De La Salle University

Animo Repository

Units

2011

Limiting Family Size Through the Sufficient Provision of Basic Necessities and Social Services: The Case of Pasay, Eastern Samar, and Agusan Del Sur

John Paolo R. Rivera

Kurt Gerrard T. See

Limiting family size through the sufficient provision of basic necessities and social services: The case of Pasay, Eastern Samar, and Agusan Del Sur

John Paolo R. Rivera, Ph.D.
School of Economics, De La Salle University
Manila, Philippines
john.paolo.rivera@dlsu.edu.ph / johnpaolo_rivera@yahoo.com

Kurt Gerrard T. See
School of Economics, De La Salle University
Manila, Philippines
kurt.see@dlsu.edu.ph / kurtgerrardsee@yahoo.com

ABSTRACT

The socio-economic quandaries of rapid population growth and poverty have always been coupled. It is evident that the poorest households are those who have larger family size. Consequently, these households have to support more people with fewer resources, making the family live a life of inherited poverty. With this, the state has been on the pursuit of looking for solutions such as the Reproductive Heath (RH) Bill to address rapid population growth and eventually poverty. However, the Roman Catholic Church (RCC) condemns the RH Bill because it is contradictory to Catholic principles. For this reason, we will explore other possibilities to limit family size by highlighting whether the availability of water, electricity, decent housing, sustainable income, employment, and other welfare enhancing programs limits family size. By showing whether the provision of these basic sustenance affects family size via the Maximum Likelihood Estimation (MLE) procedure, it is then possible to propose an alternative solution other than the use of contraceptives. Likewise, the government can improve on its socio-economic policies that will address the problem of overpopulation. Results have shown that Pasay, Eastern Samar, and Agusan Del Sur responded differently to various stimuli such as living conditions, educational attainment, employment status, as well as government-funded programs among others insofar as population dynamics is concerned. This suggests a need to peer into the distinction of each region's socioeconomic context and underlying psyche. The milieu within which an individual resides may greatly influence his rational calculus and decision-making process. Also, beyond tailoring-fitting population control programs, there is also a need to calibrate policies based on relevant socioeconomic, political, and cultural nuances each region may possess.

Keywords: *contraceptives, family planning, maximum likelihood estimation, population, Reproductive Health Bill, women empowerment*

I. Introduction

Rapid population growth in the Philippines is blamed for the country's state of underdevelopment, economic stagnation, resource depletion, low literacy rate, and high crime rate among others. Likewise, according to Todaro & Smith (2006), the problem of rapid population growth gives rise to ominous problems such as poverty and unemployment because economic growth is slower than population growth most especially for developing countries. Based on the statistics of the Department of Economic and Social Affairs Population Division of the United Nations, as of 2009, the Philippine population reached 91,983,000. According to Cuyegkeng (2006), the factors that contribute to rapid population growth include but are not limited to poverty, high incidence of hunger, lack of job opportunities, under quality of education, and others many of which result from one another. Nonetheless, whatever is the root cause of the problem; it has something to do with the sustenance of life. According to the Central Intelligence Agency (CIA) World Factbook, birth rate in the Philippines far exceeds its death rate with an estimated 26.01 and 5.1 birth rate and death rate for 2010 respectively.

Various legislative reforms have been enacted in the Philippines regarding population control such as the legalization of the use of contraceptives and family planning, which contributed to the decrease in the fertility level of the country. However, such policies specifically the RH Bill of the Philippines is bringing about controversies as it is being condemned by the RCC. As a result, the government is constrained to adjust its policies in promoting the distribution of contraceptives (Gopalakrishnan, 2008). Such bill, also known as the Reproductive Health and Population Development Act of 2008, promotes information on and access to both natural and modern family planning methods that are medically safe and legally permissible. It also assures an enabling environment where women and couples have the freedom of informed choice on the mode of family planning they want to adopt based on their needs, personal convictions and religious beliefs. However, the RCC has been arguing that by making modern forms of contraceptives such as condoms or pills readily available, the youth will have little to worry about pre-marital sex.

Despite the arguments against the RH Bill, according to Bernas (2008), "the RH bill is by no means a perfect document." Indeed, there are provisions in the bill which contradicts moral beliefs. However, the arguments for and against the RH Bill are just natural consequences of the fact that the moral rules of Philippine society as well as much of its civil laws are grounded on religious values. Moreover, Bernas (2008) highlighted that the Philippines is a religiously pluralist society. Hence, Filipinos can differ in matters of morality specifically sexual morality. Most importantly, Bernas (2008) argued that the RH Bill is not entirely ruinous because "there are provisions in the bill which seek to answer the crying needs of women and important needs of young people, especially among the poor."

Since there are a lot of apprehensions about the population policy of the government, there is a need to look for an alternative or complementary solution to the RH Bill. If this policy will just lead to the division of the Filipino people, then an alternative must be considered. If the advantages of this policy cannot be discarded, then a complementary policy must be considered to mitigate the disadvantages of some provisions that give rise to moral concerns. This will

provide policymakers another perspective on the RH Bill. Hence, the following specific objectives are set:

- To determine whether the provision of the basic sustenance of households specifically water, electricity, housing, education, and food can influence family size.
- To determine whether the employment status will aid in limiting family size.
- To provide policy recommendations on how the government will be able to address population control without contradicting the moral values of the RCC.

We will highlight whether water supply, availability of electricity, decency of housing, accessibility to information, educational attainment, employment status, as well as government-funded programs limit family size. Showing whether the provision of these welfare-enhancing instruments limits household size, then it is plausible to propose an alternative solution wherein instead of advocating for the use of contraceptives, the government can simply improve on its socio-economic policies. Hence, the government will be able to formulate policies addressing the problem of overpopulation that is supported by the RCC.

II. Poverty, Fertility, Population, and Women Empowerment

2.1. Education and Household Size

Various studies have explored the relationship between the level of parental education and fertility. Bautista (2007) suggested that parental education may have both a positive and a negative influence on the number of children within a household. Individuals with a higher level of education are likely to encounter significantly more income-generating opportunities than their less educated counterparts. Given the constraints, a trade-off between the exploitation of such opportunities and childcare begins to surface. The plausibility and desirability of child making and childrearing decrease as the returns to labor-force participation increase. In the instance that parents opt to forgo more children in exchange for pursuing career opportunities, the substitution effect dominates. Turchi (1975) reinforced this idea by explaining that any activity that requires the use of market goods and services or the consumer's time must be weighed in the context of allocating scarce resources among competing alternatives. In this particular instance, parents must be able to choose between the psychic rewards of childbearing and the rewards from other activities which would have been made possible should they decide not to have an additional child. On the other hand, the same study indicated the possibility of a positive relationship between education and family size. The additional income made possible by higher levels of education allows parents the financial capacity to raise more children. Being able to afford more offspring is one less disincentive for parents to bear children. In such instances, the income effect dominates.

Van de Kaa (1996) related that there indeed exits strong interaction between the quality and quantity of children, although both must not be mistaken as perfect substitutes. In most cases, educated parents have been found to prioritize quality over quantity of children. This implies that there is focused spending on a few offspring as opposed to spreading income too thin amongst many children. Meanwhile, Janowitz (1976) posited that education affects family size through both direct and indirect channels. Direct influences include a higher degree of attitudinal maturity and exposure to vital information that pertain to the costs and childbearing

and the availability of contraception. Indirect influences include the labor force participation and deferred age of marriage resulting from time spent for schooling. The same study also highlighted that the educational attainment of both husband and wife do impact fertility rates.

2.2. Poverty and Population Growth

The causal relationship between poverty and population growth has been contended to be bidirectional. Rogers (1989), as cited by McNicoll (1997), claimed that poverty is both a cause and a consequence of population growth. Todaro & Smith (2006) provided a comprehensive explanation as to how this phenomenon is indeed applicable to many low-income societies today.

The first causal relationship pertains to the idea that high population levels and growth rates are usually associated with higher levels of poverty. From the perspective of a household, an additional member that will naturally require additional expenditures effectively reduces family savings rate. Income, which would have originally been spent on other activities such as increasing the quality of life of other household members or perhaps entrepreneurial undertakings, is instead spent to sustain the additional member. Similarly, from an aggregate perspective, a larger population may hinder the effective and efficacious provision of social services as limited funds are spread too thinly across a huge number of individuals.

The second relationship suggests that poverty is in fact one of the main causes of high fertility rates. According to Caldwell (1978), one of the most important determinants of the utility of fertility lies in intergenerational wealth flows. In many traditional societies, where net wealth flows from young generations to the elderly, children were perceived to be sources of future income. McNicoll (1999) added that in early stages of economic development, parents expect to benefit from having many children. In locations where child labor is prevalent, children are expected to augment income through employment at young ages. Meanwhile, some are seen as substitute parents who are tasked to care for younger siblings, while others are used as tools to procure wealth from dowries. Moreover, Todaro & Smith (2006) posited that children have also become substitutes to a formal social security system, as aging parents seek support.

An alternative explanation to the causal relationship between poverty and high fertility rates can be found in the consequence of the former. Low income societies with high rates of child mortality owing to poverty and the lack of adequate resources have been shown to exhibit higher fertility rates. According to Schultz (1997), underpinning this positive co-variation are the "hoarding" and "replacement" motives. The first channel refers to how parents bear an excess number of children in order to hedge against the possibility of the death of an offspring. This is something which is highly likely in areas wrought by restricted and limited access to basic necessities and social services. The second channel concerns the typical response of parents to replace a child after a death. Although the aforementioned reasons require a more complex understanding of human behavior and psychology, both provide plausible connections between poverty, child mortality, and higher population growth. Reinforcing such ideas are empirical methods employed by Schultz (1997) which suggest that a decline in child mortality is associated with a decline in fertility rates. This behavior is attributed to the diminished need to replace dying children and the institutionalization of better social services, which reduces the economic value once conferred upon children.

2.3. Employment and Fertility Rate

A significant amount of research has been conducted on the relationship between female labor force participation and fertility rates. Several studies such as that of Faria & Wang (2007) and El-Ghannam (2005) have predicted a negative relationship between employment and the number of children. A plausible explanation can be found in the seminal work of Mincer (1962) and Becker (1965) which stated that an individual's limited amount of time can be allocated between work-related activities, home-related activities, and leisure. Therefore, increased amount of time spent at work will naturally reduce the amount of time which can be spent for leisure or, of more relevance to this study, home-related activities. Note that home-related activities include child-rearing which requires a significant amount of time. Moreover, Faria & Wang (2007) cited the opportunity cost of women's time as a major determinant of the said inverse relationship. Increased wages for females make childrearing more costly as time spent caring for the child will imply forgone returns to employment. Based on this framework, women then face a trade-off between employment and childcare. Ultimately, it is assumed that the woman's decision to either seek employment or to remain at home to tend to her children will depend on the returns either course of action will provide her.

Despite the vast amount of literature which seeks to explain and validate the inverse relationship between female employment and fertility, there is a dearth of research that delves into the employment choices of the husband. Employing a differential game framework, Faria & Wang (2007) concluded that the employment choices of the husband holds as much weight as the employment choices of the wife inasmuch as fertility is concerned. Hence, it is interesting to verify whether or not the same opportunity cost framework applies to the relationship between the employment of the household head, which is often the husband, and family size.

However, it must be noted that various factors other than opportunity cost may also affect the type of correlation between female labor force participation and fertility rates. Faria & Wang (2007) suggested the existence of multiple equilibriums across different countries, implying a non-homogenous relationship between the two relevant variables. Rindfuss & Brewster (1996) categorize such factors into two major categories namely social structural factors and attitudinal or ideational factors. The first deals with policies that aim to reduce the conflict that exists between employment and childrearing. The institutionalization of tax relief, parental leaves, flexible work hours, and access to childcare alternatives such as daycare centers and nannies allow women to simultaneously carry out both work-related and home-related responsibilities. Rindfuss & Brewster (1996) have shown that such mechanisms assuage the mother-worker conflict. The second set of factors is more concerned with the role of culture and gender perceptions in determining the relationship between labor force participation and household size. The rigidity of gender roles and societal perceptions on working mothers do indeed play a role in the ability of engage in work-related activities. The proper apportioning of home-related responsibilities and appropriate childbearing practices do vary across societies.

2.4. Women Empowerment and Opportunity Costs to Childbearing

According to Todaro & Smith (2006), increasing the women's access to opportunities may reduce fertility rates. Hence, it is believed that the prevalence of women empowerment programs may create channels for women to be aware of the potential lifestyle alternatives to motherhood and childrearing. The facilitation of such access via awareness campaigns, livelihood programs, and ultimately, the reduction of gender prejudices create avenues by which women need not remain in the household to perform childcare duties. Moreover, as women begin to gain access to the same economic returns which were previously exclusive to males in patriarchal societies, the viability to excessive childbearing may become less tenable due to increased opportunity costs.

Similarly, Davis, Bernstam & Ricardo-Campbell (1986) and Garcia (2000) defined empowerment of women as providing women with access to employment, access to education, and access to reproductive health care that is free from discrimination, compulsion, and aggression. According to Chavkin (n.d.), these same factors are correlated with declines in fertility, which has become a global occurrence that causes growing concern for state planning for future workforce and social security needs.

However, Castles (2003) argued that public policy strategies to empower women may advance the decline in fertility. However, it is also likely that policies supporting women in working and raising children are most likely to sustain fertility (Castles, 2003). According to Chavkin (n.d.), "while demographers had anticipated that fertility decline would follow the mortality decline attendant upon improved living conditions and medical advances, they had expected fertility to level off at replacement rates." Furthermore, Chavkin (n.d.) emphasized that "the decline in birth rates has led to a host of positive changes on both the societal and individual levels – economic growth resulting from women's increased employment, improved health and education of children, benefits for women's health and life opportunities."

While a number of theorists hold opposing views regarding the attributable contribution of specific factors to fertility, according to Sorrentino (1990) and Oppenheim & Jensen (1995), they generally agree that the decline in fertility is associated with mortality decline, increased longevity, urbanization, increased female education and employment, changes in family formation such as delayed marriage and first birth, increases in divorce and out of wedlock childbearing, technological advances in contraception, increased costs of childrearing, opportunity costs for women, increased secularity and individualism, and changes in economic and cultural aspirations.

III. Methodology

3.1. Maximum Likelihood Estimation (MLE): The Binary Logistic Regression

Qualitative Response Model (QRM) involves a dependent variable that indicates in which one of m mutually exclusive categories the outcome of interest belongs in which no ordering is required for the categories (Gujarati & Porter, 2009). For this study, categorization is done on the number of children a typical Filipino household has. Each household is classified whether it has a relatively acceptable number of children or otherwise. This study specifies that the acceptable number of children for a typical Filipino household is four based on the statistics

from the National Statistics Office (NSO) showing that the average number of children per woman in 2006 is 3.2. Hence, it can also be construed that the average household size in the Philippines is six.

Therefore, the study will utilize a binary logistic regression model. For a binary outcome data, the dependent variable, y, takes one of two values as shown by Equation 1.

$$y = \begin{cases} 1 & \text{with probability } p \\ 0 & \text{with probability } 1 - p \end{cases} \tag{1}$$

From Equation 1, the dependent variable assumes a value of one if the number of children in the household is at most four and assumes a value of zero if the number of children in the household is greater than four. According to Cameron & Trivedi (2005), there is no loss of generality in setting the values to one and zero if all that is being modeled is p, which determines the probability of the outcome.

Based on Cameron & Trivedi (2005), a regression model is formed by allowing the probability p to depend on a regressor vector $\mathbf{x}$ and a $K \times 1$ parameter vector β via a parametric technique. The model is of single-index form with conditional probability given by Equation 2

$$p_i = \Pr[y_i = 1|\mathbf{x}] = F(\mathbf{x}_i'\beta), \tag{2}$$

where $F(\cdot)$ is a specified function. To guarantee that $0 \le p \le 1$, it is natural to specify $F(\cdot)$ to be cumulative distribution function (CDF). The logistic model arises if $F(\cdot)$ is the CDF of the logistic distribution. Note that if $F(\cdot)$ is a CDF, then this CDF is only being used to model the parameter p and does not denoted the CDF of y itself (Cameron & Trivedi, 2005).

Particular concentration lies in determining the marginal effect of change in a regressor on the conditional probability that $y = 1$. For any probability model, given by Equation 2, and change in the jth regressor assumed to be continuous, this is shown by Equation 3

$$\frac{\partial \Pr[y_i = 1 \mid x_i]}{\partial x_{ij}} = F'(x_i'\beta)\beta_j \tag{3}$$

where $F'(z) = \partial F(z)/\partial z$. The marginal effects differ with the point of evaluation x_i, as for any nonlinear model, and differ with alternative choices of $F(\cdot)$.

Considering an estimation given a sample (y_i, x_i) for $i = 1, \ldots, N$, where independence over i is assumed. The outcome is Bernoulli distributed for the binomial distribution with one trial. A compact notation for the density of y_i is its probability mass function given by Equation 4

$$f(y_i \mid x_i) = p_i^{y_i}(1 - p_i)^{1 - y_i} \text{ for } y_i = 0,1 \tag{4}$$

where $p_i = F(\mathbf{x}_i'\beta)$. This yields probabilities pi and $(1 - p_i)$ since $f(1) = p^1(1 - p)^0 = p$ and $f(0) = p^0(1 - p)^1 = p$. The density shown in Equation 3 shows log density $\ln f(y_i) = y_i \ln p_i + (1 - y_i)\ln(1 -$

p_i). Given independence over i and Equation 2 for p_i, the log-likelihood function is given by Equation 5.

$$L_N(\beta) = \sum_{i=1}^{N} \left\{ y_i \ln F(x_i'\beta) + (1 - y_i) \ln(1 - F(x_i'\beta)) \right\} \tag{5}$$

Differentiating with respect to β, the MLE $\hat{\beta}_{ML}$ solves Equation 6

$$\sum_{i=1}^{N} \left\{ \frac{y_i}{F_i} F_i' x_i - \frac{1 - y_i}{1 - F_i} F_i' x_i \right\} = 0 \tag{6}$$

where $F_i = F(\mathbf{x}_i'\beta)$, $F_i' = F'(\mathbf{x}_i'\beta)$, and $F'(z) = \partial F(z)/\partial z$. Converting to fractions with common denominator $F_i(1 - F_i)$ and simplifying yields the ML first order condition in Equation 7.

$$\sum_{i=1}^{N} \frac{y_i - F(x_i'\beta)}{F(x_i'\beta)(1 - F(x_i'\beta))} F'(x_i'\beta)x_i = 0 \tag{7}$$

Cameron & Trivedi (2005) highlighted that the MLE is consistent if the conditional density of y given $\mathbf{x}$ is correctly specified. Since the density is Bernoulli, the only possible misspecification is that the Bernoulli probability is incorrectly specified. Therefore, the MLE is only consistent if $p_i = \underline{F}(\mathbf{x}_i'\beta)$.

Given this backdrop on QRM, the logistic regression model is specified in Equation 8. According to Gujarati & Porter (2009), the binary logistic model is the simplest unordered model that allows regressors to differ between two alternatives. Moreover, according to Cameron & Trivedi (2005), the marginal effect for binomial data is computed as a separate marginal effect on the probability of each outcome, and these marginal effects sum to zero since probabilities sum to one.

$$p = \Lambda(x'\beta) = \frac{\exp(x'\beta)}{1 + \exp(x'\beta)} \tag{8}$$

where $\Lambda(\cdot)$ is the logistic CDF, with $\Lambda(z) = e^z/(1+e^z) = 1/(1+e^{-z})$. Moreover, the logistic MLE first order condition, as seen in Equation 9, simplifies to

$$\sum_{i=1}^{N} (y_i - \Lambda(x_i'\beta))x_i = 0 \tag{9}$$

since $\Lambda'(z) = \Lambda(z)[1 - \Lambda(z)]$. Thus, the raw residual, $y_i - \Lambda(\mathbf{x}_i'\beta)$, is orthogonal to the regressors, similar to the Ordinary Least Squares (OLS) regression. Meanwhile, if the regressors x_i include an intercept, then Equation 9 implies that $\sum_i (y_i - \Lambda(x_i'\hat{\beta})) = 0$, so the logistic residuals sum to

zero (Cameron and Trivedi, 2005). This implies that the average in-sample predicted probability $N^{-1}\sum_i \Lambda(x_i^{'}\hat{\beta})$ necessarily equals the sample frequency $\bar{y}$.

The marginal effects for the logistic regression model can be obtained from the coefficients, since $\partial p_i/\partial x_{ij} = p_i(1 - p_i)\beta_j$, where $p_i = \Lambda_i = \Lambda(\mathbf{x}_i'\beta)$. Evaluating at $p_i = \bar{y}$ yields a crude estimated marginal effect of $\bar{y}(1-\bar{y})\hat{\beta}_j$. As such, the interpretation of the coefficients is in terms of marginal effects on the odds ratio rather than on the probability (Cameron & Trivedi, 2005). For the logistic regression model, the model specification is shown by Equation 10

$$\ln\left(\frac{p_i}{1-p_i}\right) = x'\beta + \varepsilon \qquad (10)$$

where $p_i/(1 - p_i)$ measures the probability that $y = 1$ relative to the probability that $y = 0$, which is called the odds ratio (Gujarati & Porter, 2009). For the logistic regression model, the log-odds ratio is linear in the regressors (Cameron & Trivedi, 2005).

3.2. Model Specification

In tracing the influence of the availability of water, electricity, housing, education, food, and employment status on the probability that a household will maintain a relatively acceptable number of children, the data on household characteristics and demographics was sourced from the Community Based Monitoring Survey (CBMS) for Pasay City in 2005, Eastern Samar in 2005, and Agusan Del Sur in 2006. These provinces were selected to capture the Philippine behavior in its entirety with ample representatives from Luzon, Visayas, and Mindanao. The logistic specification of the variables influencing the probability that the household will maintain the acceptable or optimal family size is given by Equation 11. As abovementioned, this study specifies that the acceptable number of children for a typical Filipino household is four based on the statistics from NSO.

$$\ln\left(\frac{p_i}{1-p_i}\right) = f(WATERNEAR_i, ELECT_i, WALLSTRONG_i, ROOFSTRONG_i,$$
$$PERMANENT_i, SEASONAL_i, TEMPORARY_i, HHINCOME_i, ELEMGRAD_i, \qquad (11)$$
$$HSUNDR_i, HSGRAD_i, PSUNDR_i, PSGRAD_i, COLUNDR_i, COLGRAD_i, WMSPHD_i,$$
$$WOMEN_i, HEALTH_i, SCHOLAR_i, TRAINING_i, HOUSING_i, CREDIT_i) + \varepsilon$$

where

p_i is the probability that a household has four children at most while $(1 - p_i)$ is the probability that a household has number of children greater than four. This is an indicator whether a family has a desired number of children below or beyond the usual number of children.

WATERNEAR$_i$ is a dummy variable indicating whether a household is near the source of water. It assumes a value of one if the distance of household from source of water is near and zero if otherwise. Note that if the water source is inside the household fence or yard and/or outside the fence or yard but less than 250 meters, it is deemed to be near. On the other hand, when the water source is more than 250 meters away from the household and/or the distance is undetermined, it is deemed to be far.

ELECT$_i$ is a dummy variable to indicate the presence of electricity in the household. It assumes a value of 1 if the household has electricity and zero if otherwise.

WALLSTRONG$_i$ and *ROOFSTRONG$_i$* are dummy variables indicating the strength and type of building materials used in the construction of the walls and roofs of houses respectively. It assumes a value of one if the walls and/or roofs are made of strong materials and zero if the walls and/or roofs are made of light materials, salvaged materials, or a mixture of strong, light, and/or salvaged materials.

WATERNEAR$_i$, *ELECT$_i$*, *WALLSTRONG$_i$* and *ROOFSTRONG$_i$* are indicators of poverty and poor living conditions. Todaro & Smith (2006) defined poverty as the incidence of not being able to afford basic needs and wants, which includes food, clothing, housing, medicine, education, and other necessary social services. Insufficiency of these elements in the household indicates that the household is enduring poverty, which then influences the decision to increase the number of children in the household as elucidated by the studies of Caldwell (1978), Rogers (1989), McNicoll (1997, 1999), Schultz (1997), and Todaro & Smith (2006). Hence, based on the definition of these dummy variables, all are expected to have a positive impact on the probability that the household will have at most four children.

PERMANENT$_i$, *SEASONAL$_i$*, and *TEMPORARY$_i$* are dummy variables indicating the employment status of the household head namely permanent employment, seasonal employment, and temporary employment respectively. Categories assume a value of one if the household head is permanent, seasonal, temporary, and zero otherwise. It is expected that this variable will have a positive impact on the probability that a household has a number of children less than or equal to four in reference to the studies of Mincer (1962), Becker (1965), Rindfuss & Brewster (1996), El-Ghannam (2005), and Faria & Wang (2007). However, the magnitude of each type of employment might differ.

HHINCOME$_i$ measures the total household income. It is the summation of all sources of household income from domestic and international sources. Based from the Microeconomic Theory of Fertility cited by Todaro & Smith (2006), this variable will have an ambiguous effect on the probability that a household will have an optimal number of children. Higher income does not necessarily imply that households will have more children because of the tendency of parents to prioritize quality of children over quantity.

ELEMGRAD$_i$, *HSUNDR$_i$*, *HSGRAD$_i$*, *PSUNDR$_i$*, *PSGRAD$_i$*, *COLUNDR$_i$*, *COLGRAD$_i$*, and *WMSPHD$_i$* are dummy variables indicating the highest educational attainment of the household head namely elementary graduate, high school undergraduate, high school graduate, post secondary undergraduate, post secondary graduate, college undergraduate, college graduate, and

with graduate studies respectively. The category elementary undergraduate was dropped to avoid the dummy variable trap. It is expected that this variable will have an ambiguous impact on the probability that a household has a number of children less than or equal to four in reference to the studies of Turchi (1975), Janowitz (1976), Van de Kaa (1996), and Bautista (2007).

$WOMAN_i$ is an indicator whether the woman in the household, specifically the mother, has attended women empowerment programs and positively benefited from it. Women empowerment programs aims to improve the living conditions of women by allowing them to have access to information about opportunities outside the household, to participate in the formulation and implementation of policies. Likewise, these programs enhance women's involvement at all levels of management, including policy-making and decision-making; and increase women's control over the decisions that affect their lives both within and outside the household. It assumes a value of one if the woman attended such programs and it brought positive effects to the household. Note that in the CBMS dataset, the effect of the program is categorized as negative effect, no effect, or positive effect. This is different from the highest grade completed because women empowerment programs are considered to be ad-hoc programs that are forced, arranged, or done for a particular purpose, which is to promote women's welfare alone unlike formal and technical education, whose purpose is skill building. It is expected that this variable will have a positive impact on the probability that a household has a number of children less than or equal to four in reference to Sorrentino (1990), Oppenheim & Jensen (1995), Castles (2003), Todaro & Smith (2006), and Chavkin (n.d.).

$HEALTH_i$, $SCHOLAR_i$, $TRAINING_i$, $HOUSING_i$, and $CREDIT_i$ are dummy variables indicating whether a household received health programs, scholarship programs, training programs for vocational purposes, housing programs, and credit programs respectively. These variables represent the provision of government subsidies that will augment the lack of capacity of households to acquire such services from the private sector. It is expected that these variables will have various impacts on the probability that a household will have the optimal number of children. For instance, scholarship programs have the tendency to increase the probability that a household will have more than four children because the burden of sending their children to school will be lower.

IV. Results and Discussion

4.1. Pasay City, Metro Manila

Pasay City is the third smallest political subdivision in the National Capital Region (NCR). The local government unit (LGU) of Pasay has been on the pursuit of continuously providing the basic necessities of its swelling urban population. Moroever, Pasay has already exceeded the limits of its ability to accommodate the influx of migrants from various rural areas in the country. In terms of meeting the people's health requirements, Pasay has the Pasay City General Hospital that provides medical services to all its residents. Moreover, as a government policy, Pasay places education first on its list of priorities by maintaining a local educational system that utilizes private-public partnerships (PPP). In addition, basic education in the city is both publicly and privately provided. Meanwhile, as far as demographics is concerned, the total

number of housheolds in Pasay is 65,117 with a mean household size of four and a total population of 132,704 based from the CBMS survey conducted in 2005. Furthermore, electricity in Pasay is distributed by the Manila Electric Company (MERALCO) and water supply is handled by the Maynilad Water Services, Inc.

The marginal effects for Pasay are shown in Table 1, with the rudiments of deriving the marginal effectsfor Pas ay, are listed in Appendix 1. Note that the violation of heteroscedasticity was already addressed. Also, there is tolerable multicollinearity among the explanatory variables.

The marginal effects for Pasay show that the poverty indicators represented by the physical characteristics of the household have varying impacts and statistical significance. Note that, a-priori, there is a tendency for the household to prioritize the quality rather than the quantity of children if the household deviates from the state of poverty - a prediction of the Microeconomic Theory of Fertility cited in Todaro & Smith (2006). For instance, the water source convenience, availability of electricity, and the physical structure of the house do affect the probability that a household will have the optimal number of children. Results show that the probability a household will have at most four children will increase if the structural integrity of the house is superior. This result suggest that the physical structure of a house indicates the income capacity of the household, such that superior physical construction of a house means that the owner may have the financial means to have it constructed. As such, this is indicative of an improved wealth dimension of the household that induces them to prioritize the quality over the quantity of the children that they have. However, the ease of access to water source reduces the chance that a household will only have four children. An explanation for this is the possibility that regardless of wealth and income status, everyone will always have access to water since it is a common resource. Another plausible explanation can be attributed to health and sanitation purposes. Water serves a primary necessity for everyday living such as for drinking, bathing, and cleaning. Thus, availability and accessibility of water increases the household size by means of improved health conditions via reduced water borne-diseases. On the other hand, the availability of electricity demonstrated a statistically insignificant marginal effect. Such insignificance suggests that electricity is not really a strong consideration for family size.

These incongruent findings just show that each poverty indicator does not categorically imply any real conclusion. Such is indicative of the ambiguity of how the state of poverty influences the decision to increase family size. According to Todaro & Smith (2006), poverty has two motivations regarding the decision to increase family size. First, each additional member of the household is an additional mouth to feed and this additional cost discourages the household to increase its size. Second, each additional member of the household can be an additional source of future income which encourages households to increase its size. Given these assertions, it can be concluded that poverty is not a strong consideration for family size because of the varying and conflicting perspective that individual households have towards an additional member. It can even be argued that the decision to increase family size vis-à-vis the state of poverty is behavioral in nature.

To reinforce this claim, results have shown that the income generated by the household and the employment status of the household head showed negative and statistically significant marginal effects on the probability that a household will have at most four children. While the

Microeconomic Theory of Fertility may have supported the wealth dimension indication of housing conditions, the result of total income exhibits the contrary where as income increases, the probability of obtaining only four children in the household decreases. This exemplifies the ambiguity in the effect of income, which can be deemed as another poverty indicator, on household size because the resulting statistics entail that higher income associates to a household's financial capacity to have more children. With regards to employment, results showed that whether the household head is permanently, seasonally, or temporarily employed; the probability of having only four children in the household decreases. This is consistent with the implication of income, where employment serves as an indicator of capacity to have more children because there will be an inflow of income to the household regardless of employment status. This result can be associated with the behavior of households towards expected income. Considering the magnitude of the marginal effects, it is noticeable that when a household head is temporarily employed, the probability of obtaining the optimal household size for a Filipino family is reduced by the highest amount relative to being permanently or seasonally employed. This implies that despite a precarious state of employment, they view their children to be a form of investment that will augment family income in the future allowing the household to escape the chains of poverty. Hence, there is more incentive to increase household size. Alongside this, being permanently employed will provide the household to increase its size because of the guaranteed streams of income in the future.

The educational attainment of the household head also serves as a significant determinant of the probability that a household will have a maximum of four children. Generally, it can be noticed from the results that the higher the household head's educational attainment, the higher the probability of obtaining the optimal household size. However, it can be observed that if the household head has just finished elementary or if he/she is just a high school undergraduate, the probability of having only four children in the household decreases primarily because of the lack of schooling. Note that sufficient schooling provides the necessary knowledge, information, training, and guidance in building a decent home and sustainable family. Having a low educational attainment implies the lack of essential parental planning. Moreover, the incapacity to attain a higher level of schooling can be ascribed to poverty. Hence it can be construed that from the psychological perspective of Filipino parents, an additional child is an additional source of income in the long run that will allow a household to escape poverty. Furthermore, in the case of household heads achieving post secondary school graduates, college undergraduates, or college graduates, the probability of having only four children in the household increases. As opposed to the perspective of parents who may have stopped schooling in their earlier years, these household heads view that bearing children has certain direct, indirect, and opportunity costs, which may or may not be more than their capacity to mold a larger family. Having a higher educational attainment means that the household heads have prepared to raise the quality and quantity of children they desire. Moreover, most often than not, these parents are the ones who get employed, considering that education serves as a prerequisite to obtaining a stable job. Hence, bearing more children may also serve as an opportunity cost because despite financial concerns, they would have to forgo time and career opportunities. On the contrary, household heads that are obtaining and have obtained a Masters or Doctorate degree have the tendency of having more than four children. A practical notion is that most often than not, these people are also the ones who have attained high-paying jobs, or are at least well compensated in their

profession. Again, it boils down to pecuniary conditions, where they believe that they have already accumulated enough resources to bear a large family.

The varying impacts of educational attainment on the probability of having an optimal family size can be explained by the verity that education has the capacity to change the mentality of household members. Education can promote transcendence on how households decide on their family size subject to financial constraints and other microeconomic considerations. However, it must be noted that low educational attainment is not sufficient to change or correct the mentality of household members as seen by the negative and statistically significant impact of being in elementary, being an elementary graduate, and being in high school. This is because having low educational attainment will not offer lucrative job opportunities that will increase the cost of increasing family size or that will increase the financial capacity of households to increase their size. Instead, having a low educational attainment redirects the perspective of the household towards the expectations that an additional member of the family will be another source of income. It is even accompanied by the reality that children are complements to housekeeping and in extreme cases, child labor. Hence, it can be concluded that as educational attainment correct the mentality of household members, it is being translated to how employment is perceived whether as an opportunity cost of increasing family size or as an avenue to increase capability of households to increase family size.

It is also interesting to note that employment is a consequence of achieving a certain level of education. The higher the household head's educational attainment is, the higher the probability of having an optimal family size due to the increasing opportunity cost of having a large family size brought about by lucrative job opportunities. However, results show that it is the other way around. An explanation for the contradictory effect of educational attainment and employment is the viewpoint that education is being used as a stepping stone to acquire employment that will provide the financial resource for the household to afford financing an additional family member. This is the case because educational attainment and employment status is being treated independently in the regression. However, it must be the case that educational attainment and employment complement each other. Employment alone, which is not accompanied by a high educational attainment, yields the same mentality towards family size. Nonetheless, assuming the general case that education is likely to lead to higher income in the future, it is likely that parents may foresee or experience a higher capacity to raise children.

Meanwhile, government support and/or poverty-reduction programs provided for households ought to make them consider the costs and benefits of having a larger family size because this implies that it will give them supplementary training and/or resources to raise a larger family. However, training, housing loan provisions, and credit access have shown insignificant effects on the probability that a household will have at most four children as opposed to the negative and statistically significant marginal effect of women empowerment programs, provision for health benefits, and scholarship grants. Contrary to expected results, even if women were given empowerment programs in the form of sex education, the probability of having the optimal number of children decreases. From the results, it can be seen that these programs are ineffective to limit the number of children in a typical Filipino household. Instead, it can induce the curiosity of women with regards to childbearing. Likewise, the government's attempts to women empowerment are overwhelmed by Catholic beliefs. Similarly, the

government provision of health benefits and scholarship grants lessens the burden of households to raise children such that parents no longer have to worry about medical expenditures and tuition fees. Therefore, this induces a positive effect on the probability that a household will have more than four children. Such result is indicative of the free-rider problem.

Table 1. *Marginal Effects after Logit*

Variables	Pasay dy/dx	P>|Z|	Variables	Eastern Samar dy/dx	P>|Z|	Agusan Del Sur dy/dx	P>|Z|
$WATERNEAR_i$*	-0.02639	0.000	$WATERNEAR_i$*	0.09788	0.023	-0.01196	0.381
$ELECT_i$*	-0.00769	0.139	$ELECT_i$*	0.09421	0.024	0.03055	0.071
$WALLSTRONG_i$*	0.01341	0.000	$WALLSTRONG_i$*	0.16016	0.012	0.01655	0.357
$ROOFSTRONG_i$*	0.00644	0.001	$ROOFSTRONG_i$*	-0.08871	0.030	0.02235	0.240
$PERMANENT_i$*	-0.01713	0.000	$PERMANENT_i$*	-0.07098	0.046	0.58016	0.000
$SEASONAL_i$*	-0.00729	0.038	$SEASONAL_i$*	-0.21618	0.000	0.65603	0.000
$TEMPORARY_i$*	-0.06330	0.000	$TEMPORARY_i$*	-0.07737	0.085	0.57027	0.000
$HHINCOME_i$	-0.00000	0.950	$HHINCOME_i$	-0.00000	0.000	-0.00000	0.441
$ELEMGRAD_i$*	-0.03513	0.000	$ELEMGRAD_i$*	-0.22077	0.000	0.44941	0.000
$HSUNDR_i$*	-0.02044	0.000	$HSUNDR_i$*	0.01597	0.673	0.30861	0.000
$HSGRAD_i$*	0.00326	0.374	$HSGRAD_i$*	-0.12308	0.014	0.55905	0.000
$PSUNDR_i$*	0.01510	0.115	$PSUNDR_i$*	Omitted		0.76249	0.000
$PSGRAD_i$*	0.03638	0.000	$PSGRAD_i$*	Omitted		0.26188	0.300
$COLUNDR_i$*	0.01095	0.005	$COLUNDR_i$*	0.12511	0.013	0.53911	0.000
$COLGRAD_i$*	0.03623	0.000	$COLGRAD_i$*	-0.20220	0.000	0.60153	0.000
$WMSPHD_i$*	-0.00721	0.873	$WMSPHD_i$*	Omitted		Omitted	
$WOMEN_i$*	-0.01125	0.077	$FEEDPROG_i$*	-0.16053	0.039	-0.02882	0.241
$HEALTH_i$*	-0.00836	0.000	$HEALTH_i$*	0.06500	0.068	-0.04819	0.000
$SCHOLAR_i$*	-0.03377	0.000	$SCHOLAR_i$*	-0.18774	0.004	-0.08795	0.000
$TRAINING_i$*	-0.00940	0.428	$TRAINING_i$*	Omitted		-0.01608	0.589
$HOUSING_i$*	-0.00796	0.546	$HOUSING_i$*	Omitted		-0.01047	0.863
$CREDIT_i$*	-0.01671	0.157	$CREDIT_i$*	-0.21193	0.000	-0.04041	0.014
Predicted Probability	0.94287058		Predicted Probability	0.26115648		0.12417826	

* *dy/dx* is for discrete change of dummy variable from 0 to 1
*The variable $FEEDPROG_i$ is a dummy variable that indicates government provision of feeding program. The dataset for Eastern Samar and Agusan Del Sur does not contain any data on the provision of women empowerment program. Instead, it provided for the provision of feeding program. Nonetheless, both variables captures government funded programs aimed to reduce poverty

4.2. Eastern Samar

The province of Eastern Samar, according to the CBMS (2010b), from 2005 to 2006, the number of households reached 79,976, with each household consisting of an average of five members. In 1995, according to the NSO, about 30.9% of the province's household population lived in urban areas while 69.1% constituted the rural population. As far as the provincial economy is concerned, the provincial government earned a total income of PHP 386,216,737.02 in 2005, which was up by 7.6% from its income level of PHP 359,103,607.82 in 2004 (CBMS, 2010b). The total amount of income from local sources amounted to PHP 22,458,807.99, which was 4.9% of the province's total income. Tax revenues accounted for 42.1% while non-tax operating income stood at 57.8%. Meanwhile, income from external sources accounted for 95% of the total provincial income. Internal Revenue Allotment estimated at PHP 432,389,658.25 constituted almost all of the externally sourced-out income (CBMS, 2010b).

The marginal effects for Eastern Samar are also shown in Table 1. For the fundamentals of deriving the marginal effects for Eastern Samar, refer to Appendix 2. Note that the violation of heteroscedasticity was already addressed. Likewise, there is tolerable multicollinearity among the explanatory variables.

Results for Eastern Samar showed that water distance, the availability of electricity, and the structural integrity of walls decrease the likelihood that the number of children in a family will exceed five. On the other hand, the structural integrity of the roof increases the probability that the number of children in the household will be more than four. Similar with the results of Pasay, these contrasting findings demonstrate that the individual poverty indicator does not firmly generate solid conclusions. Again, this is indicative of the ambiguity of how the state of poverty influences the decision to increase family size. However, it must not be discounted that the quality of life is still an essential factor into the decision-making process of families insofar as family size is concerned.

Characterizing Eastern Samar in terms of its poverty threshold and incidence, according to the NSCB, among the six provinces in Eastern Visayas, Eastern Samar ranked next to the highest in poverty incidence of families in 2006 with 42.7%. From the 36th poorest province in Philippines in 2003 it dropped to the 23rd ranking in 2006, indicating an increase in poverty incidence (CBMS, 2010b). Moreover, CBMS (2010b) showed that the province had 50,772 households or 63.7% living below the poverty threshold in 2006. This translates to 268,104 persons or 69.5% who are classified as poor. Furthermore, those in the rural areas had a higher poverty incidence of 69.3% than those in the urban areas with 50.0%. Annual per-capita poverty threshold increased from PHP 11,025.00 in 2003 to PHP 13,873.00 in 2006. With this threshold, a family of five members in the province should have a monthly income of PHP 5,773.00 to meet its food and nonfood requirements. Therefore, the comparatively steady composition of households in and out of poverty is an angle to look at in explaining the ambiguity of the results from the poverty indicators.

In addition, as far as domestic water supply is concerned, according to CBMS (2010b), in 2006, there were a total of 5,345 water systems facilities. Level 1 facilities consisting of shallow and deep wells, provided the domestic water requirements of majority of households in the province. This type of water source numbered 5,055 or 94.6% of the total number of water facilities. Other households depended on Level 2 and Level 3 water systems. In 2006, there were 285 Level 2 and five Level 3 water facilities. Meanwhile, with regards to power supply, electricity is directly provided by the Eastern Samar Electric Cooperative (ESAMELCO), which derives most of its power supply from the National Power Corporation (NPC). According to CBMS (2010b), as of 2006, 66.6% of all *barangays* in the province had been energized to serve a total of 49% of all households in the province. Moreover, as of 2009, 77.5% of all *barangays* have been energized. In terms of households from all municipalities, 61.8% of all potential households now have electricity. Hence, regardless of wealth and income status, everyone will always have access to water and electricity so these elements are trivial considerations regarding family size.

Generally, there is a higher probability that a higher-quality of life may diminish the need for children as a source of future income and as a mean to ensure social safety nets.

Employment, on the other hand, is shown to decrease the likelihood of a family having less than five children. This is contrary to a-priori expectations. Although employment may imply higher opportunity costs to childbearing and childrearing, it may also imply a higher capacity to sustain a larger family as far as Eastern Samar is concerned. This provides much insight as to the probable bidirectional relationship between employment and family size. Hence, the choice to bear an additional child in the context of employment may be a function not only of opportunity costs but also the capacity to raise offspring given the desire to have one.

By and large, employment in Eastern Samar provides households with the capacity to increase family size. This is because the province's labor force and employment in 2005 and 2006 indicated a total labor force of 143,530 or 37.1% of the total population (CBMS, 2010b). Moreover, CBMS (2010b) reported an employment rate of 77.7%, which is higher in the rural areas with 79.0% than in the urban areas with only 74.6%.

Household income exhibited a negative and statistically significant impact on the probability that a household will have an optimal family size. This can be explained by the 1997 and 2000 Family Income and Expenditure Survey (FIES) conducted by the NSO as cited in CBMS (2010b) wherein Eastern Samar's average family income was estimated at PHP 71,527.00 in 2000, up by 28.42% from the 1997 level of PHP 55,694.00, which was the lowest in the Eastern Visayas region. Meanwhile, the average family expenditure in 1997 was PHP 47,625.00, which increased to PHP 61,742.00 in 2000. It is also interesting to note that the province's main source of income is coming from entrepreneurial and family operated activities wherein 42.6% of the families in Eastern Samar derive their income from these activities (CBMS, 2010b). On the other hand, 24.2% of households in the province earn from salaries and wages while the remaining 33.2% derive income from other sources other than work such as cash receipts, gifts, pension and retirement, rental of buildings, spaces and other properties (CBMS, 2010b). The statistics suggest that residents have a lot of alternative sources of income that will allow them to finance the cost of childbearing.

For these reasons, the nature and type of jobs and livelihood activities available in Eastern Samar that generates household income is deemed to be sufficient to augment the capacity of households to increase their size.

The same line of analysis may be applied to the case of education. Regression results show that there is an irregularity in the impacts among various educational attainments. For instance, a high school graduate is more likely to have a larger family than a high school undergraduate. Also, a college graduate will have a larger family than a college undergraduate. Likewise, a college undergraduate will have a smaller family than a high school graduate. It is also important to note that the dummy variables representing the educational attainment of post-secondary undergraduate, post-secondary graduate and with graduate studies were dropped. This can be explained by the state of educational system in the province.

According to CBMS (2010b), in school year (SY) 2005 to 2006, Eastern Samar had a total 469 elementary schools, 458 of which were government and seven were private schools, 66 secondary schools, and eight tertiary schools. Among the government elementary schools, 304 were complete elementary and 154 were incomplete elementary and primary schools. Incomplete elementary schools were usually located in the small and hard-to-reach *barangays* with few enrollees. Moreover, the vocational schools in the province have courses in agriculture, crafts and home industries, arts and trades, and fisheries. Courses in tertiary schools, apart from postsecondary, were baccalaureate degrees in management, education, agriculture, fisheries, tourism, engineering, nursing and commerce. The only state college in the province, *Eastern Samar State University*, has master's programs in agriculture, education, and management and doctorate program in educational management. As such, the availability and accessibility of educational institutions and educational programs in the province inhibit the households to fully harness the intended target of education towards maintaining a sustainable family size.

Another plausible reason for the irregularity in the results for education attainment can be attributed to the shortcomings in the data. Note that the dataset as well as the regression results cannot capture the context and quality of the educational programs offered in Eastern Samar. Hence, there is a need to upgrade, restructure, and reframe the educational system in the province so that it will be aligned to the behavior of Eastern Samar as well as to achieve its desired impact of changing the mentality of households and correcting false precepts towards family size.

Lastly, results suggest an ambiguous relationship between government-funded programs and family size. On one hand, health programs are shown to increase the likelihood of limiting family size while scholarship and credit programs accomplish the contrary. An explanation for this is the state of health facilities in the province where health programs are administered. According to CBMS (2010b), in 2006, the province had 12 government hospitals, ten private hospitals and clinics, 26 municipal health centers, and 104 *barangay* health stations. The government hospitals include one provincial hospital, five district hospitals, and six municipal hospitals. The availability of these health facilities allows the households to respond to the intended objectives of health programs.

Likewise, given that scholarship and credit programs significantly increase the spending capacity of households, this reinforces the idea that financial capacity may be a significant consideration insofar as family size is concerned. These results are also indicative of the free-rider problem, which is reinforced by the complementing efforts from non-government and people's organizations in the development of Eastern Samar. For instance, according to CBMS (2010b), in 2006, ten non-government organizations (NGOs) operated province wide by extending varied development services in education, potable water supply and sanitation, and healthcare. A number of NGOs served as partners of government in environmental protection, agricultural development, and policy advocacy. Additionally, there were 490 registered cooperatives providing credit financing, marketing, transport services, processing and other developmental activities.

Generally, there is a notable difference between the results derived form Eastern Samar and Pasay. This difference can be attributed to the behavioral aspect of the province. For instance, the level of urbanity and development affect the behavior of the people. A highly rural

province like Eastern Samar is likely to exhibit culture, philosophy, pedagogy, or mentality, which are imbibed in all facets of society including their educational system. Note that according to CBMS (2010b), in 2006, rural household population in the province is composed of 70.6% of all households. It still outnumbered the household population in the urban areas which constitutes 29.4% only. With this argument, there is a need to assess or determine the behavioral characteristics of the province before implementing any population and/or poverty-alleviation policies.

4.3. Agusan Del Sur

The province of Agusan Del Sur, based on the 2007 census of NSO has a total population of 609,447, which is the highest among the provinces in the CARAGA region in Mindanao. The population is projected to reach 691,211 in 2017. It has a growth rate of 1.19% and a population density of 68 persons per square kilometre (CBMS, 2010a). Moreover, the population of indigenous people is 33% of the total population and children comprise half of the total population (CBMS, 2010a). Meanwhile, the urban and rural population comprises 27% and 73% respectively of the total. According to NSCB, poverty incidence in 2006 is 48.7 and the poverty threshold is PHP 14,544.00. There is a disparity in the data at the regional level because there are stark inequalities between provinces in a region, municipalities in a province, and *barangays* in a municipality in terms of poverty incidence. Because agricultural land comprises 46% of the province's total land area, the people's major economic activity is farming. Based on the report of CBMS (2010a), 63% of households, in 2005, are engaged in crop farming and gardening where rice and corn are the major crops produced. The province is also rich in mineral resources such as gold, silver, and copper. Lastly, according to the Provincial Accounting Office of Agusan Del Sur as cited in CBMS (2010a), Agusan Del Sur is a first-class province with a total income of PHP 729 million in 2007. It had a total Internal Revenue Allotment (IRA) of PHP 652 million in 2007. The total number of Provincial Government of Agusan Del Sur (PGAS) employees for the same year was 1,859, broken down into 882 permanent staff, 454 casual employees, and 523 job orders.

The marginal effects for Agusan Del Sur are also shown in Table 1. For the rudiments of arriving at the marginal effects for Agusan Del Sur, refer to Appendix 3. Note that the violation of heteroscedasticity was already addressed. Likewise, there is tolerable multicollinearity among the explanatory variables.

Results for Agusan Del Sur indicate that both distance access to water and the strength of materials used in home construction do not have any statistically significant impacts on family size. On the other hand, the availability of electricity seems to increase the likelihood that a family will have less than five children. Noting that these variables serve to capture poverty incidence and quality of life, it may seem that such factors have little to no influence to the decision making calculus of parents in selecting a desirable family size. This is suggestive of a rather myopic and short-sighted approach to decisions made within the household level, one which is dominated by preferences and impulse. Such may be a function of a lack of family planning programs and information campaigns that aim to make parents aware of the implications that successive child-bearing may lead to family well-being. Under normal circumstances, poverty is expected to either increase the likelihood of a larger family size if

children are perceived as investments or decreased if children are perceived as additional burdens. However, in this case, only a single poverty variable manifested any sort of influence on the decision-making of parents – a result which may be a function of coincidence of or some other rationale besides poverty.

On the other hand, employment has been shown to increase the likelihood of a smaller family size. This result reaffirms previous a-priori expectations which suggest a trade-off between time spent in the workplace and time spent child-rearing at home. As such, the more time parents allocate for employment translates less time allocated for home-related activities. Beyond time constraints, employment also increases the opportunity costs of child-bearing and child-rearing. Such costs range from forgone wages and unsatisfactory job performance to prolonged leaves, as in the case of pregnant mothers. It is also interesting to note that results are irrespective of the form of employment. Be it permanent, seasonal, or temporary, employment in general plays a crucial role in limiting family size.

Similar to employment, education is shown to increase the likelihood of a smaller family size. Again, this is in line with previously mentioned assumptions on the inverse relationship between education and family size. It was mentioned that education plays an informational and a practical role. The informational role is concerned with equipping parents with better decision-making skills and making them more conscious of the consequences of having additional children. On the other hand, the practical role of education is concerned with making available to individuals various employment opportunities. However, beyond the rather generalized relationship that has been established between education and family size, results show that undergoing at least elementary or high school education already increases the likelihood of a smaller family. Initially, this may seem counter-intuitive as some may claim that basic education should have incremental informational and employment benefits. However, given that the study is situated in a predominantly rural area, it may be posited that undergoing basic education may already have extensive benefits to the individual. In fact, several industries in rural areas do not require too high a level of education.

This consistent result from Agusan Del Sur with that of Pasay can be attributed to the provision of education in the province. The education indicators of the province show an increasing trend during the two SYs 2004 to 2005 and 2006 to 2007 as reported by CBMS (2010a). For SY 2006 to 2007, note the 33% enrolment under the Early Childhood Care and Development Program for aged three to five years old children. The participation rate in elementary is 74.95%; that in the secondary school is 44.14%. The achievement rate in the elementary level is 69.49% while it is 55.93% in the secondary schools. The drop-out rate has been decreasing at both the elementary and secondary levels, bringing about a positive impact to the province. The drop-out rate in the elementary and secondary schools for SY 2006 to 2007 is 5.93% and 17.57%, respectively. Furthermore, CBMS (2010a) reported that there are 3,092 classrooms in elementary schools and 1,736 rooms in secondary schools. These are evidences that the intended objective of providing education to households is being met by inducing smaller family size among households.

Lastly, government funded health, scholarship, and credit programs are shown to increase the likelihood of a larger family size. This can be explained by how such provisions shift a

portion of the financial burden of child-rearing from the parent, thus effectively decreasing the perceived and actual costs of raising a child. Appealing to the Microeconomic Theory of Fertility, a decrease in the costs of childbearing and childrearing, holding perceived benefits constant will increase the desirability of having an additional child. It could be that parents do not realize the true costs of child bearing and child-rearing given that the burden is split between the parents and the state. On a side note, results show that feeding, training and housing programs do not have statistically significant effects on family size.

Another explanation for the positive contribution of health programs to the likelihood of a larger family size can be seen from the province's crude birth rate (CBR), which has been fluctuating from 2003 to 2007. According to CBMS (2010a), the CBR in 2007 is at 21.9% per 1,000 of the population. The crude death rate (CDR) in 2007 is only 1.84%. Moreover, the infant mortality rate (IMR) per 1,000 live births is only 4.2% and has decreased in the past five years. While the under-five mortality rate per 1,000 children aged zero to four years old is only 1.14%, the maternal mortality rate is 0.89% and has also dropped in the past five years because of the maternal care and services provided. Likewise, the health program on feeding of malnourished children has greatly contributed to lowering the incidence of malnutrition in the province. The 2007 prevalence rate of malnutrition among children aged zero to five years old in the province dipped to 16.46% from 24.44% in 2003. Of equal importance is the provincial provision of immunization activity that achieved 91.25% immunized children in 2007. Such programs that provided access to safe drinking water and access to sanitary toilet facility also helped improve the health condition of the populace. According to CBMS (2010a), the number of households served with potable water rose from 73% in 2005 to 77% in 2007. Similarly, there has been a remarkable improvement in the access to sanitary toilet from 72.53% in 2004 to 76% in 2007. Therefore, the incidence of death in the province is not very alarming and the provision of health programs is sufficient to defray the personal cost of healthcare allowing households further financial flexibility. Hence, family size is expected to increase.

Additionally, the probability of having a larger family size in the province is also being reinforced by its social infrastructure support which includes five public hospitals, two private hospitals, 14 rural health units, 132 *barangay* health stations, 203 day care centres. With this, the Human Development Index (HDI) of the province has also improved. In 2003, the HDI stood at only 0.494, making the province hit the 69th rank among the provinces in the country. In 2006, the HDI has increased to 0.556, bringing the province to the 57th rank (CBMS, 2010a). These evidences allow households to have a larger family size, which is a consequence of developmental strategies implemented by their local government.

The results derived from the regression of Pasay, Eastern Samar, and Agusan Del Sur demonstrated varied impacts on the probability that a household will have at most four children. Such results convey a stark contrast between the decision-making process and priorities of the households in Pasay, Eastern Samar, and Agusan del Sur. While more weight seems to be accorded to the costs to child bearing and child rearing in Pasay and Eastern Samar, there seems to be a general inclination to bear-child, provided adequate capacity in Agusan Del Sur. This can perhaps be explained by cultural nuances and differences in living standards in these locations.

V. Conclusions and Policy Recommendations

Rapid population growth and poverty, as deemed by many economists, are coupled. It has been observed that the poorest households are those who have the most number of children. Consequently, these households have to support more people with fewer resources. As an outcome, the family is destined to a life of inherited poverty. Such is the case because the poorest social groups are unaware, uninformed, or if informed are badly informed. For instance, these poor households are not even sentient on how a woman is impregnated. Moreover, others may have not even heard of prevention in the form of contraceptives, whether natural or artificial form. Although there are some who are aware of the existence of modern family planning methods, a significant number are still alarmed by its unknown side effects. Hence, it can be construed that these are the possible arguments why women keep on having more children even though they do not want to have more children and they do not have the economic means to provide for their children.

This problem is even exacerbated by the mismatch in the ways by which the state and the RCC proposes to address rapid population growth. Note that RCC, which is the most dominant religion in the Philippines, is against abortion, sterilization, and all other forms of modern family planning methods. However, the RCC is in highly in favor of the natural form of birth control, which includes abstinence, withdrawal, and rhythm method wherein women estimate their ovulation in order to prevent pregnancy. As a fervently religious nation, the RCC has substantial pressure on government policy and has succeeded in the mitigation of government campaigns on pregnancy-prevention and sexual education among other population policy.

On a radical perspective, it can be seen that the facts are clear and the solutions are simple – there is a need to lower the birth rate by making contraceptives available to everyone, providing family planning education to everyone, and encouraging households to think for themselves and not to listen to propagandas without basis. These solutions are materialized in the RH Bill, which the RCC condemns because by using public funds to produce and distribute contraceptives such as condoms, the government has expressed its preference towards artificial contraception, which violates the religious beliefs of majority of Filipinos. These funds have better uses. Likewise, most of those who oppose the RH Bill argue that it will just worsen the problem of rapid population growth when the government allows the mandatory teaching of sexual education to minors as young as 12 years old, who are still on their stage of exploration. This conflict between the government and the RCC hinders any move to address rapid population growth.

While the debate continuously rages between the government, health organizations, and the RCC, the population keeps on growing at an exponential rate. Rapid population growth needs to be addressed now. The debates on whose plan of action must prevail continue to delay the nation's transition towards a progressive society because the problem fails to be addressed. Hence, this study explored an avenue by which population can be controlled consistently with both the goals of the state and the faith of the RCC. This avenue is through exploring whether the provision of basic necessities and social services inhibit households from having a family size beyond what is deemed to be optimal.

Regression results suggest a rather ambiguous relationship between living conditions and the number of offspring. In Pasay, the structural integrity of a family's residence decreases the likelihood of a large family while access to water seems to increase the likelihood of such. As for the case of Agusan Del Sur, access to electricity increases the probability of having fewer children. However, other indicators of living conditions seem to have no significant relationship with the number of children in a family. Meanwhile, the case of Eastern Samar indicates that access to basic utilities and the structural integrity of a house's walls increase the likelihood that a family will opt to have less than five children.

This inexplicable variation may be construed as a vague and weak relationship between actual living conditions and the number of offspring a family may opt to have. This may be a manifestation of how quality of life is given little weight and consideration in the decision-making process of parents. Given that family size appears to be at best, mercurial, and at worst, indifferent to living conditions, there is much reason in concluding that quality of life seems exert little to no influence on the number of children a household is likely to have. However, it must also be noted that the variables used to measure are mere manifestations of quality of life and may thus be unable to capture the precise relationship sought.

Meanwhile, the case of Agusan Del Sur and Pasay indicate that higher levels of educational attainment decrease the likelihood of larger families - results that conform to conventional theories on fertility. This implies that education does indeed increase the opportunity costs to child bearing as in increased the likelihood and returns to employment. On the contrary, results for Eastern Samar suggest that higher educational attainment increased the likelihood of larger families. This is evidence to the fact that education may also be perceived as a means to ascertain financial security and capacity to support a larger household. Therefore, higher educational attainment may either serve to increase or decrease family size, depending on which motivations dominate. Should the preference for children take ascendancy over the perceived opportunity costs to bearing and rearing offspring, then the case of Easter Samar becomes a highly plausible scenario. Given this analysis, it can be said that utility is not necessarily derived solely from financial return but may also be derived from other non-monetary objectives.

Results that pertain to the relationship between employment and family size show similarities between Pasay and Eastern Samar. In both regions, employment in general decreases the likelihood that a family will have less than five children. Again, this raises questions on the motivations and preferences that underpin the decision-making process of households insofar as family size is concerned. Also, the existence of extended family members who may rear children in the absence of parents may diminish the relevance of a necessary trade-off between time spent in the work and time spent at home. On the other hand, Agusan Del Sur has been shown to conform to conventional theory which claims that employment is indeed a disincentive to have additional children in the households.

Rapid population growth is seen as one of the major reason why the Philippines is experiencing relentless poverty. To address poverty, the government has been implementing programs that subsidize the basic necessities of the people such as health and education. As such, the last set of variables under scrutiny is concerned with government programs and subsidies on

various services. For all regions concerned, the state-sponsored social provisions have been shown to increase the chances of a larger household size. As such, the idea that increased government provision of basic services decreases the need to bear children as a substitute for social security becomes less applicable to the case of the Philippines. In this particular context, government provisions seem to transfer some financial burden from the household to the state, thus freeing resources that would otherwise have been spent on such basic necessities. The incentive to bear child can be attributed to two plausible sources. First, increased purchasing power in itself diminishes the fear of becoming financially unsustainable should an additional household member be born. Second the costs of bearing and rearing children also become less weighty given that expenses are partially subsidized by the state. Assuming that the decisions to bear child is contingent on a cost-benefit model, this effective lessens the perceived monetary outlay an additional member of the family will require.

The apparent defiance of results from conventional theory may suggest a need to implement rather less conventional policies as well. However, beyond tailoring-fitting population control programs, there is also a need to calibrate policies based on relevant socio-economic, political, and cultural nuances each region may possess. However, generally speaking, it is evident that regardless of provincial location, there is a need to regulate government-sponsored programs because it just promotes free-riding among poor households. The dependence of households to the government in the deferral of their cost to childbearing and childrearing must be mitigated. Perhaps, instead of providing these programs, conditional cash transfers or incentives must be given to households who is capable of maintaining a socially acceptable family size, which have yet to be determined by the government. Likewise, the scope of whom these incentives will be given is also yet to be determined by the government. In this way, the government is providing incentives to lower family size.

Different locations have shown to exhibit heterogeneous behavior insofar as population dynamics are concerned. It is quite apparent that each surveyed province responded differently to various stimuli such as living conditions, educational attainment, employment status, as well as government-funded programs among others. This suggests a need to peer into the nuances of each region's socioeconomic context and underlying psyche. The milieu within which an individual resides may greatly influence his rational calculus and decision-making process.

Also, such results reflect a departure from conventional microeconomic theories that concern fertility and the choice to bear child. The idea the education and employment are inversely related with the number of offspring has been affirmed in some cases while invalidated in others. Such inconsistencies must not be misjudged as they provide valuable insight as to how government must vary policies in accordance to characteristics exclusive to a certain region.

The evident difference in the impacts of the variables of interest to the probability of having an optimal family size just shows that the responsibility for slowing rapid population growth must be redirected from the national government to the local municipalities. As such, population policies to combat rapid population growth must no longer be a national plan. Implementing a national population and/or poverty alleviating policies is subjected to false-paradigm wherein each territory has an unconventional response relative to the nation as a whole. Moreover, consistent with the United Nation's Development Program (UNDP), to

decelerate the rapid rise in population, poverty reduction accompanied by the provision of education and reproductive counseling are the necessary methods by which information about family planning can be relayed to the public. However, these must be accompanied by good governance and sound economic policies.

VI. References

Bautista, C. M. (2007). Socioeconomic factors affecting fertility in the Philippines: Reexamining parental education. *Loyola Schools Review*, 6, 89-114.

Becker, G.S. (1965). A theory of the allocation of time. *The Economic Journal*, 75(299), 493-517.

Bernas, J.G. (2008). *The many faces of the RH bill.* Retrieved from http://opinion.inquirer.net/inquireropinion/ columns/view/20081103-169885/The_many_faces_of_the_RH_bill

Caldwell, J. C. (1978). A theory of fertility: From high plateau to destabilization. *Population and Development Review*, 4(4), 553-577.

Cameron, A.C. & P.K. Trivedi. (2005). *Microeconometrics: methods and application*. Cambridge University Press.

Castles, F.G. (2003). The world turned upside down: Below replacement fertility, changing preferences and family-friendly public policy in 21 OECD countries. *Journal of European Social Policy*, 13(3), 209-227.

Chavkin, W. (n.d.). *Fertility decline and the empowerment of women.* Retrieved from http://www.adelphi.edu/ peoplematter/pdfs/Chavkin.pdf

Community-Based Monitoring System (CBMS) (2010a). *Status Report on the Millennium Development Goals Using CBMS Data: Province of Agusan Del Sur.* United Nations Development Program.

Community-Based Monitoring System (CBMS) (2010b). *Status Report on the Millennium Development Goals Using CBMS Data: Province of Eastern Samar.* United Nations Development Program.

Cuyegkeng, J.A. (2006). The problem with population. *Philippines today: Home of the global Filipino*. Retrieved from http://www.philippinestoday.net/index.php?module=article&view=36.

Davis, K., M. Bernstam & R. Ricardo-Campbell. (1986). *Below-replacement fertility in industrial societies*. Cambridge: Cambridge University Press.

Department of Economic and Social Affairs Population Division (2009). *World population prospects*. Retrieved from http://www.un.org/esa/population/publications/wpp2008/wpp2008_text_tables.pdf.

El-Ghannam, A. R. (2005). An examination of factors affecting fertility rate differentials as compared among women in less and more developed countries. *Journal of Human Ecology*, 18(3), 181-192.

Faria, J. R. & L. Wang. (2007). Employment and fertility choice: A differential game approach. *Economics Bulletin*, 10(8), 1-8.

Garcia, B. (2000). *Women, poverty, and demographic change*. New York: Oxford University Press.

Gopalakrishnan, R. (2008). *Philippine population climbs, food problems loom*. Retrieved from http://www.reuters.com/article/idUSSP31308120080417

Gujarati, D.N. & D.C. Porter. (2009). *Basic econometrics 5th edition.* Singapore: McGraw-Hill Companies, Inc.

Janowitz, B.S. (1976). An analysis of the impact of education on family size. *Demography*, 13(2),189-198.

Mincer, J. (1962). Labor force participation of married women. *Aspects of Labor Economics*. Princeton University.

McNicoll, G. (1997). Population and poverty: A review and restatement. *Population Council*. Working Paper 105.

McNicoll, G. (1999). Population and poverty: The policy issues. *Food and Agriculture Organization of the United Nations*. Retrieved from http://www.fao.org/sd/wpdirect/WPre0087.htm

Oppenheim, K. & A. Jensen. (1995). *Gender and family change in industrialized countries*. New York: Oxford University Press.

Rindfuss, R.R. & K.L. Brewster. (1996). Childrearing and fertility. *Population & Development Review*, 22, 258-289.

Schultz, T.P. (1997). The demand for children in low income countries. *Handbook of Population and Family Economics*, 351-420.

Sorrentino, C. (1990). The changing family in international perspective. *Monthly Labor Review*, March 1990: 41-58.

Todaro, M. P. & S.C. Smith. (2006). *Economic development 8th edition*. Pearson South Asia Pte. Ltd.

Turchi, B.A. (1975). Microeconomic theories of fertility: A critique. *Social Forces*, 54(1), 107-125.

Van de Kaa, D.J. (1996). Anchored narratives: The story and findings of half a century of research into the determinants of fertility. *Population Studies*, 50(3), 389-432.

World Fact Book. (2010). *Philippines.* Retrieved from https://www.cia.gov/library/publications/the-world-factbook/geos/rp.html

VII. Appendices

Appendix 1

Appendix 1A. *Logistic Regression for Pasay*

					95% Confidence Interval	
Variables	**Coefficient**	**Standard Error**	**Z**	**P > |Z|**	**Lower**	**Upper**
$WATERNEAR_i$	-0.4081222	0.0355452	-11.48	0.000	-0.4777895	-0.3384548
$ELECT_i$	-0.1345156	0.0947075	-1.42	0.156	-0.3201389	0.0511077
$WALLSTRONG_i$	0.2816563	0.0359133	7.84	0.000	0.2112676	0.3520450
$ROOFSTRONG_i$	0.1263170	0.0351402	3.59	0.000	0.0574434	0.1951906
$PERMANENT_i$	-0.2805052	0.0386045	-7.27	0.000	-0.3561687	-0.2048418
$SEASONAL_i$	-0.1279244	0.0586227	-2.18	0.029	-0.2428229	-0.0130260
$TEMPORARY_i$	-0.8151905	0.1144240	-7.12	0.000	-1.0394570	-0.5909237
$HHINCOME_i$	-0.0000000	0.0000000	-0.06	0.950	-0.0000000	0.0000000
$ELEMGRAD_i$	-0.5173017	0.0757845	-6.83	0.000	-0.6658365	-0.3687669
$HSUNDR_i$	-0.3276949	0.0756149	-4.33	0.000	-0.4758974	-0.1794924
$HSGRAD_i$	0.0621112	0.0689454	0.90	0.368	-0.0730194	0.1972417
$PSUNDR_i$	0.3228549	0.2302890	1.40	0.161	-0.1285033	0.7742130
$PSGRAD_i$	1.0505400	0.1148143	9.15	0.000	0.8255077	1.2755720
$COLUNDR_i$	0.2242504	0.0755349	2.97	0.003	0.0762048	0.3722961
$COLGRAD_i$	1.0434240	0.0824277	12.66	0.000	0.8818686	1.2049790
$WMSPHD_i$	-0.1265224	0.7496272	-0.17	0.866	-1.5957650	1.3427200
$WOMEN_i$	-0.1917054	0.0988859	-1.94	0.053	-0.3855182	0.0021074
$HEALTH_i$	-0.1454725	0.0356844	-4.08	0.000	-0.2154127	-0.0755323
$SCHOLAR_i$	-0.5009371	0.1075440	-4.66	0.000	-0.7117196	-0.2901547
$TRAINING_i$	-0.1623793	0.1904609	-0.85	0.394	-0.5356759	0.2109173
$HOUSING_i$	-0.1389893	0.2166420	-0.64	0.521	-0.5635998	0.2856212
$CREDIT_i$	-0.2744847	0.1712630	-1.60	0.109	-0.6101541	0.0611847
Constant	2.8037050	0.1135957	24.68	0.000	2.5810610	3.0263480
Number of Households				64,094		
Likelihood Ratio chi-square (22)				1,547.43		
Probability > chi-square				0.0000		
Pseudo R^2				0.0480		
Log Likelihood				-15,354.475		

Appendix 1B. *Marginal Effects for Pasay*

Variables	dy/dx	Standard Error	Z	P>|Z|	95% Conf. Interval Lower	Upper	Mean Values
*WATERNEAR$_i$**	-0.02639	0.00322	-8.19	0.000	-0.03271	-0.02007	0
*ELECT$_i$**	-0.00769	0.00521	-1.48	0.139	-0.01790	0.00251	0
*WALLSTRONG$_i$**	0.01341	0.00207	6.48	0.000	0.00935	0.01747	0
*ROOFSTRONG$_i$**	0.00644	0.00189	3.41	0.001	0.00274	0.01014	0
*PERMANENT$_i$**	-0.01713	0.00286	-5.99	0.000	-0.02273	-0.01152	0
*SEASONAL$_i$**	-0.00729	0.00351	-2.08	0.038	-0.01418	-0.00041	0
*TEMPORARY$_i$**	-0.06330	0.01303	-4.86	0.000	-0.08884	-0.03775	0
HHINCOME$_i$	-0.00000	0.00000	-0.06	0.950	-0.00000	0.00000	220,888
*ELEMGRAD$_i$**	-0.03513	0.00587	-5.99	0.000	-0.04664	-0.02363	0
*HSUNDR$_i$**	-0.02044	0.00495	-4.13	0.000	-0.03014	-0.01073	0
*HSGRAD$_i$**	0.00326	0.00366	0.89	0.374	-0.00393	0.01044	0
*PSUNDR$_i$**	0.01510	0.00958	1.58	0.115	-0.00368	0.03388	0
*PSGRAD$_i$**	0.03638	0.00496	7.33	0.000	0.02665	0.04610	0
*COLUNDR$_i$**	0.01095	0.00390	2.81	0.005	0.00331	0.01859	0
*COLGRAD$_i$**	0.03623	0.00465	7.79	0.000	0.02711	0.04535	0
*WMSPHD$_i$**	-0.00721	0.04511	-0.16	0.873	-0.09562	0.08120	0
*WOMEN$_i$**	-0.01125	0.00635	-1.77	0.077	-0.02370	0.00121	0
*HEALTH$_i$**	-0.00836	0.00230	-3.63	0.000	-0.01287	-0.00385	0
*SCHOLAR$_i$**	-0.03377	0.00946	-3.57	0.000	-0.05231	-0.01523	0
*TRAINING$_i$**	-0.00940	0.01187	-0.79	0.428	-0.03266	0.01386	0
*HOUSING$_i$**	-0.00796	0.01321	-0.60	0.546	-0.03385	0.01792	0
*CREDIT$_i$**	-0.01671	0.01182	-1.41	0.157	-0.03987	0.00645	0

*Predicted Probability after Logit = 0.94287058

* *dy/dx* is for discrete change of dummy variable from 0 to 1

Appendix 2

Appendix 2A. *Logistic Regression for Eastern Samar*

Variables	Coefficient	Standard Error	Z	P > |Z|	95% Confidence Interval Lower	Upper
$WATERNEAR_i$	0.4604092	0.20887	2.20	0.028	0.0510357	0.8697827
$ELECT_i$	0.4444216	0.19098	2.33	0.020	0.0701120	0.8187312
$WALLSTRONG_i$	0.7226047	0.26119	2.77	0.006	0.2106791	1.2345300
$ROOFSTRONG_i$	-0.5284493	0.27008	-1.96	0.050	-1.0577940	0.0008958
$PERMANENT_i$	-0.4089283	0.19203	-2.13	0.033	-0.7853025	-0.0325541
$SEASONAL_i$	-2.0156760	0.30593	-6.59	0.000	-2.6152790	-1.4160720
$TEMPORARY_i$	-0.4509603	0.26254	-1.72	0.086	-0.9655329	0.0636122
$HHINCOME_i$	-0.0000044	0.00000	-3.64	0.000	-0.0000067	-0.0000020
$ELEMGRAD_i$	-2.1279760	0.74520	-2.86	0.004	-3.5885330	-0.6674197
$HSUNDR_i$	0.0811826	0.19036	0.43	0.670	-0.2919153	0.4542804
$HSGRAD_i$	-0.7914083	0.36431	-2.17	0.030	-1.5054360	-0.0773805
$PSUNDR_i$			Omitted			
$PSGRAD_i$			Omitted			
$COLUNDR_i$	0.5769161	0.21831	2.64	0.008	0.1490293	1.0048030
$COLGRAD_i$	-1.7303000	0.39601	-4.37	0.000	-2.5064640	-0.9541361
$WMSPHD_i$			Omitted			
$FEEDPROG_i$	-1.1502760	0.78350	-1.47	0.142	-2.6859110	0.3853592
$HEALTH_i$	0.3143473	0.16503	1.90	0.057	-0.0091074	0.6378019
$SCHOLAR_i$	-1.4954430	0.78805	-1.90	0.058	-3.0399850	0.0490985
$TRAINING_i$			Omitted			
$HOUSING_i$			Omitted			
$CREDIT_i$	-1.9207940	0.61467	-3.12	0.002	-3.1255150	-0.7160718
Constant	-0.7413058	0.26901	-2.76	0.006	-1.2685620	-0.2140500

Number of Households	984
Likelihood Ratio chi-square (17)	191.40
Probability > chi-square	0.0000
Pseudo R^2	0.1599
Log Likelihood	-502.65428

*$PSUNDR_i$, $PSGRAD_i$, $WMSPHD_i$, $TRAINING_i$, and $HOUSING_i$ were omitted because the variables predict failure perfectly, which means that almost all observations in the variable assume a value of zero.

Appendix 2B. *Marginal Effects for Eastern Samar*

Variables	dy/dx	Standard Error	Z	P>|Z|	95% Conf. Interval Lower	Upper	Mean Values
			Marginal Effects after Logit				
$WATERNEAR_i$*	0.09788	0.04292	2.28	0.023	0.01376	0.18200	0
$ELECT_i$*	0.09421	0.04169	2.26	0.024	0.01251	0.17591	0
$WALLSTRONG_i$*	0.16016	0.06350	2.52	0.012	0.03571	0.28462	0
$ROOFSTRONG_i$*	-0.08871	0.04098	-2.16	0.030	-0.16904	-0.00839	0
$PERMANENT_i$*	-0.07098	0.03553	-2.00	0.046	-0.14063	-0.00135	0
$SEASONAL_i$*	-0.21618	0.04670	-4.63	0.000	-0.30772	-0.12465	0
$TEMPORARY_i$*	-0.07737	0.04494	-1.72	0.085	-0.16546	0.01071	0
$HHINCOME_i$	-0.00000	0.00000	-3.67	0.000	-0.00000	-0.00000	68,648.3
$ELEMGRAD_i$*	-0.22077	0.05200	-4.25	0.000	-0.32269	-0.11884	0
$HSUNDR_i$*	0.01597	0.03781	0.42	0.673	-0.05814	0.09007	0
$HSGRAD_i$*	-0.12308	0.05027	-2.45	0.014	-0.22160	-0.02456	0
$PSUNDR_i$*				Omitted			
$PSGRAD_i$*				Omitted			
$COLUNDR_i$*	0.12511	0.05051	2.48	0.013	0.02611	0.22410	0
$COLGRAD_i$*	-0.20220	0.04624	-4.37	0.000	-0.29284	-0.11157	0
$WMSPHD_i$*				Omitted			
$FEEDPROG_i$*	-0.16053	0.07789	-2.06	0.039	-0.31319	-0.00786	0
$HEALTH_i$*	0.06500	0.03561	1.83	0.068	-0.00480	0.13480	0
$SCHOLAR_i$*	-0.18774	0.06563	-2.86	0.004	-0.31639	-0.05910	0
$TRAINING_i$*				Omitted			
$HOUSING_i$*				Omitted			
$CREDIT_i$*	-0.21193	0.05069	-4.18	0.000	-0.31127	-0.11258	0

*Predicted Probability after Logit = 0.26115648

*dy/dx is for discrete change of dummy variable from 0 to 1

Appendix 3

Appendix 3A. *Logistic Regression for Agusan Del Sur*

		Logistic Regression				
Variables	**Coefficient**	**Std. Error**	**Z**	**P > |Z|**	**95% Conf. Interval**	
					Lower	**Upper**
$WATERNEAR_i$	-0.1148600	0.12832	-0.90	0.371	-0.3663556	0.1366356
$ELECT_i$	0.2554594	0.13543	1.89	0.059	-0.0099783	0.5208971
$WALLSTRONG_i$	0.1441675	0.14952	0.96	0.335	-0.1488774	0.4372125
$ROOFSTRONG_i$	0.1913646	0.15414	1.24	0.214	-0.1107408	0.4934700
$PERMANENT_i$	2.8214850	0.14752	19.13	0.000	2.5323520	3.1106170
$SEASONAL_i$	3.2203270	0.20416	15.77	0.000	2.8201870	3.6204660
$TEMPORARY_i$	2.7744600	0.22899	12.12	0.000	2.3256560	3.2232650
$HHINCOME_i$	-0.0000004	0.00000	-0.77	0.441	-0.0000014	0.0000006
$ELEMGRAD_i$	2.2499540	0.29095	7.73	0.000	1.6797120	2.8201970
$HSUNDR_i$	1.6829600	0.19716	8.54	0.000	1.2965280	2.0693920
$HSGRAD_i$	2.7220820	0.26418	10.30	0.000	2.2042920	3.2398730
$PSUNDR_i$	4.0105630	1.08779	3.69	0.000	1.8785310	6.1425950
$PSGRAD_i$	1.4895500	1.06008	1.41	0.160	-0.5881679	3.5672680
$COLUNDR_i$	2.6314080	0.26764	9.83	0.000	2.1068360	3.1559800
$COLGRAD_i$	2.9263760	0.35609	8.22	0.000	2.2284500	3.6243020
$WMSPHD_i$			Omitted			
$FEEDPROG_i$	-0.2964075	0.27844	-1.06	0.287	-0.8421381	0.2493232
$HEALTH_i$	-0.5446418	0.12881	-4.23	0.000	-0.7971089	-0.2921746
$SCHOLAR_i$	-1.3276730	0.53760	-2.47	0.014	-2.3813420	-0.2740041
$TRAINING_i$	-0.1568484	0.30737	-0.51	0.610	-0.7592788	0.4455820
$HOUSING_i$	-0.0999402	0.60206	-0.17	0.868	-1.2799490	1.0800680
$CREDIT_i$	-0.4387325	0.20214	-2.17	0.030	-0.8349211	-0.0425440
Constant	-1.9188540	0.15599	-12.30	0.000	-2.2245960	-1.6131120

Number of Households	2,913
Likelihood Ratio chi-square (21)	2,060.13
Probability > chi-square	0.0000
Pseudo R^2	0.5178
Log Likelihood	-959.12433

* $WMSPHD_i$ was omitted because the variable predicts success perfectly, which means that almost all observations in the variable assume a value of one.

Appendix 3B. *Marginal Effects for Agusan Del Sur*

					95% Conf. Interval		
Variables	***dy/dx***	**Standard Error**	***Z***	***P>|Z|***	**Lower**	**Upper**	**Mean Values**
WATERNEAR$_i$*	-0.01196	0.01365	-0.88	0.381	-0.03872	0.01479	0
ELECT$_i$*	0.03055	0.01690	1.81	0.071	-0.00258	0.06368	0
WALLSTRONG$_i$*	0.01655	0.01795	0.92	0.357	-0.01864	0.05173	0
ROOFSTRONG$_i$*	0.02235	0.01903	1.17	0.240	-0.01495	0.05965	0
PERMANENT$_i$*	0.58016	0.02873	20.19	0.000	0.52385	0.63647	0
SEASONAL$_i$*	0.65603	0.03317	19.78	0.000	0.59103	0.72103	0
TEMPORARY$_i$*	0.57027	0.04606	12.38	0.000	0.47999	0.66055	0
HHINCOME$_i$	-0.00000	0.00000	-0.77	0.441	-0.00000	0.00000	89,470.3
ELEMGRAD$_i$*	0.44941	0.07214	6.23	0.000	0.30803	0.59079	0
HSUNDR$_i$*	0.30861	0.05159	5.98	0.000	0.20749	0.40973	0
HSGRAD$_i$*	0.55905	0.05795	9.65	0.000	0.44547	0.67263	0
PSUNDR$_i$*	0.76249	0.10931	6.98	0.000	0.54824	0.97673	0
PSGRAD$_i$*	0.26188	0.25272	1.04	0.300	-0.23343	0.75720	0
COLUNDR$_i$*	0.53911	0.06238	8.64	0.000	0.41685	0.66136	0
COLGRAD$_i$*	0.60153	0.07191	8.36	0.000	0.46058	0.74247	0
WMSPHD$_i$*				Omitted			
FEEDPROG$_i$*	-0.02882	0.02456	-1.17	0.241	-0.07696	0.01933	0
HEALTH$_i$*	-0.04819	0.01211	-3.98	0.000	-0.07192	-0.02445	0
SCHOLAR$_i$*	-0.08795	0.02181	-4.03	0.000	-0.13070	-0.04520	0
TRAINING$_i$*	-0.01608	0.02977	-0.54	0.589	-0.07443	0.04228	0
HOUSING$_i$*	-0.01047	0.06069	-0.17	0.863	-0.12942	0.10849	0
CREDIT$_i$*	-0.04041	0.01639	-2.47	0.014	-0.07252	-0.00829	0

* Predicted Probability after Logit = 0.12417826
* *dy/dx* is for discrete change of dummy variable from 0 to 1