Determinants of Income Class in Philippine Households: Evidence from the Family Income and Expenditure Survey 2009

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We developed a model that can classify households based on their demographic profile and household assets. A methodology is then provided in the use of this model in identifying household-benefeciaries for some targetted interventions. Using the 2009 Family Income and Expenditure Survey (FIES), five income clusters were identified. In a generalized logistic regression model, geolocation of households, urbanity, employment status and education of household head, presence of some assets, and nature of housing units can significantly identify income class of a household.

Keywords: mutlinomial logistic model, income determinants, clustering methods

1. Introduction

The Family Income and Expenditure Survey of 2009 showed the estimate of Gini coefficient, a meaure of income inequality and distribution, to be 0.4484 which is one of the highest in the Asian region (Ordinario, 2013). Because of the problem of income inequality, people from different classes have different capacity to pay and avail basic services. Those in the lower income classes will carry a greater burden to have access to social necessities. The government has instituted projects aimed at helping the poor, and has implemented mechanisms to make the services accessible to everyone. Example of projects which targets the poor with the ultimate goal of alleviating poverty are the following: Pantawid Kuryente (Katas ng VAT), a program that aims to give back to the poor the benefits reaped from the implementation of the expanded value added tax which targets families who consume electricity not more than 100 kilowatt hours a month;

Food-for-school program, which provides food-subsidy to Grade I and II pupils and to provide livelihood or employment opportunities to their parents; and the Pantawid Pamilyang Pilipino Program which gives cash subsidy to household beneficiaries using a standard scheme for the purpose of encouraging the families to send their children to school and to send their children to public hospitals. On the other hand, some of the public services which have socialized payment schemes are the Socialized Tuition and Financial Assistance Program (STFAP) by the University of the Philippines and another socialized scheme at the Philippine General Hospital.

The questions that should be answered by those who manage these policies are the following: are we targeting the right people and are the people who enjoy these services really the people who deserve them? Are people assigned to the bracket where they should be classified and pay the right amount?

The Department of Social Welfare and Development has been updating and cleaning the list of beneficiaries of the Pantawid Pamilyang Pilipino Program to ensure that the program serves those who really deserve them. The government has instituted the Grievance Redress System to handle the rescreening and reevaluating of the current program beneficiaries. Around 3,898 have been dismissed from the program during the year 2012, and it continues to reupdate the list.

The researchers are identifying the variables which will dicsriminate the different income classes to have supplement screening mechanisms to people who wish to avail of services targeted to specific income classes. Most of these projects like entrepreneurial assistance, loaning privileges, feeding program, and cash assistance are targeted for those in the lowest income classes. Moreover, this will be useful when applying the principle of social justice, that the rich should pay more and the poor should pay less, on availing public services which in the current context can not be fully free to all. The wisdom of social justice is a good idea given the current context. And this should not be defeated by operational failures. The households should be categorized in the income category where they should be classified.

The researchers could look at the results of this study on another angle. Identification of the variables which will discriminate households in terms of the income classifications will give us further understanding ofthe variables which affects income. Income is used as a proxy to a quality life since income gives the people the capacity to avail of the basic needs. The researcherscould therefore use the results to identify the significant variables which will improve the quality of life. For instance, since it is noted by Wright and Rogers(2010) that income inequality is deeply connected with poverty, which is suffered by those people in the lower income classes and while thePhilippines has been working towards alleviating and eradicating poverty, the variables that may turn out to

be significant should be the things that the government have to consider when enacting new policies and when improving existing policies. Moreover, as was noted by Reyes and Valencia (2004), reducing problems that are income-related like poverty should be accompanied by good monitoring style.

2. Review of Related Literature

Household income is an important information for decision and policy making of the state. However, the declared income of the household is not accurate. Some even purposely declare a lower income class than the original to enjoy more benefits. Without the exact information, other variables or data can be used to estimate which income class a household belongs to. These include household ownership of physical assets, such as television, refrigerator, automobile, phone (Brewster et al. 2012). Brewster et al. (2012) developed a theoretical approach of using physical assets to measure income of household. According to them, "in theory the demand for goods depends on permanent income, prices, and preferences."

Income distribution is important in decision-making process concerning policies and government programs such as taxes, benefits, and social insurance programs.In addition to Gini coefficient, which is highest in the Philippines among the Asian countries, the Philippines also has lowest in poverty reduction rate at only 2.4 percent. (Virola etal 2007)

In Virola (2007), itstudied the trends and characteristics of the middle-income class here in the Philippines. Cluster analysis was the method implemented to come up with an a priori grouping of the income classes. After the income levels were determined, multiple regression analysis was then performed. The independent variables that the study used are the following information from the household head: educational attainment, occupation, marital status, age, sex, and class of worker. Other variables included are the type of household, total employed household members, total household members by age group, square of family size, tenure status of the household, type of roof and wall materials, type of building, type of toilet, water source, facilities inside the house and location of the house. The data that was used is the 1997 FIES and there were 5 income classes determined by cluster analysis. Cluster 1 has an annual family income from PhP3,064 to PhP148,294. Cluster 2 has annual family income from PhP148,307 to PhP420,542, cluster 3 from PhP421,000 to PhP1,207,112 pesos, cluster 4 from PhP1,215,509 to PhP3472,515, and cluster 5 from PhP4,004,148 to PhP8,315,380. The authors acknowledge the fact that the limits of the classes are changing, generally increasing, through time. According to the study, the range for cluster 3 is already from PhP251,283 to PhP2,405,280 in 2007.

In Albert and Collado (2011), it aimed to summarize information on poverty in the Philippines due to the "growing interest of reorienting economic development

plans and policies for reducing poverty". The regressors that were included in the study are basically almost the same as that of Virola and Martinez (2007) on the Middle-Class. The regression analysis revealed that the following variables are significant: total household members, total employed household members, urban or rural area, household head's sex, education attainment, employment, age, and marital status, access to water source, housing characteristics such as wall, roof tenure toilets, electricity, and water.

3. Methodology

To determine the income classes of households in the Philippines in 2009, cluster analysis is conducted on the annual household income from the Family Income and Expenditure Survey (FIES) in 2009. It was noted by Africa (2011) from the Social Weather Stations that "family incomes are clustered closely together", emphasizing the "homogeneity of incomes". It tells us that households belonging to a certain/latent income category will have incomes closer to each other. This is a justification for the use of annual household income as the sole basis in the clustering procedure used in this study. Although there is a criterion used by the Market and Opinion Research Society of the Philippines (MORES), a 5-class system based on internal and external indicators of household qualities and household income(Mercado, 2006) in determining socio-economic classes, the FIES 2009 data is more accessible than MORES data.Furthermore, this method had been used by Virola et al. (2007) from the National Statistics Coordination Board in determining socio-economic classifications of households in the Philippines in 1997, using the minimum and maximum incomes per cluster as cut-offs for each income class.

There were five income classes generated using the cluster analysis with the following labels: low income class, lower middle income class, upper middle income, lower high income class, and upper high income class. The baseline class is the low-income class. The results and discussions part describes the descriptions of the income classes.

Since income classes are ordinal by nature, the cumulative logistic regression model (specifically, the proportional odds model) should have been the best choice. However, the assumption of proportional odds assumption is violated, hence the model will not be appropriate. The generalized ordered logistic regression (partial proportional odds model) is then more appropriate and is a superior choice(Williams, 2006). However, due to convergence and iteration problems, the researchers opted to use the generalized (multinomial)logistic regression model. The variable list to be used as determinants of income classes in the multinomial logistic model are listed below.

Table 1. Predictor Variables for Modelling

Information	Definition
Income Class	Income class of Household from 1 to 5, with 1 for the lowest/poorest and 5 for the richest
Total Family Income	Total family income of a household
Family Size	Average number of household members based on 1st and 2nd visit
Total Members	Total number of household member on 2nd visit
Household (HH) Non-Relative Member	No. of Non-relative household members
Number of Employed HH Member	Total number of HH members that are employed
Age of HH head	Age of the HH head
NCR	0 not within NCR, 1 within NCR
HH Head Highest Educational Attainment	1 None or elementary undergraduate 2 Elementary graduate or high school undergraduate 3 high school graduate or college undergraduate 4 College graduate and above
Marital Status of HH head	0 Single 1 Married 2 Widowed 3 Divorced/Separated
Sex of the HH head	0 Female, 1 Male
Household type	0 Single family 1 Extended family 2 Has 2 or more non relative
HH head Employment Status	0 Not employed 1 Worked for government 2 Worked for private establishment or household 3 Self-employed without any employee 4 Employer in own family-operated farm or business 5 Worked without pay in own family-operated
HH Dining Sets	Total number of dining sets
HH Vehicles	Total number of cars
HH Telephones	Total number of telephones
HH Microcomputers	Total number of Microcomputers
HH Ovens	Total number of ovens
HH Motors	Total number of motors
HH Washing Machines	Total number of washing machines
HH Airconditioning Units	Total number of airconditioning units
HH Sala Sets	Total number of sala sets
HH Radios	Total number of radios
HH Televisions	Total number of televisions
HH VTR/DVD/VCD	Total number of VTRs/DVDs/VCDs
HH Refrigerators	Total number of refrigerators
Urban/Rural	0 Urban, 1 Rural

HH House Type of Roof	1Salvaged, mixed but predominantly salvaged 2 Light and mixed but predominantly light 3 Strong and mixed but predominantly strong
HH House Type of Wall	0 Salvaged/makeshift materials and mixed but predominantly salvaged 1 Strong materials (galvanized, iron, aluminum) mixed but predominantly strong 2 Light materials (cogon, nipa, anahaw) and mixed but predominantly light
HH House Type of Building	1 Single house 2 Duplex 3 Apartment/Accessoria/Condo/Townhouse
	4 Commercial/Industrial/Agricultural building
HH House Toilet Facility	0 None and Others; 1 Water-sealed; 2 Closed pit; 3 Open pit
HH Electricity	0 No electricity, 1With Electricity
Occupation	1 Government and Special Interest Organizations 2 Professionals 3 Technicians and Associated Professionals 4 Clerks 5 Service Workers and Shop Market Sales Workers 6 Farmers, Forestry Workers and Assemblers 7 Craft and Related Workers 8 Plant and Machine Operators and Assemblers 9 Special Occupations

The full Generalized Logistic Regression Model is shown below.

$$\log\left(\frac{\quad}{\quad}\right) = \alpha_i + \beta_1 NCR + \beta_2 TotalEmployed + \beta_3 TotalNonrelative_{HH} + \beta_4 familysize + \beta_5 Age_{HH} + \beta_6 Radio + \beta_7 TV + \beta_8 VCR + \beta_9 Ref + \beta 10 Wash + \beta_{11} Aircondition + \beta_{12} Salaset + \beta_{13} Dining + \beta_{14} Car + \beta_{15} Telephone + \beta_{16} PC + \beta_{17} Oven + \beta_{18} Motor + \beta_{19k} MaritalStatus + \beta_{20} Sex + \beta_{21m} HouseholdType + \beta_{22n} Building + \beta_{23p} EmpStat + \beta_{24} Urban + \beta_{25} TotalMems + \beta_{26q} EducationFinal + \beta_{27r} Toilet + \beta_{28t} Roof + \beta_{29u} Wall + \beta_{30} Electricity$$

$\forall i = 2,3,4,5$ and $j = 1$ is the base category.

There is complete-quasi separation between the response and some of the predictors, namely Electricity, Toilet, Wall, Roof. Allison (2008) suggests redefining categories before opting to drop these variables in the analysis. Complete-quasi separation still exists when remodeling and hence, these variables were finally dropped from the model.

The variables FamilySize and TotalMems are multicollinear since the signs of the parameter estimates using only the simple generalized logistic models are different compared to when they are estimated using the multiple generalized

logistic models. Also, TotalMems is clearly defined by the National Statistical Coordination Board (NSCB) and is more interpretable than FamilySize, which is the average family size after the first and second visits of the survey.

Furthermore, the fitted generalized logistic regression model after removing variables with problems of complete-quasi separation and multicollinearity problems rejects the global null-hypothesis of good-fit of the generalized Hosmer and Lemeshow test with a p-value almost equal to zero.

The marginal effects are estimated to study the effects of the predictors upon the membership of a household to a certain income class.Finally, a sensitivity table is constructed to assess how good the final model is in classifying households to the income classes.

4. Results and Discussions

Definition of income classes for Philippines households in 2009: Cluster analysis

The researchers employed the same procedure for households in the Philippines in 2009, using the Ward's Minimum Variance Method. Table 2 below shows the result of the clustering, following from the two-step approach of Virola, et al. (2004).

Table 2. Income Clusters Generated for Philippine Households in 2009

Cluster	Minimum	Maximum	Mean	N
1	8007	142915	83487.92	21566
2	142974	330342	213825	11365
3	330480	594316	430076.6	3848
4	594875	1697928	855600.1	1512
5	1718354	30368154	2866387	109

As used by Virola et al. (2004), the paper shall define Cluster 1 as "Low Income Class", Cluster 2 as "Lower Middle Income Class," Cluster 3 as "Upper Middle Income Class," Cluster 4 as "Lower High Income Class" and Cluster 5 as "Upper High Income Class." To avoid gaps in classifying annual household incomes, the cut-offs in Table 4 were adjusted.

Table 3. Income Class Cut-offs for Philippine Households in 2009

Cluster	Income Category
1 "Low Income Class"	[0, 142974)
2 "Lower Middle Income Class"	[142974, 330343)
3 "Upper Middle Income Class"	[330343, 594317)
4 "Lower High Income Class"	[594317,1718354)
5 "Upper High Income Class"	[1718354, ∞)

Profile of income classess

It can be seen in Table 4 below that majority of household heads in the low income class are self-employed which consists 43.66% of the total houshold heads in the low income class. It is followed by those working for the private sector at 31.5%. For household heads in the lower middle income class, majority are working for the private sector at 31.75% followed by those who are self-employed at 30.45%.

Table 4. Distribution of Employment Status of Household Heads across Income Classes

	Not Employed		Worked for Government		Worked for Private		Self-Employed	
	No.	%	No.	%	No.	%	No.	%
Low	2853	13.23	654	3.03	6803	31.55	9416	43.66
Lower Middle	2211	19.45	1011	0.09	3608	0.32	3461	0.30
Upper Middle	1021	26.53	698	18.14	872	22.66	832	21.62
Lower High	396	26.19	306	20.24	326	21.56	248	16.40
Upper High	20	18.35	12	11.01	24	22.02	14	12.84
Total	6501	16.93	2681	6.98	11633	30.29	13971	36.38

	Employer in Own Business		Worked w/out Pay in Own Business		Total	
	No.	%	No.	%	No.	%
Low	1743	8.08	97	0.45	21566	56.16
Lower Middle	988	0.09	86	0.01	11365	29.60
Upper Middle	392	10.19	33	0.86	3848	10.02
Lower High	229	15.15	7	0.46	1512	3.94
Upper High	37	33.94	2	1.83	109	0.28
Total	3389	8.83	225	0.59	38400	100.00

On the other hand, majority household heads in the upper middle income class are not employed which consists 26.53 % of the households heads in the income class, followed by those working for the private sector at 22.66% and those who are self-employed at 21.62%. Furthermore, majority of household heads in the lower high income class are not employed which consists 26.19% of the total in the income class, followed by those working for the private sector at 21.56% and those working for the government at 20.24%. Finally, 33.94% of the household heads in the upper high income class are employer in their own business, 22.02% working for the private, and 18.35% who are unemployed.

It is interesting to note the trend between level of education and income class. It can be seen in Table 5 that majority of households in the low income class

are only elementary graduates (37.38%) followed by those who have not taken/ finished elementary grade (36.85%). Only 1.91% of them have finished college or are in the graduate school. Moreover, majority of households in the lower middle income class are high school graduates (46.4%) followed by elementary graduates (28.23%). Only 12.5% of them have finished college or have entered the graduate school level. Those in the upper middle income class are mostly high school graduates(44.59%), followed by some college graduates or graduate school students and graduates (35.19%). Those in the lower high income class are mostly college graduates (58.99%), some of which have at least a graduate degree, followed by high school graduates (31.21%). Finally, those at the upper high income classes have college degrees, some of which have at least a graduate degree.

Table 5. Distribution of Household Heads by Highest Educational Attainment across Income Classes

	No Grade Completed		Elementary Graduate		High School Graduate		College Graduate and Above		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Low	7946	36.85	8061	37.38	5147	23.87	412	1.91	21566	56.16
Lower Middle	1463	12.87	3208	28.23	5273	46.40	1421	12.50	11365	29.60
Upper Middle	200	5.20	578	15.02	1716	44.59	1354	35.19	3848	10.02
Lower High	38	2.51	110	7.28	472	31.22	892	58.99	1512	3.94
Upper High	1	0.92	6	5.50	12	11.01	90	82.57	109	0.28
Total	9648	25.13	11963	31.15	12620	32.86	4169	10.86	38400	100.00

It is interesting to note that majority of households in the Philippines in 2009 are “single families” as can be seen in Table 6. It can be observed that the percentage of nonrelative household members increases as income class increases, as can be seen in Table 7.

It is suggested in Table 8 that majority of households in the Philippines in 2009 in all income classes are single-type houses. It can also be seen that for households in the low income class, duplex households are the second most common building type at 1.68%. For households in the lower middle, upper middle, and low high income classes, apartment/accessoria/condominium /townhouse is the second most common building type at 8.03%, 7.54%, and 2.75% respectively.As can be expected, those at the upper high income class have equal opportunities for the other building types, as indicated by the percentage of households uniformly distributed, i.e., having other building types other than the single type, pegged at around 2.75%.

It can be observed that the percentage of employed household members increases as income class increases, as can be seen in Table 9.

Table 6. Distribution of Household Types Across Income Classes

Income Class	Single Family		Extended Family		Has 2 or More Non-Relatives		Total	
	No.	%	No.	%	No.	%	No.	%
Low	17086	79.23	4466	20.71	14	0.06	21566	56.16
Lower Middle	7501	66.00	3843	33.81	21	0.18	11365	29.60
Upper Middle	2158	56.08	1667	43.32	23	0.60	3848	10.02
Lower High	800	52.91	695	45.97	17	1.12	1512	3.94
Upper High	63	57.80	41	37.61	5	4.59	109	0.28
Total	27608	71.90	10712	27.90	80	0.21	38400	100.00

Table 7. Distribution of Nonrelative Household Members across Income Classes

Income Class	Total Number of Household Members	Total Number of Nonrelative Members	Percentage
Low	95883	277	0.29
Lower Middle	57738	528	0.91
Upper Middle	20027	558	2.79
Lower High	8074	668	8.27
Upper High	566	143	25.27

Table 8. Distribution of Building Types of Households across Income Classes

Income Class	Single		Duplex		Apartment/Accessoria/Condo/ Townhouse		Commercial/ Industrial/ Agricultural Building		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Low	20899	96.91	362	1.68	283	1.31	22	0.10	21566	56.16
Lower Middle	10373	91.27	380	3.34	595	5.24	17	0.15	11365	29.60
Upper Middle	3399	88.33	131	3.40	309	8.03	9	0.23	3848	10.02
Lower High	1353	89.48	40	2.65	114	7.54	5	0.33	1512	3.94
Upper High	100	91.74	3	2.75	3	2.75	3	2.75	109	0.28
Total	36124	94.07	916	2.39	1304	3.40	56	0.15	38400	100.00

Table 9. Distribution of Employed Household Members across Income Classes

Income Class	Total Number of Household Members	Total Number of Employed Members	Percentage
Lower Middle	57738	21921	37.97
Upper Middle	20027	7874	39.32
Lower High	8074	3446	42.68
Upper High	566	243	42.93

Determinants of income classes

From the full model composed of 30 predictors, the final model is reducedto only 10 predictors. Most of the variables are removed not due to insignificance but due to the problem of rejecting the null hypthesis of goodness-of-fit of the model. The goodness-of-fit test of Begg and Gray (1984, cited in Peng and Nichols, 2003, p. 184) was used, which says that the test may be applied by applying the Hosmer and Lemeshow test to all pairs of the outcome categories, then combine the results descriptively. If all the tests will no reject the null hypothesis, then a good model fit to the data is reasonable.

The final reduced model is shown below:

$$\log\left(\frac{\pi_i}{\pi_j}\right) = \alpha_i + \beta_1\, NCR + \beta_7\, TV + \beta_{11}\, Aircondition + \beta_{14}\, Car + \beta_{19k} MaritalStatus + \beta_{21m}\, HouseholdType + \beta_{22n} Building + \beta_{23p} EmpStat + \beta_{24} Urban + \beta_{26q} EducationFinal$$

$\forall\, i = 2,3,4,5$ *and* $j=1$ *is the base category.*

The global null hypothesis test of $\beta = 0$ was rejected. The Type 3 analysis of effects showed that all of the predictors in the final model have effects which are significantly different from zero.Shown in the next table are the Chi-square value and the p-values of the Hosmer and Lemeshow tests. All statistical results have p-values greater than our level of significance of 0.05. Therefore we will not reject our null hypothesis of global goodness-of-fit.

Table 10. Hosmer and Lemeshow Tests for Goodness-of-Fit

Pairings	Chi-Square Value	p-value
Low Income and Lower Middle Class	15.4335	0.0512
Low Income and Middle Class	11.4058	0.1798
Low Income and Lower High Income Class	15.3001	0.0536
Low Income and Upper High Income Class	1.8725	0.9847

Table 11 gives the marginal effects and their significance. The maximum likelohood estimates (Table A) and the odds ratios with their significance (Table B) are located in the appendix.

Marginal effects and implications

Marginal effects give us the effects of changes in one variable while holding all others constant on the probability of classification in each of the five income clusters.

Table 11. Marginal Effects and their Significance

		Low		Lower Middle		Upper Middle		Lower Middle		High	
		Mar-ginal	Sig	Mar-ginal	Sig	Mar-ginal	Sig	Mar-ginal	Sig	Mar-ginal	Sig
Empstat-new	1	-0.0779	0.0000	0.0353	0.0010	0.0305	0.0000	0.0122	0.0000	-0.0001	0.8740
	2	0.0442	0.0000	-0.0063	0.3220	-0.0321	0.0000	-0.0060	0.0090	0.0001	0.8330
	3	0.0383	0.0000	-0.0110	0.0890	-0.0241	0.0000	-0.0033	0.1790	0.0002	0.8450
	4	-0.0248	0.0030	0.0093	0.3080	0.0016	0.7960	0.0111	0.0020	0.0028	0.0050
	5	-0.0409	0.1130	0.0516	0.0730	0.0067	0.7120	-0.0196	0.0060	0.0021	0.4880
	6	0.1996	0.0450	-0.1695	0.0590	-0.0293	0.5890	-0.0109	0.6790	0.0101	0.4430
educa-tionfinal	2	-0.0688	0.0000	0.0504	0.0000	0.0167	0.0000	0.0006	0.8570	0.0011	0.3230
	3	-0.1794	0.0000	0.1112	0.0000	0.0559	0.0000	0.0119	0.0000	0.0003	0.7330
	4	-0.3609	0.0000	0.1580	0.0000	0.1470	0.0000	0.0521	0.0000	0.0038	0.0000
car		-0.2071	0.0000	0.0998	0.0000	0.0695	0.0000	0.0313	0.0000	0.0017	0.0000
ncr		-0.1606	0.0000	0.0951	0.0000	0.0387	0.0000	0.0226	0.0000	0.0010	0.0920
aircondi-tion		-0.1724	0.0000	0.0877	0.0000	0.0563	0.0000	0.0227	0.0000	0.0017	0.0000
building-type	2	-0.0343	0.0050	0.0298	0.0240	0.0092	0.2560	-0.0050	0.2790	0.0003	0.8710
	3	-0.0438	0.0000	0.0194	0.1060	0.0250	0.0000	0.0006	0.8480	-0.0013	0.1510
	4	0.0150	0.7800	-0.0151	0.7820	0.0032	0.9140	-0.0080	0.5450	0.0049	0.2880
house-holdtype	1	-0.1235	0.0000	0.0609	0.0000	0.0468	0.0000	0.0157	0.0000	0.0000	0.9280
	2	-0.1880	0.0010	0.0306	0.5890	0.1155	0.0020	0.0350	0.0460	0.0068	0.0990
tvs		-0.2592	0.0000	0.1603	0.0000	0.0714	0.0000	0.0223	0.0000	0.0008	0.0010
ur		-0.1089	0.0000	0.0713	0.0000	0.0266	0.0000	0.0096	0.0000	-0.0001	0.8410
Base categories: householdtype: 0; buildingtype: 1; empstat: 0; education : 1; ur: rural											

If the household is from the National Capital Region, the probability of classification in the low-income class would decrease by 16.06% andwould increase in the higher income classes. The magnitude of the increase is in a decreasing fashion. The increase in the probability of classification in the lower middle class is 9.51% and 2.26% in the lower high class.

The National Capital Region is the top region in terms of income. It is also in the top total expenditures, which includes education, culture & sports/manpower development, expenditure on health, nutrition and population control (Virola, 2010). These contributed to more opportunities in the nation's capital, which help translate into better economic classification as compared to households living in non-NCR areas. Another reason is that urban populations tend to be better than rural populations in terms of the health, housing, education, and access to services and opportunities.

If the household head is at least elementary graduate, the probability of being classified in the low income class will decrease. Specifically, if the household

head is an elementary graduate or high school undergraduate, the probability will decrease by 6.88%. If the household head is high school graduate or college undergraduate the probability of being classified in the low income class will decrease by 17.94%, while if the head has college degree or post-graduate units, the probability will decrease by 36.09%. Lastly, the probability of being classified in the higher income classes will increase in general, with the increase the highest when the educational attainment is college or post-graduate studies.

Evidently, education brings significant effect to the classification of income classes of the households. Specifically, having higher levels of education relates to a lesser probability of being classified in a lower income class. The model highlighted the impact of education and the call for possible projects relating to it. Making education more available for the people will result to the positive movement of household income classification.

Employment status of the household head affects income classification. If the household head is employed in the government, the probability of classification in the low income class will decrease by 7.79% but the probability of being classified in the lower middle, upper middle and lower high income class will increase by 3.53%, 3.05% and 1.22% respectively. On the other hand, if the household head works for private establishments, the probability of being classified in the low income class will increase by 4.42% while the probability of being classified in the lower middle, upper middle and lower high income class will decrease by 0.63%, 3.21%,and 0.60%, respectively. If the household head is self-employed without any employer, the probability of being classified in the low income class will increase by 3.83%, while the probability of being classified in the lower middle and upper middle income class will decrease by 1.1% and2.41%. Notably, if the household head is an employer in a family-owned business, the probability of being classified in the lower high income class and upper high income class will increase by 1.11% and 0.28%, respectively. If the household head works without pay in own family-operated business, the probability of being classified in the lower middle and lower high income class will increase by 5.16% and decrease by 1.96%, respectively. Lastly, if the household head is working with pay in family-operated farm or business, the probability of being classified in the low income class will increase by 19.96% and will the probability of being classified in the lower middle income class will decrease 16.95%.

Working for the government has been one of the exigent levels of employment that decreases the probability of being in the low-income class. According to the Philippine Service Commission, the budget for personal services has a growing rate, which is an indicator of rapid expansion of the bureaucracy. This is accounted by the implementation of the Salary Standardization Law.

Working for private establishments or households involves, but not limited to, working as a household help or service crews. This probably brought the increase

in the probability of being classified in the lower income classes. The same can also be seen on self-employed household heads with no employees since some of the jobs that is possibly in this employment status is vending and freelance work which again explains the increase in the probability of being classified in the lower income classes.

It is also important to note that being an employer in a family owned business increases the probability of being classified in the high income class. Enabling the capacity of the households to manage their own businesses can possibly result to a positive movement in the income classes. Projects that would lend capital or help households manage their own businesses and engage in entrepreneurial activities would be helpful.

The signs of the marginal effects corresponding to the number of physical assets, specifically television, car and air-conditioner are the same in the five income classes. Every unit increase in these assets decreases the probability of classification to the lower income class. On the other hand, it generally increases the probability of classification to the succeeding upper income classes. Cars and air-conditioners give the highest positive effects on the classification to the two high-income classes. The three physical assets identified as significant predictors are not as important as food, clothing and shelter, the three most basic needs, for the survival of the household and therefore would be logically given the least priority in the household expenses. A high number of physical assets therefore suggest a higher income classification for the household since they have more capacity to buy these commodities. Moreover, it would also be intuitive that ownership of more expensive assets will be an indication that the household belongs in the higher income classes.

If the type of house where the household lives is a duplex or apartment/ townhouse/ condominium, rather than in a single unit, the probability of classification in the low-income class will decrease. The probability of being classified in the lower-middle income class when the household lives in a duplex house, increase by 2.98%. For the upper middle class, the probability increase by 2.5% if the household lives in an apartment/condominium/townhouse. These generally suggest that the better the building type the household lives in the probability of classification in the upper income classes will also increase. Therefore, building or housing type reflects the income class of the household.

If the household is located in the urban area, the probability of classification in the low income class will decrease by 10.89%. Moreover, the probability of classification in the second, third and fourth income classes will increase. This is consistent with the literature that poverty is more prevalent in the rural areas since rural market options are very few and works are concentrated in the minimum-wage and part-time jobs which have limited security and room for advancement (Fisher, 2007).

Sensitivity table

The sensitivity table will give us an idea of how good the predictions the model will give in classifying the households in the income classifications.

Table 13. Sensitivity Table

Model Prediction						
Income Class	Low	Lower Middle	Upper Middle	Lower High	Upper High	Total
Low	18,806 87.20%	2,727 12.64%	31 0.14%	2 0.01%	0 0.00%	21,566 100%
Lower Middle	4,856 42.73%	5,931 52.19%	533 4.69%	45 0.04%	0 0.00%	11,365 100%
Upper Middle	486 12.63%	2,186 56.81%	952 24.74%	223 5.80%	1 0.03%	3,848 100%
Lower High	50 3.13%	394 26.06%	535 35.38%	527 34.85%	6 0.40%	1,512 100%
Upper High	3 2.75%	7 6.42%	13 11.93%	74 67.89%	12 11.01%	109 100%
Total	24,201 100%	11,245 100%	2,064 100%	871 100%	19 100%	38,400 100%

The overall percent correct classification is 68.30%. The sensitivity table gave 87.20% correct predictions for the low income class. This is a high value suggesting that the model has a high chance of classifying low income households to its true income cluster. Moreover about 52.19% of the households in the low middle income class are correctly predicted, with the 42.73% classified in the low income category. This tells us that if the classification is not correct, then it is most likely that the household will be classified in the low income class. Only 24.74% of the households in the upper middle class are correctly classified. This is quite a low percentage. Majority of the households in this cluster are predicted in the lower middle income class. Furthermore, about 34.85% of the households in the lower high income cluster are correctly classified. The wrongly classified households have high chances of being classified in the next lower income cluster which is the upper middle class. Lastly, only 11.01% of the households in the fifth income cluster are correctly classified. Majority of the households in the fifth income cluster are classified under the fourth cluster.

We have less problem in predicting the correct income classification of households who truly belong in the two lowest income clusters. However, for households who truly belong in the three upper income classes, the model has a low tendency of classifying them in their true income classes. The model has the tendency to classify households one classification lower in income class. Although this may give us apprehensions when applying the model in real

operational scenarios since the model gives us underestimates, this model will work well for the majority of the subjects who will wish to avail of government services which are targeted for the lower income classes. Moreover, the people will have the tendency to be obliged to pay less than what is demanded should the true income classification have been known for projects which have socialized payment schemes. The model is biased towards classifying people in the lower income classes. Also, this is a good model for the government to use for projects targeted for the poor or those who belong in the lowest income classes since there would be high probability that those who deserve to enjoy the projects will really be those who deserve them

5. Conclusions

We have shown important variables which can be considered by the government in the development of policies that can intervene in raising the quality of life of the Filipinos. The most significant variables are education, employment and rural development. As mentioned by Ross and Mirowsky (2003), "education increases the likelihood of full-time employment, and gives people access to good jobs with high incomes." Low level of education deprives the people the ability to combat economic hardships. Moreover, it is intuitive that employment will improve the quality of life of the households since having a good and decent job will give the households the capacity to provide the needs of their members. Moreover, rural development is an important aspect that should be considered by the government to improve the quality of life of the Filipinos. Barrios (2007) stressed the importance of rural development and the understanding of its dynamics to implement intervention programs to prosper. Bale (1999, cited in Barrios2007) defines rural development as the "provision of social and physical infrastructure, provision of financial services in non-urban areas, non-farm and small-medium enterprises activities in rural communities and market towns that are more closely linked to the rural community than they are to the economies of the larger urban cities, as well as the development of traditional rural sectors, such as agriculture and natural resource management."One suggestion porposed is to complement agricultural development and boost development intervention through the building of economic infrastructure (e.g. production and credit support), physical infrastructure (e.g. roads, irrigation), capacity building like trainings and information dissemination, and support services like marketing and faciliation of access to basic social services.

These three variables are very important to improve the quality of life of the Filipinos. Education should be given priority and great importance by the government. Moreover, it should be assured that there are sufficient available jobs to decrease the number of unemployed in the country. Lastly, it is important to have balanced development both in the urban and rural areas.

6. Recommendations

The findings in this research provides evidence on variables which can significantly classify the households into the difference income clusters. The model obtained from this study can be used by the government as a supplement screening mechanism on the people who wish to avail of services that are targeted only for a specific income class or group of people. Furthermore, it can be used to givebracket assignments for social services with socialized payment schemes. There are already existing methods by which the government will do these classifications. However, there are some problems in terms of the accuracy that these existing models give. Moreover, since the model obtained from this research does not really give accurate classifications for all income clusters as seen from the analysis of the sensitivty table, this can be used as a further reference for further proposals of improving the model until such time that we will arrive to the model with very high predictive power.

More than seeing the predictive power of the variables to discrimante people across different income classifications, another application of the model was deduced. We have identified important aspects that can improve the quality of life of the Filipino as proxied in this study by the income. The government should invest more on education, should ensure high and stable employment level, and give attention to rural development.

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