesses. It is important to understand that majority of existing social insurance benefits on NCDs are curative in nature. No benefit was found for preventive procedures. Currently, the PhilHealth issued the Circular No. 11-2011 that changes the provider payment mechanisms from fee for service to case payment. This policy also guarantees no balance billing among the sponsored program. At this point, only selected procedures and illnesses are covered by this policy. The following are the selected NCDs covered by

case payment scheme: essential hypertension, cerebral infarction, radio-therapy for cancer patients and mastectomy.

## Recommendations

The main objective of this paper is to analyze the social determinants of NCDs. By presenting the current situation of NCDs, it is hoped that this will facilitate genuine interest among stakeholders in the development of a national strategy in the prevention and control of NCDs. Though several programs have been in the past, most often these programs are quite scattered and unsynchronized.

It is important to understand that an inherent feature of NCD prevention and control must involve other institutions outside the health sector. For example, a policy that would regulate unhealthy diet requires close coordination with different agencies like the local government and Department of Trade and Industry. Thus, there is a need to craft a holistic national framework and strategy in the control of NCDs. This future initiative should contain the following features:

- *Define a clear and specific national position on NCDs and their risk factors.*

Risk factors like unhealthy food, alcohol and smoking are hard to regulate because of the possible political and economic backlash once controlled. National position on tobacco control is already well-defined as enshrined in several laws and policy guidelines. However, regulation of unhealthy food and alcohol seems very lax. In setting a national position, all risk factors that are feasible for regulation should be well-identified, and the level and kind regulation should also be set. The creation of a clear national position would result to a more synchronized and continuous advocacy, technical and financial support from donors and other sectors.

- *Identification of intervention points*

The formulated strategy should have defined interventional mechanisms which should include the type of programs and target population. The type of programs is highly dependent on the phase of the diseases. Thus, programs that target both the preventive and curative phases of NCDs should be in place.

Arguably, our analysis of risk factors posits the non-concentration of all risk factors to a particular socio-economic class or social segment as manifested in table 37. For example, factors like obesity and consumption of unhealthy diet are leaning towards the richer population while their poorer counterparts have several characteristics that increase their risk to NCDs. A case in point is the high consumption of salt, high consumption saturated fat (specifically the urban poor) and the high prevalence of smoking. This posits the need for the program to be customized depending on the target population.

**Table 38. Vulnerable population segments**

| Indicators                  | Age                  | Sex     | SES  | Urbanity | Urban poor |
|-----------------------------|----------------------|---------|------|----------|------------|
| <b>Vulnerabilities</b>      |                      |         |      |          |            |
| high blood sugar (diabetes) | mid-adult            | Females | Rich | Urban    |            |
| Obesity                     | mid-adult            | Females | Rich | Urban    | urban poor |
| total cholesterol           | mid-adult            | Females | Rich | Urban    | urban poor |
| Hypertension                | late adult           | Both    | Both | Both     |            |
| <b>Exposure</b>             |                      |         |      |          |            |
| Saturated oil               | young adult          | Both    | Rich | Urban    | urban poor |
| fast food expenditures      | young adult          | Both    | Rich | Urban    | urban poor |
| low consumption of fiber    | young adult          |         | Rich | Urban    |            |
| high consumption of meat    | young adult          |         | Rich | Urban    |            |
| unnecessary sugar           | young adult          |         | Rich | Urban    |            |
| high salt intake            | late adult           |         | Poor | Rural    |            |
| Smoking                     | All                  | Males   | Poor | Rural    |            |
| Alcohol                     | young adult          | Males   | All  | All      |            |
| physical inactivity         | young and late adult |         | Rich | Urban    |            |
| physical barriers           | All                  |         | Poor | Rural    |            |

- *Setting accountabilities*

One of the most effective ways in institutionalizing a national strategy is to convene different sectors of society. By simply organizing and setting individual responsibilities produce complementary strengths that would yield to better results. Most often, other sectors are oblivious on their pertinent role in NCD dynamics. Thus, there should be consultation and dialogue in order to come up with a synchronized position and objectives. This is mechanism is also a perfect avenue to check the level of commitment of these sectors in the prevention and control efforts.

- *Setting up national goals*

There are no existing solid national goals with respects to NCDs and its risk factors. Ideally, national goals on NCDs should contain very specific metrics that go beyond usual indicators. Behaviors and industry practices should also be covered if needed.

- *Financing*

Elaborate mechanism on how to harness sustainable fund needed for preventive and curative programs. Explore the possibility of financing preventive care using social health insurance.

- *Creation of a implementing body*

The creation of a body that would implement and track the programs is needed. Ideally, the Department of Health leads this body with the participative action of different sectors.

- *Monitoring and Surveillance*

Accurate data are vital in NCD control. The Philippines has usable mortality data and weak NCD surveillance. Data on NCDs are often not integrated into national health information systems highly dependent on national surveys. In other countries, their surveillance system is incorporated in health facilities.

- *Sustainability*

The national strategy should include a provision that open doors for more researches that tackles non-communicable diseases. Building research centers that focuses on NCDs would lead more to collaboration and network.

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