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**Investments in Education and Health on Poverty
Alleviation: Evidence Among Filipino Households**

by

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The literature on poverty alleviation, welfare, and equity clearly identifies the linkage between health, education and poverty. Increased human capital increases the likelihood for individuals to access to more diversified employment opportunities. This linkage provided a motivation for the conditional cash transfer (CCT) that was widely implemented in Latin America. The principle behind CCT is to provide cash incentives to the family provided that children stays in school and are regularly brought to the health centers to ensure their health. The FIES data for the period 1985-2006 was used in developing household level models that explicitly attribute poverty alleviation to investments in health and education. Proportion of the total expenditures spent on health and education are higher among those in higher income deciles but relatively constant from 1985 to 2006. A household-based targeted poverty alleviation program necessarily includes health and education with family planning as a controlling covariate. Greater investments will be needed to bail out of poverty trap the agricultural households.

Keywords: logistic regression, household model, human capital, poverty alleviation

1. Introduction

Poverty is a multi-faceted problem with a wide-ranging implication not only to individuals and the households, but also to the community as well as to the entire country. The problem has been viewed in the context of rural development, welfare economics, agricultural development, politics and local governance, among others. There has been large-scale and micro-level interventions and programs and yet, its impact is barely observed in the Philippines. Thus, the question on which of these prescriptions are most-suited for the Philippines continues, see for example (Reyes, 2002). The need to further understand the phenomenon is essential in identifying the best way forward.

Poverty in the Philippines is dominantly rural and farming households are the most vulnerable segment, (Barrios, 2008). The vulnerability of farming households stems from the limited access to productive resources outside the farm. These opportunities outside the farm require either skills or cognition of modern technologies. Development within the boundaries of the farm also requires adoption of new farming technologies, again necessitating appreciation and thorough understanding of the technology.

Several papers focused on strategies towards reducing poverty. (Balisacan, 1993) noted that rapid agricultural growth can explain the quantifiable reduction in poverty incidence in the Philippines although this is only minimal compared to other Asian countries. Policy reform was identified as a tool towards poverty alleviation rooting from beyond agriculture. (Balisacan, 1995) further noted the role of the household in poverty programs and suggests that household targeting can provide a safety net that is not only cost-effective, but also will minimize (if not eliminate) the leakages of the potential benefits among the non-poor households.

While macroeconomic policies had become popular as a strategy aiming towards poverty reduction, the role of the households in poverty alleviation is asserted by some researchers. (Schuh, 2000) emphasized that human capital is produced/accumulated in the household thus, it should be the target of programs intended to reduce incidence of poverty. Education develops the stock of cognitive and vocational skill that the households can use in accessing productive resources. Such cognition will further allow them to adopt technologies that can improve their productivity provided that health is properly maintained. Their capability to

understand and apply technology will also work in improving agricultural production and will allow those migrating out of rural areas to access employment opportunities.

Aiming to assess the poverty alleviation programs implemented in the Philippines, (Reyes, 2002) concluded that there is only a modest success in poverty alleviation and human development. While there are too many programs already implemented, many problems were identified. The programs lack targeting and therefore prone to leakages, hence the potential benefits by the poor were not optimized. The programs are also not properly monitored thus lacking the necessary adjustments that would tailor-fit its components to the realistic needs of the beneficiaries. (Reyes, 2002), recommends the identification of programs that will address chronic poverty and those that will respond to transient poverty.

This paper aims to assess the long-term empirical link between human capital and poverty alleviation. Specifically, the linkage between investments in health and education and poverty alleviation will be assessed using the Family Income and Expenditure Surveys (FIES) from 1985 to 2006. The data covering over 21 years can sufficiently illustrate the long-term effect of investments in health and education on poverty alleviation. We will further assess pattern of these linkages over time. Furthermore, similar linkages are established from some vulnerable segments of the population using 2003 and 2006 data.

2. Poverty Alleviation

There are various poverty alleviation programs implemented in the Philippines, yet, there are still many poor counted every time FIES is conducted. While the poverty rate have changed, (Reyes, 2002) noted that population increased faster than those crossing the poverty threshold, therefore maintaining a huge number of poor households. Other theories that can explain this include the chronic poverty reproduction of (Cleaver, 2005). The group of individuals with the least skills and cognitive capabilities cannot viably access the social capital or cannot participate in community dynamics that will endow them with linkages that can open opportunities. These constraints will hinder the possibility that they will be bailed out of poverty. (Cleaver, 2005) proposed that development policy should necessarily build on social capital to overcome poverty. Growth in human capital is an important requirement to mitigate the poverty trap.

Poverty alleviation programs should be multi-pronged, noted (Nordtveit, 2008). Integrated rather than marginal interventions are more optimal. For example, with children attending school while hungry or in poor health will not accrue the human capital that is expected from the access to education. At the least, health and education programs must be integrated to increase the cognitive functions of children. This will allow them to appreciate and understand modern technologies that can help them expand their livelihood opportunities.

Many rural development paradigms highlight the role of non-farm employment in rural development where the stakeholders are primarily engaged in farming as a major source of livelihood. (Ruben and Van Den Berg, 2001) discussed the role of nonfarm income for a typical farm household. Earnings from non-farm income can be used by the households in the procurement of productivity-enhancing inputs that are otherwise impossible if they rely only on farm income. Thus, non-farm income will render a multiplier effect since it contributes not only on total income, but in the expansion of farm income as well.

In the Philippine-setting whose economy is dominated by agriculture, (Balisacan and Fuwa, 2004) noted that land reform is positively associated with growth and poverty reduction while

higher agricultural terms of trade facilitate poverty reduction. (Reyes and del Valle, 1998) suggests targeting employment and livelihood that will result to a broad based economic growth. Economic empowerment of households is tantamount to facilitation of access by the poor to quality education and primary health care. (Barrios, 2008) emphasized that poverty alleviation should focus in rural areas and that rural development should pay special attention to the more vulnerable segments of the community, i.e., the farmers. Intervention should gradually detach farming households from dependence on agriculture, without compromising their food security function. The most important strategy proposed was the mitigation of isolation of rural communities through investments in accessibility infrastructure. Safety nets against leakages in rural infrastructure can be institutionalized through a socialized user's fees was also recommended.

3. Methodology

Many poverty alleviation programs aim to create and/or expand livelihood and employment opportunities among the vulnerable segments. As of 2006, family poverty incidence was measured at 26.9%. Among urban households, family poverty incidence was at 11% but almost four-folds in rural households at 41.31%. These remarkable differences in the poverty incidence between households in rural and urban areas and the dominantly rural-based Filipino households led us to examine basic differences among the rural and urban households. Also from 2006 FIES, all households spent 2.20% of their total household budget for medicine and medical services while this is only 2.04% for rural households. Proportion of budget on education was at 2.79% for all households, 3.12% for urban, while only 2.47% for rural households. In urban areas, household head without formal education is at 1%, this is several times higher at 5.22% among the rural households. Proportion of urban household head with at least college level of education is 32.82% but is only 12.38% among the rural households.

The poverty situation in the Philippines is consistent with what the literature is pointing out as the possible determinants of poverty. There is relatively low human capital among the most vulnerable segments. To examine how the Filipino household had prioritized health and education over time, logistic regression models were fitted. The dichotomous response was observed at the household level. A household whose per capita income falls short of the poverty threshold is considered poor, otherwise, the household is non-poor.

The predictors of the logistic regression model include primarily the proportion spent on health and education as the measure of total investments allocated by the households in the accumulation of human capital. Medical expenditures includes drugs and medicine, hospital room charges, medical charges, dental charges, other medical goods and supplies, other medical health services, and contraceptives. On the other hand, educational expenditures include tuition fees, study allowance away from home, books, school supplies, and other educational supplies.

Since the investments in health and education can be a function of other household characteristics, some covariates are included in the model. Family size is an important household characteristic that influence the household in decision-making about how much will be spent for health and education. Bigger household size will require greater (in absolute terms) expenses on health and education than smaller household size. Since households need food first before any other things, education and health expenditures depends on how much more they earned relative to the total expenditures. As a proximate measure of savings, the ratio of income to expenditures is included as a covariate. An agricultural

household may not find it wise to invest in education, hence, a dummy variable is included as a covariate. Finally, age of the household head is also included as a covariate. As age of the head increases, members (children) also have increasing ages, expenses on health and education also increases. Also, as the head becomes more mature, decision-making on how much investment on health and education to put on, becomes more rational.

The logistic regression model will allow the assessment of the odds that a household will be alleviated from poverty given typical household characteristics. Similar models are also developed among the sentinel groups to assess the extent in which education and health can bail them out of poverty.

4. Results and Discussion

The excess income to expenditure requirements among Filipino households barely changed for the last two decades. Income exceeds 13% over expenditures in 1985, the highest surplus was observed in 1991 where the households earned 25% more than they spent. Unfortunately, the surplus declined continuously from that year until in 2006 where the surplus income is at the same level as in 1985 at 13%. The poor households also experienced the highest income surplus in 1991 with 9%. However, since 1991, income surplus started to diminish until it is completely eroded in 2000. As of 2006, income of the poor households is 1.7% short of their total expenditures, worse than in 1985 where they actually have 3% income surplus.

There is no evidence that the Filipino households changed their priority towards health and education over the years. The highest proportion of budget spent on education was 2.86% of the total budget in 2000, and lowest at 1.99% in 1988. Among the poor households, they spent at the most 1.73% of their budget also in the year 2000. Expenditures in health are even lower, although increasing pattern was observed in 2003 and 2006 that exceeded 2%. The poor households spent barely 1% of their total expenditures on health.

The low proportion of expenditures allocated to health and education can be attributed to two reasons. First, is the legislation on free basic education, although this will only waive the tuition fee component of the expenditures on education. Also, the knowledge accumulated that is valued as human capital is a function of the quality of basic education accessed by the households. Therefore, even with free basic education, household's investment is still necessary for higher quality education. With regards to health, there is also an increased availability of medical and health services they can access with. However, vaccines and other medical supplies might still be limited hence, a necessity for the households to invest on health as well.

4.1 Expenditures on Health and Education

The proportion spent on education by income deciles from 1985 to 2006 are given in Table 1. There is an increasing trend on the proportion spent on education over increasing income deciles. As income increases, there is a tendency for the households to put higher premium on education (invest a significant portion of their total budget). The bottom 30% of the income classes retains similar level of proportion of expenditures on education over the past two decades. Starting from the fourth decile and higher, proportion spent on education increases over the years. This would mean that human capital accumulation is constant for the poor households and increases over time among the non-poor households, contributing in the worsening income disparity among the households.

Table 1. Percent Spent on Education By Income Deciles

Income Decile	1985	1988	1991	1994	1997	2000	2003	2006
First	0.64	0.61	0.65	0.63	1.25	1.62	0.71	1.39
Second	0.91	0.82	0.91	1.01	1.39	1.68	1.15	1.50
Third	1.27	1.18	1.29	1.42	1.76	1.96	1.49	1.82
Fourth	1.58	1.32	1.45	1.70	1.77	2.13	1.68	1.96
Fifth	1.92	1.67	1.68	2.04	2.21	2.40	2.14	2.12
Sixth	2.13	1.72	2.18	2.54	2.54	2.60	2.27	2.37
Seventh	2.73	2.25	2.54	2.89	2.82	3.15	2.74	3.08
Eighth	3.47	2.71	2.90	3.57	3.38	3.56	3.31	3.70
Ninth	4.13	3.54	3.67	4.31	3.84	4.39	4.25	4.63
Tenth	4.80	4.08	4.11	5.05	4.46	5.11	6.04	5.32

In Table 2, we summarized the proportion spent on medical care by income deciles over the period 1985-2006. While expenditure on health is lower than expenditure on education, there is also an increasing proportion spent on health as income decile increases. The bottom 30% of the households spent a constant proportion of their expenditures on health, while the rest of the households have a progressively increasing proportion of total expenditures spent on health over the years.

Table 2 Percent Spent on Medical Care By Income Deciles

Income Decile	1985	1988	1991	1994	1997	2000	2003	2006
First	1.30	1.13	1.32	1.33	1.08	0.89	1.14	1.10
Second	1.40	1.22	1.21	1.41	1.26	0.91	1.34	1.32
Third	1.46	1.41	1.41	1.61	1.37	1.15	1.39	1.50
Fourth	1.39	1.51	1.39	1.67	1.51	1.25	1.57	1.63
Fifth	1.77	1.25	1.43	1.83	1.61	1.39	1.70	2.03
Sixth	1.61	1.39	1.47	1.78	1.72	1.59	1.69	2.18
Seventh	2.06	1.58	1.52	1.82	1.84	1.67	2.04	2.58
Eighth	1.99	1.59	1.68	1.82	2.16	1.93	2.07	2.74
Ninth	1.96	1.71	1.72	2.31	2.35	2.29	2.23	3.08
Tenth	2.36	1.80	1.95	2.62	2.51	2.42	2.56	3.80

The non-poor households recognizes the value of their investments on health and education in increasing the level of human capital that will eventually allow them to access various factors of production. The poor who should be investing on human capital to bail them out of the poverty trap did not exhibit such realization over the past two decades. This is clear evidence that a household-focused strategy in poverty alleviation is necessary. A conditional cash transfer (CCT) program for example, with bundles of health and education components can be packaged along with a well-crafted targeting mechanism to avoid the leakage of the program towards the non-poor households.

4.2 Linkage Between Household Investments on Health, Education, and Poverty Alleviation

To quantify the chance for the households to move out of poverty based on how much they spent on education and health, logistic regression models were fitted and summarized in

Table 3. The proportion of poor households decline since 1985 until it leveled in 2000 until 2006. From the likelihood ratio test, the models for all FIES years are significant ($p < 0.0001$) implying that the variables included (investments in health and education and covariates) are sufficient determinants of the odds that a household is poor over non-poor. Expenditures in education significantly contribute in the odds that a household will become non-poor ($p < 0.0001$). Considering the 1985 model, for every 1% increase in the proportion spent on education (relative to total expenditures) by households, their likelihood of becoming non-poor increases by 13%. This odds ratio hovers around similar figure until in 2006 where the odds of becoming non-poor increases by 11% only for every 1% increase in the proportion spent on education. The relatively constant value of the odds ratio within the twenty-one year period implies that the same odds ratio can be expected in the near future. The estimated odds ratio can be used in calculating the expected amount of subsidy in education that can be bundled in a household-based, targeted poverty alleviation program like the CCT. This is further discussed in Section 4.4.

While the odds ratio of becoming non-poor are lower for increasing proportion of expenditures on health, these estimates are also significant ($p < 0.0001$). The odds ratio estimates are also relatively constant from 1985 to 2006, implying that similar amount can be expected in the near future. As of 2006, a 1% increase in the proportion spent on medical care can increase their likelihood of becoming non-poor by 7.4%.

Table 3. Odds Ratio Estimates for Some Determinants of Poverty Alleviation

Year	1985	1988	1991	1994	1997	2000	2003	2006
Percent Poor HH	43.04	40.22	39.15	35.08	32.84	26.52	28.03	28.85
Likelihood Ratio Test ($H_0: \beta=0$)	5447 (.0001)	6609 (.0001)	8412 (.0001)	8913 (.0001)	14591 (.0001)	14258 (.0001)	16150 (.0001)	14120 (.0001)
Proportion Spent on Education	0.870 (.0001)	0.874 (.0001)	0.894 (.0001)	0.882 (.0001)	0.877 (.0001)	0.898 (.0001)	0.884 (.0001)	0.890 (.0001)
Proportion Spent on Health	0.938 (.0001)	0.953 (.0001)	0.955 (.0001)	0.948 (.0001)	0.927 (.0001)	0.928 (.0001)	0.930 (.0001)	0.926 (.0001)
Family Size	1.028 (.0001)	0.1031 (.0001)	1.029 (.0001)	1.031 (.0001)	1.033 (.0001)	1.037 (.0001)	1.507 (.0001)	1.493 (.0001)
Agricultural Household	5.142 (.0001)	5.902 (.0001)	7.150 (.0001)	7.556 (.0001)	5.892 (.0001)	6.650 (.0001)	6.528 (.0001)	6.771 (.0001)
Income to Expenditures Ratio	0.083 (.0001)	0.085 (.0001)	0.142 (.0001)	0.089 (.0001)	0.047 (.0001)	0.025 (.0001)	0.020 (.0001)	0.018 (.0001)
Age of Household Head	0.991 (.0001)	0.996 (.0016)	0.995 (.0001)	0.997 (.0122)	0.988 (.0001)	0.996 (.0001)	0.995 (.0001)	0.995 (.0001)

Numbers in parenthesis are p-values.

All the covariates yield significant estimates of the odds ratio for all FIES years. In 1985, an increase of 1 member of the household can contribute a 2.8% chance for the household to become poor. However, in 2006, a household size increase of 1 can yield 49.3% likelihood of the household becoming poor. Increasing household size increases the likelihood for the household of becoming poor. This is consistent with many literatures focusing on the Philippines, see for example, (Orbeta, 2006). This means that to control for this covariate, a family planning program must be bundled as well in the same household-based, targeted poverty alleviation program focusing on health and education.

The agricultural households are defined as households with at least one member engaged in cultivating the land or raising some animals as means of livelihood. These are the most vulnerable segment of the population. In 1985, being an agricultural household, the likelihood of becoming poor is about five times compared to the non-agricultural households. In 2006, the situation of the agricultural households worsens, with close to seven times the likelihood of becoming poor relative to the non-agricultural households. Alongside the proposed accumulation of human capital as a poverty alleviation strategy, there is also a necessity to enhance income and livelihood diversification efforts for this sector. To increase productivity, access to productive resources should be facilitated for them, e.g, rural infrastructure, microfinance, capacity building, etc.

The income to expenditure ratio is a very important facilitating factor for poverty alleviation. If only the income base of the households can be expanded through the provision/creation of new employment (or at the macro level, control prices to reduce total expenditures), this would facilitate the attainment of a more sustainable reduction of the number of poor households. If income is at least doubled the total expenditure, the likelihood of becoming non-poor will also be doubled.

Age of the household head is a significant factor but has minimal impact on the odds of becoming non-poor as the household head becomes older.

4.3 Poverty Alleviation in Some Vulnerable Segments of the Population

Data from FIES 2003 and 2006 yield significant effect of investments in education and health on poverty alleviation, the odds ratio estimates are summarized in Tables 4 (2003) and 5 (2006).

Households with heads over 65 years old will have higher chance of becoming non-poor for every additional share of total expenditures allocation to health and education. Even the agricultural households with older head will have lesser chance of becoming poor compared to other agricultural households.

Female-headed households have higher return on investments on health. However even a female-headed household have similar chance of becoming poor if the household is dependent on agriculture.

A household headed by a single individual have lower returns on investment on education but higher returns on investment on health.

Agriculture- and fishing-dependent households have high poverty incidence. Returns on investment in education for agricultural households are not different from the non-agricultural households but return on investment on health is lower.

The households with at least one member working abroad have higher returns on investments in health and education.

Even among households with different educational attainment by household heads have similar odds of becoming non-poor as proportion spent on health and education increases.

In household segments with higher incidence of poor households, the estimated odds of becoming non-poor as investments on health and education increases are relatively robust.

This implies that there is only one package of poverty alleviation programs needed among all poor households (except those in agriculture).

Table 4. Odds Ratio Estimates for Some Vulnerable Groups 2003

Year	2003 All HH	Retired HH Head	Female Headed HH	HH Head Single	HH Head Widow.	HH Head Separ.	Agri HH	Fish HH	OFW Rem.
Percent Poor HH	28.03	20.13	15.79	7.48	20.07	15.38	57.35	52.25	7.90
Likelihood Ratio Test ($H_0: \beta=0$)	16150 (.0001)	1007 (0.0001)	1461 (0.0001)	246 (0.0001)	1217 (0.0001)	151 (0.0001)	4473 (0.0001)	392 (0.0001)	1518 (0.0001)
Proportion Spent on Education	0.884 (.0001)	0.871 (0.0001)	0.875 (0.0001)	0.846 (0.0004)	0.907 (0.0001)	0.903 (0.0034)	0.880 (0.0001)	0.871 (0.0001)	0.900 (0.0001)
Proportion Spent on Health	0.930 (.0001)	0.906 (0.0001)	0.915 (0.0001)	0.948 (0.1403)	0.911 (0.0001)	0.941 (0.1212)	0.906 (0.0001)	0.947 (0.1503)	0.947 (0.0002)
Family Size	1.507 (.0001)	1.233 (0.0001)	1.349 (0.0001)	1.560 (0.0001)	1.321 (0.0001)	1.451 (0.0001)	1.750 (0.0001)	1.709 (0.0001)	1.525 (0.0001)
Agricultural Household	6.528 (.0001)	3.342 (0.0001)	5.061 (0.0001)	5.948 (0.0001)	3.788 (0.0001)	5.350 (0.0001)	-	-	6.586 (0.0001)
Income to Expenditures Ratio	0.020 (.0001)	0.015 (0.0001)	0.014 (0.0001)	0.006 (0.0001)	0.012 (0.0001)	0.046 (0.0001)	0.016 (0.0001)	0.009 (0.0001)	0.020 (0.0001)

Numbers in parenthesis are p-values.

Table 4. Odds Ratio Estimates for Some Vulnerable Groups 2003 (continuation)

Year	2003 All HH	HH Head No Formal Education	HH Head Elem Grad	HH Head Elem Grad	HH Head HS Under.	HH Head HS Grad	HH Head Coll. Under.	HH Head Coll. Grad
Percent Poor HH	28.03	54.22	47.35	34.72	28.56	17.06	7.84	1.94
Likelihood Ratio Test ($H_0: \beta=0$)	16150 (.0001)	641 (0.0001)	3711 (0.0001)	3117 (0.0001)	1759 (0.0001)	2269 (0.0001)	680 (0.0001)	209 (0.0001)
Proportion Spent on Education	0.884 (.0001)	0.881 (0.0001)	0.904 (0.0001)	0.922 (0.0001)	0.894 (0.0001)	0.909 (0.0001)	0.894 (0.0001)	0.891 (0.0002)
Proportion Spent on Health	0.930 (.0001)	0.856 (0.0001)	0.929 (0.0001)	0.932 (0.0001)	0.958 (0.0003)	0.918 (0.0001)	0.967 (0.1050)	0.880 (0.0422)
Family Size	1.507 (.0001)	1.488 (0.0001)	1.513 (0.0001)	1.542 (0.0001)	1.539 (0.0001)	1.541 (0.0001)	1.512 (0.0001)	1.435 (0.0001)
Agricultural Household	6.528 (.0001)	1.958 (0.0001)	3.466 (0.0001)	4.336 (0.0001)	5.065 (0.0001)	7.003 (0.0001)	9.597 (0.0001)	11.861 (0.0001)
Income to	0.020	0.014	0.020	0.016	0.021	0.012	0.025	0.018

Expenditures Ratio	(.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
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Numbers in parenthesis are p-values.

Table 5. Odds Ratio Estimates for Some Vulnerable Groups 2006

Year	2006 All HH	Retired HH Head	Female Headed HH	HH Head Single	HH Head Widow.	HH Head Sep.	Agri HH	Fishing HH	OFW Rem.
Percent Poor HH	28.85	21.78	17.20	8.43	21.17	17.80	59.47	59.75	10.07
Likelihood Ratio Test (H₀: β=0)	14120 (.0001)	1232 (0.0001)	1537 (0.0001)	179 (0.0001)	1241 (0.0001)	168 (0.0001)	3884 (0.0001)	366 (0.0001)	1678 (0.0001)
Proportion Spent on Education	0.890 (.0001)	0.880 (0.0001)	0.889 (0.0001)	0.915 (0.0273)	0.907 (0.0001)	0.884 (0.0019)	0.877 (0.0001)	0.872 (0.0001)	0.908 (0.0001)
Proportion Spent on Health	0.926 (.0001)	0.892 (0.0001)	0.914 (0.0001)	0.963 (0.1570)	0.916 (0.0001)	0.937 (0.0780)	0.922 (0.0001)	0.925 (0.0208)	0.916 (0.0001)
Family Size	1.493 (.0001)	1.224 (0.0001)	1.296 (0.0001)	1.371 (0.0001)	1.309 (0.0001)	1.610 (0.0001)	1.829 (0.0001)	1.956 (0.0001)	1.498 (0.0001)
Agricultural Household	6.771 (.0001)	3.984 (0.0001)	5.910 (0.0001)	4.713 (0.0001)	4.088 (0.0001)	4.928 (0.0001)	-	-	9.043 (0.0001)
Income to Expenditures Ratio	0.018 (.0001)	0.011 (0.0001)	0.012 (0.0001)	0.007 (0.0001)	0.010 (0.0001)	0.023 (0.0001)	0.012 (0.0001)	0.001 (0.0001)	0.024 (0.0001)

Numbers in parenthesis are p-values.

Table 5. Odds Ratio Estimates for Some Vulnerable Groups 2006 (continuation)

Year	2006 All HH	HH Head No Formal Education	HH Head Elem Grad	HH Head Elem Grad	HH Head HS Under.	HH Head HS Grad	HH Head Coll. Under.	HH Head Coll. Grad
Percent Poor HH	28.85	56.67	47.26	37.83	31.81	17.94	9.36	1.56
Likelihood Ratio Test (H₀: β=0)	14120 (.0001)	440 (0.0001)	3220 (0.0001)	2708 (0.0001)	1630 (0.0001)	2037 (0.0001)	697 (0.0001)	174 (0.0001)
Proportion Spent on Education	0.890 (.0001)	0.846 (0.0001)	0.908 (0.0001)	0.912 (0.0001)	0.924 (0.0001)	0.923 (0.0001)	0.908 (0.0001)	0.923 (0.0042)
Proportion Spent on Health	0.926 (.0001)	0.901 (0.0002)	0.923 (0.0001)	0.906 (0.0001)	0.949 (0.0001)	0.947 (0.0001)	0.912 (0.0001)	0.927 (0.0468)
Family Size	1.493 (.0001)	1.566 (0.0001)	1.484 (0.0001)	1.561 (0.0001)	1.532 (0.0001)	1.536 (0.0001)	1.524 (0.0001)	1.511 (0.0001)
Agricultural Household	6.771 (.0001)	1.817 (0.0001)	3.652 (0.0001)	4.209 (0.0001)	5.861 (0.0001)	7.780 (0.0001)	8.410 (0.0001)	10.201 (0.0001)

Income to Expenditures Ratio	0.018 (.0001)	0.015 (0.0001)	0.018 (0.0001)	0.014 (0.0001)	0.016 (0.0001)	0.019 (0.0001)	0.015 (0.0001)	0.004 (0.0001)
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Numbers in parenthesis are p-values.

4.4 Simulation

Consider the model for 2006. The odds of becoming non-poor increases by 11% for every 1% increase in the proportion of expenditures on education. The poor households spend 1.5% of the total expenditures on education (PhP 1,094.43 per year) and 1.26% (PhP 848.11) for health for a total annual family expenditure of PhP 61,884. The probability model that differentiates a poor from a non-poor household is given by:

$$P(\text{Poor}) = \frac{1}{1 + \exp[-1.07 + (0.12 * P\text{Educ}) + (0.08 * P\text{Medic}) - (0.40 * H\text{HSize}) - (1.92 * A\text{gri}) + (4.03\text{Save})]}$$

Consider an average poor household spending 1.5% on education, 1.26% on health, household size is 5.8, engaged in agriculture, age of head is 45, and income to savings ratio of 0.55. The probability of being poor computed from the model is 0.94, almost certain that indeed a household is poor. Suppose that CCT program is implemented so that P1,000 monthly cash is transferred to the household to be spent of education-related items. In addition, P 500 monthly support in terms of health services, medicines, vaccines, or nutritional supplements are provided. The probability that the household is poor reduces to 0.61. Furthermore, if there is a family planning program so that from household size of 5.8, there are only 4.8 household members (equivalent to three children), then the probability of being poor reduces further to 0.51. If similar scenarios are applied to a non-agricultural household, then the probability of being poor is only 0.13, meaning the household can already be treated as non-poor.

The simulation indicates that agricultural and non-agricultural households should be treated separately in the poverty alleviation program. Greater investments are needed to bail the agricultural households out of the poverty trap.

5. Conclusions and Recommendations

The excess income to expenditure requirements among Filipino households barely changed for the last two decades. Income exceeds 13% over expenditures in 1985, the highest surplus was observed in 1991 where the households earned 25% more than they spent. Unfortunately, the surplus declined continuously from that year until in 2006 where the surplus income is at the same level as in 1985 at 13%.

There is no evidence that the Filipino households changed their priority towards health and education over the years. The highest proportion of budget spent on education was 2.86% of the total budget in 2000, and lowest at 1.99% in 1988. Among the poor households, they spent at the most 1.73% of their budget also in the year 2000. Expenditures in health are even lower, although increasing pattern was observed in 2003 and 2006 that exceeded 2%. The poor households spent barely 1% of their total expenditures on health.

There is an increasing trend on the proportion spent on education over increasing income deciles. As income increases, there is a tendency for the households to put higher premium on education (invest a significant portion on their total budget). The bottom 30% of the income classes retains similar level of proportion of expenditures on education over the past two decades. Starting from the fourth decile and higher, proportion spent on education increases over the years. This would mean that human capital accumulation is constant for the poor households and increases over time among the non-poor households, contributing in the worsening income disparity among the households. There is also an increasing proportion spent on health as income decile increases.

The non-poor households recognizes the value of their investments on health and education in increasing the level of human capital that will eventually allow them to access various factors of production. The poor who should be investing on human capital to bail them out of the poverty trap did not exhibit such realization over the past two decades. This is clear evidence that a household-focused strategy in poverty alleviation is necessary. A conditional cash transfer (CCT) program with bundles of health and education components can be packaged along with a well-crafted targeting mechanism to avoid the leakage of the program.

Expenditures in education significantly contribute in the odds that a household will become non-poor ($p < 0.0001$). The odds ratio on poverty alleviation is about 11% for every 1% increase in the proportion spent on education. As of 2006, a 1% increase in the proportion spent on medical care can increase their likelihood of becoming non-poor by 7.4%.

All the covariates yield significant estimates of the odds ratio for all FIES years. In 2006, a household size increase of 1 can yield 49.3% likelihood of the household becoming poor. Increasing household size increases the likelihood for the household of becoming poor. This is consistent with many literatures focusing on the Philippines, see for example, (Orbeta, 2006). This means that to control for this covariate, a family planning program must be bundled as well in the same household-based, targeted poverty alleviation program.

Alongside the proposed accumulation of human capital as a poverty alleviation strategy, there is also a necessity to enhance income and livelihood diversification efforts to address the concern of the agriculture sector. To increase productivity, access to productive resources should be facilitated for them, e.g, rural infrastructure, microfinance, capacity building, etc.

The income to expenditure ratio is a very important facilitating factor for poverty alleviation. If only the income base of the households can be expanded through the provision/creation of new employment (or at the macro level, control prices to reduce total expenditures), this would facilitate the attainment of a more sustainable reduction of the number of poor households. If income is at least doubled the total expenditure, the likelihood of becoming non-poor will also be doubled.

The simulation indicates that agricultural and non-agricultural households should be treated separately in the poverty alleviation program. Greater investments are needed to bail the agricultural households out of the poverty trap.

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