VANUATU MILLENNIUM CHALLENGE ACCOUNT

Data Quality Audit – First Mission

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Executive summary

Quality Audit Mission 1

The quality audit took place between 22 October 2007 and the 15th November 2007. The mission focused on the quality of the 2006 Household Income and Expenditure Survey which provides data for two of the three goal indicators. The audit mission paid special attention to the HIES as it is about to reach its publication stage, its quality was reviewed and recommendations made for quality improvements and the way in which the survey should be used to provide information for the MCA indicators. The overall evaluation of the survey is that in developing country terms its quality is good to average. However further work is required to identify and treat households with insufficient food consumption, which was used as a criterion for assessing the completeness of the expenditure records.

The income and expenditure data were examined in detail to check the correspondence between the two variables for individual households. It was found that just over one quarter of households lie in the same 10% of households when ranked in order of both income and expenditure, indicating an imperfect relationship between the two. An analysis of the data shows that households who have the lowest participation in the cash economy are most likely to have understated cash incomes as compared with cash purchases, while those in waged or salaried jobs are most likely to understate expenditure as compared with income, although there are extreme cases at both ends of the scale. The expenditure variable demonstrates a smoother profile with less extreme values, and is a more reliable indicator of poverty than income.

More work is required to define poverty in Vanuatu. A relative poverty line is recommended using the bottom 30% of individuals in each Province, ranked by adjusted per capita expenditure. Sampling errors should be calculated for household regional expenditure estimates. Price variations between provinces are important, with a typical national food basket in Port Vila valued at twice that of the cheapest region, there are no reliable regional deflators therefore inter-regional comparisons are problematic.

The expenditure on goods and services will be used to determine changes in poverty for project beneficiaries. Cash purchases will be used to determine per capita cash incomes.

As part of the mission indicator reference sheets were produced for each of the indicators specified in the Monitoring and Evaluation Plan, and these have been supplied to the MCA in a separate report.

The consultant also worked with the MCA Economic Analyst to revise the proposed traffic survey; and to determine methodologies for the share of road length in good or fair condition; and also to develop an annual PWD score for monitoring maintenance activities.

Some recommendations were also made on the draft terms of reference for the Roadside Enterprise Survey.

Recommendations

I. Recommendation
Erring on the side of caution it is suggested that Vatu 10,000 would be a reasonable point at which the estimates for total food consumption should be abandoned or subject to further imputation scrutiny. Records have been sent to the consultant where food consumption is either less than 5,000 Vatu per month; or in order to cater for small households, where

food consumption is between 5,000 and 10,000 Vatu per month and per capita food consumption under 1,500 Vatu per month. 224 records have been identified by the consultant for treatment and have already been sent to the MCC consultant.

II. Recommendation

For a more exact check on the adequacy of the food data, and as the first step to developing a poverty line, it is recommended that a food basket, fitting the average ni-Vanuatu household diet, is developed and priced to give 2,600 Kcal/person/day.   By using adult equivalence scales and the average household size a new minimum household food basket can be estimated. With the support of a nutritionist, and adequate desk research on similar basket calculations, the NSO should be capable of doing this work. The NSO should seek the services of a nutritionist to develop a Vanuatu poverty basket. The ADB support to the poverty line should be asked to check the basket construction as part of the terms of reference for developing a poverty line, as the resulting basket may provoke political debate, and the NSO will require the confidence of an external quality check to defend their calculations.

III. Recommendation

A poverty line should be calculated as soon as is feasible. Since the mission it has been learned that this is to be done by ADB in collaboration with NSO and the SPC. An absolute poverty line is the methodology chosen by most developing countries, but given the constraints of data quality and inter-island price comparisons, a relative poverty line using the lowest 30% per capita adult equivalents may be easier to compute for the purposes of the project and this should be done province by province to avoid 'market value' problems. Sampling errors of the household consumption estimates are required to check reliability of inter-islands comparisons. The sampling errors so far calculated are done in a way that makes it difficult to comment on whether the sample sizes are large enough for provincial estimates.   The consumption aggregate has already been calculated, but the work of correcting under-reporting of consumption must also be completed before the sampling errors can be calculated.   The variability of the estimate determines the sample sizes required – however the results of the calculations of the sampling errors will make this obvious. Island estimates will almost certainly be too small to be reliable in most cases.

IV. Recommendation

Consumption expenditure deciles should be developed for each province based on per capita (adult equivalent) consumption of goods and services and the bottom or lowest 30% be considered as 'the poor'.

V. Recommendation

Cash income is to be measured in variable 1, this should be the rise in cash incomes (using cash purchases as a proxy) in the catchment areas of the project.   The cash values will have to be deflated to reflect price changes over time, an important associated data source will be required, this is the collection of regional market prices. At present the only price collection occurs in Vila and Santo which is not sufficient to correct all regional prices. However this exercise is only required for the HIES deflators and it is not necessary to collect a monthly regional CPI. The market prices of all key own consumption commodities, (the top 20-30 items by value at least) should be collected at the same time as the next survey is conducted. Special dedicated enumerators or supervisors should be given this task to ensure it is done thoroughly. The usual CPI techniques employed by CSO should be used to do this.

VI. *Recommendation*

The evaluation will require a comparison of money metric values at the start and end of the project. The regional prices for the 2006 HIES study should be collected as soon as possible, although a considerable time has already passed since fieldwork. The general CPI will have to be used to correct prices for the intervening period. Internal HIES could be used, but there are problems with the quantity data which suggest that any unit prices may be less than reliable. This should be done in the way recommended above – prices in each province for a similar quantity and quality of a product should be collected at each provincial market for the top 20-30 commodities. These would then be used to construct an index to standardise values across regions and time for the evaluation.

VII. *Recommendation*

Variable two compares the deflated consumption level of the variable described above at 30 percentile point. This will enable a comparison to be made between the poverty line in HIES 1 and HIES 2. One further consideration must be the standard errors or significance of these results at the provincial level, additional technical assistance may be required to compute the significance of consumption at the regional level, if the skills and software are not already available in the NSO. It was noted during the mission that external consultants computed the sampling errors.

Recommendations for the next HIES

VIII. *Recommendation*

A panel design will reduce sampling errors in making comparisons between the two surveys. It will enable changes to be measured at the household level independent of sampling error, and to see which households are improving their participation in the cash economy. A panel survey involves returning to the same sample of households as was used for this HIES, but making replacements from a pre-selected list where the original households have moved or are unable to be located.

IX. *Recommendation*

Maintain same survey methodology in HIES 2 – any major changes will introduce unknown and immeasurable errors in comparing estimates from the two surveys.

X. *Recommendation*

Provincial market prices should be gathered systematically in any future HIES to derive deflators. This should be accompanied with more reliable quantity measures in the diaries. The quantities collected in the HIES cannot be replaced, as this is part of the original fieldwork. In the next survey the quantities of the own consumption data should be collected using standard units, for example hands of bananas, or kilos of rice or litres of milk. It is preferable to supply households with containers such as buckets and jugs showing quantities or with marked gradations to allow more precise quantity data to be collected. If these are given to households as gifts it may improve their cooperation.

XI. *Recommendation*

Better diary supervision is required in the next survey with visits every 2-3 days to prevent drop off in entries. If resources are not available for this, then the diary period might be reduced to 1 week, although this is not ideal. It is better to have a shorter period of good data, than a longer period of unusable data. Cost economies at the level of supervision are false economies, as the cost of attempting to correct poor data is much greater, and the results will always be of doubtful quality.

XII. Recommendation

Enumeration Areas are to be coded in the current and future HIES in order to create a variable indicating whether areas are within the project catchment area or outside. This will enable the required estimates to be made for the first two goal variables.

XIII. Recommendation

In future the balance of the household questionnaire should be changed to focus less on luxury expenditures, loans, income sources such as lottery winnings and investment income which apply to a tiny minority in urban areas. More should be included as rare or infrequent purchases over a 12 month period on items consumed less frequently by the households in rural areas, such as clothing and smaller household goods (i.e. specify a knife rather than a dinner set). In addition a section on regular fuel and transport expenses is needed, particularly for frequent purchases. There is reason to believe[1] that both these types of expenditure may have been under-recorded in the survey, partly due to the design of the diaries which stressed food items, and the infrequent nature of clothing and other 'major' purchases for rural households.

XIV. Recommendation

The cash transfers recorded in the diary seemed partly to duplicate income data collected on the household questionnaire, but also caused some extreme values when grossed-up from daily to monthly totals. There were some rather unlikely values noted in the data as a result of using the diary multiplier. It is recommended that cash transfers are treated separately and their source and regularity is explored with respondents on the household questionnaire. Worldwide it is known from other sources that transfers make up quite a significant amount of poor households' incomes and more information is required to analyse this information with accuracy.

Non-HIES Based Indicators

Increase tourism employment

XV. Recommendation

It is recommended that any frame for the tourism establishment surveys should include direct tourist establishments only, and be checked with the NSO to compare with their enterprise surveys and their business register which is derived from VAT records. It is only with a reliable frame with size measures that the results can be weighted up. The frame used for the current survey should be rearranged with size measures to obtain weighting factors for the calculation of regional estimates.

XVI. Recommendation

The business survey conducted by NSO is an alternative source of reliable information. The results of the proposed 2008 survey should be checked against those of the 2007 consultant survey. Consideration should be given to diverting future funds for tourism employment estimation to the NSO. The NSO has expertise in enterprise surveys, and has a direct need for the results. Consultants might supplement this with more qualitative information from focus groups on the effects on their businesses from the project and on their investment decisions.

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[1] NSO comparisons of total expenditure compared with national accounts estimates.

XVII. *Recommendation*
Questionnaires should avoid collecting employment in grouped categories, and include all classes of employment, including proprietors and unpaid family workers.

Number of new hotel rooms

XVIII. *Recommendation*
Hotel completion certificates are issued VIPA, and after that the Vanuatu National Tourism Development Office carries out its certification. The tourist establishment should be added to the register of hotel once the certification has been completed by the Tourism Office. A quarterly return from them would aid this communication between the bodies concerned. Initially this will only be required for the project in the areas of Efate and Santo, but it may be advantageous for the NSO to add all new hotels to its new establishments list. Action should also be taken to delete closed establishments from the list. A regular return should be required from the VNTD offices to ensure that the provision of timely, reliable data becomes a routine activity for the offices.

Number of tourists

XIX. *Recommendation*
Use 2007 Survey to update baseline data in M & E plan relating to numbers of visitors to the islands treating Malekula as a whole rather than S.W Bay is particular.

XX. *Recommendation*
Ensure that same methodology is used in next tourism survey.

XXI. *Recommendation*
Investigate including a question on the departure card for visitors about the islands which were visited by tourists during their visit. This not likely to be a fast solution, but it will have a continuing use to the Government in planning and monitoring tourism in the country.

XXII. *Recommendation*
Abandon annual tourist estimates to the islands until departure cards are amended and use airline passengers as a proxy, or simply rely on room occupancy estimates to monitor island tourism.

Occupied bed nights

XXIII. *Recommendation*
A new question should be added to the hotel occupancy questionnaire to cater for backpackers dormitories which asks;
1. Number of dormitories
2. Number of available beds in dormitory in month
3. Number of occupied beds in the month

XXIV. *Recommendation*

The frame of all hotels must be updated on a quarterly basis by sending a return to each of the provincial tourism development offices. MCA should take responsibility for ensuring this is institutionalised. The frame should be used for Indicator 4, but also be used to mail out forms to all new hotels for Indicator 6.

XXV. *Recommendation*

All quarterly returns on hotel occupancy should be checked and compared with the results from the previous quarter to ensure that the total number of room nights is consistent and any changes accounted for in Indicator 4. This validation from quarter to quarter will be required of total number of rooms and average cost of a room per night. The total number of rooms is an absolute number and should not vary, but the cost per room per night should be checked as being within an acceptable range of the that of the previous quarter.

Simple deletion of records for which no return was received will result in misleading underestimations, especially if the number of forms returned varies from month to month. Non-response must be accounted for by imputations or attempts to obtain full response from hotels. It is recommended that baseline data be obtained from all hotels, and subsequently any missing records in subsequent quarters be estimated or imputed by trends observed in the forms received from hotels in the same area. A special effort should be made to persuade the hotels to return the baseline data, and this should be accompanied with some media coverage about the value of such data to the tourism sector.

Traffic Volume

XXVI. *Recommendation*

The maximum number of interviews possible for each enumerator is just 80 per day, and over a 7 day period 560 interviews. Using just three time bands daily time band sample sizes will be small with just two interviewers. Larger sample sizes will yield less variable results and the MCA should consider the required levels of accuracy.

XXVII. *Recommendation*

Police advice should be sought on gaining cooperation of drivers near town at busy periods, and on obtaining suitable locations for the enumerators. Publicity will be require before survey to boost response and gain cooperation.

XXVIII. *Recommendation*

To assure confidentiality to be assured, data should be collected under Statistics Act and enumerators should sign the oath of secrecy.

XXIX. *Recommendation*

Counts and surveys should take place simultaneously, at same locations and at the same time of year to ensure comparability. Journey estimation procedures should be followed, and tallies kept of vehicles which cross two enumeration points.

XXX. *Recommendation*

Breakages and malfunctions in the traffic counters should be planned for. An extra counter is recommended to cope with mechanical problems which might be expected as counters are moved around the islands.

Road closures

XXXI. *Recommendation*
MCA agrees a definition of road closure with PWD at the earliest possible occasion.

Roads in good or fair condition

XXXII. *Recommendation*
It is recommended that similar templates to that prepared for Efate ring road are prepared for all the other project roads and that baseline data is collected by the MCA Economist in this way. This should be done for project roads only.

Annual PWD Score

XXXIII. *Recommendation*
The scoring of the PWD composite indicator is agreed with the MCA and PWD as soon as possible, in particular making a decision as to whether all key performance indicators are to be weighted equally.

XXXIV. *Recommendation*
The PWD Database should be inspected and checked when ready, a system of random spot checks should be developed to ensure that the maintenance recorded in the database has taken place as reported.

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List of tables and figures

Abbreviations

ADB   Asian Development Bank

EA   Enumeration area

HIES   Household Income and Expenditure Survey

OPM   Oxford Policy Management

MCA   Millennium Challenge Account

MCC   Millennium Challenge Corporation

NSO   National Statistics Office

PWD   Public Works Department

PPS   Probability Proportional to Size

SPC   South Pacific Commission

1   Data Auditing for MCA-Vanuatu

1.1   Background

In January 2004 the United States Congress passed a new compact for global development to be managed by the Millennium Challenge Corporation. The Government of Vanuatu was an early beneficiary of this initiative and is receiving assistance to facilitate poverty reduction through economic growth in Vanuatu. MCA-Vanuatu is established as an independent unit within the Ministry of Finance and Economic Management to be the legal entity responsible for the oversight and management of the implementation of the Compact. The MCA-Vanuatu Steering Committee and Management Unit have principal responsibility for the overall management of the implementation of the Program. Vanuatu identified costly and unreliable transportation infrastructure as a major impediment to economic growth. To overcome this constraint, Vanuatu's Compact consists of eleven infrastructure projects; including roads, wharfs, an airstrip and warehouses that is gear to help rural agricultural producers and providers of tourist related goods and services on eight islands to reduce transportation costs and improve access to transportation services. The Compact also includes an institutional strengthening component and policy reform initiatives to ensure the sustainable operation and maintenance of Vanuatu's entire transport infrastructure network[2]

The project has developed an ambitious Monitoring and Evaluation Plan as part of the project implementation. The project has already contributed funding towards the collection of baseline information, and has included the services of a consultant data quality auditor. The main objective of this consultancy is to ensure that data collected for program monitoring and evaluation is of acceptable quality, reliability, and consistency. The consultant is required to carry out reviews and provide quality assurance for survey proposals and other data collection initiatives.

The full terms of reference are reproduced in Annex A. The consultant is to review the data gathered, to ensure that data reported are valid, reliable, timely, and precise as resources allow. This is to verify the quality and consistency of data across different implementing entities and reporting institutions. The data quality reviews will also assist in identifying key issues or problematic areas regarding data quality and identifying mitigation measures to correct the problems. The Consultant shall review the following but not limited to;

- the methodology in which the data are collected;
- the accuracy of analysis to determine computed indicators;
- the methodology in computerizing of indicators;
- the flow of data from the various institutions to MCA-Vanuatu;
- the accuracy, consistency, and reliability of primary and secondary data;
- the review the print format and interface of the data in the database; and
- review methodology and accuracy of reporting to both MCA-Vanuatu by implementing institutions and reporting from MCA-Vanuatu to MCC.

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[2]   http://www.governmentofvanuatu.gov.vu/Default.aspx?alias=www.governmentofvanuatu.gov.vu/mca-vanuatu

1.2 Data Auditing Plan

Three missions to Vanuatu are planned over the life of the project, the plan for data auditing is as follows.

1.2.1 First Mission

- Review all indicators and special studies planned before next visit, and complete the Indicator Reference Sheets.

- On a sample basis, check HIES data and make recommendations on quality issues and improvements – check income and expenditure in detail as these are the basis of two of the goal indicators.

- Examine data collected so far on tourism survey – examine sample of questionnaires. Make recommendations for improvement.

- Explore indicator data collection methodology with NSO and all other data providers.

- Explore data collection methodology for all indicators to be collected shortly, including

  o Traffic survey

  o Hotel occupancy

  o Hotel rooms

  o Number of tourists

  o Road condition survey

  o PWD performance indicator

- Compile indicator reference sheets with basic metadata

- Report on quality concerns

- Recommend improvements/replacements

- Comment on the scope of M & E

- Make presentation to stakeholders

- Incorporate comments in findings

1.2.2 Mission 2 (2009)

- Follow-up on recommendations made during mission 1

- Check poverty estimation methodology and comment

- Review results of tourism survey – compare tourist business survey with any results from NSO's Business Survey

- Review results of agricultural survey – make recommendations on using this methodology in next HIES

- Examine data collected for all newly collected indicators – from PWD, wharf managers, Air Vanuatu etc.

- Re-examine road condition survey – progress after 2 years.

- Make further recommendations on next HIES for inclusion in survey

- Comment on feasibility of M & E process when in operation and the adequacy of resources to undertake it – suggest efficiency measures.

- Report findings to stakeholders.

1.2.3 Mission 3

- Follow-up on recommendations of mission 2.

- Review results of final surveys (HIES and Tourism) – and quality of comparisons. How robust are the findings.

- Ensure all data is properly recorded and archived.

- Comment on M & E Process

1.2.4 Ongoing Support

The consultant may also provided support during the life of the project up to the value of the fee days provided for in the contract.

1.3   Structure of the report

The report is organised according to the indicators and studies contained in the Monitoring and Evaluation Plan. This report will focus largely on the Goal indicators, as these are the indicators for which data has recently been collected, and for which baseline data is urgently required. The outcome and output indicators will be discussed, but as the means to collect data for the infrastructure improvements are not yet in place, a detailed discussion of their collection would be premature. Further investigation of these indicators will follow during the next mission.

Several studies are to be undertaken in the coming months, during the mission the consultant discussed these at length with the MCA Economist and the conclusions and recommendation will be reproduced in the text below.

Table 1.1   MCA-Vanuatu Indicators

Indicator No.	Description	Data Source
1	Increase cash income per capita of beneficiaries	HIES
2	Reduce poverty	HIES
3	Increase tourism employment	Tourist enterprise survey
4	Number of new hotel rooms	VTO/Councils
5	Number of tourists per annum	NSO & tourism surveys
6	Number of hotel rooms occupied (bed-nights)	NSO
7	Air freight uplifted from Malekula	Air Vanuatu
8	Cargo shipped from Loltong Wharf	TBD
9	Average annual daily traffic volume	MCA/PWD
10	Days road is closed	PWD
11	Number of S.W. Bay flights cancelled	Air Vanuatu
12	Time at wharf	TBD
13	Warehouse damaged cargo and revenue	TBD
14	Share of roads in good or fair condition	MCA
15	Roads upgraded	MCA
16	River crossing constructed	MCA
17	Airstrips upgraded	MCA
18	Maritime wharves reconstructed	MCA
19	Annual PWD Score	PWD/MCA

2   Goal Indicators HIES

2.1   Goal Indicators – Increased Cash Income

Indicator 1: Increase cash income per capita of beneficiaries: the source for this indicator is the 2006 Household Income and Expenditure Survey (HIES) carried out by the National Statistics Office, with financial support from the MCA.

Indicator 2: Reduce poverty – fraction of individuals with monthly cash income less than minimum wage: the source is also the HIES therefore the quality of the source data for these two indicators will be treated together.

2.1.1   Data Collection Methodology

The methodology for the survey appears to be robust and the questionnaires are designed to international norms. Recommendations to improve their appropriateness to the Vanuatu country situation will be explored in this report in subsequent sections.

The HIES survey is a two-stage clustered random household survey with a sample size of 4,680 households. The first stage involved the selection of Enumeration Areas (EA) using probability proportional to size (PPS) sampling. The size measure was the number of expected households in the EA, based on the recently conducted Agriculture Census Listing. The second stage of sampling adopted systematic sampling from a list of all households contained in the EA. These lists were produced in the field by enumerators during the first visit to the EA[3].

There are 8 domains each with a sample of between 600 and 460 households. As a result, 21 strata were created based on the Area Council's accessibility, consisting of the following Area Councils:

#	Region	Province	Area Council 1	Area Council 2	Area Council 3	Area Council 4	Area Council 5	Area Council 6
1	Urban	Shefa	Port Vila					
2	Urban	Sanma	Luganville					
3	Rural	Torba *	Vanua Lava	Mota Lava	Gaua			
4	Rural	Torba *	Mere Lava	Ureparapara	Loh			
5	Rural	Sanma	Canal-Fanafo					
6	Rural	Sanma	South Santo	South-East Santo				
7	Rural	Sanma	West Malo	East Malo	East Santo			
8	Rural	Sanma	West Santo	North Santo	North West Santo			
9	Rural	Penama	West Ambae	East Ambae				
10	Rural	Penama	Central Pentecost 1	South Pentecost				
11	Rural	Penama	North Ambae	Central Pentecost 2	South Maewo	South Ambae	North Pentecost	North Maewo
12	Rural	Malampa	Central Malekula					
13	Rural	Malampa	West Ambrym	South East Malekula	North East Malekula			
14	Rural	Malampa	South Malekula	North West Malekula	South West Malekula	North Ambrym	South East Ambrym	Paama
15	Rural	Shefa	Erakor	Pango	Ifira	Mele		
16	Rural	Shefa	North Efate	Eton	Eratap	Malorua		
17	Rural	Shefa	Vermali	Emau	Nguna	Makimae		
18	Rural	Shefa	Varisu	Vermaul	Yarsu	North Tongoa	Tongariki	
19	Rural	Tafea	West Tanna	Middle Bush Tanna	South West Tanna			
20	Rural	Tafea	Whitesands	Aniwa	Futuna	Aneityum		
21	Rural	Tafea	North Erromango	South Erromango	North Tanna	South Tanna		

NB: For Torba, rather than group by Area Councils, groupings are done by Island
NB2: Due to it being too difficult to get to any Islands in Stratum 4, it has been merged with Stratum 3

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[3] 'Documentation for HIES Sample Selection' NSO

'Sample allocation to each stratum was performed by allocating proportionally to the population within each "target area". The sample sizes for each stratum were then rounded to a number divisible by 15, so equal workloads could be produced within each stratum. The number 15 was chosen as it was considered to be a manageable number of households for one enumerator to deal with over a 4-week period. Although it would have been desirable to cover all of Vanuatu for this survey, due to cost and time constraints, some EAs were excluded from the frame before the selections were made. The impact on sub-population estimates will differ, as some areas have had larger scope reductions. The estimated number of households removed from scope of the survey, with the percentage remaining, can be found in the table below.

Table 2.1   Out of scope households

PROVINCE/AREA	# Households	In scope	Out-of-scope	% In scope
Pt Vila	7493	7493	0	100.0%
Luganville	2496	2496	0	100.0%
Malampa	7976	5422	2554	68.0%
Penama	7215	5539	1676	76.8%
Sanma	5912	4564	1348	77.2%
Shefa	6240	5991	249	96.0%
Tafea	6641	5089	1552	76.6%
Torba	1619	997	622	61.6%
TOTAL	45592	37591	8001	82.5%

The sample was boosted to increase the numbers of households in the project catchment areas. The estimations process which led to the calculations of the necessary sample sizes were not made available, but the provincial standard errors, for those in and out of the catchment areas should be tested once the data is tagged with those households who live within the catchment areas. A number of key variables should be selected and standard errors be calculated for each for those living in the catchment area and for those outside the catchment area.

Table 2.2   Example of catchment confidence intervals

Region	Efate		Sanma	
	In catchment area	outside catchment area	In catchment area	outside catchment area
Variables	95% confidence interval	95% confidence interval	95% confidence interval	95% confidence interval
Number of cars per household	0.95 to 0.97	0.83 to 0.89	0.48 to 0.56	0.49 to 0.52
% people poor	54.3 to 58.9	65.1 to 66.0	etc	etc
Mean consumption	Vt xx,xxx to Vt	etc	etc.	etc.
Variable ….				

These calculations will allow the significance of the results relating to catchment areas and comparisons with the population beyond the catchments area. The project will want to show how the households within the project catchment area have benefited compared with those living outside the catchment.

For example, the confidence intervals of the average number of cars per household for those in the catchment area and those outside it might be calculated and then compared. Only those results were the confidence intervals do not overlap would be significant. In the hypothetical example above it can be seen that (at the 95% confidence level) the estimate of the number of cars per household in Efate within the project catchment area lies in the range from 0.95 and 0.97. It is lower for households living outside the catchment where the result is in the range of 0.83 and 0.89. It can therefore be concluded that there is higher car ownership inside the Efate project catchment than outside it. The same cannot be said of Santo where the two ranges overlap, therefore there is no significant difference in the household car ownership estimates inside and outside the catchment. Of course these figures are fictitious and have been included to show how the significance of results by catchment areas would be used.

2.1.2 Cash Income – Which variable should be used

The HIES collected data from respondents on both their incomes and expenditures. For the purposes of proving data for the first goal indicator, the first issue for consideration is which of these two monetary measures of welfare is the most robust to estimate increases in per capita income for the project beneficiaries. The international norm for estimating income is to use expenditure rather than income.   Income tends to be difficult to estimate, as most people receive their incomes in an irregular manner. This is particularly the case in subsistence economies like Vanuatu.   Cash income tends to arrive sporadically and is not systematically recorded by individuals. Any survey measures of income will be subject to recall error. If income is measured over a short period of time the results will tend to over or under-estimate the annual or monthly income because of its sporadic and irregular nature, wrongly allocating households to rich and poor categories. Asking for income over the long reference period leads to large reporting errors as respondents are not able to recall their income over such a long period.   Expenditure on the other hand tends to represent a more steady and regular stream of consumption, as households smooth out the peaks and troughs of their incomes[4]

'The empirical literature on the relationship between income and consumption has established, for both rich and poor countries, that consumption is not closely tied to short-term fluctuations in income, and that consumption is smoother and less-variable than income…. As a result, in circumstances where income fluctuates a great deal from year to year-as in rural agriculture-the ranking of households by income will usually be much less stable than the ranking by consumption, though exceptions can occur as discussed in Chaudhuri and Ravallion (1994). Even limited smoothing gives consumption a practical advantage over income in the measurement of living standards because observing consumption over a relatively short period, even a week or two, will tell us a great deal more about annual-or even longer period-living standards than will a similar observation on income[5]'.

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[4] See Angus Deaton and Salman Zaidi; <u>Guidelines for Constructing Consumption Aggregates for Welfare Analysis'</u> LSMS Working Paper 135, World Bank, Washington, 2002 pp 11-13

[5] ibid

2.1.3   Correspondence of income and expenditure

Poverty estimation requires us to compare the 'incomes' of households, and to make some kind of ranking from the poorest to the richest people in the population, this has a bearing on the second goal indicator, reducing poverty. Both the income and expenditure data is collected at the household level, although salary information is available for individuals, other forms of income are collected for the entire household therefore all those living in the same household are deemed to have the same level of welfare. Intra-household poverty does not tend to be measured by this kind of survey. As part of the analysis, survey households were sorted into 10 ranked, equal sized parts, or deciles according to each of the two measures of money metric welfare – income or expenditure.   In order to compare the correspondence between the two money metric welfare variables, income and expenditure deciles were compared for each household.

The components of income and expenditure are derived from a variety of components, from different sections of the questionnaire. Figure 2.1 below shows the main components of the income and expenditure variables, full details are available from NSO. The main components of expenditure are derived from the daily diary kept by households over a two week period. The main components of income come from the household questionnaire where an annual or monthly recall period was used, however the value of own produce consumed is collected from the household diaries and appears in both the income and expenditure variables. It comprises 28% of the total estimate of household income and therefore both variables depend on good diary completion.

Figure 2.1   Main components of income and expenditure

Expenditure
- Cash purchases
- Value of own produce and gifts consumed
- Imputed consumption (value of own house etc.)

Key: Diary: over 2 weeks

Income
- Wages and salaries
- Self-employment
- Cash income (earned and unearned)
- Value of own produce consumed

Key: Questionnaire: annual

The first step taken was to test the fit between the total expenditure and the total income deciles at the household level. The household income deciles had already been computed by the NSO, but the expenditure deciles had not. Therefore weighted deciles were computed by the consultant using the HH_TOT_EX variable on the Household Summary data file.

The two variables were cross tabulated with each other to test the 'fit'. The yellow diagonal cells shown in Table 2.3 represent accurate correspondence of income and expenditure, and show households ranked in the same deciles for both the two variables.

Table 2.3   Income and Expenditure Decile Fit

Total Income Decile	**Total Consumption Expenditure Decile**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	**2280**	786	440	214	190	86	78	133	89	35
2	762	**1418**	775	494	322	255	135	77	69	29
3	454	730	**1026**	919	500	233	160	191	98	18
4	229	512	604	**757**	708	596	493	197	159	73
5	180	282	391	498	**847**	795	557	429	175	184
6	157	224	314	512	467	**749**	809	464	500	131
7	132	123	241	276	560	579	**746**	776	616	288
8	77	149	225	267	363	433	620	**843**	863	487
9	28	62	267	191	227	308	362	836	**971**	1079
10	28	46	55	200	154	284	371	399	790	**2005**

Table 2.4 shows that only 27% of households are allocated to exactly the same decile for both income and expenditure, although another 31% are within 1 decile distance, giving 60% of households allocated to roughly the correct quintile. However in looking at whether income tends to be higher than expenditure, it can be seen that for 39% households the income decile is lower than that of expenditure, particularly in the middle ranks, suggesting that there is an underestimation of income compared with expenditure for households of middling welfare. This is despite the average income being higher than that of expenditure.

Table 2.4   Fit of Deciles

Same Decile	27%
Income Lower than Expenditure	39%
Income Higher than Expenditure	35%
Within 1 Decile	**31%**

Table 2.5 shows the situation for the lowest 30% of households by either income or expenditure. Only two thirds are allocated to the bottom 30% of households according to both measures, one third were too prosperous by either income or by expenditure.

Table 2.5   Poor by income or expenditure (bottom 30% of households)

Description	Weighted Households	%
Poor Both Measures	8,671	67%
Poor by income only	4,326	33%
Poor by expenditure only	4,325	33%
All	**12,997**	

Comparing the values of the two variables in Table 2.6 the averages show that income has a higher national mean than does expenditure, however this can be explained by a few households with very high estimated incomes.   Table 2.6 shows the descriptive statistics associated with these two variables, the maximum income value is Vatu 2.25 million, while for expenditure it is just Vatu 0.9 million. Cumulative income and expenditure graphs are reproduced in Annex B and show some very high incomes at the upper end of the income graph. An exercise was conducted to smooth out the extreme incomes by removing from the variable any cash income recorded in the daily diary, as these are multiplied by a factor of 30/14 to give a monthly estimate. It was thought that some very high income figures might have been derived from this treatment of cash diary transactions.   However while this smoothing cut the most extreme cases, the correspondence between income and expenditure was not much improved so this approach was abandoned.

The descriptive statistics of the two variables reproduced below show households with a minimum income of zero and a minimum expenditure of Vatu 43. These are obviously unrealistically low, although it would be possible for a household to have a zero income in any month, by surviving on its cash savings, very small estimates of consumption are close to impossible and suggest under-recording in the diaries.

Table 2.6   Descriptive statistics for total income and expenditure

		HH_TOT_EXP	HH_TOT_INC
N Valid		43312	43312
Missing		0	0
Mean		53,785	60,711
Std. Error of Mean		268	359
Median		38,590	40,000
Minimum		42	0
Maximum		898,586	2,278,664
Percentiles	10	14,163	13,167
	20	20,913	20,019
	30	26,290	25,892
	40	31,905	32,625
	50	38,590	40,000
	60	45,612	48,854
	70	56,220	61,535
	80	73,993	82,774
	90	106,719	124,273

2.1.4 The income and expenditure gap

A variable (income gap) was created to compare the difference between expenditures and incomes for individual households. It can be seen from the results shown in Table 2.7 that the income decile understates expenditure for the lowest decile, while for the higher decile groups stated incomes are much larger than expenditure, perhaps illustrating the smoother expenditure profile. The differences are more extreme for the mean value than for the median value but both show the same trend. The descriptive statistics (Table 2.6) reinforces this picture, the standard error is higher for income than it is for expenditure. An interesting point is that the value of each decile division is similar for at least the lowest 60% of households, but becomes higher for income in the richer deciles.   This means that the decile value cut points of the bottom 60% of households are similar, but include different household cases. In summary, the expenditure variable has a lower variance, while income is overstated for the rich as compared with expenditure.

Table 2.7   Income and expenditure difference by income decile

Income Decile	Expenditure minus income	
	Median	Mean
1	4,290	12,509
2	3,350	8,194
3	1,843	4,791
4	2,317	7,068
5	528	6,106
6	- 2,798	1,745
7	- 4,907	- 505
8	- 15,784	- 8,803
9	- 28,710	- 20,383
10	- 83,179	- 97,496

Both sets of deciles are compared in the same way in Table 2.8 – the income decile shows a systematic and progressive underestimation of expenditure through the deciles to the median point. In comparison the expenditure decile underestimates income for all deciles other than the top two by expenditure.

Table 2.8   Income Gap using both income and expenditure deciles

Income Decile	Expenditure minus income		Expenditure Decile	Expenditure minus income	
	Median	Mean		Median	Mean
1	4,290	12,509	1	- 2,998	- 9,851
2	3,350	8,194	2	- 2,588	- 9,327
3	1,843	4,791	3	- 3,556	- 11,635
4	2,317	7,068	4	- 3,042	- 18,062
5	528	6,106	5	- 1,493	- 11,214
6	- 2,798	1,745	6	- 2,798	- 14,532
7	- 4,907	- 505	7	- 95	- 11,876
8	- 15,784	- 8,803	8	- 2,038	- 10,600
9	- 28,710	- 20,383	9	10,430	- 6,135
10	- 83,179	- 97,496	10	22,057	7,280

A more specific check was then applied to cash transactions alone: that is cash purchases minus cash income, in order to check the balance for cash transactions alone. This was done to avoid concerns about valuations of income or expenditures in kind. For income, the new variable used wages and agricultural income only, as the cash transfers and non-earned income were thought to contribute to the high variance of the income estimates.   The results show that around one half of households received more cash income than they spent in cash, but that the position was reversed

for 42% of households who spent more cash than they received (the middle category of 1,000 vatu difference was ignored).

2.1.5 Which households are affected by this poor fit of income to expenditure?

Table 2.9 shows the provincial distribution of this 'cash gap'. The most extreme situation occurs in the two urban domains where either cash or income tends to be overstated in comparison with the other, in almost equal proportions. Torba shows the most balanced picture, as do all the more rural provinces, however there is a slight tendency for income to be overstated in rural areas as compared with expenditure.

Table 2.9   Provincial cash gap

	Torba	Sanma (rural)	Penama	Malampa	Shefa (rural)	Tafea	Lugan ville	Port Vila	All Hhds
More than 5000 more income	26.8	42.8	52.8	38.3	43.5	37.7	40.6	45.9	42.6
1000 to 4,999 Vt more income	14.0	11.1	6.9	9.1	9.0	9.0	4.8	6.4	8.5
Within +/-1,000 vatu	13.5	9.5	4.5	7.5	4.9	13.6	2.9	1.7	6.9
1000 to 4,999 Vt more expenditure	23.0	12.0	10.7	15.4	11.3	14.0	6.3	4.2	11.4
More than 5000 more expenditure	22.6	24.6	25.1	29.7	31.4	25.7	45.4	41.7	30.5
All	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

The next test compared the cash gap by the main economic activity status of the household. The results are displayed in Table 2.10 where it can be seen that those household heads deriving their incomes from waged work were much more likely to under-report expenditure, as were those farmers mainly selling their cash crops. However for the largest group, the subsistence farmer households, a much more mixed pattern emerged with 45% understating income and almost as many overstating it. The business owning households were also very likely to underestimate their incomes. The analysis also ran similar tables for the bottom three expenditure deciles (not shown). For the 13,000 households in the lowest 3 deciles, some 6,360, or almost half, were subsistence farmers of whom 2,200 spending more that their earnings. In all almost 5,400 of the 13,000 households spent more than their estimated cash incomes. In conclusion income performs particularly poorly among the lowest spending households, the poor.

Table 2.10   Cash balance of income and expenditure

Main economic activity of household head	Working full time wages	Working Part time wages	Own Busi-ness	Selling Produce (crops, fish, crafts)	Own produce	Unemp-loyed	Home Duties	Full time educ	Other	All
More than 5000 Vt more income	52.3	45.8	36.2	48.3	36.8	29.5	27.6	26.7	29.0	40.0
1000 to 4,999 Vt more income	5.9	3.7	8.1	11.0	9.6	5.7	9.8	0.0	4.8	8.1
Within +/-1,000 vatu	2.9	10.7	3.0	4.6	8.8	7.8	13.7	0.0	4.4	7.2
1000 to 4,999 Vt more expenditure	5.4	7.6	6.7	10.9	14.9	14.1	17.6	20.0	20.7	12.1
More than 5000 more expenditure	33.5	32.3	46.1	25.1	29.9	42.9	31.2	53.3	41.1	32.5
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Weighted Sample	**10,866**	**1,412**	**1,780**	**2,992**	**17,373**	**2,688**	**4,791**	**60**	**1,351**	**43,312**

To follow these findings more clearly the cash gap was tabulated by income source and the results shown in Table 2.11. For households with much more stated income than expenditure, the main source of the income tends to be wages and salaries, or from sales of crops, fish and handicrafts (78% of all the household income for those overstating income by Vt 20,000).   At the other end of the scale households with cash expenditures higher than cash incomes by over Vt 10,000, over 50% of the income is derived from the value of own produce, the remainder is largely from salaries.   The most extreme high expenditure comes from those households with 'other cash incomes' which include the self-employed or from the waged or salaried suggesting that there was under-reporting of income in some higher earning households running their own companies or in paid work.

The conclusions drawn from this are as follows; estimated income tends to exceed estimated expenditure for those whose main source of income is cash from sale of crops, fish and handicrafts or from wages, while under-reporting of income is more common for those dependent on their own garden produce who are likely to be those who are the poorest and least dependent on the cash economy – our target beneficiaries. There are some confounding factors, for those whose main income are wages and salaries there is a very mixed pattern, with some clearly understating their incomes and some under-reporting expenditures quite dramatically. For those with other cash incomes – largely small businesses – the reported expenditure tends to be much higher than income, suggesting that business persons understated their incomes.   For the subsistence farmers, income tends to be understated compared with expenditure. The conclusion is that for the potentially poorest households, the subsistence households, the income variable will tend to understate their participation in the cash economy by a significant amount. Therefore the income variable would be a poor estimator of the poorest peoples' participation in the cash economy.

Table 2.11   Gap between cash expenditure and cash income by source of household income

Cash Gap	Own account consump-tion	Crops, fish & handicrafts	Wages & Salaries	Other cash	Other in-kind	All Income
Over 20,000 more income	14%	38%	40%	3%	6%	100%
10,000 - 19,999 Vt more income	25%	24%	36%	6%	8%	100%
5,000 to 9,999 Vt more income	36%	26%	26%	7%	6%	100%
1,000 - 4,999 Vt more income	41%	21%	27%	5%	6%	100%
Within =/- 1,000 vatu	54%	18%	15%	6%	6%	100%
1001 to 5000 Vt more expenditure	54%	13%	19%	7%	8%	100%
5001 to 10000 Vt more expenditure	54%	16%	17%	5%	8%	100%
10,001 to 20,000 Vt more expenditure	50%	11%	26%	6%	8%	100%
Over 20,000 Vt more expenditure	23%	7%	39%	22%	9%	100%
Group Total	**27%**	**25%**	**34%**	**7%**	**7%**	**100%**

2.1.6 Conclusions on the comparisons between income and expenditure

Of the two variables under consideration, we have observed expenditure has the smoother distribution with less extreme values among the wealthier households. The definition of expenditure includes all household consumption of goods and services. The moment of consumption is deemed to be the cash purchase of a good or service, or the point that own produced goods are consumed (eaten or burned) by the household.

Income includes cash income from economic activity, cash transfers and income in kind such as gifts, payments in kind, imputed value of own homes and the value of own produce consumed. Income may be saved, either in the form of cash or produce in the households' stores or spent immediately. However consumption occurs every day in normal life, households eat on a daily basis and consume goods and services on a daily basis. Therefore expenditure is a better reflection of income over a longer reference period.

The analysis has found large discrepancies in the values cash incomes and expenditures for individual households, and very high variances in the income variable. It has also been illustrated that the cash incomes of those whose main source of income is food from their own gardens are understated, as they are spending much more on cash purchases then their estimated cash incomes would imply.   Using the cash income variable would tend to under-estimate the participation of the poorest subsistence farmers in the cash economy, the very thing that the project goal indicators wish to measure.

It is recommended that cash purchases is used as the variable of interest in measuring the first indicator, increase in cash incomes. However it is suggested that before this variable in used that further work is carried out to treat households where there has been obvious under-recording of expenditures. A subset of records where under-reporting of consumption has already been identified and passed to the MCC specialist consultant for treatment. The MCC consultant will make a decision on either deleting or treating the record. This work must be done before cash purchases are analysed, and if the consultant is unable to make separate imputations for cash and own consumption in the treated records, then all the records identified as for the consultant should be excluded from this analysis of cash incomes, and the weights recalculated to enable proper estimation of the variables. The process of identifying the records will be discussed in the next section. The poverty estimators will also be discussed in later sections of this report.

2.2   Validity of the expenditure data

Table 2.12   HIES response rates by province

Province	HH selected	HH responding	Response rate
Torba	465	423	91%
Luganville	495	414	84%
Sanma (remainder)	600	566	94%
Penama	630	552	88%
Malampa	690	596	86%
Port Vila	600	405	68%
Shefa (remainder)	600	445	74%
Tafea	600	485	81%
Total	*4680*	*3886*	*83%*

Source: Draft report on consultancy to provide technical assistance to Vanuatu national statistics office for the household income and expenditure survey. Leon Pietsch 21 May to 15 June 2007

The overall response rate for the HIES is reasonably good, with an overall response of 83% rising to 94% in Sanma Province and falling to 68% in Port Vila, indicating some field difficulties in the main urban centre of the country.

Anecdotal evidence suggests that some of the fieldwork was not well done, particularly in Port Vila. Obtaining good expenditure data relies on very good field supervision, and repeated call-backs to households completing the diaries.   It is understood that in many cases this did not happen and that many households abandoned diary completion after one week. *'When the HIES diaries were returned from the field, some households had not completed any entries for the second week, although they had provided information for the first week. For these households, the second week's diary was imputed by repeating the information from the first week. The following (Table 2.13) shows the pattern of purchases and own production account recorded in the diaries, after imputations had been made for diaries that had no records in the second week*[6]*'.*

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[6] HIES 2006, Survey Documentation, NSO

Table 2.13   HIES Diary records after imputations

Week	Day	Number of purchases	Number of own account production records
1st wk	Mon	13 030	9 941
	Tues	10 140	9 211
	Wed	10 268	8 884
	Thur	9 540	8 890
	Fri	10 514	8 673
	Sat	8 411	8 840
	Sun	7 984	7 477
	Total	*69 887*	*61 916*
2nd wk	Mon	10 505	9 222
	Tues	8 624	8 603
	Wed	8 900	8 345
	Thur	8 309	8 347
	Fri	9 254	8 000
	Sat	7 646	8 474
	Sun	7 325	6 971
	Total	*60 563*	*57 962*
2nd wk total / 1st wk total		*87%*	*94%*

There is a small drop off of reporting in the second week, which on first sight seems not too serious. As Vanuatu is not a country which suffers widely from food shortages, one test which can be applied to the data to test its quality is the adequacy of food consumption.

The value of cash food purchases and the value of food own consumption were combined together at the household level to obtain a monthly estimate of food consumed. As was seen earlier in the report, in Table 2.6, the minimum value for the expenditure variable was Vatu 42, clearly insufficient to feed a family for one month. To explore the adequacy of the food expenditure data further, the value of food consumed by each household was calculated from purchases, own consumption and gifts. The results grouped by food expenditure bands are illustrated in Table 2.14. It can be seen that some 12% of households consume less than Vatu 10,000 per month. There is no data available on the minimum food poverty basket for Vanuatu with which to compare this, but the MDG report of 2005 mentions a household poverty line of Vatu 35,000. In 1998 the equivalent of a dollar a day was estimated at Vt 19,125 per household[7], some of this amount would be for fuel, clothing etc. but a typical proportion of total expenditure spent on food by the poor tends to be around 75% to 80%. Allowing for inflation this dollar a day equivalent might be around Vatu 20,000 a day, but this seems too high as around 40% of households would be under $1 and consuming too little, so it is recommended that a bare minimum be set at a much lower level.

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[7] Asian Development Bank, Discussion Paper on Assessment of Poverty and Hardship, Vanuatu, 21 October 2002. ADB TA 6002-REG: Consultative Workshops for Poverty Reduction Strategies in Selected PDMCs

As further evidence that there is under-reporting in the diaries for those with very low levels of food consumption, the mean number of food transactions was calculated. For households with under Vatu 10,000 of food consumption, the average number of transactions is half that recorded for the next two consumption bands (see Table 2.15). Those with less than Vt 10,000 worth of food in the month had 21 transactions (purchases or eating home grown food) so recorded less than 1 transaction per day. While those in the next band had 42 and the next 71 and so on. While a transaction does not correspond with a meal, one would expect that the poorest households have a high proportion of own consumption and at least 30 transactions can be expected in the diaries.

Table 2.14   Monthly value of all household food consumed by Province

Monthly food expenditure	Torba	Sanma (rural)	Penama	Malam pa	Shefa (rural)	Tafea	Lugan ville	Port Vila	Table Total
	Col %	Col %	Col %	Col %	Col %	Col %	Col %	Col %	Col %
0 -10,000 VT	22.3	3.7	13.0	8.1	19.1	17.6	7.5	12.3	12.4
10,001 - 20,000 VT	35.2	29.1	30.6	29.4	19.7	32.5	29.2	27.4	28.7
20,001 - 30,000 VT	22.6	40.5	22.6	27.8	24.6	19.7	32.4	26.4	26.9
30,001 - 40,000 VT	10.0	15.7	15.1	20.2	13.1	11.8	17.4	11.1	14.5
40,001 - 50,000 VT	6.2	5.8	8.2	7.6	12.2	8.6	6.0	8.4	8.2
50,001 - 60,000 VT	1.4	2.8	3.1	2.3	3.8	3.5	4.1	5.2	3.4
60,001 - 70,000 VT	0.7	1.4	2.8	2.1	3.2	2.4	1.0	3.5	2.4
70,001 - 80,000 VT	0.7		2.1	0.9	1.7	1.0	1.0	1.7	1.2
80,001 and more VT	1.0	0.9	2.6	1.5	2.7	2.8	1.4	4.0	2.3
Cash and Own Con food	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table 2.15   Number of food transactions (mean) per household

	Torba	Sanma (rural)	Penama	Malampa	Shefa (rural)	Tafea	Lugan ville	Port Vila	Table Total
0 -10,000 VT	17	28	26	21	16	19	23	23	21
10,001 - 20,000 VT	35	42	44	46	43	38	49	41	42
20,001 - 30,000 VT	47	54	58	64	61	54	66	62	59
30,001 - 40,000 VT	55	66	69	77	65	69	77	77	71
40,001 - 50,000 VT	58	82	70	81	77	66	97	89	78
50,001 - 60,000 VT	72	94	76	103	92	93	113	99	94
60,001 - 70,000 VT	47	113	84	96	100	82	106	94	93
70,001 - 80,000 VT	59	.	85	89	84	111	115	122	98
80,001 and more VT	93	127	99	129	117	94	121	125	114
Mean food transactions	**38**	**56**	**55**	**62**	**56**	**49**	**65**	**62**	**56**

I. *Recommendation*

Erring on the side of caution it is suggested that Vatu 10,000 would be a reasonable point at which the estimates for total food consumption should be abandoned or subject to further imputation scrutiny. Records have been sent to the consultant where food consumption is either less than 5,000 Vatu per month; or in order to cater for small households, where food consumption is between 5,000 and 10,000 Vatu per month and per capita food consumption under 1,500 Vatu per month. 224 records have been identified by the consultant for treatment and have already been sent to the MCC consultant.

II. *Recommendation*

For a more exact check on the adequacy of the food data, and as the first step to developing a poverty line, it is recommended that a food basket, fitting the average ni-Vanuatu household diet, is developed and priced to give 2,600 Kcal/person/day. By using adult equivalence scales and the average household size a new minimum household food basket can be estimated. With the support of a nutritionist, and adequate desk research on similar basket calculations, the NSO should be capable of doing this work. The NSO should seek the services of a nutritionist to develop a Vanuatu poverty basket. The ADB support to the poverty line should be asked to check the basket construction as part of the terms of reference for developing a poverty line, as the resulting basket may provoke political debate, and the NSO will require the confidence of an external quality check to defend their calculations.

III. *Recommendation*

A poverty line should be calculated as soon as is feasible. Since the mission it has been learned that this is to be done by ADB in collaboration with NSO and the SPC. An absolute poverty line is the methodology chosen by most developing countries, but given the constraints of data quality and inter-island price comparisons, a relative poverty line using the lowest 30% per capita adult equivalents may be easier to compute for the purposes of the project and this should be done province by province to avoid 'market value' problems. Sampling errors of the household consumption estimates are required to check reliability of inter-islands comparisons. The sampling errors so far calculated are done in a way that makes it difficult to comment on whether the sample sizes are large enough for provincial estimates. The consumption aggregate has already been calculated, but the work of correcting under-reporting of consumption must also be completed before the sampling errors can be calculated. The variability of the estimate determines the sample sizes required – however the results of the calculations of the sampling errors will make this obvious. Island estimates will almost certainly be too small to be reliable in most cases.

2.3 Prices and valuation of own consumption

The value of goods and services consumed in the total expenditure variable is determined by the cost paid when purchasing items; or by the declared value of goods consumed by the household either when received as a gift or grown in their own gardens. In the HIES the goods produced by the household and consumed by it were valued by the consuming household. While it is believed that households are aware of the market prices for their produce, in many cases there is no local market and it is difficult to know whether this estimated value is a farm gate price or a market price, and where the price would be applicable. In estimating poverty lines and making comparisons over time and space it is usual to apply deflators to correct for price differences between

geographical areas and over time. No external price data for this kind of exercise is available in Vanuatu, as the CPI is collected only in the urban centres of Port Vila and Luganville. The author is not aware of any other price data routinely collected. It is therefore necessary to explore the internal price data in the survey to examine price consistency. This is difficult as in comparing values the differences in quantities also have to be accounted for, and for the majority of items, food is consumed in non-standard units such as plates, baskets, bundles, sacks and so on. The diary form asks for description, quantity, weight and amount. 81% of transactions had a quantity but only 16% a weight. For the majority of cases with a weight a quantity was also given, quantity was therefore used to determine the unit value of an item. For items such as meat and fish, weights were very rarely indicated, reducing its value as a variable to estimate unit costs.

Table 2.16   Expenditures with a quantity or weight available in the transactions file

		ITEMQTY		ITEMWGT	
N	Valid	249593	81.3%	50230	16.4%
	Missing	57236	18.7%	256599	83.6%

Crude unit prices were constructed by dividing price by quantity. It is recognised that this is a very crude approach but the best possible in the circumstances. The unit prices were compared by product code and an index developed comparing the provincial prices for a unit of each commodity. These unit prices were used to compare the value of cash purchases those of with own produce consumed for the most frequently consumed commodities.

2.3.2 Existence of market prices

The first observation is that in rural Vanuatu most household's transactions are limited to quite a small range of items. In rural areas 10 items account for 58% of the value of all food consumption from cash purchases or own consumption; and 20 items account for 75%. In urban areas the comparable figures are the first 10 items account for 34% and the first 20 items 55%. The consumption patterns are therefore quite different. The table showing the food items can be found in Annex B, Table B.4.

In rural areas 50% of all transactions by value are comprised of seven items: rice; bananas (cooking); island taro/ taro Fiji; yam; manioc; island cabbage; kumala. Of these top 7 rural items only one is routinely purchased, that is rice. Of the others under 5% of all transactions are in cash economy in rural areas, the remainder are home produced food. This leads us to question whether an accurate market price can be known by the households. Mean unit prices were compared for the top twenty items consumed by value in the country. And these are shown in Table 2.17.

Table 2.17   Proportion of food items purchased

		% Transactions purchased		
		Rural	**Urban**	**National**
1	Rice	100%	100%	100%
2	Bananas (Cooking)	2%	29%	4%
3	Island Taro/ Taro Fiji	4%	36%	6%
4	Yam	3%	36%	5%
5	Manioc	2%	20%	3%
6	Island Cabbage	4%	52%	11%
7	Kumala	5%	51%	12%
8	Pork fresh	10%	32%	11%
9	Chicken/ Local chicken	19%	80%	34%
10	Beef fresh	31%	84%	45%
11	Other Tinned Fish	100%	100%	100%
12	Sugar	100%	100%	100%
13	Tinned Tuna	100%	100%	100%
14	Bread (sliced, loaf, square, rolls)	100%	100%	100%
15	Water Taro	3%	36%	4%
16	Dry Coconut / Copra	2%	37%	6%
17	Laplap (Yam, banana, manioc, etc)	28%	72%	33%
18	Flour	100%	100%	100%
19	Other fish	13%	39%	16%
20	Cream cracker, biscuits, Buns	100%	100%	100%

Table B.5 in the Appendix shows the mean unit price of cash purchases by province, recalling that for most items there are very few of these purchases. It can be seen from these tables that the prices at provincial level are quite variable, especially for meat products, flour and coconut. Yams, manioc and kumala also show quite wide differences, suggesting that there is quite wide price variation across the provinces.

To show the effects of the local prices on a typical island consumption basket two crude price indices were constructed; island consumption baskets at national unit prices, and the converse a national consumption basket at island prices.   The results are quite interesting, and show that the variations in unit prices of meats, flour and coconut have a particularly distorting effect, particularly in Tafea. To try to eliminate these distortions which may well have been caused by some high unit values for meat and imperfect quantity data (as very little weight data was available) the unit values were replaced by the less variable price per kilo for 5 items in the basket, pork, beef, other fish, and flour.

To illustrate the regional price variations, a crude commodity price index was constructed. The mean average price per unit of each item commodity was calculated for each item code, and regional deflators then calculated for each item, Then a national household food basket was

developed[8], this is the average value of household consumption for the top 20 most popular items by value. This basket was then deflated, item by item, using the index to show the cost of the same national basket at island prices. The results are shown in Table 2.18, and show that Port Vila is almost twice as expensive as the national basket, while Malampa is the cheapest. Of course the actual consumption basket varies per island, and the purpose of the table is to show the price difference which can be found using a common basket.

This rather crude basket shows the effects of the different pries or values for food items. It should be recalled that the value of own produce appears in both the expenditure and income variables, and it is the own consumption items for which the price is uncertain. The table above should not be used in any poverty illustration, and is included to show the effects of regional price variations and the reasons why a simple unadjusted poverty value cannot be used to compare between provinces. Several options are available in adopting a poverty line, in the absence of good deflators which are discussed below.

IV. *Recommendation*
Consumption expenditure deciles should be developed for each province based on per capita (adult equivalent) consumption of goods and services and the bottom or lowest 30% be considered as 'the poor'.

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[8] Total sum of weighted expenditure on the item concerned divided by the total weighted number of households will result in the average per household expenditure on an item for each of the top 20 items by value. This gives an 'average household consumption basket'.

Table 2.18   Cost of typical household national food basket at provincial unit values (monthly value of consumption per household in Vatu).

		Torba	Sanma (rural)	Penama	Malampa	Shefa (rural)	Tafea	Lugan ville	Port Vila	Group Total
	Comparative cost of national household food basket (top 20 consumption items) at provincial prices (with meat products standardised)									
1	Rice	2,792	2,898	3,021	1,762	2,322	3,955	4,747	4,570	3,105
2	Island Taro/ Taro Fiji	3,376	2,777	1,758	1,485	2,947	1,696	3,116	4,334	2,191
3	Bananas (Cooking)	1,674	2,201	1,966	1,978	2,250	2,423	2,795	3,789	2,130
4	Yam	1,657	2,867	1,226	1,319	2,350	1,368	3,599	5,329	1,902
5	Manioc	1,302	1,340	898	1,006	1,665	1,283	1,839	2,140	1,285
6	Island Cabbage	976	678	827	1,145	1,410	1,181	524	1,711	955
7	Bread (sliced, loaf, square, rolls)	838	1,382	468	765	768	763	1,205	884	914
8	Kumala	800	802	500	637	1,135	787	928	1,498	827
9	Dry Coconut / Copra	1,332	403	286	376	1,077	2,608	718	3,097	772
10	Chicken/ Local chicken	454	574	690	573	675	707	601	726	636
11*	Pork fresh	381	288	619	314	1,694	512	199	1,657	529
12	Tinned Tuna	564	433	533	525	529	606	381	498	491
13	Water Taro	286	658	586	165	318	480	666	240	484
14*	Beef fresh	330	236	489	541	515	393	548	2,219	472
15	Other Tinned Fish	586	464	523	483	384	653	339	289	456
16*	Other fish	392	282	666	351	711	629	502	2,466	441
17	Laplap (Yam, banana, manioc, etc)	388	405	122	520	1,044	392	152	1,063	408
18	Sugar	415	392	381	341	400	564	337	390	386
19	Cream cracker, biscuits, Buns	358	387	312	255	254	320	324	342	314
20*	Flour	220	204	281	154	145	508	262	419	255
	Total Value	18,648	19,680	16,375	14,735	23,146	20,613	23,522	37,301	18,953
	Proportion of national cost	**98%**	**104%**	**86%**	**78%**	**122%**	**109%**	**124%**	**197%**	**100%**

2.4   Measuring cash incomes – computing indicator1

V.   *Recommendation*

Cash income is to be measured in variable 1, this should be the rise in cash incomes (using cash purchases as a proxy) in the catchment areas of the project.   The cash values will have to be deflated to reflect price changes over time, an important associated data source will be required, this is the collection of regional market prices. At present the only price collection occurs in Vila and Santo which is not sufficient to correct all regional prices. However this exercise is only required for the HIES deflators and it is not necessary to collect a monthly regional CPI. The market prices of all key own consumption commodities, (the top 20-30 items by value at least) should be collected at the same time as the next survey is conducted. Special dedicated enumerators or supervisors should be given this task to ensure it is done thoroughly. The usual CPI techniques employed by CSO should be used to do this.

VI.   *Recommendation*

The evaluation will require a comparison of money metric values at the start and end of the project. The regional prices for the 2006 HIES study should be collected as soon as possible, although a considerable time has already passed since fieldwork. The general CPI will have to be used to correct prices for the intervening period. Internal HIES could be used, but there are problems with the quantity data which suggest that any unit prices may be less than reliable.   This should be done in the way recommended above – prices in each province for a similar quantity and quality of a product should be collected at each provincial market for the top 20-30 commodities. These would then be used to construct an index to standardise values across regions and time for the evaluation.

2.5   Poverty estimation – computing indicator 2

The second goal indicator measures the reduction in poverty over the project period. No specific poverty line has yet been developed in Vanuatu, mainly due to the many challenges to doing so arising from the lack of suitable data and the difficulties in determining a poverty line across diverse communities.

Variable 2 suggests a poverty line which is individuals with less than the minimum wage of 20,000 vatu per month. This is not recommended as the minimum wage is presumably designed to serve a whole or proportion of a household rather than a single individual. Taking an individual income as Vt 20,000 would suggest that a family of 5 would require Vt 100,000, which would leave very few poor households. Of course children do not require the same amount of goods and services as adults, and there are economies of scale at the household level, even using an adult equivalence scale might set the line too high, and the undeflated monetary value of needs in Vila are clearly higher than those in Penama as we have seen from Table 2.18. Another poverty definition will be required to be credible.

The usual method is to develop an absolute poverty line according to a minimum needs basket based on an adult calorific requirement and what is known about the local diet to determine a typical family basket of goods. The price or value of this minimum basket is then used to determine a line of extreme poverty, and this is supplemented with additional costs for housing, fuel and clothing to determine a poverty line. This approach is perhaps not ideally suited to

Vanuatu which is extremely fertile and suffers from very little malnutrition, however a low proportion of the population has good access to basis services and can be considered poor in some MDG terms rather than the calorific. It is recommended that Vanuatu develop a poverty line, and adopt it as official. However this is quite a significant task and may be too resource intensive for this project to attempt.

An alternative approach would be to adopt the bottom 30% persons in each province, and to adopt these as the poor. This will avoid the regional prices problem discussed above. Households should be the bottom 30% using the expenditure variable rather than the income variable for reasons discussed above. Person deciles are preferable to household deciles, as larger households tend to be poorer, and it is considering expenditure per adult equivalent which is relevant. New deciles will need to be created using this per capita approach. In terms of developing adult equivalence scales there are several in use. The ones recently adopted in Rwanda are attached in Annex C (Table C.1) as an example. A nutritional basket which was sufficient to provide 2600kcal was used as the basis of this, recalling that Rwanda is an agricultural subsistence economy reliant on small tropical garden agriculture on hilly volcanic soils.

VII. Recommendation
Variable two compares the deflated consumption level of the variable described above at 30 percentile point. This will enable a comparison to be made between the poverty line in HIES 1 and HIES 2. One further consideration must be the standard errors or significance of these results at the provincial level, additional technical assistance may be required to compute the significance of consumption at the regional level, if the skills and software are not already available in the NSO. It was noted during the mission that external consultants computed the sampling errors.

2.6 Sampling errors

It was noted that standard errors had been calculated by NSO consultants for a number of variables, however in the case of income and expenditure the standard errors were computed for the total sum of the consumption values, rather than the average value per households. This will make the reliability of any poverty or income estimates used as a poverty line difficult to assess. It is recommended that standard errors are recomputed for household consumption to enable the sampling errors associated with household consumption to be considered. The simplest approach is to adopt the poorest households in each region, using the expenditure variable as a proxy for income. The consultants who computed the sampling errors should be asked to redo their estimates, as they have the software available to them for this exercise and the methodology should be consistent with that used elsewhere in the survey. If this is not possible then OPM could suggest an alternative consultant.

2.7 Recommendations for the next HIES

VIII. Recommendation
A panel design will reduce sampling errors in making comparisons between the two surveys. It will enable changes to be measured at the household level independent of sampling error, and to see which households are improving their participation in the cash economy. A panel survey involves returning to the same sample of households as was used for this HIES, but making replacements from a pre-selected list where the original households have moved or are unable to be located.

IX. Recommendation

Maintain same survey methodology in HIES 2 – any major changes will introduce unknown and immeasurable errors in comparing estimates from the two surveys.

X. Recommendation

Provincial market prices should be gathered systematically in any future HIES to derive deflators. This should be accompanied with more reliable quantity measures in the diaries. The quantities collected in the HIES cannot be replaced, as this is part of the original fieldwork. In the next survey the quantities of the own consumption data should be collected using standard units, for example hands of bananas, or kilos of rice or litres of milk. It is preferable to supply households with containers such as buckets and jugs showing quantities or with marked gradations to allow more precise quantity data to be collected. If these are given to households as gifts it may improve their cooperation.

XI. Recommendation

Better diary supervision is required in the next survey with visits every 2-3 days to prevent drop off in entries. If resources are not available for this, then the diary period might be reduced to 1 week, although this is not ideal. It is better to have a shorter period of good data, than a longer period of unusable data. Cost economies at the level of supervision are false economies, as the cost of attempting to correct poor data is much greater, and the results will always be of doubtful quality.

XII. Recommendation

Enumeration Areas are to be coded in the current and future HIES in order to create a variable indicating whether areas are within the project catchment area or outside. This will enable the required estimates to be made for the first two goal variables.

XIII. Recommendation

In future the balance of the household questionnaire should be changed to focus less on luxury expenditures, loans, income sources such as lottery winnings and investment income which apply to a tiny minority in urban areas. More should be collected as a rare purchase over a 12 month period on items consumed less frequently by the households in rural areas, such as clothing and smaller household goods (i.e. specify a knife rather than a dinner set). In addition a section on regular fuel and transport expenses is needed, particularly frequent purchases. There is reason to believe[9] that both these types of expenditure may have been under-recorded in the survey, partly due to the design of the diaries which stressed food items, and the infrequent nature of clothing and other 'major' purchases for rural households.

XIV. Recommendation

The cash transfers recorded in the diary seemed partly to duplicate income data collected on the household questionnaire, but also caused some extreme values when grossed-up from daily to monthly totals. There were some rather unlikely values noted in the data as a result of using the diary multiplier. It is recommended that cash transfers are treated separately and their source and regularity is explored with respondents on the household questionnaire. Worldwide it is known from other sources that transfers make up quite a significant amount of poor households' incomes and more information is required to analyse this information with accuracy.

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[9] NSO comparisons of total expenditure compared with national accounts estimates.

3 Non HIES Based Indicators

3.1 Increase tourism employment

Indicator 3 requires estimates of the increase in 'formal tourism jobs' in Efate, Tanna and Santo. The information is being collected by means of the tourism enterprise survey, which is being conducted by a consultancy company on a sample of 100 enterprises. The frame for these formal sector tourism employers has been obtained from the Vanuatu Tourism Office and is simply a list of Vanuatu tourism addresses and contacts. It covers a wide range of businesses:

- Tour operators and sporting activity operators

- Hotels, motels and bungalows etc.

- Airlines

- Car and scooter hire

- Restaurants

- Wedding coordinators

- Shops including, handicrafts, art galleries and museums; fashion boutiques; duty free shops (who also sell goods not duty free); florists; beauty salons; hair salons, commercial banks, media and newspapers; medical centres and clinics; dental surgeries;

- Nightclubs and bars.

While most of these serve a largely foreign visitor clientele, this is not always the case, particularly for some of the service industries, including medical centres, hair salons, airlines and so on. It is important to stick to a very clear definition of the universe from which the sample has been selected. This is to enable the exercise to be repeated in exactly the same way at the end of the project, and to enable the results from the sample to be weighted, or grossed up to form a national estimate. There is some evidence from the Vila survey coordinator that the enterprise list was extended to include some suppliers to the tourist industry such as the local supermarket chain Au Bon Marche. While these may supply local hotels and restaurants, they also serve the local population and are indirect employers in the tourism[10] industry. The UNWTO recommends that only direct employment be included in the estimates of tourism employment. Problems are anticipated if the consultants extend the frame to include other enterprises in an ad hoc fashion, as the definition will be unclear and the problems in grossing-up to national estimates will be made even more difficult.

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[10]

As a consequence, and for the time being, these recommendations will only consider the calculation of employment in the tourism industries (that is, in the set of establishments which principal productive activity is a tourism characteristic activity) using two indicators: number of jobs and number of employed persons. UNWTO recommendation System of Tourism Statistics 2000.
http://www.unwto.org/statistics/basic_references/index-en.htm

The frame used will require regular updating to form a consistent base for further surveys, however a more serious problem is anticipated. The current frame is only organised by type of enterprise and is not organised by any size measure. The 70/30 rule is likely to apply to enterprises in Vanuatu, with 70% of enterprises employing fewer than 30% people, and 30% employing more than 70% of people. This means that unless there is some stratification of the sample by size measures, then a large enterprise of say 500 people will receive the same weighting factor as one of 3 people and lead to some unreliable results.   This could be resolved by post stratification of the frame by a size measure to obtain better grossing-up factors. The method proposed in the consultants tender of using a focus group to refine the estimates is not recommended, a *'business proportion' basis with the final estimates being confirmed in some sectors by a focus group with a sample of the tourism industry*. This will not in my view give reliable estimates of those employed in the tourism industry.

This problem is further exacerbated by the questionnaire design which requires the respondent to tick one of a number of boxes. The categories are:

1 – 3 employees	13 -15 employees	31 – 40 employees
4 – 6 employees	16 – 20 employees	41 – 50 employees
7 – 9 employees	21 – 25 employees	50 – 100 employees
10 – 12 employees	26 – 30 employees	100 plus employees

Most of the responses will be in the first two boxes and in the last two. The small sample of 10 questionnaires viewed during the mission confirmed the problem. The next survey should ask for actual numbers of workers rather than for size categories.

One further problem identified is that not all employment is captured by the survey which asks for numbers of employees – that is waged or salaried workers. Proprietors and unpaid family workers, likely to be important in ni-Vanuatu enterprises are not captured. This should be amended in the next survey.

Most growth in tourist related employment is likely to come from business start-ups – and these must be captured in the next survey. The questionnaire asks for change in employees over the last two years, this question is poorly answered with some respondents indicating a positive or negative, others entering a % (and what is 5% of 100+ employees?) and yet others entering a numeric answer. Obtaining a reliable frame for both the surveys will be important in obtaining realistic estimates of growth in tourist employment, as this question cannot be depended on and it does not take account of start-ups.

One anticipated problem is that the data has been collected anonymously and while the consultants know which companies have been approached and have responded, the company details are not completed on the form. The consultants have assured anonymity to the respondents, which will cause problems in linking any records with those of the NSO Business Survey. The survey is not being conducted under the Statistics Act therefore anonymity is not guaranteed under law, and no sanctions are available for companies who refuse to collaborate. It is recommended that future surveys be conducted under the Statistics Act.

The HIES was checked to give the only possible estimate of informal tourist employment in the catchment areas. The Industry codes for hotels, restaurants and recreational activities identify

an estimated 1,000 people. The occupation codes identify around 1,700 in direct tourist related activities. The sampling errors will be very high and using this as a source is not recommended.

XV. *Recommendation*

It is recommended that any frame for the tourism establishment surveys should include direct tourist establishments only, and be checked with the NSO to compare with their enterprise surveys and their business register which is derived from VAT records. It is only with a reliable frame with size measures that the results can be weighted up. The frame used for the current survey should be rearranged with size measures to obtain weighting factors for the calculation of regional estimates.

XVI. *Recommendation*

The business survey conducted by NSO is an alternative source of reliable information. The results of the proposed 2008 survey should be checked against those of the 2007 consultant survey. Consideration should be given to diverting future funds for tourism employment estimation to the NSO. The NSO has expertise in enterprise surveys, and has a direct need for the results. Consultants might supplement this with more qualitative information from focus groups on the effects on their businesses from the project and on their investment decisions.

XVII. *Recommendation*

Questionnaires should avoid collecting employment in grouped categories, and include all classes of employment, including proprietors and unpaid family workers.

3.2   Number of new hotel rooms

Variable 4 is an objective level indicator requiring a cumulative total of the number of new hotel rooms constructed. A clear definition of a new hotel room is required, involving type of establishment, size of hotel, number of weeks it has to be available in the year, whether the rooms must be newly built and so on. The best sources for this information are building completion certificates, which are issued by councils for new buildings. Shefa Council has confirmed that new commercial buildings require planning permission and a building permit. During construction regular inspections are carried out and when the building is complete a completion certificate is given. Subsequently the Vanuatu National Tourism Development Office carries out its certification of its suitability for tourists. These returns from the two agencies concerned should be used by NSO to identify new hotel rooms on a quarterly basis.

XVIII. *Recommendation*

Hotel completion certificates are issued VIPA, and after that the Vanuatu National Tourism Development Office carries out its certification. The tourist establishment should be added to the register of hotel once the certification has been completed by the Tourism Office. A quarterly return from them would aid this communication between the bodies concerned. Initially this will only be required for the project in the areas of Efate and Santo, but it may be advantageous for the NSO to add all new hotels to its new establishments list. Action should also be taken to delete closed establishments from the list. A regular return should be required from the VNTD offices to ensure that the provision of timely, reliable data becomes a routine activity for the offices.

3.3   Numbers of tourists

Variable 5 The national tourist visitor information is derived from immigration records, and this seems a reliable and well managed system. It has been in use for many years and was recently updated to link arrivals and departures. Data is robust in respect of international arrivals and departures. It is noted that the figures do not relate to day-trippers which could be a little less reliable. This is a good strategy and should be continued.

What is not known reliably are the numbers of visitors to the islands. The 2004 visitor survey indicated that around 50% of visitors went to one of the other islands, but closer inspection of the data indicates that this is not the case, and that the baseline data is broadly accurate for Santo and Tanna. The current series of tourism surveys will provide new baseline data for 2007, and the baselines in the M & E Plan should be updated when the results are available. The problem is that no alternative source is available for estimation of island visitors in subsequent years. Possible proxies might be passengers flying to other islands, but many passengers will be local residents, and this will exclude sea passengers who are thought are growing in number. However as the only information available, the short-term solution is to use the number of Air Vanuatu passengers on the Vila-Santo-Vila and Vila-Tanna-Vila routes.

In the longer term the MCA should consult with the VTO to request that the Ministry of Internal Affairs add an additional question to the departures card for visitors. This question would ask which islands visitors had during visited during their stay – the response categories would be the 5 main islands and a code for others. This was discussed at the consultant's final presentation and seemed acceptable to the MCA and the Tourism Office representative. It will take some time for this proposal to become operational. New departure cards would have to be printed and old stock exhausted, however it is a more reliable solution and would provide information needed by the Vanuatu tourism industry beyond the life of the project.

Table 3.1   Baseline tourism data compared with results of 2004 Tourism Survey

	No of Tourists in M & E Baseline	2004 Tourism Survey
National	61,453	
Santo	6,963	5,748
Tanna	5,000	5,982
Malekula (South-West Bay)	30	1,172*

* All visitors to Malekula

The current total for South-West Bay alone is not recommended as results for Santo and Tanna must come from the tourism survey, while South West Bay estimates come from airline records. A common source of information should be used. The figure should be revised to reflect the results of the 2007 Tourism Survey and include all tourist visitors to Malekula, and updated if and when the departure cards are amended. In the interim air passenger numbers could be collected and used as a separate proxy series, in other words all the island figures would come from the air passenger totals, not just S.W. Bay, as this is currently the only information available annually.

The question suggested for departures would apply to visitors only and take a form such as:

'Which of the following islands did you visit during this stay in Vanuatu' (tick all visited)

        1 Efate   2 Tanna   3 Santo   4 Malekula   5 Pentecost   6 Other

3.3.2 Data quality of the Visitor Survey

The survey has benefited from having an experienced tourism consultant with relevant Vanuatu survey experience. The consultants have been able to boost response rates and cooperation from respondents by using the official channels and the goodwill of tourism operators. The main problems experienced have been the short opening times of the airport departure lounges, and finding space to conduct the interviews with cruise passengers. The latter has been solved and good co-operation has been achieved by pre-disembarkation announcements on the ships about the survey. The issue of the late opening of the departure lounges at the airport has not been solved, but the consultants are now interviewing every second group of tourists rather than every third group. This is not expected to have any important consequences. The only group of air passengers who are routinely missed are those arriving late at check-in, who board the plane directly, this group is more likely to be residents who are well informed about departure procedures. Around 14-20 interviews are conducted on each of the selected flights.

The tourist expenditure data is of rather variable quality, the consultants say cruise passengers tend to know exactly what they spent, as do many business people, but others have only a vague idea. Some business travellers do not know the price of their ticket or accommodation when they are pre-paid and arranged for by their companies. Other problems in obtaining ticket price include those on free frequent flyer tickets or other concessionary fare deals.

Yacht tourists are collaborating well, some spend a lot, others almost nothing.   Excluded cruise passengers are those who have drunk a lot of alcohol and those accompanied by tired and fretful children. In general the airport passengers are the most cooperative of the tourists. Records of non-response are being kept, this is a tally of refusals by date, sex and approximate age category.

Many tourists express disappointment that more opinions on their stay are not sought, and many are anxious to comment about tourist facilities and to give their opinions on their holidays.

3.3.3 Recommendations on number of tourists

XIX. *Recommendation*
Use 2007 Survey to update baseline data in M & E plan relating to numbers of visitors to the islands treating Malekula as a whole rather than S.W Bay is particular.

XX. *Recommendation*
Ensure that same methodology is used in next tourism survey.

XXI. *Recommendation*
Investigate including a question on the departure card for visitors about the islands which were visited by tourists during their visit. This not likely to be a fast solution, but it will have a continuing use to the Government in planning and monitoring tourism in the country.

XXII. *Recommendation*
Abandon annual tourist estimates to the islands until departure cards are amended and use airline passengers as a proxy, or simply rely on room occupancy estimates to monitor island tourism.

3.4   Number of hotel room nights occupied

This objective level **indicator 6** is proving problematic as the sampling frame used for collecting information from hotels had not been updated by NSO for many years.   The published hotel occupancy rates are based on an outdated sample of hotels and reflect fluctuations in a stable set of hotels, rather reflecting all the bed-nights available in Vanuatu.   The original NSO series is based on very small, outdated sample of hotels which includes 29 nationally and 11 in Port Vila. This can be compared with the current list of hotels obtained from the National Tourism Database of accommodation which has 158 hotels[11] in all, of which 69 are in Port Vila, plus a number of camping sites.

There have been recent attempts to both amend the form and to collect the series from all hotels in the country. These attempts have not so far been successful, due to high levels of non-response and strong resistance from hoteliers to providing the additional information sought by NSO. The proposed questionnaire forms have been amended several times in consultation with the hoteliers association and the form is now the simplest possible and now reflects the number of rooms available during the month and the number occupied, this could be called *occupied room nights*. NSO now claim that response rates are improving.

The new questionnaires have resulted in a change in definition of the indicators from the number of bed-spaces occupied to the number of occupied room nights. There are concerns in NSO that this very simple form may cause responding hotels to make calculation errors which cannot be checked subsequently by the statisticians. The calculation involves the total of rooms in the establishment multiplied by the number of days in month; and the total number of rooms occupied in month. The consultant suggested adding an optional sheet to assist hotels to do the simple arithmetic, but not to make this compulsory.

It is likely that increases in hotel occupancy will arise largely from new hotels rather than from increased take-up in existing hotels it is therefore important that the sampling frame for hotels is undated very regularly. It was noted during the mission that the regional tourism offices are able to supply details of newly available hotels, and this links to Indicator 4 number of new hotel rooms. The two indicators should be cross-checked against one another each quarter.

The proposed questions which resulted in some resistance from hotel owners, included 'takings from accommodation' ; and a daily record of room occupancy. Information on takings can be obtained from VAT records or be included in the forthcoming 2008 NSO Business Survey. One problem identified with the new format is that a number of hotels provide dormitory accommodation to backpackers – a number of unrelated persons occupy the same room. A new section will be required on the questionnaire to cater for this kind of facility.

XXIII. Recommendation
>   A new question should be added to the hotel occupancy questionnaire to cater for backpackers dormitories which asks;
>   1. Number of dormitories
>   2. Number of available beds in dormitory in month
>   3. Number of occupied beds in the month

XXIV. Recommendation
>   The frame of all hotels must be updated on a quarterly basis by sending a return to each of the provincial tourism development offices. MCA should take responsibility for ensuring this

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[11] Hotels includes motels, bungalows, fares, guest houses and other accommodation available to tourists.

is institutionalised. The frame should be used for Indicator 4, but also be used to mail out forms to all new hotels for Indicator 6.

XXV. *Recommendation*
All quarterly returns on hotel occupancy should be checked and compared with the results from the previous quarter to ensure that the total number of room nights is consistent and any changes accounted for in Indicator 4. Non-response must also be accounted for by imputations or attempts to obtain full response from hotels.

3.5   Airfreight uplifted from South West Bay, Malekula

This data is collected from Air Vanuatu and is available from their computerised system. The company is willing to co-operate and the variable seems non-problematic in theory. The main obstacle will be to ensure that the information is returned to the MCA as a matter of routine.

3.6   Cargo shipped from wharves (Loltong and Lamen Bay)

This information will not be available until the wharves have been constructed and the local authorities involved have decided on the managing agent for the facilities. A private wharf manager is the preferred solution by MCA, and this manager should be required to complete monitoring returns as part of the managing contract.

3.7   Traffic volume – Average annual daily traffic

Indicator 9 is an outcome level indicator which is to be collected on all the project roads. Detailed advice was given to the MCA on traffic volume estimation, and a revised draft questionnaire is reproduced in Annex D. Key points are discussed below.

At the time of the visit the traffic counters were being procured. The traffic counters will be placed at intervals along the project roads, and the information from the traffic counters will be supplemented with information from the traffic survey. The two operations must coincide to be able to estimate journeys from the traffic counter information. The origin and destination of journeys can only be obtained from the traffic survey, and this must be used in conjunction with the traffic counters to estimate the numbers of journeys, their origins and destinations and their purpose. The traffic counters record only the numbers of broad categories of traffic which cross them, the axle length is recorded which enables the vehicle type to be obtained.

The questionnaire used must be short and appropriate for all types of driver, and the driver should be in a position to know the answers to the questions. Questioning about business activities, profits etc. are not recommended as these are unlikely to be known or be appropriate for many drivers for example drivers of private vehicles, public service vehicles, employees of companies etc. Even if the answers are known by the driver, the time taken will cause traffic delays and may well result in a high level of refusals. The questionnaire should focus on the indicator information required, this is journey purpose, type of users; vehicle type, passengers; journey origin and destination. The total length of the interview should be no more than 5 minutes, vehicles are on route and are likely to resent delays.

All periods in the day should be covered by the survey as it is necessary to gross up the traffic counts for the full day. The coding of the place of origin and destination of the journey may cause problems in the office and be time consuming to code. It is advisable to liaise with NSO to use

standard place codes and to have these printed on the questionnaires for the codes to be entered to the computer directly from the forms completed in the field.

Vehicles making long trips will be double counted by multiple counters along the same stretch of road, and potentially at the survey enumeration points. A system will be required to identify drivers who have already been surveyed at an earlier point. A sticker could be given to each responding driver to ensure that they are not asked to repeat the interview, and each enumerator should keep a tally of those approached for interview, but who have already participated. These tallies will be used in the procedure for estimating trips which is described in D.1.

The survey must be carefully planned and steps taken to pilot the questionnaires and the data processing system before the survey takes place.   The data entry system must match the questionnaire.

3.7.1 Potential quality risks

The budget for the survey is limited with a small number of enumerators who are to be employed twice yearly for one week. Supervision of lone enumerators will be difficult and the MCA should exercise supervision throughout to ensure that enumerators do not leave their stations unattended, or tempted to fabricate information. The traffic counters will serve as a check on the survey, and the enumerators should be made aware of this.

There should be no attempt made to select every nth vehicle as this will be very difficult to manage and may lead to a loss of efficiency, the enumerators at busy periods should move quickly on from one respondent to the next available one. Enumerators may be tempted to focus on easy targets. On the first survey no quotas can be set, as we do not know the composition of traffic on the roads. However the traffic counters will be able to calculate the broad make-up of vehicles and this will serve as a check on the impartiality of the interviewer selections. Enumerators should be made aware that they must select a representative cross-section of vehicle types, and be made aware that the counters will check their success in doing so.

The enumerators will be able to interview at a certain rate during the course of the day, and it is expected that each interview will take around 5 minutes from the stopping a vehicle to completing the interview. This means that the maximum amount of survey returns that can be expected from any interviewer is 12 interviews per hour, and given refusals and problems it is more likely to be 10. The product of an 8 hour working day is 80 interviews.

It is anticipated that only 2 interviewers will be recruited for one day – therefore the maximum number of questionnaires will be 160, rather a small sample size. With a small number of vehicle types and three periods of day, sample sizes will be small.

Table 3.2   Example daily sample sizes with 2 enumerators

	Cars	Trucks/Lorries	Buses	Total	Weekly
Morning	22	25	6	53	371
Afternoon	20	25	8	52	364
Evening	23	25	6	54	378
Total	**65**	**75**	**20**	**160**	**1 120**

XXVI. Recommendation

The maximum number of interviews possible for each enumerator is just 80 per day, and over a 7 day period 560 interviews. Using just three time bands daily time band sample sizes will be small with just two interviewers. Larger sample sizes will yield less variable results and the MCA should consider the required levels of accuracy.

XXVII. Recommendation

Police advice should be sought on gaining cooperation of drivers near town at busy periods, and on obtaining suitable locations for the enumerators. Publicity will be require before survey to boost response and gain cooperation.

XXVIII. Recommendation

To assure confidentiality to be assured, data should be collected under Statistics Act and enumerators should sign the oath of secrecy.

XXIX. Recommendation

Counts and surveys should take place simultaneously, at same locations and at the same time of year to ensure comparability. Journey estimation procedures should be followed, and tallies kept of vehicles which cross two enumeration points.

XXX. Recommendation

Breakages and malfunctions in the traffic counters should be planned for. An extra counter is recommended to cope with mechanical problems which might be expected as counters are moved around the islands.

3.8   Days road is closed (number per annum)

Indicator 10 is another outcome level indicator, this information is supplied by the Public Works Department. Records are kept by local PWD offices, but no operational definition of closed was available at the time of the visit. Roads may be closed for a matter or hours or a matter of days, PWD were asked to provide a minimum period of closure which would constitute closed. Despite repeated calls no definition was forthcoming. A period of 12 hours is suggested.

XXXI. Recommendation

MCA agrees a definition of road closure with PWD at the earliest possible occasion.

3.9   Number of S-W Bay Malekula flights cancelled due to flooding

Indicator 11 is another outcome level indicator supplied by Air Vanuatu who are cooperating in supplying the information. No problems are anticipated once the reporting system becomes routine.

3.10 Time at wharf

Indicator 12 is another outcome level indicator with no source of information yet identified. Until the wharves are constructed it is premature to anticipate data quality.   The wharf managing agent may be the best solution to providing this information, but the next visit should explore this further.

3.11 Warehouses

Indicator 13 to be decided once construction is completed.

3.12 Share of road length in good condition

Indicator 14 is an objective level indicator and monitors road maintenance standards in the country recording the speed at which a vehicle can comfortably travel. The indicator requires the proportion of the road in 'good' or 'fair' condition. The methodology was tested by the consultant and the MCA Economic Analyst on the road which runs around Efate.

It was agreed that the conditions were to be measured on 'comfortable speed' only, this requires the passenger to be able to note the speeds while being driven. It was agreed that the definition of comfortable was subjective and depended on the age, type and condition of the vehicle, and the attitudes of the driver and passenger. As far as is possible the vehicle and the driver used should be constant. The same MCA named driver should therefore check each of the roads annually, using a 4x4 vehicle in good roadworthy condition. As the physical recording of the entire road lengths takes up a considerable amount of time, only the project roads should be included in the measurement of the indicator, not as previously planned all roads in Vanuatu.

The exercise is rather subjective, and should not be entrusted to PWD whose performance is being assessed. It is noted that this is a conditionality of the funding and both the PWD and the MCA might be tempted to be less than objective. No disinterested parties have been identified to carry out the assessment.

The 5 categories distinguished in the M & E Plan present a problem for this exercise. On the road test it was found that for most of the road length the comfortable speed was around 40 Kph which is the boundary for fair and good. The speedometer remained just over or under 40 kph for the majority of the trip, with the exception of short stretches in a very poor state of repair and the occasional short stretch. It is recommended that this ambient recorded be contained within a band rather than forming a boundary. The new proposed categories are set out below in Table 3.3.

Table 3.3

Road Condition Categories	
Under 20 km/h	Very Poor
20 to 45 km/h	Poor
46 to 65 km/h	Fair
66 to 85	Good
Over 85	Excellent

A template was developed for the Efate Ring Road which can be found in Excel speadsheet Efate Road Surface Check.xls. A section of this is replicated below. Segments of approximately 10 km in length were specified, the distance from the start in Rentabao is noted for each settlement to aid recording. The average speed for each 10 km section is noted, short, specific 'bad patches' are individually noted. On each annual road check any new bad sections should be noted. Sections which were previously bad and have been repaired should also be noted. Using the distance for each section and the average speed for each measured section the percentages in each category can be calculated. The Efate road had 9% in fair condition during the test, the remaining 91% was in poor or very poor condition.

Table 3.4   Example of road condition monitoring template

	Odo '000s	Odometer	Distance	Place	Speed	Section	Av. Speed	Comments	Av k/hr	Category	Length km
Start recording	23,	123	0	Rentabao	50	Section 1					
		125	2	Eruiti	35						
		127	4		38						
		130	7		38						
		133	10		45		Av. Speed		41	Poor	10
		135	12	Eton South	35	Section 2					
		136	13		45						
		138	15		35						
		140	17	Eton village	30						
		143	20		35		Av. Speed		36	Poor	10
		144	21	Cressoniere	25	Section 3	Lowest Speed				

Table 3.5   Current road condition on Efate ring roads

Category	Length Km	% of Road in Condition Category
V. poor	4	4%
Poor	82	86%
Fair	9	9%
Bad patches	7	

XXXII. Recommendation

It is recommended that similar templates to that prepared for Efate ring road are prepared for all the other project roads and that baseline data is collected by the MCA Economist in this way. This should be done for project roads only

3.13 Activity indicators

The indicators associated with the completion of project activities (**Indicators 15 – 18**), such as the kilometres of road built, numbers of river crossings constructed, etc. are to be collected from the contractors by MCA office and a sample checked against actual completions. THE MCA Engineer will presumably check completion is to standard and verify it as such. These indicators will be explored in subsequent missions.

3.14 Maintenance activities

Indicator 14 is a score based on compliance with the Key Performance Indicators in the MCA contract with PWD. The form of this indicator has been agreed with the PWD in principle. It is understood that the key performance indicators are still subject to further negotiations but the recommended method can be adapted to suit whatever key indicators are agreed.

A system of scoring each performance indicator against the target for the year, and then combining these scores is recommended. The 8 key performance indicators are taken from the PWD Service agreement and reflect the Key Performance Indicators contained within it. It seems reasonable to score the performance against the indicator target set for each year.   The proposed system gives a maximum score of 40 for the indicator, with each KPI accruing points according to the compliance with the annual target for that KPI, from 50% compliance upwards. Achievements below 50% will not accrue any score and be recorded as zero. What remains to be agreed is the 'weighting' of the indicators, each of the five indicators can be awarded the same maximum score of 5 points, or some considered to be more significant could be awarded 10 points or some other

score. The PWD officials preferred each indicator to be awarded the same score, while the MCA Engineer suggested a higher score be awarded to routine maintenance.

For example, KPI 1 is routine maintenance of unsealed roads and has a target for 2008 of 2,000 km of road maintenance including grading, filling potholes, clearing of culverts and drains, reinstatement of minor erosion. Annually the total completed should be checked against the target by using PWD records.

Table 3.6   Key Performance Indicators – Annual PWD Score

Activity	Amount Completed in Year	Total Possible Score	Scoring
1. Routine maintenance, unsealed roads	*Length completed against target in KPI*	5	*Score against target of 5*
2. Periodic maintenance, unsealed roads	*Length completed against target in KPI*	5	*5 – On target* *4 - 10% below*
3. Routine maintenance, sealed roads	*Length completed against target in KPI*	5	*3 – 20% below* *2 – 30% below*
4. Pothole and edge repairs	*Length completed against target in KPI*	5	*1 – 40% below*
5. Vegetation clearance	*Length completed against target in KPI*	5	*0 – 50% or lower*
6. Road furniture	*Length completed against target in KPI*	5	
7. Quarrying	*Length completed against target in KPI*	5	
8. Road Inventory	*Length completed against target in KPI*	5	
		Maximum score 40	

An example is demonstrated in Table 3.7. In the year 2008 the target was 2,000 km, yet PWD records that on 1,800 km was carried out. This equals 90% compliance, therefore it is 10% below target and a score of 4 is recorded for this indicator. Then for KPI 5, vegetation clearance the target is 2,000 km per year, yet only 1200 was completed. This is 60% compliance so the score for this would be 1. [12]

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[12] If indicators 1 and 3 are agreed to be more important in terms of maintaining roads in good condition, then a total maximum scores of 10 could be used. The other 6 indicators would continue to receive a maximum score of 5.

Table 3.7   Example of Performance Score for 2008

Activity	Target for 2008		Example achieved	Score	
	Max. score	Km/Cu.m	Km	% achieved	Score achieved
1. Routine maintenance, unsealed roads	5	2,000	1,800	90%	4
2. Periodic maintenance, unsealed roads	5	120	120	100%	5
3. Routine maintenance, sealed roads	5	300	300	100%	5
4. Pothole and edge repairs	5	50	30	60%	1
5. Vegetation clearance	5	2,000	1,000	50%	0
6. Road furniture	5	1,800	1,000	56%	1
7. Quarrying	5	150,000	175,000	117%	5
8. Road Inventory	5	360	210	58%	1
Total Performance Score	40				22

NB. Nothing is awarded for over-performance i.e. KPI 7.

3.14.2 Quality considerations for PWD score

The contracts for routine activities such as grass cutting, culvert clearing and so on are readily checked against the contracts awarded to small contractors and the MCA office maintains copies of these contracts. More difficult to check will be the direct works undertaken by PWD. PWD have an information database under construction which is planned to be operational in January 2008. This should be carefully checked and procedures for spot checks of a sample of maintenance activities.

XXXIII. Recommendation
The scoring of the PWD composite indicator is agreed with the MCA and PWD as soon as possible, in particular making a decision as to whether all key performance indicators are to be weighted equally.

XXXIV. Recommendation
The PWD Database should be inspected and checked when ready, a system of random spot checks should be developed to ensure that the maintenance recorded in the database has taken place as reported.

4   Evaluation component

4.1   Role of transportation infrastructure on investment and production decisions – Roadside Enterprise Survey

Some advice was offered on the proposed roadside enterprise survey and the terms of reference for the study were discussed. The plans are to survey all enterprises along the road and in settlements attached directly to the road, the topics to be covered include:

- Business starts

- Business growth

- Employment growth

- Investment decisions

- Details of proprietors

4.2   Comments on Terms of Reference

4.2.1   Overview

There is some confusion about whether this is a survey (all businesses page 1) or a sample survey (references to sampling methodology on page 2). I would recommend a census listing of businesses in scope, followed by a more detailed sample survey to gain information in greater depth.

4.2.2   Survey Details

Survey is expected to cover all businesses that are located in the vicinity of the roads that will be upgraded with MCC funding.   This should be carefully defined, 3 km was the original catchment used and this should correspond with the enumeration areas included in catchments in the HIES.

Number of employees – This should cover all employed persons, including employees (waged or salaried), proprietors and unpaid family members

Type of business – it will be useful to specify the categories – standard industrial classification might be used but the categories should correspond with those used by NSO. There may be a need to cross check with the forthcoming business survey.

Measure whether any increase was due to the road improvement (i.e. whether there is a statistical correlation). All you can do is measure whether business activity has increased. You do not know whether this is due to the road improvement or not, as what is going to be correlated against what? The best that could be achieved is to ask questions of the proprietors about what prompted their decisions to invest and start businesses and hope that the road improvements were part of the reasons.

4.2.3   Survey Methodology

What is a business?   This will need clear definitions from the list given the following may be problematic;

> *Agricultural business* – should this include commercial farming only, or is it intended that all farming activities are covered. Clear definitions will be required

> *Real estate* – are not enterprises, some may become enterprises, some may be private households. If real estate values and amount released to the market is to be used as evaluation variables, then a distinct indicator may be required with details collected from real estate agents.

> *Road-side markets* – these are enterprises, but they may only be part-time operations and this will need to be taken account of in the survey design.

Scope of Work & Methodology

Training interviewers is always necessary and is essential if reliable data are to be obtained.

For small informal enterprises, it is sometime helpful to ask them to keep a business diary of expenses and income, for the roadside market they are unlikely to keep any records. Recall errors will apply to small businesses in the same way as it applies to households.

4.2.4   Additional quality points

It would be helpful to collect this information under the Statistics Act, as the information obtained may commercially valuable. This was a point noted by the TRIP survey coordinator in relation to the Tourism Enterprise Survey. Respondents need confidentiality assurances and the consultants and enumerators should sign the oath of secrecy provided for by the Statistics Act.

 It would be helpful to cross check answers against VAT records and NSO Business Survey questionnaires to obtain further information on turnover, and access to the raw data by the NSO is desirable.   In the contract the consultants should be ask submit the original data without imputations together with the edited database and the completed survey forms.   The computer syntax used for the processing and imputations must be retained as part of the metadata.

Between 2007 and 2011 it can be expected that many of the businesses identified in the first round will have ceased operating, many more will have set up. Therefore there will need to be a full listing on enterprises in both years, and a sample selected from each listing.   It will be advantageous to retain the <u>same businesses </u>in the second survey as in the first, as this will enable changes over time to be tracked without sampling errors, the sample will however need to supplement by newly emerged businesses. This will enable two distinct analyses to be carried out – changes in the businesses identified in 2008 and new business start-ups. This will have benefits in evaluating the project's success.

Deliverables

You may wish to specify the format in which the dataset should be presented. If it will be scrutinised by NSO then it should be a package they are familiar with. Issues which require resolution include;

- Whose property is the data?

- Where is it stored?

- Who has access to it?

Terms of Service

The consultant will need relevant computer equipment and software or access hardware and software from NSO or the Government. These aspects must be explored if a single consultant is to be recruited to do the task.

List of Persons Met

Name	Designation	Agency
Lennox Vuti	Director	MCA-Vanuatu
Tony Amos Sewen	Economic Analyst	MCA-Vanuatu
Jeff Stubbs	MCC Resident Representative	MCC Vanuatu
Chris Cookson	Deputy Resident Country Director	MCC Vanuatu
Johnny Arnhambat	Manager Revenue Accounting and Control	Air Vanuatu
Captain Hamish	Director	Ports and Harbours Authority, Port Vila
Annie	Marketing Officer	National Tourism Development Office
Willie Watson	Projects Manager	Public Works Department
Dennis Alvos	Engineer	Public Works Department
Tess Newton Cain	Survey Coordinator	TRIP Consultants
Simil Johnson	Acting Government Statistician	National Statistics Office
Pita Toa	Statistician	National Statistics Office
Benuel Lengue		National Statistics Office
Pioni Willie	Statistician	National Statistics Office
Anna Tavoa	Statistician	National Statistics Office
Leon Pietsch (by e-mail)	Statistician Technical Assistance	Independent Consultant
Celeste Tarricone (telephone)	Monitoring and Evaluation	MCC Washington
Anne Reader (by e-mail)		Austrialian Bureau of Statistics

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Deaton, Angus and Zaidi, Salman (2002); *Guidelines for Constructing Consumption Aggregates for Welfare Analysis LSMS Working Paper 135,* World Bank, Washington.

Government of Republic of Rwanda (2002): *A Profile of Poverty in Rwanda,* Ministry of Finance and Economic Planning, Kigali, Rwanda.

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Annex A   Terms of reference

DESCRIPTION OF SERVICES

1. BACKGROUND

The Government of the Republic of Vanuatu has received a grant from the Government of the United States of America through the Millennium Challenge Corporation (MCC) to support a five-year Program of investments in the Transport Sector, aimed at facilitating poverty reduction through economic growth. Vanuatu is now beginning the implementation phase, including set-up of performance monitoring and data collection. The Program, which was developed by the country through a consultative process, is designed to reduce poverty through infrastructure development to enable farmers in rural areas to get their produce to the markets and to foster development of the tourism industry.

The Government of Vanuatu has established an MCA-Vanuatu Unit within the Ministry of Finance and Economic Management to work full-time on implementing and managing the Program. Given that the Compact and supplemental agreements have been signed, MCA-Vanuatu has now become a Project Management Unit charged with the responsibility of managing and implementing the Program. The Compact and other supplemental agreements can be viewed on the MCA-Vanuatu's website http://www.governmentofvanuatu.gov.vu

The Project Management Unit is governed by the Compact and other Supplemental Agreements. One of the main responsibilities of the Unit is to monitor and evaluate the progress of the program, as outlined in the Monitoring and Evaluation Plan. Given the amount of data to be collected and reported on, a Consultant is required to regularly assess the monitoring work. The Consultant's main task is to review all program data for quality and reliability. The Consultant shall also provide support and advice to MCA-Vanuatu on developing a data quality manual, a management information system, planning and overseeing surveys, and other data quality issues.

2. OBJECTIVE OF THE ASSIGNMENT

The main objective of this consultancy is to ensure that data collected for program monitoring and evaluation is of acceptable quality, reliability, and consistency. The consultant shall carry out three reviews and provide quality assurance for surveys and other data collection initiatives. The Consultant is to review the data gathered for the program in three separate inputs, to ensure that data reported are valid, reliable, timely, and precise as resources allow. This is to verify the quality and consistency of data across different implementing entities and reporting institutions. The data quality reviews will also assist in identifying key issues or problematic areas regarding data quality and identifying mitigation measures to correct the problems. The Consultant shall review the following, but not limited to:

- the methodology in which the data are collected;
- the accuracy of analysis to determine computed indicators;
- the flow of data from the various institutions to MCA-Vanuatu;
- the accuracy, consistency, and reliability of primary and secondary data;
- data warehousing;
- survey quality and accuracy; and
- review methodology and accuracy of reporting to both MCA-Vanuatu by implementing institutions and reporting from MCA-Vanuatu to MCC.
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3. METHODOLOGY AND SCOPE OF WORK

3.1 Content of Data Quality Audits and Analysis of Indicators

The Consultant shall carry out an analysis of the indicators and data yield that should include, but not be limited, to:

- Reviewing the data collection methods for the indicators, in addition to the data itself
- Ensuring that all data meets the standard required by MCC throughout the program;
- Identifying data weaknesses and proposing strategies for remedial measures;

- Flagging indicators that may be too weak, or have become inappropriate or irrelevant, and should be removed from program monitoring.
- Identifying replacement indicators and data collection methods that might supplant those that need to be removed.

3.2 Methodology

The Consultant will be based primarily in Port Vila. The Consultant shall review all data collected and relevant monitoring documents, make random site visits when required, and conduct interviews with relevant stakeholders. It is anticipated that the Consultant will engage in sufficient field visits to program activities and site visits to the sources of secondary data to observe and verify, through a methodology to be described below, how data are actually collected and calculated.

In order for the Consultant to perform the tasks thoroughly, he or she will need to work closely with MCA-Vanuatu, MCC, the National Statistics Office (NSO) and other institutions that are involved in data collection. Timing of proposed inputs need to agreed in advance as agencies such as the NSO have other responsibilities to manage. Reviews should include the following, but not be limited to:

i. Data mining - searching databases, registers, personal files, expert informants, agencies as well as conducting interviews;
ii. Site visits to the sources of data to observe and verify indicator accuracy, reliability, and consistency;
iii. Analysis on a sample of data to verify the outcome of the indicators;
iv. Identification of weaknesses in the data as well as in the mechanisms used in the data collection; and
v. Recommending remedial measures to address any weaknesses and assist in the implementation of the recommendations.

3.3. Key Tasks

The Consultant shall execute the following tasks:
Task 1: Carry out data quality reviews.
Specifically:

- Provide a Quality Auditing Plan (QAP) during the first assignment applicable for each review stating methods, frequencies, etc, during the initial phase of the contract.
- Conduct reviews of the quality of data gathered as mandated by the M&E plan to ensure that data reported are valid, reliable, consistent, and timely.
- Verify the quality and consistency of data across different implementing entities and reporting institutions through spot checks, detailed review of database content, and other techniques.
- Identify key issues and concerns regarding data quality.
- Identify strategies and recommendations for improving data quality and addressing any concerns raised during an audit.
- Make additional recommendations for modification of the monitoring and evaluation plan and data collection procedures, if necessary, to address any systemic data quality issues identified.
- Provide assistance to MCA-Vanuatu, if necessary, in implementing any recommendations.

Task 2: Provide advice and support to MCA-Vanuatu on its Database setup..
Specifically:
- Provide input and comments to MCA-Vanuatu about the content and structure of the Database to ensure that the system adequately addresses data quality and control issues.
-

Task 3: Carry out technical assistance and training related to data quality.
Specifically:
- Provide technical capacity building and training to MCA-Vanuatu to carry out interim data quality reviews and spot checks in between the data quality audits. In particular, the auditor shall develop written guidelines that will assist MCA-Vanuatu in carrying out ongoing data quality reviews.
- Provide technical assistance to the National Statistics Office to improve its data quality and

develop data quality procedures and guidelines for its own data quality audits
- Provide data quality orientation and training to all institutions that will be responsible for the collection and reporting of data

Task 4: Provide advice and support to MCA-Vanuatu on survey documentation and oversight.
Specifically:
- Assist with the development of survey documentation for all baseline and follow-up surveys.
- Provide technical advice and assistance as necessary to address data quality issues during survey implementation and dataset preparation.

4. DELIVERABLES

The Consultant shall be responsible for submitting the following deliverables. All deliverables must be submitted in English, and in both hard-copy and electronic form, unless otherwise agreed to with MCA-Vanuatu. Deliverables will be submitted according to a timeline agreed to by the Consultant and MCA-Vanuatu at the start of the Contract. MCA-Vanuatu will have one (1) week to review the deliverable and notify the Consultant of any questions or concerns, and the Consultant will then make any necessary revisions. The Consultant will provide to MCA-Vanuatu and MCC the Final Report or deliverable no later than two (2) weeks after the clarification meeting occurs, as outlined below. The deliverables are as follows:

(i). During the initial stage of the contract the Consultant is expected to provide a Quality Auditing Plan. This is expected to be done prior to proceeding with the first review. This document will serve as the baseline to the guidelines for MCA-Vanuatu interim reviews.

(ii). At the conclusion of each input, the Consultant shall make an oral presentation to MCA-Vanuatu, MCC-Vanuatu and key implementing entities. In the presentation the Consultant will include a description of the methodological approach taken and persons interviewed and any changes that may have been made during the engagement, and a description of the findings, conclusions and recommendations;

(iii). Following its initial review at the start of the program of all indicators, data collection methods, and reporting procedures, the Consultant will provide a preliminary written report to MCA-Vanuatu. The Preliminary Report will include, but not be limited to, a description of the methodological approach taken and persons interviewed. The report should include a description of findings, conclusions and recommendations for moving forward. The report should be provided in both hard and soft copy to MCA-Vanuatu.

(iv). Once MCA-Vanuatu receives the preliminary report it will carry out such analysis and discussions on the Consultant's recommendations and will communicate any comments on the recommendations requiring modification and/or issues requiring further clarification to the Consultant. Based on those discussions, the Consultant will provide the final report and assist MCA-Vanuatu in prioritizing the recommendations and developing strategies to be implemented by MCA-Vanuatu to address the issues that arise during the engagement.

(v). Provide three audit reports following each input, which should include the content outlined in item (iii) above. Audit reports will be submitted according to a timeline agreed upon between the Consultant and MCA-Vanuatu at the start of the contract. The reports should include the methodology, findings, conclusions and recommendations.

(vi). Provide written report summarizing input and comments provided in development of the database and management information system.

(vii). The Consultant shall deliver to MCA-Vanuatu written guidelines for spot checks and data quality reviews to assist MCA-Vanuatu in conducting quarterly reviews.

(viii). Provide the National Statistics Office written guidelines for improving that office's data quality.

Annex B

Figure B.1   Cumulative household expenditure
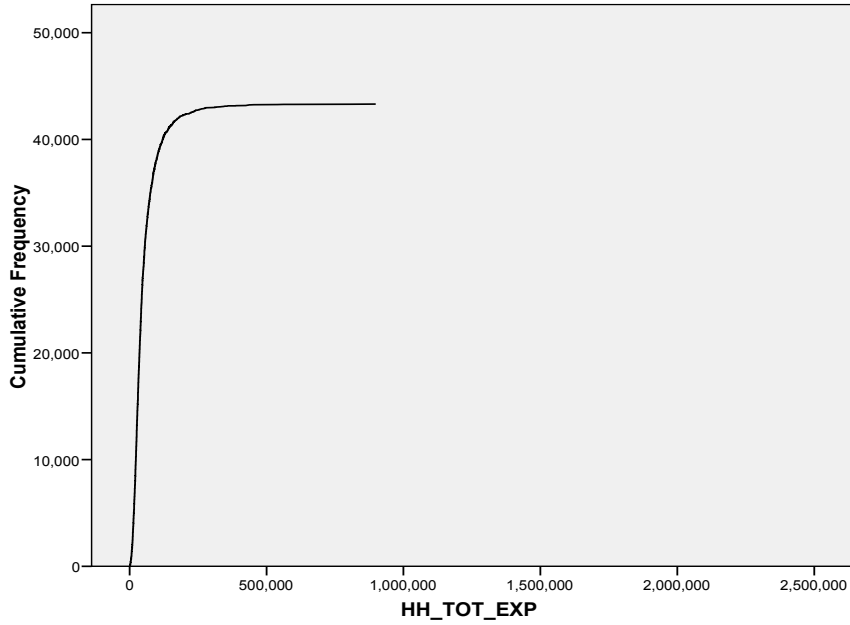
Figure B.2   Cumulative household income
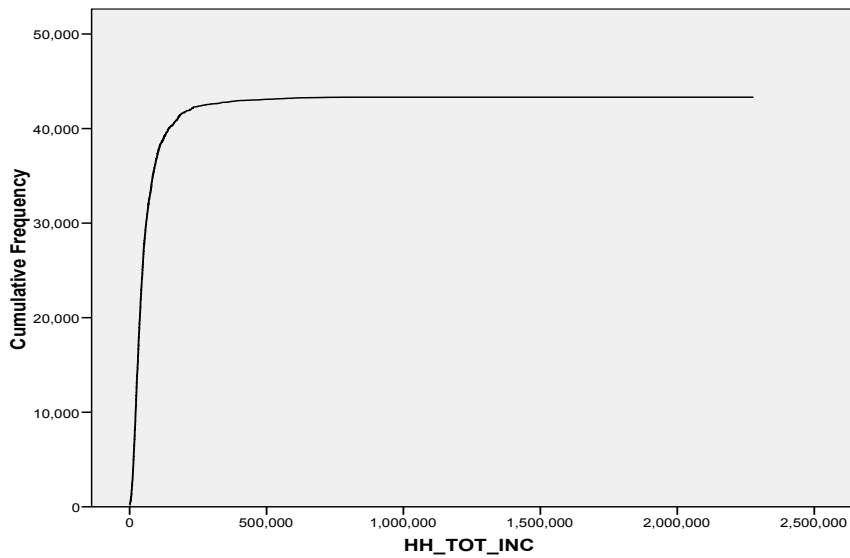
Table B.2   Comparison of mean household incomes and expenditure by Income decile

Income Deciles	Rural		Urban		National	
	Mean Exp	Mean Inc	Mean Exp	Mean Inc	Mean Exp	Mean Inc
1	16,969	7,987	44,905	8,749	19,536	8,057
2	23,099	16,598	40,656	17,094	25,191	16,657
3	27,835	22,994	38,813	23,265	29,202	23,027
4	34,867	29,345	46,742	29,785	37,106	29,428
5	40,420	36,334	61,624	36,443	44,259	36,354
6	44,709	44,434	62,181	44,301	47,712	44,411
7	49,853	54,270	71,652	55,150	56,191	54,526
8	61,580	71,838	72,461	71,663	64,970	71,784
9	74,062	98,912	100,856	100,342	82,705	99,373
10	115,462	219,034	153,205	229,864	130,978	223,486
Table Total	**45,519**	**53,462**	**82,871**	**86,218**	**53,785**	**60,711**

Table B.3   Comparison of mean household incomes and expenditure by expenditure decile

Expenditure Deciles	Rural		Urban		National	
	Mean Exp	Mean Inc	Mean Exp	Mean Inc	Mean Exp	Mean Inc
1	9,290	17,018	8,907	34,232	9,263	18,213
2	17,645	25,290	18,023	36,142	17,680	26,291
3	23,623	36,270	23,769	32,294	23,640	35,824
4	29,198	39,012	29,185	73,464	29,196	44,281
5	35,197	47,506	35,280	44,901	35,211	47,091
6	42,045	53,369	41,808	58,624	42,008	54,200
7	50,631	60,930	51,199	65,538	50,774	62,088
8	64,229	69,913	65,014	76,970	64,457	71,961
9	88,355	96,366	88,313	82,631	88,338	90,775
10	173,469	156,373	180,934	156,495	177,352	156,436
	45,519	**53,462**	**82,871**	**86,218**	**53,785**	**60,711**

Table B.4   Cash and own consumption diary transactions

Rank Order	Item description	Cumulative % of all food transactions		
		Rural	**Urban**	**National**
1	Rice	10%	15%	11%
2	Bananas (Cooking)	19%	18%	19%
3	Island Taro/ Taro Fiji	29%	20%	27%
4	Yam	38%	23%	35%
5	Manioc	44%	24%	39%
6	Island Cabbage	48%	27%	43%
7	Kumala	51%	29%	46%
8	Pork fresh	54%	29%	48%
9	Chicken/ Local chicken	56%	32%	51%
10	Beef fresh	58%	34%	53%
11	Other Tinned Fish	60%	36%	54%
12	Sugar	61%	38%	56%
13	Tinned Tuna	63%	41%	58%
14	Bread (sliced, loaf, square, rolls, French)	64%	49%	61%
15	Water Taro	67%	49%	63%
16	dry Coconut / Copra	70%	50%	65%
17	Laplap (Yam, banana, manioc, etc)	72%	51%	67%
18	Flour	72%	52%	68%
19	Other fish	74%	53%	69%
20	Cream cracker, biscuits, Buns	75%	55%	71%
21	Chicken (chicken parts)	76%	58%	72%
22	Cooking oil (incl. salad oil)	76%	59%	72%
23	Other tinned meat	77%	61%	73%
24	Other meat nec	77%	62%	74%
25	Tomatoes	78%	63%	75%
26	Leaf laplap	79%	63%	75%
27	Corn	80%	63%	76%
28	Butter/margarine	80%	65%	76%
29	Plate of food/ Take away	80%	67%	77%
30	Bread fruit	81%	67%	78%
31	Salt	82%	67%	78%
32	Noodles	82%	68%	79%
33	Reef Fish	84%	69%	80%
34	Crabs	84%	69%	81%
35	Nangai	84%	69%	81%
36	Ball Rice	85%	70%	81%
37	Peanuts	85%	70%	82%
38	Pumpkin	86%	71%	82%
39	Bowl Cabbage	86%	71%	83%
40	Fish (Fried/ Cooked)	87%	72%	84%
41	Paw paws	88%	73%	84%
42	Steak (meat) / Fried	88%	74%	85%
43	Milk powder	88%	75%	85%
44	Soft drinks (lemonade, coke, fanta etc)	88%	76%	85%
45	Chinese Cabbage (white bun)	89%	76%	86%
46	Green Coconut	90%	77%	87%
47	Other fresh/frozen meat	90%	78%	87%

Rank Order	Item description	Cumulative % of all food transactions		
		Rural	Urban	National
48	Ripe Bananas	90%	78%	87%
49	Beans	90%	79%	88%
50	Peanut butter	90%	79%	88%
51	Egg	91%	80%	88%
52	Other fresh fruits n.e.c	91%	80%	89%
53	Mangoes	91%	81%	89%
54	Doughnuts, Kato	92%	82%	90%
55	Other Foods nec	92%	83%	90%

Note: Table excludes gift transactions

Table B.5   Top 20 transactions mean value (Vatu) per one item – cash purchases

		Torba	Sanma (rural)	Penama	Malampa	Shefa (rural)	Tafea	Lugan-ville	Port Vila	Table Total
1	Rice	226	228	229	179	205	270	292	285	236
2	Bananas (Cooking)	132	171	220	188	246	254	247	232	234
3	Island Taro/ Taro Fiji	355	241	218	174	295	283	346	357	299
4	Yam	219	316	399	309	549	257	410	422	385
5	Manioc	17	195	237	109	298	263	256	289	263
6	Island Cabbage	86	66	73	72	101	78	57	106	77
7	Kumala	172	224	245	317	345	234	297	390	304
8	Pork fresh	1,131	1,113	966	296	529	2,566	178	1,026	1,007
9	Chicken/ Local chicken	406	425	547	414	497	560	461	515	496
10	Beef fresh	108	209	696	381	631	388	381	303	392
11	Other Tinned Fish	171	153	162	156	139	182	131	121	152
12	Sugar	165	160	158	149	159	192	148	157	158
13	Tinned Tuna	118	103	114	113	114	122	97	110	110
14	Bread (sliced, loaf, square, rolls, French)	53	69	40	51	51	51	64	55	56
15	Water Taro	160	314	200	333	500	313	352	171	276
16	dry Coconut / Copra	15	28	24	190	73	55	63	87	76
17	Laplap (Yam, banana, manioc, etc)	32	43	51	38	54	46	53	113	53
18	Flour	1,053	540	1,051	538	524	1,138	502	579	697
19	Other fish	86	118	179	207	245	367	204	535	228
20	Cream cracker, biscuits, Buns	119	124	111	102	101	113	113	114	111

Table B.6   Top 20 transactions mean value (Vatu) per one item – own consumption

		Torba	Sanma (rural)	Penama	Malampa	Shefa (rural)	Tafea	Lugan-ville	Port Vila	Table Total
1	Rice									
2	Bananas (Cooking)	211	239	226	226	237	250	273	387	234
3	Island Taro/ Taro Fiji	328	293	230	212	302	225	290	373	256
4	Yam	297	376	244	245	322	255	383	560	298
5	Manioc	240	241	190	208	265	235	284	316	234
6	Island Cabbage	80	66	74	86	93	88	60	105	79
7	Kumala	273	266	207	231	312	266	275	320	265
8	Pork fresh	573	481	1,104	549	1,317	1,661	555	934	868
9	Chicken/ Local chicken	425	470	495	462	513	498	513	514	481
10	Beef fresh	858	304	380	380	662	335	310	441	372
11	Other Tinned Fish									
12	Sugar									
13	Tinned Tuna									
14	Bread (sliced, loaf, square, rolls, French)									
15	Water Taro	225	330	319	157	215	280	305	238	284
16	dry Coconut / Copra	57	31	26	29	49	77	36	87	40
17	Laplap (Yam, banana, manioc, etc)	330	184	116	185	279	162	172	540	200
18	Flour									
19	Other fish	137	98	240	130	200	541	178	171	173
20	Cream cracker, biscuits, Buns	.	50	110	43	50	.	.	233	96

Table B.7   Cash price as a proportion of own consumption value

Cash/own con	Torba	Sanma (rural)	Penama	Mal ampa	Shefa (rural)	Tafea	Lugan ville	Port Vila	National
Bananas (Cooking)	0.63	0.71	0.97	0.83	1.04	1.02	0.90	0.60	1.00
Island Taro/ Taro Fiji	1.08	0.82	0.95	0.82	0.98	1.26	1.19	0.96	1.17
Yam	0.74	0.84	1.64	1.26	1.71	1.01	1.07	0.75	1.29
Manioc	0.07	0.81	1.25	0.52	1.13	1.12	0.90	0.92	1.13
Island Cabbage	1.07	1.01	0.99	0.84	1.08	0.88	0.95	1.01	0.98
Kumala	0.63	0.84	1.18	1.37	1.11	0.88	1.08	1.22	1.15
Pork fresh	1.97	2.31	0.87	0.54	0.40	1.54	0.32	1.10	1.16
Chicken/ Local chicken	0.96	0.91	1.10	0.90	0.97	1.13	0.90	1.00	1.03
Beef fresh	0.13	0.69	1.83	1.00	0.95	1.16	1.23	0.69	1.05
Water Taro	0.71	0.95	0.63	2.12	2.32	1.12	1.15	0.72	0.97
dry Coconut / Copra	0.26	0.89	0.93	6.61	1.49	0.72	1.75	1.00	1.88
Laplap (Yam, banana, manioc, etc)	0.10	0.23	0.45	0.21	0.19	0.28	0.31	0.21	0.26
Other fish	0.63	1.20	0.75	1.59	1.23	0.68	1.15	3.13	1.31

The cash values per unit were divided by the own consumption values to compare the relative values at province level and to check if value recorded reflected those of the few price observations? The results are shown in Table B.7, values below 1.0 show an own consumption value higher than the unit purchase price, values greater than 1.0 show the converse. While the national price ratios are very close to 1.0, the provincial prices show some distortions, although in many cases the number of observations for cash sales of commodities in rural areas is very small.

Annex C

C.1 Annex heading 1

Table C.1 Example of Adult Equivalence scales used in Rwanda in 2001 and 2006

Age range	Gender	
	Male	Female
Less than 1 year	0.41	0.41
1 to 3 years	0.56	0.56
4 to 6 years	0.76	0.76
7 to 9 years	0.91	0.91
10 to 12 years	0.97	1.08
13 to 15 years	0.97	1.13
16 to 19 years	1.02	1.05
20 to 39 years	1.00	1.00
40 to 49 years	0.95	0.95
50 to 59 years	0.90	0.90
60 to 69 years	0.90	0.80
More than 70 years	0.70	0.70

Annex D   Traffic Survey Estimation procedures

D.1   Survey method and purpose

The traffic count survey is intended to add more detail to the information collected by the automatic traffic counters, such as purpose, origin and destination of the trip, and details about the persons travelling. They should be conducted to enhance the information collected to ensure that details about road users, their vehicles, the journeys and purpose of the journeys are known.

The survey should be kept as short and concise as possible to ensure that drivers and their vehicles can be on their way as quickly as possible, and that as large a sample can be gathered on the day. Information that will or could be collected by other surveys and instruments should not be included in this survey, this is to ensure it is not overloaded and to ensure that we do not ask people for information that is not readily available. It may be necessary to involve the policy in heavily trafficked areas, particularly at the rush hours.

D.1.1 Methodological points

The survey data will be used to add detail to the traffic count data, therefore the survey should take place on a day when the traffic counters are being used. The survey period should ideally extend throughout the day, but if this is not possible then the times of the interviews should be carefully selected to represent morning, afternoon and evening and should include both peak traffic hours and low traffic periods.

D.1.2 Survey weighting

This will then enable the survey results to be weighted against the traffic counts. However as the type of vehicle user is likely to be different at particular times of the day it is important that there are samples of peak and off-peak hours. To calculate an appropriate weight (w) for each time band simply divide the Traffic Count (N) by Survey size achieved (n). $N_t/n_t = w_t$. The weighted totals are simply the achieved survey (n) multiplied by the weight (w) for the appropriate band $n_t * w_t$ (see Table D.1)

Table D.1   Example of weighting the survey by the traffic count.

Time Band	Traffic Count	Roadside Survey	Weight	Estimate
06:00 - 08:00	567	102	5.56	567
08:01 – 10:00	124	96	1.29	124
10:01 – 12:00	136	87	1.56	136
12:01 – 14:00	267	110	2.43	267
14:01 – 16:00	183	76	2.41	183
16:01 – 18:00	427	106	4.03	427
Total	**1704**	**577**		**1704**

The best practice is for the survey to cover all time periods, if there is no recorded traffic then the weight is zero. Should there be some time bands where there are no sampled drivers, but there is a recorded traffic count then the sample will have to be appropriately weighted, as we do not know

the characteristics of the drivers and vehicles in this period, collecting zero records is not recommended.

Should enumerators go missing during the survey, so that you have to impute records, then I suggest that the data of the closest period before the missing data is used. An example of this is given in

Table D.2   Example of weighting of period when no results available.

	Cars	Trucks/Lorries	Buses	Total	Weekly
Morning	22	25	6	53	371
Afternoon	20	25	8	52	364
Evening	23	25	6	54	378
Total	**65**	**75**	**20**	**160**	**1 120**

A more sophisticated solution would be to weight the survey responses according to vehicle type. I understand that using axle width can be detected by the counters, and therefore give a more complex weighting possibility. It is recommended that the matrix of time and types contain not too many cells, as this will lead to large weights which will increase the variability of the results, and consequently the standard errors. Only 3 or 4 vehicle types should be weighted, and the cell sizes should be 20 or above where possible. This means that each time segment should have around 100 interviews.

D.1.3 Weighting for vehicle types.

Time Band	Traffic Count			Survey			Weight		
Vehicle type	Cars	Bikes	Trucks	Cars	Bikes	Trucks	Cars	Bikes	Trucks
06:00 - 08:00	230	35	302	43	15	44	5.35	2.33	6.86
Weighted total							230	35	302

D.1.4 Survey Points and Duplicate Interviews

If more than one traffic survey point is allowed for along the same stretch of road then, some vehicles will cross more than one traffic counter, and can potentially be entered into the survey twice. This poses a number of problems;

D.1.4.1 Weighting
The survey is to be weighted by the traffic counters, some vehicles will cross one and others will cross one or more counters. Each survey form will need to record which counters have been crossed according to origin and destination data. If only one survey point is anticipated, then the weighting is straightforward, if two or more survey points are anticipated along any stretch of road then the an element of double counting is certain to take place. This must be taken care of.

Table D.3   Potential double counting in the survey

In any time period t For each vehicle type v	Survey Point X	Survey Point Y
Origin before X	50	30
Origin after X		29
Destination before Y	20	
Destination after Y	30	59
Total Journey	50	29 (30 already counted)

The problems occur for the survey at point Y, as some 30 of the 50 journeys which originate before point X (and are counted) then continue on to point Y where they are counted again.   At point Y some 30 journeys out of a count of 29 originated before point X. It will not be possible or desirable to interview travellers twice, therefore those who were enumerated at Point X will automatically be excluded from any surveys at Point Y. Enumerators at point Y should keep records of refusals and vehicles stopped who have already participated in the survey. A daily return as shown in Table D.4 should be completed, but enumerators must keep a tally on their clip boards. This information will be used to adjust the information obtained from the counters and to adjust the survey weights.

Table D.4   Enumerators response sheet

Time Band	Refusals	Already surveyed today	Surveyed	Total approached
06:00 - 08:00				
08:01 – 10:00				
10:01 – 12:00				
12:01 – 14:00				
14:01 – 16:00				
16:01 – 18:00				
Total				

The weighting of the survey at point Y must therefore reflect these long distance journeys and the weights be reduced accordingly.   Data for correcting the survey at point Y will come from three possible sources;

> 1. Survey data from X – will indicate destinations of drivers, but it is not useful to reweight Y as the universe is different, but it is a check on the tally sheet at Y. The proportions between survey results at X and the tally sheet should be similar. If it is not then the tally sheet should be adjusted

2. the tally sheet at Y. This will record the proportion of drivers who have already been interviewed.

3. Survey data from Y, will provide an estimate of the proportion of drivers, who have not already been interviewed whose journeys started before point X.

Table D.5   Calculating the adjustment factor for the weighting of survey at point Y

	refusals	Already surveyed	interviewed		Total
Tally Sheet	23	43		573	639
			Origin Before X	Origin After X	
Survey Y			215	358	573
Survey Y + Already interviewed and excluded			258	358	616
			42%	58%	

Therefore at survey point Y the total sample of those who started their journey earlier than point X are derived from the survey and from the tally sheet of those excluded to avoid a second interview, with the total being the sum of those already interviewed and those who said their origin was earlier than point X.

Let us take the example seen in Table D.1 but this time reflecting the observations at the second survey point Y. Here we have to inspect the survey data from point X and point Y to establish which journeys started before point X and have been picked up on the first traffic counter.

Table D.6   Count and weighting at Point Y

Time Band	Traffic Count	Roadside Survey	% trips originating after X	Weight	Adjusted Weight Xa	Estimate of trips origin after X
	N	n	d	N/n=w	w*d	n*w*d
06:00 - 08:00	620	95	50%	6.53	3.27	310
08:01 – 10:00	215	95	59%	2.26	1.34	127
10:01 – 12:00	167	87	67%	1.92	1.29	112
12:01 – 14:00	106	112	71%	0.95	0.67	75
14:01 – 16:00	143	89	63%	1.61	1.01	90
16:01 – 18:00	459	95	55%	4.83	2.66	252
Total	**1710**	**573**	**58**			**967**

Using the above example the traffic counter totals are reduced to account for the proportion of journeys already accounted for at the earlier checkpoint X.

D.1.5 Avoiding survey bias

The enumerators will be able to interview at a certain rate during the course of the day, and it is expected that each interview will take around 5 minutes from the stopping a vehicle to completing the interview. This means that the maximum amount of survey returns that can be expected from any interviewer is 12 interviews per hour, and given refusals and problems it is more likely to be 10. The product of an 8 hour working day is 80 interviews.

It is anticipated that only 2 interviewers will be recruited for one day – therefore the maximum number of questionnaires will be 160, rather a small sample size. With a small number of vehicle types and three periods of day, sample sizes will be small. A very limited number of time bands should be used to weight up the estimates as sample accuracy and variability will be affected if sample sizes in cells are too small.

	Cars	Trucks/Lorries	Bikes	Buses	Total
Morning	22	25	1	5	53
Afternoon	20	25	2	5	52
Evening	23	25	1	5	54
Total	**65**	**75**	**5**	**15**	**160**

D.1.6 Supervision

It is important to ensure that enumerators do not look for easy targets at the expense of those who are more difficult to interview. In a roadside survey it is impossible to hand out forms at regular intervals. The usual solution to this is to allocate quotas, however we do not know the composition of traffic in Vanuatu, and this would almost certainly bias the results.

The answer probably lies in good supervision and training, to explain why a good cross-section of vehicles are needed. There is also the possibility of checking on the reliability of selections as the traffic counters will provide information about the type of vehicle passing the survey sites that day, therefore the enumerators selections can be checked.

D.1.7 Data Processing

Consideration should be given to the processing of these forms, and the forms tested using the data entry software to be used.

Of particular importance will be allocating:

1. a unique serial number to each questionnaire,

2. Recording the time and place of the interview

3. Recording the enumerator responsible

4. Recording origin and destination geographic codes to the forms, and considering how these will be recorded, on the forms would be easiest. The codes should correspond with, or form a grouping of codes used by NSO in their statistical operations.

D.2   Draft questionnaire

TRAFFIC COUNT ORIGIN AND DESTINATION SURVEY QUESTIONNAIRE

MILLENNIUM CHALLENGE ACCOUNT-VANUATU, PORT VILA

This survey is sponsored by the Millennium Challenge Account Vanuatu in collaboration with the Vanuatu Public Works Department. The purpose of this survey is to assess the characteristics vehicles and people traveling on the road networks.

1. Identification

Location: _____   Date: _____
Location code:
Island :   _____   Province: _____

Time of interview
                         Hr   min

2. Type of vehicle?
Please tick (√) the applicable box.
(N.B. Should correspond with vehicle types recorded by traffic counters)

Type of vehicle	✓		Type of vehicle	✓	
Bicycle		1	Mini Bus		5
Motor Bike		2	Bus		6
Cars		3	Vehicle & Trailer		7
Pickup Truck		4	other		8

Consider collecting gender of drivers and passengers to respond to gender specific evaluation of project

3. Who does this vehicle belong to you, a member of your household, your employer or somebody else ?

Vehicle ownership	✓	
Driver		1
Member of driver's household		2
Driver's employer		3
Friend/relative		4
Hire vehicle belonging to car hire company		5

4. Is this vehicle ever used for businesses purposes, that is for you, your family or employer to make profits or earn money?

Please tick (√) the applicable box.

Yes		1	NO		2

If No go to question 7.

5. What type of business is this transport used for?

Type of business	✓	
Small household business		1
Enterprise with fixed business premises		2
Government / Public service or NGO		3
Public transport		4

6. What main does the business do or make?

Please tick (√) the applicable box.

Type of business	√	
1. Farming or fishing business or selling own produce		1
2. Public transport / buses / taxi		2
3. Construction		3
4. Retail/wholesale trade		4
5. Tourism business		5
6. Government/ Public Service or NGO		6
7. Other types of business		7

7. Last week how many kilometres did you travel on this vehicle?

If none because new to vehicle, then put 0km
Please tick (√) the applicable box.

Distance	✓		Distance	✓	
0 km		1	101-150km		5
1 - 20 km		2	151-200km		6
21-50 km		3	201-300km		7
51-100km		4	More than 300 km		8

8. Where did you start your trip today?

Places and codes to correspond with those of NSO

9. Where do you expect to end your trip today?

February 2008

10. What is the purpose of this trip?

Purpose of trip	✓	
Pleasure		1
Journey to work / school		2
Shopping		3
Selling goods on the market		4
Business		5
Other private or social		6

11. Is this a regular journey you make?

Please tick (√) the applicable box.

Yes		1	NO		2

If No go to 13.

12. How often do you make this journey?

		Times per week

13. What is the expected travel distance for this trip?
Please tick (√) the applicable box.

Distance	✓		Distance	✓	
Less than1 km		1	11-20km		5
1 - 2 km		2	21-50km		6
3-5 km		3	51-100km		7
6-10km		4	More than 101 km		8

14. How many passengers are travelling on this trip (including the driver)?
Please tick (√) the applicable box

Number of passengers	✓				
1 Passenger		1	5-10 passengers		5
2 Passengers		2	11-15 Passengers		6
3 Passengers		3	16-20 passengers		7
4 Passengers		4	21 or more passengers		8

15. How much cargo or freight are you transporting on this trip?

Please tick (√) the applicable box.

Weight loaded	✓		Weight loaded	✓	
No cargo		1	1,000 – 2,000 kg		5
1 - 100 kg		2	2,000-5,000 kg		6
100-500 kg		3	50,00-10,000kg		7
500-1,000 kg		4	More than 10,000 kg		8

Thank You