

# **Urban Health in Myanmar: Assessing Wealth-based Intra-urban Health Inequalities**

**Further Analysis of the Myanmar  
Demographic and Health Survey 2015-16**



**DHS Further Analysis Reports No. 124**



DHS Further Analysis Reports No. 124

# **Urban Health in Myanmar: Assessing Wealth-based Intra-urban Health Inequalities**

**Further Analysis of the Myanmar  
Demographic and Health Survey 2015-16**

Kyawt Sann-Lwin<sup>1</sup>  
Lwin Lwin Aung<sup>2</sup>

ICF  
Rockville, Maryland, USA

March 2019

<sup>1</sup> Health Policy and Management Department, University of Public Health, Yangon, Myanmar

<sup>2</sup> Department of Public Health, Ministry of Health and Sports, Myanmar

*Corresponding author:* Kyawt Sann-Lwin, Health Policy and Management Department, University of Public Health, Yangon, Myanmar; email: [kyawtsannlwin@gmail.com](mailto:kyawtsannlwin@gmail.com)



**Acknowledgments:** The authors wish to express our deep appreciation to USAID for funding support for the Myanmar Demographic and Health Surveys (DHS) Fellows Program implemented by The DHS Program. We are grateful to Kerry L.D. MacQuarrie, technical specialist at The DHS Program, for her kind support in data analysis and valuable comments in writing the report. Thanks also to the other facilitators, Elma Laguna, Courtney Allen, and Ramesh Kafle, for their technical support. We would also like to express our sincere thanks to Shireen Assaf, technical specialist at ICF, for her input in computing the concentration index and reviewing the study. We would also like to acknowledge Thet Thet Mu, Deputy Director General, Department of Public Health, and Khay Mar Mya, former rector of University of Public Health, Yangon, Ministry of Health and Sports, Myanmar, for their kind support and encouragement.

Editor: Diane Stoy

Document Production: Joan Wardell

This report presents findings from a further analysis undertaken as part of the follow-up to the 2015-16 Myanmar Demographic and Health Survey (MDHS). ICF provided technical assistance for the project. This report is a publication of The DHS Program, which is designed to collect, analyze, and disseminate data on fertility, family planning, maternal and child health, nutrition, and HIV/AIDS. Funding was provided by the U.S. Agency for International Development (USAID) through the DHS Program (#AID-OAA-C-13-00095). The opinions expressed here are those of the authors and do not necessarily reflect the views of USAID and other cooperating agencies.

The 2015-16 MDHS was implemented by the Ministry of Health and Sports of the Republic of the Union of Myanmar. Funding for the survey was provided by USAID and the Three Millennium Development Goal Fund (3MDG). ICF provided technical assistance through The DHS Program, which assists countries in the implementation of population and health surveys in countries worldwide.

The DHS Program assists countries worldwide in the collection and use of data to monitor and evaluate population, health, and nutrition programs. Additional information about The DHS Program can be obtained from ICF, 530 Gaither Road, Suite 500, Rockville, MD 20850, USA; telephone: +1 301-407-6500; fax: +1 301-407-6501; email: [info@DHSprogram.com](mailto:info@DHSprogram.com); internet: [www.DHSprogram.com](http://www.DHSprogram.com).

Recommended citation:

Sann-Lwin, Kyawt, and Lwin Lwin Aung. 2019. *Urban Health in Myanmar: Assessing Wealth-based Intra-urban Health Inequalities. Further Analysis of the Myanmar Demographic and Health Survey 2015-16*. DHS Further Analysis Reports No. 124. Rockville, Maryland, USA: ICF.

# CONTENTS

---

<b>TABLES</b> .....	<b>v</b>
<b>FIGURES</b> .....	<b>vii</b>
<b>ABSTRACT</b> .....	<b>ix</b>
<b>ACRONYMS AND ABBREVIATIONS</b> .....	<b>xi</b>
<b>1 INTRODUCTION</b> .....	<b>1</b>
1.1 Background.....	1
<b>2 DATA AND METHODS</b> .....	<b>5</b>
2.1 Data.....	5
2.2 Definition of Dependent and Independent Variables .....	5
2.3 Statistical Analysis .....	6
2.4 Ethical Considerations .....	7
<b>3 RESULTS</b> .....	<b>9</b>
3.1 Background Characteristics of Respondents.....	9
3.2 Description of Wealth-based Intra-urban Inequalities in Health Impact.....	10
3.3 Wealth-based Intra-urban Inequalities in Coverage of Interventions.....	11
3.3.1 Preventive health care services for children .....	11
3.3.2 Maternal health care services .....	11
3.3.3 Reproductive health services.....	12
3.4 Wealth-based Intra-urban Inequalities in Risk Factors and Behavior.....	13
3.4.1 Physiological risk factors.....	13
3.4.2 Environmental risk factors.....	13
3.4.3 Behavior risk factor indicators.....	14
3.5 Comparison of CIX Values for Coverage of Interventions and Risk/behavior Indicators.....	15
<b>4 DISCUSSION</b> .....	<b>17</b>
4.1 Conclusions.....	20
<b>REFERENCES</b> .....	<b>21</b>
<b>APPENDIX</b> .....	<b>27</b>



# TABLES

---

Table 1	List of indicators.....	5
Table 2	Percent distribution of urban women and men age 15-49 by selected background characteristics, MDHS 2015-16.....	9
Appendix Table A1	Wealth-based inequality of health impact indicators .....	27
Appendix Table A2	Wealth-based inequality of preventive health care service for children indicators.....	27
Appendix Table A3	Wealth-based inequality of maternal health care service indicators .....	27
Appendix Table A4	Wealth-based inequality of reproductive health care service indicators .....	28
Appendix Table A5	Wealth-based inequality of physiological risk indicators .....	28
Appendix Table A6	Wealth-based inequality of environmental risk indicators .....	28
Appendix Table A7	Wealth-based inequality of behavior risk indicators .....	29



## FIGURES

---

Figure 1	Wealth-based intra-urban inequality of health impact .....	10
Figure 2	Wealth-based intra-urban inequality of preventive health care services for children .....	11
Figure 3	Wealth-based intra-urban inequality of maternal health care services .....	12
Figure 4	Wealth-based intra-urban inequality of reproductive health care service indicators .....	12
Figure 5	Wealth-based intra-urban inequality of physiological risk factors .....	13
Figure 6	Wealth-based inequality of environmental risk factors .....	14
Figure 7	Wealth-based intra-urban inequality of behavioral risk factors .....	15
Figure 8	Concentration indices for coverage of interventions and risk/behavior indicators .....	16



## ABSTRACT

---

According to the 2015-16 Myanmar Demographic and Health Survey, urban health indicators are generally better than rural indicators. However, it is necessary to assess whether all urban dwellers enjoy the same health benefits of urban residence. This study aims to identify the magnitude and pattern of wealth-based health inequalities in urban Myanmar. The study is a secondary analysis of DHS data that uses the urban wealth index as an equity stratifier and three health impact indicators, six intervention indicators, and nine risk/behavior indicators as dependent variables.

The study finds that indicators are at a reasonable level for the urban population overall, but these successes have failed to reach the poorest group in urban Myanmar. The three health impact indicators show inequality gaps with a pattern of marginalization in which most population groups experienced better health than the poorest group. Furthermore, most indicators for coverage of interventions and risk/behavior indicators also show inequality gaps with some degree of marginalization. Reproductive health service indicators are an exception. The study concludes that the urban poor face barriers in the use of health services and that there are inequalities in the determinants of health.

These barriers may be addressed by adopting pro-poor strategies and proactively targeting the urban poor to improve service delivery and achieve universal health coverage. Addressing inequality in the determinants of health also requires intersectoral action and advocacy for “health in all policies,” and the development of an inequality monitoring system that can ensure the Myanmar health system’s accountability in addressing the wealth-based health inequalities that exist among urban subpopulation groups.

KEY WORDS: Urban health, inequality, wealth index, Demographic and Health Survey, Myanmar



## ACRONYMS AND ABBREVIATIONS

---

3MDG	Three Millennium Development Goals Fund
ANC	antenatal care
BMI	body mass index
CIX	concentration index
CPR	contraceptive prevalence rate
DESA	Department of Economic and Social Affairs
DHS	Demographic and Health Survey
DPT3	diphtheria-tetanus-pertussis third dose
EBF	exclusive breastfeeding
EPI	Expanded Program on Immunization
GHO	Global Health Observatory
HERA	Health Research for Action
HIV	human immunodeficiency virus
IMR	infant mortality rate
IUD	intrauterine device
LAM	lactational amenorrhea method
mCPR	modern contraceptive prevalence rate
MDG	Millennium Development Goals
MDHS	Myanmar Demographic and Health Survey
MICS	Multiple Indicator Cluster Survey
MOHS	Ministry of Health and Sports
MOPF	Ministry of Planning and Finance
MPLCS	Myanmar Poverty and Living Condition Survey
NCD	noncommunicable diseases
SBA	skilled birth attendant
SDG	Sustainable Development Goals
SDH	social determinants of health
U5MR	under-5 mortality rate
UHC	universal health coverage
UN	United Nations
USA	United States of America
VIP	ventilated improved pit
WHO	World Health Organization



# 1 INTRODUCTION

---

It is generally accepted that urban residents, on average, enjoy better health than their rural counterparts. However, there is an unequal distribution of health risks among social groups within urban areas, with most of the health burden concentrated among vulnerable segments and, particularly, the urban poor (WHO 2016). Globally, there is strong evidence that intra-urban health inequalities occur among economic subgroups (WHO and UN-Habitat 2010, 2016; Ezeh et al. 2017). Urban health inequalities are detrimental to urban residents and threaten the achievement of the Sustainable Development Goals (SDGs) (WHO and UN-Habitat 2016). Thus, assessing urban health inequalities is required for reducing inequality and for improving accountability in public policy making (WHO 2013).

According to the Myanmar Demographic and Health Survey (MDHS) 2015-16 final report, almost all the health and social determinants of health indicators are better in urban than in rural populations (MOHS and ICF 2017). However, these indicators are averages that mask potentially wide disparities between more and less disadvantaged populations. Therefore, it is necessary to assess how improved outcomes have been shared among urban economic subpopulations (WHO 2016; WHO Center for Health Development 2010). Because Myanmar is committed to the Sustainable Development Goals and universal health coverage (UHC) (MOHS 2017), it is very important to identify intra-urban health inequalities and to prioritize the provision of health and other services to marginalized urban poor population groups.

## 1.1 Background

Globally, more people in 2014 lived in urban areas than rural areas, with 54% of the world's population living in urban areas (UN DESA/Population Division 2015). The speed of urban growth has outpaced the ability of governments to build essential infrastructures that make life in cities and towns safe and healthy. There is a proliferation of informal settlements and urban poor in urban areas, in which the advantages of city life are lacking. The urban poor face barriers in their use of health services, and it has been reported that some urban residents are experiencing inequalities, various forms of exclusion, and marginalization (WHO and UN-Habitat 2010).

Health inequalities are defined as “differences in health status or in the distribution of health resources between different population groups, arising from the social conditions in which people are born, grow, live, work, and age” (WHO 2017a). The determinants of urban health inequality include political and economic factors, as well as factors related to the physical and social environment. Deficiencies in any of these factors can lead to health inequities and greater health risks for the poor, minorities, women, children, and other vulnerable groups (WHO 2016). Thus, socioeconomic inequalities are inequitable and unjust, and contribute to a large degree to health inequalities (Wagstaff and van Doorslaer 2004; WHO Center for Health Development 2010).

Health inequalities between the poor and the more affluent persist. The poor tend to use fewer health services, despite the fact that they have greater health needs. They spend more on health care

as a share of income and suffer higher rates of mortality and morbidity than do the more affluent (O'Donnell et al. 2007).

These consistent inequalities are not inevitable and require concerted effort to ensure that health systems reach the disadvantaged groups more effectively. Although UHC programs are designed to improve access to care among the poor and to address persistent inequalities, addressing intra-urban inequalities requires complementing UHC strategies and other pro-poor strategies aimed at improving use of services by the poor (Gwatkin, Wagstaff, and Yazbeck 2005). It is essential to make sure that the design and operation of health systems include explicit goals for improving coverage among the poor, rather than in entire populations, and that these goals are included in health systems monitoring and evaluation (Gwatkin, Davidson, Bhuiya, Abbas, and Victora 2004; WHO 2005; WHO 2013).

UN-Habitat has estimated that one-third of the urban population lived in slums or informal settlements in 2007, and that the urban poor are vulnerable to extreme poverty, extreme inequality, and poverty traps if they become ill. Therefore, slum health should be mainstreamed in the implementation of the SDGs (Ezeh et al. 2017). The monitoring of urban health inequality should include disaggregating urban health indicators for key disadvantaged subgroups, including by their economic status (WHO 2017b). The monitoring of health inequality is an indirect means of evaluating health inequity that measures the changes over time in health indicators within population subgroups. Such monitoring uses indicators that are likely to reflect unfair differences between groups, which could be corrected by changes to policies, programs, or practices (WHO 2013). Equity-oriented health information systems are basic requirements for monitoring health inequality that require capacity building of health information systems at the national level (WHO 2015b). This should be sufficiently comprehensive and concise to facilitate policy making and prioritization of interventions (WHO Center for Health Development 2010).

Characteristic patterns of inequality across economic subgroups are worthwhile to observe because they can effectively describe the nature of inequality and can identify appropriate approaches for addressing inequality. Health service coverage across economic subgroups can be characterized by four distinct patterns of inequality. *Universal coverage pattern* describes coverage of 100% or close to 100% in all subgroups. *Marginal exclusion or marginalization* describes markedly lower coverage in the poorest subgroup than the other four subgroups. A *linear or queuing pattern* shows a gradual increase in service coverage from the poorest to the richest subgroup, while *mass deprivation* has low or very low coverage in all subgroups except the richest (WHO 2015b; WHO 2013; WHO 2005).

Appropriate types of policies, programs, or interventions can be based on these patterns of inequality. The mass deprivation pattern of inequality requires a whole population (universal) approach, where resources are invested in all or most subgroups. With marginalization, health interventions target the most disadvantaged subgroup(s). The queuing pattern requires combined universal and targeted interventions, whereas universal coverage requires continued monitoring to ensure that the situation remains favorable (WHO 2015b; WHO 2013).

Urbanization improves health through infrastructural improvements such as access to health services, education, sanitation, and a safe water supply (McDade and Adair 2001). Access to information and communication technology in urban areas can influence disease prevention and health promotion opportunities in developing countries. However, the impact of urbanization on health has been controversial in some literature (Niakara et al. 2007; Eckert and Kohler 2014).

In the urban poor areas, there is evidence from the international literature that there is inadequate access to services, with more than half of urban poor children under age 5 stunted and/or underweight and more than half of births taking place at home (WHO and UN-Habitat 2010). It is reported that the urban poor are often neglected because they are frequently absent from data sources available to the decision makers. The census excludes “illegal” settlements and the homeless, while public health authorities do not collect information on informal or illegal settlements (WHO and UN-Habitat 2010; Elsey et al. 2015). The reasons for inadequate access to services include illegality, social exclusion of slums, hidden slum pockets, and a weak social fabric. This situation has created the rapid proliferation of an unqualified private health sector, which has led to high health expenditures, a persistent and vicious cycle of poverty, and ill health among the urban poor (Patil 2014; SDH 2008).

There are numerous studies on wealth-related inequality in the international literature. These studies typically use data from DHS surveys, Multiple Indicators Cluster Surveys (MICS), World Health Organization (WHO) World Health Surveys, or the Family Health Survey and have reported marked wealth-related disparities in maternal and child health indicators (Gwatkin and Deveshwar-Bahl 2001; Gwatkin et al. 2007; Kia et al. 2017; Hosseinpoor et al. 2011; Wang 2013; Assaf and Pullum 2016; Hosseinpoor, Bergen, Schlottheuber, and Gacic-Dobo et al. 2016; Ameyaw, Kofinti, and Appiah 2017; Arsenault et al. 2017). However, there are fewer studies focused on intra-urban health inequality (WHO and UN-Habitat 2016; Elsey et al. 2015; Arokiasamy et al. 2013; Agarwal 2011; Anyamele 2011; Kumar and Mohanty 2010; WHO and UN-Habitat 2010), although it has become a global concern for policy makers.

Elsey et al. discuss the advantages and disadvantages of using cross-sectional survey data to analyze health inequalities. The authors note that DHS’s approaches and questionnaires are standardized for many surveys, which allows comparison across countries and over time, and the wealth index can be used to measure the economic status of households. The authors warn that although these surveys have large sample sizes, they are not always sufficient to compare inter-urban or intra-urban disparities for all indicators (Elsey et al. 2015).

According to UN estimates, the percentage of the Myanmar urban population in 2017 was 34%, and is projected to increase to 43% in 2030 and 55% in 2050 (UN, DESA 2017). According to World Urbanization Prospects (2014), Myanmar has been identified as one of the 10 countries with the largest projected decline in the rural population between 2014 and 2050 (UN DESA/Population Division, 2015). Thus, Myanmar will experience a significant reduction in the size of its rural population and a significant increase in the size of its urban population in the future. The 2015 Myanmar Poverty and Living Condition Survey (MPLCS) reported that poverty in urban areas was 15% and that standards of living increased more rapidly in urban areas than in rural areas. It also

found that living standard inequality between poor and rich households has risen in Myanmar (MOPF and World Bank 2017).

There is very limited information on wealth-related health inequality within the Myanmar urban population. Health Research for Action (HERA) and the Three Millennium Development Goals Fund (3MDG) conducted a qualitative study, “Health Care for Urban Poor in Myanmar,” in 2014 that described the situation of the urban poor. The study found that there is an increased concentration of young residents who require more reproductive health services and protection against HIV and sexually transmitted diseases. There was also a higher prevalence of communicable and non-communicable diseases (NCDs) that result from poor living conditions and lifestyle (Ali 2014).

The 2015-16 MDHS is the first national survey ever implemented in the country as part of the worldwide DHS Program. The final report provides descriptions of standard sets of national-level health and social determinants of health indicators that are disaggregated by background variables such as urban/rural residence, age, gender, education, states and regions, and wealth quintiles (MOHS and ICF 2017). It is essential to further analyze MDHS urban data to ascertain if there is any significant disparity in the key health impact indicators, coverage of intervention indicators, and risk/behavior indicators among different urban wealth groups and whether the urban poor in the lowest wealth quintile have marked lower levels of health.

## 2 DATA AND METHODS

### 2.1 Data

This study is a secondary analysis of 2015-16 MDHS data. The MDHS is a cross-sectional study with a stratified, two-stage cluster sampling design that selected 442 clusters – 123 from urban and 319 from rural areas. A fixed number of 30 households per cluster was selected to achieve a total of 13,260 households. This design facilitates the calculation of key indicators at the national, state, and regional levels, as well as the urban/rural residence level, in Myanmar. The detailed methodology of the 2015-16 MDHS is provided in the final report (MOHS and ICF 2017). The current analysis includes all urban households (3,399), and the age-eligible respondents (age 15-49) who were women (3,785), men (1,321), and their children. Anthropometric measurements were obtained from all women respondents and children age 6-59 months in selected households.

### 2.2 Definition of Dependent and Independent Variables

To describe the wealth-based urban health inequalities, 16 key indicators are selected from the WHO illustrative list of core indicators for health sector reviews (WHO and International Health Partnership 2011; Hosseinpoor, Bergen, Schlottheuber, and Victora, et al. 2016); and the WHO Global Health Observatory and Clean Cities: Urban Health (WHO 2016). A detailed description of the indicators can be found in the Guide to DHS Statistics (Croft, Marshall, and Allen 2018). As shown below in Table 1, this study uses three sets of indicators: (1) health impact indicators, (2) coverage of interventions indicators, and (3) risk factors and behavior indicators.

**Table 1 List of indicators**

Health impact indicators	
1.	Under-5 mortality rate (deaths per 1,000 live births)
2.	Infant mortality rate (deaths per 1,000 live births)
3.	Adolescent birth rate (per 1,000 women age 15-19)
Coverage of interventions indicators	
Preventive health care services for children	
4.	Coverage of diphtheria-tetanus-pertussis third dose (DPT3) vaccination among children age 1 (%)
5.	Coverage of measles vaccination among children age 1 (%)
Maternal health care services	
6.	Coverage of skilled birth attendance (%)
7.	Coverage of antenatal care (at least four visits) (%)
Reproductive health services	
8.	Contraceptive prevalence: modern methods (%)
9.	Demand for family planning satisfied by modern methods (%)
Risk factors and behavior indicators	
Physiological risk factors	
10.	Prevalence of (moderate or severe) chronic malnutrition in children age less than 5 (stunting) (%)
11.	Prevalence of obesity in non-pregnant women age 15-49 with BMI $\geq$ 30 (%)
Environmental risk factors	
12.	Access to improved drinking water (%)
13.	Access to improved sanitation facilities (%)
Behavioral indicators	
14.	Prevalence of current cigarette smoking among men (%)
15.	Comprehensive correct knowledge about sexual transmission of HIV among young women (age 15-24) (%)
16.	Children age 0-5 months exclusively breastfed (%)

We use the wealth index as an equity stratifier to describe wealth-based inequalities in health across urban subpopulations. In DHS surveys, the following steps are used to calculate the wealth index. First, households are given scores based on the number and types of assets they possess, which range from a television to a bicycle or car, and housing characteristics such as the source of drinking water, toilet facilities, and flooring materials. These scores are obtained using principal component analysis. Wealth quintiles are compiled by assigning the household score to each usual household member, ranking each person in the household population by their score, and then dividing the distribution into five equal categories, each with 20% of the population from the first quintile (Q1)—the poorest 20%—to the fifth quintile (Q5)—the richest 20%. In DHS, a separate wealth index is calculated for the urban and rural populations (Rutstein and Rojas 2006).

## 2.3 Statistical Analysis

Stata 15 software is used to analyze DHS data for the magnitude and pattern of wealth-based inequalities. To describe magnitude, the percentage point difference between the poorest and richest quintiles and the ratio between the poorest and richest quintiles are analyzed. Weight factors and the 'svyset' Stata command are applied in the analysis because the survey used a complex survey design with stratification, clustering, and unequal sampling weights. Bivariate analysis is used to estimate the relationship between the independent variable (wealth quintiles) and 16 dependent variables (indicators). The independent variable is treated as an ordinal variable. The association between the independent variable and each of the dependent variables is analyzed by calculating a 95% confidence interval. P values are also calculated with the significance level set at 0.05.

The concentration index (CIX), a relative measure of inequality that indicates the health gradient across five wealth subgroups and describes the extent to which the health indicator is concentrated among the poor or rich, is calculated for the coverage of intervention and risk/behavior indicators by using the *conindex* command in Stata. The sample weight and survey cluster are applied in calculation but not for survey design because the *conindex* command does not allow for the use of survey stratification design.

The Erreygers (2009) correction is used in the calculation because all the binary health indicators are bounded between zero and one, which means that the amount of dispersion is related to the overall mean (Binnendijk, Koren, and Dror 2012; Van Malderen et al. 2013; Assaf, Staveteig, and Birungi 2018). The CIX has a negative value when the health indicator is concentrated among the poor and a positive value when the indicator is concentrated among the rich. The CIX is zero when there is no inequality, and can be tested to assess whether the CIX is significantly different from zero. The highest theoretically possible relative inequality is  $\pm 1$ , with a CIX of 0.2 to 0.3 considered to represent a reasonably high relative inequality (WHO 2013; O'Donnell et al. 2007; Hosseinpoor, Bergen, Barros, et al. 2016).

To describe crude patterns of inequality, the three inequality patterns of marginalization, mass deprivation, and a queuing pattern are used in this study (WHO 2013; WHO 2005). The fourth pattern indicating no inequality, the universal coverage pattern, is not anticipated in these data.

## **2.4 Ethical Considerations**

The MDHS was approved by the Institutional Technical and Ethics Review Committee on Medical Research including Human Subjects in the Department of Medical Research, Ministry of Health and Sports, Myanmar, and the ICF Institutional Review Board in Calverton, Maryland, USA. The data are publicly available free of charge in the form of standard recode datafiles from The DHS Program at <https://www.dhsprogram.com/Data/>. For the further analysis, the authors requested permission for use of the data from The DHS Program.



## 3 RESULTS

### 3.1 Background Characteristics of Respondents

The mean age for women in the analysis sample is age 31.7±10, and for men is age 31.5±10. The percentage of never married is 39% among women and 40% among men. With education level, 24% of women and 15% of men have more than secondary education. Because the MDHS is a nationally representative survey, the analysis includes a representative sample of urban respondents from all states/regions of Myanmar (Table 2).

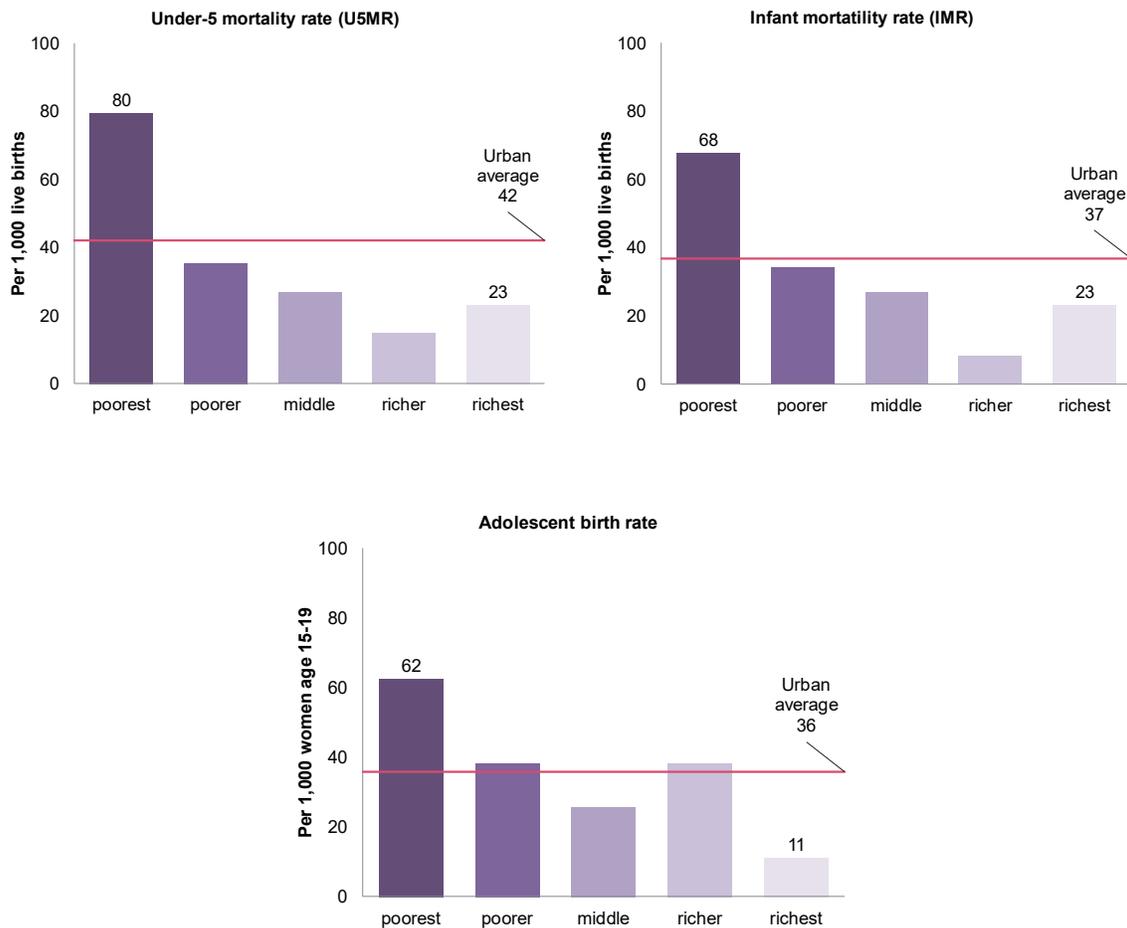
**Table 2** Percent distribution of urban women and men age 15-49 by selected background characteristics, MDHS 2015-16

Background	Women		Men	
	%	Number	%	Number
<b>Age</b>				
15-19	15.7	591	16.3	220
20-24	14.1	530	16.5	222
25-29	14.5	545	15.2	205
30-34	14.2	535	12.7	171
35-39	15.4	579	14.3	193
40-44	13.0	489	13.9	188
45-49	13.3	500	11.2	151
<b>Marital status</b>				
Never married	39.3	1,481	40.3	544
Married	53.7	2,022	56.8	767
Widowed	3.4	128	0.4	6
Divorced/separated	3.6	136	2.5	33
<b>States/Regions</b>				
Kachin	3.4	129	3.8	51
Kayah	0.5	18	0.4	5
Kayin	1.9	72	2.1	29
Chin	0.7	26	0.5	7
Sagaing	6.5	245	6.2	83
Tanintharyi	1.8	69	1.9	25
Bago	6.6	249	6.6	90
Magway	4.3	162	3.4	46
Mandalay	11.9	450	13.7	185
Mon	3.8	142	3.9	53
Rakhine	2.8	105	2.1	28
Yangon	36.5	1,375	34.8	470
Shan	9.7	366	10.1	136
Ayeyarwady	7.1	266	7.8	105
Nay Pyi Taw	2.5	95	2.7	36
<b>Education</b>				
No education	5.1	193	4.5	61
Primary	22.8	859	20.1	271
Secondary	48.2	1,816	60.1	812
More than secondary	23.9	900	15.3	206
<b>Wealth quintile</b>				
Poorest	18.9	710	20.7	279
Poorer	19.9	750	21.1	286
Middle	19.6	737	19.0	256
Richer	20.8	785	21.7	294
Richest	20.9	786	17.5	236
Total	100	3,768	100	1,350

### 3.2 Description of Wealth-based Intra-urban Inequalities in Health Impact

To describe inequalities in health impact, three indicators are analyzed. These are the under-5 mortality rate (U5MR), infant mortality rate (IMR), and adolescent birth rate (Figure 1). The inequality pattern of the three indicators reveals a marginalization pattern, with the U5MR and IMR of the poorest quintile very high while the other four wealth quintiles are lower than the urban average. Similarly, the adolescent birth rate is also very high in the poorest quintile, while the other four wealth quintiles are near the urban average. The ratios of the poorest to richest quintiles are 3.4, 2.9, and 5.7 for the U5MR, IMR, and adolescent birth rates, respectively. The absolute difference between the poorest and richest quintiles are 56 deaths per 1,000 live births for the U5MR, 45 deaths per 1,000 live births for the IMR, and 51 births per 1,000 women age 15-19 for the adolescent birth rate (details in Appendix Table A1).

**Figure 1** Wealth-based intra-urban inequality of health impact

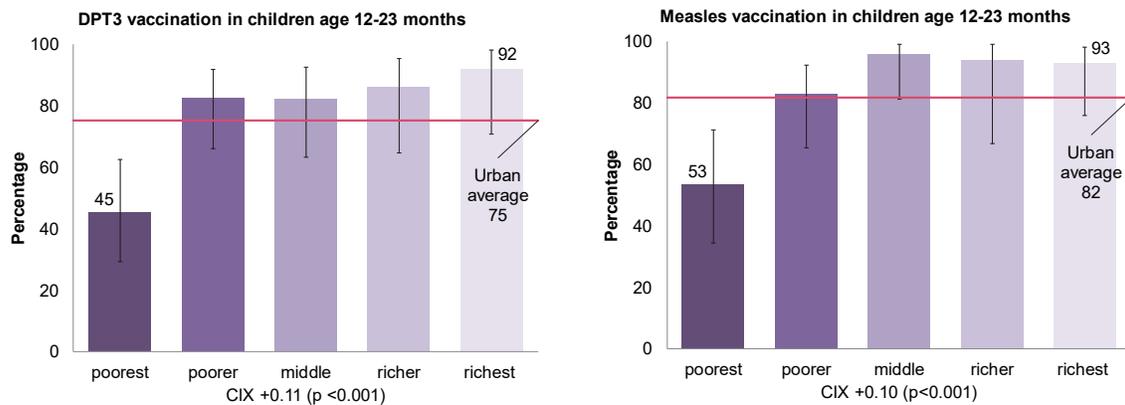


### 3.3 Wealth-based Intra-urban Inequalities in Coverage of Interventions

#### 3.3.1 Preventive health care services for children

To assess inequalities in preventive health care services for children, the coverage of vaccines<sup>1</sup> (DPT3 and measles) among children age 12-23 months is analyzed (Figure 2). The analysis finds that the poorest quintile has low vaccination coverage, while the other four wealth quintiles have higher than the urban average (marginalization). Absolute differences between the richest and the poorest quintiles are 47 and 40 percentage points for the DPT3 and measles indicators, respectively. Children living in households of the richest quintile are almost twice as likely to be vaccinated as those in the poorest households for both vaccinations. The CIX is +0.11 ( $p < 0.001$ ) for DPT3 and +0.10 ( $p < 0.001$ ) for measles vaccination. The statistical test of both CIX values indicates that they are significantly different from a CIX of zero, which suggests the presence of inequalities (details in Appendix Table A2).

**Figure 2** Wealth-based intra-urban inequality of preventive health care services for children



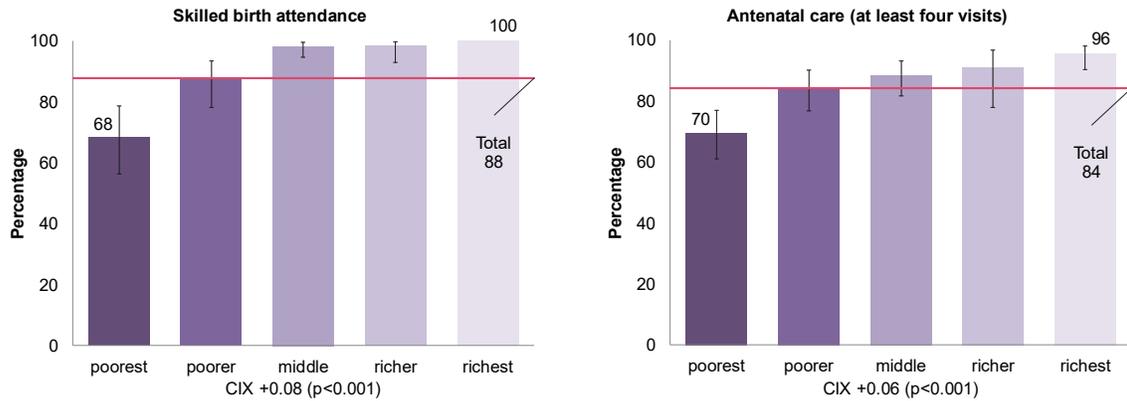
#### 3.3.2 Maternal health care services

The use of maternal health care services, defined as receiving services of a skilled birth attendant<sup>2</sup> (SBA) for childbirth and attendance of at least four antenatal care (ANC) visits, is concentrated among the rich with a marginalization pattern. The richest quintile to poorest quintile ratio is 1.5 for SBA at delivery and 1.4 for four or more ANC visits (Figure 3). The absolute differences are 32 and 26 percentage points, respectively. The CIX values are +0.08 ( $p < 0.001$ ) and +0.06 ( $p < 0.001$ ), respectively. Both concentration indices are significantly different from zero, indicating that inequalities exist. Details are found in Appendix Table A3.

<sup>1</sup> Vaccination coverage is defined as the percentage of children age 12-23 months who received specific vaccines at any time before the survey (according to either their vaccination card or mother's report).

<sup>2</sup> Skilled birth attendants include nurses, midwives, and doctors.

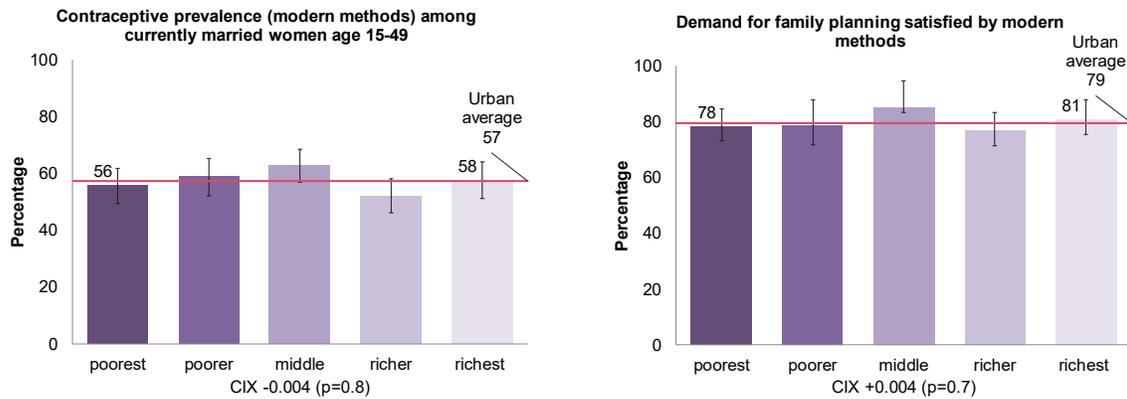
**Figure 3 Wealth-based intra-urban inequality of maternal health care services**



### 3.3.3 Reproductive health services

Among currently married women, there is little difference in either the modern contraceptive prevalence rate (mCPR)<sup>3</sup> or the percentage of demand for family planning satisfied by modern methods<sup>4</sup> across the wealth quintiles (Figure 4). The ratio of poorest to richest quintile is 1, and the differences between the richest and the poorest quintiles are just 1.8 and 2.6 percentage points. The CIX values show very small equality gaps that are not significantly different from zero. This indicates that equality by wealth is reached for these indicators at -0.004 (p=0.8) and +0.004 (p=0.7), respectively (see details in Appendix Table A4).

**Figure 4 Wealth-based intra-urban inequality of reproductive health care service indicators**



<sup>3</sup> Modern methods include male and female sterilization, injectables, intrauterine devices (IUDs), contraceptive pills, implants, male condoms, and the lactational amenorrhea method (LAM).

<sup>4</sup> Percentage of demand for family planning satisfied is met need divided by total demand:

$$\frac{\text{Current contraceptive use (any modern method)}}{\text{Unmet need + current contraceptive use (any method)}}$$

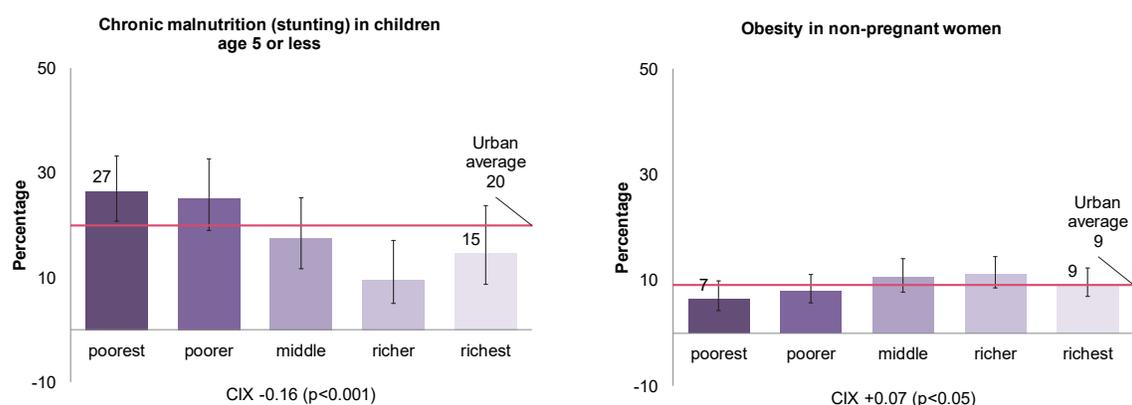
### 3.4 Wealth-based Intra-urban Inequalities in Risk Factors and Behavior

#### 3.4.1 Physiological risk factors

The physiological risk factor indicators, prevalence of moderate or severe chronic malnutrition (stunting) in children age 5 or less, are concentrated among the poor (Figure 5). The difference between the poorest and the richest quintiles is 12 percentage points, and manifests a queuing pattern with the stunting rate gradually decreasing from the poorest to the richer quintile. The poorest quintile to richest quintile ratio is 1.8 and the CIX is -0.16 ( $p < 0.001$ ), which indicates inequalities.

The prevalence of obesity in non-pregnant women age 15-49 (those with a BMI  $\geq 30$ ) is slightly higher among the richer quintile, with the poorest quintile 2.7 percentage points lower than the richest quintile and a CIX of +0.07 ( $p < 0.05$ ) (details in Appendix Table A5).

**Figure 5** Wealth-based intra-urban inequality of physiological risk factors



#### 3.4.2 Environmental risk factors

Access to improved sanitation facilities<sup>5</sup> increases with increasing wealth quintile (Figure 6); that is, it demonstrates a queuing pattern. The difference between the richest and the poorest quintiles is 59 percentage points, and the ratio is 2.8 with a CIX of +0.19 ( $p < 0.001$ ). This indicates that large inequalities are apparent for this indicator (details in Appendix Table A6).

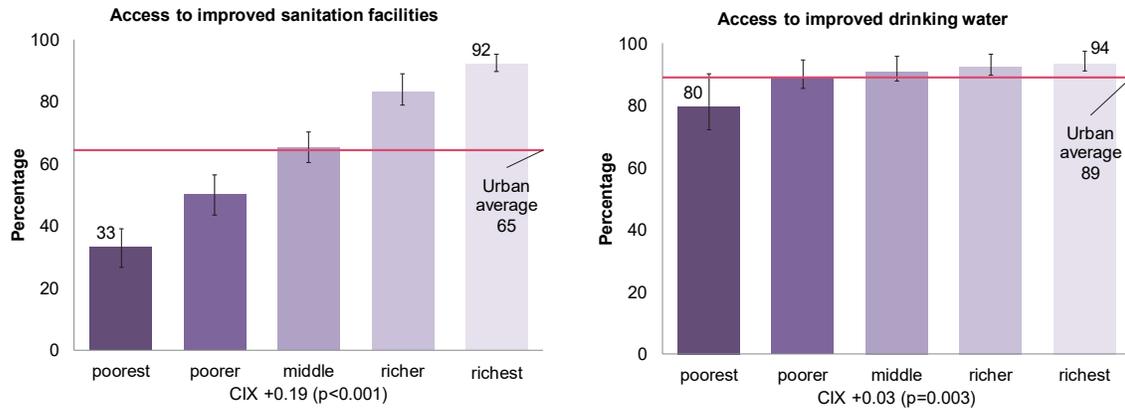
As shown in Figure 6, access to an improved source of drinking water<sup>6</sup> is concentrated among the rich, indicating a marginalization pattern. The difference between the richest and the poorest quintiles is 14 percentage points, and the ratio is 1.2 with a CIX of +0.03 ( $p = 0.003$ ) (see Appendix

<sup>5</sup> Improved sanitation facilities include any non-shared toilet of the following types: flush/pour flush toilets to piped sewer systems, septic tanks, and pit latrines; ventilated improved pit (VIP) latrines; pit latrines with slabs; and composting toilets.

<sup>6</sup> Improved drinking water include piped water, public taps, standpipes, tube wells, boreholes, protected dug wells and springs, rainwater, and bottled water.

Table A6 for details). Therefore, although the gaps appear small, inequality exists in access to improved drinking water.

**Figure 6 Wealth-based inequality of environmental risk factors**



### 3.4.3 Behavior risk factor indicators

The indicator for the prevalence of current cigarette smoking among men shows a mass deprivation pattern, with all wealth quintiles having a high prevalence of cigarette smoking except for the richest quintile (Figure 7). The prevalence in the richest quintile is 17 percentage points lower than in the poorest quintile, with a ratio of 1.7 and significant inequality with the CIX -0.08 (p=0.005).

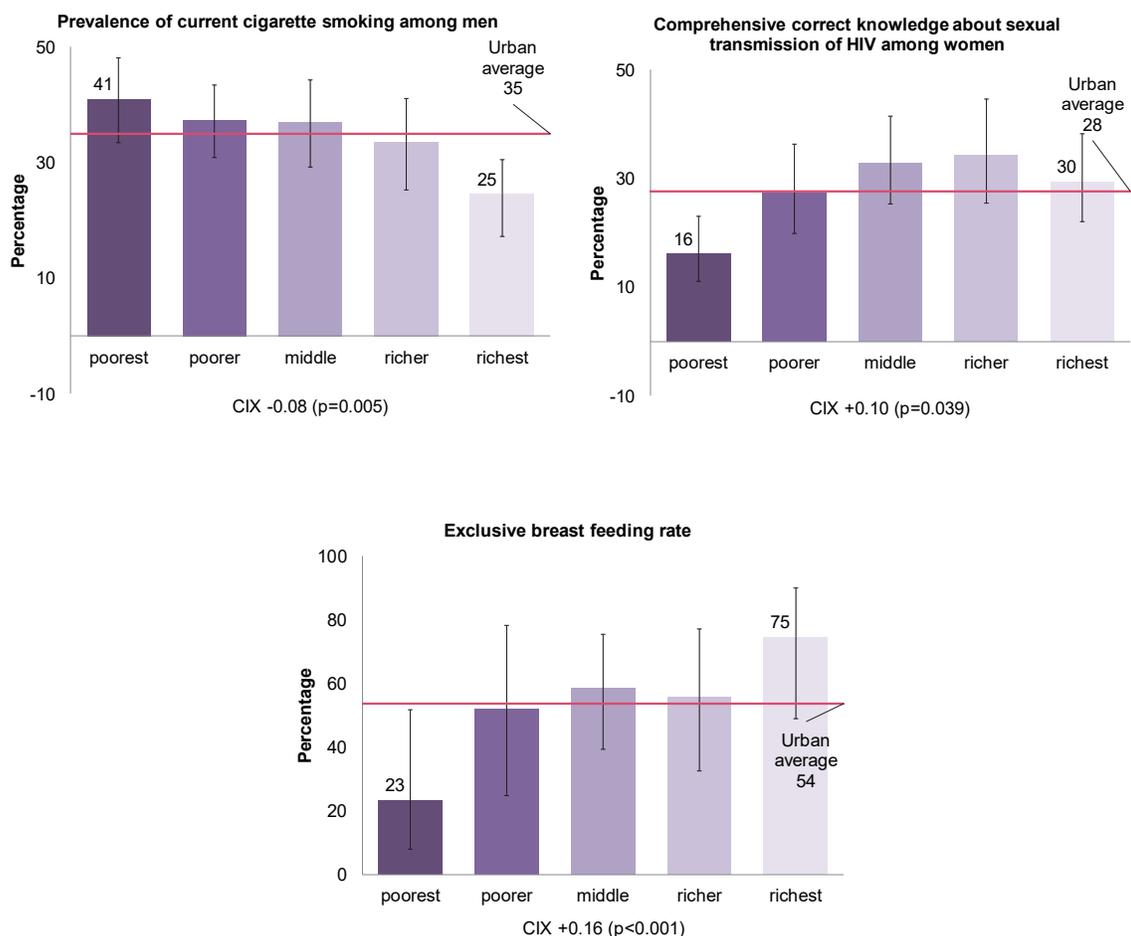
The percentage of young women (age 15-24) with comprehensive, correct knowledge about the sexual transmission of HIV<sup>7</sup> is concentrated among the rich, with a difference between the poorest and richest quintiles of 13 percentage points suggesting a marginalization pattern. The ratio is 1.8 and the CIX is +0.10 (p=0.039). Although marginal, the p-value indicates that inequalities exist.

Exclusive breastfeeding among children age 0-5 months<sup>8</sup> is concentrated among the rich with a marginalization pattern. The richest to poorest ratio is 3.2. The absolute difference is 51 percentage points, with inequality suggested by the CIX +0.16 (p<0.001). Details of all three indicators can be found in Appendix Table A7.

<sup>7</sup> Comprehensive, correct knowledge about the sexual transmission of HIV is a composite measure and indicates that a person knows that both condom use and limiting sexual intercourse to one uninfected partner can prevent HIV, knows that a healthy-looking person can have HIV, and rejects the two most common local misconceptions about the transmission of HIV.

<sup>8</sup> Exclusive breastfeeding is defined as a child in the first 6 months of life given nothing but breast milk. Complementing breast milk before age 6 months is unnecessary and is discouraged because the likelihood of contamination and the resulting risk of diarrheal disease are high.

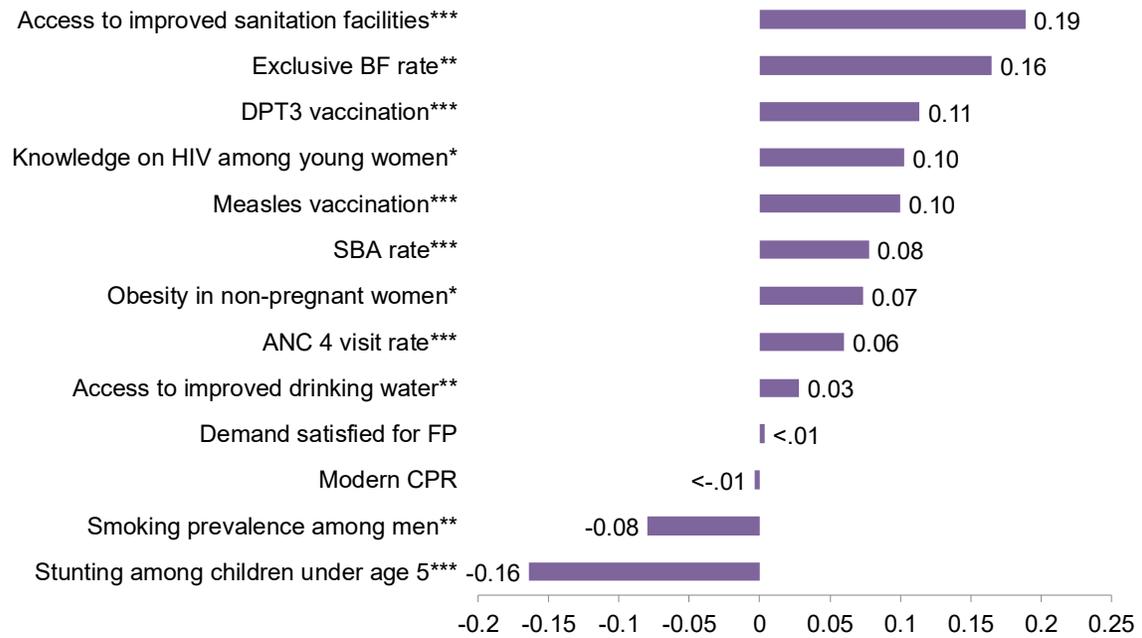
**Figure 7 Wealth-based intra-urban inequality of behavioral risk factors**



### 3.5 Comparison of CIX Values for Coverage of Interventions and Risk/behavior Indicators

To summarize the magnitude of the relative inequality of health indicators across the urban wealth groups, Figure 8 compares the CIXs of the 13 health interventions and risk/behavior indicators. All indicators are below the reasonably high relative inequality cutoff point (CIX  $\pm 0.2$ ). The CIX values of all indicators are significantly different from zero except for two reproductive health indicators (mCPR and demand satisfied for family planning by modern methods). However, among the positive values of the CIX, which indicate the indicator is concentrated among the rich, larger inequality gaps are found in access to improved sanitation facilities and the exclusive breastfeeding rate, while among the negative values of CIX (meaning the indicator is concentrated among the poor), a larger inequality gap is found in the prevalence of stunting among children under age 5.

**Figure 8 Concentration indices for coverage of interventions and risk/behavior indicators**



\*\*\*p<0.001; \*\*p<0.01; \*p<0.05

## 4 DISCUSSION

---

The 2015-16 MDHS final report provides comprehensive national and state/regional-level indicators as well as urban/rural disaggregated demographic and health indicators. This further analysis focuses on identifying the disparity in key health indicators based on economic dimensions in urban population groups. The wealth index variable, which is a proxy variable for the household economic situation, divides the urban population into five wealth quintiles. The poorest quintile household members represent the urban poor. This study determined *the magnitude and pattern of inequalities* in the three categories of indicators (health impact, coverage of interventions, and risk factor/behavior indicators) across wealth quintiles, and explored whether the poorest quintile experiences adverse health situations.

With inequality in health impact, all three indicators (IMR, U5MR, and the adolescent birth rate) indicate that there are large inequality gaps, and that the urban poor are marginalized and unable to enjoy health benefits usually associated with urban residence. These findings call for immediate attention to identifying and improving the root causes of inequality. Urbanization itself should not be regarded as a solution to the health problems, but should be complemented by informed, reactive, pro-poor health policy and planning (Eckert and Kohler 2014).

Similarly, analysis of the coverage of interventions indicators also shows that there are inequality patterns of marginalization. The urban poor cannot enjoy good health if they cannot equally access health services and urban benefits. For the urban poor in Myanmar, inequality in access to health services could be considered to be inequity in health because inequity is “a difference in health that is systematic, socially produced [and] therefore, modifiable, and unfair” (WHO Center for Health Development 2010).

Preventive health care services for children (namely DPT3 and measles vaccination coverage) across wealth quintiles show a marginalization pattern. Despite achieving some successes with the Myanmar Expanded Program on Immunization (EPI), marginalization still persists for the urban poor. The 2005 World Health Report described how the size of the poor-rich gap becomes smaller as a country moves closer to UHC goals (WHO 2005). Therefore, while the Myanmar health system is pursuing UHC, it is essential to consider pro-poor strategies such as proactively targeting the poorest urban residents to improve service delivery. Furthermore, monitoring of wealth-related inequality is essential to ensure that there is accountability in planning the vaccination program for universal access to health services (Hosseinpour, Bergen, Schlottheuber, Gacic-Dobo, et al. 2016).

Maternal health care services (SBA at delivery and four or more ANC visits) have relatively smaller inequality gaps (CIX less than +0.1). With SBA at delivery, the finding is consistent with previous analyses conducted by WHO on seven selected countries' DHS (2003-05) urban data (WHO and UN-Habitat 2010). Based on our study findings, maternal health care services are accessible for urban mothers of most wealth levels.

It is encouraging that reproductive health services are equally accessible to all urban, currently married women, regardless of wealth quintile. There are small differences in contraceptive prevalence as well as demand for family planning satisfied by modern methods among currently

married women across wealth quintiles. Therefore, long-established Myanmar reproductive services for married women are considered a pro-poor service. However, it is still necessary to offer adolescent-friendly services in urban areas because there is a very high adolescent birth rate among urban poor adolescents. According to a 2016 UNFPA report, one in five deaths among adolescent girls in Myanmar is due to complications from pregnancy (UNFPA 2016).

The majority of determinants of health indicators (risk/behavior indicators) show inequality gaps. This calls for community participation, intersectoral action, and advocacy for “Health in All Policies” because health inequality in urban areas is also determined by many other factors in the political/economic, physical, and social environments (WHO 2016). Physiological risk factor indicators are analyzed for children under age 5 and non-pregnant women. This study finds a higher child chronic malnutrition rate among poorer quintiles, a finding that is consistent with a WHO study in urban areas of seven countries (WHO and UN-Habitat 2010), and with another study conducted in urban areas of the Kanchanaburi province in Thailand in which undernutrition was strongly associated with household poverty (Firestone et al. 2011). A higher obesity rate among richer urban non-pregnant women is consistent with findings from a study using Bangladesh DHS data (2011) (Biswas et al. 2016).

One of the behavior risk factor indicators, current cigarette smoking prevalence among urban men, is high in all wealth quintiles except the richest quintile, which displays a mass deprivation pattern. Almost all urban men are exposed to various forms of cigarette advertising, although a law to control smoking and consumption of tobacco products has been promulgated in Myanmar since 2006. Therefore, a comprehensive ban on tobacco advertising may be necessary for effective control of tobacco use because the tobacco industry continues to find new ways of promoting cigarettes through new communication channels not covered by the national legislative requirement (WHO 2015c).

There are large inequalities in comprehensive, correct knowledge about sexual transmission of HIV among young women across wealth quintiles. Young, urban women from the poorest quintile are about two times less likely to have knowledge about HIV transmission. This is consistent with findings from a further analysis of the Nigeria DHS (2013), which includes both urban and rural young women (Faust, Yaya, and Ekholuenetale 2017). Urban, poor, young women have a low level of knowledge of HIV sexual transmission, and may underestimate their risk and become vulnerable to HIV infection. Therefore, there is an urgent need for the National AIDS Program to target urban poor young women with preventive health services.

Similarly, the poorest quintile has a three times lower exclusive breastfeeding (EBF) rate than the richest quintile. This indicates that both the pro-poor approach in delivery of maternal health care services and social support services are necessary to improve the EBF rate. To be able to exclusively breastfeed her child, a working mother needs social support services such as 6 months of maternity leave, breastfeeding support facilities, and daycare services for children age 0-5 months at work. Improving the health of the poor requires pro-poor policies in health, intersectoral action, and “Health in All Policies,” which is a collaborative approach to improving the health of all people that incorporates health considerations into decision-making across all sectors and policy areas (WHO 2014).

Among environmental risk factors, there are smaller inequalities in access to improved drinking water, although this finding is not consistent with those of a WHO study conducted elsewhere. In the WHO analysis, a substantial disparity existed between the richest and poorest urban residents in terms of piped water access, which is the most improved drinking water source (WHO and UN-Habitat 2010). It can be concluded that the Myanmar urban poor can enjoy a certain degree of safe water facilities provided by the government, donor organizations, and civil society organizations in urban areas. However, there are challenges in access to sanitation facilities because in Myanmar, construction of household sanitation facilities is a responsibility of individual households, and most of the urban poor cannot afford to build a proper latrine or proper housing. It is necessary to make sure that the health needs of urban poor are considered and targeted in urban development policy. Furthermore, the Commission on Social Determinants of Health suggested that although health care systems are vital determinants of health, health systems in developing countries are chronically under-resourced and pervasively inequitable (WHO 2016). Therefore, reducing these inevitable inequalities in health, intersectoral action, and community participation should be advocated and implemented.

It is important to emphasize that the impact indicators of 2015-16 MDHS reflect experiences in the 3 or 5 years before the survey (Hosseinpoor, Bergen, Schlottheuber, Victora, et al. 2016). The situation in 2019 may have changed. Therefore, inequalities should be assessed not only to describe the current situation, but also to monitor the changes over time to assess how well the Myanmar health system is addressing these urban health inequalities. Thus, further analysis should be conducted with data from a future MDHS so that time trends on inequality can be monitored.

There are some strengths in this further analysis study. First, the analysis used nationally representative DHS data, which represent urban populations from all states and regions of Myanmar. Second, this analysis used the indicators selected by WHO that are likely to reflect differences between groups that could be corrected by changes to policies, programs, and practices. Third, this analysis used three categories of indicators (health impact, coverage of interventions, and risk/behavior indicators) in order to describe inequality comprehensively in terms of health as well as determinates of health. Finally, for the interpretation of inequality, this study used not only the magnitude of inequality but also the pattern of inequality, which is important for identifying strategies to address inequality among the urban subpopulations.

There are some limitations in this study. The first is sample size. The Myanmar urban population is only one-third of the entire population, and this was further disaggregated by five wealth quintiles. This decreased the sample size for the point estimate of some indicators, and some indicators could not be analyzed (for example, women's smoking rate). Moreover, only analysis of national-level urban health inequality could be conducted. The regional-level inequality analysis could not be conducted because of the small sample size, although this information would be useful for regional planning.

Although inequalities in health have many dimensions such as gender, education, and region, this analysis focused only on wealth-based inequalities. Therefore, future studies should include other inequality dimensions in order to fully describe the urban health inequalities. Because the MDHS is the first DHS ever implemented in Myanmar, time trends of inequality in health indicators could

not be calculated. Another important limitation is that the cross-sectional nature of DHS makes it difficult to identify the underlying reasons for the observed pattern of inequalities.

## **4.1 Conclusions**

Although the Myanmar health system is providing a reasonable level of services to the urban population, it has failed to reach the poorest group. The three health impact indicators show inequality gaps with a marginalization pattern in which most population quintiles enjoy better health than the poorest quintile. Most indicators for coverage of interventions and risk/behavior factors also show inequality gaps with some degree of marginalization except reproductive health service indicators. The urban poor face barriers to the use of health services and there are inequalities in the determinants of health. The barriers should be addressed by adopting pro-poor strategies and proactively targeting the urban poor in service delivery in order to reach the UHC goals. Addressing inequality in the determinants of health also requires intersectoral action and advocacy to achieve health in all policies. Therefore, development of an inequality monitoring system is required to ensure that the Myanmar health system is accountable in addressing the wealth-based health inequalities among urban economic population groups.

## REFERENCES

---

- Agarwal, S. 2011. "The State of Urban Health in India; Comparing the Poorest Quartile to the Rest of the Urban Population in Selected States and Cities." *Environment and Urbanization* 23 (1): 13-28. <https://doi.org/10.1177/0956247811398589>.
- Ali, A. 2014. "Health Care for the Urban Poor in Myanmar HERA and 3MDG /Final Report. Assessment to Identify the Scope of Problem and Intervention Options-Consultancy Mission Report." [https://www.3mdg.org/sites/3mdg.org/files/publication\\_docs/health\\_care\\_for\\_the\\_urban\\_poor\\_in\\_myanmar\\_5\\_may\\_2014\\_3.pdf](https://www.3mdg.org/sites/3mdg.org/files/publication_docs/health_care_for_the_urban_poor_in_myanmar_5_may_2014_3.pdf).
- Ameyaw, E. K., R. E. Kofinti, and F. Appiah. 2017. "National Health Insurance Subscription and Maternal Healthcare Utilisation across Mothers' Wealth Status in Ghana." *Health Economics Review* 7(1):16. <https://doi.org/10.1186/s13561-017-0152-8>.
- Anyamele, O. D. 2011. "The Role of Wealth in Infant Mortality in Sub-Saharan Africa within Urban and between Urban and Rural Areas." *International Journal of Economics Research* 2 (1): 73–81. <https://www.ijeronline.com/documents/volumes/vol2issue1/ijer2011020108.pdf>.
- Arokiasamy, P., K. Jain, S. Goli, and J. Pradhan. 2013. "Health Inequalities among Urban Children in India: A Comparative Assessment of Empowered Action Group (EAG) and South Indian States." *Journal of Biosocial Science* 45 (2): 167-185. <https://doi.org/10.1017/S0021932012000211>.
- Arsenault, C., S. Harper, A. Nandi, J. M. Mendoza Rodríguez, P. M. Hansen, and M. Johri. 2017. "Monitoring Equity in Vaccination Coverage: A Systematic Analysis of Demographic and Health Surveys from 45 GAVI-Supported Countries." *Vaccine* 35 (6): 951–59. <https://doi.org/10.1016/J.VACCINE.2016.12.041>.
- Assaf, S., and T. Pullum. 2016. *Levels and Trends in Maternal and Child Health Disparities by Wealth and Region in Eleven Countries with DHS Surveys*. DHS Comparative Report No. 42. Rockville, Maryland, USA: ICF International. <https://www.dhsprogram.com/pubs/pdf/CR42/CR42.pdf>.
- Assaf, S., S. Staveteig, and F. Birungi. 2018. *Republic of Rwanda Trends in Maternal Health in Rwanda: Further Analysis of the 2014-15 Demographic and Health Survey*. DHS Further Analysis Reports No. 108. <https://dhsprogram.com/pubs/pdf/FA108/FA108.pdf>.
- Binnendijk, E., R. Koren, and D. M. Dror. 2012. "Can the Rural Poor in India Afford to Treat Non-Communicable Diseases." *Tropical Medicine & International Health* 17 (11): 1376–85. <https://doi.org/10.1111/j.1365-3156.2012.03070.x>.

- Biswas, T., M. S. Islam, N. Linton, and L. B. Rawal. 2016. "Socio-Economic Inequality of Chronic Non-Communicable Diseases in Bangladesh." *PLoS ONE* 11 (11): e0167140. <https://doi.org/10.1371/journal.pone.0167140>.
- Commission on Social Determinants of Health (CSDH). 2008. *Closing the Gap in a Generation: Health Equity through Action on the Social Determinants of Health*. [http://apps.who.int/iris/bitstream/handle/10665/43943/9789241563703\\_eng.pdf;jsessionid=19405442FBFE513F3B1CCE7AA8D3D545?sequence=1](http://apps.who.int/iris/bitstream/handle/10665/43943/9789241563703_eng.pdf;jsessionid=19405442FBFE513F3B1CCE7AA8D3D545?sequence=1).
- Croft, T. N., A. M. J. Marshall, and C. K. Allen. 2018. *Guide to DHS Statistics*. Rockville, Maryland, USA: ICF. [https://dhsprogram.com/pubs/pdf/DHSG1/Guide\\_to\\_DHS\\_Statistics\\_DHS-7.pdf](https://dhsprogram.com/pubs/pdf/DHSG1/Guide_to_DHS_Statistics_DHS-7.pdf).
- Eckert, S., and S. Kohler. 2014. "Urbanization and Health in Developing Countries: A Systematic Review." *World Health & Population* 15 (1): 7–20. <https://doi.org/10.12927/whp.2014.23722>.
- Eelsey, H., D. R. Thomson, R. Y. Lin, U. Maharjan, S. Agarwal, and J. Newell. 2015. "Addressing Inequities in Urban Health: Do Decision-Makers Have the Data They Need? Report from the Urban Health Data Special Session at International Conference on Urban Health Dhaka 2015." *Journal of Urban Health* 93 (3): 526–537. <https://doi.org/10.1007/s11524-016-0046-9>.
- Ezeh, A., O. Oyeboode, D. Satterthwaite, Y. F. Chen, R. Ndugwa, J. Sartori, B. Mberu, et al. 2017. "The History, Geography, and Sociology of Slums and the Health Problems of People Who Live in Slums." *The Lancet* 389 (10068):547-558. [https://doi.org/10.1016/S0140-6736\(16\)31650-6](https://doi.org/10.1016/S0140-6736(16)31650-6).
- Faust, L., S. Yaya, and M. Ekholuenetale. 2017. "Wealth Inequality as a Predictor of HIV Related Knowledge in Nigeria." *BMJ Global Health* 2:e000461. <https://doi.org/10.1136/bmjgh-2017-000461>.
- Firestone, R., S. Punpuing, K. E. Peterson, D. Acevedo-Garcia, and S. L. Gortmaker. 2011. "Child Overweight and Undernutrition in Thailand: Is There an Urban Effect?" *Social Science & Medicine* 72 (9): 1420–28. <https://doi.org/10.1016/j.socscimed.2011.03.003>.
- Gwatkin, D. R., A. Bhuiya, and C. G. Victora. 2004. "Making Health Systems More Equitable." *The Lancet* 364 (9441): 1273–80. [https://doi.org/10.1016/S0140-6736\(04\)17145-6](https://doi.org/10.1016/S0140-6736(04)17145-6).
- Gwatkin, D. R., S. Rutstein, K. Johnson, E. Suliman, A. Wagstaff, and A. Amouzou. 2007. *Country Reports on HNP and Poverty: Socio-Economic Differences in Health, Nutrition, and Population Within Developing Countries*. Washington, DC, USA: The World Bank. <http://documents.worldbank.org/curated/en/962091468332070548/pdf/483610WP0Socio10Box338901B01PUBLIC1.pdf>.
- Gwatkin, D. R., and G. Deveshwar-Bahl. 2001. "Immunization Coverage Inequalities: An Overview of Socio-Economic and Gender Differentials in Developing Countries." <https://pdfs.semanticscholar.org/1f5f/50511944db6b7b02762e0275ccde9e8d51fa.pdf>.

- Gwatkin, D. R., A. Wagstaff, and A. S. Yazbeck. 2005. *Reaching the Poor with Health, Nutrition, and Population Services : What Works, What Doesn't, and Why*. Washington, DC, USA: The World Bank. <http://siteresources.worldbank.org/INTPAH/Resources/Reaching-the-Poor/complete.pdf>.
- Hosseinpoor, A. R., N. Bergen, A. J. D. Barros, K. L. M. Wong, T. Boerma, and C. G. Victora. 2016. "Monitoring Subnational Regional Inequalities in Health: Measurement Approaches and Challenges." *International Journal for Equity in Health* 15 (1): 18. <https://doi.org/10.1186/s12939-016-0307-y>.
- Hosseinpoor, A. R., N. Bergen, A. Schlotheuber, M. Gacic-Dobo, P. M. Hansen, K. Senouci, T. Boerma, and A. J. D. Barros. 2016. "State of Inequality in Diphtheria-Tetanus-Pertussis Immunisation Coverage in Low-Income and Middle-Income Countries: A Multicountry Study of Household Health Surveys." *The Lancet Global Health* 4 (9): e617-26. [https://doi.org/10.1016/S2214-109X\(16\)30141-3](https://doi.org/10.1016/S2214-109X(16)30141-3).
- Hosseinpoor, A. R., N. Bergen, A. Schlotheuber, C. G. Victora, T. Boerma, and A. J. D. Barros. 2016. "Data Resource Profile: WHO Health Equity Monitor (HEM)." *International Journal of Epidemiology* 45 (5): 1404–1405e/. <https://doi.org/10.1093/ije/dyw176>.
- Hosseinpoor, A. R., C. G. Victora, N. Bergen, A. J. D. Barros, and T. Boerma. 2011. "Towards Universal Health Coverage: The Role of within-Country Wealth-Related Inequality in 28 Countries in Sub-Saharan Africa." *Bulletin of the World Health Organization* 89: 881–90. <https://doi.org/10.2471/BLT.11.087536>.
- Kia, A. A., A. Rezapour, A. Khosravi, and V. A. Abarghouei. 2017. "Socioeconomic Inequality in Malnutrition in Under-5 Children in Iran: Evidence From the Multiple Indicator Demographic and Health Survey, 2010." *Journal of Preventive Medicine & Public Health* 50 (3): 201. <https://doi.org/10.3961/jpmp.17.028>.
- Kumar, A., and S. K. Mohanty. 2010. "Intra-Urban Differentials in Utilization of Reproductive and Child Health Care Services in India, 1992-05." Paper presented at the annual meeting of the Population Association of America (PAA), Dallas, TX, USA, April 15-17, 2010. <https://paa2010.princeton.edu/abstracts/100817>
- McDade, T. W., and L. S. Adair. 2001. "Defining the Urban; in Urbanization and Health: A Factor Analysis Approach." *Social Science & Medicine* 53 (1): 55–70. <http://www.ncbi.nlm.nih.gov/pubmed/11380161>.
- Ministry of Health and Sports (MOHS) and ICF. 2017. *Myanmar Demographic and Health Survey 2015-16*. Nay Pyi Taw, Myanmar: MoHS and ICF. <https://dhsprogram.com/pubs/pdf/FR324/FR324.pdf>.
- Ministry of Health and Sports (MOHS). 2017. *Myanmar National Health Plan (2017-2021)*. [http://themimu.info/sites/themimu.info/files/assessment\\_file\\_attachments/NHP\\_2017-2021\\_ENG\\_0.pdf](http://themimu.info/sites/themimu.info/files/assessment_file_attachments/NHP_2017-2021_ENG_0.pdf).

Niakara, A., F. Fournet, J. Gary, M. Harang, L. V. A. Nébié, and G. Salem. 2007. "Hypertension, Urbanization, Social and Spatial Disparities: A Cross-Sectional Population-Based Survey in a West African Urban Environment (Ouagadougou, Burkina Faso)." *Transactions of the Royal Society of Tropical Medicine and Hygiene* 101 (11): 1136–42.  
<https://doi.org/10.1016/j.trstmh.2007.07.002>.

O'Donnell, O., E. Van Doorslaer, A. Wagstaff, and M. Lindelow. 2007. *Analyzing Health Equity Using Household Survey Data: A Guide to Techniques and Their Implementation Analyzing Health Equity Using Household Survey Data WBI Learning Resources Series*. Washington, DC, USA: World Bank Group. <http://hdl.handle.net/10986/6896>.

Patil, R. R. 2014. "Urbanization as a Determinant of Health: A Socioepidemiological Perspective." *Social Work in Public Health* 29 (4): 335-41.  
<https://doi.org/10.1080/19371918.2013.821360>.

Rutstein, S. O. and G. Rojas. 2006. *Demographic and Health Surveys Methodology*. Calverton, Maryland, USA: ORC Macro.  
[https://www.dhsprogram.com/pubs/pdf/DHSG1/Guide\\_to\\_DHS\\_Statistics\\_29Oct2012\\_DHSG1.pdf](https://www.dhsprogram.com/pubs/pdf/DHSG1/Guide_to_DHS_Statistics_29Oct2012_DHSG1.pdf).

UN Department of Economic and Social Affairs/Population Division. 2017. *World Urbanization Prospects 2014-Report*. New York: United Nations.  
<https://www.scribd.com/document/304437836/World-Urbanization-Prospects-UN-2014-Full-Report>.

UNFPA. 2016. UNFPA in Myanmar, Annual Report 2016.  
<https://myanmar.unfpa.org/en/publications/unfpa-myanmar-annual-report-2016>.

United Nations, Department of Economic and Social Affairs, Population Division. 2017. "World Population Prospects: The 2017 Revision Key Findings and Advance Tables," p. 1–46.  
[https://population.un.org/wpp/Publications/Files/WPP2017\\_KeyFindings.pdf](https://population.un.org/wpp/Publications/Files/WPP2017_KeyFindings.pdf).

Van Malderen, C., I. Ogali, A. Khasakhala, S. N. Muchiri, C. Sparks, H. Van Oyen, and N. Speybroeck. 2013. "Decomposing Kenyan Socio-Economic Inequalities in Skilled Birth Attendance and Measles Immunization." *International Journal for Equity in Health* 12 (1): 3.  
<https://doi.org/10.1186/1475-9276-12-3>.

Wagstaff, A., and E. van Doorslaer. 2004. "Overall Versus-Socioeconomic Health Inequality: A Measurement Framework and Two Empirical Illustrations." *Health Economics* 13(3): 297-301.  
<https://doi.org/10.1002/hec.822>.

Wang, W. 2013. *Assessing Trends in Inequalities in Maternal and Child Health and Health Care in Cambodia: Further Analysis of the Cambodia Demographic and Health Surveys*. DHS Further Analysis Reports No. 86. Calverton, Maryland, USA: ICF International.  
<https://dhsprogram.com/pubs/pdf/FA86/FA86.pdf>.

World Bank. 2017. *An Analysis of Poverty in Myanmar (English)*. Washington, DC, USA: World Bank Group. <http://documents.worldbank.org/curated/en/829581512375610375/An-analysis-of-poverty-in-Myanmar>.

World Health Organization. 2005. *The World Health Report 2005. Make Every Mother and Child Count*. Geneva: World Health Organization. [http://www.who.int/whr/2005/whr2005\\_en.pdf](http://www.who.int/whr/2005/whr2005_en.pdf).

———. 2013. “Handbook on Health Inequality Monitoring: With a Special Focus on Low- and Middle-Income Countries.” Geneva: World Health Organization. [https://apps.who.int/iris/bitstream/handle/10665/85345/9789241548632\\_eng.pdf?sequence=1](https://apps.who.int/iris/bitstream/handle/10665/85345/9789241548632_eng.pdf?sequence=1).

———. 2014. *Helsinki Statement Framework for Country Action*. Geneva: World Health Organization. <http://www.searo.who.int/entity/healthpromotion/helsinki-statement-framework-for-country-action.pdf?ua=1>.

———. 2015a. “Monitoring Health Inequality: An Essential Step for Achieving Health Equity.” Geneva: World Health Organization. <http://www.who.int/iris/handle/10665/164530>.

———. 2015b. *State of Inequality: Reproductive, Maternal, Newborn and Child Health*. Geneva: World Health Organization. [https://apps.who.int/iris/bitstream/handle/10665/164590/9789241564908\\_eng.pdf?sequence=1](https://apps.who.int/iris/bitstream/handle/10665/164590/9789241564908_eng.pdf?sequence=1).

———. 2016. “Urban Health Equity.” Geneva: World Health Organization. <http://www.who.int/sustainable-development/cities/health-equity/en/>.

———. 2017a. “10 Facts on Health Inequities and Their Causes.” Geneva: World Health Organization. [http://www.who.int/features/factfiles/health\\_inequities/en/](http://www.who.int/features/factfiles/health_inequities/en/).

———. 2017b. *World Health Statistics 2017 : Monitoring Health for SDGs*. Geneva: World Health Organization. [https://www.who.int/gho/publications/world\\_health\\_statistics/2017/en/](https://www.who.int/gho/publications/world_health_statistics/2017/en/).

WHO and UN-Habitat. 2010. *Hidden Cities: Unmasking and Overcoming Health Inequities in Urban Settings*. Geneva: World Health Organization. [https://apps.who.int/iris/bitstream/handle/10665/44439/9789241548038\\_eng.pdf?sequence=1](https://apps.who.int/iris/bitstream/handle/10665/44439/9789241548038_eng.pdf?sequence=1).

———. 2016. *Global Report on Urban Health: Equitable, Healthier Cities for Sustainable Development*. Geneva: World Health Organization. <http://www.who.int/iris/handle/10665/204715>.

WHO Center for Health Development. 2010. *Urban HEART: Urban Health Equity Assessment and Response Tool*. Geneva: World Health Organization. <https://apps.who.int/iris/handle/10665/79060>.

WHO and International Health Partnership. 2011. *Monitoring, Evaluation and Review of National Health Strategies: A Country-Led Platform for Information and Accountability*. Geneva: World Health Organization.

[https://www.who.int/healthinfo/country\\_monitoring\\_evaluation/1085\\_IER\\_131011\\_web.pdf?ua=1](https://www.who.int/healthinfo/country_monitoring_evaluation/1085_IER_131011_web.pdf?ua=1).

WHO and the Tobacco Free Initiative. 2015c. WHO | Comprehensive Bans on Tobacco Advertising, Promotion and Sponsorship - TAPS. Geneva: World Health Organization.

<http://www.who.int/tobacco/worldconference2015/workshoptaps/en/>.

## APPENDIX

**Appendix Table A1 Wealth-based inequality of health impact indicators**

	Under 5 mortality rate (per 1,000 live births)	Infant mortality rate (per 1,000 live births)	Adolescent birth rate (per 1,000 women age 15-19)
<b>Wealth quintile</b>			
Poorest	79.5	67.6	62.3
Poorer	35.3	34.2	38.3
Middle	26.8	26.8	25.7
Richer	14.8	8.1	38.3
Richest	23.1	23.1	11.0
Total	42.0	37.0	36.0
<b>Ratio*</b>	3.4	2.9	5.7
<b>Absolute difference</b>	56.4	44.5	51.3

\*Reference group is the richest quintile.

**Appendix Table A2 Wealth-based inequality of preventive health care service for children indicators**

	DPT3 vaccination		Measles vaccination	
	%	CI	%	CI
<b>Wealth quintile</b>				
Poorest	45.3	[29.2-62.4]	53.3	[34.5-71.3]
Poorer	82.3	[66.1-91.7]	82.7	[65.3-92.4]
Middle	82.0	[63.3-92.4]	95.8	[81.3-99.1]
Richer	86.0	[64.6-95.3]	93.9	[66.7-99.2]
Richest	91.9	[70.6-98.2]	92.8	[75.8-98.2]
Total	75.2	[67.9-81.4]	81.7	[73.7-87.7]
<b>No. of respondents</b>	220		220	
<b>Ratio*</b>	2.0		1.7	
<b>Absolute difference</b>	46.6		39.5	

\*Reference group is the poorest quintile.

**Appendix Table A3 Wealth-based inequality of maternal health care service indicators**

	Coverage of SBA		ANC 4 visits	
	%	CI	%	CI
<b>Wealth quintile</b>				
Poorest	68.4	[56.2-78.6]	69.6	[61.1-76.9]
Poorer	87.6	[78.0-93.4]	84.5	[76.7-90.1]
Middle	98.2	[94.6-99.4]	88.6	[81.5-93.2]
Richer	98.4	[92.9-99.7]	91.1	[77.9-96.7]
Richest	100	[100-100]	95.6	[90.3-98.0]
Total	87.8	[82.1-91.9]	84.2	[80.3-87.5]
<b>No. of respondents</b>	953		837	
<b>Ratio*</b>	1.5		1.4	
<b>Absolute difference</b>	31.6		26	

\*Reference group is the poorest quintile.

**Appendix Table A4 Wealth-based inequality of reproductive health care service indicators**

	CPR modern methods		Demand for FP satisfied by modern methods	
	%	CI	%	CI
<b>Wealth quintile</b>				
Poorest	55.7	[49.4-61.8]	78.2	[72.0-83.3]
Poorer	58.8	[52.1-65.1]	78.6	[69.2-85.5]
Middle	62.7	[56.6-68.4]	82.2	[75.9-87.2]
Richer	52.0	[46.0-57.9]	76.7	[70.3-82.1]
Richest	57.5	[50.9-63.9]	80.8	[73.7-86.3]
Total	57.3	[54.5-60.1]	79.3	[76.2-82.1]
<b>No. of respondents</b>	2,022		1,477	
<b>Ratio*</b>	1.0		1.0	
<b>Absolute difference</b>	1.8		2.6	

\*Reference group is the poorest quintile.

**Appendix Table A5 Wealth-based inequality of physiological risk indicators**

	Stunting		Obesity in non-pregnant women	
	%	CI	%	CI
<b>Wealth quintile</b>				
Poorest	26.6	[20.8-33.3]	6.5	[4.2-9.9]
Poorer	25.2	[19.0-32.7]	8.0	[5.7-11.1]
Middle	17.5	[11.7-25.3]	10.6	[7.7-14.4]
Richer	9.4	[5.0-17.1]	11.2	[8.5-14.5]
Richest	14.7	[8.7-23.7]	9.2	[6.9-12.3]
Total	20.0	[17.1-23.3]	9.1	[7.8-10.6]
<b>No. of respondents</b>	876		3,519	
<b>Ratio*</b>	0.6		1.4	
<b>Absolute difference</b>	-11.9		2.7	

\*Reference group is the poorest quintile.

**Appendix Table A6 Wealth-based inequality of environmental risk indicators**

	Improved drinking water		Improved sanitation facilities	
	%	CI	%	CI
<b>Wealth quintile</b>				
Poorest	79.9	[69.5-87.5]	33.1	[27.2-39.5]
Poorer	89.3	[83.9-93.0]	50.2	[43.7-56.6]
Middle	91.1	[86.3-94.3]	65.2	[60.1-70.0]
Richer	92.5	[88.4-95.2]	83.2	[77.5-87.6]
Richest	93.7	[89.8-96.1]	92.1	[88.8-94.5]
Total	89.2	[85.0-92.4]	64.5	[59.9-68.8]
<b>No. of respondents</b>	3,315		3,315	
<b>Ratio*</b>	1.2		2.8	
<b>Absolute difference</b>	13.8		59.0	

\*Reference group is the poorest quintile.

**Appendix Table A7 Wealth-based inequality of behavior risk indicators**

	Prevalence of smoking among men		Knowledge about HIV transmission among young women		Exclusive breastfeeding	
	%	CI	%	CI	%	CI
<b>Wealth quintile</b>						
Poorest	41.0	[33.9-48.6]	16.2	[11.1-23.0]	23.3	[8.0-51.6]
Poorer	37.4	[31.3-43.8]	27.4	[19.9-36.3]	52.0	[24.8-78.1]
Middle	37.1	[29.9-44.9]	32.9	[25.3-41.5]	58.3	[39.2-75.3]
Richer	33.7	[26.3-42.1]	34.3	[25.4-44.5]	55.9	[32.4-77.0]
Richest	24.5	[18.5-31.8]	29.5	[22.0-38.2]	74.6	[49.0-90.0]
Total	35.0	[31.3-39.0]	27.6	[24.4-31.0]	53.7	[43.0-64.0]
<b>No. of respondents</b>	1,350		1,120		95	
<b>Ratio*</b>	0.6		1.8		3.2	
<b>Absolute difference</b>	-16.5		13.3		51.3	

\*Reference group is the poorest quintile.