

# **FORECAST SCENARIOS ON THE SOCIO-ECONOMIC CONDITIONS OF SMALL-SCALE FISHERS IN THE COASTAL TOWNS OF THE FIRST DISTRICT OF ZAMBOANGA DEL NORTE**

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## **ABSTRACT**

This paper describes the socioeconomic conditions of the small-scale fishers in the coastal towns of the first district of Zamboanga del Norte and attempts to describe their future conditions via scenario analysis (up to year 2020). Posteriori probability estimates show that the most likely scenario for the fishers in these municipalities is that they will remain poor and poorly educated so that their numbers would increase (for lack of alternative livelihood) and poverty incidence will significantly rise as well. Intervention through higher and technical education of the relatively young household members are needed to forestall the occurrence of the likely scenario in 2020.

**KEYWORDS:** small-scale fishers, socio-economic conditions, scenario analysis.

## **INTRODUCTION**

Municipal fishery is regarded as the most important sector in Philippine fisheries. It is a major source of fish and provides employment for a significant portion of the rural population. Catch from municipal fishing accounted for 68% of total fish output (Umengan, 2001; [www.adb.org/.../5th-Country-Environmental-Analysis-PHI](http://www.adb.org/.../5th-Country-Environmental-Analysis-PHI)). Because it is an extremely labour-intensive occupation, the municipal fishing sector provides direct employment to over 1 million people along the coastal areas of the country. Municipal fisheries provide employment indirectly through fish marketing and distribution, fish processing, net making, and boat construction. Despite this substantial contribution of the municipal fishery to the national economy, until recently this sector had received only scant support from the government (Librero, et al. 1985).

According to Panayotou (1985), socioeconomic problems faced by small-scale fishers have been largely ignored, partly due to a presumption that, sooner or later, small-scale fishermen

would be absorbed by the rapidly progressing large-scale fishing sector (either by acquiring advanced technology or by becoming labourers on large trawlers); otherwise, they would be forced to alternative, more profitable, occupations. Leaving aside the social problems that such a transformation would have generated, the fact is that the small-scale fishermen, despite their apparently deteriorating standard of living, continue to exist alongside a highly profitable large-scale fishing sector. A number of explanations for this dualistic structure and persisting poverty have been advanced, ranging from the lack of advanced technology to the depletion of fish resources; from a suspected gambling behaviour among fishermen to the alleged exploitation by unscrupulous middlemen; and from the lack of alternative employment opportunities to fishermen's occupational and geographical immobility.

Economic factors are not the only determinants of poverty; there are also social, cultural and political variables. Understanding these determinants is crucial in designing and implementing effective solutions. The poor can often be difficult to help due to poor health, illiteracy, a lack of time, and a common aversion to risk. Their lack of influence and power is an especially important problem, and necessitates trying to identify win-win solutions that are in the interests not just of the poor, but also of the rich, the elite and the powerful.

Depending on which factors are found to contribute more to family income, the government can design its intervention policies so as to achieve the maximum effect on the small-scale fishing household's income from a given level of public expenditure. The optimum policy will often be one of a mixture of policy instruments such as promotion of both labour-intensive fishing technology as well as creation of nonfishing employment opportunities; or helping fishermen to convert their vessels into more profitable types of gear as well as helping them to move gradually out of the fishing occupation. The above analysis will help select the most appropriate mix of such policies.

The province of Zamboanga del Norte is located in the southern part of the country. It is one of the poorest provinces in the country (PEF, 2006). Among its coastal bays, Dapitan Bay and Murcielagos Bay provide fishery livelihood to three municipalities of Dapitan, Rizal and Sibutad. Like the rest of the country, its abundant coastal resources need improved resource management and sustainable programs to effect poverty mitigation. For a better program implementation and sustainability, a base study on the socio economic status of these three coastal municipalities is essential to have a clear glimpse of the socio-economic picture of its fisherfolks.

In response to the urgent need for and severe lack of reliable information on small-scale fishing communities, Jose Rizal Memorial State University undertook a study of the socioeconomic conditions of small-scale fishermen on the coast of Rizal, Sibutad and Dapitan City and attempts to describe their future status via scenario analysis (up to year 2020).

## **METHODS**

A household survey questionnaire was developed in English and translated to visayan dialect to generate primary data according to the terms of reference for the rapid site assessment. Only

10% of the households per barangay served as the sample size considering the available budget, time, nature of the site assessment, and the number of barangays to be surveyed.

The sample size per barangay was proportionate to the number of households of every barangay. This means that those barangays with small number of households had small sample sizes but these were randomly identified and presumed to represent the rest of the households. On-site sampling procedure, adapted from the Social Weather Station (1997), was used to randomly determine the sample households and to prevent bias on the data gathered. This procedure required the randomly determined starting point (where to begin the interview) and random start (the first household to be interviewed from the starting point). The lottery method was used in determining the starting point and random start. The places in the barangay such as barangay captain’s house, barangay hall, health center, school, and chapel were randomly identified for each barangay being surveyed. The first household sample from the starting point was randomly determined from numbers 1 to 3.

Generated data were summarized using descriptive statistics such as percent and were analyzed utilizing scenario analysis approach.

## RESULTS

### HOUSEHOLD CHARACTERISTICS

**Household Size and Type.** All the households surveyed in Dapitan, Rizal and Sibutad have a mean size of 4.76 or they have on the average five members. Sibutad has the biggest mean household size of 4.98 and Rizal has the smallest at 4.36. Based on the total percentage distribution, the data show that 23% of the households have four members and followed by almost 18% of the households with five members. Only Dapitan has households (2.00%) with 11 members while Rizal and Sibutad have 10 and 9 members as their largest households, respectively.

The data from the survey also show that most of the households are of nuclear type (90.00%). This means that they are only composed of the parents and their unmarried children. Only about 10% are classified as extended families with members that also include unmarried children or grandparents and other relatives. Comparatively speaking, Dapitan has 82% nuclear families while Sibutad has about 98%; the highest among the three places surveyed.

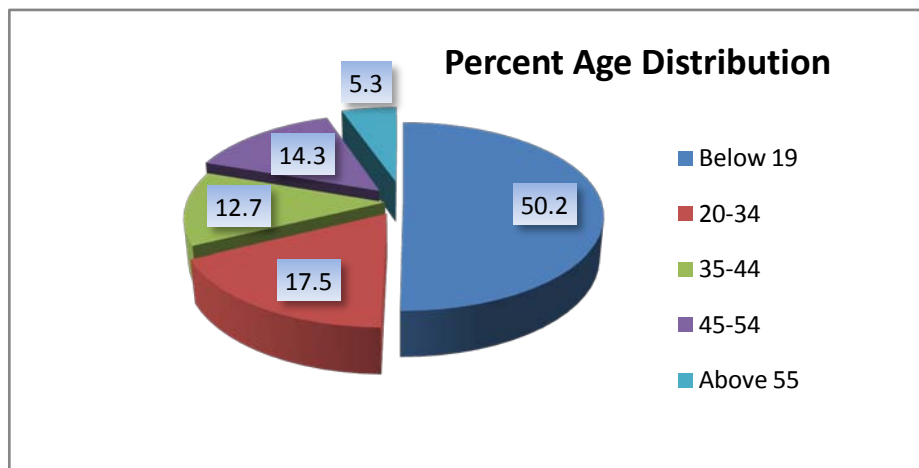
**Table 1 Household Size Distribution**

Household Size	Dapitan (%)	Rizal (%)	Sibutad (%)	Total (%)
1	6 (9.00)	-	-	6 (2.61)
2	9 (9.00)	2 (4.26)	5 (6.02)	16 (6.96)
3	12 (12.00)	14 (29.79)	12 (14.46)	38 (16.52)
4	19 (19.00)	11 (23.40)	24 (28.92)	54 (23.48)
5	17 (17.00)	13 (27.65)	11 (13.25)	41 (17.83)
6	11 (11.00)	2 (4.26)	15 (18.07)	28 (12.17)
7	11 (11.00)	4 (8.51)	8 (9.64)	23 (10.00)
8	5 (5.00)	-	2 (2.41)	7 (3.04)
9	5 (5.00)	-	6 (7.23)	11(4.78)
10	3 (3.00)	1 (2.13)	-	4 (1.74)

11	2 (2.00)	-	-	2 (0.87)
<b>Total</b>	<b>100 (100.00)</b>	<b>47 (100.00)</b>	<b>83 (100.00)</b>	<b>230 (100.00)</b>
<b>Mean Size</b>	<b>4.95</b>	<b>4.36</b>	<b>4.98</b>	<b>4.76</b>

**Age-sex Distribution.** As a whole, from the three municipalities surveyed, the male population and the female population are more or less evenly distributed at 51% and 49%, respectively. Interestingly, the results of the survey indicate that half of the population (46% for male and 50% for female) in the coastal areas is nineteen years old and younger as shown in Figure 1. If we include those whose age are 34 years and younger, the percentage is almost 68%. What is the implication of this in relation to poverty alleviation? Oladuja and Adeokun (2007) found out that fishers within 41-50 years old remained in their profession because they have difficulty of starting another profession.

**Educational Attainment.** Data on educational attainment of household members of fisherfolks shown in Table 3 indicate that majority of the members have attended elementary (one of every three persons) but those who actually finished it are smaller (one out of five).



**Figure 2 Percent Age Distribution of Household Members**

Noteworthy is the resulting trend as educational level rises. Generally, as the level of education increases, the percentage of educational attainment decreases so that at the college level, the average percentage for both male and female who have attended college is less than 10% (one out of ten). The percentage of those who have actually finished college is even smaller, less than 3%. This is an indication of the inability of fisherfolks to invest in human capital in children or household members (Orbeta, 2005), or that that children in large families (who are poor) perform less well in school, have poorer health, and have less survival probabilities (King, 1987). This suggests the inability of children of fisherfolks to substantially reach and finish higher education which is essential for poverty alleviation.

**Table 3 Distribution of Educational Attainment of Household Members Who Attended School**

Education	Male				Female			
	Dapitan (%)	Rizal (%)	Sibutad (%)	Total (%)	Dapitan (%)	Rizal (%)	Sibutad (%)	Total (%)
Attended Elementary	70 (39.11)	5 (6.10)	71 (47.33)	146 (35.52)	84 (46.41)	1 (1.56)	63 (41.72)	148 (37.37)
Completed Elementary	32 (17.88)	30 (36.59)	24 (16.00)	86 (20.92)	19 (10.50)	22 (34.38)	10 (6.62)	51 (12.88)
Attended High School	51 (28.49)	12 (14.63)	29 (19.33)	92 (22.38)	45 (24.86)	7 (10.94)	34 (22.52)	86 (21.72)
Completed High School	18 (10.06)	23 (28.05)	19 (12.67)	60 (14.60)	21 (11.60)	16 (25.00)	32 (21.19)	69 (17.42)
Attended College	7 (3.91)	9 (10.98)	5 (3.33)	21 (5.11)	7 (3.87)	11 (17.19)	7 (4.64)	25 (6.31)
Completed College	1 (0.56)	2 (2.44)	2 (1.33)	5 (1.22)	5 (2.76)	5 (7.81)	5 (3.31)	15 (3.79)
Graduate Studies	-	1 (1.22)	-	1 (0.24)	-	2 (3.13)	-	2 (0.51)
<b>Total</b>	<b>179</b> <b>(100.00)</b>	<b>82</b> <b>(100.00)</b>	<b>150</b> <b>(100.00)</b>	<b>411</b> <b>(100.00)</b>	<b>181</b> <b>(100.00)</b>	<b>64</b> <b>(100.00)</b>	<b>151</b> <b>(100.00)</b>	<b>396</b> <b>(100.00)</b>

According to Reyes (2002), education is important in mitigating poverty. She found out that the proportion of poor families decreases as the educational attainment of household increases: three (3) out of every five (5) families whose head did not attend college are poor, two (2) out of every 100 families headed by a college graduate are poor (meaning there are more non poor for those who finished college), and that it is more difficult for those with no schooling to earn enough to become non-poor. In terms of refocusing policy and program design for poverty alleviation, this is a significant consideration.

**Employment and Mean Monthly Income.** Expectedly, fishing is the primary occupation of the households surveyed (92.47%) particularly among husbands and other adult members because they are situated in coastal communities and the target population of this study. The wives have a very low participation in the productive labor because they are considered mostly as “plain housekeepers” although they may be actually involved in some pre- and post-fishing related activities. The other major occupations observed but only among few households included in the study are farming, fish trading, and carpentry works. The meager income of the households, as shown later, can be attributed to the limited involvement of the wives in productive role other than doing reproductive tasks. This condition is one potential area to consider in developing alternative livelihood options in these communities.

This is important information especially when related to the educational level of female household members. From the previous topic in Table 3, the survey shows that female household members have higher attendance rate in college (5%) than male members (3%). This is significant when related to poverty alleviation programs especially if related to the low participation rate of females in productive labor. The female household members can be tapped and encouraged to do other economic activity to augment income especially that they have higher educational level in the community. This can be done through livelihood and skills trainings couple with credit assistance from financial sources.

Based on the estimated monthly household income reported by the respondents, the data show that the mode for all the three communities is between Php 1,001-2,000 (28.26%). But for

specific sites this is only true for Rizal (34.04%) and Sibutad (37.35%). The modal income for Dapitan is between Php 2,001-3,000 (24.00%) and followed by Php 4,001-5,000 (22.00%). It is only in Dapitan that 10% of the sampled households have mean monthly income from Php 5,001 and beyond. This suggests that the households in Dapitan included in the study are economically better off compared those in Rizal and Sibutad, in that order.

**Table 4 Estimated Monthly Household Income**

<b>Income Cohorts</b>	<b>Dapitan (%)</b>	<b>Rizal (%)</b>	<b>Sibutad (%)</b>	<b>Total (%)</b>
< 1,000	13 (13.00)	4 (8.51)	24 (28.92)	41 (17.83)
1,001- 2,000	18 (18.00)	16 (34.04)	31 (37.35)	65 (28.26)
2,001- 3,000	24 (24.00)	14 (29.79)	21 (25.3)	59 (25.65)
3,001- 4,000	13 (13.00)	7 (14.90)	3 (3.61)	23 (10.00)
4,001- 5,000	22 (22.00)	3 (6.38)	4 (4.82)	29 (12.61)
5,001 and above	10 (10.00)	3 (6.38)	-	13 (5.65)
<b>Total</b>	<b>100 (100.00)</b>	<b>47 (100.00)</b>	<b>83 (100.00)</b>	<b>230 (100.00)</b>

**Migration.** The migration data show that about only 15% or 34 of all the households of the respondents had migrated utmost at one time. Specifically, more households in Dapitan (17%) had migrated compared to those in Rizal and Sibutad (13% each). And almost 59% of the reported migration is from another barangay of the same town and less came from another region, town or another province. This suggests that spatial mobility is more localized and confined. Foremost of the reasons for migration is economic and this constitutes majority of the responses of households from Rizal and Sibutad. The reasons for the households in Dapitan are varied but a good number also include economic opportunities and to be with relatives. Poor peace and order condition as driver for transferring residence was reported only in Sibutad and Dapitan. Generally, the data show that the desires for better economic and educational opportunities are behind the migration of the surveyed households.

### **SETTLEMENT CHARACTERISTICS**

**Farm Ownership.** Expectedly, majority of the households (61.74%) do not own farm lands which can be explained by the fact that they are mostly in coastal areas and farming is not a major economic activity. Incidence of non-ownership is highest in Sibutad (69.84%) and followed by Dapitan (66.00%). Only 38% of the households surveyed in Rizal admitted not to own farmlands where about 45% owned but smaller farmlands that only measure between 0.1 to 1.0 hectare. In fact, small landholding (0.1-1.0 ha) can describe the land ownership status of the households in all the communities surveyed (29.13%). Land ownership beyond three hectares is rare. In Dapitan and Rizal, only two households reportedly owned farmlands from 3.1 to 4.0 hectares while only one in Sibutad owned more than four hectares.

**House Ownership.** Although not so many owned farmlands, majority of the said households (78.70%) really owned their houses by working or spending for them. Rizal has the highest percentage (85.11%) of households that owned their houses while a lesser percent is in Sibutad (73.49%). However in Sibutad 18% said they owned their houses by inheritance as compared those who personally spent money to acquire them. Inheritance constitutes 11% of the modes of house ownership while the other modes include free use (6.96%) and rented (1.74%).

**Table 5 Size of Farmland Owned**

Farm Size	Dapitan (%)	Rizal (%)	Sibutad (%)	Total (%)
None	66 (66.00)	18 (38.30)	58 (69.88)	142 (61.74)
0.1 – 1.0	29 (29.00)	21(44.68)	17 (20.48)	67 (29.13)
1.1 – 2.0	1(1.00)	2 (4.26)	4 (4.82)	7 (3.04)
2.1 – 3.0	2 (2.00)	-	3 (3.62)	5 (2.17)
3.1 – 4.0	1(1.00)	1 (2.13)	-	2 (0.87)
> 4.0	-	-	1 (1.20)	1 (0.44)
No answer	1 (1.00)	5 (10.64)	-	6 (2.61)
<b>Total</b>	<b>100 (100.00)</b>	<b>47 (100.00)</b>	<b>83 (100.00)</b>	<b>230 (100.00)</b>

**Table 6 Household Ownership of House**

Ownership of House	Dapitan (%)	Rizal (%)	Sibutad (%)	Total (%)
Own house	80 (80.00)	40 (85.11)	61 (73.49)	181 (78.70)
Inherited	6 (6.00)	5 (10.63)	15 (18.07)	26 (11.30)
Free use	10 (10.00)	1 (2.13)	5 (6.02)	16 (6.96)
Rented	2 (2.00)	1 (2.13)	1 (1.2)	4 (1.74)
Others	2 (2.00)	-	1 (1.2)	3 (1.30)
<b>Total</b>	<b>100 (100.00)</b>	<b>47 (100.00)</b>	<b>83 (100.00)</b>	<b>230 (100.00)</b>

**Roofing Materials.** The use of light materials like nipa or cogon for roofing of houses was reported by half of the households (50.43%) while the rest have galvanized iron sheets (30.87%), combination of galvanized iron sheets and nipa (17.83%) and other materials (0.87%). Houses with nipa or cogon roofing are dominantly observed in Sibutad (60.00%) while Rizal has a higher percent (38.30%) with galvanized iron sheets as compared to the other communities. Meanwhile, Dapitan excels among households with a combination of nipa and galvanized iron sheets (25.81%) which suggest the availability and affordability of both materials.

**Table 7 Types of Roofing Materials**

Roofing Materials	Dapitan (%)	Rizal (%)	Sibutad (%)	Total (%)
Nipa or cogon	45 (45.00)	21 (44.68)	50 (60.24)	116 (50.43)
Galvanized iron sheets	27 (27.00)	18 (38.30)	26 (31.33)	71 (30.87)
Nipa and galvanized iron	26 (26.00)	8 (17.02)	7 (8.43)	41(17.83)
Others	2 (2.00)	-	-	2 (0.87)
<b>Total</b>	<b>100 (100.00)</b>	<b>47 (100.00)</b>	<b>83 (100.00)</b>	<b>230 (100.00)</b>

**Fuel for Cooking.** The use of firewood is expectedly high (93.48%) because of the lower socioeconomic conditions and locations of these households as compared in peri-urban centers. The use of alternative fuel sources for cooking is minimal although present in some households particularly in Sibutad where sawdust (14.46%) for fuel was reported. In Rizal the use of sawdust (2.13%) and charcoal (2.13%) were also mentioned by a few households surveyed. Only in Dapitan that liquefied petroleum is used for cooking (1.00%) but this is very insignificant.

**Drinking Water.** Another parameter for determining the quality of health of a community is the source of the drinking water of its residents. Majority of all the households (55.65%) get their supply of drinking water from *tubod* or spring which raises the question of safety of this water source. Incidentally, the percent of households that reported this water source is highest in Dapitan (68.00%) and followed by Sibutad (62.86%). Nevertheless, there are households in Sibutad (18.57%) and Dapitan (16.00%) that get their drinking from communal faucet which is not the case in Sibutad where more households reported to use mineral water for drinking (48.94%). The other reported water sources for drinking included open well and communal or private deep well.

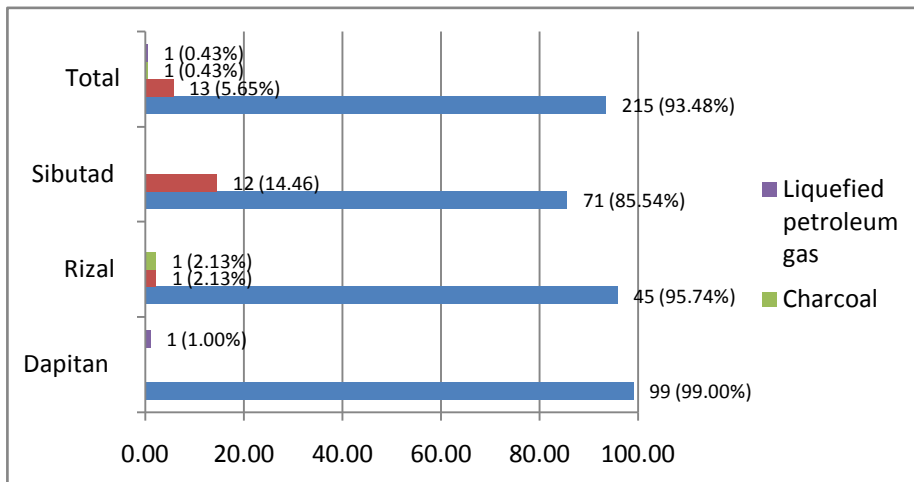


Figure 7 Fuel Used in Cooking at Home

Table 8 Sources of Drinking Water

Sources of Drinking Water	Dapitan (%)	Rizal (%)	Sibutad (%)	Total (%)
Spring	68 (68.00)	8 (17.02)	52 (62.65)	128 (55.65)
Communal faucet	17 (16.00)	-	15 (18.07)	32 (13.91)
Mineral water	7 (7.00)	23 (48.94)	-	30 (13.04)
Open well	7 (7.00)	15 (31.91)	6 (7.23)	28 (12.17)
Communal deep well	-	-	10 (12.05)	10 (4.35)
Artesian or deep well	-	1 (2.13)	-	1(0.44)
No answer	1 (1.00)	-	-	1(0.44)
<b>Total</b>	<b>100 (100.00)</b>	<b>47(100.00)</b>	<b>83 (100.00.00)</b>	<b>230 (100.00)</b>

**Vehicle Ownership.** About 87% of all the households surveyed do not own any vehicle for personal or household transportation which reflects the low socioeconomic status of the sampled households. Nonetheless, motorcycle is owned by 10% of those who reportedly had vehicles at the time of the study. Those that owned motorcycle is highest in Dapitan (15.00%) as compared in Rizal (10.64%) and Sibutad (3.61%). Even the ownership of bicycle is highest in Dapitan. Inversely, 96% of the households in Sibutad do not own any vehicle as compared in Rizal (87.23%) and Dapitan (79.00%).



**Lighting Facilities.** Electricity is accessible to the majority of the households (84.35%) and this is a major social service that has reached the rural communities not only in the research sites but also elsewhere in the country where electric cooperatives are operating. The use of improvised kerosene lamp (12.61%) seems to be minimal now but still popular in Rizal (27.66%).

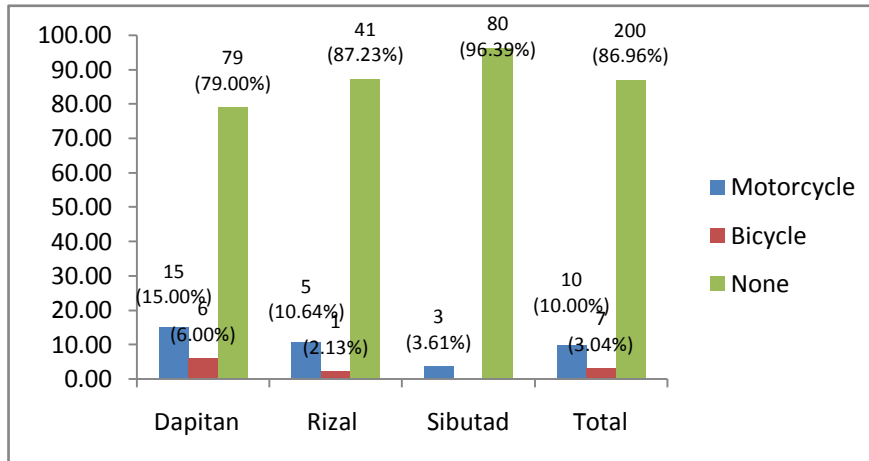


Figure 8 Vehicles Owned by Households

Table 9 Types of Lighting Facilities

Lighting Facilities	Dapitan (%)	Rizal (%)	Sibutad (%)	Total (%)
Electricity	89 (89.00)	32 (68.09)	73 (87.95)	194 (84.35)
Kerosene lamp	9 (9.00)	13 (27.66)	7 (8.43)	29 (12.61)
Petromax	-	1 (2.13)	3 (3.62)	4 (1.74)
No answer	2 (2.00)	1 (2.13)	-	3 (1.30)
<b>Total</b>	<b>100 (100.00)</b>	<b>47 (100.00)</b>	<b>83 (100.00)</b>	<b>230 (100.00)</b>

**Equipment and Appliances.** Twenty-three percent of all the households owned television sets as a source of entertainment, news and information and has taken over the radio which is reportedly owned by only about 16% which served the same purposes two decades ago. The dominance of television sets and radio sets is consistently true in other communities covered by the study. Almost 18 percent also owned cellphone which is a quick means, as compared in the past, for sending messages to relatives and friends within and outside the community. Other major electronic equipment and appliances owned are disc and digital music players and cassette recorders. Comparatively speaking, a good number of households in Dapitan and Sibutad owned electronic equipment and appliances than in Rizal. Fifty-seven percent of households in Rizal reportedly do not own any of the listed equipment and appliances.

Table 10 Electronic Equipment and Appliances Owned

Equipment and Appliances	Dapitan (%)	Rizal (%)	Sibutad (%)	Total (%)
Television	23 (23.00)	5 (10.64)	26 (31.00)	54 (23.48)

Celphone	18 (18.00)	3 (6.38)	20 (24.62)	41 (17.83)
Transistor radio	21 (21.00)	2 (4.26)	14 (16.92)	37 (16.09)
CD/DVD music player	15 (15.00)	3 (6.38)	8 (9.23)	26 (11.30)
Cassette recorder	16 (16.00)	3 (6.38)	5 (6.15)	24 (10.43)
CD/DVD video player	3 (3.00)	1 (2.13)	-	4 (1.74)
Cable television	-	1 (2.13)	2 (2.50)	3 (1.30)
Personal computer	1 (1.00)	1 (2.13)	-	2 (0.87)
Internet connection	1 (1.00)	-	1 (1.54)	2 (0.87)
Telephone	-	1 (2.13)	-	1 (0.44)
None	2 (2.00)	27 (57.45)	7 (8.43)	36 (15.65)
<b>Total</b>	<b>100 (100.00)</b>	<b>47 (100.00)</b>	<b>83 (100.00)</b>	<b>230 (100.00)</b>

## Discussion

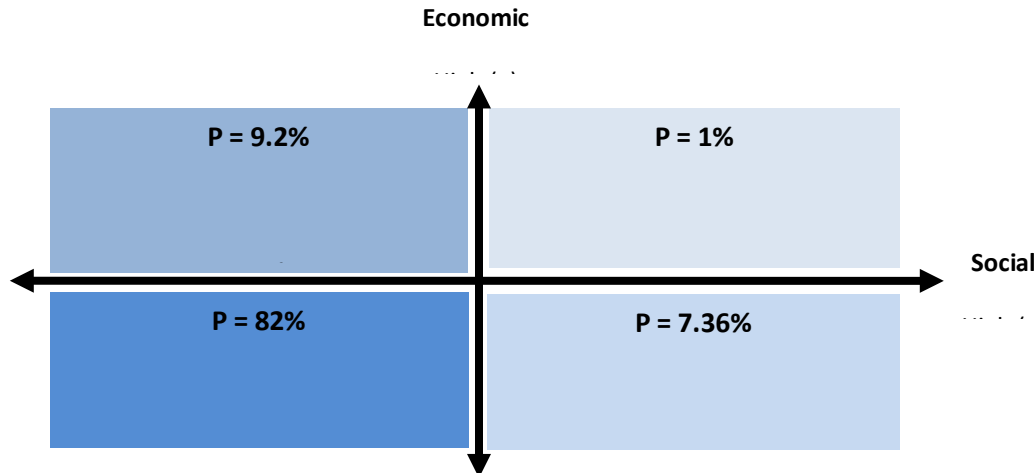
It has been an accepted fact that there is a relationship between demographic factors and poverty. Orbeta (2002) found that poverty incidence is always higher in households with larger family size than with smaller one. The issue that the poor prefer to have large families is borne by the argument that there is a higher benefit in having many children (the children add to family income and source of labor), and that they have lesser control over their fertility than non-poor (limited access to family planning services and lower use of contraceptives).

Perhaps the best way to show the relationship between poverty and family size is the study by Orbeta (2005) linking family size to poverty incidence, gap, and severity. He determined that as family size increases from one to nine, poverty incidence, gap and severity (2005). Poverty gap means the average proportionate difference between poverty line and the average income of the poor while severity means the square of this gap. Generally, all three municipalities have average family size of at least five (5). Based on Orbeta's calculation as of 2000, a family size of five has a poverty incidence of 31.1, a poverty gap of 8.9 and a poverty severity of 3.5. However, whatever poverty measure is used, poverty exacerbates as family household size shifts from smaller to bigger (Orbeta, 2005).

Moreover, the greater proportion of the younger population bracket in the three coastal municipalities means a significant opportunity for poverty alleviation. There is a greater chance for younger family members to shift and start other profession to improve their economic status. This can be accomplished through continuing education, skills training, and economic migration (usually as urban migrants or OFWs). The limiting factor to achieve this is related to the large household size of fisherfolks. Orbeta (2005) asserts that large family size perpetuates poverty through its negative impact on household savings, earnings of parents, as well as on the human capital investment in children. This means that families of fisherfolks have difficulty in supporting the educational needs of their family members. To deal with this, the government as well as NGOs should focus poverty alleviation policies and programs on the younger sector through assistance in technical training and continuing tertiary education. In this manner, the "intergenerational effect" of poverty espoused by Lloyd (1994) will hopefully be severed.

## *Scenario Building*

We are interested in building forecast scenarios for: (a) the number of small-scale fishers, and (b) the incidence of poverty in the fishing communities in the three (3) coastal towns of the First District of Zamboanga del Norte. We make use of two (2) context variables, namely (a) economic (income) indicators and (b) social (education) indicator.



**Figure 1 Forecast Scenarios Based on Income-Education Contexts of Small-**

**Posteriori Probability Estimates.** The probability that the scenarios will happen are denoted by  $P(+,+)$ ,  $P(-,+)$ ,  $P(-,-)$ , and  $P(+,-)$  respectively. Thus, based on the baseline data:

$$\begin{aligned}
 P(+,+) &= P(\text{high education, high income}) \\
 &= P(\text{college level, income} \geq 5000) \\
 &= \frac{68}{807} \times 0.10 \text{ (based on Dapitan Income)} \\
 &= 0.084 \times 0.10 \\
 &= 0.0084 \approx 1\%
 \end{aligned}$$

$$\begin{aligned}
 P(-,+) &= P(\text{low education, high income}) \\
 &= 0.916 \times 0.10 \\
 &= 0.92 \approx 9.2\%
 \end{aligned}$$

$$\begin{aligned}
 P(-,-) &= P(\text{low education, low income}) \\
 &= 0.916 \times 0.9 \\
 &= 82.44\%
 \end{aligned}$$

$$\begin{aligned}
 P(+,-) &= P(\text{high education, low income}) \\
 &= 1 - 0.1 - 0.092 - 0.8244 \\
 &= 7.36\%
 \end{aligned}$$

On account of these probability estimates two scenarios appear to be most likely:

**Scenario 1: Low Education – Low Income Scenario.** With more than 80% chance of happening based on the observed data, this scenario implies that the relative number of small-scale fisher in the coastal towns of Zamboanga del Norte will either remain the same or will likely increase with the latter being more probable. Subsistence fishing will be the way of life since fishermen, with low education will be unable to shift to other better-paying jobs. The “intergenerational effect” of poverty will be so pronounced since the social circle of the younger generations will almost certainly be limited among the small-scale fishers’ community. Relatively large family sizes (4 to 5 children) coupled with the information that most of the household members are young (19 years old below) but poorly educated (85% are either in high school or in the elementary grades) provide the conditions for perpetuating the cycle of poverty among growing members of small-scale fishers (Orbeta (2005)).

**Scenario 2: High-low Combination of the Social and Economic Conditions Scenario.** These scenarios, high education- low income and low education-high income events, will occur with an estimated combined probability of 16.56% (7.36% + 9.2%). In the unlikely event that these scenarios will indeed happen, the estimated number of small-scale fishers will most likely decrease. In particular, if the “high education-low income scenario” prevails then the household members of the fishers will seek for greener pastures since they will now be equipped with skills and knowledge necessary to shift to other lucrative jobs. The motivation to find better-paying jobs will be stronger and because this new generation of fishers are better educated, they will most likely succeed.

Likewise, with this scenario, the “low education-high income” event will trigger an exodus away from small-scale fishing. This event, for instance, can happen if the small-scale fishers begin to engage in alternative livelihood viz. business or eco-tourism services which will certainly generate more income for the families compared with fishing

## **CONCLUSION**

A scenario where the small-scale fishers will continue to subsist on meager income and remain poorly educated is most likely for the fishers in the coastal towns of the First District of Zamboanga del Norte. This scenario leads to, among others, an increase in the number of small-scale fishers and a rise in the incidence of poverty in these communities within the next ten years (2020). These consequences, in turn, imply pressure on the already depleted marine resources in the province. However this most likely scenario can be forestalled through an intervention on the context variables: social and economic. Providing the relatively young fishers’ population with higher and technical education through sponsored scholarships (with grants to sustain their education) and redirecting the small-scale fisher towards ecotourism services will, in combination, significantly alleviate poverty in these communities in the next decade.

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