POVERTY MEASUREMENT: AN APPLICATION FOR SMALL-SCALE FISHERIES IN BICH DAM ISLAND, VIETNAM

VO VAN DIEN

Master Thesis in Fisheries and Aquaculture
Management and Economics
(30 ECTS)

The Norwegian College of Fishery Science
University of Tromso, Norway
&
Nha Trang University, Vietnam

May 2009

Acknowledgement

I am grateful to Professor Ola Flaaten (The Norwegian College of Fishery Science, University of Tromso, Norway) and Associate Professor Nguyen Thi Kim Anh (Nha Trang University, Vietnam) for specific guidance during the research as well as comments in writing the thesis.

I would like to give my thanks to the colleagues in Economics Faculty: MSc Tran Cong Tai (Fisheries Economics Dept.), Dr Nguyen Van Ngoc (Fisheries Economics Dept.), Le Kim Long (PhD student in Tromso University), MSc Pham Thanh Thai (Basic Economics Dept.) for the valuable advice and kind attention. Thanks to Diep Thi My Hao (Master student in US) for English comments in the thesis. Encouragements from colleagues, friends and family all are also gratefully acknowledged.

I dedicate my sincere thanks to NOMA program that has given me such an opportunity to participate in FAME courses. For classmates, thank you all for the great sharing, pleasures and memorable time.

Once more, I would like to express my deep gratitude to you all.

Nha Trang, May 15th 2009

Vo Van Dien

TABLE OF CONTENTS

List of tables

List of figures

Abstract

Small-scale fisheries are one of the key sectors in Vietnam economy. This has been explained by its noticeable contribution to GDP, sizable share in the total export value in addition to the significant role in employment generation and food security. Contrary to the promising signs of sectorial performance, most of fishermen are considered the poorest of the poor and poverty is dominantly characteristic in small-scale fisheries. Poverty alleviation has emerged as an urgent requirement to sustain fishing communities. Characteristics and causes of poverty in small-scale fisheries should be therefore carefully investigated before any policy decisions are made. The thesis presents findings based on primary data collected through from 60 samples of households in Bich Dam Island in Nha Trang Bay, Vietnam. The empirical results show that 18% of fishermen households are living below the poverty line which is still above the provincial average. Living conditions of islanders' communities are far below the minimal threshold in the critical shortage of electricity; clean water supply and basic amenities. Regression outcomes in poverty, represented by consumption per capita, analysis indicate that the size and structure of fishing households have considerable effects on poverty. Fishing boat owners have higher expenditures per head as compared with others. Introducing alternative jobs should be implicated in poverty alleviation policy in the island.

Key words: **Poverty measurement, Small-scale fisheries, Fishing communities, Poverty indices, Bich Dam Island**

Chapter 1
INTRODUCTION

1.1. Small-scale fisheries in Vietnam.

Vietnam has a coastline of 3,260 km in length and more than 1 million square kilometers of the Exclusive Economic Zone (EEZ) spreading over 28 coastal provinces. Climate conditions and fishing ground features vary sharply across the regions. The total marine water resources under national jurisdiction can be divided into 4 areas: the Gulf of Tonkin; the central region; the southeast region and the southwest region (Figure 1.1) (Son, et al, 2003). In general, the northern and southern coastal areas are wide and shallow; the central is narrow with a steep slope (Son, et al, 2003).

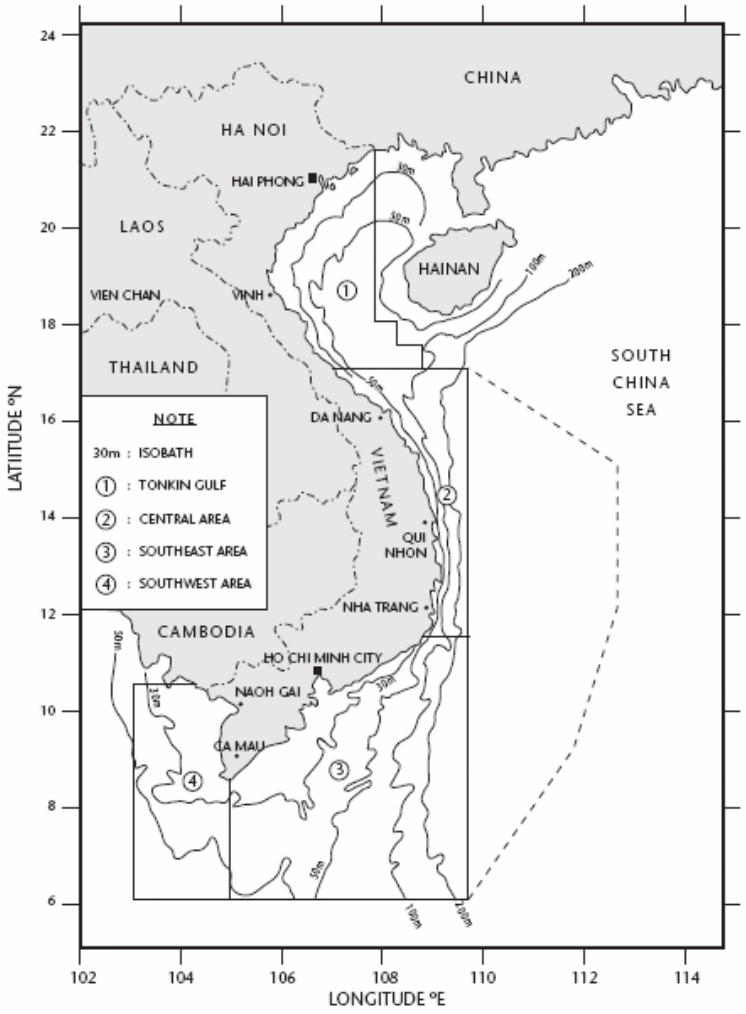


Figure 1.1 The Excusive Economic Zone of Vietnam

(Source: Son, et al, 2003)

The fisheries industry is one of the key sectors of Vietnam economy with its contribution to GDP about 4% in 2006 (Pomeroy, et al, 2009). Its significance can be highlightes through several dimensions, namely generating 9-10% export revenue of the total, creating jobs (about 4 millions employments, equivalent to 10% of the labor force) (Long, et al, 2008) and providing food security for local residents (FICen, 2006).

Table 1.1 Types of fishing gears in Vietnam

Fishing gears	**%**
Gill nets (drift gillnet, mackerel gillnets, shrimp gillnet and trammel net)	31.4
Trawls (otter board trawl, pair trawl and beam trawl)	26.0
Long line and hand line	13.4
Set nets	7.1
Lift nets	5.6
Seine nets (beach seine, purse seine)	4.3
Others	12.2

(Source: Son, et al, 2003)

Most of Vietnam fisheries are considered small-scale, operating along near-shore fishing grounds, using artisanal fishing tools (Table 1.1) and low engine capacity vessels (Table 1.2) (Long, N. 2003). However, coastal fisheries were responsible for 88% of the total marine fish catch and effectively absorbed 82% of fishing labors (Long, et al, 2008). Fisheries are considered small-scale as engine power is less than 90 HP and fishing grounds concentrate on coastal areas with less than 30 meters in depth in the southern and northern areas and 50 meters in the central areas.

Small-scale fishing activities thus have put strong pressures on coastal resources. Fishing pressures are increasing in severity due to the annual additions of small fishing boats (Pomeroy et al, 2009). Small mesh-sized nets, harmful fishing gears and destructive fishing techniques are the main factors that resulted in the over-fishing in the small-scale fisheries and the over-exploitation of near-shore resources. The over exploitation can then lead to decreased earnings from fisheries (Long, N., 2003).

Table 1.2 Number of fishing boats by horsepower capacity in Vietnam, in 1997

	Number of fishing boats			
	North	**Central**	**South**	**Total**
Total motorized fishing boats	20409	26675	23971	71055
Average capacity (HP/boat)	**16.4**	**16.0**	**47.7**	**26.8**
<45 HP	19161	24651	16988	60800
46-84 HP	198	1839	3922	5959
85-150 HP	57	186	1459	1701
151-200 HP	21	0	416	437
>200 HP	19	0	949	968

(Source: Long, N., 2003)

The fish market system is organized with multi-classes. High value species are mostly preferred to export. Fish are sold to middlemen and/or wholesalers at ports, and then re-sold to processing factories. Meanwhile fishermen sell lower value products to local markets for domestic consumption. In a typical supply chain, women play an important role. Many fishers do not want to sell their products to middlemen since they can benefit more from selling fish directly to processing factories at higher price. However, fishers have no other options given the fact that they had borrowed money from middlemen. In real terms, fishermen have to maintain good relationships with middlemen in return for credits to cover logistic services and provisions such as fuels, baits, ice and so on. It is especially the case during off seasons. For these reasons, middlemen constitute the stakeholders who are an actively engaged in the loop. In the small-scale fisheries, meager income from fish is expensed for daily costs. Fishing activities take place on the daily basis except days of bad weather. Fishermen thus have little chance to save for the future. In the off seasons, fishermen have no alternative sources of income. They have to seek loans from middlemen for daily essential demand. Low education, coupled with limited capital investment, is the main reason why small scale fishermen can not afford to buy bigger boats for offshore fishing.

To reduce fishing pressures on near-shore areas and improve the living standard for fishing communities, Vietnam Government has adopted a support program to develop

offshore fisheries. However, the program objectives were not attained because of several factors including the absence of a reliable database on offshore resources, unsuitable fishing technologies and insufficient understandings of economic realities of offshore fisheries (Long, et al, 2008). Sustainable development and poverty alleviation seem not to be in sync with objectives in small-scale fisheries.

1.2. Fisheries in Bich Dam.

Bich Dam is one of the closest islands in the Nha Trang Marine Protect Area (MPA) (Figure 1.2). The majority of Bich Dam population depend their livelihoods on fisheries. About one third of households have lobster farms in aquaculture and a half of households own fishing boats. Fishing activities are virtually small-scale on the daily basis. Fishing boats have low capacity in terms of hull length, engine power and capital investment.

Fishing is one the most important activities of coastal communities in Khanh Hoa as well as on Bich Dam Island. While the inshore fishery stock has been clearly overexploited, the offshore fish stock is believed to be under exploited (Long, et al, 2008). In addition, it is observed that the fish stock in the proximity of the Nha Trang Bay Marine Protect Area (MPA) is more abundant than that further away. Consequently, some of fishermen on islands around the MPA as Hon Mot, Vung Ngan, Bich Dam and Dam Bay try to fish in the protect area.

Fisheries in the Bich Dam Island are typical smaller in scale than the standard of provincial longline fishery, which can be measured in several criteria. In Bich Dam, the hull length of boat (9.3m at mean), power of engine (15HP at mean) and crew on boat (3.2 people on average) are small as compared to 15.1m, 121.9HP and 9.2 people, respectively, in Khanh Hoa longline fishery (Long, et al, 2008). In the research on economic performance of offshore fishery, with special focus on Khanh Hoa longline fishery, Long, Flaaten, Kim Anh (2008) also concluded that boats with engine capacity from 90 to 140 HP have higher gross cash flow and net profits. Crew members on offshore vessels can earn higher opportunity income (Long, et al, 2008). Offshore fisheries may therefore be well-off than small-scale fisheries.

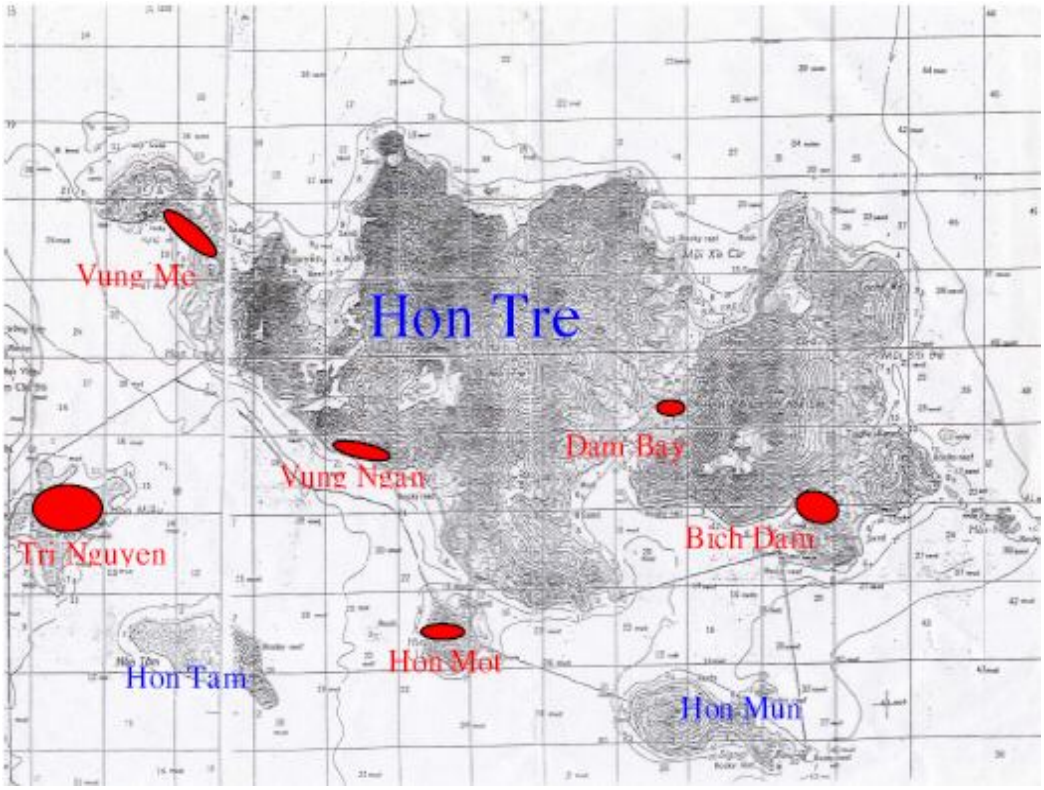


Figure 1.2 Nha Trang Marine Protect Area

(Source: Hai Yen, et al, 2002)

Aquaculture has become part of the local fisheries. However, only a small portion of households have lobster farms, which are considered small in scale. This economic activity has been inefficient in recent years. Most lobster cages were operated at a loss in 2008 because of disease outbreaks.

1.3. Research objective.

Poverty in the rural area has been investigated in several works. However, there is almost a complete absence of references to fisheries case studies in the current literature on poverty (Béné, 2003). The question remains whether there are any differences in fishery sector. In some instance, poverty has become a characteristic rather than an exception in small-scale fishing households and communities. There is no final conclusion whether poverty is more a problem to isolated communities than inland fishing communities or not.

Poverty alleviation policies, especially those targeting fishing communities, are among the most important priorities of governments' worldwide, included Vietnam. The number of employments in fisheries increases from 3.12 million (1996) to 3.8 million (2001) at the rate of 2.4% per year (FICen, 2006). Fisheries have become a major source of livelihoods and contributing to the poverty elimination (FICen, 2006). It may be the best when increased the living standard for fishing communities go hand in hand with resource protection along coastal fisheries. Unfortunately, without a holistic approach, poverty alleviation and sustainable development in small-scale fisheries are practically in conflict. While small-scale fisheries are considered as the safety-valve for the poor, coastal fishery resources are more exhausted as fishing efforts increase. To reach both ends, policy makers need to base relevant decisions on a good understanding of the characteristics of small-scale fisheries. These should be a firm grasp on the main factors leading to poverty, which are region specific.

Poverty alleviation programs are also urgent requirements for island fishing communities. Bich Dam is the second most populated island in the Nha Trang Bay MPA with 170 (2002) and 182 (2005) households (Thu, et al, 2005). The island is a isolated area in critical shortage of electricity public supply and clean-water. The livelihoods of fishing communities are primarily dependent on daily catch within near shore areas, using gill-net, lift-net, hand-line, set-net and night purse-seine. Because of the seasonal effects, fishing activities just take place over 9 months on average during the year. Most of them live in dilapidated houses without any valuable interiors. Women have no jobs while in many cases, their sons discontinue their education upon completion of the primary level, becoming income generators for their family. If children want to pursue a more advanced education, they have to leave family and pay for accommodations. This is a costly expense for the family.

It is very necessary to conduct a research on poverty that investigates the living conditions of the fishing community in Bich Dam Island. The research may contribute as a case study of poverty measures in small-scale fisheries. The other implication is to incorporate research a finding into local poverty alleviation polices.

The thesis will address three main objectives. The first is to present characteristics of small-scale fisheries as well as the living conditions of fishing households in Bich Dam Island. Some socio-economic indicators are presented as an overview picture. The second

is to measure the poverty situation. Poverty indices as head-count index, poverty gap and poverty severity are calculated based on 60 sample households, which is about 30% of the population in the island. The third objective is to investigate the impact of some important factors related to household and individual characteristics to poverty condition of island community, specific in consumption per capita of households.

1.4. Research question.

General questions arise are how the small-scale fishing households are living in the island and whether they are actually the poor? The fundamental questions to be answered in the research are therefore what constitute the main factors that lead to poverty of fishing households in the area? And to what extent each factor is responsible for?

Chapter 2
THEORETICAL FRAMEWORK

2.1. Poverty in perspectives.

It is difficult to come up with a commonly agreed poverty definition because poverty is a multi-dimensional approach (WB, 2005). Different criteria have been used to define poverty. In general, there are three main dimensions on poverty approach – economic well-being, capability and social exclusion (Wagle, 2002).

Many researchers have defined "being poor" as that portion of the population that is unable to meet basic nutritional needs (Ojha, 1970 or Reutlinger and Selowsky, 1976 in Blackwood, et al, 1994). Others view of poverty as a function of education and/or health, including variables such as life expectancy or child mortality (Singer, 1975 in Blackwood, et al, 1994). Levels of expenditures are yet other criteria used to identify the poor (Musgrove and Ferber, 1976 in Blackwood, et al, 1994). Some researchers, poverty are defined in very broad terms, such as being unable to meet "basic needs". Basic needs refer to the physical (food, health care, education, shelter, etc.) and nonphysical (participation, identity) requirements of a "meaningful life" (Streenten, 1979 in Blackwood, et al, 1994).

Relative poverty is another economic metric expressed in income and consumption terms. A commonly used measure is the average income of specific percentage of the population at the lowest end of the income spectrum (Blackwood, et al, 1994).

Hence, a society may have no absolute poverty but still have relative poverty.

2.2. Poverty measures.

Three ingredients are necessary to determine in computing a poverty measure: first, indicator of well-being and a relevant dimension have to be chosen. Second, a poverty line has to be selected, that is, a threshold below which a given household or individual will be classified as poor. Finally, one must decide whether to apply the metric to the population as a whole or only to a population subgroup (Coudouel, et al, 2002).

2.2.1. Indicator of poverty.

Monetary measures, income and/or consumption are commonly used indicators of well-being when calculating poverty indices (Coudouel, et al, 2002). Consumption information can be easier obtained from a household survey and will be better indicator than income in poverty measurement (WB, 2005, Coudouel, et al, 2002) for following reasons:

First, consumption is a better outcome indicator than income (Coudouel, et al, 2002). Actual consumption is more closely related to a person's well-being, that is, of having enough to meet current basic needs. On the other hand, income is only one of the elements that will allow consumption of goods' others include questions of access and availability.

Second, consumption may be better measured than income (Coudouel, et al, 2002). In poor agrarian economies, incomes for rural households may fluctuate during the year due to the harvest season. This implies a potential difficulty for households in correctly recalling their income, in which case the information on income derived from the survey may be of low quality.

Third, consumption may better reflect a household's actual standard of living and ability to meet basic needs (Coudouel, et al, 2002). Consumption expenditures reflect not only the goods and services that a household can command based on its current income, but also whether that household can access credit markets or household savings at times when current income is low, perhaps because of seasonal variation, harvest failure, or other circumstances that cause income to fluctuate widely.

In addition, fishing activity incomes may fluctuate either annually or even on a daily basis whereas consumption remains relatively stable. In other words, consumption is more stable indicator than income in poverty analysis. The fluctuation of income and consumption can be captured graphically (Figure 2.1) (WB, 2005).

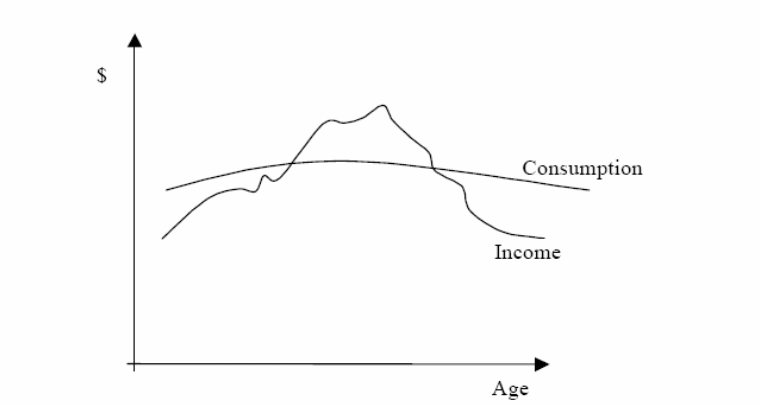


Figure 2.1 Income and consumption fluctuation

(Source: WB, 2005)

2.2.2. Poverty line.

Poverty lines are arbitrary cutoff points separating the poor from the non-poor (Coudouel, et al, 2002). There are two main ways of setting poverty lines – relative and absolute. Absolute poverty lines are often based on estimates of the cost of basic food needs in monetary measures (Coudouel, et al, 2002). Relative poverty line could be set at percentage of the country's mean income or consumption (Coudouel, et al, 2002).

Absolute poverty line may be static, changing over time as well as differ from region to region. Thus, a discrete poverty line has not much meaning in the measurement of relative poverty.

2.2.3. ***Poverty measures.***

Absolute poverty measures consider exclusively the well-being of those who are defined as poor. Three commonly used absolute metrics are: (i) the headcount: measuring the number of poor people; (ii) the poverty gap measuring the amount incomes needed to raise the poor out of poverty; (iii) the distribution of income among the poor.

(i) The HeadCount (H)

This index measures the number (or percentage) of the population that falls below the poverty line whose cannot afford to buy a basic basket of goods.

$$H = \frac{q}{n}$$

Where, n: total number of people in the population, and

q: number of people below the poverty line

The head count ratio is a very crude index implied to count the poor and calculate the percentage of this category in the total population (Sen, 1976). The index could be very useful in the case of measuring the effectiveness of poverty alleviation policies over time such as the decrease in percentage and/or number of the poor (Blackwood, et al, 1994). However, the headcount may not capture the difference in income distribution and the extent of immoderation of the poor (Sen, 1976).

(ii) The Poverty Gap

If we consider $\bar{y}$ as the average income of the poor and z as the poverty line, then $I = z - \bar{y}$, as the average income shortfall, which measures the amount of money needed to raise the income of the poor up to the poverty line. The main limitation of poverty gap index is that it fails to reflect the number of poor people in total (Blackwood, et al, 1994).

(iii) The Poverty Severity (squared Poverty Gap)

This index measures both distance separating the poor from the poverty line along with the inequality among the poor (Coudouel, et al, 2002). Therefore, higher weight is placed on those households further away from the poverty line.

Foster, Greer and Thorbecke (1984) devised a formula (FGT) to measure the poverty that includes changes in the number of poor, changes in the income shortfall and sensitivity of poverty as:

$$P_\alpha(y,z) = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{g_i}{z}\right)^\alpha \quad or \quad P_\alpha(y,z) = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z-y_i}{z}\right)^\alpha$$

Where:

$\alpha \geq 0$

n: total number of households in a community

q: number of households below the poverty line

g_i: poverty gap of the *i*th household

y_i: income of the *i*th poor household

z: poverty line

When $\alpha = 0$, P_0 is the headcount ratio $P_0 = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{g_i}{z}\right)^0 = \frac{q}{n} = H$

When $\alpha = 1$, P_1 is the income-gap measure $P_1 = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z - y_i}{z}\right)$

When $\alpha = 2$, P_2 is the squared poverty gap index or poverty severity index

$$P_2 = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z - y_i}{z}\right)^2$$

The parameter α can be viewed as a measure of poverty aversion (Foster, et al, 1984)

2.3. Causes of poverty.[1]

World Bank (2005) has summarized that poverty may be due to national, sector-specific, community, household or individual characteristics.

Regional level characteristics

At the regional level, generally, poverty is high in areas characterized by geographical isolation, a low resource base and other inhospitable climatic conditions. Other important regional and national characteristics that affect poverty include good governance, sound environmental policy, as well as economic, political and market stability (WB, 2005).

Community level characteristics

Infrastructure is a major determinant of poverty at the community-level characteristics (WB, 2005). Indicators of infrastructure development include proximity to paved roads, access to electricity, proximity to large markets, availability of schools and medical clinics in the area, and distance to local administrative centers. Other indicators of community level characteristics include average human resource development, access to employment, social mobility (WB, 2005).

Household and individual level characteristics

Education, age structure of household members, education, gender of the household head, and extent of labor force participation in the labor force are some of the important characteristics in this category. These characteristics can be organized into subgroups as demographic, economic and social characteristics (WB, 2005).

[1] This section is based primarily on Poverty manual, World Bank (2005)

Demographic characteristics

Indicators of household size and structure are important in that they show a possible correlation between the level of poverty and household composition. Household composition, in terms of the size of the household and characteristics of its members (such as age), is often quite different for poor and non-poor households. That also includes the dependence ratio and gender of household head (WB, 2005).

Economic characteristics

Apart from income or consumption – which is typically used to define whether a household is poor – these are a number of other economic characteristics that related to poverty, most notably household employment and the property and other assets owned by the household (WB, 2005).

There are several indicators for determining household employment. Within this array of indicators, economists focus on whether individuals are employed; how many hours they work; whether they hold multiple jobs; and how often they change employment (WB, 2005).

The property of a household includes its tangible goods (land, cultivated areas, livestock, agricultural equipment, machinery, buildings, household appliances and other durable goods) and its financial assets (liquid assets, savings and other financial assets). These indicators are of interest as they represent the household's inventory of wealth and therefore affect its income flow (WB, 2005).

Social characteristics

Aside from the demographic and economic indicators, several social indicators are correlated with poverty and household living standard. The most widely used are measures of health, education and shelter.

Table 2.1 Main determinants of poverty

Regional characteristics	Isolation/remoteness, including less infrastructure and poorer access to markets and services Resource base, including land availability and quality Weather (e.g. are typhoons or droughts common) and environmental conditions (e.g. frequency of earthquakes) Regional governance and management Inequality
Community characteristics	Infrastructure (e.g. is there piped water, access to a tarred road) Land distribution Access to public goods and services (e.g. proximity of schools, clinics) Social structure and social capital
Household characteristics	Size of household Dependency ratio (i.e. unemployed old and young relative to working age adults) Gender of head; or of household adults on average Assets (typically including land, tools and other means of production, housing, jewelry) Employment and income structure (i.e. proportion of adults employed, type of work – wage labor or self employment; remittance inflows) Health and education of household members on average
Individual characteristics	Age Education Employment status Health status Ethnicity

Source: World Bank, 2005

2.4. Poverty in fisheries.

Poverty in fisheries is mainly related to the natural factors - fishing resource and its associated exploitation level, e.g., the lack of resources or their overexploitation due to population growth leads to poverty and famine (Béné, 2003). Cause(s) and origin(s) of poverty in small-scale fisheries are very necessary to investigate for fisheries management and livelihood enhances especially small-scale industry.

Béné (2003) had showed the first interpretation of the relationship between fisheries and poverty is that "they are poor because they are fishermen". Fishermen are considered as the poorest of the poor caused by the endogenous and exogenous origin of poverty in fishery (Béné, 2003). According to the endogenous causes, poverty is related to the low level of the natural resources (Copes, 1989) and common property nature condition (Gordon, 1954) in small-scale fisheries. More and more people can joint to the fishing sector in open-access of the fisheries, which leads to the economic overexploitation of the resources. As a results, the economic rent will be dissipated and the income of fishermen will be low (Gordon, 1954).

Regarding the exogenous origin, the issue of poverty in the fishery has based on the economic concept of low opportunity income (Béné, 2003). Small-scale fisheries are usually located in remote areas with very few alternative job opportunities. In other words, the alternative incomes are usually low outside the fisheries sector that keeps fishermen's incomes at low level.

> *"Fishermen's income mainly reflects the low opportunity costs that characterize small-scale developing countries fisheries"* (Cunningham, 1993).

Béné (2003) concluded that small-scale fishery generates low income (assumed to be equivalent to poverty) for fishermen, whatever trying to do, fishermen will remains the poor.

Béné (2003) had also indicated that open-access nature in fisheries offers poorest people a livelihood through fishing activities is the second interpretation about interaction fishery and poverty. Small-scale fisheries are considered as the last safety valve for the poor that permits people to enter the fisheries even they have no any skill or asset.

> *"The open-access nature of fishery resources and the ease with which people can enter a fishery with limited experience or capital investment, means that there are few obstacle so seeking a livelihood at sea"* (Bailey, et al, 1990).

The perception of small-scale fisheries as the last resort for the poor, the relation between fisheries and poverty is that "they are fishermen because they are poor" (Béné, 2003).

Béné (2003) had also an excellent synthesize picture to show the relationship between small-scale fisheries and poverty as figure.

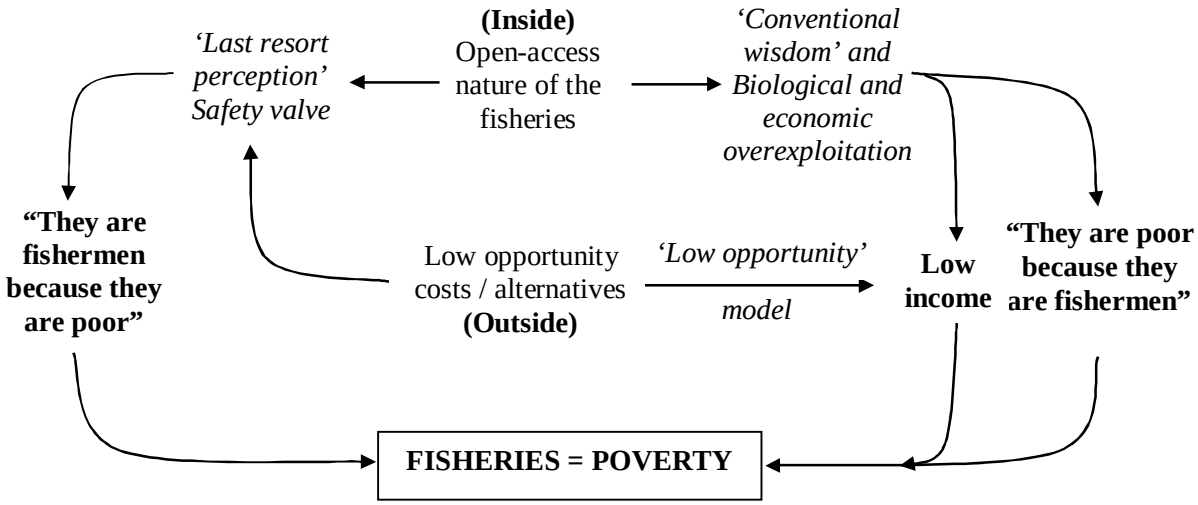


Figure 2.2 The two pillars – "they are fishermen because they are poor" and "they are poor because they are fishermen" – "fisheries = poverty'

(Source: Béné, 2003)

2.5. Log-Linear model.[2]

Econometric models that employ natural logarithms are very common. Logarithms transformations are often used for variables that are monetary values, such as wages, salaries, income, prices, sales, and expenditures and in general for variables that measure the "size" of something (Hill, et al, 2007). These variables have the characteristics that they are positive and often have distributions that are positively skewed, with a long tail to the right.

The log-linear model, $\ln(y) = \beta_1 + \beta_2 X$, has a logarithmic term on the left-hand side of the equation and an untransformed (linear) variable on the right-hand side. In the model, only dependent variable is transformed by the logarithm. The dependent variable must be greater than zero.

Both its slope and elasticity change at each point and are the same sign as β_2. Using the antilogarithm we see that $\exp[\ln(y)] = y = \exp(\beta_1 + \beta_2 X)$, so that the log-linear function

[2] This section is based primarily on Principles of Econometric, Third Edition, Wiley, 2007

is an exponential function. The function requires y > 0. The slope at any point is $\beta_2 y$, which for $\beta_2 > 0$ means that the marginal effect increase for larger values of y. An economist might say that this function is increasing at an increasing rate.

An interpretation can be obtained by using the properties of logarithms. A feature of logarithms helps greatly in their economic interpretation.

Let y_1 be a positive value of y, and let y_0 be a value of y that is "close" to y_1. The value of $\ln(y_1)$ can be approximated as:

$$\ln(y_1) \cong \ln(y_0) + \frac{1}{y_0}(y_1 - y_0)$$

Subtract $\ln(y_0)$ from both sides to obtain:

$$\ln(y_1) - \ln(y_0) = \Delta \ln(y) \cong \frac{1}{y_0}(y_1 - y_0) = \frac{\Delta y}{y_0} = \textit{relative change in } y$$

The symbol $\Delta \ln(y)$ represents the "difference' between two logarithms. Multiply both sides to 100 to obtain percentage change in y:

$$100\Delta \ln(y) = 100[\ln(y_1) - \ln(y_0)] \cong 100 \times \frac{\Delta y}{y_0} = \%\Delta y = \textit{percentage change in } y$$

With respect to the log-linear model, let us look at an increase in x from x_0 to x_1. The change in the log-linear model is from $\ln(y_0) = \beta_1 + \beta_2 x_0$ to $\ln(y_1) = \beta_1 + \beta_2 x_1$. Then subtracting the first equation from the second gives $\ln(y_1) - \ln(y_0) = \beta_2(x_1 - x_0) = \beta_2 \Delta x$. Multiply by 100 to obtain:

$$100[\ln(y_1) - \ln(y_0)] \cong \%\Delta y = 100\beta_2(x_1 - x_0) = 100\beta_2 \times \Delta x$$

Hence, in the log-linear model $\ln(y) = \beta_1 + \beta_2 X$, a one-unit increase in X leads, approximately, to a $100\ \beta_2$% change in y.

Chapter 3
METHODOLOGY

3.1. Poverty measurement.

Indicator of poverty

In the thesis, monthly consumption per capita (CPC) is as indicator of poverty measurement. Consumption per capita is calculated as divided total expenditure by the number of person in family. A higher consumption per head indicates that the household is well off than others in the population.

$$CPC = \frac{Total\ consumption\ of\ the\ household\ in\ month}{Number\ of\ people\ in\ the\ household}$$

Poverty lines

In the thesis, poverty line is set follow Vietnam national standard in 2006-2010 periods. Particularly, households are considered poor when income per capita is smaller 200,000 VND[3] per month in the rural area and 260,000 VND in the urban area. In 2008, the poverty line has been adjusted toward to consumer price index (CPI) change. The CPI increased 6.5% (2006) 12.63% (2007) and 27.5% (2008)[4].

Bich Dam Island is considered rural region. In the thesis, there are two poverty lines which are set at z_1=200,000 VND and z_2 = 200,000*(1+6.5%)*(1+12.63%)*(1+27.5%) ≈ 300,000 VND to calculate poverty indices as well as estimate CPI change to poverty indices.

Poverty measures

FGT formula is applied to calculate poverty indices which include headcount index (α=0), poverty gap index (α=1) and poverty severity index (α=2).

$$P_\alpha(CPC\ , z) = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z - CPC_{\ i}}{z}\right)^\alpha$$

Where, n = 60, z_1 = 200,000 VND, z_2 = 300,000 VND

[3] Viet Nam Dong, currency unit of Vietnam, $US 1 = 16,973 VND, http://www.customs.gov.vn/Lists/TyGia/TraCuu.aspx (01/09/2008)
[4] http://www.saga.vn

3.2. Econometric model.

Multiple regression model attempts to explain the level of expenditure (or income) per capita – the dependent variable – as a function of variety of variables (the "independent" or "explanatory" variables) (WB, 2005).

World Bank (2005) also has suggested that a semi-logarithm model should be applied to poverty analysis. A typical multiple regression equation would look like:

$$Ln(C) = \beta_0 + \beta_i X_i$$

where C: consumption per capita in the household

β_0 , β_i : estimated coefficients

X_i: independent variables – "explanatory" variables

A regression estimate shows how closely each independent variable is related to the dependent variable, (e.g. consumption per capita - CPC), holding all other influences constant. In the typical log-linear model, $Ln(C) = \beta_1 + \beta_2 X$, one unit increase in independent variable (X) lead to appropriately $100\beta_2$% change in C.

$$C = e^{(\beta_1 + \beta_2 X)}$$

$$\frac{\partial C}{\partial X} = \left[e^{(\beta_1 + \beta_2 X)}\right] \times \beta_2 = C \times \beta_2$$

Consumption per capita (C) is always positive. Consequently, the sign of $\frac{\partial C}{\partial X}$ is determined by the sign of β_2. If β_2 is positive so that $\frac{\partial C}{\partial X} > 0$; as X increase we expect consumption per capita to increase.

In the poverty manual report, World Bank (2005) has also showed several factors that affect to the poverty. These factors can be separated into macro and micro level. Regional and community characteristics are included in macro group. Demographic (household and individual) characteristics belong to micro level factors.

Macro factors are assumed that have the same effect to islander community. The thesis thus investigates micro factors that affect to the poverty of fisher household in the island. Household characteristics can be represented by some factors such as size of household, dependency ratio, assets and number of children. Individual characteristics can include age, gender, and education of head. Employment condition is also important factor in poverty analysis.

Models in specification:

$$Ln(CPC) = \beta_0 + \beta_1 FSIZE + \beta_2 DEPEN + \beta_3 CHILD + \beta_4 BOAT + \beta_5 AQUA + \beta_6 CREDIT + \beta_7 AGE + \beta_8 EDUC + \beta_9 EMPL + e$$

Table 3.1 Definition of variables

Variable	Definition	Expected effect
FSIZE	Family size	Negative (-)
DEPEN	Dependent members	Negative (-)
CHILD	Number of children in the household	Negative (-)
BOAT	Fishing boat owned	Positive (+)
AQUA	Aquaculture farm owned	Positive (+)
CREDIT	Credit condition	Positive (+)
AGE	Age of the household head	Positive (+)
EDUC	Educational level of head	Positive (+)
EMPL	Employment condition of head	Positive (+)

FSIZE: is presented by number of people in the family. According to the World Bank's (2005) report on poverty, the poor tend to live in larger household. The hypothesis here is that household size and poverty condition have positive relationship that means the higher poor condition is as larger household size.

DEPEN: is calculated as the number of family members who can not get income (whether young, elder or jobless) in the household. One might expect that a high dependency ratio will reduce the expenditure per capita and be associated with greater poverty.

CHILD: is understood as people are less than 15 years old in the family. Those are whether in school or jobless. If they are still in school, their parents have to pay for learning at school. Otherwise they have no thing to do, no income unless sometime help their parents. One family with many kids can save nothing while the household has to expense much more for living. The higher number children in the household are hypothesized to increase the poverty.

BOAT: is a dummy variable getting the value 1 if household own the boat and 0 for otherwise. Fishing boat is one of the most important assets of the fisher households. Fishing boat is expected to increase the consumption per capita and reduce the poverty for fishermen.

AQUA: is a dummy variable that get the value of 1 if household own the aquaculture pen-raised and 0 for otherwise. Aquaculture farm is also one kind of assets that can generate income for the household. Aquaculture variable is expected positive affect to consumption per capita.

CREDIT: is dummy variable that get the value 1 for formal source of finance and amount of loan is greater than 10 million VND in loan, 0 for otherwise. If the households can get the official loan from the bank, they can invest to fishing or aquaculture with low interest rate. Conversely, if the household has to loan from private ("black-credit"), they have to pay high interest rate. It is threat for fishermen household. One expects that family can approach to formal credit that will reduce the poverty.

AGE: is closely related to the poverty condition. The poor tend to live in younger and slightly fewer people over age 60 and better-off household tend to have heads who are older (WB, 2005). The main reason is that the older are more experiences in working and can get higher income. One might expect that a higher age of head will increase expenditure per capita in household. It is also the same meaning with reducing the probability poor of the household.

EDUC: is calculated by the number of years in schools. Education variable is separated as five groups. EDUC will get the value 1 if the heads were illiterate; 2 for primary level; 3 for secondary level; 4 for high school level and 5 for higher levels. It is expected that higher education level is correlated to knowledge and ability. The heads with higher education level has more opportunities and choices to joint the labor market. The poverty condition is expected to decrease at increasingly educational level of head.

EMPL: is a dummy variable that indicate employment condition of head. It gets the value of 1 if the head of household have job and stable income, 0 if job and income of household head are unstable and/or unemployment. Employment condition is expected to increase consumption as well as reduce poverty of the household.

3.3. Data.

The primary data are used for the thesis through a socio-economic survey in Bich Dam Island during February, 2009. Data were mainly collected about household characteristics as well as economic activities such as income and expenditure in 2008. Other important data was also included such as credit condition, occupation, faced difficulties and family's wishes.

From the total population of about 182 households, 60 samples have been randomly selected for visiting. Face-to-face interviewing to fishermen and/or their wife was carried out through a questionnaire (Appendix 1).

Data analysis procedures were conducted by using Microsoft Excel 2003 and the statistical package SPSS version 16.0.

Chapter 4
RESULTS

4.1. Socio-economic conditions in fisher community.

4.1.1. Income and expense.

Table 4.1 Monthly average income and consumption[5] of households in 2008

	N	Minimum	Maximum	Mean	Std. Deviation
INCOME	60	250	5900	1432.25	1072.004
INCOME PER CAPITA	60	62	1250	298.41	242.900
CONSUMPTION	60	670	6500	2502.75	1097.664
CONSUMPTION PER CAPITA	60	112	1625	525.60	285.682
Valid N (listwise)	60				

Relationship between income and expense can be considered as an indicator to show living condition in the community. Generally, higher income leads to higher consumption. Whether income is higher than consumption that presents a good situation, conversely people has to survive in penurious circumstance.

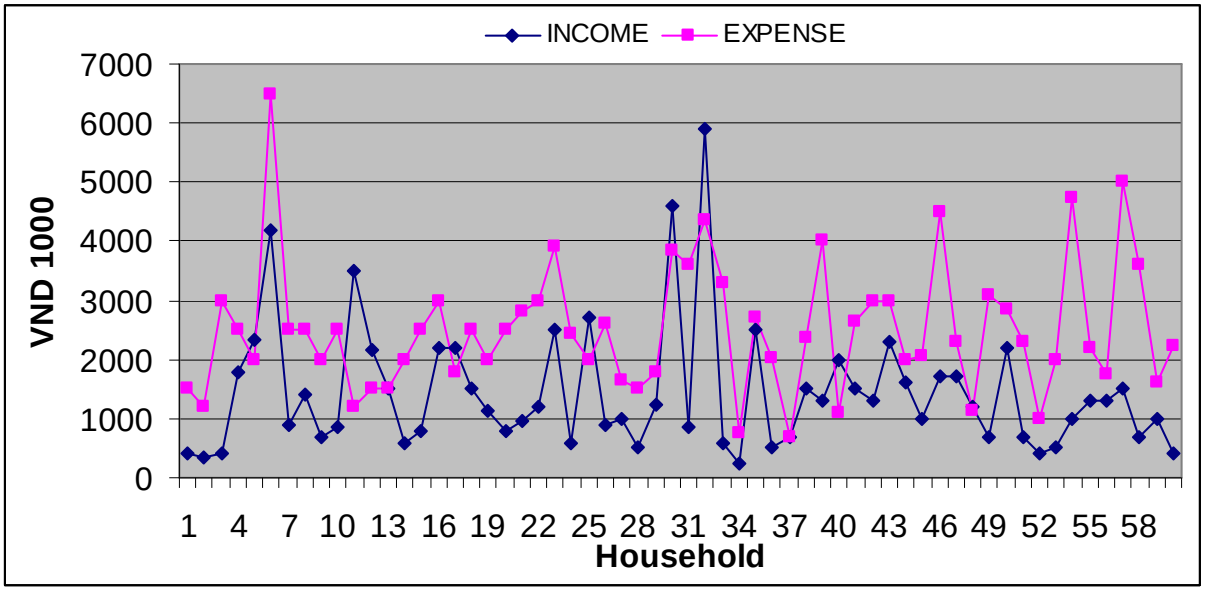


Figure 4.1 Monthly average income and expenditure of households in 2008

[5] Income and consumption are all in thousand of VND; Consumption = Expense

Monthly average consumption and income of fishermen households are showed in the figure 4.1. Income is not enough to cover expenditure in most of household. Some of fishermen believe that their income even are unable to consume basically need for daily living such as rice, food, clean water, fuel, electricity, cloth. In the fisher communities, these conditions are more badly during the season-off and they have to borrow money from several sources as relative, private lenders, middlemen.

The insufficient in income may result deeply in debt in fishery communities which make families to be more difficulty in the live.

4.1.2. Education of household head.

Education of the head in the island is quite low in general with 57% at primary and 32% at the secondary level. Some of the head are even in unlettered condition, about 8% of household heads. Just 3% of household heads got high school level (Table 4.2). Islanders have not opportunity to attend school because of isolation area and no secondary school.

Table 4.2 Educational level of the head

	Level	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Illiterate	5	8.3	8.3	8.3
	Primary level	34	56.7	56.7	65.0
	Secondary level	19	31.7	31.7	96.7
	High school level	2	3.3	3.3	100.0
	Total	60	100.0	100.0	

The educational level of the head in the Bich Dam Island is nearly the same with fishery communities in Vietnam. Education condition in fishery communities is actually low with 68% under primary school, 20% at primary, 10% at secondary and less than 1% at diploma level (Pomeroy, et al, 2009). General speaking, fishermen did not care about education in the previous years because fishing activity is just based on their experience, not educational. In other word, education is not much effect to income of small-scale fishers. This outcome is also showed in the regression model results. This condition is one of difficulties for changing toward to large-scale or off shore fisheries. Most of

fishers can not use modern facilities in off shore fishing and have no any professional skill. This disadvantage also causes difficulty to find alternative employment for fishermen to reduce fishing effort and/or during season off. In addition, the lack of education of fishers' children is a big problem in the fishing communities. When a child becomes 15 years old or even less than that, some of them have to leave school and go fishing with their fathers.

4.1.3. Fishing boat.

There are approximately half island households whom have owned fishing boat. However, almost boats are small in size, power as well as limitation in capital investment.

Table 4.3 Descriptive statistics of sample fishing boats in 2008

	N	Minimum	Maximum	Mean	Std. Deviation
LENGTH (m)	30	7.40	12.00	9.2633	1.48683
POWER (hp)	30	7.00	33.00	15.0500	6.85106
VALUE (VND 1000)	30	5000.00	170000.00	41800.0000	46090.91466
OPERATING (months/year)	30	4.00	12.00	8.9667	2.32651
CREW (persons)	30	1.00	10.00	3.1667	2.65334
FISHING TRIP (days/month)	30	10.00	30.00	21.5333	6.34488
COST (VND 1000)	30	80.00	800.00	187.1667	144.04072
REVENUE (VND 1000)	30	100.00	1100.00	314.0000	214.83915

Length for the sample fishing boats ranges from 7.4 m to 12 m, with an average length about 9.3 m. Engines vary from 7 to 33 hp, with a mean of 15 hp. The average fishers are 3.2 employees on board, range from 1 to 10 persons. Average fishing activity of the boats is 9 months, estimated from February to November. Time for fishing trip is just one night for most of fishing activities such as hand-line, night purse seine, and gill-net. The trip often starts around 4pm in the previous day and lands on in the early next morning.

Table 4.4 Households boat owned and income/expense in 2008

	None boat	**Owned boat**	**%**
Number of households	30	30	
Average Income (vnd 1000)	1148.833	1715.667	+49.34%
Average Expense (vnd 1000)	2262.667	2742.833	+21.22%

The table demonstrates the differentiation between fishing boat owner and none in income as well as in consumption in perspectives. Households own fishing boats who have higher income (49%) and expenditure (21%) as compared to the rest of households.

4.1.4. Household size.

Table 4.5 Size of households in the island in 2008

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	1	1.7	1.7	1.7
	3	3	5.0	5.0	6.7
	4	18	30.0	30.0	36.7
	5	19	31.7	31.7	68.3
	6	9	15.0	15.0	83.3
	7	6	10.0	10.0	93.3
	8	4	6.7	6.7	100.0
	Total	60	100.0	100.0	

The household size in the Bich Dam Island is mostly 4-5 members (62%). On average, each family has 5.1 people. Further result is that the number of children in each family is just 1.2 people. This may be outcome of the birth control program that was introduced in the island in previous years.

4.1.5. Fisheries occupation.

Almost the heads in the island are fishermen and/or working as fishermen (about 87%), a few others are either unstable workers (included hired workers) or taking aquaculture activity (1.7%). The remarkable status is that most of fishing activities are took place the near shore with small-scale fisheries such as lift-net with light (31.7%), hand-line

(21.7%), night purse-seine (11.7%), gill-net (3.3%) and set-net (5%). This can result in the overexploitation in the region that may press to the Nha Trang marine protect area.

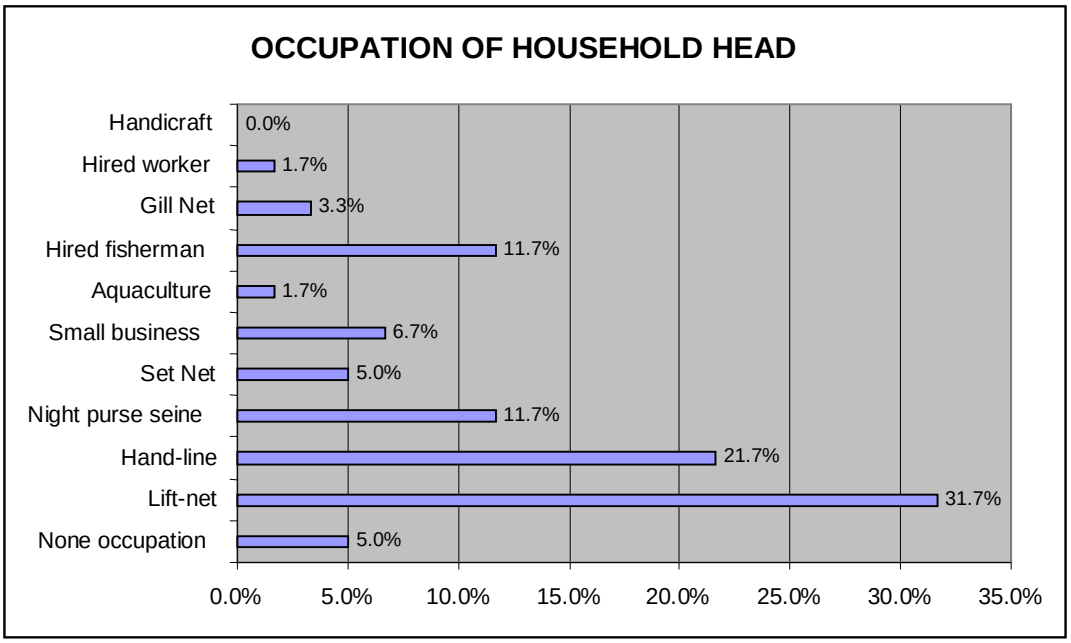


Figure 4.2 Main occupations of the heads

4.1.6. Credit condition.

There are even several sources of credit available in the island included formal such as banks (Agriculture, Socio Policy) , government subsidy programs (Poverty alleviation, Job creation), MPA project, unions (women, farmer) as well as informal sources (or "black finance") such as middlemen, private lenders. However, around 38.3% island household do not make any loan from financial organizations. Inlanders believe that it is difficult to access the formal credit source because they have nothing to security the loan, even their fishing boat which is the most valuable asset.

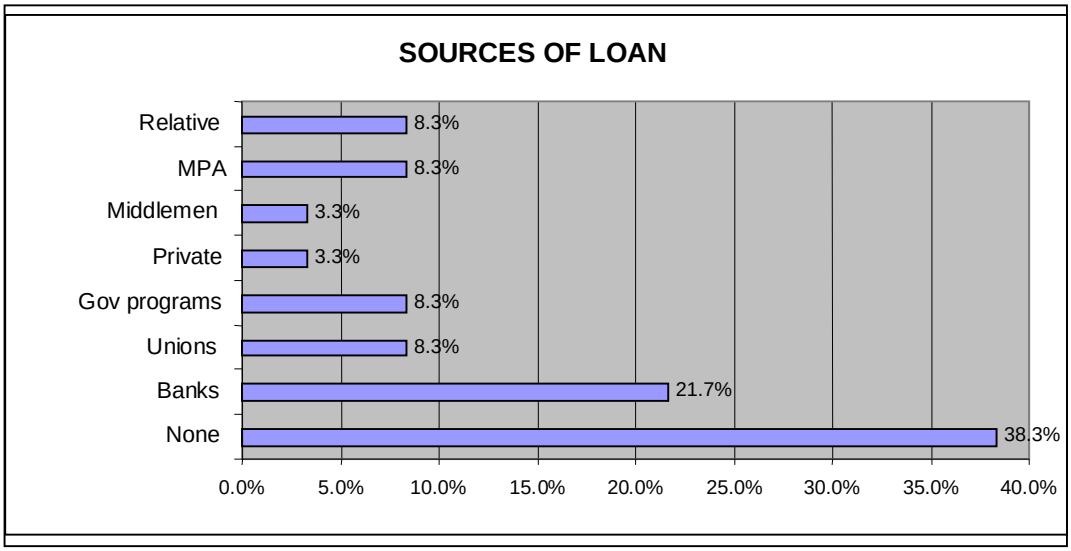


Figure 4.3 Credit condition

The difficulty to access the public finance may one of the reasons that results in limitation investment in small-scale fisheries. Consequently, private lender ("black credit") and middlemen are become an imperative finance source in fishery communities. The "black-credit" is popular in Bich Dam Island in particular as well as in Vietnam fisheries in general because it is utility and quickly supply for their work. Fishermen would like to loan money from one of the state banks with lower interest rate but they can not because they have no any security asset, even the fishing boat. One reason is that fishing boats are variable (liquid) assets.

During the off season, around 4 months, almost fishermen have no income to expense for daily living. Coupled with that, as fishermen have to maintain the fishing boat or buy material for beginning fishing season, they have to borrow money from middlemen or "black credit". If they get money from the middlemen they have to sell fish for them with lower price. With the "black-credit", fishers have to pay for interest with very high the rate, around 8-10% per month. Hence, each fishing trip in during fishing season, if they catch enough fish that enough to repay cost and interest, if not, they have a big debt and stand in front of bankrupt.

4.1.7. Causes of poverty.

The islanders believe that lacking of capital is considered as one of the most essential causes of poverty in the Bich Bam Island with 67% respondents. Fishing activities barely have enough to cover their daily existence. Fishermen do not have any saving amount to invest to fishing and/or aquaculture.

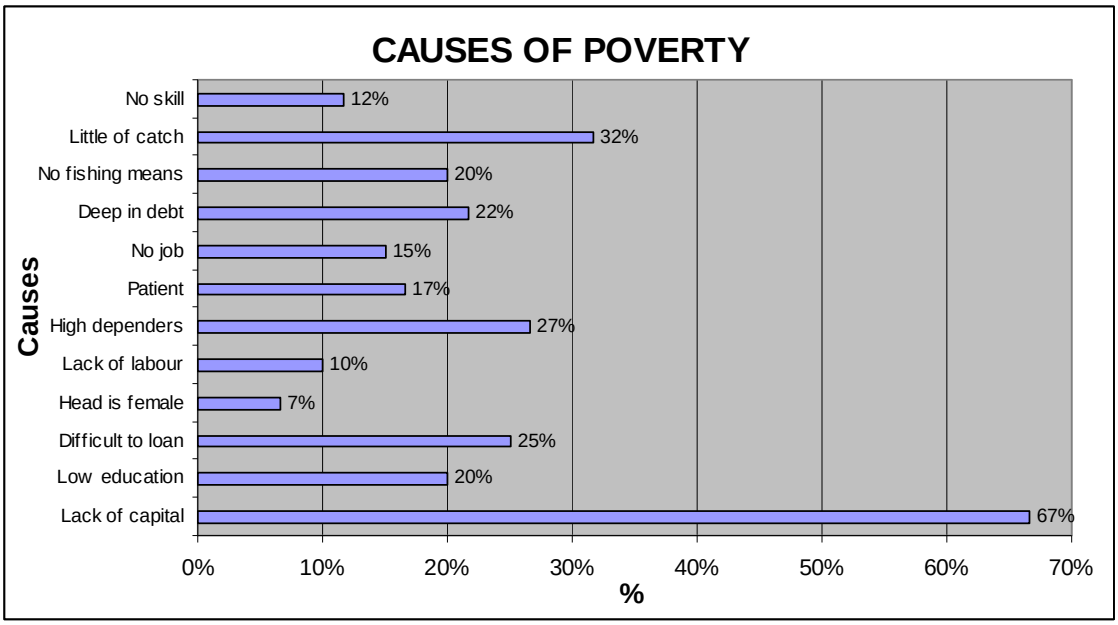


Figure 4.4 Causes of poverty

The dominantly second cause of poverty is decreasing amount of catch (32% respondents). The island fishermen believe that there are much more fishing boats that are catching in the area comparably with previous years. It is remarkable that most of boats are small with little of capital. This sometime leads to rate of fishing and conflict among fishers.

High dependency is also considered a significantly cause of poor (27% respondents). In the island, fishermen's wives are unemployment. Women often do housework and take care of their children. Some of them can also generate income through making handicraft, but this amount is not measurable at all.

Difficulty to loan (25%) and deep in debt (22%) are also two noticeable reasons of poverty in the island. Fishermen usually borrow money from private lenders with high interest rate to expense for the living during the season-off (around 3-4 months). Hence, some of household are deeply in debt condition meanwhile they can not access to the formal finance sources.

4.2. Poverty indices.

Poverty indices such as headcount ratio, poverty gap and severity are presented in the table 4.6. There are 3.33% of population who are living below the poverty line (z_1 = VND 200,000/head/month) with 2 households in total of 60. The condition is more serious as the poverty line has been changed. The poverty line has been adjusted toward to changing in consumer price index (CPI) in 2008 (z_2 = VND 300,000/head/month). The headcount ratio thus increases to 18.33% with 11 households who are living under the poverty line in 2008.

Table 4.6 Poverty indices in 2008

	Poverty lines	
	z_1 = VND 200,000	**z_2 = VND 300,000**
Household below poverty line	2	11
Household above poverty line	58	49
Total of household	60	60
Head-count index – P_0 (100%)	3.33%	18.33%
Poverty gap index – P_1 (100%)	0.82%	3.85%
Poverty severity index – P_2 (100%)	0.33%	1.34%

This index also demonstrates that the percentage of the poor in Bich Dam Island is quite higher than Khanh Hoa province on average. Specifically, there is only 8.12%[6] of the population who are the poor as a whole province while this index is 18.33% in the island in 2008.

The poverty gap index indicates that 0.82% of the poor short-fall at the mean from the poverty line. This index increases to 3.58% toward the adjusted poverty line.

Expense/income distribution is also apart of poverty measures. The follow table shows that the distribution of expense is quite equally in the island compared with Vietnam (income shared) as a whole.

[6] Cited from Khanh Hoa Annual Socio- Economic report in 2008

Table 4.7 Households expense/income distribution in 2008

Percent of Household	Percent of Expense	% cumulative households	% cumulative of expense/income	
			Bich Dam island	Vietnam[7]
Poorest 20%	11.40%	0%	0.00%	0.00%
Mid-poor 20%	15.05%	20%	11.40%	9.03%
Middle 20%	18.58%	40%	26.45%	20.47%
Mid-rich 20%	23.90%	60%	45.03%	35.19%
Richest 20%	31.07%	80%	68.93%	55.67%
Total	100.00%	100%	100.00%	100.00%

Sources: http://www.nationmaster.com/red/country/vm-vietnam/eco-economy&all=1

The table shows that 20% of poorest households (by definition, households with the lowest in consumption per capita) appropriate only 11.40% total expenditure in the Island while 20% of richest families account for 31.07%. Distribution in expense is also presented in Lorenz curves (Figure 4.6).

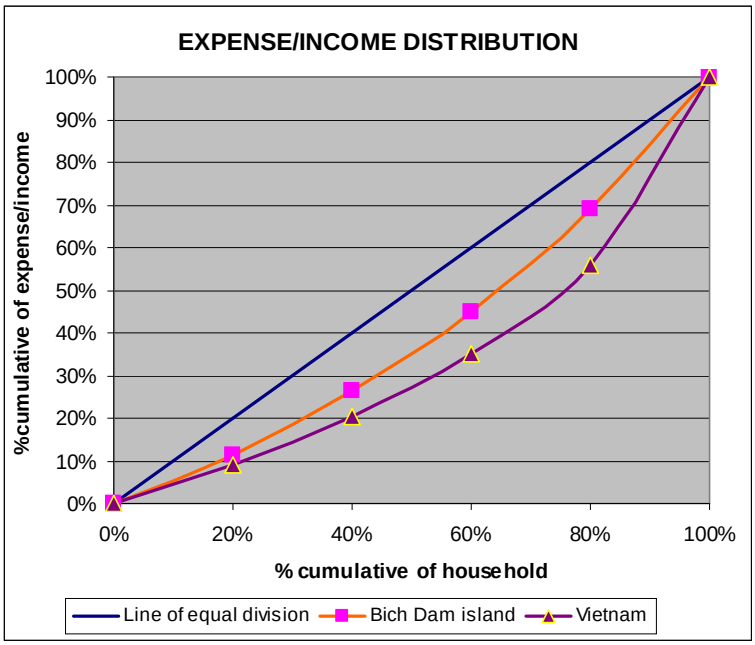


Figure 4.5 Lorenz curves

[7] Income share held by classes, in 2004

4.3. Regression result.

Table 4.8 Descriptive statistics of independent variables

	N	Minimum	Maximum	Mean	Std. Deviation
FSIZE	60	2	8	5.10	1.349
DEPEN	60	0	6	2.92	1.441
CHILD	60	0	4	1.20	1.190
AGE	60	33	70	47.43	9.153
EDUC	60	1	4	2.30	.671
BOAT	60	0	1	.52	.504
AQUA	60	0	1	.37	.486
EMPL	60	0	1	.68	.469
CREDIT	60	0	1	.32	.469
Valid N (listwise)	60				

Regression results of research model are summarized and presented in the follow table. Estimated result shows that some variables are not statistical significance at the 10% level, especially aquaculture farm owned (AQUA), credit condition of household (CREDIT), age of the head (AGE), education level of the head (EDUC) and employment condition of the head (EMPL) with p-value equally to 0.507, 0.521, 0.987, 0.640 and 0.270, respectively.

Table 4.9 Regression model result

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.115	.475		14.989	.000
	FSIZE	-.263	.060	-.701	-4.399	.000
	DEPEN	.165	.065	.469	2.556	.014
	CHILD	-.179	.064	-.420	-2.793	.007
	BOAT	.218	.120	.217	1.813	.076
	AQUA	-.081	.121	-.078	-.668	.507
	CREDIT	.087	.134	.080	.647	.521
	AGE	.000	.007	-.002	-.016	.987
	EDUC	.041	.087	.054	.470	.640
	EMPL	-.147	.131	-.136	-1.116	.270

Dependent Variable: LnCPC
R Square = 0.398, Adjusted R Square = 0.290

The second thing should be noted in the model that is sign of estimated coefficient for some variables. Especially, the effect of DEPEN, AQUA, and EMPL variables are unexpected.

However, these results are not final outcome. Regression results can be affected when heteroskedasticity, multicollinearity occur. Thus some hypotheses testing are very important procedure during estimation model.

The outcome of hypotheses testing procedure has showed that heteroskedasticity and multicollinearity are not the problem in the model (Appendix 2). The result of normally distributed testing shows that mean value is equal to 3.57E-15, closely to 0 and standard deviation is equal to 0.966, approximately 1. This can be considered as normal distribution.

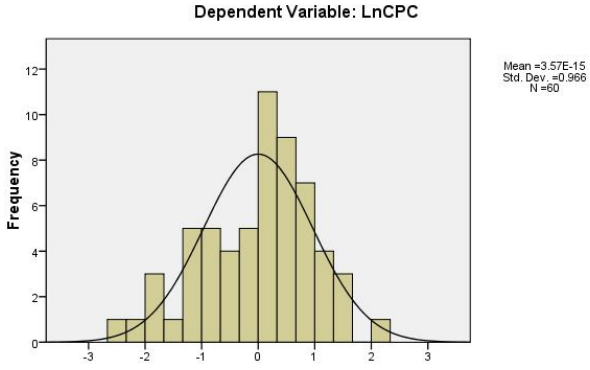


Figure 4.6 Regression Standardized Residual

By removing variables which are not statistical significance, the final model can be determined as follow table.

Table 4.10 Estimated regression model

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.158	.228		31.331	.000
	FSIZE	-.262	.054	-.698	-4.880	.000
	DEPEN	.140	.059	.399	2.367	.021
	CHILD	-.158	.058	-.372	-2.727	.009
	BOAT	.187	.108	.186	1.726	.090
Dependent Variable: LnCPC R Square = 0.371, Adjusted R Square = 0.326						

The final estimated model regression is:

$$LnCPC = 7.158 – 0.262FSIZE + 0.140DEPEN – 0.158CHILD + 0.187BOAT$$

The regression results have showed that approximately 33% (adjusted $R^2 = 0.326$ and $R^2 = 0.371$) of the variation in logarithm of consumption per capita (LnCPC) in fishermen households can be explained by regression model, which uses some important explanatory variables such as size of household (FSIZE), number of children (CHILD), dependent members (DEPEN) and fishing boat condition (BOAT).

The sign of estimated coefficients are as initial expectation, excluding DEPEN variable. Explanatory variables in the model are all significance at different levels. Particularly, FSIZE and CHILD are reasonable at the 1% of significance while DEPEN and BOAT are statistical significance at the level of 5% and 10% in respectively.

The model shows that the size of household (FSIZE) and number of child (CHILD) are negative effect to consumption per capita in fisher families in the island. Particularly, as number of people in the family increase 1 person that leads to approximately 0.262*100% = 26.2% decreasing in consumption per capita, with standard error 0.054. Similarly, we estimate that an additional of child results in a reducing correspondently in consumption per capita of approximately 0.158*100% = 15.8%, with standard error 0.058.

The model also indicates that boat condition (BOAT) affects positively to consumption per capita in the households of fisher community. As the household owns a fishing boat that leads to increase in consumption per head of approximately 0.187*100% = 18.7%, with standard error 0.108.

For fishermen household in the island, we estimate that an additional dependent person in the family leads to an increase in average consumption of approximately 0.140*100% = 14.0%, with standard error 0.059. The number of dependent people (DEPEN) is positively effect to consumption per capita in the model, which is against early expectation.

These can be explained through characteristics of fishermen community and household structure. The first explanation is that dependent people, as earlier defined, do not only stay at home, that they work as assist for husbands/parent in fishing activities. For example, the member in family can mend fishing net, the wise sell catch which their husband land on and boys help their parent in fishing. However, these activities are not

considered as generating actions and they are not included in income generators. In other word, income all is calculated for the head in the fisher household. The opportunities cost of other member in family is not mentioned in the fishing communities.

The second explanation may be that the family structure has not been considered in the model. Household size and composition can be significant effect to consumption. However, households' compositions are simplified of aggregate in the thesis that can be quite misleading about the average consumption of individuals in the family. On average, there are about 42.16% incomer, 23.53% children, 3.92% of elders and 30.39% people in the labor force but unstable job and/or unemployment in the island household (Table4.8). Besides that, expense for elders' healthy care may also increase monetary expenditure.

Table 4.11 Households structure in 2008

	N	Minimum	Maximum	Mean	%
People in family	60	2	8	5.10	100.00%
Income generator	60	1	6	2.15	42.16%
Children	60	0	4	1.20	23.53%
Elder	60	0	2	0.20	3.92%
Jobless and/or unstable employment	60	0	6	1.55	30.39%

It is evident that different individuals have different demands. In other words, members in the labor force need more consumption levels than children and elders to sustain themselves, at least from the nutrition perspective. The economies of scale in consumption have not been considered in the model. Unemployed members are responsible for a significant portion of consumption amount in a family, thus increasing the total household consumption.

Regression results also showed that the signs of variables as CREDIT, AGE and EDUC are consistent with general expectations, which means these variables all are positive correlated with consumption per head. However, the association is rather weak. It is worth-noting that they all are not reasonable at the level of 10% significance.

Small-scale fishery can be considered as the single source of income for islanders household that might affect to expenditures. Moreover, fishing activities are carried out in inshore area day by day that may be not much affected by age and/or educational level of fishermen.

Chapter 5
DISCUSSION AND CONCLUSION

5.1. Discussion.

The research primarily focuses on the influence of micro factors on poverty. Macro factors as regional governance, resource base, infrastructure, and public goods and services accessibility have not been examined in this paper. In addition, the economies of scale in consumption have not been investigated. All members in the family are assumed to have the same level of consumption.

The value of R square (0.371) and adjusted R square (0.326) in the econometric model are reasonable. With cross-sectional data R^2-values from 0.10 to 0.40 are very common. Moreover, microeconomic household behavior is very difficult to fully explain (Hill, et al, 2007).

The households owned fishing boat have higher consumption per capita level (to be equivalent with lower poverty condition) as compared to others. The outcome suggests that subsidies for fishermen to buy fishing boats could be implicated in poverty alleviation policy. This tool may reduce poverty condition for islanders in short-run. However, increasing efforts will lead to over-fishing in open access fisheries in long-run. This solution may be not guaranteed sustainable livelihood for fishermen in small-scale fisheries.

In other way, there are almost 30% of people in labor force but unemployment in the island that leads some of families fall down to poverty condition. Local government should introduce more jobs to diversify income sources for islanders, especially women. In addition, alternative income opportunities should be inserted in the island. For example, under subsidy of Nha Trang MPA project, handicraft activities have been implicated in this area, but just for MPA members. This model should be maintained and expanded to increase income for households as well as decrease efforts pressure on fisheries resources.

The research has just investigated the micro factors affect to consumption per capita of fishing households. Further researches could analysis in more detail. Particular, investigating the contribution of each factor affect to probability of fishing households fall to below poverty line.

5.2. Conclusion.

The research paper has found some important outcomes that can be useful for local decision-makers. First of all, islander communities are living in poor conditions. Small-scale fisheries represent a seemingly unique source of income in areas under survey. However, income from small-scale fisheries is not enough to cover all expenditures incurred. Some of them have to borrow money from relatives, middlemen and/or even private lenders, especially around 3-4 months during the off season time. Unemployment is one of the most serious issues in the island; particularly around 30% of labor forces are jobless.

Second, absolute poverty indices have suggested that more than 18% of islanders are living below the poverty line, which is quite higher than the headcount index in Khanh Hoa province. In addition, public services as education, electricity, clean water supply are not sufficient. In other words, it can be concluded that poverty condition in islands is more serious in remote area. Poverty alleviation is urgent requirement for islanders' communities.

Third, regression outcome has pointed out that family size, numbers of children and numbers of dependent people have significant effects on consumption per capita. Of which family size and children have negative impacts while dependent members have positive correlation to expenditure. Households that operate their own fishing boat have higher consumption per capita compared with others.

Fourth, the characteristics of household heads such as age or educational level do not have considerable influence on consumption. In other words, the efficiency of small-scale fisheries does not depend on age and educational level of the fishermen.

Finally, generating alternative jobs to diversify income sources should be implication rather than subsidy to buy fishing boat in poverty alleviation policies in small-scale fisheries.

SUMMARY

The Vietnam fisheries have been briefly reviewed in which its important roles can be cited in several aspects: being a great contributor to GDP, accounting for a high share of export values, generating jobs as well as providing food security for a significant part of the population. Contrary to these optimistic facts and figures is that fisheries are mostly small-scale, measured by fishing boat size, engines capacity and fishing ground (almost coastal and nearshore). The living standard of most of fishing households is quite low and they rely their income primarily on daily fishing activities. The situation itself poses an alarming threat to coastal marine resources. Overexploitation and poverty are therefore the main issues in the small-scale fisheries in Vietnam.

Major characteristics of small-scale fisheries and socio-economic conditions of Bich Dam Island are more specifically described in the following chapters of the paper. Daily fishing activities take place in Nha Trang Bay with some main occupations such as gill-net, lift-net with light, hand-line, set-net and night purse-seine. Income from fisheries is not enough to cover the cost of living although their life depends on these activities. In general, the living standard of these islanders is very low with critical shortage of electricity as well as clean water supply. The majority of all constructions are in shabby conditions, typically made of timber and/or bamboo mat with fibro-cements roof and brick floor. Educational level of household head is also quite low in the island. There is only one primary school in the area and children tend to leave school as they finish primary level. A considerable proportion of family members are unemployed and their income are unstable. In other words, the lack of alternative employment available represents the root cause of all problems in Bich Dam Island.

Paradoxically, poverty has become a characteristic rather than an exception of small-scale fisheries. The poverty in small-scale fisheries is caused by both internal factors and external factors. Low or almost depleted levels of natural resources along with common property nature in fisheries are considered internal factors that lead to poverty of fishing households. In addition, fishing communities are often located in remote areas which practically reduce for alternative livelihood (income) for fishermen. On the other hand, the open-access nature in small-scale fisheries enables potential fishers to enter fisheries as a final safety-valve without any effective regulatory and administrative barriers.

Poverty measures are applied to calculate poverty indices as headcount ratio (18.33%), poverty gap (3.85%), and poverty severity (1.34%) in Bich Dam Island. These indicators have suggested that poverty issue in the island is more serious than the average level in Khanh Hoa province. These absolute poverty indices have also demonstrated the poverty in small-scale fisheries as evidence from case study research.

Poverty determinants have also been summarized into two categories. The first group includes factors that are related to the macro level such as regional and community characteristics. The second group is composed of elements that belong to the micro level such as household and individual characteristics. The research is conducted in Bich Dam Island which is isolated to the rest of the Province area. The macro factors are thus assumed to have equally significant effect on the community. The thesis only focuses on some important micro variables that may affect to consumption per capita of fishing households. The lower of expenditure per capita is considered equivalently with poorer situation. The research has pointed out that the size and structure of households coupled with boat conditions (boat owned or not) are determinant factors that are responsible for poverty in this area.

References

Bailey, C., and S. Jentoft. (1990). Hard choices in fisheries development. *Marine Policy*, p333-344.

Béné, C. (2003). When fishery rhymes with poverty: A first step beyond the old paradigm on poverty in small-scale fisheries. *World Development , 31*(6), 949-975.

Blackwood, D.L., Lynch, R.G. (1994). The measurement of Inequality and Poverty: A policy maker's guide to the literature. *World Development*, *22*(4), 567-578.

Copes, P. (1989). *Why are fishing incomes often low? A critical review of the conventional wisdom*. Discussion paper 21/89-1, Burnaby, Canada: Institute of Fisheries Analysis, Simon Fraser University.

Coudouel, Aline & Hentschel, Jesko & Wodon, Quentin. (2002). "**Medición y análisis de la pobreza [Poverty Measurement and Analysis]**," MPRA Paper 10491, University Library of Munich, Germany.

Cunningham, S. (1993). *Fishermens' income and fisheries management*. Research paper No. 61, Portsmouth: CERAME, University of Portmouth.

FICen (2006) - Fisheries Informatics Centre (2006). Role of importance of fisheries sector in the national economy. http://www.fistenet.gov.vn/details_e.asp?Object=2114246&news_ID=921147

Foster, J., Greer, J., Thorbecke, E. (1984). A class of decomposable poverty measures. *Econometrica*, Vol. 52, No. 3, 761-766.

Gordon, S. H. (1954). The economic theory of a common property resources: the fisheries. *Journal of Political Economy*, 62, 124-142.

Hai Yen, N.T., Adrien, B. (2002). Socio-economic Assessment of the potential implications of the establishment of the Hon Mun MPA Nha Trang, Vietnam. Report No. 1.

Hill, R.C., Griffiths, W. E., Lim, G.C. (2007). Principles of Econometrics, Third Edition, Wiley. P. 83, 87, 93, 473, 474.

Long, L.K. , Flaaten, O., Kim Anh, N.T. (2008). Economic performance of open-acess offshore fisheries – The case of Vietnamese longliners in the South China Sea. *Fisheries Research,* 93 (2008) 296-304.

Long, N. (2003). A preliminary analysis on the socioeconomic situation of coastal fishing communities in Vietnam, p. 657 - 688. In G. Silvestre, L. Garces, I. Stobutzki, M. Ahmed, R.A. Valmonte- Santos, C. Luna, L. Lachica-Aliño, P. Munro, V. Christensen and D. Pauly (eds.) Assessment, Management and Future Directions for Coastal Fisheries in Asian Countries. WorldFish Center Conference Proceedings 67, 1 120 p.

Pomeroy. R, Kim Anh. N.T, Thong. HX. (2009). Small-scale fisheries policy in Vietnam, *Marine Policy*, 33, 419-428.

Son, D.M. and P. Thuoc (2003). Management of Coastal Fisheries in Vietnam, p. 957 - 986. In G. Silvestre, L. Garces, I. Stobutzki, M. Ahmed, R.A. Valmonte-Santos, C. Luna, L. Lachica-Aliño, P. Munro, V. Christensen and D. Pauly (eds.) Assessment, Management and Future Directions for Coastal Fisheries in Asian Countries. WorldFish Center Conference Proceedings 67, 1 120 p.

Sen, A. (1976). Poverty: An ordinal approach to measurement. *Econometrica, 44*(2), 219-231.

Thu, V.T. Ho. (2005). Socio-Economic impact assessment of the Hon Mun MPA project on local communities within the MPA. Hon Mun Marine Protected Area Pilot Project.

Wagle, U (2002). Rethinking poverty: definition and measurement. Open Forum. *International Social Science Journal*. Vol 54, Issue 171, Pages 155-165.

World Bank (2005), Poverty manual.

http://www.kso.gov.vn/news.php?chuyenmuc=10&demuc=44&tintuc=576&nam=2008

http://www.nationmaster.com/red/country/vm-vietnam/eco-economy&all=1

http://www.saga.vn/Sukiendoanhnghiep/taxsocresp/12884.saga

http://www.customs.gov.vn/Lists/TyGia/TraCuu.aspx

http://www.kso.gov.vn/news.php?chuyenmuc=10&demuc=44&tintuc=520&nam=2008

APPENDICES

APPENDIX 1 FISHER HOUSEHOLD SURVEY QUESTIONNAIRE

(Data collection in 2008)

Respondent: ……..……... Sex: …… Age: ……..…..

Village: ……

Interviewer: …….. Date: ……

A. GENERAL INFORMATION:

1. Full name of household head: ……

2. Information about members in family:

Member	Head	2	3	4	5	6	7	8
Name								
Age								
Sex								
Related to head								
Education								
Class								
Under college								
University/ College								
Going to school								
Stopped to school								
Literate								
Illiterate								
Employment								
Having job and stable income								
Lacking of job and unstable income								
Unemployment								
Going to school								
Unworkable								
Others								
Occupation								
Main occupation								
Sub-Occupation								
Health condition								
Good								
Bad								
Invalid								
Losing								
Elder								

B. INTERVIEW CONTENTS:

1. Fishing boat:

Boat, engine	Length (m) - Power (HP)	Year purchased	Purchase value (million VND)	Present value (million VND)
Boat 1				
Engine 1				
Gears				
On board equipment 1				
Boat 2				
Engine 2				
On board equipment 2				

2. What are the present fishing activities that the men in your family are engaged in?

Fishing activity	Time of fishing (month)	Work for family	Work for private

3. Number of people on boat: ……. person.

4. Time for a fishing trip: …….day.

5. How many days are for fishing in a month on average? …….. day.

6. Average quantity of catch per trip: …….. (kg)

7. Average revenue per trip: …… (VND)

8. Average cost per trip: …….. (VND)

9. Is catch quantity either increasing or decreasing compared to previous years?

a. Increase
b. Decrease
c. Unchanged
d. No income from fishing

10. What are sources of finance that the family loans and in debt? Purposes?

Source	Purpose	Amount (million VND)	Interest rate (%)
(1) Relative ☐	(1) Marine fishing ☐		
(2) Neighbor ☐	(2) Aquaculture ☐		
(3) Agriculture Bank ☐	(3) Mountain field ☐		
(4) Policy – Socio Bank ☐	(4) Ranching ☐		
(5) Union (Farmer, Fisher) ☐	(5) Emergency ☐		
(6) Poverty alleviation Program ☐	(6) Subsistence ☐		
(7) Subsidy program ☐	(7) Education ☐		
(8) Private lenders ☐	(8) Repay debt ☐		
(9) Middlemen ☐	(9) Other ☐		
(10) Other ☐	☐		
(11) None ☐			

11. Income of family.

Estimated income of family in 2008	Net income	Stable	Unstable
Fishing for family			
Fishing as hired			
Hired work			
Small business			
Aquaculture			
Ranching			
Handicraft			
Salary			
Subsidy from government			
Relative			
Saving			
Planting			
Other			

12. Is income enough to cover basic need?

a. Yes b. No

13. Expenditure of family.

Expenditure items	Per month	Per year	Remark
Food			
Transportation			
Educational fees			
Fuel			
Clean water			
Electricity, phone			
Cloth			
House repair			
Interior			
Healthy care			
Wedding, Funeral			
Alcohol, Beer, Cigarette			
Entertainment			
Other			
Total			

14. Do you want to change to another fishing activity?

a. Yes b. No

15. Is changing fishing activity either easy or difficult?

a. Easy.
b. Difficult, because of:
   i. Lacking of skill for new career.
   ii. Lacking of investment capital.
   iii. Psychological reason.
   iv. Other

16. Aquaculture in 2008

Species	Cost	Revenue	Remark

17. House condition:

a. Strong building b. Short-lived building c. Wooden building d. Bamboo building

18. Interiors in the house:

a. Television.
b. Radio - Cassette.
c. Bicycle.
d. Motorbike
e. Phone
f. Video, VCD
g. Refrigerator
h. Other

C. OTHER INFORMATION:

1. Has your family faced to following problems? (multi answer)

a. Lacking of investment capital
b. Lacking of farmland
c. Lacking of fishing facility
d. Lacking of labor
e. Patient in family
f. High dependent ratio
g. Have no job
h. Lacking of skill
i. Deeply in debt

2. What is your family preferred from government subsidy?

a. Loan capital.
b. Help to learn a skill.
c. Sell product.
d. Introduce job.

3. Is loan form the bank either easy or difficult?

a. Easy b. Difficult

4. Which activity is your family preferred to invest?

(1)	Buying bigger boat	(6)	House repair
(2)	Aquaculture	(7)	Invest to mountain field
(3)	Repay debt	(8)	Invest to ranching
(4)	Education investment	(9)	Food
(5)	Shopping	(10)	Do not know

5. Do you want to share capital investment with other in co-operation?

a. Yes. b. No

6. According to yourself, which group is your family belongs to?

a. Rich b. Well-off c. Middle d. Sub-poor e. Poor

7. According to local authority, which group is your family belongs to?

a. Poor b. Non-poor

8. What are the main causes that lead to poverty?

(a) Lacking of capital ☐
(b) Difficulty to loan ☐
(c) Low education of head ☐
(d) Head is female ☐
(e) Lacking of labor ☐
(f) High dependent ratio ☐
(g) Patient in family ☐
(h) Have no job ☐
(i) Have no skill ☐
(j) Deeply in debt ☐
(k) Lacking of farmland ☐
(l) Little of catch ☐
(m) Lack of fishing facilities ☐

APPENDIX 2 REGRESSION RESULTS

Correlations

		LnCPC	FSIZE	DEPEN	CHILD	BOAT	AQUA	CREDIT	AGE	EDUC	EMPL
Pearson Correlation	LnCPC	1.000	-.482	-.222	-.231	.201	.006	.228	.025	.119	.004
	FSIZE	-.482	1.000	.597	.072	.022	.021	-.292	.069	-.202	-.003
	DEPEN	-.222	.597	1.000	.533	-.033	.044	-.211	-.318	-.061	.136
	CHILD	-.231	.072	.533	1.000	-.119	-.100	-.024	-.451	.051	-.036
	BOAT	.201	.022	-.033	-.119	1.000	.182	.228	.039	-.015	.274
	AQUA	.006	.021	.044	-.100	.182	1.000	.226	-.017	-.031	.146
	CREDIT	.228	-.292	-.211	-.024	.228	.226	1.000	.129	.016	.001
	AGE	.025	.069	-.318	-.451	.039	-.017	.129	1.000	-.035	-.129
	EDUC	.119	-.202	-.061	.051	-.015	-.031	.016	-.035	1.000	.199
	EMPL	.004	-.003	.136	-.036	.274	.146	.001	-.129	.199	1.000
Sig. (1-tailed)	LnCPC	.	.000	.044	.038	.062	.481	.040	.424	.182	.488
	FSIZE	.000	.	.000	.293	.432	.438	.012	.300	.061	.492
	DEPEN	.044	.000	.	.000	.401	.368	.053	.007	.321	.150
	CHILD	.038	.293	.000	.	.183	.224	.427	.000	.350	.391
	BOAT	.062	.432	.401	.183	.	.082	.040	.384	.455	.017
	AQUA	.481	.438	.368	.224	.082	.	.042	.448	.407	.132
	CREDIT	.040	.012	.053	.427	.040	.042	.	.162	.451	.496
	AGE	.424	.300	.007	.000	.384	.448	.162	.	.394	.162
	EDUC	.182	.061	.321	.350	.455	.407	.451	.394	.	.064
	EMPL	.488	.492	.150	.391	.017	.132	.496	.162	.064	.
N	LnCPC	60	60	60	60	60	60	60	60	60	60
	FSIZE	60	60	60	60	60	60	60	60	60	60
	DEPEN	60	60	60	60	60	60	60	60	60	60
	CHILD	60	60	60	60	60	60	60	60	60	60
	BOAT	60	60	60	60	60	60	60	60	60	60
	AQUA	60	60	60	60	60	60	60	60	60	60
	CREDIT	60	60	60	60	60	60	60	60	60	60
	AGE	60	60	60	60	60	60	60	60	60	60
	EDUC	60	60	60	60	60	60	60	60	60	60
	EMPL	60	60	60	60	60	60	60	60	60	60

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	EMPL, CREDIT, CHILD, EDUC, AQUA, FSIZE, BOAT, AGE, DEPEN[a]	.	Enter
2	.	AGE	Backward (criterion: Probability of F-to-remove >= .100).
3	.	EDUC	Backward (criterion: Probability of F-to-remove >= .100).
4	.	CREDIT	Backward (criterion: Probability of F-to-remove >= .100).
5	.	AQUA	Backward (criterion: Probability of F-to-remove >= .100).
6	.	EMPL	Backward (criterion: Probability of F-to-remove >= .100).

a. All requested variables entered.

b. Dependent Variable: LnCPC

Model Summary[g]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.631[a]	.398	.290	.426526110844	.398	3.680	9	50	.001	
2	.631[b]	.398	.304	.422324908758	.000	.000	1	50	.987	
3	.629[c]	.396	.314	.419167083025	-.003	.225	1	51	.637	
4	.625[d]	.391	.322	.416906698362	-.005	.430	1	52	.515	
5	.622[e]	.387	.330	.414281794346	-.004	.322	1	53	.573	
6	.609[f]	.371	.326	.415707105469	-.016	1.379	1	54	.245	1.782

a. Predictors: (Constant), EMPL, CREDIT, CHILD, EDUC, AQUA, FSIZE, BOAT, AGE, DEPEN

b. Predictors: (Constant), EMPL, CREDIT, CHILD, EDUC, AQUA, FSIZE, BOAT, DEPEN

c. Predictors: (Constant), EMPL, CREDIT, CHILD, AQUA, FSIZE, BOAT, DEPEN

d. Predictors: (Constant), EMPL, CHILD, AQUA, FSIZE, BOAT, DEPEN

e. Predictors: (Constant), EMPL, CHILD, FSIZE, BOAT, DEPEN

f. Predictors: (Constant), CHILD, FSIZE, BOAT, DEPEN

g. Dependent Variable: LnCPC

ANOVA[g]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.026	9	.670	3.680	.001[a]
	Residual	9.096	50	.182		
	Total	15.122	59			
2	Regression	6.026	8	.753	4.223	.001[b]
	Residual	9.096	51	.178		
	Total	15.122	59			
3	Regression	5.985	7	.855	4.867	.000[c]
	Residual	9.136	52	.176		
	Total	15.122	59			
4	Regression	5.910	6	.985	5.667	.000[d]
	Residual	9.212	53	.174		
	Total	15.122	59			
5	Regression	5.854	5	1.171	6.822	.000[e]
	Residual	9.268	54	.172		
	Total	15.122	59			
6	Regression	5.617	4	1.404	8.126	.000[f]
	Residual	9.505	55	.173		
	Total	15.122	59			

a. Predictors: (Constant), EMPL, CREDIT, CHILD, EDUC, AQUA, FSIZE, BOAT, AGE, DEPEN

b. Predictors: (Constant), EMPL, CREDIT, CHILD, EDUC, AQUA, FSIZE, BOAT, DEPEN

c. Predictors: (Constant), EMPL, CREDIT, CHILD, AQUA, FSIZE, BOAT, DEPEN

d. Predictors: (Constant), EMPL, CHILD, AQUA, FSIZE, BOAT, DEPEN

e. Predictors: (Constant), EMPL, CHILD, FSIZE, BOAT, DEPEN

f. Predictors: (Constant), CHILD, FSIZE, BOAT, DEPEN

g. Dependent Variable: LnCPC

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	7.115	.475		14.989	.000	6.162	8.069					
	FSIZE	-.263	.060	-.701	-4.399	.000	-.383	-.143	-.482	-.528	-.482	.473	2.114
	DEPEN	.165	.065	.469	2.556	.014	.035	.294	-.222	.340	.280	.357	2.805
	CHILD	-.179	.064	-.420	-2.793	.007	-.307	-.050	-.231	-.367	-.306	.532	1.881
	BOAT	.218	.120	.217	1.813	.076	-.023	.459	.201	.248	.199	.843	1.187
	AQUA	-.081	.121	-.078	-.668	.507	-.325	.163	.006	-.094	-.073	.885	1.130
	CREDIT	.087	.134	.080	.647	.521	-.182	.356	.228	.091	.071	.781	1.280
	AGE	.000	.007	-.002	-.016	.987	-.015	.014	.025	-.002	-.002	.704	1.420
	EDUC	.041	.087	.054	.470	.640	-.134	.215	.119	.066	.052	.906	1.103
	EMPL	-.147	.131	-.136	-1.116	.270	-.411	.117	.004	-.156	-.122	.811	1.233
2	(Constant)	7.110	.348		20.423	.000	6.411	7.809					
	FSIZE	-.263	.057	-.702	-4.604	.000	-.378	-.149	-.482	-.542	-.500	.507	1.971
	DEPEN	.165	.063	.470	2.634	.011	.039	.291	-.222	.346	.286	.370	2.701
	CHILD	-.178	.061	-.419	-2.948	.005	-.300	-.057	-.231	-.382	-.320	.582	1.717
	BOAT	.218	.119	.217	1.832	.073	-.021	.456	.201	.248	.199	.843	1.186
	AQUA	-.081	.120	-.078	-.675	.503	-.322	.160	.006	-.094	-.073	.890	1.123
	CREDIT	.086	.130	.080	.662	.511	-.175	.348	.228	.092	.072	.809	1.237
	EDUC	.041	.086	.054	.475	.637	-.132	.213	.119	.066	.052	.909	1.101
	EMPL	-.147	.129	-.136	-1.132	.263	-.406	.113	.004	-.157	-.123	.820	1.220
3	(Constant)	7.218	.262		27.504	.000	6.691	7.744					
	FSIZE	-.268	.056	-.713	-4.769	.000	-.380	-.155	-.482	-.552	-.514	.519	1.925
	DEPEN	.165	.062	.469	2.650	.011	.040	.290	-.222	.345	.286	.370	2.701
	CHILD	-.177	.060	-.416	-2.948	.005	-.297	-.056	-.231	-.378	-.318	.584	1.712
	BOAT	.215	.118	.214	1.824	.074	-.021	.451	.201	.245	.197	.845	1.184
	AQUA	-.083	.119	-.080	-.698	.488	-.322	.156	.006	-.096	-.075	.891	1.122
	CREDIT	.085	.129	.079	.656	.515	-.175	.344	.228	.091	.071	.809	1.236
	EMPL	-.134	.126	-.124	-1.064	.292	-.386	.118	.004	-.146	-.115	.858	1.165
4	(Constant)	7.275	.246		29.542	.000	6.781	7.769					
	FSIZE	-.275	.055	-.732	-5.019	.000	-.385	-.165	-.482	-.568	-.538	.540	1.852
	DEPEN	.162	.062	.461	2.623	.011	.038	.286	-.222	.339	.281	.372	2.686
	CHILD	-.174	.059	-.408	-2.919	.005	-.293	-.054	-.231	-.372	-.313	.588	1.700
	BOAT	.232	.114	.231	2.037	.047	.004	.461	.201	.270	.218	.891	1.122
	AQUA	-.065	.115	-.063	-.568	.573	-.297	.166	.006	-.078	-.061	.939	1.065
	EMPL	-.140	.125	-.130	-1.122	.267	-.390	.110	.004	-.152	-.120	.863	1.159
5	(Constant)	7.256	.243		29.920	.000	6.770	7.742					
	FSIZE	-.273	.054	-.728	-5.027	.000	-.382	-.164	-.482	-.565	-.536	.542	1.847
	DEPEN	.158	.061	.450	2.593	.012	.036	.280	-.222	.333	.276	.377	2.655
	CHILD	-.169	.059	-.398	-2.888	.006	-.287	-.052	-.231	-.366	-.308	.598	1.671
	BOAT	.223	.112	.222	1.988	.052	-.002	.448	.201	.261	.212	.910	1.099
	EMPL	-.145	.123	-.134	-1.174	.245	-.392	.103	.004	-.158	-.125	.868	1.152
6	(Constant)	7.158	.228		31.331	.000	6.700	7.616					
	FSIZE	-.262	.054	-.698	-4.880	.000	-.370	-.154	-.482	-.550	-.522	.558	1.791
	DEPEN	.140	.059	.399	2.367	.021	.022	.259	-.222	.304	.253	.402	2.491
	CHILD	-.158	.058	-.372	-2.727	.009	-.275	-.042	-.231	-.345	-.292	.614	1.630
	BOAT	.187	.108	.186	1.726	.090	-.030	.404	.201	.227	.185	.985	1.016

a. Dependent Variable: LnCPC

Coefficient Correlations[a]

Model			EMPL	CREDIT	CHILD	EDUC	AQUA	FSIZE	BOAT	AGE	DEPEN
1	Correlations	EMPL	1.000	.048	.172	-.215	-.085	.109	-.271	.106	-.203
		CREDIT	.048	1.000	-.133	.032	-.234	.234	-.225	-.184	.036
		CHILD	.172	-.133	1.000	-.068	.158	.240	.057	.295	-.535
		EDUC	-.215	.032	-.068	1.000	.033	.161	.048	-.050	-.003
		AQUA	-.085	-.234	.158	.033	1.000	-.006	-.083	.074	-.103
		FSIZE	.109	.234	.240	.161	-.006	1.000	-.099	-.259	-.654
		BOAT	-.271	-.225	.057	.048	-.083	-.099	1.000	.019	.049
		AGE	.106	-.184	.295	-.050	.074	-.259	.019	1.000	.193
		DEPEN	-.203	.036	-.535	-.003	-.103	-.654	.049	.193	1.000
	Covariances	EMPL	.017	.001	.001	-.002	-.001	.001	-.004	.000	-.002
		CREDIT	.001	.018	-.001	.000	-.004	.002	-.004	.000	.000
		CHILD	.001	-.001	.004	.000	.001	.001	.000	.000	-.002
		EDUC	-.002	.000	.000	.008	.000	.001	.001	-3.125E-5	-1.402E-5
		AQUA	-.001	-.004	.001	.000	.015	-4.414E-5	-.001	6.506E-5	.000
		FSIZE	.001	.002	.001	.001	-4.414E-5	.004	.000	.000	-.003
		BOAT	-.004	-.004	.000	.001	-.001	.000	.014	1.689E-5	.000
		AGE	.000	.000	.000	-3.125E-5	6.506E-5	.000	1.689E-5	5.227E-5	8.985E-5
		DEPEN	-.002	.000	-.002	-1.402E-5	.000	-.003	.000	8.985E-5	.004
2	Correlations	EMPL	1.000	.069	.148	-.211	-.094	.142	-.274		-.228
		CREDIT	.069	1.000	-.084	.023	-.225	.196	-.226		.075
		CHILD	.148	-.084	1.000	-.056	.143	.343	.054		-.631
		EDUC	-.211	.023	-.056	1.000	.037	.153	.049		.007
		AQUA	-.094	-.225	.143	.037	1.000	.014	-.084		-.120
		FSIZE	.142	.196	.343	.153	.014	1.000	-.097		-.638
		BOAT	-.274	-.226	.054	.049	-.084	-.097	1.000		.046
		DEPEN	-.228	.075	-.631	.007	-.120	-.638	.046		1.000
	Covariances	EMPL	.017	.001	.001	-.002	-.001	.001	-.004		-.002
		CREDIT	.001	.017	.000	.000	-.004	.001	-.003		.001
		CHILD	.001	.000	.004	.000	.001	.001	.000		-.002
		EDUC	-.002	.000	.000	.007	.000	.001	.001		3.891E-5
		AQUA	-.001	-.004	.001	.000	.014	9.370E-5	-.001		.000
		FSIZE	.001	.001	.001	.001	9.370E-5	.003	.000		-.002
		BOAT	-.004	-.003	.000	.001	-.001	.000	.014		.000
		DEPEN	-.002	.001	-.002	3.891E-5	.000	-.002	.000		.004
3	Correlations	EMPL	1.000	.075	.140		-.088	.181	-.270		-.232
		CREDIT	.075	1.000	-.082		-.226	.195	-.227		.074
		CHILD	.140	-.082	1.000		.145	.357	.057		-.632
		AQUA	-.088	-.226	.145		1.000	.008	-.086		-.121
		FSIZE	.181	.195	.357		.008	1.000	-.106		-.646
		BOAT	-.270	-.227	.057		-.086	-.106	1.000		.045
		DEPEN	-.232	.074	-.632		-.121	-.646	.045		1.000
	Covariances	EMPL	.016	.001	.001		-.001	.001	-.004		-.002
		CREDIT	.001	.017	.000		-.003	.001	-.003		.001
		CHILD	.001	.000	.004		.001	.001	.000		-.002
		AQUA	-.001	-.003	.001		.014	5.427E-5	-.001		.000
		FSIZE	.001	.001	.001		5.427E-5	.003	.000		-.002
		BOAT	-.004	-.003	.000		-.001	.000	.014		.000
		DEPEN	-.002	.001	-.002		.000	-.002	.000		.004
4	Correlations	EMPL	1.000		.147		-.073	.170	-.261		-.239
		CHILD	.147		1.000		.130	.381	.039		-.629
		AQUA	-.073		.130		1.000	.055	-.145		-.107

		FSIZE	.170		.381		.055	1.000	-.065	-.676
		BOAT	-.261		.039		-.145	-.065	1.000	.064
		DEPEN	-.239		-.629		-.107	-.676	.064	1.000
	Covariances	EMPL	.016		.001		-.001	.001	-.004	-.002
		CHILD	.001		.004		.001	.001	.000	-.002
		AQUA	-.001		.001		.013	.000	-.002	.000
		FSIZE	.001		.001		.000	.003	.000	-.002
		BOAT	-.004		.000		-.002	.000	.013	.000
		DEPEN	-.002		-.002		.000	-.002	.000	.004
5	Correlations	EMPL	1.000		.158			.174	-.275	-.249
		CHILD	.158		1.000			.378	.059	-.624
		FSIZE	.174		.378			1.000	-.057	-.675
		BOAT	-.275		.059			-.057	1.000	.049
		DEPEN	-.249		-.624			-.675	.049	1.000
	Covariances	EMPL	.015		.001			.001	-.004	-.002
		CHILD	.001		.003			.001	.000	-.002
		FSIZE	.001		.001			.003	.000	-.002
		BOAT	-.004		.000			.000	.013	.000
		DEPEN	-.002		-.002			-.002	.000	.004
6	Correlations	CHILD			1.000			.360	.108	-.612
		FSIZE			.360			1.000	-.010	-.662
		BOAT			.108			-.010	1.000	-.020
		DEPEN			-.612			-.662	-.020	1.000
	Covariances	CHILD			.003			.001	.001	-.002
		FSIZE			.001			.003	-5.744E-5	-.002
		BOAT			.001			-5.744E-5	.012	.000
		DEPEN			-.002			-.002	.000	.004

a. Dependent Variable: LnCPC

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions									
				(Constant)	FSIZE	DEPEN	CHILD	BOAT	AQUA	CREDIT	AGE	EDUC	EMPL
1	1	7.319	1.000	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
	2	.847	2.939	.00	.00	.01	.05	.04	.14	.25	.00	.00	.00
	3	.547	3.657	.00	.00	.00	.11	.03	.19	.47	.00	.00	.03
	4	.487	3.877	.00	.00	.00	.08	.20	.60	.00	.00	.00	.02
	5	.348	4.586	.00	.00	.00	.18	.53	.01	.03	.01	.01	.00
	6	.245	5.463	.00	.01	.00	.01	.17	.00	.03	.00	.00	.79
	7	.123	7.711	.00	.03	.24	.18	.01	.04	.15	.00	.16	.01
	8	.053	11.719	.01	.02	.24	.23	.01	.00	.02	.09	.61	.11
	9	.020	19.051	.01	.87	.50	.03	.01	.00	.06	.29	.07	.01
	10	.010	27.230	.97	.07	.00	.13	.00	.01	.00	.60	.14	.02
2	1	6.416	1.000	.00	.00	.00	.00	.01	.01	.01		.00	.00
	2	.847	2.753	.00	.00	.01	.06	.04	.14	.26		.00	.00
	3	.547	3.425	.00	.00	.00	.11	.03	.21	.48		.00	.03
	4	.480	3.657	.00	.00	.00	.06	.27	.57	.00		.00	.03
	5	.307	4.570	.00	.00	.00	.23	.59	.03	.05		.02	.05
	6	.227	5.321	.01	.02	.01	.09	.04	.00	.00		.01	.76
	7	.120	7.303	.01	.02	.23	.13	.01	.03	.13		.23	.04
	8	.042	12.329	.09	.17	.53	.21	.02	.00	.01		.45	.07
	9	.015	20.891	.89	.78	.22	.10	.00	.00	.05		.29	.02
3	1	5.541	1.000	.00	.00	.00	.01	.01	.01	.01			.01
	2	.840	2.569	.00	.00	.01	.07	.04	.13	.26			.00
	3	.547	3.183	.00	.00	.00	.11	.03	.21	.48			.03
	4	.477	3.410	.00	.00	.00	.05	.30	.57	.00			.04
	5	.280	4.448	.01	.01	.00	.22	.61	.06	.08			.18
	6	.223	4.988	.02	.03	.01	.16	.01	.01	.00			.65
	7	.075	8.592	.19	.00	.57	.19	.00	.01	.12			.00
	8	.019	17.276	.79	.96	.41	.20	.00	.00	.05			.09
4	1	5.190	1.000	.00	.00	.00	.01	.01	.01				.01
	2	.711	2.701	.00	.00	.01	.15	.08	.34				.01
	3	.477	3.300	.00	.00	.00	.05	.32	.60				.04
	4	.296	4.185	.01	.01	.00	.26	.55	.03				.21
	5	.223	4.827	.02	.03	.01	.16	.01	.01				.66
	6	.084	7.854	.21	.00	.50	.14	.03	.00				.00
	7	.020	16.307	.76	.96	.48	.24	.00	.01				.08
5	1	4.769	1.000	.00	.00	.00	.01	.01					.01
	2	.603	2.812	.00	.00	.01	.21	.31					.04
	3	.300	3.987	.01	.01	.00	.26	.64					.17
	4	.224	4.617	.02	.03	.01	.15	.01					.70
	5	.084	7.529	.21	.00	.50	.15	.03					.00
	6	.020	15.551	.76	.96	.47	.23	.00					.08
6	1	4.044	1.000	.00	.00	.00	.01	.02					
	2	.569	2.665	.00	.00	.01	.20	.48					
	3	.281	3.792	.02	.02	.01	.43	.45					
	4	.084	6.928	.24	.00	.54	.15	.04					
	5	.021	13.754	.73	.97	.44	.21	.01					

a. Dependent Variable: LnCPC

Excluded Variables[f]

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics		
						Tolerance	VIF	Minimum Tolerance
2	AGE	-.002[a]	-.016	.987	-.002	.704	1.420	.357
3	AGE	.001[b]	.007	.994	.001	.706	1.417	.357
	EDUC	.054[b]	.475	.637	.066	.909	1.101	.370
4	AGE	.016[c]	.126	.900	.018	.730	1.369	.357
	EDUC	.052[c]	.462	.646	.064	.909	1.100	.372
	CREDIT	.079[c]	.656	.515	.091	.809	1.236	.370
5	AGE	.018[d]	.147	.884	.020	.731	1.368	.360
	EDUC	.055[d]	.489	.627	.067	.911	1.098	.377
	CREDIT	.060[d]	.514	.610	.070	.853	1.173	.376
	AQUA	-.063[d]	-.568	.573	-.078	.939	1.065	.372
6	AGE	.035[e]	.276	.784	.037	.741	1.350	.379
	EDUC	.026[e]	.231	.818	.031	.953	1.049	.401
	CREDIT	.067[e]	.578	.566	.078	.855	1.169	.400
	AQUA	-.072[e]	-.650	.519	-.088	.944	1.059	.395
	EMPL	-.134[e]	-1.174	.245	-.158	.868	1.152	.377

a. Predictors in the Model: (Constant), EMPL, CREDIT, CHILD, EDUC, AQUA, FSIZE, BOAT, DEPEN

b. Predictors in the Model: (Constant), EMPL, CREDIT, CHILD, AQUA, FSIZE, BOAT, DEPEN

c. Predictors in the Model: (Constant), EMPL, CHILD, AQUA, FSIZE, BOAT, DEPEN

d. Predictors in the Model: (Constant), EMPL, CHILD, FSIZE, BOAT, DEPEN

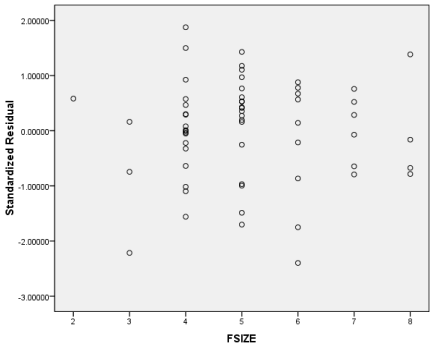
e. Predictors in the Model: (Constant), CHILD, FSIZE, BOAT, DEPEN

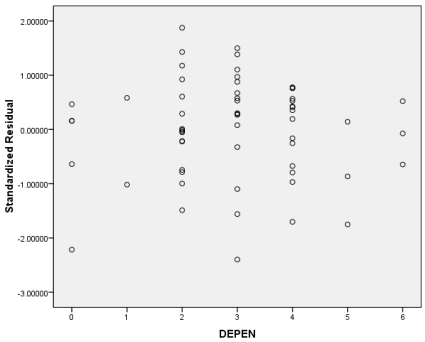
f. Dependent Variable: LnCPC

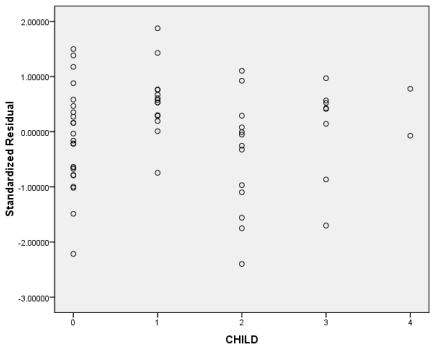
Residuals Statistics[a]

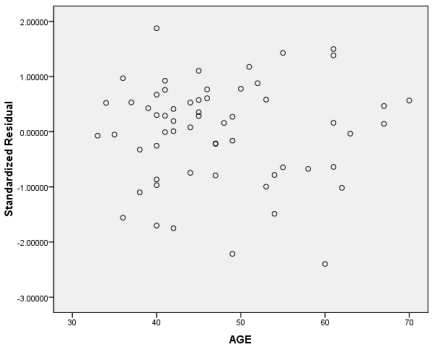
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	5.52985191345E0	6.96126508713E0	6.13782735842E0	.308557211381	60
Residual	-9.750679731369E-1	.847105562687	.000000000000	.401368039073	60
Std. Predicted Value	-1.970	2.669	.000	1.000	60
Std. Residual	-2.346	2.038	.000	.966	60

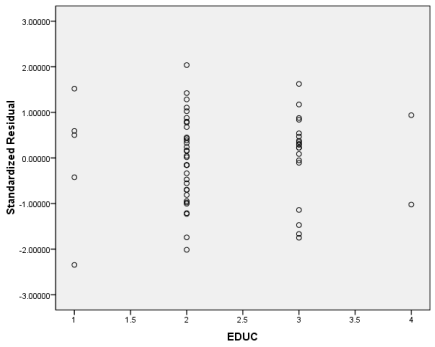
a. Dependent Variable: LnCPC

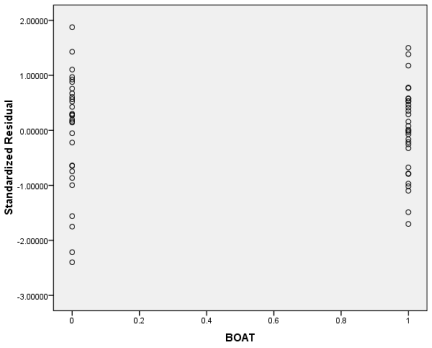


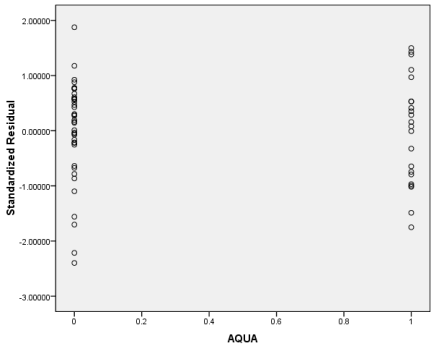


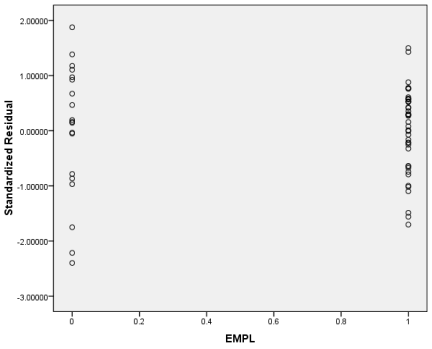

Standardized Residual
CHILD

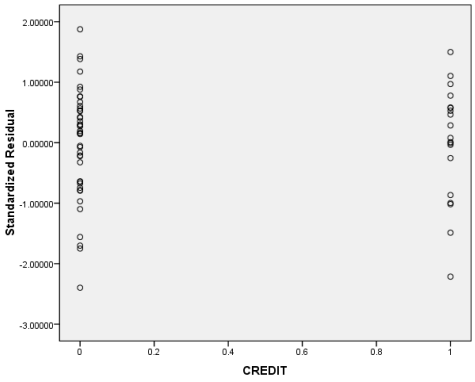

Standardized Residual
AGE

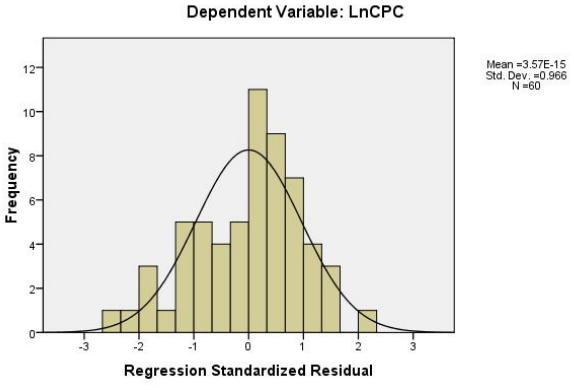

Standardized Residual
EDUC


Standardized Residual
BOAT


Standardized Residual
AQUA


Standardized Residual
EMPL


Standardized Residual
CREDIT


Dependent Variable: LnCPC
Mean =3.57E-15
Std. Dev. =0.966
N =60
Frequency
Regression Standardized Residual

Correlations

			FSIZE	DEPEN	CHILD	BOAT	AQUA	CREDIT	AGE	EDUC	EMPL	LnCPC
Spearman's rho	FSIZE	Correlation Coefficient	1.000	.635**	.081	-.022	.034	-.278*	.079	-.252	-.002	-.475**
		Sig. (2-tailed)	.	.000	.536	.868	.796	.032	.547	.052	.987	.000
		N	60	60	60	60	60	60	60	60	60	60
	DEPEN	Correlation Coefficient	.635**	1.000	.503**	-.012	.037	-.206	-.308*	-.061	.123	-.250
		Sig. (2-tailed)	.000	.	.000	.928	.779	.114	.017	.641	.348	.054
		N	60	60	60	60	60	60	60	60	60	60
	CHILD	Correlation Coefficient	.081	.503**	1.000	-.155	-.078	-.037	-.609**	.078	-.051	-.170
		Sig. (2-tailed)	.536	.000	.	.238	.553	.781	.000	.551	.700	.194
		N	60	60	60	60	60	60	60	60	60	60
	BOAT	Correlation Coefficient	-.022	-.012	-.155	1.000	.182	.228	.069	.025	.274*	.168
		Sig. (2-tailed)	.868	.928	.238	.	.163	.079	.598	.850	.034	.200
		N	60	60	60	60	60	60	60	60	60	60
	AQUA	Correlation Coefficient	.034	.037	-.078	.182	1.000	.226	.026	-.043	.146	-.007
		Sig. (2-tailed)	.796	.779	.553	.163	.	.083	.844	.745	.265	.958
		N	60	60	60	60	60	60	60	60	60	60
	CREDIT	Correlation Coefficient	-.278*	-.206	-.037	.228	.226	1.000	.151	.012	.001	.202
		Sig. (2-tailed)	.032	.114	.781	.079	.083	.	.249	.929	.992	.122
		N	60	60	60	60	60	60	60	60	60	60
	AGE	Correlation Coefficient	.079	-.308*	-.609**	.069	.026	.151	1.000	-.045	-.067	.040
		Sig. (2-tailed)	.547	.017	.000	.598	.844	.249	.	.735	.609	.762
		N	60	60	60	60	60	60	60	60	60	60
	EDUC	Correlation Coefficient	-.252	-.061	.078	.025	-.043	.012	-.045	1.000	.198	.130
		Sig. (2-tailed)	.052	.641	.551	.850	.745	.929	.735	.	.129	.323
		N	60	60	60	60	60	60	60	60	60	60
	EMPL	Correlation Coefficient	-.002	.123	-.051	.274*	.146	.001	-.067	.198	1.000	-.066
		Sig. (2-tailed)	.987	.348	.700	.034	.265	.992	.609	.129	.	.615
		N	60	60	60	60	60	60	60	60	60	60
	LnCPC	Correlation Coefficient	-.475**	-.250	-.170	.168	-.007	.202	.040	.130	-.066	1.000
		Sig. (2-tailed)	.000	.054	.194	.200	.958	.122	.762	.323	.615	.
		N	60	60	60	60	60	60	60	60	60	60

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).