Individual Variations in Fishing Activity with Respect to Household Food Consumption Pattern on Pam Island, Papua New Guinea

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Abstract This paper examines individual variations in skill (efficiency), time and catch in fishing with respect to household food consumption pattern for the Pam Islanders, Papua New Guinea. The results show that the individuals with the higher skill of dive fishing tend to fish longer and obtain a larger catch in comparison with the less-skilled counterparts. The less-skilled individuals' households tend to depend more on purchased foods.

Keywords: fishing, individual variation, food consumption, modernization, Papua New Guinea

Introduction

Individual variations in fishing or hunting activity have been neglected for the populations in the process of modernization, while there are several studies on the issue in pre-modernizing populations (Ohtsuka, 1989). The individual variations have an important influence on the decision-making process (Orlove, 1980), concerning the acceptance or rejection of modernization among the individuals or their households. Therefore, to explore individual variations in traditional activities is essential for the understanding of subsistence changes in relation to modernization.

Fishing still has a special importance in the subsistence adaptations of Pam Islanders, because fishes traditionally were almost the sole animal protein source on this island. However, the cash income from wage labor, a result of modernization, made the imported foods containing animal protein available. As the result, the extent to which each household depends on fish or purchased foods probably corresponds to fishing productivity or income level of the household. The purpose of this paper is to elucidate individual variations of fishing productivity, determined by such factors as skill (efficiency), time and total catch, and to relate them to the difference of food consumption pattern among the households.

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Subject and Methods

Pam island, located at 2° 25'S and 147° 20'E, is a small island in the South Pacific Sea, with a diameter of about 600 m. Administratively, Pam belongs to Manus Province of Papua New Guinea. There are two villages called Ngambaoi and Buiat in the island. The former village was selected for the present research. The de facto population of the target village was 73 who were divided into 10 households, defined as a group using the same kitchen.

Traditionally the Pam people have depended on fishing and shifting cultivation for their subsistence. The villagers, mostly males, fish ordinarily for their daily consumption, using traditional outrigger canoes. In the modernization process, purchased foods, such as tin fish and corned beef, and various imported goods, including fishing apparatuses, now occupy an indispensable part of their diet and subsistence activities.

Two research methods were used to collect the principal data of this study. The first was the observation of fishing activities conducted by 8 adult men for 30 days from August 5 to September 3, 1994. In this survey, each fisherman's time of departure from and return to the island was recorded from 6:00 to 18:00. The fishing methods were grouped into four categories: dive, line, net and poison fishing. Which fishing method was employed by each fisherman for the day's fishing was judged from the fishing apparatuses he carried and interview. The catch was weighed at the time of return from fishing. Only the individual fishing instances were analyzed in this survey, because the cooperative net fishing, which was frequently carried out by use of a motorboat, was not done for household consumption but for the banquet held on the village base. The individual fishing accounted for 85% of all fishing occasions in the survey period.

The second method was a food consumption survey that was conducted on four households (26 persons) for one week from August 27 to September 2, 1994. The method of data collection followed the former studies (Ohtsuka et al., 1985). The author weighed all foods before cooking; if household members ate foods out of the village, he asked them about the kinds of food, together with their amounts and sizes as detailed as possible, to estimate the quantities. The amounts of foods were converted to nutritional values on the basis of the conversion table (Dignan, 1994). The subject persons including men, women and/or children were standardized into the number of adult men on the basis of energy requirement value recommended by WHO (FAO/WHO/UNU 1985).

Results and Discussion

The fishermen engaged most frequently in the dive fishing (67% of individual fishing occasions), followed by the line fishing (28%), the net fishing (4%) and the

Figure 1a. The relation between individual efficiency of dive fishing and labor time spent in individual dive fishing. $r = 0.653$, $P < 0.079$

b. The relation between time spent in dive fishing and that in other kinds of fishing. $r = 0.777$, $P < 0.023$

Table 1. The relation between individual fishing efficiency and his household consumption of animal protein

Household	Dive fishing efficiency of FISHERMAN* (Weight/Hour)	Total Catch by FISHERMAN in 30 days** (kg)	Per-day per-adult male intake of animal protein in household (g)	
			Fish	Purchased foods
A	325	7.90 (100%)	9.38 (55%)	7.67 (45%)
B	1243	58.56 (100%)	52.34 (96%)	2.25 (4%)
C	903	51.68 (100%)	40.44 (94%)	2.73 (6%)
D	779	29.54 (100%)	39.16 (78%)	11.14 (22%)
E***	982	15.80 (83%)		
F	689	5.00 (100%)		
G	220	2.88 (100%)		

* FISHERMAN is an individual who caught fish most in each household.

** The percentage in parentheses indicates proportion of the FISHERMAN's catch to his household total catch.

*** Household E had two men practicing fishing in survey period; the other households had one man.

poison fishing (1%). The efficiency of each fishing method, represented by the weight of catch per labor time, averaged 862 g/hr in the dive fishing, 631 g/hr in the line fishing, 1417 g/hr in the net fishing, and 2143 g/hr in poison fishing for all the fishermen.

Skill, time and catch in fishing widely varied among the individuals. In this study, the skill was regarded as the labor efficiency of each fisherman of the dive fishing, because the fishing required more precise psycho-motor ability than other fishing methods to operate the fishing gears. Fig. 1a shows the scattergram of the individuals

according to the skill (efficiency) and the total fishing time spent during the study period. There was the tendency that the fishermen with the higher skill (efficiency) spent more time than those with the lower skill, although the correlation was not significant.

Fig. 1b shows a significant correlation between the time spent in dive fishing and the total time spent in other kinds of fishing. This fact indicates that the fishermen with the higher skill in the dive fishing tended to spend the larger amount of time in all kinds of fishing in comparison with those with the lower skill.

Table 1 shows each fisherman's skill (efficiency in the dive fishing) and the total catch including other fishing activities during the study period (30 days), and animal protein intake per day per adult male of his household during the period of food consumption survey (7 days). There was a significant correlation ($r = 0.783$, $P < 0.05$) between the skill and the total catch among the fishermen. This suggests that the households with the higher-skilled fishermen could obtain and consume larger amounts of fish. On the contrary, the household with the lower-skilled fishermen had to depend more on purchased animal foods, while the sample size was too small to stand a statistical analysis.

The food consumption survey revealed a high dependence on fish for their protein intake. Of the average amount of protein intake (73.4 g), including both animal and plant protein consumed, 39.9% was derived from fish and 20.9% from imported (purchased) animal foods. This result shows that the contribution of fish to the Pam Islander's diet is at the highest level among the 54 populations in Papua New Guinea reviewed by Kuchikura (1994).

Conclusion

The results of the research deny the assumption that the lower-skilled fishermen would devote more time to fishing than those with the higher skill in order to increase their catch. Among Pam Islander's, there was a tendency that fishing time negatively related to the fishing skill: the higher-skilled fishermen engaged more in fishing than those with the lower-skill.

The modernization opened up the relatively isolated societies such as Pam Islanders to the outside world and provided another opportunity such as wage labor to obtain purchased animal foods. Instead of engaging in fishing, the lower-skilled individuals became to emphasis the wage labor to secure the protein intake of his household. Thus, the means of acquirement of animal protein are diversified and the islanders are able to choose the acquiring strategy of the resource according to their fishing skill. On the other hand, the author has an impression that the modernization has changed the traditional customs of the islanders: the frequency of communal fishing in which the catch was shared among participants decreased and the fishing tends to be done on an individual base. In order to reveal the subsistence strategy of a

population accurately in human ecological study, it is important to evaluate individual variations, especially in the populations who can choose plural strategies that become available in the modernization process.

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