Josefina V. CABIGON, "Poverty: the Cause and Consequence of Philippine Mortality", CICRED Seminar on *Mortality as Both a Determinant and a Consequence of Poverty and Hunger*, Thiruvananthapuram, India, February 23-25, 2005, pp. 1-28.

Understanding the Poverty–Mortality Relationship: the Philippine Case[1]

Josefina V. Cabigon, Ph.D.
Population Institute
College of Social Sciences and Philosophy
University of the Philippines Diliman
Quezon City

1. Introduction

In most of her official pronouncements[2], President Macapagal-Arroyo's priorities in relation to the 2000 millennium goals[3] are poverty alleviation and provision of quality education. Lamentably, nothing is mentioned about improvement of health despite the link between poverty reduction and health advancement. As J. Sachs (2004:947) simply puts: '… the first millennium goal … to reduce by half the proportion of the population in extreme poverty … by 2015 cannot conceivably be accomplished if the health goals are not achieved.'

---

[1] Paper presented for the CICRED seminar on *The Impact of Mortality as Both a Determinant and a Consequence of Poverty and Hunger: A Contribution to Achieving the First Millenium Development Goal (Eradicate Extreme Poverty and Hunger)* held in the Centre for Development Studies, Prasanth Nagar, Ulloor, Trivandum – 695 011, Kerala State, India on 12-14 January 2005.

[2] Examples are her July 22, 2004 State of the Nation address (SONA) unveiling her 5 key reform packages: (1) job creation through economic growth;(2) anti-corruption through good government; (3) social justice and basic needs; (4) education and youth opportunity; and (5) energy independence and savings and her 10-point agenda unfolded nearly a month before her 2004 SONA: (1) create 6-10 million new jobs in 6 years; (2) provide quality education; (3) present a balanced budget by 2009; (4) develop a transportation network to interconnect the whole country; (5) decongest Metro Manila; (6) provide electric power and clean water to all *barangays* (villages); (7) develop the former US-run Subic Naval and Clark Air Bases into the best strong international service and logistic center in the region; (8) automate the election process; (9) end the armed conflict in Mindanao; and (10) unite the forces of the EDSA 1,2, and 3 uprisings.

[3] These millennium goals are: (1) eradicate extreme poverty and hunger; (2) achieve universal primary education; (3) promote gender equality and empower women; (4) reduce child mortality; (5) improve maternal health; (6) combat HIV/AIDS, malaria and other diseases; (7) ensure environmental sustainability; and (8) develop a global partnership for development (http:///www.developmentgoals.org.).

In the current development discourse, what appears to be the common view is that development in the past 50 years has not changed the lives of many poor (ex. W. Sachs, 1992; A. Sen, 2000; D. Kingsbury, 2004). The millennium goals are clear evidence that the international community has agreed that there can be no development without poverty reduction (J. Remenyi, 2004) and he argues that the millennium poverty reduction and social development targets[4] of these goals are achievable with adequate resolve and political will of both the poor and donor countries. More so if these governments, for example the Philippine government, are provided with hard evidence of the equal importance of poverty and mortality reduction.

In light of the above, this paper aims to examine Philippine poverty and mortality exhausting all available relevant data. Specifically, it: (1) establishes trends in both poverty incidence and mortality; (2) explores the poverty-mortality link; and (3) discusses the complexity of the poverty-mortality relationship within a multidimensional framework.

2. Data and Methods

In establishing **mortality** trends from 1960 to 2000, various indicators are used. Life table infant mortality rate (IMR)[5] and expectation of life at birth ($^{o}e_{o}$)[6] are obtained from my other related works. These figures were derived after careful assessment of the robustness in the application of several techniques of estimating the completeness of death coverage of population ages 5 years and over to arrive at adjusted age-specific death rates. The adjusted age-specific death rate of the age group 5 to 9 was used to locate the implied infant and child central death rates of the United Nations Latin American pattern. The under-five mortality rate (U5MR) and maternal mortality ratio (MMR) are official estimates recommended by the Technical Working Group on Maternal and Child Mortality of the Philippine NSO.

As the "disease of the poor", TB mortality is also included in the present paper and serves as both health and poverty indicators. In establishing the trend in overall TB mortality, published estimates on TB, all forms per 100,000 population by the Department of Health (DOH, 1996) for 1975, 1980, 1985, 1990 and 1995 are used. These estimates are based on weekly reports of notifiable diseases from all provincial and city

[4] The corresponding targets of the millennium goals are: (1) 50% reduction of people in extreme poverty; (2) universal primary education for all; (3) eliminate gender disparities in primary and secondary education; (3) reduction in infant mortality by two-thirds; (4) reduction in maternal mortality by three-quarters; and (5) access to reproductive health services for all (J. Remenyi:193, Table 8.1).

[5] Number of infant deaths per 1000 live births.

[6] Commonly defined as a period life table function that refers to the number of years a baby born in some specified period could expect to live if it were subject to the current age-specific death rates operating over its entire life.

health offices throughout the country. It must be noted that there are no similar DOH publications after 1996. Comparable WHO estimates are also cited where appropriate.

To further understand mortality in the Philippine context, the leading causes of deaths by gender are also examined. Data on disease patterns are obtained from the 1994 and 2000 Vital Statistics Reports of the NSO.[7] In the present paper, the causes of deaths in broad categories except respiratory TB, taken singly as percent of total deaths by gender and age groups 5-14, 15-24, 25-44, 45-64 and 65+, are analyzed. It is worth mentioning that ranking of the leading causes of death does not differ whether rates or percent of total deaths are used.

The actual level of mortality attributed to each of the main diseases in question is highly suspect and undoubtedly low. Encouragingly however, data in the Philippines in the 1960s were included in the data sets that passed the permissive tests used by S. Preston et al. (1972:3) which are: absence of gross error (e.g. a decline in death rates with age after age 50 years, implausible life expectancy), empirical regularities, highly predictable frequencies of particular causes of death, errors not obscuring fundamental changes in the structure of mortality, and pattern of cause structure of mortality changing systematically as the level of mortality changes. Recorded deaths thereafter appear to show the same encouraging patterns, as will be shown later. Given that little can be done to quantify any corrections to the data which might seem appropriate, examining the relativity of trends for the main categories of recorded causes to gain some useful insights into the main killers in the Philippines may be a better option than ignoring the available data altogether. The possibilities of data deficiencies should not however be discounted.

As to trends in **poverty**, several published poverty incidence at the national level from 1960 to 2000 using different ways of deriving them from three main sources will be used to ascertain meaningful trends from 1960 to 2000. The **first** source is the poverty incidence calculated and published by the National Statistical Coordination Board (NSCB) based on the Family Income and Expenditure Survey (FIES) taken every three years starting 1961. Unfortunately, the official estimates from 1961 to 2000 could not be interpreted as a continuous series because the method of estimation is not uniform. The estimates prior to 1997 were calculated using a method different from the 1997 and 2000 poverty incidence. A provincial poverty methodology approved by the NSCB Executive Board in its meeting on January 15, 2003 was employed with the 1997 and 2000 estimates but not with the earlier estimates. Nonetheless, NSCB poverty incidence refers to the poor as those families and individuals whose income fall below the poverty threshold and who cannot afford to provide for their minimum basic needs in a sustained manner.

[7] The 1996 DOH source is no longer utilized as its sources for the 1975 to 1995 estimates are the National Statistics Office (NSO) Vital Statistics Reports. Instead, the 1994 and 2000 Vital Statistics Reports of the NSO are used to update my earlier work (1995) on shifts in disease patterns which covered 1964 to 1990 data.

Balisacan's works on poverty incidence estimation are the **second** source. He calculated two main sets of poverty estimates (A. Balisacan, 1994:120-123). One is based on population distributions reported in the FIESs. The other set, which he termed Fixed Physical Areas (FPA), is based on population distributions for fixed physical areas. Under each set he calculated three indices, the head-count index, the poverty gap index and the Foster-Greer-Thorbecke index. The head-count estimates based on the FIESs are used in the the present paper. Balisacan's head-count poverty index is simply the proportionate number of the population below a given official poverty line. His estimates differ in his several publications because he used different official poverty lines estimated by NSCB. Also, his estimates are not strictly comparable with the NSCB official estimates because he held fixed the real poverty lines for the period under consideration and his estimates are based on uniformly constructed grouped data.

The **third** source refers to the World Bank poverty incidence estimates based on the internationally comparable "$1 a day" poverty line.

Trend in poverty incidence for the 10 poorest and 10 least poor provinces is also analyzed.

The human development index (HDI) for 1994, 1997 and 2000, calculated and published by the NSCB, is also utilized in this paper. The index is calculated in the same way as the United Nations Development Program HDI which combined $^{o}e_{o}$, income and education indicators. Trend in the percent distribution of the provinces constituting the country according to 1994 to 2000 HDI is also examined.

With regards to the exploration of the poverty-mortality linkage, the lack of appropriate data to examine the relationship within a multivariate context is a constraint. Repeating the same multivariate analyses I have previously done with the same variables but measured using the most recent data will not yield new findings as to the unraveling of such link. Nonetheless, the correlation coefficient between IMR and poverty incidence for 1995 data by province and TB mortality and poverty incidence for 1997 data by province are generated.

I explore the poverty-mortality relationship in a descriptive way using the most recent available information to update some of my earlier works at the global, provincial and household-individual levels.

At the global level, I examine how the Philippines fared compared to other selected countries belonging to the high, upper middle, lower middle and low income groups in 2000 and 1990. For 2000, I used the 2002 World Bank gross national income in purchasing power parity (GNI PPP), $^{o}e_{o}$ by sex and IMR for both sexes combined from the 2004 World Population Data Sheet of the Population Reference Bureau (2004). GNI PPP refers to gross national income converted to international dollars using a

purchasing power parity conversion factor. International dollars indicate the amount of goods and services one could buy in the United States with a given amount of money. For 1990, the sources are the World Bank (1992) figures except for the life expectation at birth values for the Philippines which came from W. Flieger and Cabigon (1994) and infant mortality values from the official estimate recommended by the Technical Working Group on Maternal and Child Mortality which I chair.

At the provincial level, I look at the provincial distribution according to the HDI, income, education and life expectancy index calculated and published by NSCB for the years 1994 and 1997 based on the UNDP classification as shown in the text box.

High	0.80 to 1
Medium	0.50 to 0.79
Low -	0.0 to 0.49.

At the household-individual level, I use the 1998 and 2003 National Demographic Health Survey (NDHS) IMR and U5MR by wealth index quintile (total, by gender and urban-rural residence) and the percentage of skilled attendance at delivery as proxy indicator of maternal mortality by wealth index quintile by urban-rural residence. The source of the 1998 NDHS figures is D. Gwatkin et al. (2000) while the source of the 2003 NDHS figures is the Final Report (NSO and ORC-Macro International, 2004). The wealth index is derived from household ownership of consumer items from a fan to a television and car, dwelling characteristics such as flooring material, type of drinking water source and toilet facilities used using the principal component analysis. Resulting scores were standardized to define the wealth quintiles expressed in terms of quintiles of individuals in the population. For example, the quintile IMR for the poorest group is IMR per 1000 live births among all people in the population quintile concerned (D. Gwatkin et al., 2000).

3. Findings

3.1 Trends in Mortality

Table 1 shows the IMR per 1000 live births and ${}^{o}e_{o}$ for male, female and both sexes, U5MR per 1000 for both sexes and MMR from 1960 to 2000. A drastic decline in infant mortality rates from 1960 to 1980 and a decelerating decrease thereafter is observed. This trend is more marked among male infants compared to female infants. The pace of decline in the number of years a newborn baby lives in a given year under consideration (${}^{o}e_{o}$) is slow since 1960, irrespective of sex. This decelerating pace of mortality decline is also observed in the recent years for children below 5 years old (U5MR) and maternal deaths (MMR). The pattern of decline of the selected indicators over the past four decades is graphically presented in **Figure 1**.

Table 2 shows the estimated tuberculosis, all forms mortality rate per 100,000 population from two main sources. WHO estimates indicate a worsening trend in the

most recent years while DOH estimates show a saw-tooth pattern trend from 69 per 100,000 population in 1975 to 55.6 per 100,000 in 1983, then a rise to 57.9 in 1985 then a fall to 36.7 in 1993 and then a rise to 38.9 in 1995 **(Figure 2)**. Note that the WHO estimate for 1993 which is 42 is higher than the DOH estimate of 36.7. However, the consistent rising trend in the DOH estimate from 1993 to 1995 and in the WHO estimate from 1993 to 2003 indicate some slight worsening in TB mortality in the Philippines.

Table 1. Selected Mortality Indicators in Various Years, Philippines

Year	Infant mortality rate per 1000 live births (IMR)			Expectation of life at birth ($^{o}e_{o}$)			Under-5 mortality rate (U5MR)/1000	Maternal Mortality Ratio (MMR)
	Male	Female	Both Sexes[a]	Male	Female	Both sexes[a]	Both sexes	
1960	120	96	108	57.5	59.0	58.2	NC	NA
1970	95	85	90	57.3	61.3	59.2	NC	NA
1980	66	60	63	59.9	65.0	62.4	NC	NA
1990	61	54	58	62.1	67.9	64.9	79.6[b]	209[b]
1995	54	49	52	63.0	68.0	65.0	66.8[b]	180[b]
2000	42	38	40	63.1	69.1	66.0	53.4[c]	NA

[a] Calculated with sex ratio at birth of 105.

[b] Official estimates

NC=Not calculated from the life tables; NA=Not available.

Sources: Cabigon (1990); Flieger and Cabigon (1994); Cabigon and Flieger (1999); NSCB (1995); Small group for Mortality re 2000-based population projection which I chair.

Figure 1. Selected Mortality Indicators in Various Years, Philippines

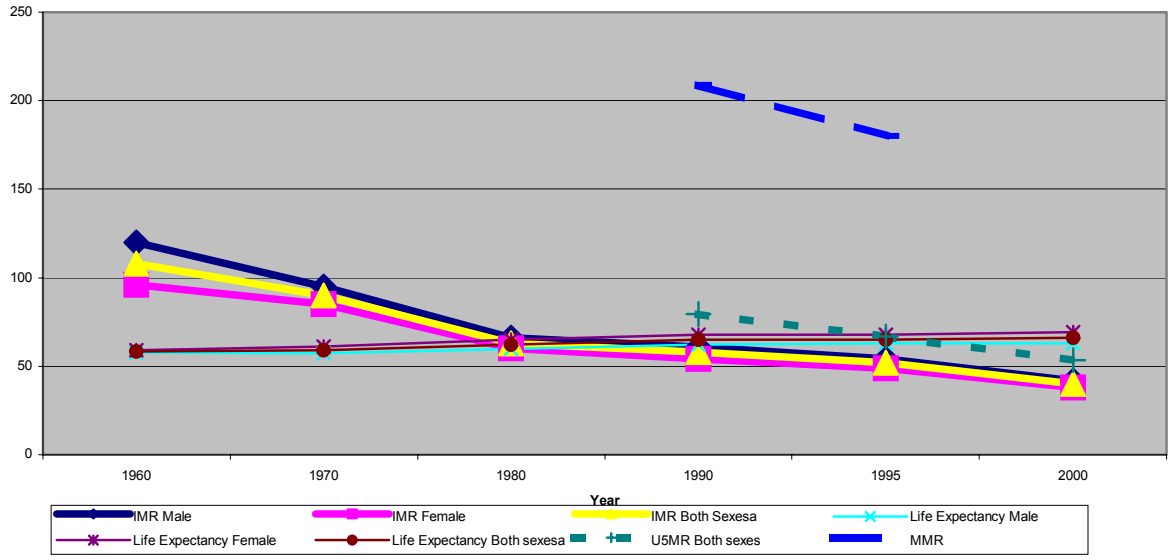


Table 2. TB Mortality per 100,000 population 1975 to 2003 from various sources

Source/Year	TB mortality per 100,000 population
A. WHO	
2003	57
1993	42
B. DOH Weekly reported notifiable diseases	
1995	38.9
1993	36.7
1990	39.2
1985	57.9
1983	55.6
1980	59.6
1975	69.2

Sources: WHO Report 2004:100 for 2003 and Blumenfeld et al., 1999:1 for 1993; DOH, 1995 Philippine Health Statistics: Table 16:81.

Figure 2. TB Mortality per 100,000 population 1975 to 2003 from various sources

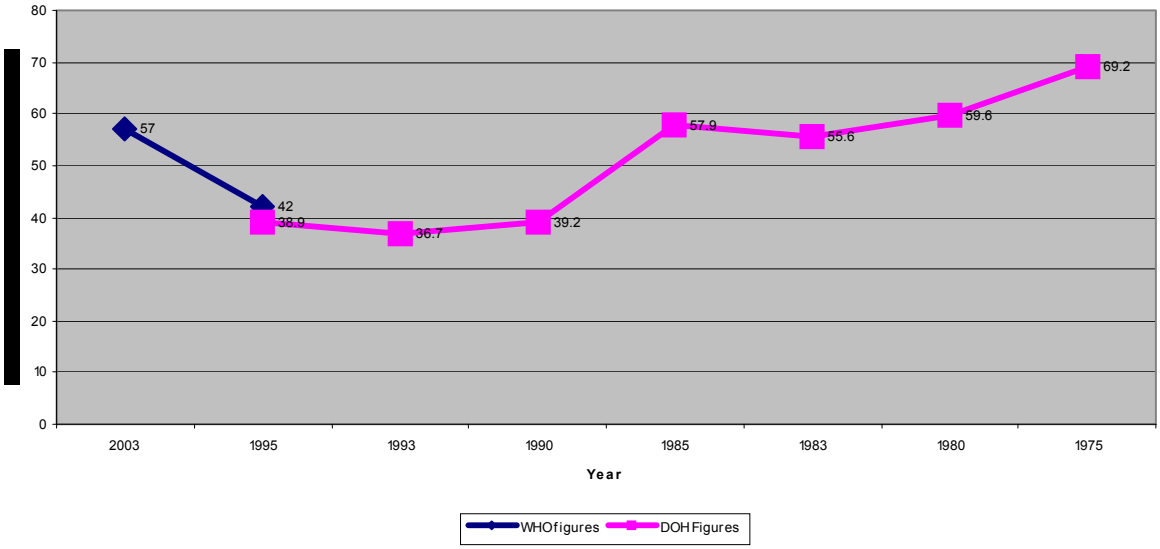


Table 3 presents the causes of deaths in percent of total deaths by gender from 1964 to 2000. Respiratory TB among males and females was slightly falling from 1964 to 1990 but rose then fell in 1994 and 2000. The observed worsening trend in overall TB mortality all forms in recent years is slightly reflected by respiratory TB and mostly reflected by other infectious diseases which include TB meningitis and all other forms of TB. Respiratory TB remains as one of the six leading causes of mortality.

Table 3: Causes of deaths in per cent of total deaths by sex, Philippines, 1964-2000

Sex/Broad Category Of Disease	Sex							
	1964	1970	1974	1980	1984	1990	1994	2000
Male								
Respiratory TB	**10.6**	**10.4**	**10.2**	**9.6**	**9.2**	**8.2**	**9.1**	**8.2**
Other Infectious diseases	7.7	5.8	7.4	6.0	6.0	5.2	4.1	9.2
Influenza, pneumonia, bronchitis	9.6	17.8	20.4	15.8	14.6	12.4	7.9	7.7
Diarrhea, gastritis, enteritis	7.5	4.7	1.5	4.5	3.3	1.7	0.2	1.0
Cardiovascular diseases	7.8	10.5	13.2	16.6	18.1	24.6	26.8	28.3
Certain degenerative diseases	3.9	4.0	4.3	4.8	4.9	5.7	6.9	8.0
Malignant & benign neoplasms	3.1	3.8	4.2	5.0	5.1	6.4	7.9	9.0

Motor vehicle accidents	0.6	0.6	0.6	0.9	0.7	1.1	1.6	1.9
Unknown	10.0	12.8	10.8	9.7	9.6	5.8	6.5	8.0
All others	39.2	29.6	27.4	27.1	28.5	28.9	29.0	18.7
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
N	**117575**	**133344**	**160061**	**176545**	**186148**	**185788**	**191846**	**217404**
Female								
Respiratory TB	**11.7**	**11.1**	**9.9**	**8.9**	**8.1**	**6.6**	**6.8**	**5.7**
Other Infectious diseases	7.1	5.7	6.9	6.1	6.7	5.7	4.1	7.6
Influenza, pneumonia, bronchitis	20.6	19.7	22.0	18.0	16.9	15.4	10.5	10.9
Diarrhea, gastritis, enteritis	7.2	4.6	1.4	4.6	3.4	1.8	0.2	1.2
Cardiovascular diseases	7.7	10.8	13.6	18.3	19.5	26.7	29.3	31.5
Certain degenerative diseases	3.1	3.1	3.2	3.7	4.0	4.9	6.1	7.7
Malignant & benign neoplasms	3.6	4.5	4.9	6.0	6.4	8.0	9.9	11.2
Motor vehicle accidents	0.2	0.3	0.3	0.5	0.4	0.7	0.9	1.0
Complications of pregnancy	1.9	1.4	1.3	1.3	1.1	1.0	1.8	0.8
Unknown	-	12.4	10.6	8.9	8.9	5.5	9.0	9.6
All Others	36.9	26.4	25.9	23.7	24.6	23.7	21.4	13.8
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
N	**97361**	**100694**	**123914**	**121461**	**127211**	**128102**	**129594**	**149527**

Continuation of Table 3.

Category	Composition of cause-of death categories: Terms in the international classification			
	1960 & 1970	1974	1980-1994	2000
Respiratory tuberculosis	001-008	---------010-012----------		A15-A16
Other infectious diseases	010-138	----001-008,013-136/137---		A00-08,A17 B99,J22,J40- J98
Influenza, pneumonia, bronchitis	480-502	460-6,470-474 480-6, 490-493	466, 480-6, 487	J10-J21
Diarrhoea,gastritis, enteritis	543,571,572	009,535	009	A09
Cardiovascular diseases	330-334,400-468	390-458	390-459	I00-I99

Certain degenerative diseases	260,540-1,581,591-4	------250,531-533,571, 580-589	E10-E14, K25-K28, K73-K74, N17-N27
Malignant & benign neoplasms	----------140-239----------		C00-C96
Motor vehicle accidents	E810-E835	---------E810-E819----------	V01-V99
Complications of pregnancy	640-689	--------- 630-676 ----------	O08-O99
Unknown	773-776,793,795	---764-766,775,780-796,798-799-	P00-P99, R00-R99
All other (residual)			

Sources: For 1964, Preston et al. (1972: 566-564); for the other years, National Statistics Office: *Vital Statistics Report*.

What is noticeable is a steeper decrease in mortality due to respiratory tuberculosis for females compared to males. Among males, respiratory TB ranked 1 in 1964, ranked 3 from 1970 to 1990, ranked 2 in 1994 and ranked 4 in 2000. Among females, it ranked 2 in 1964 and 1970, ranked 3 from 1974 to 1984, ranked 4 in 1990 and 1994 and ranked 6 in 2000. While females were more disadvantaged compared to males in the 1960s with regards to respiratory TB mortality, the reverse holds true since the 1980s. Of the other communicable diseases, influenza, pneumonia, bronchitis exhibit an upward trend (both sexes) up to 1974 and a large, monotonic decline thereafter. With respect to the non-infectious diseases, cardiovascular diseases manifest a clear and substantial rising trend in the percentage to total deaths while certain degenerative diseases and malignant and benign neoplasms indicate a slow rising then constant trend (both sexes).

Is the continuously increasing or stable trend in mortality due to non-communicable diseases, which is not contrasted by a corresponding marked decrease in mortality from all communicable diseases, except respiratory tuberculosis, entirely due to improved recognition and specification of the non-communicable diseases? The proportion of deaths assigned to the 'Unknown' category (symptoms, signs and ill-defined conditions, other causes of perinatal morbidity and mortality) decreases gradually from about 12 per cent in 1970 to 6 per cent in 1990 for both sexes. This decline may indicate better diagnosis or reporting, most likely of non-communicable diseases over time, which may partly explain the rising and constant mortality trend in these diseases. However, if the observed pattern of change in non-communicable diseases were entirely due to improved disease recognition and specification, the resulting bias would characterize the rise similarly for both sexes and across periods. That the observed pace of change in

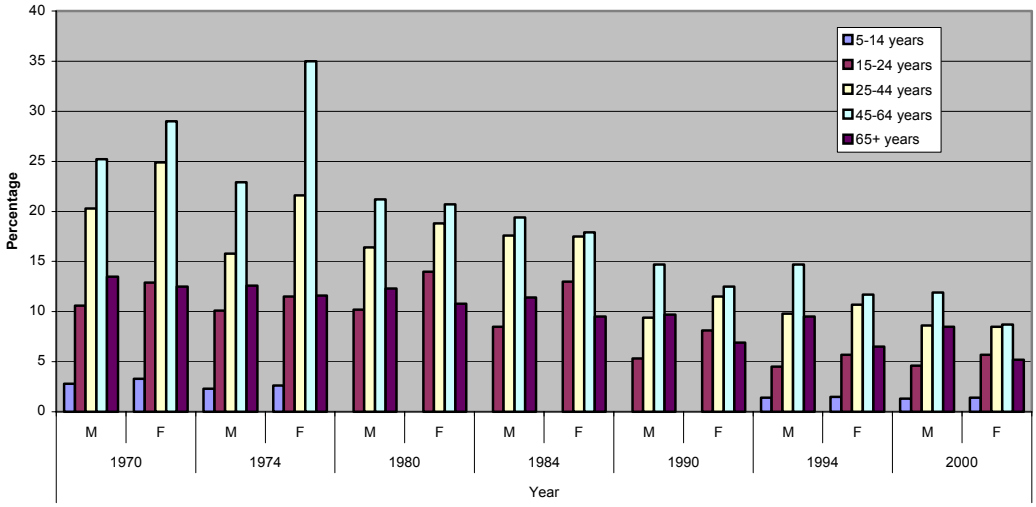
mortality from non-communicable diseases substantially differs by sex, with a marked increase among males and a much slower pace among females, and then a rise and fall since 1994 does not indicate a serious and systematic bias. Hence, some of the observed change may be genuine.

Table 4 and **Figure 3** shows that the proportionate share of deaths due to respiratory TB to total deaths is as expected , with the lowest among the youngest age group 5-14, and the highest among the 45-64 years old (males and females). With the exception of 1984 and 2000, the proportionate share of deaths to total deaths at reproductive ages is higher for females than males. It is in the oldest age group 65 years and over that the proportionate share of deaths due to TB is consistently higher for males than females.

Table 4. Percentage of Deaths due to Respiratory TB to total deaths in a given age group by gender and age 5 years and over by gender, 1970 to 2000

Age	Year													
	1970		1974		1980		1984		1990		1994		2000	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
5-14	2.8	3.3	2.3	2.6	0.0	0.0	0.0	0.0	0.0	0.0	1.39	1.5	1.3	1.4
15-24	10.6	12.9	10.1	11.5	10.2	14.0	8.5	13.0	5.3	8.1	4.5	5.7	4.6	5.7
25-44	20.3	24.9	15.8	21.6	16.4	18.8	17.6	17.5	9.4	11.5	9.8	10.7	8.6	8.5
45-64	25.2	29.0	22.9	35.0	21.2	20.7	19.4	17.9	14.7	12.5	14.7	11.7	11.9	8.7
65+	13.5	12.5	12.6	11.6	12.3	10.8	11.4	9.5	9.7	6.9	9.5	6.5	8.5	5.2

Figure 3. Percentage of Deaths due to Respiratory TB to total deaths in a given age group by gender and age 5 years and over by gender, 1970 to 2000



These data appear to confirm the global findings of men and women at ages 15-24 and reproductive ages getting afflicted with TB and the more or less universal higher male than female mortality evident with TB mortality at old ages 65 and over.

3.2 Trends in Poverty

Irrespective of what methods of estimation of the poverty incidence in the Philippines are, the trend they portray is also declining as observed with mortality (**Table 5)**. The greatest decline seems to have occurred during the 1985-1995 period but has slackened during the 1997-2000 interval. The same socioeconomic improvement is depicted with 26 percent of provinces in the low HDI index in 1994 reduced to 9 percent in 2000 (**Table 6**).

Table 7 shows that most of the 10 poorest provinces according to 2000 poverty incidence are in the Mindanao Island (Sulu, Tawi-Tawi, Maguindanao, Lanao del Sur, Sultan Kudarat and Camiguin). Sulu and Lanao del Sur and all of the Luzon provinces (Masbate, Ifugao, Romblon and Camarines Norte) remained the most impoverished since 1997. The remaining Mindanao provinces experienced worsening poverty during the 1997 to 2000 interval revealing more than half of the families in extreme poverty. As expected, the 10 least poor in 1997 and 2000 are in Metro Manila, the most developed region in the country and in the Luzon Island. With HDI, Sulu, Tawi-tawi, Maguindanao and Lanao del Sur of the Mindanao Island and Ifugao of the Luzon are also in the bottom 10. Four of the Mindanao islands (Basilan, Agusan del Sur, Lanao del Norte and Sarangani) and Samar from the Visayan Island joined the impoverished provinces. Also with HDI, all of the top 10 are in Luzon Island with Ilocos Norte, Batangas, Pampanga and Isabela joining the camp of the least poor provinces based on poverty incidence.

Table 5. Selected Poverty Indices in Various Years from Various Sources

Year	NSCB official estimates[a]	NSCB official estimates[a]	World Bank[b]	Balisacan[c]	Balisacan[d]
1961				59.2	
1971				52.2	
1975			35.7		
1985		49	32.4	53.9	41.5
1988		50			
1991		45		44.6	
1994		41			
1995			25.5		25.0
1997	33.0	37			
2000	34.0				

[a]Poverty incidence or percent of population whose income fall below the poverty threshold and who cannot afford in a sustained manner to provide for their minimum basic needs derived on a provincial poverty methodology.

[b]Poverty incidence at the national aggregate level using the internationally comparable "$1 a day" poverty line.
[c]Poverty incidence based on the head count reported in the FIES using the real poverty line lines held fixed for the period under consideration.
[d]Poverty incidence on spatially consistent poverty lines applied to the distribution of per capita consumption expenditures.

Sources in chronological order from first to fifth columns: National Statistical Coordination Board (NSCB). "Highlights: Poverty incidence 1997 and 2000 accessed online at www.nscb.gov.ph; P. David and D. Maligalig (May 2001) accessed on line at http:/google.com; A. Balisacan (2002) Table 6:13; A. Balisacan (1994) Table 2:122; A. Balisacan and E. Pernia (2002).

Table 6. Percent Distribution of Provinces by HDI three-classification, 1994, 1997 and 2000.

HDI three-classification according to the United Nations Development Programme (UNDP)	Year		
	2000	1997	1994
High (0.80-1.00)	-	-	-
Medium (0.50-0.79)	90.9	81.8	73.7
Low (0.00-0.49)	9.1	18.2	26.3
Total	100.0	100.0	100.0
N	77	77	76

Sources: National Statistical Coordinating Board (NSCB) ."Highlights of the Report of the 1997 Philippine Human Index " and "Highlights of the Report of the 2000 Philippine Human Index " accessed online at www. nscb.gov.ph.

Table 7. Poverty Incidence of Families in the 10 Poorest Provinces and 10 Least Poor Provinces Based on 2000 in Two Periods and HDI in the Top 10 and Bottom 10 Provinces Based on 2000 in Three Periods

Poverty incidence			HDI			
Province	Year		Province	Year		
	2000	1997		2000	1997	1994
Poorest			**Bottom 10**			
1. Sulu	63.2	67.1	1. Sulu	0.351	0.336	0.357
2. Masbate	62.8	61.4	2. Tawi-tawi	0.390	0.430	0.387
3. Tawi-tawi	56.5	35.0	3. Basilan	0.425	0.439	0.423
4. Ifugao	55.6	57.7	4. Ifugao	0.461	0.452	0.406
5. Romblon	55.2	52.8	5. Maguindanao	0.416	0.416	0.449
6. Maguindanao	55.1	41.6	6. Lanao del Sur	0.464	0.415	0.442
7. Lanao del Sur	55.0	55.6	7. Agusan del Sur	0.482	0.482	0.459
8. Sultan Kudarat	54.3	36.6	8. Samar	0.511	0.493	0.462
9. Camiguin	53.1	32.5	9. Lanao del Norte	0.512	0.470	0.473
10. Camarines Norte	52.7	49.7	10. Sarangani	0.516	0.494	0.529
Least Poor			**Top 10**			
1. 2nd District, NCR	4.1	4.5	1. Bulacan	0.760	0.702	0.727
2. 4th District, NCR	4.9	4.6	2. Bataan	0.746	0.727	0.653

3. Bulacan	5.4	8.3	3. Cavite	0.735	0.724	0.782
4. 1st District, NCR	5.8	5.7	4. Rizal	0.733	0.693	0.730
5. Batanes	7.5	8.7	5. Batanes	0.717	0.713	0.760
6. Rizal	8.0	8.3	6. Laguna	0.709	0.676	0.721
7. Laguna	8.6	12.3	7. Ilocos Norte	0.684	0.646	0.623
8. 3rd District, NCR	9.0	4.6	8. Batangas	0.683	0.684	0.672
9. Bataan	9.9	7.7	9. Pampanga	0.665	0.648	0.664
10. Cavite	10.2	8.0	10. Isabela	0.649	0.626	0.624

Sources: National Statistical Coordination Board (NSCB). "Highlights: Poverty incidence 1997 and 2000; "Highlights of the Report of the 1997 Philippine Human Index " and "Highlights of the Report of the 2000 Philippine Human Index "accessed online at www.nscb.gov.ph.

3.3 Poverty-Mortality Relationship

3.3.1 Poverty affecting mortality. As expected and consistent with the general approach of taking IMR as an indicator of socioeconomic condition of an area, the correlation coefficient between 1995 IMR and 1997 poverty incidence is 0.81. The correlation coefficient between TB mortality and poverty incidence using 1997 figures and province as units of analysis is very low (r=.05) and insignificant.[8] This is more a reflection of the great variation by province in the reporting of notifiable diseases wherein the better-off provinces are more likely to submit more complete reports than their counterparts to the DOH central office.

With IMR as the dependent variable, and poverty incidence, proportion of households with safe drinking water, proportion of underweight children and proportion of accomplished fully immunized children to targets as predictors, multivariate analysis revealed poverty incidence losing its significance. Given such results and as stated in Section 2, further analysis using the expectation of life at birth as the dependent variable was not done anymore because initial results showed clearer infant mortality-poverty incidence relationship than expectation of life at birth-poverty incidence relationship. Moreover, I have already performed multivariate analyses focused on the expectation of life at birth as the dependent variable in my earlier works using 1960, 1970 and 1980 data (Cabigon, 1990) as will be cited in Section 4.

3.3.2 Global perspective: the Philippines compared with selected countries in poverty and mortality. According to the United Nations estimates, the Philippines is one of the 11th – 15th lowest middle income countries, and has a life expectancy at birth **($^0e_0$)** of 70 years (67 years for males and 72 years for females) in 2000(**Table 8a)**. It is closest to China in terms of GNI PPP per capita, $^0e_0$ (regardless of sex), and infant mortality rate.

[8] Even correlating TB prevalence with poverty incidence, the results are insignificant.

Both countries portray much better values in mortality indicators than Trinidad and Tobago, two countries that ranked highest among the upper middle income countries. These figures suggest a poverty-mortality relationship that is not straightforward. The same pattern is also evident with the 10 richest countries, with Japan, the 10th richest country showing the longest life span and lowest infant mortality compared to other countries in its group , as well as among the 10 poorest countries with the Democratic Republic of Congo, the 6th poorest low income country, manifesting better survival than Ethiopia, the 9th poorest low income country. These observations imply that the relationship between poverty as indicated by GNI PPP per capita and mortality is not monotonically negative (with IMR as the indicator) nor positive (with $^{o}e_{o}$ as the indicator).

A similar non-monotonic positive association between poverty and mortality is evident with the 1990 corresponding figures (**Table 8b**). The Philippines shows the highest life expectancy of 65 followed by Bolivia among the five lowest lower-middle-income Countries, as classified according to their gross national product (GNP) per capita. Japan the third richest country in 1990, registers the longest lifespan. Nepal, the 5th lowest low income country portrays a higher life expectancy of 52 years than Senegal, the 3rd in the lowest lower middle income group with a life expectancy of 47 years.

Another trend observed in Tables 8a and 8b is a sharper pattern of decline in infant mortality as development, measured by GNI PPP or GNP per capita, becomes greater. This is in contradiction to the more gradual upward trend observed in life expectancy as development status increases. While the most economically advanced countries have an average life span of their population about two times that of the poorest countries, the poorest countries have over 10 times the infant mortality rates of the most developed countries. It is worth noting here that the infant mortality rate is usually taken as a proxy indicator of the socioeconomic condition of a country because in most instances, the infant mortality-development relationship is clearer than the life expectancy-development relationship.

Table 8a: Selected Indicators for Selected Countries, Around 2000

Country	2002 GNI PPP per capita in US dollars	Expectation of life at birth ($^{o}e_{o}$)			Infant Mortality Rate per 1,000 live births
		Males	Females	Both Sexes	
A. 10 highest high income[a]					
1. Luxembourg	53,290	75	81	78	4.9
2. Norway	36,690	77	82	80	3.4
3. United States	36,110	75	80	77	6.7
4. Switzerland	31,840	77	83	80	4.4
5. Denmark	30,600	75	79	77	4.4
6. Ireland	29,570	75	80	77	5.1
7. Canada	28,930	77	82	79	5.2
8. Austria	28,910	76	82	79	4.5

9. Australia	27,440	77	83	80	4.7
10. Japan	27,380	78	85	82	3.0
B. 5 highest upper middle income[b]					
1. Trinidad and Tobago	9,000	63	66	64	65
2. Mexico	8,800	74	80	77	11
3. Costa Rica	8,560	67	73	70	17
4. Malaysia	8,500	72	78	75	12
5. Uruguay	7,710	69	74	71	25
C. 11th – 15th lowest middle income[c]					
1. China	4520	70	73	71	32
2. **Philippines**	**4450**	**67**	**72**	**70**	**29**
3. Jordan	4180	71	72	72	22
4. Guatemala	4030	63	69	66	39
5. Guyana	3940	60	67	63	53
D. 10 lowest low income[d]					
1. Yemen	800	58	62	60	75
2. Ethiopia	780	45	47	46	105
3. Madagascar	730	53	58	55	84
4. Congo	710	47	50	48	84
5. Ginea Bisau	680	43	47	45	125
6. Congo, Dem Republic of	630	46	51	49	100
7. Burundi	630	42	44	43	74
8. Tanzania	580	44	46	45	105
9. Malawi	570	42	45	44	121
10. Sierra Leone	500	34	36	35	180

[a]Above $9075 as high income countries according to World Bank criteria
[b] $2936-9075 as upper middle income countries according to World Bank criteria
[c]$736-2935 as lower middle income countries according to World Bank criteria
[d]$735 or less as low income countries according to World Bank criteria.

Source: Population Reference Bureau **2004 World Population Data Sheet;** GNI PPP per capita(gross national income in purchasing power parity divided by midyear population) from World Bank World Development Indicators 2003.

Table 8b: Selected Indicators for Selected Countries, 1990

Country	GNP per capita income in dollars	$^{o}e_{o}$			Infant Mortality Rate per 1,000 live births[f]
		Males	Females	Both Sexes[e]	
A. 9 highest high income[a]					
1. Switzerland	32,680	75	82	78	7
2. Finland	26,040	73	79	76	6
3. Japan	25,430	76	82	79	5
4. Sweden	23,660	75	81	78	6
5. Norway	23,120	74	81	77	8
6. West Germany	22,320	73	80	76	7
7. Denmark	22,080	73	78	75	8
8. United States	21,790	73	80	76	9
9. Canada	20,470	74	81	77	7
B. 5 highest upper middle income[b]					

1. Saudi Arabia	7,050	63	66	64	65
2. Greece	5,990	74	80	77	11
3. Korea, Rep.	5,400	67	73	70	17
4. Portugal	4,900	72	78	75	12
5. Trinidad and Tobago	3,610	69	74	71	25
C. 5 lowest lower middle income[c]					
1. Cote d' Ivorie	750	54	57	55	95
2. Philippines	**730**	**62**	**67**	**65**	**57**
3. Senegal	710	46	49	47	81
4. Zimbabwe	640	59	63	61	49
5. Bolivia	630	58	62	60	92
D. 5 lowest low income[d]					
1. Nepal	170	53	51	52	121
2. Somalia	120	47	50	48	126
3. Ethiopia	120	46	50	48	132
4. Tanzania	110	46	49	47	115
5. Mozambique	80	45	48	46	137

According to World Bank criteria:

[a]above $7620=high income countries
[b] $2466-7620=upper middle income countries
[c] $611-2465= lower middle income countries
[d] $610 or less= low income countries

[e]calculated assuming sex ratio at birth = 105
[f] refers to 1991

Source: World Bank (1992): Table 1, pp. 218-219; Table 28, pp. 272-273 and Table 32, pp 280-281; for Philippines, same source for GNP but on mortality; Flieger and Cabigon (1994) and NSCB (1995).

3.3.3 Macro-Provincial perspective: poverty-mortality relationship. Table 9 reveals that almost all provinces belong to the medium group if the expectation of life at birth index in 1994 and 1997 is used. However, if the income index is considered, majority of the provinces fall into low group. Two-thirds of the 77 provinces in 1997 are classified high in the education index, a rise from 51.3 percent in 1994. Data with the mortality, income and education indices also do not portray clear positive poverty-mortality linkage. What the data show, however, is that improvement in education is much faster than improvement in poverty and mortality reduction in the provinces.

Table 9. Percentage Distribution of Provinces various Indices, 1997 and 1994

Group	Index							
	Human Index		Education		Income		Expectation of life at birth	
	1997	1994	1997	1994	1997	1994	1997	1994
High	-	-	66.2	51.3	-	-	-	-
Medium	81.8	73.7	33.8	48.7	4.0	6.6	97.4	94.8
Low	18.2	26.3	-	-	96.0	93.4	2.6	5.2

Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
N	77	76	77	76	77	76	77	76

According to the United Nations Development Programme (UNDP) classification of the index values is as follows:

0.80 to 1 = high
0.50 to 0.79= medium
0.0 to 0.49= low.

Source: National Statistical Coordinating Board (NSCB) ."Highlights of the report of the 1997 Philippine Human Index " accessed online at www.nscb.gov.ph.

3.3.4 Micro-level perspective: poverty-mortality relationship. Tables 10 and 11 indicate that the infant mortality (male or female) among the poor people is twice that among the rich people according to the 1998 and 2003 NDHSs. Occurrence of child mortality, irrespective of gender, among the poor people is about three times that among the rich people. The urban poor-rich gap is larger (about 3 times) than the rural poor-rich gap (about two times) taking the fourth quintile to indicate the rich.

Skilled delivery attendance as a proxy of maternal mortality ratio (**Table 12)** clearly shows that the poor is the least advantaged when it comes to being attended by medically trained personnel (the rich is 4 times more likely to have skilled delivery attendance than the poor) during maternal delivery. Rich mothers are 11 times more likely to be attended by doctors during delivery compared to poor mothers. There are 33rich mothers delivering at private facilities for each poor mother delivering at private facilities. The difference in these rich-poor gaps in skilled delivery attendance and place of delivery is slight between urban and rural areas. The number of poor mothers giving birth at home are four times that of their rich counterparts. While in the urban areas, the ratio of poor mothers to their rich mothers delivering at home is 5, the comparable ratio in the rural areas is 2.

A clear positive poverty-mortality relationship is evident at the micro- or household individual level regardless of the type of mortality indicator used.

Table 10. Infant Mortality Rate (IMR) and Under-five Mortality Rate (U5MR) by Wealth Index Quintile, 1998 and 2003 NDHSs

Quintile	IMR		U5MR	
	2003 NDHS	1998 NDHS	2003 NDHS	1998 NDHS
Poorest	42	49	66	80
Second	32	39	47	60
Middle	26	34	32	50
Fourth	22	25	26	33
Richest	19	21	21	29
Poorest/Richest ratio	2.2	2.3	3.1	2.7

Sources: National Statistics Office and Macro International (2004:Table 8.2a) for 2003 figures and D. Gwatkin et al., (2000) for 1998 figures.

According to D. Gwatkin et al. (2000), the socioeconomic status is defined in terms of assets or wealth based on household ownership of consumer items from a fan to a television and car; dwelling characteristics such as flooring material, type of drinking water source and toilet facilities. The asset or wealth index is constructed using these assets and principal component analysis, the resulting factor scores of which were standardized to define the wealth quintiles. They are quintiles of individuals in the population.

Table 11. Infant Mortality Rate (IMR) and Under-five Mortality Rate (U5MR) by Wealth Index Quintile and Urban-Rural Residence and Gender, 1998 NDHS

Mortality Indicator/Urban-rural residence	Quintile					Poor/Rich Ratio
	Poorest	Second	Middle	Fourth	Richest	
IMR						
Urban	49.7	40.1	37.6	24.8	17.7	2.8
Rural	48.7	38.7	28.4	25.1	(35.5)	(1.4)
U5MR						
Urban	70.5	62.9	57.9	33.2	26.9	2.6
Rural	81.2	59.2	38.8	33.7	(39.8)	(2.0)
IMR						
Male	54.8	45.0	32.0	27.1	23.8	2.3
Female	42.4	33.1	35.5	22.4	17.8	2.4
U5MR						
Male	87.1	70.0	48.3	35.2	31.1	2.8
Female	72.0	50.6	51.1	31.4	27.1	2.7

Figures in parenthesis are based on very small cases.

Source: D. Gwatkin et al., (2000).

Table 12. Skilled Delivery Attendance by Wealth Index and Urban-Rural Residence, 1998 NDHS

Urban-Rural Residence	Quintile					Rich/Poor Ratio
	Poorest	Second	Middle	Fourth	Richest	
Total						
A Medically Trained Person	21.2	45.9	72.8	83.9	91.9	4.3
Doctor	7.1	16.5	35.7	50.2	75.8	10.7
Nurse or Trained Midwife	14.1	29.3	37.1	33.8	16.0	1.1
% in a Public Facility	7.1	16.0	28.7	29.3	26.3	3.7
% in a Private Facility	1.6	4.1	11.8	25.5	52.5	32.8
% at Home	91.0	79.4	59.4	44.8	21.2	4.29[a]
Urban						
A Medically Trained Person	36.1	60.9	82.2	86.4	94.5	2.6
Doctor	10.4	23.0	42.6	51.4	80.1	7.7
Nurse or Trained Midwife	25.7	37.9	39.5	35.0	14.4	0.6
% in a Public Facility	12.6	22.8	34.2	28.9	26.7	2.1
% in a Private Facility	2.1	5.5	13.1	27.5	56.4	26.9
% at Home	85.1	71.2	52.5	43.4	16.9	5.04 [a]

Rural						
A Medically Trained Person	18.9	37.6	59.5	78.2	78.6	4.2
Doctor	6.6	13.0	25.9	47.3	54.1	8.2
Nurse or Trained Midwife	12.3	24.6	33.6	30.9	24.5	2.0
% in a Public Facility	6.2	12.3	20.7	30.2	23.9	3.8
% in a Private Facility	1.5	3.4	9.9	21.0	33.1	22.1
% at Home	91.9	83.9	69.2	47.9	43.0	2.13 [a]

[a] Calculated as poorest/richest.

Source: D. Gwatkin et al., (2000).

4. Summary and Discussion

In terms of mortality trends, this paper has shown the following: (1) a drastic decline in infant mortality from 1960 to 1980 and a decelerating decrease thereafter, with male babies more disadvantaged than female babies; (2) a slow pace of decline in life expectancy at birth since 1960, regardless of sex, as well as in under-five and maternal mortality since 1990; and (3) TB mortality remaining as one of the six leading causes of mortality since 1960, even showing a recent rising trend, and affecting men and women at ages 15-24 and reproductive ages, with higher mortality among males at ages 65 and over.

With respect to trends in poverty, this paper has demonstrated that there is a significant poverty reduction between 1985 and 1997, using poverty incidence as the measure. However, available figures for poverty incidence and HDI for 1997 and 2000 indicate only a slight improvement. Most of the poorest provinces, mostly in Mindanao, remained at the extreme poverty situation in 1997 and 2000.
Initial exploration of the poverty-mortality link reveals that poverty incidence and infant mortality are significantly correlated (r=0.8).

At the global level, the Philippines and China are similar in terms of their GNI PPP per capita in 2002, placing them in 11th – 15th lowest middle income countries. Likewise, mortality indicators, $^{0}\mathbf{e}_{0}$ and infant mortality rate, in 2000 for these two countries are more or less the same . The global figures around 2000 and 1990 consistently reveal a marked contrast in mortality situations among the richest, middle and poorest countries in mortality situation: while the most economically advanced countries have about two times the life span of the poorest countries, the poorest countries have over 10 times the infant mortality level of the most developed countries. Comparison of poverty and mortality indicators among countries in the same income groups exhibits a more marked relationship between poverty and infant mortality compared to that between poverty and life expectancy at birth. Furthermore, such relationships are non-monotonic.

At the provincial level of analysis, data on mortality, income and education indices also do not portray a clear positive poverty-mortality linkage. It is interesting to note, however, that that improvement in education is much faster than in poverty and mortality reduction in the Philippine provinces.

The clearest and monotonic poverty-mortality linkage is evident at the household-individual level of analysis, using data based on the 1998 and 2003 NDHSs. Both surveys reveal infant and child mortality (male or female) rates among the poor people that are two times and three times, respectively, higher than that of the rich people. A similar pattern is observed in the rich-poor differential in both the urban and rural population. Maternal mortality, as proxied by skilled delivery attendance, is also worst among the poor, with the rich more likely to have skilled attendance at delivery and than the poor. Utilization of private facilities for delivery is also higher among the rich compared to the poor, who were more inclined to have home births.

The findings of this paper provide further evidence that the association between poverty and mortality is complex. To gain further understanding of the poverty-mortality relationship, a number of important and relevant empirical findings and theoretical explanations are cited in the following discussion.

As consistently shown in the literature, there are variables other than income that dominate in the poverty-mortality linkage. In my 1990 study on the relationship between socioeconomic and health-related variables and life expectancy at the provincial level, analysis using ordinary least squares regression revealed that the factors strongly associated with overall survival are road density, motor vehicles, safe drinking water supply, and toilet sanitation. W. Flieger *et al.* (1981) found that life expectancy at birth was correlated significantly with their development indicators: percentage of population urban, percentage of towns with electricity, percentage of population 25 years old and over with college education, and number of manufacturing establishments per 10,000 population. S. West (1981) demonstrated that provincial infant mortality decreased with the proportion of females with elementary education and with the proportion of households with pumped water, but increased with the proportion of males who are farmers and of females who married early.

S. Preston (1975, 1980, 1986) finds that some 75-90 percent of the increase in life expectancy for the world as a whole between the 1930s and the 1960s is attributable to factors other than national income or improved nutrition. B. Christian *et al.* (1977) demonstrate that the proportion of the population having access to potable water emerged as the strongest predictor of infant mortality, explaining approximately 60 per cent of the variance compared to calorie and protein availability per capita, medical services indices such as doctors, nurses and hospital bed availability per capita, and per capita adult illiteracy rates. B. Pendleton and Yang (1985) show that socioeconomic variables and levels of health and health care expenditure are significantly associated

with mortality in developing countries. J. Caldwell (1986, 1989) refutes the integral element of the demographic transition theory (F. Notestein, 1945; M. Spiegelman, 1968; A. Coale, 1969, 1973; United Nations, 1973) which argues that modernization or industrialization is a precondition for both mortality and fertility declines. He showed that China, Costa Rica, Kerala and Sri Lanka experienced drastic decline in mortality, even without national economic advancement, through political will in China and both through political and social will in the other three countries. In these countries, a large proportion of the already tight national budget was earmarked for education and health.

A. Alachkar and W. Serow (1988) discovered that around 88 percent of the variance in life expectancy in 185 developed and developing countries is explained by the share of the labour force in agriculture, the level of fertility as indicated by the crude birth rate, the proportion of the population enrolled in secondary school and the number of persons per physician. S. Kunitz and S. Engerman (1992) point out that the association between real wages or income and mortality is not invariably monotonic; they classify the reasons as epidemiological, sociological, geographical, demographic, technologic and economic.

Other relevant theories relate to epidemiologic transition theory. T. Mckeown *et al*. (1972 and T. Mckeown (1978) argue that a large increase in food supplies causing better nutrition results in increased resistance to infectious diseases and hence, a decline in mortality. A. Omran's (1977) epidemiologic transition theory states that there is a long-term shift in mortality and disease patterns with the last stage characterized as the age of degenerative and man-made diseases. He postulates that better personal hygiene, nutrition and housing are the important determinants of this shift. A. Mercer (1990) on the other hand contends that this shift cannot be understood singly as a consequence of improvement in the economic standard of living. His view is that preventive and public health measures, socio-demographic changes affecting transmission rates of infections diseases, links between communicable and non-communicable diseases involving immunological-cellular processes, and the changing impact of infectious diseases in childhood are more important determinants than affluence and nutrition.

Other explanations are cultural and medical. A. Lopez and L. Ruzicka (1983) argue that mortality differentials in some societies reflect the role and status of females both within the family and in society at large inasmuch as they represent the health consequences of social, economic and cultural discrimination against females. L. Sagan (1987) as cited by T. Moore (1993: 77-78) argues that longevity gain was a change in attitude more than a change in health status and the burden of disease. A stable family structure and maternal affection produce healthier, taller, more disease-resistant and more intelligent children. T. Moore (1993) and L. Garrett (1994) talk of microbes (most commonly known as viruses), which are adapting, changing, and evolving, as the greatest potential danger to human lives. This may be one of the reasons why TB in the

Philippines has long been a major killer with some indication that the tuberculosis virus is becoming more resistant to available drugs.

Another dimension worth discussing is the definition of poverty I used in this paper. GNI PPP or GNP per capita and poverty incidence are dependent on assumptions made about "adequate standards of living" which some enjoy and which some do not. Hence, the different poverty estimates had to be presented in the paper. One further complication of the weakness of the poverty indicators used in the paper is that they are indicators to gauge the success of economic development. However, the reality is that in the Philippines, a 10% increase in overall per capita income raises the welfare of the poorest quintile by just about 5 % (A. Balisacan and E. Pernia, 2002). C. Henderson (2002) argues that this finding implies that the poorest 20 % of the population lagged further behind and the income inequality widened.

Moreover, J. Remenyi strongly argues (2004:191) that during the 1950 to 1990 period, the goal of poverty reduction took a back seat to the goal of economic development, investment needs of modernization over consumption needs of the poor. Perhaps there is the need to use other poverty indicators in the poverty-mortality relationship discourse. J. Remenyi (2004:213-214, Table 8.5) cites the following eight poverty indicators consistently selected by poor villagers in China: (1) days lost to health problems by women; (2) hours per day devoted to accessing potable water; (3) % of eligible children not attending school regularly; (4) Yuan per person per year; (5) Kg of grain produced per person per year; (6) % of houses in the village constructed from brick; (7) % of natural villages with access via all weather road; and (8) % of households with access to reliable electricity. He mentions though that IMR and expectation of life at birth are also other poverty indicators.

Another implication of the findings of this paper is the need to improve not only the estimation of poverty but also mortality. Most of the techniques used are indirect given the inherent defective mortality statistics in the country and the problem of estimating the level of mortality directly from surveys. The greatest problem currently faced in the country is the estimation of maternal mortality. Given the rarity of death as an event, a large sample size for mortality estimation is required (Z. Matthews, 2002). A panel data, similar to the work of D. Cogneau and M. Grim (2004) that used the 1993-1997 and 1997-2000 Indonesian Family Life Survey panel data set in illustrating the effect of mortality changes on income being dominated by the effects of changes in the structure of fertility, migration and educational attainment, may be an alternative to a costly survey. In effect, perhaps the direction of research is poverty reduction study rather than development study which attempts to be multi-dimensional or transdisciplinary (N. Higginbotham, G. Albrecht and S. Freemen, 1997) .

5. Conclusion

While improvement in poverty and mortality reduction is evident in the Philippines, understanding the poverty-mortality relationship is a challenge. The relationship between poverty and mortality is complex. Given its complex dimension, there is a need for further research in unravelling such complexity that necessitates the improvement in the measurement of poverty and mortality for clearer insights to policy makers.

References

Alachkar, Ahmad and William J. Serow (1988), 'The Socioeconomic Determinants of Mortality: An International Comparison', *Genus*, 44(3-4):131-151.

Balisacan, Arsenio M. (1994), 'Urban Poverty in the Philippines: Nature, Causes and Policy Measures. *Asian Development Review.* Vol.10:117-152.

Balisacan, Arsenio M. (n.d.), 'Pathways of Poverty Reduction Rural Development and Transmission Mechanism in the Philippines' Paper to be delivered at the Asia and pacific Forum on Poverty Reforming Policies and Institutions for Poverty Reduction to be held at the ADB, manila, 5-9 February 2001.

Balisacan, Arsenio M. and Ernesto Pernia (2002). 'What Else Besides Growth Matters to Poverty Reduction? Philippines'. ERD Policy Brief No. 5. Paper prepared for the Economic and social Commission for Asia and the Pacific Meeting of the Advisory Panel on the ESCAP UNDP Initiative to Support the Achievement of the Millennium Development Goals in Asia and the Pacific.

Blumenfeld, Stewart N., Maricor de los Santos, Maria Corazon V. Teoxon, Nora Cruz and Frank Dizon, (1999). "Reducing Treatment Default Among Tuberculosis Patients in the Philippines"Bethesda: Center for Human Services.

Cabigon, Josefina V. (1990), 'Philippine Mortality in Changing Times', Unpublished Ph.D. thesis, Australian National University, Canberra.

Cabigon, Josefina V. (1995), 'Shifts in Disease and Adult Mortality Patterns in the Philippines'. *Professorial Chair Papers Series No. 95-2.* Diliman: UP-CSSP Publications.

Cabigon, Josefina V. and Wilhelm Flieger (1999).*1995 Gender-Specific Life Tables for thePhilippines, its Regions and Provinces*. Monograph N0. 17, published by the National Statistics , Republic of the Philippines, with the Assistance of UNFPA. Manila.

Caldwell, John C. (1976), 'Toward a Restatement of Demographic Transition Theory', *Population and Development Review,* 2(3 and 4): 321-366.

Caldwell, John C. (1986), 'Routes to Low Mortality in Poor Countries', *Population and Development Review,* 12(2):171-220, Also in 1989 in J.C. Caldwell and G. Santow (eds.), *Selected Readings in the Cultural, Social and Behavioral Determinants of Health,* Health Transition Series No. 1, Canberra: Health Transition Centre, The Australian National University, pp. 1-46.

Christian, B., D. Ray, A. Benyoussef and T. Tanahashi (1977), 'Health and Socio-economic Development: An Intersectoral Model', *Social Science and Medicine,* 2:63-69.

Coale, Ansley J. (1969), 'Population and Economic Deveopment', In P.M. Hauser (ed.), *The Population Dilemma*, Engelwood Cliffs, New Jersey: Prentice Hall, pp. 46-69.

Coale, Ansley J. (1973), 'The Demographic Transition', In International Union for the Scientific Study of Population, *International Population in Conference Liege, 1973,* Liege: IUSSP, vol. 1, pp. 53-72.

Cogneau, Denis and Michael Grimm (2004), 'The Measurement of Poverty Dynamics when Mortality is is Correlated with Income – Theory, Concept and Empirical Implementation'. Paper Prepared for the 28th General Conference of the International Association for Research in Income and Wealth, University College Cork, Ireland, 22-28 August 2004. First complete draft. June 1.

David, P. and D.S. Maligalig (2001), 'Issues in Estimating the Poverty Line: A Revised Version of the of a paper presented at the WBI-Philippine Institute Development Workshop in Strengthening Poverty Data Collection and Analysis, 30 April – 3 May 2001, Manila. Accessed on line http:/google.com.

Department of Health (n.d) *1995 and 1996 Philippine Health Statistics.*

Flieger, Wilhelm, Macrina K. Abenoja and Alice C. Lim (1981), *On the Road to Longevity,* Cebu City: San Carlos Publications.

Flieger, Wilhelm and Josefina V. Cabigon (1994). *Life Table Estimates for the Philippines, Its Regions and Provinces, by Sex: 1970, 1980 and 1990*. HFDP Monograph No. 5, published by the Department of Health, Republic of the Philippines, under the Health Finance Development Project with the Assistance of USAID. Manila.

Garrett, Laurie (1994), *The Coming Plague*, New York: Farrar, Straus and Giroux.

Gwatkin, D.R. et al. (2000), 'Socioeconomic Differences in Health, Nutrition and Population in the Philippines for the HNP Poverty Thematic Group of the World Bank.

Henderson, Clarence (2002) 'Pearl of the Orient seas": Notes on Poverty in the Philippines.

Higginbotham, N., Albrecht, G. and Freeman, S. (1997), 'The Case for a Transdisciplinary Paradigm', in L. Hunt (e.d.), *Third Asia and Pacific Conference on the Social Sciences and Medicine Proceeding*, Volume 1 Perth:Edith Cown University.

Kingsbury, Damien (2004), 'Introduction' in Kingsbury, Damien, Joe Remenyi, john McKay and Janet Hunt (eds.). *Key Issues in Development.* New York: Palgrave Macmillan.

Kunitz, Stephen J. and Stanley L. Engerman (1992), The Ranks of Death: Secular Trends in Income and Mortality. *Health Transition Review* 2(Suppl.) 29-46.

Lopez, Alan D. and Lado T. Ruzicka (eds.), (1983) *SexDifferentials in Mortality: Trends, Determinants and Consequences*, Canberra: Department of Demography, Australian National University, Miscellaneous Series No. 4.

Matthews, Zoe (2002), 'Maternal Mortality and Poverty' Centre for Sexual and Reproductive Health. DFID Resource Centre for Sexual and Reproductive Health managed by John Snow International (UK).

Mckeown, Thomas (1978), 'Fertility, Mortality and Cause of Death', *Population Studies*, vol. 32:3.

Mckeown, T., R.G. Brown and R.G. Record (1972), 'An Interpretation of the Modern Rise of Population in Europe', *Population Studies*, vol. 26:3.

Mercer, Alex (1990), *Disease Mortality and Population in Transition,* London: Leicester University Press.

Moore, Thomas J. (1993), *Lifespan,* New York*:* Simon and Schuster.

National Statistical Coordination Board (1995) *Recommended Infant Mortality Rates, Child Mortality Rates, Under-Five Mortality Rates and Maternal Mortality Ratios National, Regional, Provincial and City Levels, 1990-1995,* Submitted to the Technical Committee on Population and Housing Statistics by the Technical Working Group on Maternal and Child Mortality. November.

National Statistical Coordinating Board (NSCB) ."Highlights of the report of the 1997 Philippine Human Index " accessed online at www.nscb.gov.ph.

National Statistical Coordinating Board (NSCB) ."Highlights of the report of the 2000 Philippine Human Index " accessed online at www.nscb.gov.ph.

National Statistical Coordination Board (NSCB). "Highlights: Poverty incidence 1997 and 2000 "accessed online at www.nscb.gov.ph.

National Statistics Office . 1970, 1974, 1980, 1984, 1990, 1994 and 2000 Vital Statistics Report; 1970, 1980, 1990, 1995 and 2000 censuses.

National Statistics Office (NSO) [Philippines] and Macro International Inc. (MI), (1994), *National Demographic Survey 1993*, Calverton, Maryland: NSO and MI.

National Statistics Office (NSO) [Philippines] and ORC Macro International Inc. (MI), (2004), *National Demographic Survey 2003*, Calverton, Maryland: NSO and MI.

Notestein, Frank W., (1945), 'Population: The Long View', in Theodore W. Schultz (ed.), *Food or the World,* Chicago: University of Chicago Press, pp. 36-57.

Omran, Abdel R. (1977), 'Epidemiologic Transition in the United States', *Population Bulletin,* vol. 32:2.

Pendleton B. and S. Yang (1985), 'Socioeconomic and Health Effects on Mortality Declines in Developing Countries', *Social Science and Medicine,* 20:589-599.

Population Reference Bureau **2004 World Population Data Sheet**

Preston, Samuel H., Nathan Keyfitz and Robert Schoen (1972), *Causes of Death, Life Tables for National Populations*, New York: Seminar Press.

Preston, Samuel H. (1975), 'The Changing Relation between Mortality and Level of Economic Development', *Population Studies*, 29(2): 231-248.

Preston, Samuel H. (1980), 'Causes and Consequences of Mortality Declines in Less-Developed Countries', in R.A. Easterlin (ed.), *Population and Economic Change in Less-Developed Countries*, Chicago: University of Chicago Press, pp. 289-360.

Preston, Samuel H. (1986), 'Mortality and Development Revisited', *Population Bulletin of the United Nations*, 18-1985:34-40.

Remenyi, Joe (2004), 'Poverty and Development: The Struggle to Empower the Poor' in Kingsbury, Damien, Joe Remenyi, john McKay and Janet Hunt (eds.). *Key Issues in Development.* New York: Palgrave Macmillan.

Sachs, Wolfgang (ed.) (1992). *The Development Dictionary: A Guide to Knowledge as Power.* London: Zed Books.

Sachs, Jeffrey D. (2004), 'Health in the Developing World: Achieving the Millenium Development Goals' *Bulletin of the World Health Organization.* Dec. 82(12):947-949.

Sagan, Loenard A. (1987), *The Health of Nations*, New York: Basic Books.

Sen, A. (2000), *Development as Freedom.* London: Oxford University Press.

Small Working Group on Mortality re 2000 Philippine Population Projection.

Spiegelman, M. (1968), *Introduction to Demography*, Cambridge, Mass: Harvard University Press.

United Nations (1973), *The Determinants and Consequences of Population Trends,* 1: Chapter V. New York: United Nations.

West, Sheila (1981), 'Infant Mortality in the Philippines: Causes and Correlates', Report prepared for the United States Agency for International Development.

World Bank, (1992), *World Development Report 1992: Development and the Environment*, Oxford: Oxford University Press.

World Health Organization (2004) Global Tuberculosis Control. WHO Report 2004. Geneva, Switzerland.