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Income Disparity among Persons with Disabilities Assessed by Education and Sex: Findings from a Field Survey Conducted in Metro Manila, the Philippines

Jose Ramon Albert, Soya Mori, Celia Reyes,
Aubrey Tabuga, and Tatsufumi Yamagata
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Abstract

How do persons with disabilities (PWDs) earn a living? From the view point of poverty reduction, this question is quite critical in developing countries. This paper presents an investigation of economic activities of PWDs in the Philippines where, among developing countries, disability-related legislation is relatively progressive. In 2008, a field survey was conducted in cooperation with Disability People's Organizations (DPOs) using a tailor-made questionnaire in four representative cities of Metro Manila. The level and determinants of income of PWDs were examined with Mincer regression. Conclusions are as follows: (1) The incidence and depth of poverty are greater among sample PWDs than that of the total population in Metro Manila. (2) There is remarkable income disparity among PWDs which is associated with education and sex. (3) After controlling individual, parental, and environmental characteristics, it was found that female PWDs are likely to earn less than male PWDs due to fewer opportunities to participate in economic activities. It is suggested that female PWDs are doubly handicapped in earning income.

Keywords: Disability; Philippines; Poverty; Rate of return on education; Gender; Mincer regression; Heckman selection model.

JEL classification: D31, I12, I20, I31, J16, J31, O53

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INSTITUTE OF DEVELOPING ECONOMIES (IDE), JETRO
3-2-2, WAKABA, MIHAMA-KU, CHIBA-SHI
CHIBA 261-8545, JAPAN

Income Disparity among Persons with Disabilities Assessed by Education and Sex: Findings from a Field Survey Conducted in Metro Manila, the Philippines*

(Running title: Persons with Disabilities in the Philippines)

Jose Ramon Albert†, Soya Mori‡, Celia Reyes†, Aubrey Tabuga†, and Tatsufumi Yamagata‡

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† Philippine Institute for Development Studies, NEDA sa Makati Bldg., 106 Amorsolo St., Legaspi Village 1229, Makati City, the Philippines.

‡ Institute of Developing Economies, Japan External Trade Organization, 3-2-2 Wakaba, Mihama-ku, Chiba-shi 261-8545, Japan. E-mail: soya_mori@ide.go.jp; tatsufumi_yamagata@ide.go.jp.

I. Introduction

Only recently has "disability" been recognized as a development issue in the international community. In the past, it has been regarded as simply including diseases and injuries. Data on disability has thus not been widely collected beyond the medical domain. This inactivity is more applicable to developing countries than to those that are developed. These days, some international organizations constituting the "Washington City Group" have put forth intensive efforts to determine how disability should be identified, and this has included use of questionnaires for population census in both developed and developing countries (see Altman, 2006, among others). However, they give much attention to the identification of disabilities, and the socio-economic life of persons with disabilities (hereafter PWDs) has rarely been featured in field surveys on disability, even though the livelihood of PWDs appears to have qualitatively distinct aspects relative to those of persons without disabilities.[1]

This study focuses on the livelihood of PWDs in the Philippines, a country most widely enacting disability-related laws among developing nations. In August, 2008, the Institute of Developing Economies (IDE) in Japan and the Philippine Institute for Development Studies (PIDS) conducted a field survey in four cities of Metro Manila. Yap *et al.* (2009) have covered basic facts that were derived from the data. In this paper, questions related to how PWDs make a living are fully examined using the survey data. One of the unique methodological features adopted for this survey was that persons with a disability were hired as enumerators to interview persons that had the same category of disability in order to facilitate communication between interviewer and interviewee.

There are three main conclusions: (1) both the incidence and depth of poverty is higher among sample PWDs than that of the total population in Metro Manila, (2) there is remarkable income disparity among PWDs which is positively associated with years of education, and (3) after controlling individual, parental, and environmental characteristics, female PWDs are likely to earn less than males due to narrower opportunities to

participate in economic activities. From results reported in this paper it is obvious that income disparity among PWDs due to education and sex is remarkably salient.

The paper is organized as follows: The next section briefly explains the sampling strategy used in the field survey. Section III includes a review of the basic educational and income features of sampled PWDs. The incidence and depth of poverty among sample PWDs is also investigated in this section. Section IV is devoted to the analysis of determinants for income of PWDs. The final section provides concluding remarks.

II. Sampling method

II.1 Legal structure for PWDs

The Philippines is a country where laws and institutions have been better and more comprehensively formulated than in other developing nations. The first law for PWDs dates to Republic Act 1179 entitled "An Act to Provide for the Promotion of Vocational Rehabilitation of the Blind and other Handicapped Persons and their Return to Civil Employment" that was enacted in 1954.[2] Since that time, seven Republic Acts have been developed. They culminated in Republic Act 7277, named "An Act Providing for the Rehabilitation, Self-Development and Self-Reliance of Disabled Persons and their Integration in to the Mainstream of Society and for Other Purposes." This act is more widely known as the "Philippine Magna Carta for Disabled Persons", and it was enacted in 1992. This "Magna Carta" declares rights of persons with disabilities in terms of employment, education, health, social services, and other factors. It was further amended in 2007.

II.2 Geographical areas to study

Metro Manila is the capital of the Philippines, and it consists of seventeen cities known as "Local Government Units" (LGUs). Needless to say, Metro Manila is a megacity to and from which a large number of people migrate both domestically and internationally.

In this sense, Metro Manila represents the Philippines even though it is not an average place of the country.

Among the seventeen LGUs, Makati, Pasay, Quezon, and Valenzuela were selected for the survey (Figure 1). These four cities represent certain features of Metro Manila. Makati contains the richest quarter in the Philippines; thus, its fiscal affluence is outstanding among the seventeen LGUs (see Figure 2). PWDs living in ordinary residential districts of Makati benefit from large amounts of revenue. Quezon makes up 20 percent of Metro Manila in terms of both area and population. It is known as an educational district where several famous universities are located. Pasay and Valenzuela are as poor as other LGUs of Metro Manila. While Pasay is adjacent to Makati, Valenzuela is considered to be on the periphery of Metro Manila. It is assumed that an intensive study of these four cities sheds light on various aspects of the livelihood of PWDs living in Metro Manila.

II.3 Three mother lists of PWDs

There are three types of mother lists of PWDs living in Metro Manila. The most formal list is the one made through the survey for *2000 Census of Population and Housing* (NSO, 2004). Provided by the National Statistics Office (NSO) for the survey, this list was used to determine numbers of PWDs by LGUs and types of disability that are shown in Table 1. Unfortunately, this list turned out to be useless for the field study because of the inaccuracy of information about PWDs relative to name, disability, age, gender, and address. Thus, we gave up using this source.[3] The second source consisted of member lists of Disabled People Organizations (DPOs) that are maintained by each DPO. This was considered to cover a relatively upper class of PWDs because highly motivated people are more likely to become members of DPOs. The third source was PWD lists maintained by LGUs. Each LGU keeps and updates its list to identify who should be beneficiaries of disability-related social services offered by the LGU. This list covers the lower segment of

PWDs who need social services. Comparing the three mother lists, those maintained by the four LGUs were used in this study.[4]

II.4 PWDs interview PWDs

In this survey, PWD enumerators were hired to interview persons with the same type of disability. This policy was adopted for two reasons: First, PWDs perhaps know best the situation of peers with the same disability, so PWDs may be the most qualified enumerators. Second, the communication is smoother between persons with the same type of disability. This is particularly applicable to persons with hearing impairments; a deaf enumerator can interview in the Filipino sign language when the interviewee knows it as well. Without knowing any sign languages, the interviewer cannot interview persons with hearing impairments who knows neither written Filipino nor English. In order to be consistent with this policy, types of disabilities were limited to mobility[5], visual, and hearing. Persons with other types of disabilities (cognitive, mental, etc.) were interviewed only if they had a mobility, visual, or hearing impairment. Some powerful DPOs introduced candidates for enumerators for mobility, visual and hearing disabilities, but there were no such DPOs for the remaining types of disabilities.

Qualified interviewees who were determined to reside at their correct address and who were of working age (15-70 years old) were surveyed. The target sample size was 360 and consisted of 120 subjects in each disability category similarly distributed across LGUs. The distribution of samples is displayed in Table 2. Sample PWDs categorized under "multiple" had at least two of the three types of disabilities. In total, 403 samples were collected and there was no extreme concentration of samples by LGU or disability.

III. Education and economic activities of sample PWDs

The purpose of this study was to examine the livelihood of PWDs. Before proceeding to empirical analyses, basic features of key variables are reviewed in this section.

III.1 Education

Education is known as a key determinant of income. Thus, it is meaningful to review general tendencies of the educational achievement of sample PWDs. Table 3 shows distribution of samples by disability and highest educational attainment. Table 4 presents the share of samples within each education category to the total number of PWDs by disability. As seen in Table 4, persons who have never been to school make up 7.9 percent of the total sample. In fact, almost a quarter (24.3 percent) of sample PWDs did not finish primary school. Conversely, another quarter (exactly 25.0 percent) attended a college, university, or graduate school. Thus, there is high disparity in education among PWDs. This disparity is especially notable for people with visual impairments. While 13.2 percent of these interviewees never attended school, 27.8 percent have been to a college or a higher educational institution.

Table 5 summarizes the average years of schooling[6] by disability and sex. Note that the average years of schooling are shorter for females irrespective of their disability. The table shows that persons with mobility impairments go to school longer than those with hearing disabilities.

III.2 Jobs

Availability of a job is critical for an individual to earn income. Table 6 exhibits the probability of sample PWDs getting income-generating jobs[7]. The table shows that about a half of the sampled PWDs were engaged in economic activities. The data indicates that persons with visual impairments are more likely to get a job than those with the other two types of impairment. Table 7 reveals that 71.5 percent have jobs, and this is far higher than the same ratios for those with mobility and hearing impairments (44.2 percent and 31.5 percent respectively). According to a detailed review, many of those with visual impairments work as masseuses (Yap *et al*., 2009). Institutional factors such as training schools, collective shops, and having a long-established reputation appear to allow persons

with visual impairments to naturally consider massage as a promising occupation, and they can generally get a job by following predecessors.

III.3 Income by Disability

The average annual income of PWDs by source and disability is shown in Table 8. The simple average of annual income of sample PWDs is 60,173 pesos; this is roughly equivalent to 1,200 US dollars. Again, disparities in the average income by disability are remarkable. The average income of persons with visual impairments is 76,270 pesos which is 1.67 greater than those of persons with hearing and 1.37 times greater than those with mobility impairments. Another interesting fact is that the amount of private income transfer is greatest for those persons with hearing impairments whose income is the lowest, while persons with visual impairments who are the richest receive the least private income transfer. These observations imply that private income transfer is made in a direction to offset income differences. In other words, at least to a certain extent, private income transfer hides real potential to earn money.

Income difference by disability was statistically examined, and results are displayed in Table 9. Personal income was regressed to dummy variables for respective impairments. Since impairments are not mutually exclusive, no reference impairment was set, and the intercept was dropped. Note that cognitive, mental, and other impairments were accompanied by either mobility, visual, or hearing impairment among the sample PWDs, and the number of persons with cognitive, mental, or other impairments was small.[8].

In order to examine differences in income by type of impairment, tests of difference in coefficients attached to respective disability dummies were conducted. The lower panel of Table 9 shows that the average income of persons with visual impairment was significantly higher than those with mobility and hearing impairment regardless of whether the conventional or robust standard error was used. The income of persons with cognitive and other impairment additionally was far lower.

III.4 Poverty Indices

For evaluation of welfare and economic achievements of PWDs, a comparison in poverty indices between PWDs and non-PWDs (or just total population) is meaningful. Figure 3 depicts the sample distribution in terms of personal income as well as poverty line applied to Metro Manila. The poverty line is 19,345 pesos which was determined by the National Statistics Office (NSO) for the year 2007[9]. It is apparent at a glance that there are a small number of persons who have high earnings, and this implies a highly skewed distribution.

The second column of Table 10 provides estimates of standard poverty indices calculated with the data. The head count ratio turns out to be as high as 40.8 percent[10]. To gain perspective on how high this value is, the same ratio of Metro Manila derived from the latest *Family Income and Expenditure Survey* (FIES) which was conducted in 2006 can be taken as a reference (see the third column of Table 10). The value of this ratio was 10.4 percent, far lower than 40.8 percent. Even though sampling methods, survey periods, and survey areas were not exactly the same, the difference between the two is quite large. This strongly suggests that poverty incidence is higher among PWDs than persons without disabilities in Metro Manila.

In addition to the head count ratio, the poverty gap ratio and the squared poverty gap ratio were computed[11]. The poverty gap ratio reflects the depth of poverty, and the squared poverty gap ratio takes inequality among the poor into account. As is the case with in the head count ratio, the differences in the poverty gap ratio and the squared poverty gap ratio between the PWD samples and FIES total population were substantial. These observations suggest that the depth of poverty and inequality among the poor are greater among PWDs than persons without disabilities. Collateral evidence to the inequality is that quite a few PWDs living below the poverty line earn nothing. Out of 162 sample PWDs living below the poverty line, 74 earn no monetary income.

Some caveats on the above comparison are in order. There are offsetting factors

which can lead to overestimates and underestimates of poverty indices. Overestimation is due to sampling method. PWDs with lower income are considered to be more motivated to register with Local Government Units to receive social services than those with higher incomes. The data set may contain more PWDs with lower income than what is proportional to the population of all PWDs. This factor may produce upward bias in the poverty indices.[12] Factors leading to a downward bias in poverty indices are related to under-valuation of the poverty line relative to PWDs. The price and quantity of essential commodities and services for PWDs are considered to be greater than those for persons without disabilities. Thus, the poverty line estimated covering the whole population with and without disabilities is too low for PWDs to maintain the same standard of living as persons without disabilities. The estimated poverty indices based on the poverty line thus have downward bias. It is difficult to determine which factor dominates and whether estimates of poverty indices in this research have upward or downward bias.

IV. Empirical analyses of determinants of income

In order to explore how poor PWDs can get out of poverty, it is necessary to know the determinants of their income. A celebrated and tractable method to analyze determinants of income is Mincer regression (Mincer [1958]). This is a regression of logged income[13] with years of education and other control variables and estimates the rate of return on education and the impact of the control variables. Since Mincer regression has been used in a large number of studies, it is easy to compare estimation results of this study with existing literature.

In addition, determinants of years of education were investigated. While the rate of return on education is of key interest, years of education may have bi-directional causalities with the level of income. Thus, accurate estimates of the effect of education on income are important in order handle such endogeneity. Moreover, the income generation process is divided into two steps: (1) whether or not a PWD participates in an income

generating opportunity, and (2) how much the PWD earns. These two steps are explicitly treated with the Heckman selection model.

Remaining estimation exercises proceeded as follows: A simplified benchmark Mincer equation was estimated. A high rate of return on education and a significant negative coefficient of the sex dummy were observed. Then, factors and mechanisms behind such high rates of return on education and disadvantages for female PWDs were further elaborated. The nature of truncation in income of PWDs at zero pesos was then taken into consideration with the Tobit model. Second, endogeneity in the binary choice of a PWD to participate in an income generating activity was addressed with the Heckman selection model. Third, a better proxy for the ability of earning was introduced as well as other control variables. Finally, all the above revisions were introduced, and the duration of education was treated as an endogenous variable with instruments. All variables used in those estimations are summarized in Table 11.

IV.1 Benchmark Mincer regression

The Mincer regression was conducted with fundamental explanatory variables such as years of schooling, age, age squared, sex dummy (female = 1), marriage dummy[14] (the married =1), and disability dummies. Since disabilities are not mutually exclusive, the intercept was suppressed. The regression equation is specified as follows:

$$\ln(\text{income}) = \beta_1(\text{years of schooling}) + \beta_2(\text{age}) + \beta_3(\text{age}^2) + \beta_4 D_{\text{Sex}} + \beta_5 D_{\text{Marriage}} + \beta_6 D_{\text{Mobility}} + \beta_7 D_{\text{Visual}} + \beta_8 D_{\text{Hearing}} + \beta_9 D_{\text{Cognitive}} + \beta_{10} D_{\text{Mental}} + \beta_{11} D_{\text{Others}} + u. \quad (1)$$

Since the number of sample PWDs with mental impairment was very small, the specification with an integrated dummy variable for mental or other impairment is more frequently used in the following text.

Table 12 displays estimation results of this benchmark regression. Since the dependent variable was left-censored at zero, Tobit regression method was applied as well

as OLS. The results were qualitatively similar between the OLS and Tobit regressions. The coefficient on years of schooling can be interpreted as the rate of return on education. The point estimates for the specification with the integrated "mental and other dummy" were 24.9 percent with the OLS and 29.8 percent with the Tobit regression. These estimates are high relative to a genuine rate of return on education[15]. For example, the OLS estimate implies that one year increase in education raises income by 24.9 percent.

Other significant explanatory variables are age, age squared, sex dummy, and mental disability dummy. The point estimates of coefficients on age were as high as 30 percent, regardless of estimation method. This coefficient is conventionally interpreted as the "rate of return on experience in life". Precisely speaking, effects of age squared must be taken into account to compute the rate of return on experience. Since the estimates on age squared were significantly negative, it appears that an increment in income according to age decreases with aging.

Another interesting finding is that the coefficient on the sex dummy was significantly negative. The magnitude was large enough that the absolute values of the estimated coefficients exceeded unity for both OLS and Tobit regression. The significantly negative coefficient implies that women have significantly lower income than men with the same years of schooling, age, marital status, and disability. Moreover, the fact that the coefficient exceeded unity in absolute value means that the difference in income between a woman and a man with the same education, age, marital status, and disability is more than double[16]. Thus, female PWDs seem to incur double disadvantages, one as a PWD and the other as a woman.

There were several very impressive findings, such as the high rate of return on education, high rate of return to life experience, and low income of women. However, further empirical trials seemed necessary to check the robustness of the findings, and these are reported in the following subsections.

IV.2 Heckman selection model

The high estimates of the rate of return may be an artifact of: (1) neglect of the selection behavior of PWDs on participation in income generating activities as celebrated textbooks on micro-econometrics indicate (see Amemiya, 1985, and Wooldridge, 2002, among others), (2) mis-measurement of income, (3) omitted explanatory variables, and (4) endogeneity of education. Each of these was examined.

To assess the possibility of endogenous decisions of participation in income generating opportunities, the Heckman selection model was applied as follows:

$$\ln(\text{income}) = \mathbf{x}\boldsymbol{\beta} + u, \qquad (1)'$$

$$D_{\text{Income}} = I(\mathbf{z}\boldsymbol{\delta} + v > 0). \qquad (2)$$

The first equation is identical to eq. (1). $\mathbf{x}$ and $\boldsymbol{\beta}$ are vectors of respectively explanatory variables and coefficients. Equation (2) incorporates decisions made by PWDs to participate or not participate in income generating activities. The dependent variable is a dummy variable which takes a value of one if the PWD has positive income and zero otherwise. The right hand side is an indicator function which returns one if the inequality holds and zero otherwise. $\mathbf{z}$ is a vector of instrumental variables which contains $\mathbf{x}$. $\boldsymbol{\delta}$ is a vector of coefficients, and v is error. The two stage Heckman selection model is estimated by adding the inverse Mills ratio, $\lambda(\mathbf{z}\boldsymbol{\delta})$, of eq. (2) to eq. (1) as an explanatory variable to obtain the conditional mean:

$$\mathrm{E}(\ln(\text{income})|\mathbf{z}, D_{\text{Income}} = 1) = \mathbf{x}\boldsymbol{\beta} + \gamma \cdot \lambda(\mathbf{z}\boldsymbol{\delta}). \qquad (3)$$

γ is a coefficient. The instrumental variables added to the independent variables are those concerning parents of each PWD and include dummy variables such as whether or not parents are alive (parents' life dummy), years of schooling of parents, and LGU dummies. Table 13 gives results using two step Heckman and maximum likelihood estimations.

The values of estimates of the rate of return on education dropped to a level between 9 and 10 percent, and this is more consistent with the values of estimates attained in similar studies on developing countries (see note 15 for details). Thus, the endogeneity of choice relative to participating in income generating opportunities appears to be a factor raising the estimates of rate of return on education.

Another impressive change lies in the coefficient of the sex dummy. It was insignificant where the Mincer equation was concerned. An offsetting feature on the selection equation is that the estimates of the coefficient on the sex dummy in this equation were significantly negative. Thus, the income gap between female and male PWDs is reflected in the sex dummy on the selection equation rather than the Mincer equation. In other words, the income gap lies in the binary choice of whether or not a PWD participates in an income generating activity rather than difference in income after an income generating opportunity has been gained.

IV.3 Mis-measurement and omitted variables

Other factors leading to an upward bias in the rate of return on education are mis-measurement of earning ability and omitted variables positively correlated with years of schooling. The dependent variable used for the benchmark Mincer estimation was the logarithm of total income which contains income transferred from family members and friends. As mentioned in Subsection III.3, transfer income is likely to be allocated to offset other income. Therefore, "total income minus transferred income," termed "autonomous income" in this paper, may be a better proxy for PWD earning ability.

In addition, some variables that were omitted for the benchmark estimation were introduced as additional explanatory variables. These newly added explanatory variables were area dummies and years since onset of each disability. The area dummies were based on LGU residency of the respondent. Makati was the reference city. Residential environments and LGU policies may affect income generating opportunities of PWDs.

The number of years since onset of disability may be negatively correlated with years of schooling since disability beginning at a younger age may hinder receiving education. Therefore, if this instrument is negatively correlated with income, then the rate of return on education has an upward bias.

Table 14 shows the results of the adjustments described above. Some area dummies were significant. The number of years since onset of visual impairment was positively associated with autonomous income.[17] As a result, the estimates of rate of return on education fell to the level of 23.5with OLS and 13.1 percent with Tobit. Age, age-squared, and the sex dummy were still significant.

Finally, the Heckman selection model was applied to autonomous income, and the new set of explanatory variables (see the fifth and sixth columns of Table 14). The estimate of the rate of return on education decreased to 9.2 percent. Again, the sex dummy on the Mincer equation became insignificant, and the same dummy variable was significantly negative for the selection equation.

Thus, the correction of measurement of the dependent variable and incorporation of omitted variables as explanatory variables, as well as the Heckman selection model, led to a reduction in the estimate of the rate of return on education.

IV.4 Endogeneity in education

The final exercise to examine determinants of PWD income was to treat endogeneity in education with instrumental variables. There may be reverse causality running from income to education, and this may result in upward bias on the estimate of rate of return. Therefore, treatment to mitigate endogeneity is necessary. Wooldridge (2002) proposed a method to handle a sample selection model with endogenous explanatory variables. This is a variation of the Heckman two step estimation where instrumental variables are used from the first step (Wooldridge, 2002: 567-570). The method was applied to the model as follows:

$$\ln(\text{income}) = \beta_1(\text{years of schoolong}) + \tilde{\mathbf{x}}\tilde{\boldsymbol{\beta}} + u, \quad (1)'$$

$$\text{years of schooling} = \tilde{\mathbf{z}}\boldsymbol{\theta} + \varepsilon, \quad (4)$$

$$D_{\text{Income}} = I\left(\tilde{\mathbf{z}}\tilde{\boldsymbol{\delta}} + \tilde{v} > 0\right), \quad (2)'$$

where $\mathbf{x} = (\text{years of schooling}, \tilde{\mathbf{x}})$ and $\boldsymbol{\beta} = \left(\beta_1, \tilde{\boldsymbol{\beta}}\right)$. $\tilde{\mathbf{z}}$ is an augmented set of instruments where new variables are added to $\mathbf{z}$. The first pair of newly added instruments is how long each parent lived during the primary - tertiary school period of a given PWD. More concretely, the variable indicates how long each parent lived during the period in which the PWD was 6 to 21 years of age. If a parent dies in the period when a PWD is supposed to be in a school, then the possibility for the PWD being able to go to school decreases. Therefore, this pair of instruments satisfies the requirements of an instrument in the sense that the time for a parent to die is exogenous, and this variable is expected to be positively correlated with years of schooling of a PWD.

The second pair of newly added instruments is the difference in age between a sample PWD and her/his parent. This variable is exogenous to a PWD, but the age of parents may affect the probability of a PWD going to school. If the parents are too young or too old, then they may not be able to afford to send the PWD to school. To reflect non-linearity of the relation between affordability and parental age, the squared difference was introduced as an explanatory variable.

According to Wooldridge (2002), inverse Mills ratios were obtained using probit regression with the above instruments as explanatory variables. The instrumental variable estimation was then conducted with the number of years of schooling as an endogenous variable, and the inverse Mills ratios were added to the set of instrumental variables.

Results may be found in Table 15. First, the autonomous income dummy was regressed to all the instruments by the probit model. An important issue is that the estimate of the coefficient of the sex dummy was significantly negative, and this implies that female PWDs have a statistically significant disparity in probability of obtaining income generating opportunities.

The instrumental variable estimation was applied to the Mincer equation with the number of years of schooling as an endogenous variable. The results of this estimation are shown in the third and fourth columns of Table 15. As commonly seen in such estimations, results seem to suffer from weak instrument problems in the sense that the standard errors of the estimates of coefficients of the years of schooling and sex dummy turn out to be statistically insignificant. The point estimate of the rate of return on education was 14.9 percent, and this is not significantly greater than zero. This point estimate is far lower than the 25-30 percent observed with the benchmark estimation (Table 12), and it does looks reasonable.

Relative to the gender gap, the point estimate of the coefficient of the sex dummy was -0.655. This is equivalent to $e^{-0.655} \approx 1/1.925$. This point estimate indicates that the autonomous income of male PWDs is twice that of female PWDs with the same conditions reflected in the explanatory variables. Of course, this point estimate is not completely reliable due to the great standard error entailed. The significantly negative estimate of the coefficient of the sex dummy with the selection equation implies that the gap in income unfavorable to female PWDs which was observed with the benchmark Mincer regression was also found in the form of the difference in probability to attain income generating opportunities (and more vaguely in the form of disparity in autonomous income). This was found after: (1) a more sensible proxy for earnings was used, (2) omitted variables were explicitly taken into account, and (3) endogeneity in education and choice to participate in economic activities were addressed. The data reveals that female PWDs in Metro Manila are doubly handicapped in earning income.

V. Concluding Remarks

It may be reasonably argued that PWDs are poorer than persons without disabilities, that the variation in income among PWDs is high, and that female PWDs are doubly handicapped in earning income. However, it is rare to find these statements presented with quantitative data that is statistically scrutinized.

This study has shown how much poorer PWDs are than persons without disabilities and how great the income disparity by education and sex are. This was done using a data set originally collected through interviewing PWDs directly by PWDs. The results produced with the benchmark Mincer estimation were scrutinized with various proxies, control variables, instruments, and estimation methods. The main findings from the benchmark Mincer estimation remain valid, and these include: (1) high variation in income by education and sex and (2) a disparity against female PWDs in income generating activities.

Quantitative evidence presented in this paper may provide policy makers and practitioners with concrete evidence of just how serious the livelihood problem for PWDs is and which types of disabilities lead to tougher conditions.

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[1] An exception is a set of field surveys conducted by Washington University in St. Louis and the National Institute on Disability and Rehabilitation Research in the United States. These are known as the "Community Receptivity Project" and "Assistive Technology in the Community Assessment." For a similar study on Nepal, see Lamichhane and Sawada (2009).

[2] For more in details, see the National Council on Disability Affairs Website at www.ncda.gov.ph.

[3] See Yap *et al.* (2009), pp. 26-36 for more information. The inaccuracy is suggested by the extraordinarily small number of persons with hearing impairments in Table 1 as well.

[4] Precisely speaking, 3.0, 9.9, and 7.7 percent of samples were drawn from the first, second, and other sources. For more details, see Table 6 of Yap *et al.* (2009).

[5] In this study, upper-limb impairments were also categorized under "mobility impairments."

[6] Interviewees were asked about the highest educational degree that they had attained. Years of schooling was constructed as follows: (1) Kindergarten/Prep, 1 year; (2) Grades I to V, 3 years; (3) Elementary graduate, 6 years; (4) 1st to 3rd Year High School, 8 years; (5) High School Graduate, 10 years; (6) Vocational school, 10 years; (7) Post-secondary (diploma courses/ certificate), 11 years; (8) College level, 12 years; (9) College or University graduate, 14 years; (10) Masters or higher, 15 years.

[7] The term "income generating jobs" includes self-employment throughout this paper.

[8] There was only one PWD subject who had a mental impairment.

[9] See the following site: http://www.nscb.gov.ph/poverty/2006-2007/pov_th_07.asp.

[10] A more precise estimate that includes region-wise poverty lines is 36.5 percent. See Table 150 of Yap *et al.* (2009).

[11] For details of these poverty indices, see Deaton (1997) and Foster, Greers and Thorbecke (1984) among others.

[12] There is a more delicate factor which may add upward bias to the estimates of poverty indices. The estimates of poverty indices worked out by the NSCB are based on the average income of a family over family members, while the estimates used in this study are based on income of individuals. NSCB estimates smooth out variations in income among family members. Estimates of "income" in this paper do not incorporate transfers in kind in a family but do reflect monetary income transfer.

[13] As indicated in the previous section, 74 sample PWDs did not have any monetary income. Since the logarithm is applicable to only positive numbers, one peso is assigned to the income of the 74 sample PWDs in place of zero. One peso is as small as zero pesos in terms of annual income in the Philippines. Thus, there was no discernible effect.

[14] Common-law marriage is also counted as a marriage.

[15] The 95 percent confidence interval is (14.5%, 35.3%) with OLS and (16.8%, 42.8%) with Tobit regression. Estimates of rates of return on education as high as 20-40 percent have not been unusual in studies for developing countries in the 1960's-70's (Willis, 1986, pp. 540-41). However, estimates commonly observed in the world in these years (Card [1999: 1834-1854]) as well as those found with data from the Philippines are likely to be closer to 10 percent (Maluccio, 1998, Schady, 2003, Yamauchi, 2005, p. 965]).

[16] When the coefficient on the sex dummy is one, the conditional male to female income ratio is e^1 (=2.718...).

[17] Persons who attain a visual impairment in childhood may be able to adjust more smoothly by going to a school for the blind and receiving occupational training as masseuses.

Table 1. Total Number of PWDs by Sample Area, Cited from the Population Census 2000

Area (LGU)	Type of Impairment				
	Mobility	Visual	Hearing	Others	Total
Makati	233	4,637	133	227	5,230
Pasay	161	1,189	66	126	1,542
Quezon	850	4,701	372	720	6,643
Valenzuela	203	1,990	63	193	2,449

Source: NSO (2004).

Table 2. Number of Respondents by Type of Impairment and Area

Area (LGU)	Type of Impairment				
	Mobility	Visual	Hearing	Multiple	Total
Makati	54	31	38	2	125
Pasay	29	27	23	5	84
Quezon	28	58	32	4	122
Valenzuela	27	28	15	2	72
Total	138	144	108	13	403
Percentage					
Makati	39	22	35	15	31
Pasay	21	19	21	38	21
Quezon	20	40	30	31	30
Valenzuela	20	19	14	15	18
Total	100	100	100	100	100

Note: Sample PWDs categorized under "multiple" had at least two of the three types of disabilities.

Source: Yap *et al.* (2009), Table 8.

Table 3. Number of Respondents by Highest Educational Attainment and Impairment

Highest educational attainment	Type of Impairment				
	Mobility	Visual	Hearing	Multiple	Total
Never gone to school	5	19	5	3	32
Kindergarten/preparatory school	0	0	2	0	2
Grades I to V	12	22	28	2	64
Elementary graduate	11	14	6	0	31
1st to 3rd year high school	25	12	20	0	57
High school graduate	26	24	24	5	79
Vocational school	20	13	1	1	35
Post-secondary	2	0	0	0	2
College level	26	22	17	1	66
College or university graduate	11	15	5	1	32
Masters degree or higher	0	3	0	0	3
Total	138	144	108	13	403

Source: Yap *et al.* (2009), Table 21a.

Table 4. Percentage of Respondents by Highest Educational Attainment and Impairment

Highest Educational Attainment	Type of Impairment				
	Mobility	Visual	Hearing	Multiple	Total
Never gone to school	3.6	13.2	4.6	23.1	7.9
Kindergarten/preparatory school	0.0	0.0	1.8	0.0	0.5
Grades I to V	8.7	15.3	25.9	15.4	15.9
Elementary graduate	8.0	9.7	5.6	0.0	7.7
1st to 3rd year high school	18.1	8.3	18.5	0.0	14.1
High school graduate	18.8	16.7	22.2	38.5	19.6
Vocational school	14.5	9.0	0.9	7.7	8.7
Post-secondary	1.4	0.0	0.0	0.0	0.5
College level	18.8	15.3	15.7	7.7	16.4
College or university graduate	8.0	10.4	4.6	7.7	7.9
Masters degree or higher	0.0	2.1	0.0	0.0	0.7
Total	100	100	100	100	100

Source: Yap *et al.* (2009), Table 21b.

Table 5. Average Years of Schooling by Type of Impairment and Sex

Impairment	Female	Male	Total
Mobility	8.5	9.3	9.1
Visual	7.6	8.1	7.9
Hearing	7.0	7.8	7.5
Multiple	5.5	8.4	7.1
Total	7.6	8.5	8.1

Source: Yap *et al.* (2009), Table 23i.

Table 6. Respondents with Income-Generating Job by Sex

Status	Sex		Total
	Female	Male	
With	61	142	203
Without	93	105	198
No answer	0	2	2
Total	154	249	403
Percentage			
With	39.6	57.0	50.4
Without	60.4	42.2	49.1
No answer	0.0	0.8	0.5
Total	100	100	100

Source: Yap *et al.* (2009), Table 106.

Table 7. Percentage of Respondents with Income-Generating Job to Total Respondents by Type of Impairment

Impairment	Status			
	Without	With	No answer	Total
Mobility	76	61	1	138
Visual	41	103	0	144
Hearing	73	34	1	108
Multiple	8	5	0	13
Total	198	203	2	403
Percentage				
Mobility	55.1	44.2	0.7	100
Visual	28.5	71.5	0.0	100
Hearing	67.6	31.5	0.9	100
Multiple	61.5	38.5	0.0	100
Total	49.1	50.4	0.5	100

Source: Yap *et al.* (2009), Table 108.

Table 8. Mean Annual Income of Respondents from Various Source by Impairment

Source	Mobility	Visual	Hearing	Multiple	All
Wages and Salaries	10,460	58,315	13,053	6,111	28,127
Profits from business	15,320	4,745	1,870	16,622	8,004
Rent for buildings/rooms/lands	1,733	1,894	3,906	462	2,331
Interest and dividends from bonds, savings, and stocks	92	0	47	0	44
Pension	7,690	592	1,048	5,700	3,256
Benefit/allowance from government	4,412	296	0	0	1,617
Receiving money from family members/friends	12,229	7,352	24,967	15,554	13,995
Other	1,759	3,076	10	0	1,706
Total Income	55,681	76,270	45,667	44,077	60,173

Source: Yap *et al.* (2009), Table 138.

Table 9. Decomposition of Personal Income into Impairments

Variable	Coefficient	Ordinary Standard Error			Robust Standard Error		
		Standard Error	Test Statistics	*p*-value	Standard Error	Test Statistics	*p*-value
Dummy: Mobility	51,356	7,508	*t*=6.84	0.000	7,148	*t*=7.18	0.000
Dummy: Visual	71,384	6,979	*t*=10.23	0.000	6,937	*t*=10.29	0.000
Dummy: Hearing	42,003	8,044	*t*=5.22	0.000	8,872	*t*=4.73	0.000
Dummy: Cognitive	-43,665	44,161	*t*=–0.99	0.323	21,391	*t*=–2.04	0.042
Dummy: Mental	36,244	85,647	*t*=0.42	0.672	7,148	*t*=5.07	0.000
Dummy: Others	-18,969	20,053	*t*=–0.95	0.345	12,721	*t*=–1.49	0.137
Test: Mobility = Visual			*F*=3.75	0.054		*F*=4.08	0.044
Test: Mobility = Hearing			*F*=0.71	0.399		*F*=0.66	0.418
Test: Visual = Hearing			*F*=7.47	0.007		*F*=6.70	0.010
Test: Mobility = Cognitive			*F*=4.36	0.038		*F*=15.88	0.000
Test: Mobility = Mental			*F*=0.03	0.862		*F*=1.12	0.291
Test: Mobility = Other			*F*=9.02	0.003		*F*=16.94	0.000

Note: This results from a regression of personal income to disability dummy variables without an intercept. R-squared and adjusted R-squared are 0.329 and 0.318, respectively. The number of observations is 397.

Table 10. Poverty Indices in Metro Manila (%)

	IDE-PIDS Survey 2008	FIES 2006
Head Count Ratio (P_0)	40.8	10.4
Poverty Gap Ratio (P_1)	30.6	1.5
Squared Poverty Gap Ratio (P_2)	27.0	0.5

Note: FIES is the abbreviation of the *Family Income and Expenditure Survey*. This survey was conducted by the National Statistical Coordination Board (NSCB) throughout the entire country in 2006. Figures of the FIES 2006 are cited from Tables 2 and 11 of the following site: http://www.nscb.gov.ph/poverty/ 2006_05mar08/tables.asp. The squared poverty gap ratio is called "severity of poverty" on the site.

Table 11. Summary of Variables used for Estimations

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Personal income	397	58,996.42	84,943.26	1	660,000
Personal income minus private income transfer	389	45,712.22	68,392.78	1	600,000
Age	403	38.42	12.63	15	67
Sex dummy (Female = 1)	403	0.38	0.49	0	1
Marriage dummy (Married = 1)	402	0.47	0.50	0	1
Years of schooling	403	8.15	4.08	0	15
Disability dummy: Mobility (reference)	403	0.37	0.48	0	1
Disability dummy: Visual	403	0.38	0.49	0	1
Disability dummy: Hearing	403	0.29	0.45	0	1
Disability dummy: Cognitive	403	0.01	0.11	0	1
Disability dummy: Others	403	0.05	0.22	0	1
Area dummy: Makati (reference)	403	0.31	0.46	0	1
Area dummy: Quezon	403	0.30	0.46	0	1
Area dummy: Pasay	403	0.21	0.41	0	1
Area dummy: Valenzuela	403	0.18	0.38	0	1
Years since onset of mobility impairment	403	7.85	14.68	0	58
Years since onset of visual impairment	403	9.86	15.74	0	58
Years since onset of hearing impairment	403	4.81	11.77	0	58
Father's life dummy (Alive=1)	390	0.49	0.50	0	1
Mother's life dummy (Alive=1)	395	0.68	0.47	0	1
Father's years of schooling	341	8.27	3.86	0	15
Mother's years of schooling	359	7.46	3.80	0	15
Years of father's survival during PWD's school-age	359	13.97	3.23	0	15
Years of mother's survival during PWD's school-age	376	14.62	1.91	0	15
Father's disability dummy (Yes=1)	386	0.08	0.26	0	1
Mother's disability dummy (Yes=1)	389	0.08	0.28	0	1
Difference in age with father	337	30.78	8.63	14	60
Difference in age with mother	359	27.13	7.06	11	47

Table 12. Benchmark Mincer Regression

Explanatory variables	OLS	OLS	Tobit	Tobit
Years of schooling	0.252***	0.249***	0.302***	0.298***
	(0.053)	(0.053)	(0.066)	(0.066)
Age	0.319***	0.325***	0.298***	0.305***
	(0.062)	(0.061)	(0.075)	(0.075)
Age squared	-0.004***	-0.004***	-0.003***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Sex dummy (female = 1)	-1.086**	-1.097**	-1.364**	-1.378***
	(0.433)	(0.432)	(0.533)	(0.532)
Marriage dummy (the married = 1)	-0.100	-0.117	-0.090	-0.110
	(0.450)	(0.449)	(0.535)	(0.534)
Disability dummy: Mobility	-0.282	-0.324	-0.823	-0.876
	(1.161)	(1.152)	(1.418)	(1.410)
Disability dummy: Visual	1.639	1.588	1.405	1.342
	(1.121)	(1.112)	(1.371)	(1.363)
Disability dummy: Hearing	0.755	0.702	0.357	0.291
	(1.033)	(1.023)	(1.281)	(1.272)
Disability dummy: Cognitive	-1.319	-1.371	-1.115	-1.181
	(2.725)	(2.688)	(3.483)	(3.448)
Disability dummy: Mental	4.061***	-	4.789***	-
	(0.603)		(0.768)	
Disability dummy: Others	0.024	-	0.032	-
	(1.206)		(1.473)	
Disability dummy: Mental and Others	-	0.215	-	0.266
		(1.175)		(1.430)
Number of observations	396	396	396	396
Log likelihood	-	-	-1053.4	-1053.9

Note: The dependent variable is the logarithm of income of the PWD. For respondents who do not have any income, the income is assumed to be one peso instead of zero pesos because of the convenience with the log transformation. As annual income, one peso is taken to be as small as zero pesos in Metro Manila. The figures in parentheses are heteroscedasticity-robust standard error. The coefficients with ***, ** and * are statistically significant at respectively, the .01, .05, and .10 levels of probability. For Tobit estimation, 73 observations are left-censored at the log income of zero.

Table 13. Mincer Regression: Heckman Selection Model

Estimation method	Two step Heckman		Maximum likelihood	
Dependent variable	dummy	log income	dummy	log income
Years of schooling	0.063**	0.093***	0.076***	0.103***
	(0.026)	(0.028)	(0.027)	(0.026)
Age	0.026	0.408***	0.029	0.399***
	(0.032)	(0.030)	(0.031)	(0.030)
Age squared	-0.000	-0.005***	-0.000	-0.005***
	(0.000)	(0.000)	(0.000)	(0.000)
Sex dummy (Female = 1)	-0.473**	-0.099	-0.453**	-0.209
	(0.186)	(.234)	(0.184)	(0.208)
Marriage dummy (Married = 1)	-0.017	0.038	-0.062	0.044
	(0.225)	(0.204)	(0.221)	(0.211)
Disability dummy: Mobility	-0.314	1.827***	-0.140	1.678***
	(0.476)	(0.501)	(0.438)	(0.504)
Disability dummy: Visual	0.131	2.543***	0.312	2.490***
	(0.465)	(0.470)	(0.433)	(0.485)
Disability dummy: Hearing	-0.069	1.827***	0.166	1.701***
	(0.437)	(0.449)	(0.407)	(0.458)
Disability dummy: Cognitive	-0.845	-2.809**	-1.051	-2.769**
	(0.829)	(1.137)	(0.857)	(1.156)
Disability dummy: Mental and Others	-0.374	0.401	-0.341	0.365
	(0.385)	(0.450)	(0.378)	(0.459)
Area dummy: Quezon	0.269		0.306	
	(0.236)		(0.232)	
Area dummy: Pasay	0.781**		0.447	
	(0.322)		(0.344)	
Area dummy: Valenzuela	-0.028		-0.081	
	(0.263)		(0.246)	
Father's life dummy: Alive	-0.192		-0.104	
	(0.222)		(0.216)	
Mother's life dummy: Alive	0.326		0.172	
	(0.249)		(0.249)	
Father's years of schooling	0.007		-0.004	
	(0.031)		(0.028)	
Mother's years of schooling	-0.024		-0.034	
	(0.032)		(0.029)	
Inverse Mill's ratio		0.202		
		(0.794)		
Log likelihood			-608.6	
Sample size	321		321	

Note: Figures in parentheses are standard errors. The coefficients with ***, ** and * are statistically significant at respectively, the .01, .05, and .10 levels of probability.

Table 14. Augmented Mincer Regression

Estimation method	OLS	OLS	Tobit	Heckman: MLE	
Dependent variable	Autonomous income	Autonomous income	Autonomous income	Dummy	Autonomous income
Years of schooling	0.131**	0.169***	0.235***	0.037	0.092***
	(0.059)	(0.058)	(0.086)	(0.023)	(0.022)
Age	0.315***	0.224***	0.139	0.016	0.385***
	(0.074)	(0.079)	(0.123)	(0.029)	(0.048)
Age squared	-0.004***	-0.003**	-0.001	-0.000	-0.005***
	(0.001)	(0.001)	(0.002)	(0.000)	(0.001)
Sex dummy (Female = 1)	-1.243**	-1.323***	-1.952***	-0.350**	-0.066
	(0.509)	(0.501)	(0.747)	(0.168)	(0.187)
Marriage dummy (Married = 1)	0.406	0.377	0.565	0.131	0.253
	(0.543)	(0.537)	(0.763)	(0.186)	(0.176)
Disability dummy: Mobility	-0.565	-0.995	-2.249	-0.522	1.420
	(1.377)	(1.527)	(2.341)	(0.452)	(1.090)
Disability dummy: Visual	1.903	0.875	0.265	0.024	1.809*
	(1.297)	(1.397)	(2.180)	(0.485)	(1.057)
Disability dummy: Hearing	-1.093	-1.108	-2.950	-0.472	1.133
	(1.200)	(1.210)	(1.972)	(0.378)	(0.914)
Disability dummy: Cognitive	-1.979	-1.451	-1.069	-0.112	-3.965**
	(2.733)	(2.880)	(5.128)	(0.879)	(1.985)
Disability dummy: Mental and Others	-0.153	-0.458	-0.484	-0.645	-0.379
	(1.351)	(1.382)	(2.009)	(0.409)	(0.312)
Area dummy: Quezon		1.441	2.008**	0.298	0.704***
		(0.624)	(0.937)	(0.212)	(0.236)
Area dummy: Pasay		2.132***	2.991***	0.687***	1.359***
		(0.706)	(1.029)	(0.265)	(0.272)
Area dummy: Valenzuela		0.837	1.210	0.083	0.351
		(0.725)	(1.084)	(0.241)	(0.249)
Years since onset of mobility impairment		0.049*	0.068*	0.014*	0.002
		(0.026)	(0.038)	(0.008)	(0.008)
Years since onset of visual impairment		0.052**	0.070**	0.011	0.003
		(0.024)	(0.034)	(0.012)	(0.010)
Years since onset of hearing impairment		0.020	0.035	0.001	-0.016
		(0.027)	(0.043)	(0.009)	(0.013)
Father's life dummy (Alive=1)				0.014	
				(0.198)	
Mother's life dummy (Alive=1)				-0.011	
				(0.218)	
Father's years of schooling				-0.003	
				(0.028)	
Mother's years of schooling				-0.035	
				(0.030)	
Father's disability dummy (Yes=1)				0.186	
				(0.340)	
Mother's disability dummy (Yes=1)				-0.157	
				(0.334)	
Sample size	388	388	388	307	
Log likelihood			-972.7	-500.76	
Test: Mobility impairment dummy = Visual impairment dummy	F=16.86 [0.000]				
Test: Mobility impairment dummy = Hearing impairment dummy	F=0.56 [0.456]				
Test: Visual impairment dummy = Hearing impairment dummy	F=22.52 [0.000]				
Left censored observations			129	96	
Uncensored observations			259	211	

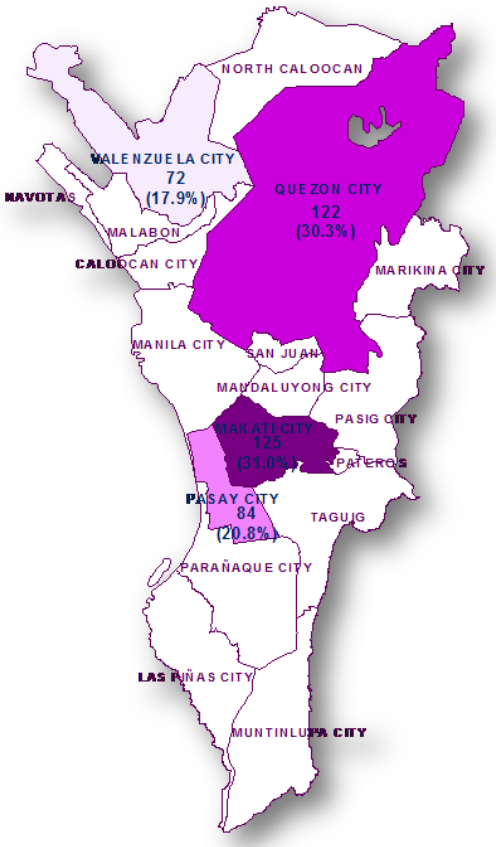
Note: The dependent variable is log (income minus transfer) unless specified otherwise. The dummy variable of the selection equation for Heckman MLE is assigned 1 for those with positive independent income and 0 for those without it. Figures in parentheses are robust standard errors. The coefficients with ***, ** and * are statistically significant at respectively, the .01, .05, and .10 levels of probability.

Table 15. Augmented Mincer Regression: 2SLS with Sample Selection

Estimation method	Probit	First Stage	Second Stage
Dependent variable	Autonomous income dummy	Years of schooling	ln (autonomous income)
Years of schooling	-	-	0.149 (0.194)
Age	0.078 (0.050)	0.019 (0.135)	0.308** (0.133)
Age squared	-0.001 (0.001)	-0.000 (0.002)	-0.003** (0.002)
Sex dummy (Female = 1)	-0.447** (0.194)	0.410 (0.635)	-0.655 (0.633)
Marriage dummy (Married = 1)	0.166 (0.224)	0.952* (0.513)	0.412 (0.650)
Disability dummy: Mobility	-0.155 (0.664)	0.648 (0.952)	-0.450 (2.287)
Disability dummy: Visual	0.463 (0.653)	1.128 (1.028)	1.034 (2.162)
Disability dummy: Hearing	-0.195 (0.624	0.941 (0.835)	-0.661 (2.219)
Disability dummy: Cognitive	-0.743 (1.205)	3.789** (1.674)	-1.439 (3.152)
Disability dummy: Mental and Others	-0.578 (0.413)	0.843 (1.667)	-1.548 (1.858)
Area dummy: Quezon	0.228 (0.234)	-2.227*** (0.628)	0.939 (0.827)
Area dummy: Pasay	0.664** (0.291)	-1.900** (0.947)	2.076** (0.945)
Area dummy: Valenzuela	0.020 (0.269)	-1.714*** (0.658)	0.409 (0.913)
Years since onset of mobility impairment	0.009 (0.009)	-0.018 (0.021)	0.023 (0.029)
Years since onset of visual impairment	0.009 (0.013)	-0.084*** (0.027)	0.017 (0.036)
Years since onset of hearing impairment	-0.003 (0.011)	-0.005 (0.027)	-0.011 (0.037)
Father's life dummy (Alive=1)	0.303 (0.277)	-0.395 (0.636)	-
Mother's life dummy (Alive=1)	0.164 (0.288)	0.463 (0.719)	-
Father's years of schooling	0.014 (0.030)	0.141* (0.075)	-
Mother's years of schooling	-0.023 (0.030)	0.163** (0.078)	-
Father's disability dummy (Yes=1)	0.063 (0.417)	-0.836 (0.840)	-
Mother's disability dummy (Yes=1)	-0.097 (0.347)	-0.088 (0.856)	-
Years of father's survival during PWD's school-age	-0.045 (0.040)	0.121 (0.116)	-
Years of mother's survival during PWD's school-age	-0.189** (0.090)	0.460** (0.203)	-
Difference in age with father	0.002 (0.076)	0.214 (0.187)	-
Difference in age with father, squared	-0.000 (0.001)	-0.003 (0.003)	-
Difference in age with mother	0.127 (0.097)	-0.199 (0.238)	-
Difference in age with mother, squared	-0.002 (0.002)	0.004 (0.004)	-
Inverse Mill's ratio	-	-5.333*** (2.043)	-2.041 (1.364)
Sample size	273	273	273

Note: Figures in parentheses are robust standard errors. The coefficients with ***, ** and * are statistically significant at respectively, the .01, .05, and .10 levels of probability. Out of 188 observations, 85 are left-censored at the log income of zero.

Figure 1. Areas Where the Survey was Conducted



Note : The figures assigned to each area (local government unit) represent the number of respondents. Those in parentheses are proportions of total number of respondents.

Source: Yap *et al.* (2009), Figure 2.

Figure 2. Per Capita Revenue and Population of all LGUs of Metro Manila

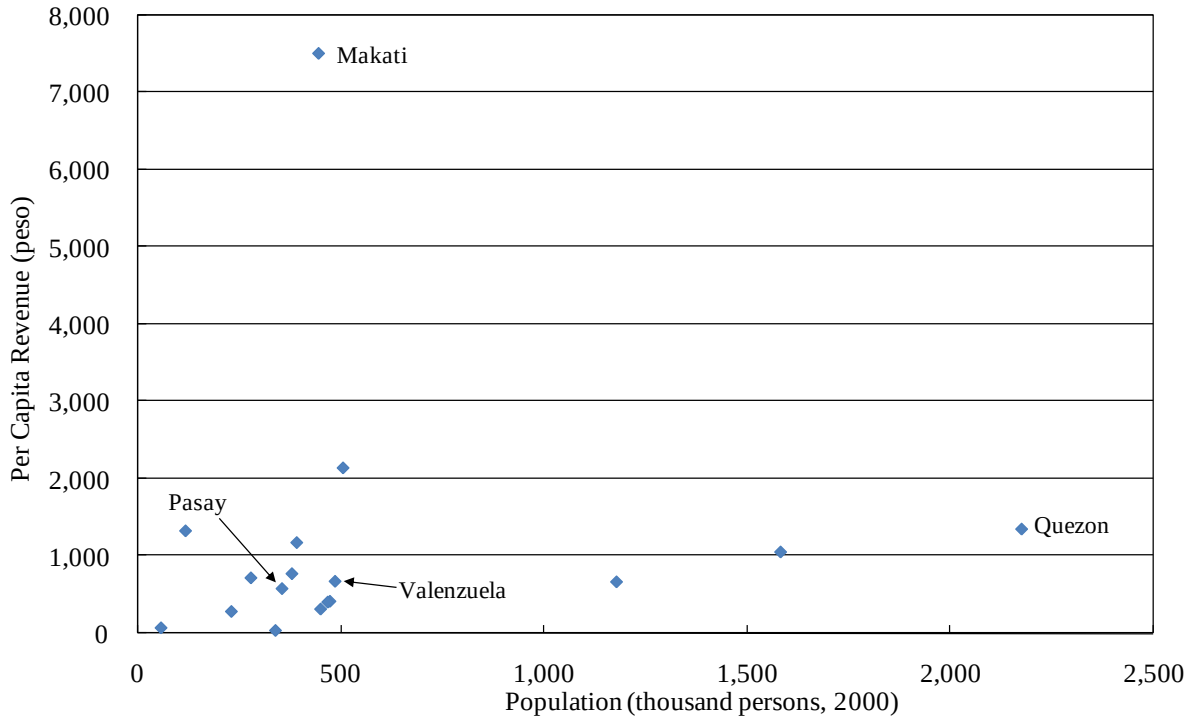
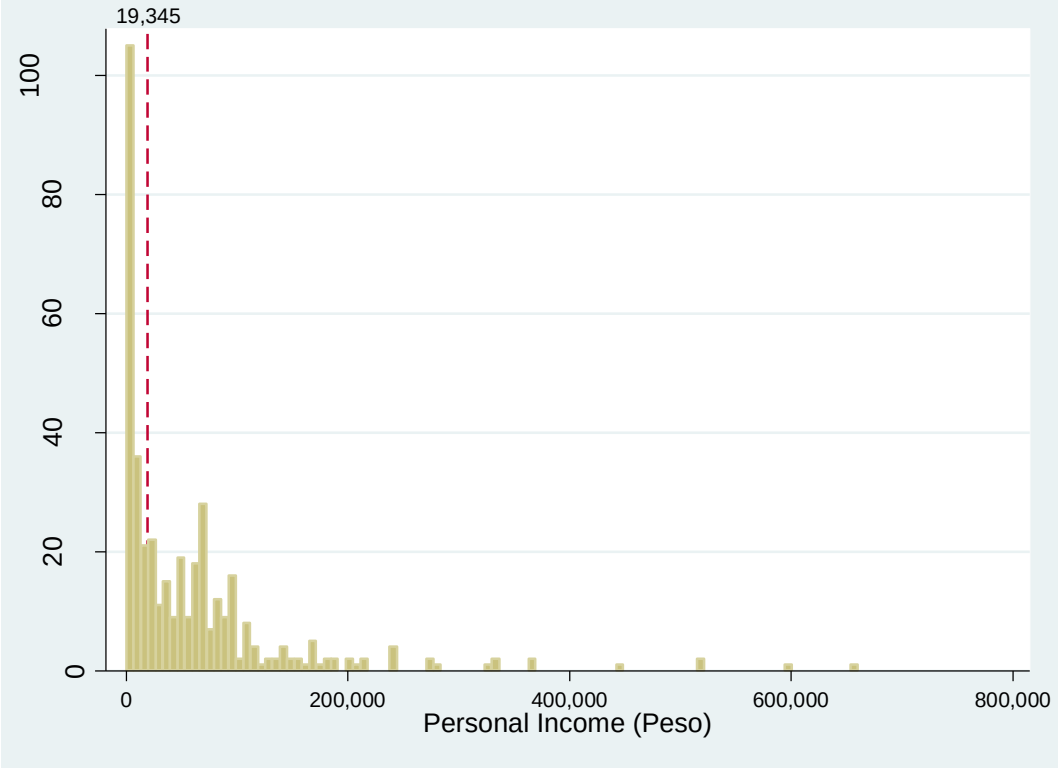


Figure 3. Histogram of Sample PWDs in Personal Income



Note: The broken line indicates the poverty line in Metro Manila in 2007. This poverty line was estimated by the National Statistical Coordination Board, the Philippines.