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

# Linking Poverty and the Environment: Evidence from Slums in Philippine Cities

*Marife M. Ballesteros*

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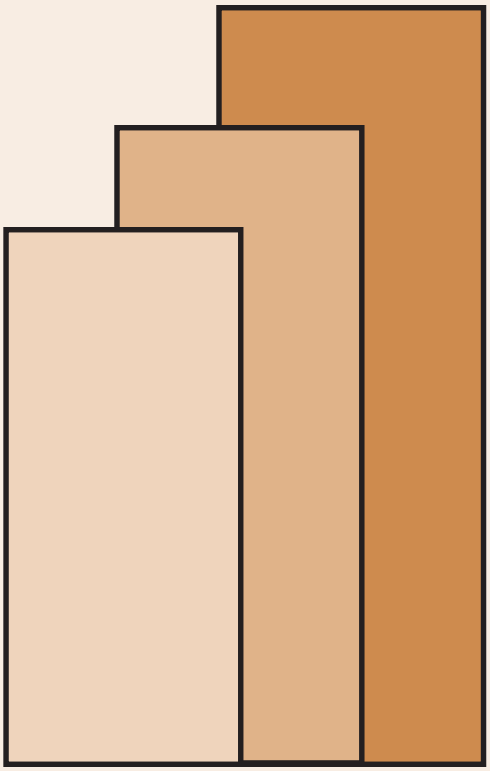

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For comments, suggestions or further inquiries please contact:
**The Research Information Staff,** Philippine Institute for Development Studies
5th Floor, NEDA sa Makati Building, 106 Amorsolo Street, Legaspi Village, Makati City, Philippines
Tel Nos: (63-2) 8942584 and 8935705; Fax No: (63-2) 8939589; E-mail: publications@pids.gov.ph
Or visit our website at http://www.pids.gov.ph

# Linking Poverty and the Environment: Evidence from Slums in Philippine Cities

Marife M Ballesteros
Philippine Institute for Development Studies[1]

*Abstract*: This paper examines the linkages of poverty and environment at the household level in Philippine slums. Rapid urbanization and the inadequate infrastructure and basic services in large towns and cities have led to the proliferation of slums and informal settlements in the country. While poverty incidence of population in key metropolitan centers is on average 17% compared to the national average of 32%, slum population has been exponentially rising at an average rate of 3.4%. In Metro Manila, which is the prime city, an estimated 37% of population or over 4.0 million Filipinos live in slums in 2010 and slum population growth rate is at 8% annually. These slum dwellers and informal settlers confront on a daily basis another dimension of poverty which is environmental poverty. The underserviced and bad living conditions in slums impact on health, livelihood and the social fiber. The effects of urban environmental problems and threats of climate change are also most pronounced in slums due to their hazardous location, poor air pollution and solid waste management, weak disaster risk management and limited coping strategies of households. It has also been argued in several studies that possible trade-offs exist between bad housing and medical care and between bad housing and education. Bad living environment thus deepens poverty, increases the vulnerability of both the poor and non-poor living in slums and excludes the slum poor from growth.

*Key words: slums, poverty, environment, Philippines*

## I. Introduction

The Philippines is among the countries in Asia with large number of urban slum dwellers. In 2006, about 7% of urban population live in slums up from 2.8% in 1990. Slum population is increasing at an annual rate of over 3.5% compared to urban population growth rate of 2.3% for the period 2000-2006. In the country's premier city or Metro Manila, an estimated 37% of population or over 4.0 million people live in slums in 2010.[2] By 2050, slum population in Metro Manila alone will have reached over 9 million. About 32% of slum population are poor with incomes below the 2006 national poverty threshold of over P20,000 (US$400) annual per capita and 12% are in extreme poverty below the $1.25 international poverty line.[3]

Slums are characterized by poor sanitation, overcrowded and crude habitation, inadequate water supply, hazardous location and insecurity of tenure. The people living in slums are highly

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[1] Research Fellow, mballesteros@mail.pids.gov.ph. This paper was undertaken in collaboration with the Asian Development Bank and was presented as background paper for the Conference on the Environments of the Poor in the Context of Climate Change and the Green Economy, 24-26 November 2010, New Delhi.

[2] Metro Manila Road Map for Urban Renewal and Basic Services for the Poor. Report prepared by the Housing and Urban Development and Coordinating Council and Local Government Units. November 2008.

[3] US$1 = Php50

vulnerable to different forms of risks- both natural and man-made. Their living conditions depict poverty in terms of both inadequate incomes and environmental deprivation. Studies show that slum poverty puts major stress on people's lives through pollution, congestion, noise, stagnant water and flooding. Households living in these poor environs pay more for basic services (i.e., water and electricity), have poorer health status, have poorer school performance, have lower productivity and are vulnerable to crimes and violence. While the country has made substantial progress in water and sanitation targets of the MDGs, it has done poorly in improving the lives of people in slums and in providing quality of life for most of the urban poor.

The objective of this paper is to present the socioeconomic condition and environmental situation of slums in the Philippines especially in Metro Manila or the National Capital Region (NCR). It describes the nature and extent of slum poverty and explores the problems and peoples' responses to their environment and to threats of climate change. The paper argues that bad environment deepens poverty, excludes the poor from growth and makes them vulnerable to climate change.

## II. Economic Importance of the Urban Sector in the Philippines

The Philippines development path is characterized by a fast growing services sector and a lagging manufacturing and agriculture sector. About 82% of production and 66% of employment in 2009, are accounted for by urban activities mainly from the service sectors such as telecommunications, IT, BPO, and tourism.[4] Metro Manila which is the capital city with the largest service sector accounts for 37% of GDP and 12% of employment as of 2009. By 2035, the share of urban activities to total production and total employment will increase by 92% and 88%, respectively and the service sector will likely be the driver of urban growth in the longer term.[5]

Following this growth pattern, the urbanization process has been accompanied by significant migration to metropolitan areas where most urban activities are concentrated. The economic opportunities in towns and cities attract low and middle income people from the rural areas in search of new or better income opportunities. On the other hand, the loss of farmland and underperforming agriculture sector push people to cities and towns to escape poverty and find jobs. Between 1990 and 2000, urban population grew by 2.5% compared to one-half of one percent in rural areas. By 2000 about 48% of population or 36 million people already lived in urban areas (Table 1). In 2020, urban population will exceed rural population with 57 million people or 52% of population living in urban areas. In-migration is highest in Metro Manila which is also the center of economic, socio-cultural and political activities in the country. In 2000, 60% of population growth in Metro Manila is due to net migration.[6]

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[4] Source: NSCB, NSO

[5] Projections, macromodel. Josef Yap (2010). Concept Note on Long Term Vision for the Philippines. Philippine Institute for Development Studies (October 2010). Draft

[6] Cabegin (2010). Patterns of Urban growth in the Philippines. Draft, Unpublished Report.

**Table 1**. Population in Key Urban Cities, Philippines

| | Number of Cities | Actual Population | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1990 | | | 2000 | | |
| | | Population | % to Total Population | % to Urban Population | Population | % to Total Population | % to Urban Population |
| Urban Philippines | | 28,500,544 | 47 | 100 | 36,739,849 | 48 | 100 |
| Small Cities (30,000-100,000) | 51 | 4,605,103 | 8 | 16 | 3,595,745 | 5 | 10 |
| Large Towns (100,000-1,000,000) | 31 | 2,861,384 | 5 | 10 | 4,304,828 | 6 | 12 |
| Large Cities (100,000-1,000,000) | 71 | 13,086,516 | 22 | 46 | 15,063,274 | 20 | 41 |
| Mega Manila (10M and above) | 1 | 7,948,392 | 13 | 28 | 9,932,560 | 13 | 27 |

*Sources: National Statistics Office; National Statistical Coordination Board; United Nations, Department of Economic and Social Affairs*

| | Number of Cities | Projected Population | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 2010 | | | 2020 | | | 2050 | | |
| | | Population | % to Total Population | % to Urban Population | Population | % to Total Population | % to Urban Population | Population | % to Total Population | % to Urban Population |
| Urban Philippines | | 45,781,000 | 49 | 100 | 57,656,000 | 52 | 100 | 101,370,000 | 48 | 100 |
| Small Cities (30,000-100,000) | 51 | 4,496,212 | 5 | 10 | 5,755,610 | 5 | 10 | 7,065,111 | 3 | 7 |
| Large Towns (100,000-1,000,000) | 31 | 5,382,867 | 6 | 12 | 6,890,620 | 6 | 12 | 8,458,355 | 4 | 8 |
| Large Cities (100,000-1,000,000) | 71 | 18,835,505 | 20 | 41 | 24,111,370 | 22 | 42 | 29,597,121 | 14 | 29 |
| Mega Manila (10M and above) | 1 | 11,552,100 | 12 | 25 | 12,775,900 | 11 | 22 | 15,782,191 | 8 | 16 |

*Sources: National Statistics Office; National Statistical Coordination Board; United Nations, Department of Economic and Social Affairs*

*Note:*

*Populations were projected using the Annual Urban Growth Rate from United Nations, Department of Economic and Social Affairs, Population Division, and using Geometric Growth: Pt+n = Pt (1 + r)^n*

*Growth Rates used for Urban Philippines, Small Cities, Large Towns and Large Cities: 2.26 (2010), 2.38 (2020), 1.36 (2050); for Mega Manila: 1.63 (2010), 1.43 (2020), 1.18 (2050).*

Philippine urbanization has been characterized by distinct hierarchy of settlements**.** Rapid population growth has been occurring mainly in large towns and cities where the economy does not revolve around farming. The hierarchy of settlement is much evident with high concentration of population in few urban centers. Metro Manila is the nation's megacity consisting of 17 administrative cities with a combined population of 9.8 million or over 13% of total population in 2000. The 102 large towns and cities with population above 100,000 are located in the other top urbanizing regions.[7] Aside from Metro Manila, rapid urbanization from 2000 onwards has also

[7] There are about 1,631 towns and cities in the Philippines excluding cities in Metro Manila.

been taking place in four other regions, namely, Regions 3 and 4, 7 and 11 (Figure 1). Regions 3 and 4 are the regions around the peripheries of Metro Manila. There are five large metropolitan clusters with population of above 1 million in these regions namely, the Metro Angeles and the Malolos-Meycauyan corridor in Region 3 and the Bacoor-Dasmariñas corridor, the Calamba-San Pedro corridor, and the greater Antipolo area in Region 4.[8] Regions 7 and 11 are located in the Visayas and Mindanao Islands, respectively. Rapid urbanization in these regions is fueled by the fast economic growth of Metropolitan Cebu in Region 7 and Metro Davao in Region 11. The rapidly urbanizing regions combined account for 69% of GDP and generate 52% of employment in the country (Table 2). The combined population of Metro Manila and the large towns and cities amount to 29 million or 80% of total urban population in 2000. By 2010, it is estimated that 35 million people are living in these key urban centers. Projections for 2020 show that there will be 44 million people in these major metropolitan centers and by 2050 population will have reached 54 million. The most rapid urbanization will take place in the metropolitan clusters of Regions 3 and 4. The above spatial distribution is unlikely to be altered at least in the next 20 years. [9]

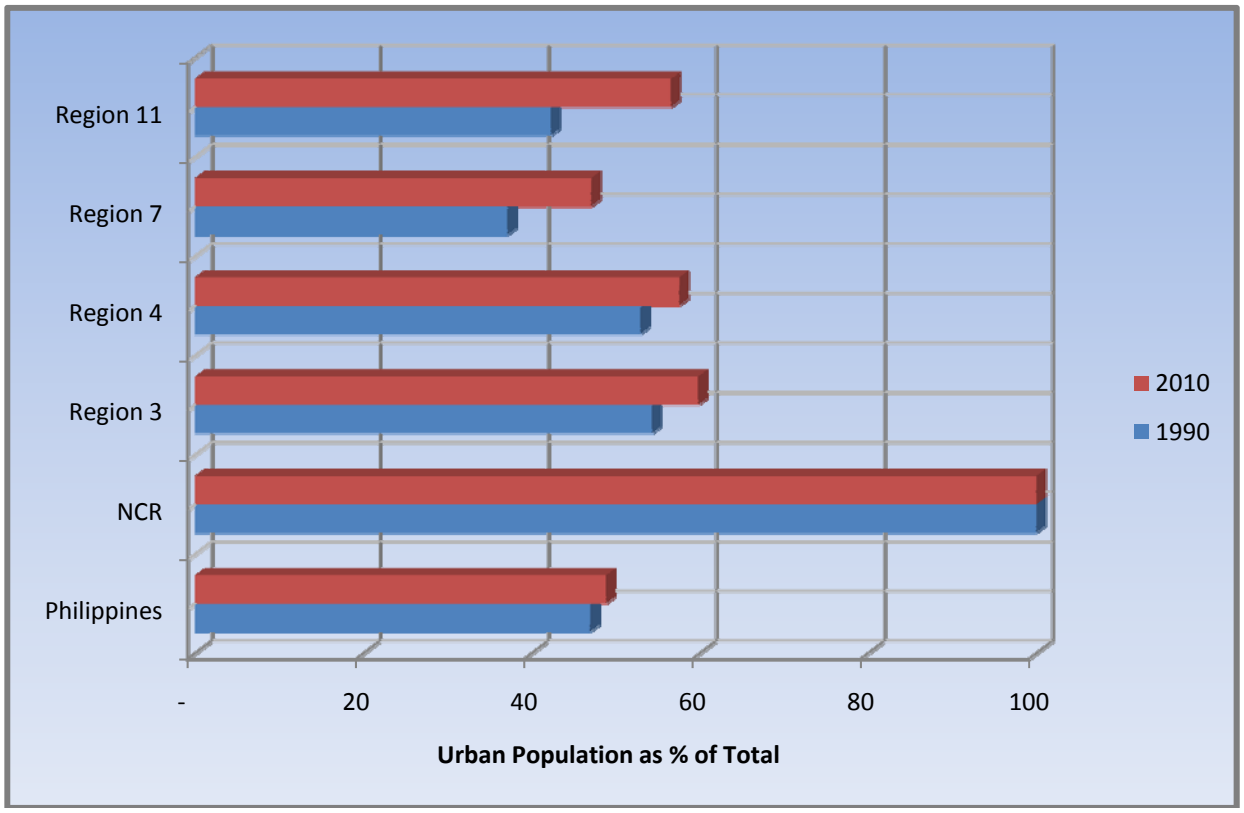


**Figure 1**. Urbanization in Regions with Large Metropolitan Centers

[8] Cariño and Corpuz (2009) Towards a Strategic Urban Development and Housing Policy for the Philippines. Discussion Paper Series 2009-21. Philippine Institute for Development Studies.

[9] National Statistics Office (2010).

**Table 2.** GDP and Employment in the Top Five Urban Regions

| Region | GDP [1] (PM at Current) | Percent to Total GDP | Total Labor Force ('000)[2] | Percent to Total Labor Force |
|---|---|---|---|---|
| | | | | |
| NCR | 2,747,388 | 37.0 | 4,719 | 12.7 |
| Region III | 571,867 | 7.7 | 3,891 | 10.5 |
| Region IV | 965,223 | 13.0 | 5,961 | 16.1 |
| Region VII | 507,886 | 6.8 | 2,833 | 7.6 |
| Region XI | 337,310 | 4.5 | 1,744 | 4.7 |
| *Subtotal* | 5,129,674 | 69 | 19,148 | 52 |
| Philippines | 7,423,213 | 100.0 | 37,116 | 100.0 |

Note:
[1] Source: National Statistical Coordination Board, 2008 Data
[2] Source: National Statistics Office, 2008 Data

## III. Urban and Slum Poverty in the Metropolitan Centers

Poverty incidence in urban areas is lower compared to rural areas but shelter deprivation in urban areas is acute**.** Urban poverty is still much lower than rural poverty but the number of urban poor population is rising due to rapid urbanization. As of 2006, there are about 8 million poor in urban areas and about half of this population is found in Metro Manila and other large cities and towns (Table 3). Moreover, poverty incidence only captures income poverty and does not reflect other forms of deprivation. Deprivation in metropolitan centers is income-based as well as lack of access to adequate housing. Most towns and cities in the country have been unprepared for the rapid rate and high level of urbanization that exerted tremendous pressure on towns/cities' infrastructure and basic services. This lack of access to infrastructure and basic services led to the growth of unregulated settlements or slums. Government has tolerated the growth of slums while the housing market has not been able to keep pace with urban housing demand. There is an estimated housing need of 3.7 million units and the shortfalls are concentrated in low-income housing where (i) the population is least able to respond to rising land prices and house construction costs and (ii) the private housing market has not been able to provide housing at affordable prices close to places of work.[10] Moreover, the financial sector has been very conservative with home financing as reflected in the very low depth of residential mortgage finance in the Philippines.[11]

[10] ADB (2000). An Overview of the Philippine Housing Sector; Llanto and Orbeta (2001) The State of Philippine Housing Programs: A Critical Look at How Housing Subsidies Work. Philippine Institute for Development Studies 2001.

[11] See comparative studies across countries. Warnock, V.C and Warnock, F.E (2008). Markets and Housing Finance. *Journal of Housing Economics* 3 (1) 2008. P.1-15.

**Table 3**. Poverty Incidence, Philippines, 2006

| | National Poverty Line | | Subsistence Poor (below $1.25PPP) | | Vulnerable Poor (below $2.00PPP) | |
|---|---|---|---|---|---|---|
| | % to Population | Number of Poor | % to Population | Number of Poor | % to Population | Number of Poor |
| Philippines | 32.89 | 27,589,745 | 19.45 | 16,315,726 | 40.73 | 34,165,861 |
| Rural | 50.37 | 19,663,144 | 34.48 | 13,461,137 | 65.35 | 25,511,657 |
| Urban | 19.17 | 7,926,601 | 6.90 | 2,854,589 | 20.93 | 8,654,204 |
| Small Cities | 29.80 | 335,990 | 15.19 | 171,221.39 | 36.00 | 406,174 |
| Large Towns | 11.62 | 499,285 | 1.80 | 76,820.03 | 12.40 | 531,797 |
| Large Cities | 17.56 | 2,329,661 | 6.00 | 791,338 | 20.88 | 2,769,429 |
| Metro Manila | 10.41 | 1,156,313 | 1.00 | 111,516 | 6.98 | 775,598 |

*Source: Family Income and Expenditure Survey*

In 2006, 7% of the urban population or about 3 million people lived in slums (Table 4). Slum population is highest in Metro Manila where 1 of every 10 persons lived in slums. However, these proportions are low estimates of slum population in the country since the national survey captures only illegal settlements.[12] Slums have been defined to include blighted areas that lack basic infrastructure and services, squatter areas (illegal settlements) and areas where the settlers' legal representation has not been documented formally (i.e. extra legality of land tenure). Using this broader definition of slum, there are over 4.0 million slum dwellers in Metro Manila by 2010. It is projected to reach 6 million in 2020 and over 9 million by 2050 (Figures 2 and 3). The distribution of slum families in Metro Manila shows that about one in every four (23.3%) live in Quezon City. The remaining families are scattered in the cities of Manila (14 percent), Caloocan (9%), Pasay (8%), Muntinlupa City (5.6%), and Taguig City (3%). Most slums (43%) are on government lands; 15% are on private properties; and 15% live in danger zones such as waterways, river banks and railroad tracks. [13] About 26% of slums are blighted areas where land occupation is through extra legal means or has yet to be formalized.

The growth of population in slums has been very rapid at an average annual rate of over 3.4% in urban areas and large metropolitan areas. This rate is higher than the 2.3% urban population growth rate. Assuming "business as usual", projection from trends shows that one-third of

[12] The Family income and Expenditure Survey (FIES) conducted every three years captures mainly households in informal settlements or those occupying land without consent from owners. However, there are several informal arrangements on land which provide consent. The data also do not capture informal households without permanent address and communities defined as blighted areas. Thus, FIES data on slum population is a low estimate. For instance in 2005, the Urban Asset Reform Office of HUDCC recorded in Metro Manila alone some 726,908 informal settler families or about 3.6 million population.

[13] Urban Asset Reform Office, HUDCC.

population (34%) in large towns and cities and over 50% of Metro Manila population will live in slums by 2050.

**Table 4.** SLUM Population, Urban Philippines

| | Slum Population 2006 | % Slum | Slum Annual Growth Rate(%) (2000-2006) | Projected Slum Population (based on slum growth rate) | | | Percent Slum | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2010 | 2020 | 2050 | 2010 | 2020 | 2050 |
| Urban Philippines | 2,936,011 | 7.10 | 3.40 | 3,819,766 | 6,572,683 | 12,967,806 | 7.4 | 8.5 | 14.76 |
| Large Towns/Cities | 978,422 | 5.57 | 3.49 | 1,122,335 | 1,736,317 | 10,108,036 | 5.1 | 7.1 | 33.7 |
| Metro Manila | 1,351,960 | 12.17 | 8.55 | 1,877,003 | 4,689,943 | 6,668,187 | 17.9 | 46.6 | 53.6 |
| Metro Manila[1] | 4,035,283 | 36.33 | 3.14 | 4,565,951 | 6,294,181 | 8,949,102 | 36.6 | 36.0 | - |

*Source: Family Income and Expenditure Survey*

*Note:*

*[1]Slums defined as squatters (illegal settlements) and informal (no formal or legal documentation of agreements) and blighted settlements. Source: Metro Manila Urban Services for the Poor*
*Slum Population Annual Growth Rate estimated using r= ln(Pt+n/Pt)/n*
*Slum Population projected based on Geometric Formula: Pt+n = Pt (1 + r)^n*
*Used 2003 data for Small Cities, Large Towns & Cities*
*- no data*

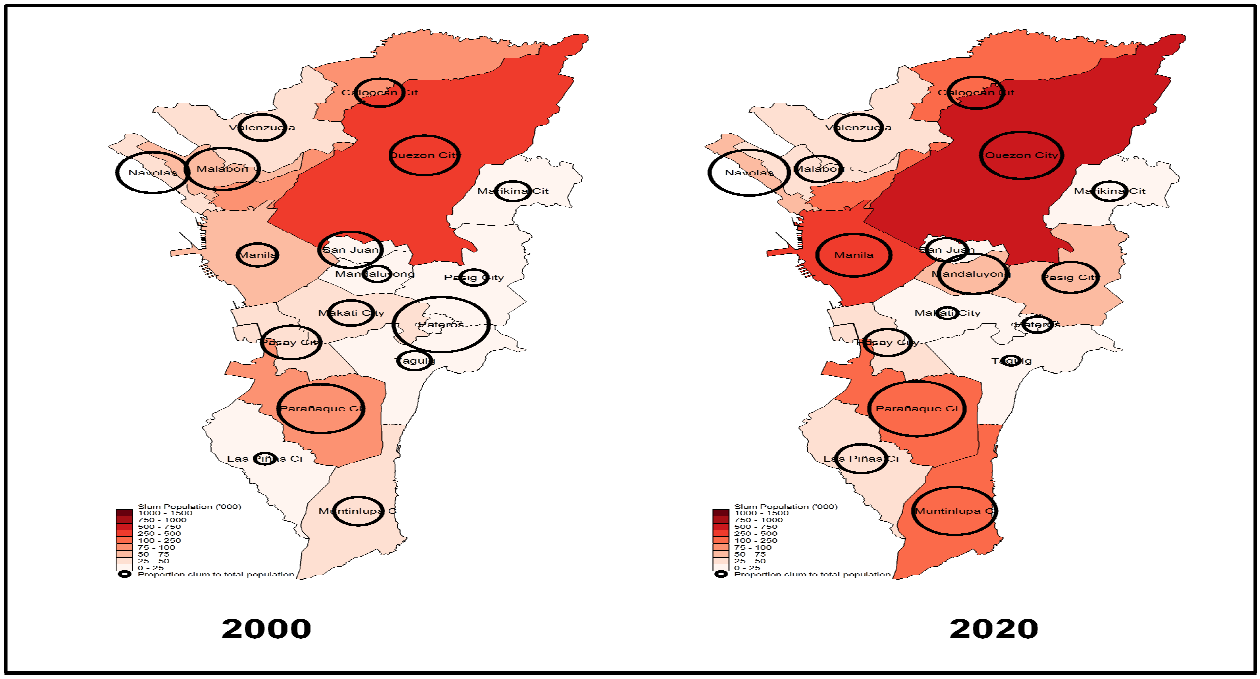


**Figure 2**. Slum Population in Metro Manila, FIES
*informal settlers defined as households occupying land/housing without consent

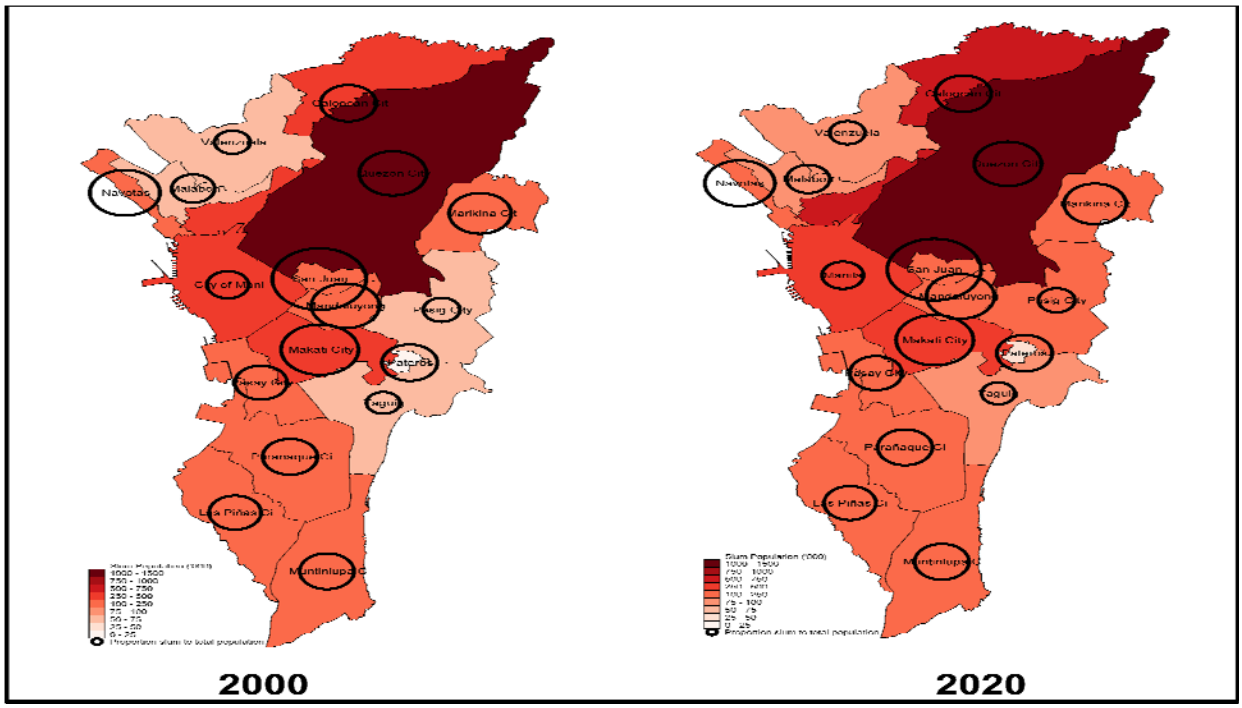


**Figure 3**. Slum Population in Metro Manila, MMUSP
*population includes households in squatter (illegal) areas and those informal settlers( i.e. no formal/legal document on tenure agreements)

Not all households in slums are income poor**.** Slum poverty covers a wider segment of the urban population. It includes those who are poor due to inadequate incomes and those non-income poor but are environmentally deprived. About 32% of slum population (or less than a million people) are poor based on national poverty lines of P20,688 per capita (Table 5).The balance consists of the environmentally poor households living above the poverty line who can spend between $2 and $4 per day but reside in poor living environment. These are usually minimum wage earners and casual workers who continue living in slums because there are no alternative to slums and "they cannot afford the cost of traveling from distant less expensive peri-urban regions for work and income earning opportunities in urban centers".[14] These families are exposed to high health risks and other environmental hazards thus are highly vulnerable and can easily move to income poverty. It is projected that in 2020, the number of income poor in urban slums will reached 1.3 million and by 2050, there will be about 5 million poor in slums (Table 6).

[14] Italics based on MMUSP study (2008)

**Table 5.** Slum Poverty Incidence, Philippines, 2006

| | National Poverty Line | | Subsistence Poor (below $1.25PPP) | | Between $1.25 and $2.00 PPP | | Between $2.00 and $ 4.00 PPP | |
|---|---|---|---|---|---|---|---|---|
| | % to Population | Number of Poor | % to Population | Number of Poor | % to Population | Number of Poor | % to Population | Number of Poor |
| Urban Philippines | 32.48 | 953,728 | 11.88 | 348,872 | 20.69 | 607,403 | 41.66 | 1,223,124 |
| Large Towns/Cities | 35.25 | 344,860 | 13.83 | 135,313 | 27.32 | 267,348 | 37.66 | 368,436 |
| Metro Manila | 20.66 | 279,361 | 3.26 | 44,127 | 11.40 | 154,076 | 49.00 | 662,472 |

*Source: Family Income and Expenditure Survey*

**Table 6.** Projected Slum Poverty, Philippines*

| | Percent Slum | Poverty Incidence | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | National | | Below $1.25 | | Below $2.00 | | Between $2-$4 | |
| | | % to Population | Magnitude | % to Population | Magnitude | % to Population | Magnitude | % to Population | Magnitude |
| **2010** | | | | | | | | | |
| Urban Philippines | 7.44 | 38.85 | 1,303,793 | 10.53 | 353,425 | 29.95 | 1,005,029 | 44.15 | 1,481,852 |
| Large Towns/Cities | 5.09 | 41.50 | 465,769 | 15.10 | 169,473 | 44.00 | 493,827 | 37.40 | 419,753 |
| Metro Manila | 17.88 | 23.50 | 441,096 | 5.20 | 97,604 | 25.00 | 469,251 | 46.00 | 863,421 |
| Metro Manila[1] | 36.00 | 23.50 | 1,072,998 | 5.20 | 237,429 | 25.00 | 1,141,488 | 46.00 | 2,100,337 |
| **2020** | | | | | | | | | |
| Urban Philippines | 8.55 | 33.11 | 1,574,501 | 11.91 | 587,251 | 32.58 | 1,605,995 | 41.64 | 2,052,628 |
| Large Towns/Cities | 7.10 | 35.46 | 615,736 | 14.93 | 328,444 | 41.80 | 919,719 | 38.86 | 854,879 |
| Metro Manila | 37.77 | 19.70 | 923,879 | 3.57 | 212,445 | 17.50 | 1,041,715 | 39.54 | 2,353,907 |
| Metro Manila[1] | 36.00 | 19.70 | 1,239,954 | 3.60 | 226,591 | 17.50 | 1,101,482 | 39.50 | 2,486,201 |
| **2050** | | | | | | | | | |
| Urban Philippines | 14.76 | 33.11 | 4,293,058 | 11.91 | 1,544,996 | 32.58 | 4,225,203 | 41.64 | 5,400,248 |
| Large Towns/Cities | 33.67 | 35.46 | 3,584,530 | 14.93 | 1,509,019 | 41.80 | 4,225,600 | 38.86 | 3,927,698 |
| Metro Manila | 53.64 | 19.70 | 1,313,576 | 3.57 | 237,938 | 17.50 | 1,166,720 | 39.54 | 2,636,373 |

*Note:*

** population projection based on slum growth rate*

*a.) 2010 Poverty Incidence estimated from per capita growth rate*

*b.) Slum Poverty Incidence Estimates (Magnitude) for 2010, 2020 and 2050 were computed by multiplying the poverty incidence estimate with the projected population*

*c.) Slum Poverty Incidence (% to Population) for 2020 and 2050 were estimated using the Average Proportion for 2003, 2006 and 2010.*

## IV. Slums and Environmental Poverty

Slums have the most unsafe and unhealthy living conditions in urban areas**.** Slums are heavily populated areas with substandard housing in a physically deteriorated environment that lacks or have poorly maintained public services (roads, sewage system, garbage disposal, electricity, water). Some slums are formed in hazardous places that are highly susceptible to natural disasters. More generally, the UN-HABITAT defines slum as any living space that lacks two of the following characteristics.[15]

- durable housing: a permanent housing structure with durable wall, roof and flooring structures in a non-hazardous location
- adequate living space: not more than 2 people sharing the same room
- minimally sanitary excretion facilities ("improved sanitation"): either in the form of a private toilet or a public toilet shared with a reasonable number of people,
- safe water: access to sufficient amounts of water for family use at an affordable price, without being subject to extreme effort,[16]
- property rights: the right to hold property

Although slums have similar physical attributes, the degree of environmental problem may differ. Slums may be clustered on the basis of the major risks in the environment. Specifically in Metro Manila, we find four main types of slums: (1) slum communities situated along river lines which are frequently affected by typhoons and sea surges; (2) slums along coastal (shoreline) or seashores which are affected by seasonal rains, sea surges and erosion; (3) dumpsite slums which are communities that developed in infill or open dumpsite and most households earn from scavenging; and (4) slum along major highways which are along heavily trafficked roads and corners. Figures 4 to 7 show pictures of these slum communities in Metro Manila. The major environmental problems that have significant impact on the lives of those living in these communities are congestion, flooding, pollution (water, air and noise).

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[15] See UN-Habitat at *http.//www.unhabitat.org/* or Cities Alliance http://www.citiesalliance.org/ca/About-slum-upgrading.

[16] An "improved" [water] source is one that is likely to provide "safe" water, such as a household connection, a borehole, etc." *http.//www.wssinfo.org/en/122_definitions.html*

## DUMPSITE POVERTY

- The settlement was started by previous residents of Smokey Mountain in 2000.
- The dump covers an area of at least 10 hectares
- Major Environmental Problem
  - Congestion
  - Air Pollution
  - Sanitation
  - Flooding/Mud

Figure 4. Pier 18, Manila

Figure 5. Pasig-Cainta Floodway

## FLOODWAY POVERTY

- Thickly populated and houses are separated by thin walls, especially now that the Manggahan East and West Floodway is full of Settlers
- Environmental concerns
  - Flooding
  - Congestion

# COASTAL POVERTY

- BASECO sits on a delta created by deposits from the Pasig River.
- It covers an area approximately 56 hectares consisting of four main blocks:
  (1) Big Island 11.7 has
  (2) Dumping site 5.4 has
  (3) Small Island 15.1 has
  (4) Swampy area 23.7 has
- Environmental concerns
  - Flooding (9)
  - Sanitation (9)
  - Congestion (7)
  - Water Pollution (7)

Figure 6. Baseco, Manila

# ALONG ROADS or HIGHWAY

•The center has a land area of 184 hectares

•The houses are situated along the highway of Commonwealth Avenue.

•Major Environmental Problem
- Air Pollution
- Noise Pollution
- Congestion

Figure 7. National Government Center, Quezon City

Environmental problems in cities are more pronounced in slums**.** Urbanization and economic growth have created environmental problems which are particularly related to air pollution, water pollution, flooding and congestion. Most people in the cities are affected by these environmental problems but slums are most affected since they are formed in environments where exposure to all forms of pollution is highest. Moreover, slums usually operate outside society's norms thus environmental laws more often are not enforced.

Air pollution Air quality in metropolitan areas has deteriorated fast partly due to pollution that are generated domestically, either from stationary (industrial and agricultural plants) or mobile (vehicles) sources. Heavy vehicular traffic is common in metropolitan cities specifically in the megacity of Metro Manila where critical levels of air pollutants have been detected since 1990s.[17] There is low enforcement of Air Quality Act. The Air Quality Action Plan and Programs to support the law did not materialize due to lack of support from the government.[18] Carbon emission test in vehicles are poorly regulated. There is low usage of antipollution devices, traffic has worsened and city roads have not been well-maintained. The poor management of solid waste also contributes to air pollution caused by unsanitary or open dumpsites and the inappropriate burning of waste.

The concentration of air pollutants from vehicular traffic is highest along roads and highways. Slum communities are located on the sides of the roads without proper road easement. They have higher exposure to air pollutants which have detrimental effect on health and welfare of the households. Air pollution in these areas has further expanded with the increase use of motorbikes and tricycles which are the main transport system among low income households and also a source of livelihood for some families. Tricycles and pedicabs do not burn fuel efficiently and emits higher volume of carbon monoxide than cars. There is weak implementation of regulations requiring the use of antipollution and silencing devices on these bikes. Local officials also do not pay attention to indiscriminate burning activities in slum communities. In dumpsite communities, for instance, air pollution from open burning of scavenged copper wires and wood for charcoal is a daily occurrence since these are livelihood activities of some households in the area. Burning specifically of industrial waste releases furans and dioxins and particulates which are carcinogenic but the practice is tolerated by both local government and community.

Water Pollution. Water pollution is very evident in urban areas specifically Metro Manila. About 35% to 58% of the organic pollution of our waters comes from domestic sources both solid waste and sanitation.[19] The inadequate solid waste management program contributes to a very serious water pollution problem in cities. It is estimated that in the urban areas, waste generation is around half a kilo (0.5kg) per person per day. In Metro Manila, about 7,000 tons of solid wastes are generated on a daily basis in 2008.[20] Only about 700 tons per day are recycled or composted while the balance of around 6,000 tons per day are either hauled to the city's dump sites, dumped

[17] ABD (1998). Metro Manila Air Quality Improvement Sector Development Project. Loans and Technical Assistance Proposal to the Philippine Government. November 2008.

[18] ADB (1998).

[19] Phil Environmental Quality Report, DENR,1996

[20] National Solid Waste Management Commission

into creeks, canals and rivers, burned or left on streets. Leachate from solid waste contaminate the soil and the waters, both groundwater and surface waters.

Moreover, the absence of sewerage systems in most parts of the country adds to pollution in water. Household waste is disposed through septic tanks, many of which are improperly designed, constructed (many are bottomless) and hardly maintained.[21] In Metro Manila only about 15% of the sewage generated is treated. All other pollutants are drained into rivers thus all four water bodies in the metropolis- Pasig-Marikina, Navotas-Malabon-Tullaban-Tenejeros, Manila Bay, and Laguna Lake – have been considered biologically dead.[22]

Water pollution is worsened by sanitation problem in slum communities especially along rivers and creeks and coastal areas. Communities along rivers and creeks have their own toilets but they use pipes to bring waste to the river or have septic tanks that are improperly built. In coastal and dumpsite areas, very few households can build their own toilets. These communities sit on land reclaimed from solid waste and the soft subsurface of the land requires more expensive toilet construction. The toilet also becomes unserviceable during sea surges. Thus, most households defecate in the waters or throw their waste in the river.

Slums specifically those considered as temporary settlements have no access to safe water since water companies do not provide them connections. These communities depend on vended water which is not safe and also cost more than water from the regular water system. Slums living near rivers and coastal areas are also constantly exposed to polluted water specifically the children who are oblivious to the health hazards of water pollution.

Congestion. Congestion is more pronounced in slums since these communities are heavily populated. Living space is inadequate (about 3 to 5 sqm per person) and houses are attached to each other with very thin walls in between them. With land scarcity in urban areas, it is expected that high population growth resulting from both net migration and net natural increase will largely be absorbed by existing slums. The extent of congestion in slums is seen in the population growth occurring in barangays or districts with large concentration of slum communities. A comparison of small area population annual growth rate shows that in the City of Manila average annual population growth for 1990-2007 was less than 1% while the population in barangays or districts where several slum communities are located were growing at over 5% in Pier 18 and over 10% in the Port area (Table 7). In Quezon City, average annual city population growth for 1990-2007 was at 2.78% while barangays with slum communities along roads grew at 4.5% for the same period. The floodway area recorded an annual population increase of 6.47% in 1995-2007 compared to 3.44% for the entire municipality of Cainta.

[21] E. Gozun (2010). Water and Sanitation. Policy Notes. Philippine Urban Consortium

[22] E. Gozun (2010)

**Table 7.** Average Annual Population Growth Rate, Metro Manila Slums

| Area | % Annual Growth Rate |
|---|---|
| **Manila City (1990-2007)** | 0.21 |
| Tondo, Manila | 0.76 |
| Brgy. 105 (*Dumpsite Poverty*) | 5.57 |
| Port Area, Manila | 10.06 |
| Brgy. 649 (*Coastal Slum*) | 10.77 |
| **Quezon City (1990-2007)** | 2.78 |
| Brgy. Holy Spirit (*Along Main Roads/Highways*) | 4.58 |
| **Cainta (1995-2007)** | 3.44 |
| Brgy. San Andres (*Pasig-Cainta Floodway)* | 6.47 |

*Source: Census of Population*

*Note:*
*Slum Annual Growth Rate estimated based on exponential growth formula: r= ln(Pt+n/Pt)/n*

Flooding. A large part of the settlement occurring from rapid urbanization is informal and unregulated. Many structures were allowed or tolerated to be built on river floodplains or along the foreshore, over swamps or above the tidewater level on the coast. Government poor enforcement of urban regulation and planning systems has caused flooding problems. Other contributing factors to the flooding problem are the lack of attention to waste management and to the construction and maintenance of drainage channels. Most slums are formed in low lying areas thus aside from flooding due to natural causes (e.g. sea surges), localized or street level flooding occur even under normal rains due to deficit infrastructure - absence of paved roads, drainage or clogged drainage in the area. Flooding is also accompanied by mud due to years of neglect of services in the community and poor enforcement of proper waste disposal.

Living conditions of the poor in urban areas of the Philippines show that it is highly congested with one person occupying an average area of 4 sqm. Access to basic facilities is apparently not the major problem. These communities are located within easy access to schools, hospitals, etc. About 97% of household in slums have also access to electricity (Table 8). Although about 25 to 30% of slum households still have no access to safe water and sanitary toilets, there is a wide scope for improvement in the provision of safe water and sanitation through the local government and the private sector. Local politicians often respond to these types of projects since the community and households are willing to pay for these services. The cost of purified water has also gone down due to cheaper technology and competition.

**Table 8.** Living Conditions of the Poor in Slums, Philippines

| Conditions | National Poverty Line | | | | $1.25 Income Poor | | | | Between $1.25 and $2.0 Income Poor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Metro Manila | | Large Towns/Cities | | Metro Manila | | Large Towns/Cities | | Metro Manila | | Large Towns/Cities | |
| | *Number* | *%* | *Number* | *%* | *Number* | *%* | *Number* | *%* | *Number* | *%* | *Number* | *%* |
| Average Household size | 7 | | 7 | | 6 | | 6 | | 7 | | 7 | |
| Average Area Occupied per HH Member(sq m) | 5 | | 7 | | 3 | | 3 | | 4 | | 4 | |
| Tenure Status of House | | | | | | | | | | | | |
| Own House | 37,185 | 89 | 77,768 | 90 | 5,912 | 87 | 21,251 | 88 | 19,628 | 91 | 56,562 | 92 |
| Renter | 4,405 | 11 | 8,618 | 10 | 891 | 13 | 2,827 | 12 | 1,950 | 9 | 4,991 | 8 |
| Water Source | | | | | | | | | | | | |
| With Access to Safe Water | 28,763 | 69 | 63,526 | 74 | 3,096 | 46 | 18,175 | 75 | 16,442 | 76 | 45,057 | 73 |
| Without Access to Safe Water | 12,828 | 31 | 22,860 | 26 | 3,707 | 54 | 5,903 | 25 | 5,136 | 24 | 16,495 | 27 |
| Toilet Type | | | | | | | | | | | | |
| With Access to Toilet | 31,862 | 77 | 60,321 | 70 | 3,360 | 49 | 14,152 | 60 | 17,874 | 83 | 44,067 | 71 |
| Without Access to Toilet | 9,729 | 23 | 26,065 | 30 | 3,443 | 51 | 9,357 | 40 | 3,704 | 17 | 18,054 | 29 |
| Electricity | | | | | | | | | | | | |
| With Electricity | 35,348 | 85 | 72,125 | 83 | 3,263 | 48 | 16,822 | 70 | 19,569 | 91 | 54,768 | 89 |
| Without Electricity | 6,243 | 15 | 14,260 | 17 | 3,541 | 52 | 7,256 | 30 | 2,009 | 9 | 6,785 | 11 |
| Wall material | | | | | | | | | | | | |
| Strong | 20,085 | 48 | 33,357 | 39 | 2,197 | 32 | 6,180 | 26 | 10,913 | 51 | 25,312 | 41 |
| Light | 6,334 | 15 | 13,698 | 16 | 1,074 | 16 | 4,355 | 18 | 3,760 | 17 | 11,337 | 18 |
| Makeshift | 15,172 | 36 | 39,331 | 46 | 3,533 | 52 | 13,544 | 56 | 6,906 | 32 | 24,904 | 40 |
| Roof material | | | | | | | | | | | | |
| Strong | 22,626 | 54 | 43,503 | 50 | 2,682 | 39 | 9,778 | 41 | 11,906 | 55 | 33,515 | 54 |
| Light | 6,195 | 15 | 13,971 | 16 | 549 | 8 | 4,843 | 20 | 4,145 | 19 | 10,578 | 17 |
| Makeshift | 12,770 | 31 | 28,911 | 33 | 3,573 | 53 | 9,456 | 39 | 5,526 | 26 | 17,459 | 28 |

*Source: 2006 Family Income and Expenditure Survey, National Statistics Office*

Slum poverty is primarily urban environmental poverty. The low incomes of households in slum communities are the basis for their environmental poverty. However, their bad habitat has adverse implications to health and peace of mind that deepens income poverty. The main asset of the poor is labor but bad environment makes this asset vulnerable to poor health and mental stress. The impact on physical and mental health reduces the productivity of the poor, causes fragile family relations due to irritation and frustration, poor school performance of children and higher vulnerability to commit crimes and violence (Table 9).

The congested built environment of slum is highly at risk to fire disasters. For instance, fire has been a yearly disaster affecting slum communities of BASECO in Port area and the Floodway area. It has affected as much as 200 families resulting in loss of housing and properties of the affected households.

There are also environmentally poor households whose livelihood is directly damage by environmental problems. Such households include the fishermen who fall deeper into poverty as a result of pollution of rivers and coastal areas. The Philippines is primarily a coastal country with 82 percent of the provinces and 65 percent of the municipalities bordering the coast. Some of the

largest and relatively densely populated urban centers--such as the metropolitan areas of Manila, Bulacan, Cebu, and Cagayan de Oro--are all located in the coastal zone. Fishing or fishery can therefore be a source of livelihood in Philippine cities. However, severe water pollution in urban areas have affected aquatic life and impaired ecological stability. [23] The frequent occurrence of "red tides" has also been attributed to pollution. The cost of water pollution in terms of foregone earnings from sale of shellfish in affected areas and the loss of livelihood by fish farmers and gatherers are quite high. In 1988, it was estimated that 20% (or 88.6 million) of total cost of damages due to deterioration of water quality in Laguna Lake (one of the water bodies of Metro Manila) is forgone earnings from fisheries.[24]

While the incidence of poverty may not be worse in the urban areas compared to the rural areas this is a little source of comfort for the urban dwellers who have to contend with congestion, pollution, poor sanitation, flooding, extreme heat and humidity, and other environmental concerns.[25]

**Table 9.** Key Impact Channels of Poor Living Environment, FGD 2010

| | Coastal Slum | Dumpsite Slum | Along Main Roads/Highway |
|---|---|---|---|
| **Health** | •Children are usually sick of colds and cough<br>•Mosquitoes thrive and are abundant in stagnant water affecting the health of the residents<br>•Diarhea, skin infections, asthma and sore eyes are the usual sickness of both adults and children due to spread of infection<br>•Practice of placing human wastes in plastic bags is health hazard<br>•Severe heat is felt due to compactness and condensed physical interaction. | •Due to heat common ailments are fever, sore eyes, skin diseases<br>•Congestion causes headache specially among the elderly<br>•Flooding causes sickness such as typhoid, cholera, diarrhea<br>•Causes difficulty in breathing specially for children and elderly<br>•Cause illness such as tuberculosis, asthma, coughs<br>•Poor Sanitation postpones bowel movement resulting to sickness and irritation<br>•Children get pinworms easily due to poor sanitation | •Cause difficulty in breathing and asthma for children<br>•Cause headaches specially for women<br>•Irritates babies causing stress to mothers<br>•Cause poor sleep<br>•Cause nervousness and high blood pressure for the elderly<br>•Common illness include sore eyes, cough and colds, and high blood pressure for the elderly |
| **Social** | •Working household members unable to go to work for the duration of floods (1 to 2 days)<br>•Women have difficulty doing household chores<br>•Children cannot go to school for the duration of flood.<br>•Narrow pathways cause occasional quarrels and differences among neighbors and difficult to impose rules on limits of structures<br>•Security-related incidences such as robberies or theft (adolescents' usual pranks)often occur<br>•Incidence of child rape and molestation inside the house cannot be ruled out due to congestion | •Encourage early marriage to lighten the burden at home<br>•Women have difficulty in doing household work and easily gets tired due to too much heat<br>•Children have difficulty in going to school on rainy days due to mud<br>•Difficult for the elderly to move outside the house on rainy days<br>•Lack of privacy for women<br>•Causes irritation and frustration in the family | •High incidence of crime theft, robbery, drugs<br>•Causes worry for security of children especially for women<br>•Cause absence from work due to lack of sleep<br>•Cause lack of concentration on household chores and studying |
| **Damage to lives and property** | •Fire disaster common in the area affecting different blocks each year, which caused total damage to housing | •Fire can spread easily in the community. Fire in 2008 affected 80 households | |
| **Livelihood** | | •Water pollution reduce fish catch<br>•Frequent "red tide" | |

[23] J. Padilla (1996) Water Quality and Fisheries Issues Accompanying Population Growth in the Philippines. Journal of Philippine Development , 23 (3) 1996, p315-336.

[24] Ebarvia, M. "Estimation of Environmental Damages." In *Environment and Natural Resources Accounting Project (ENRAP Phase II) Technical Appendices*. Department of Environment and NaturalResources (DENR) and United States Agency for International Development (USAID), Philippines, 1994.

[25] A. Bauer and T. Ohmura (2007) . Environmental Poverty: New perspectives and Implications for Sustainable Development in Asia and the Pacific, July 29, 2010. ADB Environment Poverty Brief

The health impact of poor housing has been established in several epidemiological studies. These studies show that poor housing environment cause or enhance the incidence of specific diseases. Overcrowding raises the risk of respiratory illness. Contaminated water supply and unsanitary human and household waste disposal causes gastro-intestinal problems, skin ailments, cholera, typhoid and other infectious diseases. Long-term exposure to traffic related air pollution causes problems in the cardiovascular and respiratory systems. Living near dumpsites or earning a living through scavenging exposes the poor to furans and dioxins and particulates that are carcinogenic. Dumps serve as breeding ground for harmful bacteria, fungus and other parasites which bring a lot of diseases. In Manila, more than 35 diseases have been identified in scavenger communities and in areas that lack garbage collection and sanitation. They include diarrhea, typhoid fever, cholera, dysentery, tuberculosis, anthrax, poliomyelitis, skin disorders, pneumonia, and malaria.[26]

Econometric analysis also found a strong relationship between the poor state of health of households with presence of human and animal waste and of stagnant water in the home environment.[27] The same study showed that as much as 40% of children's health status is explained by the housing and environmental conditions and that improving housing characteristics (i.e. roofing, interior space) and neighborhood services such as sewerage and solid waste disposal system enhance the health status especially of children.

The results of the focus group discussions conducted by the author in the four slum areas in the Metro Manila noted that residents suffer from the health effects of poor environment. For instance, respiratory ailments such as tuberculosis, bronchitis and asthma are common complaints of households in dumpsite communities and those along roads and highways. Mental stress and sleepless nights affects the residents specially children and the elderly. Diarrhea and skin ailments are common ailments in all slum communities especially those residing near rivers. Table 10 shows that the top four morbidity cases in public health units that service the slum communities along the floodway are acute respiratory disease, skin disease, diarrhea and parasitism. The rate of cases per 100,000 population in floodway area (RHU1) in the past five years is higher than the average for the municipality. Almost one third of the cases of acute respiratory disease, skin ailments and diarrhea in the Municipality of Cainta are from residents along the floodway or in barangays along rivers and creeks. The main cause of child morbidity in the municipality is diarrhea where 20% to 30% of cases are residents of barangays along the floodway or canals.

In the slum areas of Manila, of the top five morbidity cases, four are respiratory ailments (including bronchitis, pneumonia and tuberculosis) (Table 11). Diarrhea is also among the top five causes of morbidity. The rate of occurrence per 100,000 population is higher in the slum areas (District 1 and 2) compared to the average for the entire city. For instance, of the total cases of bronchitis in the City, about 50% are residents of the slum areas.

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[26] Adan, B., V. Cruz and M. Palaypay (1982). Scavenging in Metro Manila. Manila, Philippines. Report Prepared for Task 11. 1982.

[27] Solon, O. (1989) The Health Impact of Urban Poor Housing and Environmental Conditions. Working Paper Series 89-14. Philippine Institute for Development Studies.

**Table 10.** Top Morbidity and Mortality Diseases, Municipality of Cainta
(Rate per 100,000 Population)

| | Cainta | | RHU I | | |
|---|---|---|---|---|---|
| | *Ave. Past 5 Years (2004-2008)* | *2009* | *Ave. Past 5 Years (2004-2008)* | *2009* | % to Total Cases in Cainta |
| Morbidity | | | | | |
| Top 5 | | | | | |
| Acute Respiratory Infection | 5,649.35 | 9,913 | 6,726 | 9,606.85 | 27.72 |
| Skin Diseases | 249.74 | 1,097 | 206.58 | 1,074.55 | 28.01 |
| Acute Watery Diarrhea | 273.47 | 409 | 127.45 | 326.98 | 22.87 |
| Parasitism | 160.60 | 342 | 264.80 | 300.05 | 25.11 |
| Hyper-Vascular Disease | 133.43 | 394 | 151.85 | 210.09 | 14.88 |
| | | | | | |
| Mortality | | | | | |
| Top 3 | | | | | |
| Coronary Artery Disease | 44.54 | 67.84 | - | 75.65 | 31.89 |
| Pneumonia | 16.69 | 49.5 | - | 44.87 | 25.19 |
| Cancer | 17.78 | 27.14 | - | 24.36 | 25.68 |
| Child Morbidity (below 5 years) | **2008** | | **2009** | | |
| | *% to Child Population* | *% to Total Cases, Cainta* | *% to Child Population* | *% to Total Cases, Cainta* | |
| Diarrhea | 1.10 | 31.32 | 1.57 | 20.90 | |
| Pneumonia | 0.40 | - | 0.32 | - | |

*Source: Annual Accomplishment Report: Cainta, Rizal; RHU 1 health service unit at Floodway*

**Table 11**. Top Morbidity and Mortality Diseases, Manila City (Rate per 100,000 population)

| | Manila | | District 1 [a] | | | | District 5 [b] | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2008 | 2009 | 2008 | | 2009 | | 2008 | | 2009 | |
| Morbidity | Rate | | Rate | % to Total Cases in Manila | Rate | % to Total Cases in Manila | Rate | % to Total Cases in Manila | Rate | % to Total Cases in Manila |
| Top 6 | | | | | | | | | | |
| Acute Respiratory Infection | - | 67.18 | - | - | 62.02 | 23.00 | - | - | 73.33 | 18.78 |
| Bronchitis | 27.48 | 8.74 | 39.60 | 38.43 | 17.22 | 49.10 | 12.83 | 4.81 | 3.04 | 5.98 |
| Pneumonia | 26.77 | 5.90 | 19.34 | 19.26 | 4.56 | 19.25 | 24.27 | 9.34 | 7.30 | 21.29 |
| Diarrhea | 18.60 | 7.06 | - | - | 6.89 | 24.29 | - | - | 7.91 | 19.25 |
| TB Respiratory | 11.74 | 3.80 | 12.29 | 27.93 | 3.73 | 24.49 | 21.71 | 19.06 | 4.19 | 18.99 |
| Dengue | 3.84 | 0.95 | 3.96 | 27.46 | 0.87 | 22.83 | 3.70 | 9.92 | 0.55 | 9.93 |
| | | | | | | | | | | |
| Mortality | | | | | | | | | | |
| Top 3 | | | | | | | | | | |
| Pneumonia | 21.31 | 18.90 | 25.37 | 28.80 | 20.97 | 27.43 | 24.06 | 15.57 | 19.31 | 15.25 |
| Heart Disease | 19.79 | 24.50 | 19.59 | 23.95 | 25.81 | 26.04 | 21.70 | 15.12 | 27.76 | 16.90 |
| Cancer | 10.97 | 11.37 | 11.12 | 24.51 | 16.44 | 35.75 | 13.36 | 16.80 | 11.38 | 14.93 |

*Source: Manila Health Department*
*Note:*
*a\ Barangay 105 (Pier 18) belong to district 1 of Manila*
*b\ Barangay 649 (Baseco) belong to district 5 of Manila*
*- no data*

## V. Slum Poverty and Climate Related Hazards

The Philippines is highly prone to typhoon activity and other natural disasters.[28] The country is considered one of the most disaster-prone. It ranks 12th among 200 countries most at-risk for tropical cyclones, floods, earthquakes, and landslides in the 2009 Mortality Risk Index of the UN

[28] This section is based on the Report on Typhoon Ondoy and Pepeng: Post Disaster Needs Assessment Study (2010).

International Strategy for Disaster Reduction. Around 20 typhoons cross the country each year. Although typhoons can occur in all major regions, the ones that are usually most devastating are the track that traverses to the north of Manila and the track that traverses south of Manila. The regions that are especially affected are Metro Manila, Regions 3 and 4 and regions in Northern Luzon. Typhoons that affect the Metro Manila usually result in relatively gentle flooding of low-lying areas but can last for a long period of time. NDCC records show that out of the many typhoons and tropical storms that hit the Philippines between 1990 and 2008, a total of 158 destructive typhoons resulted in 13,491 deaths. The impact of climate change is likely to increase the occurrence of extreme weather events.

Climate change is likely to influence rainfall and heat which can make these phenomena intense and long enough and unpredictable. The urban environmentally poor would be suffering more from these changes than other group of urban dwellers since they are most exposed from natural risks. In particular, flooding is observed to be the main impact of climate change in urban areas. This is primarily caused by heavy rains due to typhoons.[29] The other climate-related factors include a combination of high tide, excess runoff from rivers and sea level rise. However, flooding is aggravated by non-climate related factors such as (a) a decrease in river channel capacity through encroachment of houses, siltation from deforestation, and garbage; (b) disappearance of 21 km of small river channels; (c) urbanization accelerating runoff concentration and reducing infiltration losses; (d) loss of natural retention areas; and (e) land subsidence.[30] These factors increase the depth and breadth of floods.

The combined effects of climate change and non-climatic factors have pronounced impact on slums as demonstrated by recent flooding in Metro Manila due to Typhoon Frank in 2008 and Typhoon Ondoy in 2009. Typhoon Frank affected the western side of Metro Manila and slum communities in the port areas. Families occupying an area of about 30 hectares in Barangay BASECO had to stay in evacuation centers for at least three days. On the other hand, Typhoon Ondoy affected the eastern part of Metro Manila affecting settlements along the Pasig River and Laguna Lake. The depth and expanse of flood that resulted from Typhoon Ondoy has never been experienced in the past. The slums along the river lines were worst hit experiencing above 200 cm depth of flood which receded only after two months. Estimates based on 2008 show that the area affected by flood in Metro Manila will increase by 42% in 2050 climate change scenarios. This will affect about 2.5 million population and communities in low lying areas would be at high risk.[31]

Flooding leads to pronounced difficulties for the poor. Most households are unable to do anything during floods. Slum dwellers' livelihoods depend on such activities as small-scale commerce, petty trading and artisanal trades, which are disrupted by floods, thus affecting the capacity to buy food or pay bills, including those for children's education and healthcare. Tropical Ondoy which caused widespread flooding in Metro Manila resulted in a national state of calamity.

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[29] ADB, JICA and World Bank (2010) Climate Change and Adaptation in Asian Coastal Megacities. Washington:The International Bank for Reconstruction, The World Bank.

[30] Land subsidence refers to downward shifts of land due to natural and human activities. Ground water pumping and geologic processes along the West Marikina Valley Fault Line are the possible causes for Metro Manila.

[31] ADB, JICA and World Bank, 2010.

It has affected over 993,000 families or 4.4 million population in Metro Manila and neighboring municipalities in the province of Rizal and Laguna.[32] About 15,798 families have to be relocated in 244 evacuation centers in the affected cities and municipalities. The disaster affected mainly the productive and social sector (i.e., housing) with damages and losses valued at about Php150 million. For housing alone, it is estimated that recovery and reconstruction needs will amount to Php75 million.[33]

The slum communities along the Pasig-Cainta floodway area were among those worst hit by flooding due to Typhoon Ondoy. Many households were displaced and moved in evacuation center or with relatives and friends. Children did not attend school for two months. Houses were damaged and some have not been able to rebuild their houses a year after the Typhoon. After the flood subsided, it took more than one month for the households to clean-up due to thick mud with depth of two feet that settled in the area. Women and men have been stressed causing even death in some households. Children got sick of diarrhea, coughs, fever and skin diseases. The adults who were involved in household chores got sick of athlete's foot and leptospirosis. There were serious cases of leptospirosis that led to death in some families. The effects of flooding include not only loss of properties or damaged housing but also loss of lives, livelihood, disruption of education of children and deterioration of health.

Slums that are often affected by flooding are continually faced with sanitation problems. Flooding carry all sorts of organic waste into the homes and increases the risk of prolonged exposure to water pollution. A health assessment study in Metro Manila was undertaken to assess the level of risk associated with direct and indirect exposure to polluted floodwaters. [34] The study specifically measured the probabilities of gastroenteritis caused by E. Coli in polluted waters for different inundation level (from less than 50 cm to greater than 200 cm). The accidental ingestion of polluted water through bathing, laundry, swimming or playing increases with depth level and thus the risk of infection is also higher. Children in particular 4 to 15 years old are the most affected since they tend to ingest twice as much compared to adults. On the average, the risk of infection of the population is 0.0134% for inundation depth of less than 50 cm (street level floods and still possible to walk through the water) and 0.19% for floods above 200 cm (first floor of the house is covered with water). The health risks could be higher if risks due to other vectors of polluted waters are taken into account.

The poor in slums have the least means to protect themselves from environmental hazards. The efforts at the household level show the limits of the slum population to protect themselves from climate-related effects. Table 12 shows the different coping strategies of households to environmental hazards. In coastal settlements, residents constructed barriers against water and garbage entry at doorsteps by surrounding the house with stones, blocks or even slippers. Individually households land fill their areas by using scrap building materials which they get from construction sites. Along river lines, the houses are built high above water lines using stilts or on

[32] GOP, UN and WB (2010) Post Disaster Needs Assessment Study-Volume 1: Ondoy and Pepeng

[33] GOP, UN and WB (2010)

[34] JICA (2010). Intangible Risks Analysis from Flooding. A Study on the Social Impacts of Flood Events in Metro Manila. JICA

embankments which are used for support. Modifications inside the house include the use of wood planks to have elevated places to provide dry place for the children and for household equipment. They also use chairs and furniture as beds when flood waters rises to the house. During storms households secure structures of house (roof and walls) with ropes or placing tires and heavy objects on the roof. They also prepare for eventual evacuation by putting their things inside sacks or plastic.

Evacuation is imminent when flood rises at a level such as that caused by Typhoon Ondoy. Early warnings from local officials keeps the communities informed of disaster but the preparedness of local government differs across cities. In the BASECO area, evacuation centers are readilty available but for residents along the floodway or the dumpsite area, evacuation centers are not readily available. Households in these areas depend on network of friends and relatives in the city or even in the provinces in case of evacuation.

There are less or no modifications to protect from heat or fire due to congestion. Slums are highly congested with houses close to each other and pathways too narrow even for one person to pass through. Most households simply go out of the house during hot days and may even sleep outside the house. Fire is a major disaster in congested slums. It results in total damaged of housing, loss of property and life and displacement. Coping activities are confined to reminding neighbors to be vigilant specifically in using candles or gas lamps during power outages

**Table 12.** Coping Strategies of Households in Poor Living Environment, FGD 2010

| Congestion | Flooding/Mud | Poor Sanitation | Pollution (Air and Noise) |
|---|---|---|---|
| •On hot days, men sleep outside the house for the family to have more space.<br>•Go to nearby malls<br>•The elderly wet the blanket and damp on body<br>•Children dip in polluted water.<br>•The residents or the community agreed to stop the use of gasera or improvised cooking ranges to avoid fire<br>•When there is power interruption, remind neighbors' vigilance in using candles, cooking range, and to keep matches/lighters away from the kids<br>•Children avoid wearing upper clothing<br>•Women take a bath 3 times a day, while men don't wear tops | •On rainy days, households stay in the house and limit outside activities.<br>•To minimize effect of flooding around the house, they usually elevate house using soil and scrap filling materials<br>•To minimize effect of flooding in the house they raise furniture using levers, some build multi-level housing<br>•Use plywood as bridge when it rains<br>•Borrow from informal lenders to buy boots for the household. One pair of boots costs P450 paid for P20 for 25 days. If housheold can afford only one pair, the men is given priority.<br>•Prepares candles, flashlights and medicines for emergency<br>•Raise wood planks to serve as "second floor"<br>•Stay on top of furniture for sleeping/eating<br>•Surround house with slippers to prevent garbage from entering the house | •Limit bowel movement<br>•Bear smell of surroundings<br>•Use plastic bags for human waste<br>•Reduce toilet usage<br>•Children just squat on soil to relieve themselves<br>•Pay for use of public toilet<br>•Use river as toilet | •When finances are tight, households boil water<br>•The residents just bear the smoke<br>•Cover nose with towels<br>•Fanning and use of air freshener<br>•Refer to household association to call attention of neighbors causing noise and to require tricycle drivers to reduce noise from their motor.<br>•Some tricycle owners use silencer or new technology (4-stroke brand) to lessen noise<br>•Use earphones<br>•Bear the noise and watch television |

## VI. Government Response to Slum Poverty : Disaster Management and Shelter Policies

The weak capability of government to respond to disaster puts the lives of the people in slums at higher risks. Usually, very little attention is paid to areas that are under risk until the disaster

actually occurs. But disaster response is often delayed and lacking. Local governments lack the equipment and manpower to undertake the necessary rescue operations specifically for disasters such as Typhoon Ondoy. There is also a lack of evacuation centers. Public schools are often used as temporary shelters and prolonged use of these schools imply disruption of classes.

There are no preventive measures considered at the national or local levels. The impact and implications of disaster such as the massive flooding brought about by Ondoy tend to be easily forgotten. Instead of mitigation measures such as infrastructure projects, government think in terms of disaster preparedness which is translated to purchase of more boats and flood paraphernalia and disaster training. Public infrastructure investments could have been pushed by local officials (mayors, congressmen) but they tend to confine solutions within their own administrative jurisdictions

Likewise, government programs for urban poor shelter have barely addressed the housing backlog.[35] The development of the Philippine housing sector, more specifically the low cost housing sector, is a major component of the government's action agenda on poverty alleviation. Since the 1970s, government has established the National Shelter Program (NSP) to address housing for the poor. The NSP consists of several programs intended to increase the housing stock for households in the lowest 50 percent of population through policy interventions in housing production, regulation and financing. The program classifies housing for the low income population into socialized and economic housing. Socialized housing is targeted to the poor or low income households up to the 30th income percentile. In terms of value it represents housing units at less than P300,000 (US$6,000)[36]. On the other hand, economic housing units are valued at greater than 300,000 up to P2 million (>US$6,000 to 40,000) and targeted to families from the 30th percentile up to the 50th percentile. Prior to 1990, slum upgrading was a major strategy under NSP but this scheme was diminished due to huge budget requirement of project and the inability of government to tap private sector funds for the program. From the 1990s onwards, the NSP focused on the following strategies: (a) provision of secure tenure through the Community Mortgage Program (CMP) and Presidential Land Proclamations; (b) Resettlement through the NHA; (c) housing loan through HDMF. The CMP is a mortgage financing program which enables urban poor squatter communities to purchase land they occupy or land where they choose to resettle. The beneficiaries of the program are organized slum dwellers. Under Presidential Land Proclamations, the Government pursues the regularization of tenure of informal settler families occupying public lands by declaring parcels of public lands open for disposition to qualified beneficiaries. Presidential land proclamations can be done through several issuances – Presidential Proclamations (PP), Executive Orders (EO), Memorandum Orders and Administrative Orders. The Resettlement Program is administered by the National Housing Authority. This Program is designed for families with income below the poverty threshold specifically for families displaced from sites earmarked for government infrastructure project or those in areas identified as danger zones. Resettlement projects involve the acquisition and development of large area of raw

[35] See M. Ballesteros (2009). Housing Policy for the Poor: Revisiting UDHA and CISFA. Policy Note 2009-4. Philippine Institute for Development Studies

[36] US$= P50

land into serviced home lots or core housing units. The areas are provided basic facilities such as schools, potable water and electricity. The Home Development Mutual Fund is a social security fund from mandatory contributions of workers and their employers to the fund as well as voluntary contributions of those in the private sector both the formal and informal sectors. HDMF aims to encourage its members to achieve homeownership through mortgage financing and the private sector to build socialized housing projects by making available a finance program for low income households.

The housing assistance to socialized housing or programs that catered to the bottom 30% represents only about 25% to 30% of the NSP program total accomplishments (Table 13). The implementation of these schemes has been constraint by several issues. First, Presidential Land Proclamations are constrained by several bureaucratic legalities that prevent the utilization of proclaimed lands for settlement in addition to the absence of financing scheme to develop these lands for the poor. Thus, most of the outputs from Proclamations are mainly in paper since the legalities have constrained the production of new housing units. Second, the resettlement housing sites of the NHA are often in areas far from the livelihood or place of work of beneficiaries. Working household member have to rent a place in the city on work days leaving their family in the resettlement site while economic opportunities for women are limited due to lack of livelihood opportunities in these areas. The economic and social costs are too high in off-city resettlement. Resettlement projects are also highly subsidized and local governments who are recipient of these communities are highly dependent on government for both logistic and fund support. Third, the housing loan facility through the HDMF favors those who are employed in the formal sector and limits access of the poor who are mostly engage in the informal sector. The classification of socialized housing under the program is based on loan amount rather the housing value thus it is possible that those loans classified as socialized were actually provided to non-poor households.

**Table 13.** Housing Need [a], Targets and Socialized Housing Accomplishment

| | 2001-2004 | 2005-2010 |
|---|---|---|
| | (in housing units) | (in housing units) |
| Housing Backlog | 1,872,747 | 1,170,798 |
| Housing Need | 3,637,704 | 3,756,072 |
| Housing Target [b] | 1,200,000 | 1,146,000 |
| NSP [c] (actual) | 311,819 | 302,716 |
| a. Resettlement | 49,680 | 124,619 |
| b. Land Proclamation | 196,640 | 85,958 |
| c. Community Mortgage Program | 49,943 | 49,336 |
| d. Socialized HDMF | 15,556 | 42,803 |

*Note:*

*[a] Housing need is housing backlog + projections of growth of new households*

*[b] Housing targets from key shelter agencies based on budgetary allocation*

*[c] Refers to direct housing outputs from resettlement (including slum- upgrading, core housing and sites and services), CMP and land proclamations and HDMF finance for socialized housing. Socialized housing component estimated from total HDMF end user finance based on loan values and housing cost of P300,000/unit. Data as of end 2008*

Government programs for housing the poor do not address urban environmental poverty. Government approach to housing has always been client-based targeting specific beneficiaries and measuring accomplishments in terms of individual housing assistance thus concerns about the community and the environment of the poor have not really been translated into investment programs. The CMP which is the major program targeting slum communities mainly address security of land tenure. While this is an important condition to upgrading efforts low-income communities are usually unable to provide for neighborhood facilities such as streets, drainage, water connections, etc. Overtime, some communities have become overcrowded and depressed because the communities are unable to provide for themselves the infrastructure for site development. Moreover, the provision of individual lots to families constrains densification and the efficient use of urban land. To implement an integrated service packages for the urban poor remains a significant challenge in the country.

There is currently no political support for metropolitan-wide slum eradication**.** As a member country of Cities Alliance, the Philippines government has expressed support to the citywide and nationwide slum upgrading in accordance with action plan (MDG Target 11). However, there is currently no political support for a metropolitan 'CWS' strategy. HUDCC failed to impress on the DOF the urgency and importance of a metro-wide investment program for housing of the urban poor.[37] Allocation of land for the urban poor is still a major bottleneck. At the root of the problem is the fact that the demand for well-located, suitable land for the urban poor far outstrips supply. The result is that land has become unaffordable for the vast majority of urban Filipinos. Apart from the problem of unaffordable land is the limited availability of land brought about by a host of factors that artificially constrict the supply of sufficient new land and limit the optimal use of existing urban land.[38] And despite government programs on presidential land proclamations for the purpose of housing for the urban poor, these lands are not made available due to complicated titling procedures. There seems to be a lack of political will to improve the situation of informal settlements. "Most LGUs pursue off-city resettlement of informal settlers as their preferred strategy and perceive the problem of informal settlements as a burden rather than a development opportunity."[39]

While government focuses on traditional poverty programs for the poor, the slum poor are more concerned with the deficit infrastructure facilities and pollution in their area. Table 14 is a list of key infrastructure projects and actions that the slum communities would want the national and local government to prioritize. The list shows their need for projects that would minimize environmental hazards in the slums such as roads, asphalting, land filling and drainage projects. Tree planting, implementation of anti pollution measures and maintenance of waterways are the actions they want government to effectively implement to reduce pollution and occurrence of flooding. The

[37] F. Steinberg (2010). Technical Assistance Completion Report. Preparing the Metro Manila Urban Services for the Poor Project (MMUSP). TA4616-PHI. ADB document.

[38] These issues are extensively discussed in Strassman and Blunt (1993) and the ADB TA 3291-PHI-Development of Poor Urban Communities Project (DPUCP).

[39] F. Steinberg (2010).

reblocking or implementation of standards on living space to address the congestion problem is also a major need.

**Table 14.** Slum Poor Recommended Projects to the Government, FGD 2010

| National Government | Local Government |
|---|---|
| •Relocation with livelihood support and basic services (in the city) | •Security of tenure |
| •NHA-enforce ruling on re-blocking 36-54, Floor Area to Land Area Ratio | •Visibility of Barangay Security Development Office to ensure enforcement of anti-pollution measures |
| •Housing Rehabilitation Program in coordination with the private sector | •Provision of ambulances, fire trucks, rubber boats and patrol vehicles for rescue searching in case of emergency disasters; proper rescue equipment |
| •Provision of Philhealth cards for medical needs | •Provision of landfill |
| •Development of Road and Provision of Drainage | •Provision of open canal |
| •Coordinate with Maynilad regarding maintenance of distribution line for water | •Asphalting areas needed to prevent muddy season |
| •Inititate mangrove planting | •Request seed for tree planting |
| •Require manufacturers to phase out 2-stroke brand for motorcycles | •Provision of street lights |
| | •Maintenance of creeks on a quarterly basis to prevent clogging and avoid flooding. |
| | •Non-acceptance of registration of 2-stroke brand for motorcycles |

## VII. Conclusions and Policy Recommendations

Slum poverty is primarily urban environmental poverty. Living in bad environment deprives people of a quality of life to have better incomes and gainful employment. In particular, poor environment lowers the physical and mental health status of households which adversely affects productivity, lowers the performance of children in schools and increases vulnerability to crimes and violence. The slum environment is also vulnerable to climate-induced risk and its impact has been more pronounced in slums due to deficit infrastructure, congestion or overcrowding and limited coping strategies of households. The flood event caused by Typhoon Ondoy in 2009 had cost government billions of pesos for rehabilitation and relief operations. The disaster led to significant damages and losses to slum households' natural, physical and social assets. It increased helplessness and created greater difficulties for the slum poor.

Slum poverty will become more pronounced with the influx of population from the rural areas and high fertility rates among the ranks of the slum poor. People reside in slums because there are no other housing alternatives and the demand–supply gap for the low income sector continues to grow. A large number of the population in slums are the low-income workers that provide labor in the service sectors, industrial production and construction. They contribute substantially to

productivity and growth in urban areas yet they are deprived of basic services in cities. The rising population in slums shows that inequality is rising and growth has not been inclusive. Improving slums would not only impact on poverty reduction but also bring about growth due to higher productivity of labor. Less slums will also attract tourist and investment in cities.

Slum poverty cannot be addressed through traditional poverty programs such as cash transfer because bad housing significantly lowers health status of households especially children. It has in fact been argued that possible trade-offs exist between bad housing and medical care and between bad housing and education. If such trade-offs do exist, improving slums also reduces government costs on medical care or insurance and education subsidy for the poor.

It is noteworthy that among the housing components that tend to matter most in terms of health index and households' assessment of risk reduction are public good types- drainage, sewer facilities, asphalt roads, solid waste management, pollution enforcement etc- which the individual household cannot provide or enforce by itself. These "goods" require government investments and regulatory actions. It implies investments in basic infrastructure and flood mitigation measures and effective town planning and pollution controls. It also implies strong national government presence since public good investments and environmental concerns cut across administrative boundaries.

The link between poverty, environment and climate change in slums is considerable and empirical work to further establish this link should be undertaken. Studies that will quantify the defense cost of households to their environment and climate change and also quantify the impact of poor environment to education are the possible areas for research.

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