

IMPORTANCE OF HOUSEHOLD INCOME AND EXPENDITURE SURVEYS AND CENSUSES FOR MANAGEMENT OF COASTAL AND FRESHWATER FISHERIES

INTRODUCTION

'Development and implementation of national and regional conservation and management measures for the sustainable use of fisheries resources' is a priority of the Pacific Plan. It was reiterated in the Vava'au Declaration on Pacific Fisheries Resources, the Special Theme of the 5th Pacific Conference on the 'Future of Pacific Fisheries', and at the 4th Annual Forum Fisheries Committee Ministerial Meeting.

SPC and FFA are assisting Pacific Island countries and territories (PICTs) to develop and implement plans to improve the assessment and sustainable management of their oceanic, coastal and freshwater fisheries resources and aquaculture. Particular emphasis is being placed on:

- maximizing the contribution of tuna to economic growth by increasing the involvement of PICTs in the catching, processing and trading sub-sectors of the industry, rather than focusing mainly on optimising access revenues (see www.ffa.int/devfish for details);
- planning the use of fish for food security to provide for the future welfare of the region's rapidly growing populations (SPC 2008, Bell et al. 2009); and

*Johann Bell¹, Phil Bright¹,
Bob Gillett², Greg Keeble¹,
Mecki Kronen¹,
Kelvin Passfield³, and
Chris Ryan¹*

- optimising the number of livelihoods that can be sustained by fisheries and aquaculture (SPC 2007a,b).

Export data provide good information for assessing the effectiveness of management measures aimed at maximising the economic benefits from tuna and the contribution of aquaculture products and coastal fisheries commodities (such as bêche-de-mer and trochus) to livelihoods. But there is currently little or no reliable information on the volume of fish⁴ used for subsistence for most PICTs (Gillett 2009). The same is true for harvests of fish from coastal and freshwater areas sold at local markets.

There is an urgent need to redress this problem. Large increases in the supply of fish are needed to provide food security in the near future (Fig. 1). Governments need to know whether the recommended management measures and policies they implement to provide access to this fish are working effectively. Depending on the country or territory, such measures include storing and

distributing low-value tuna landed by industrial fleets; sustaining the productivity of coastal reef fisheries resources; installing low-cost, inshore fish aggregating devices (FADs) to provide better access to tuna for coastal subsistence fisheries; development of fisheries for small pelagic fish; and expansion of pond aquaculture (SPC 2008, Bell et al. 2009).

This paper outlines how household income and expenditure surveys (HIES) and censuses can be modified relatively easily to provide governments with a powerful tool to monitor: i) how much fish is being consumed in rural and urban areas; ii) how much of this fish is derived from subsistence fishing, gifts, or purchased from local markets; iii) how much income is being earned from the sale of fish on local markets; iv) how many households use fish for subsistence, and/or depend on the sale of fish to contribute to their livelihood; and v) what proportions of these benefits come from oceanic, coastal and freshwater fisheries resources and aquaculture.

ADVANTAGES OF HIES AND CENSUSES

While there are limits to the information that can be derived from HIES and censuses, these tools give fisheries departments the opportunity to collect basic information on production of coastal and freshwater fisheries that would otherwise be expensive to collect through targeted surveys.

The advantages of using HIES to assess fisheries production are that they are usually conducted every 5 years and are a high priority for both governments and

¹ Secretariat of the Pacific Community, Noumea, New Caledonia

² Gillett, Preston and Associates, Suva, Fiji

³ International Union for Conservation of Nature, Suva, Fiji

⁴ Fish is used here in the broad sense to include finfish and invertebrates

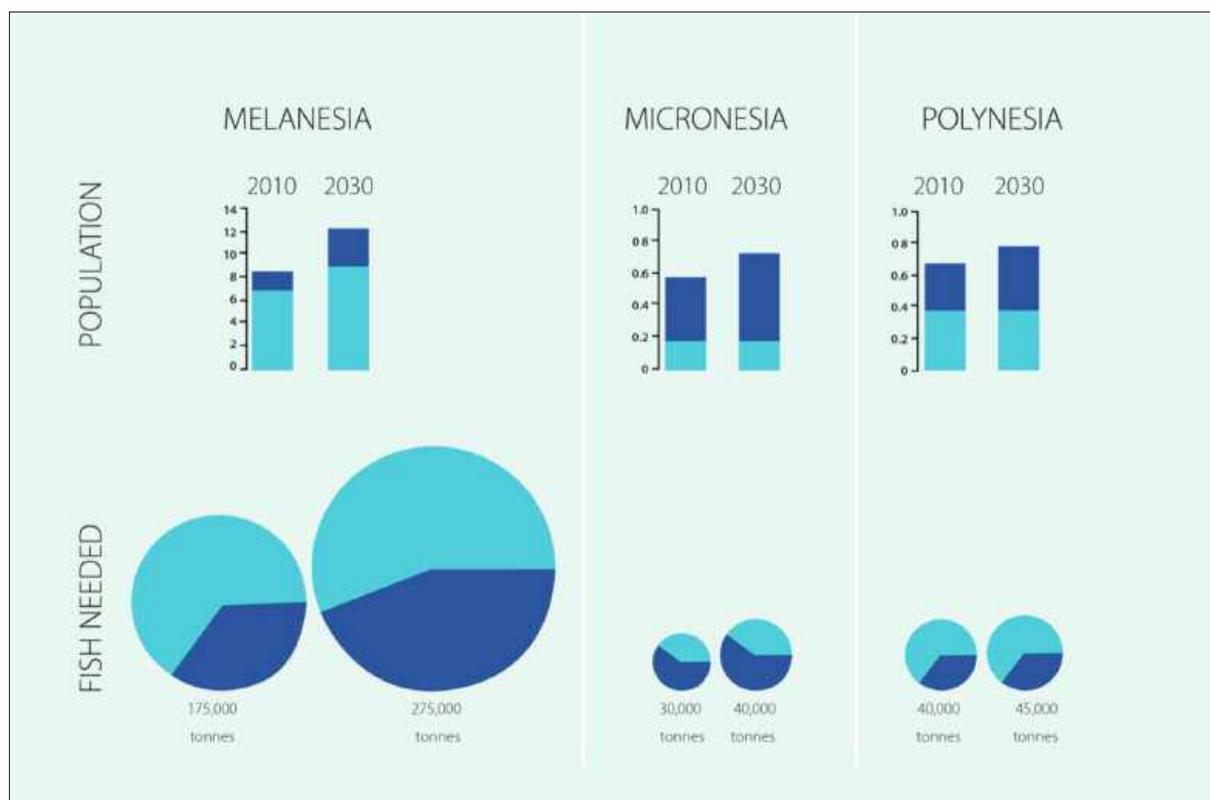


Figure 1. Forecasts of population growth and amount of fish needed for food in rural (light grey) and urban (dark grey) areas of the Pacific - Source: Bell (2007)

donors – they are used to adjust the Consumer Price Index, quantify poverty and hardship, and analyse the nutritional status of households. For larger PICTs, up to 5% of households are covered nationally by HIES. In smaller PICTs, up to 30% of households are surveyed. In both cases, extrapolations to the national level are considered to be reliable.

Well-designed HIES, appropriately supervised by national statistics offices, can be expected to deliver sound estimates of local fish consumption, household expenditure on fish, and household income derived from fish, in both rural and urban areas.

The great strength of censuses is that they provide information for all citizens every 5 or 10 years, depending on the PICT involved. If they are modified to include basic questions about participation in fishing and associated activities, they have

the potential to measure the percentage of households involved in subsistence fishing, and in other types of fishing to derive income. Another advantage of using censuses is that they lend themselves to analysis using geographic information systems (GIS). This allows policy-makers to see the spatial distribution of fishing activities for subsistence and livelihoods.

PREREQUISITES FOR HIES AND CENSUSES FOR USE IN FISHERIES MANAGEMENT

Although information of much use to fisheries managers can be obtained from HIES and censuses, modification of these tools needs to be done carefully to minimise the number and cost of additional questions.

Identifying the objectives of collecting the information is the essential first step. In most cases, these objectives will centre around:

- i) obtaining estimates of coastal and freshwater fisheries production where they do not exist already; and
- ii) evaluating the success of management interventions and policies, such as those designed to improve regular access to fish for food security, or to assist fishing communities to adapt to climate change.

Clearly, senior staff from national fisheries departments and national statistics agencies need to consult on how best to modify HIES and censuses for the purpose of fisheries management. In particular, they need to identify the best trade-off between the additional work involved for enumerators and the information to be gained. As a guide, modification should be limited to 3–5 new questions.

INFORMATION REQUIRED

HIES

To assist management of fisheries, HIES should be modified to collect information in ways that are simple to understand and that make it easy to quantify, for each household, the fish caught for subsistence, purchased at local markets, sold, received as gifts and given as gifts⁵. These data can then be used to estimate total fish consumption, total fish catch, the number of households engaged in subsistence and market-based fishing, and the average income earned by selling fish on domestic markets.

Fish consumed and caught by households should be disaggregated into the lowest number of categories that enable fisheries managers to:

- i) evaluate the relative contributions of the main fisheries resources to subsistence fishing/aquaculture, and activities aimed at generating income; and
- ii) assess the total fish production from the key coastal and freshwater fisheries management sectors and aquaculture.

A provisional list of the fish categories that could be used in modified HIES by a broad range of PICTs is shown in Table 1. In general, the number of fish categories used for HIES diaries and questionnaires should be limited to 8–10. The list should cover the major commodities used by households but could also include individual species where they are a regular and important part of the diet and need specific management.

Although the most frequent application of HIES for fisheries

will be to estimate coastal and freshwater fish production, the fish categories chosen should also measure consumption of:

- i) tuna and other offshore fisheries resources (to evaluate policies to improve access to these resources); and
- ii) imported fresh and frozen fish (to evaluate the need/potential for replacement of imports. Note, however, that records of imports of seafood for the tourism industry will also be needed to do this).

It will also be important to obtain robust estimates of:

- i) the consumption of fresh meat, poultry and tinned meat to quantify the contribution of fish to total intake of animal protein, and
- ii) the consumption of both locally produced and imported canned fish to ascertain the relative contribution of fresh fish and canned fish to the diet.

Censuses

For censuses, questions need to be constructed to measure the num-

ber of people and households deriving subsistence and income from oceanic, coastal, freshwater and fisheries, aquaculture and fish processing on a self-employed and employed basis. Once again, the questions used should be kept to the minimum needed to obtain the basic patterns of engagement in fishing.

Care is needed to:

- i) phrase fisheries questions for censuses in an identical way to those in HIES;
- ii) separate fishing and aquaculture activities from agriculture activities; and
- iii) define terms such as 'subsistence' and 'employment'. In particular, statisticians should recognize that employment in fishing is not limited to jobs with fishing companies – in most countries there are large numbers of small-scale fishers selling fish for income.

ESTIMATING TOTAL PRODUCTION FROM SMALL-SCALE FISHERIES USING HIES

In PICTs where there is no export of coastal fish, robust estimates of

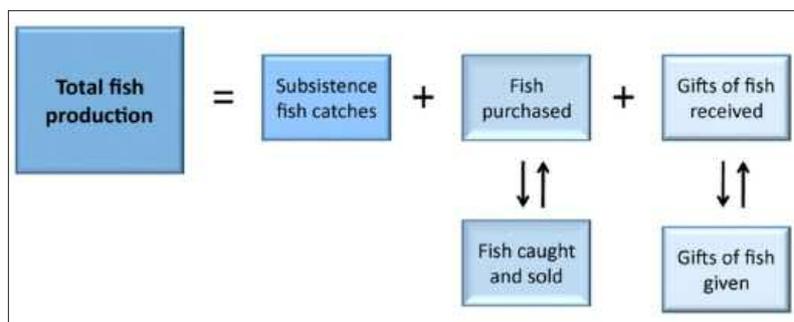


Figure 2. Principal sources of information from HIES that can be used to estimate total national production of coastal (or freshwater) fisheries in countries and territories where such fish are not exported.

Note that the total amount of fish sold can often, but not always (see text), be used to verify the total amount of fish purchased, and the total amount of fish given as gifts can be used to verify the total amount of fish received as gifts.

⁵ Gifts includes fish taken overseas by the household to give to relatives

national fish consumption can provide a good proxy for production from coastal fisheries (Fig. 2). However, care is needed to deduct any purchased fish consumed that is derived from imports of fresh or frozen coastal fish species. Also, in PICTs that have a large tourism industry, the amount of fish sold by households is likely to exceed the amount of fish purchased by households. In such cases, the amount of fish sold should be used in preference to the amount of fish purchased to estimate production over and above that recorded for subsistence and gifts.

In PICTs where commercial companies export coastal food fish, the quantities involved will need to be obtained from national export records and added to the categories described in Figure 2 to estimate total coastal fisheries production. The volume of exports can be verified by comparing it with the volume of imports recorded by the receiving country.

HIES will be of most value to fisheries managers when they quantify the total weight of fish

harvested – total weight is the most common metric for reporting fisheries production. Accurate measurements of total fish weight derived from HIES will enable managers to identify changes in per capita fish supply, and changes in total production from each of the main resources used to provide access to fish.

Caution is needed, however, in interpreting any changes over time in total production of coastal and freshwater fisheries derived from HIES. Changes in production may not always represent changes in the status of the stock. For example, improved access to tuna may induce coastal communities to rely more heavily on offshore resources for food and reduce catches of reef fish. To interpret whether changes in coastal fish production derived from HIES are due to changes in the rate of exploitation, fisheries managers will also need to rely on other indicators of the status of coastal resources, such as changes in the relative abundance and size of key species.

METHODS TO IMPROVE THE ACCURACY OF HIES

In past HIES, total weight of whole fish consumed has often been calculated by dividing the amount spent to purchase fish by the average price per kilogram. Errors have occurred when the average purchase price was not recorded at the time and had to be estimated later. In the case of subsistence catch, households were asked to estimate:

- i) the price they would have paid if they had bought the fish at a local market, or
- ii) the weight of their catch, without providing them with the equipment or a reasonable guide for doing so.

The accuracy of information on fish acquisition and sales can be improved in future HIES by changing the recording methods as follows:

1. Arranging for a fisheries specialist to provide training for all enumerators in attributing fish to the main

Category	Market price (unit)	Caught by household		Purchased		Sold		Gift received		Gift given	
		Value (\$)	Wt (kg)	Value (\$)	Wt (kg)	Value (\$)	Wt (kg)	Value (\$)	Wt (kg)	Value (\$)	Wt (kg)
1. Tuna											
2. Other offshore fish											
3. Reef fish											
4. Other inshore fish											
5. Shellfish (invertebrates)											
6. Freshwater fish											
7. Aquaculture fish											
8. Imported fresh/frozen tuna											
9. Imported fresh/frozen reef fish											

Table 1. A summary of the recommended information on fisheries to be collected from HIES, showing the main categories of resources used for subsistence, purchased and sold, and received and given as gifts.

(1,2: Offshore resources; 3,4,5: Coastal resources; 6: Freshwater resources; 7: Aquaculture; 8,9: Imports (outside management areas))

- categories prior to implementing a HIES.
2. Estimating the total weight of fish caught by the household for subsistence or received as a gift. To enable households to do this, enumerators will need to provide them with charts that can be used to estimate the weight of fish of different sizes in each category. Where possible, enumerators should be equipped with scales and visit each household every day during the HIES period to help measure the fish and 'ground truth' that the fish are allocated to the correct category. A simple, inexpensive hand-held spring scale and a plastic bag for holding the fish is all that is required.
 3. For fish purchased at local markets, the total purchase price, and the price per unit (kg, lb, string of fish, etc.) should be recorded, together with the total weight (or number of units) as described above. Similarly, for fish sold by the household, the total price and total weight (or units) should be recorded (Table 1).
 4. The fish categories selected by a PICT could be pre-printed on the pages of a diary as an aid for households in recording what fish they caught, purchased, sold, received as gifts and gave as gifts (Table 1). Diaries could also include images of the main categories of fish (with examples of the main species in each category) to minimise the risk of errors in filling out the diary.

5. When data from HIES are converted to totals for fish categories, and consolidated to document patterns for rural and urban areas, confidence limits should be calculated to provide a measure of evaluating the significance of any changes in total fish weight over time.

Careful application of these methods is essential. Otherwise, the benefits of modifying HIES will not be realised – poorly supervised HIES will produce data of little value. National statistics agencies, and the donors that support them, may wish to consider incentives for the implementation of well-designed HIES, e.g., bonus payments when all fieldwork is performed thoroughly.

CONCLUSION

Fisheries management agencies throughout the Pacific currently have poor information on the amount of fish caught for subsistence or livelihoods (local sales) from coastal and freshwater areas. This poses a major problem because managers have little idea about whether these resources, which play a vital role in national food security and maintaining livelihoods in rural areas, are being harvested within sustainable bounds. Government decision-makers also have no idea of the value of subsistence and small-scale commercial fisheries to the national economy.

Well-conducted HIESs and censuses promise to provide basic information on the composition, quantity and estimated value of these harvests, and the number of households involved in different forms of fishing and aquaculture, on a regular basis. This information can then be used to evaluate the success of management measures and

policies to improve regular access to fish for food security and income earning opportunities. It can also be used to inform decision-makers responsible for evaluating the cost benefits of coastal and watershed developments that may have a negative impact on coastal fisheries resources.

Senior staff from national fisheries departments and national statistics agencies need to consult on what modifications should be made to future HIES and censuses to collect the basic information required in ways that minimise the work involved.

Considering that a large number of HIES or censuses are planned for the Pacific over the next three years (Haberkorn 2008), and that many PICTs do not have the resources to support targeted fisheries surveys, the modification of HIESs and censuses to serve fisheries management should be given urgent consideration.

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Secretariat of the Pacific Community, Marine Resources Division, Information Section,
BP D5, 98848 Noumea Cedex, New Caledonia
Telephone: +687 262000; Fax: +687 263818; cfpinfo@spc.int; <http://www.spc.int/coastfish>