

Academic Discriminants of Poverty

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Abstract: This study aims to investigate how Poverty Incidence (PI) determines the students' academic performance in the four core areas of NAT using Discriminant Analysis. The study utilized a multivariate secondary data of the Average Poverty Incidence from 2009 – 2015 of sixteen regions in the Philippines with the corresponding NAT results in the four core subjects, namely: Science, Mathematics, English, and Filipino. The data were then analyzed employing Discriminant Analysis. Findings show that to some extent, the "Not Poor" group has gained advantage over the "Poor" group in Filipino, Science, and English categories, while only in Mathematics had the "Poor" group gained an edge.

Keywords: academic, poverty, discriminant, performance, analysis

1. Introduction

Discriminant analysis as claimed by Klecka, W. R., & Klecka, W. R. (1980), provides a very strong technique for examining simultaneously the differences between two or more groups of data or observations relative to several variables.

On the other hand, academic achievement of basic education students is measured through the National Achievement Test (NAT), a system-based assessment designed to evaluate learning outcomes in identified periods of basic education. It includes set of examinations taken nationwide by students in Years 6, 10, and 12. The test is administered to determine their academic levels, strength and weaknesses, as well as their knowledge learnt throughout the year divided into 5 categories; English, Filipino, Math, Science and Araling Panlipunan (Social Studies in English). The objectives of NAT are as follows: 1) provide empirical information on the achievement level of pupils/students in Grades Six, Ten, and Twelve to serve as guide for policy makers, administrators, curriculum planners, supervisors, principals and teachers in their respective courses of action; 2) identify and analyze variations on achievement levels across the years by region, division, school and other variables ; and 3) determine the rate of improvement in basic education with respect to individual schools within certain time frames. The said aims focus on one major component of student achievement which gives an empirical measures or information of the totality of his learning in a particular subject or area.

Along with learning, Kurt Lewin's Topological and Vector theory proposes that learning is affected by both the internal and external factors, the latter of which may include the socio-economic status of the family to which Poverty Incidence (PI) is closely linked with. Poverty incidence can be described as the proportion of the population with per capita income less than the per capita poverty threshold. (<https://psa.gov.ph> > Environment and multi-domain statistics) or it is the proportion of people below the poverty line to the total population.

Poverty Incidence is akin to Human Poverty index (HPI) which refers to the standard of living in a particular country or region. (<https://planningtank.com/development-planning/human-poverty-index>). It is a measure of economic growth which proposes that human poverty should be gauged in terms of the three key deprivations of life.

(survival, knowledge and economic provisions), Survival is determined based on life expectancy. As to knowledge, its main determinant is basic education which is measured by the percentage of adult citizens who are illiterate, putting emphasis on education deprivation for females. Economic provision is measured by the percentage of the population without access to health services as well as safe water, and lastly, the percentage of children below 5-year old who are under-weight.

([http://www.economicconcepts.com/human_poverty_index_\(hpi\).htm](http://www.economicconcepts.com/human_poverty_index_(hpi).htm)).

With the foregoing, this study then, aims to prove how the Poverty Incidence determines the students' academic performance in the four core areas of NAT using Discriminant Analysis.

2. Conceptual Framework

This study lies on the premise that, given a multi-variate data of two or more groups corresponding to several variables, their differences can be determined simultaneously through Discriminant Analysis. Klecka, W. R., & Klecka, W. R. (1980). Such analysis further suggests that an observation can be classified logically into two or more classes/groups relating to the qualitative variables. In this study, the poverty incidence represents the group and the NAT achievement results of the four core subjects are the qualitative variables. Figure 1 below shows the schematic diagram of the study.

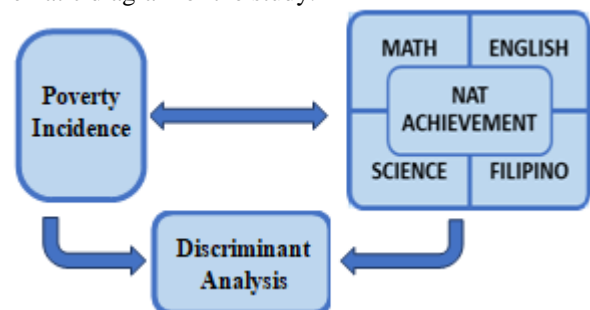


Figure 1: Schematic Diagram of the Study

3. Methodology

The study utilized the secondary data of the Average Poverty Incidence from 2009 – 2015 of sixteen regions in the Philippines with the corresponding NAT results in the four mentioned core subjects. With reference to the

median which was automatically calculated using a statistical software, the poverty incidences of the different regions were grouped/classified into two classes: Class **Not Poor** or **NP** ($PI = < \text{median}$) and Class **Poor** or **P** ($PI = \geq \text{median}$) described as **low** and **high** poverty incidence, respectively. The data were then analyzed employing Discriminant Analysis using the same software.

4. Results and Discussion

Table 2 shows the automated descriptive statistics showing the different statistical measures particularly the mean and the median. It can be noted that the median 29.77 is a bit greater than the mean and by principle, the median can group the poverty incidence more proportionately than the

mean, hence, the latter was used as basis in grouping the said poverty incidence.

Table 2: Descriptive Statistics showing the median and other measures.

Variable	Minimum	Maximum	Q1	Q3
Ave.PI	3.74	48.06	20.12	40.44

Variable	N	Mean	Median	TrMean	StDev	SE Mean
Ave.PI	17	29.16	29.77	29.59	12.59	3.05

With median as the reference value, the Poverty Incidences were then grouped/ classified into two. Those which are less than the median is marked 0 (Not Poor) and those equal to or greater than the same are marked 1 (poor). Table 3 presents the grouping of the poverty incidence by region with their corresponding NAT performance in the four core subjects.

Table 3: Poverty Incidence by Region with Corresponding Classes and NAT Performance for Both Grades 6 and 10 for SY2009 – 2015

Region	Average Poverty Incidence	Poverty Incidence Class	Average Filipino	Average Science	Average English	Average Mathematics
CARAGA	48.06	1	61.99	60.41	63.56	66.38
VIII	44.25	1	60.40	53.26	58.20	57.65
V	42.13	1	56.40	39.78	46.90	41.77
IX	41.62	1	53.74	46.47	51.91	50.96
X	39.26	1	54.92	45.23	52.42	48.55
XII	38.48	1	55.17	44.62	51.01	48.81
IV-B	31.07	1	59.62	43.09	49.37	47.13
VII	30.21	1	58.04	45.69	54.44	50.19
XI	29.77	1	56.25	44.98	51.71	47.84
VI	29.71	0	57.54	45.13	52.59	48.30
CAR	24.06	0	56.99	41.59	52.68	43.50
II	21.69	0	55.45	40.94	48.93	44.75
I	18.54	0	52.90	37.94	45.88	39.99
III	12.97	0	57.23	42.98	50.23	45.23
IV-A	10.99	0	58.49	38.30	47.87	40.02
NCR	3.74	0	59.92	41.25	51.79	43.57
Average	29.16	0	57.19	44.48	51.84	47.79

To assess simultaneously the differences between the two groups of poverty incidences labeled 0 (Not Poor) and 1 (Poor) with respect to the students' NAT performance in the four core subjects, the data were subjected to discriminant analysis using the same software mentioned earlier. Results of the analysis are presented in Table 4. Per summary of classification it can be gleaned that using the median as the basis of grouping, a proportion correctness of 82.4% was obtained with Classes 0 (low PI) and 1 (high PI) having 8 and 9 counts respectively.

Table 4: Discriminant Analysis: PI Class versus Ave.Filipino, Ave.Science

Summary of Classification		
Group	Not Poor	Poor
Count	8	9

N = 17 N Correct = 14 Proportion Correct = 0.824

Linear Function for Group		
	NOTPOOR (NP)	POOR (P)
Ave.Fili	9.53	9.47
Ave.Scie	-4.63	-4.99
Ave. Eng	5.88	5.12
Ave. Mat	-0.96	0.10

From the above table of Linear Discriminant Function for Group, it can be noted that students from the Not Poor (NP) group are performing better in Filipino (9.53) compared to the Poor (P) group. However, with the small difference in the weight values, it can be averred that Filipino subject is more or less of the same importance for both the NP and P group.

As to Science, students from both NP and P groups obtained a negative weight of -4.63 and -4.99, respectively. This implies that both groups of students consider the subject not very important. On the other hand, the figures show that more students from the P group do not perform well in this category.

In English, more students from the NP group are performing well (5.88) compared to the P group (5.12) which implies that English has greater weight or importance for the NP group than for the P group.

On the contrary, different result is obtained in Mathematics as more students performed better from the P group (0.10) as compared to the NP group -0.96.

5. Conclusion

From the foregoing analysis and discussion, it can be averred that, to some extent, the “Not Poor” group has gained advantage over the “Poor” group in Filipino, Science, and English categories, while only in one category has the poor gained an edge, that is, mathematics.

References

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