



SOLOMON ISLANDS GOVERNMENT

SOLOMON ISLANDS POVERTY PROFILE BASED ON THE 2012/13 HOUSEHOLD INCOME AND EXPENDITURE SURVEY



WORLD BANK GROUP

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**SOLOMON ISLANDS POVERTY PROFILE BASED ON
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**SOLOMON ISLANDS NATIONAL STATISTICS OFFICE
THE WORLD BANK GROUP**

DECEMBER 2015

FOREWORD

On behalf of the Government of Solomon Islands, I take this opportunity to embrace the findings of the analysis of poverty in Solomon Islands, a significant milestone for the country, and to commend this report to the people of Solomon Islands.

Based on the recently completed 2012/13 Household Income and Expenditure Survey (HIES) data, the poverty findings provide a timely set of new socio-economic measures that will inform the DCC government's policy framework in supporting socio-economic development and structural reforms in the country. In particular, the poverty results will support the effective monitoring and implementation of the government's national development strategy (NDS) which also encompasses the government's fiscal and monetary policy goals and the medium term development plan (MTDP). The poverty benchmarks will underpin the current poverty reduction interventions within the NDS and MTDP, and allow the government to decide, among alternative investments, strategies to arrest poverty and to ensure effective service delivery, especially in the rural areas.

The DCC government also supports the current efforts towards the development and implementation of the first-ever Solomon Islands National Statistics Development Strategy (NSDS) 2015-2034, currently spearheaded by the National Statistics Office (NSO) of the Ministry of Finance and Treasury (MOFT). The government recognizes the importance of a fully functioning and vibrant national statistical system that is able to provide timely, relevant and vital socio-economic statistics and indicators to strengthen evidence-based decision making, policy development and planning in the country.

I am grateful for the development partnership between the Government of Australia's Department of Foreign Affairs and Trade (DFAT), the World Bank, and the National Statistics Office in ensuring the completion of this major analysis.

I believe that through the recently developed Aid Management and Development Cooperation Policy and the Partnership Framework for Effective Development Cooperation, the collaboration with our development partners on key development issues such as poverty alleviation will continue to be strengthened to achieve sustainable economic development for our people.

I want to convey my appreciation for the leadership of the Government Statistician, Mr. Douglas Kimi, Permanent Secretary for the Ministry of Development Planning and Aid Coordination, Mr. Shadrach Fanega, and the Permanent Secretary for MOFT, Mr. Harry Kuma. I also want to thank the staff of the NSO for their participation in this important undertaking.

Lastly, I wish to call upon all stakeholders, development partners, private businesses, non-government organizations and the people of Solomon Islands to not only draw from the findings of this report, but join the government in further analyzing, debating and tackling poverty, now, and into the future.



Honorable Snyder Rini, MP
Minister for Finance and Treasury

ACKNOWLEDGMENTS

This poverty analysis report could not have been possible without the support of a number of people and organizations.

Firstly, we acknowledge the contribution of Professor John Gibson (World Bank Consultant), who was the lead author of this report. We also acknowledge the peer reviewers of the draft analysis, namely, Dr. Ken Simler, Senior Economist (World Bank), and Dr. Michael Carnahan, Chief Economist (Department of Foreign Affairs and Trade (DFAT), Government of Australia).

We are grateful to Dr. Franz Drees-Gross (Country Director, Timor-Leste, Papua New Guinea & Pacific Islands, World Bank) for chairing the peer review discussions amongst representatives from the World Bank, Solomon Islands Government (SIG) through the National Statistics Office (NSO) and DFAT-Solomon Islands.

We would also like to thank Manohar Sharma (World Bank) for overall project coordination, additional analysis and commentary of the draft report. We are also grateful to Willie Lahari, resident Statistics Advisor (Solomon Islands Resource Facility/DFAT) for technical support to the NSO regarding related data analysis and validations, commentary and coordination with the World Bank, DFAT and SIG/NSO.

The leadership of the SIG is acknowledged through Mr. Douglas Kimi, Government Statistician of NSO, in the provision of the 2012/13 HIES dataset and additional information including overall support rendered to this project. The NSO staff are also recognized for their efforts in data validations and attending to various queries. Moreover, the Permanent Secretary and Under Secretary of MOFT, Mr. Harry Kuma and Mr. McKini Dentana are also thanked for their administrative leadership and oversight provided to this project at the ministry (MOFT) level.

Other persons who provided comments and editorial inputs as well as administrative and other logistical support include Imogen Halstead (World Bank), and staff at the World Bank office in Solomon Islands namely: Jennifer Appo, Carlos Orton Romero, and Chandana Kularatne.

Lastly, we would like to sincerely thank DFAT-Aid Program for funding support towards this analysis and program management support through the Education-Statistics Program, especially from Moses Tongare, Jane Bastin-Sikimeti and Kirsten Hawke.

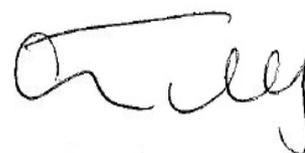
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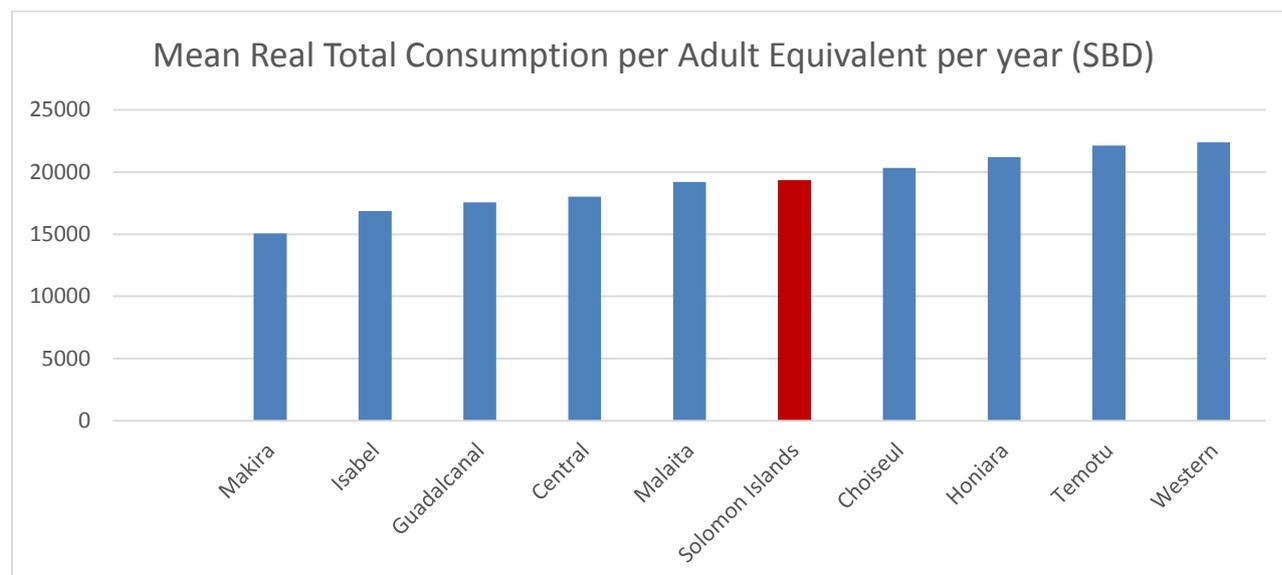
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Summary of Findings

The 2012/13 poverty profile of the Solomon Islands presented in this report is based on the 2012/13 Household Income and Expenditure Survey (HIES) conducted by the Solomon Islands National Statistics Office (SINSO). Between October 2012 and November 2013, a nationally representative sample of 4500 households were surveyed by SINSO, with detailed information on living standards collected. In particular, the survey elicited information on all types of foods consumed and a wide variety of non-food goods purchased by a nationally representative sample of households.

Welfare indicators and poverty lines

The indicator used to measure living standards is total consumption expenditure, specified as the total monetary value of all food and non-food goods consumed by the household. This welfare indicator is expressed “per adult-equivalent” to take account of the age composition of households. Also because prices of many commodities vary across provinces, the value of consumption is adjusted to account for differences in inter-province prices. On the average, consumption levels, when adjusted for prices, are higher in Honiara, Temotu, and Western Province and lowest in Makira¹.

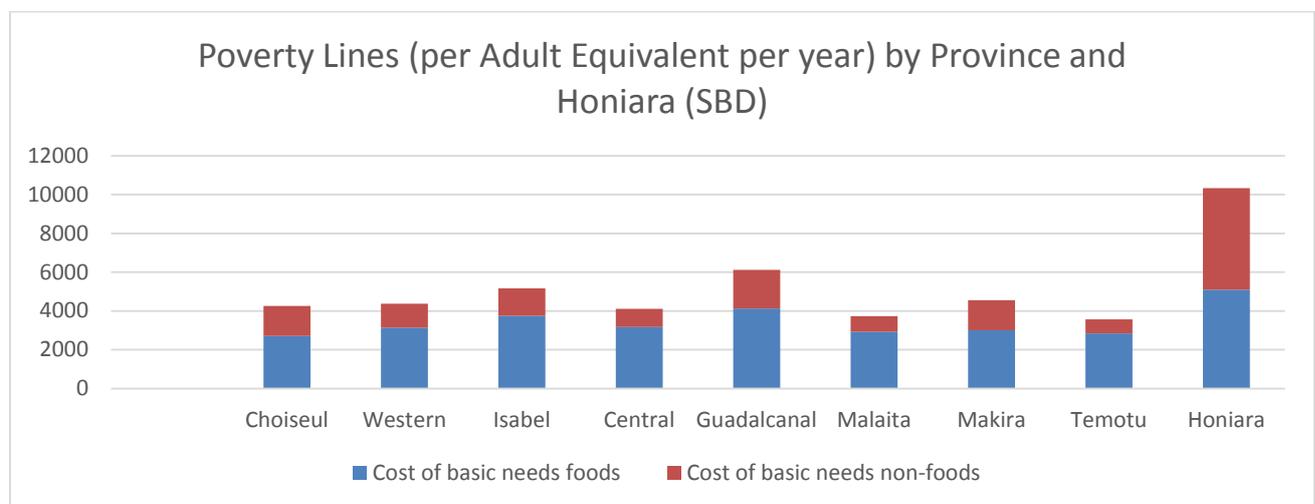


A Solomon Island-specific “poverty line” is specified as the minimum expenditures needed to obtain basic food and non-food goods taking into account prevailing consumption patterns in the country. The cost of basic needs is calculated separately for food and non-food goods. In the case of food, it is calculated as the minimum amount of money required to secure a daily energy intake of 2200 calories per day given prevailing dietary patterns of the poorer groups in Solomon Islands. This is called the “food poverty line”. Because prices of foods vary across the country, the food poverty line also varies by location. In order to obtain the full “basic needs” poverty line, the additional cost for purchasing basic non-food goods is added to the food poverty line. This cost of non-food basic needs is taken as the average non-food expenditure of those households whose spending

¹ The very small size for the province of Rennell-Bellona limits an accurate estimation of poverty measures for the province and thus Rennell-Bellona is included as part of Central Province. Administratively, prior to 1993, Rennell-Bellona was part of Central province.

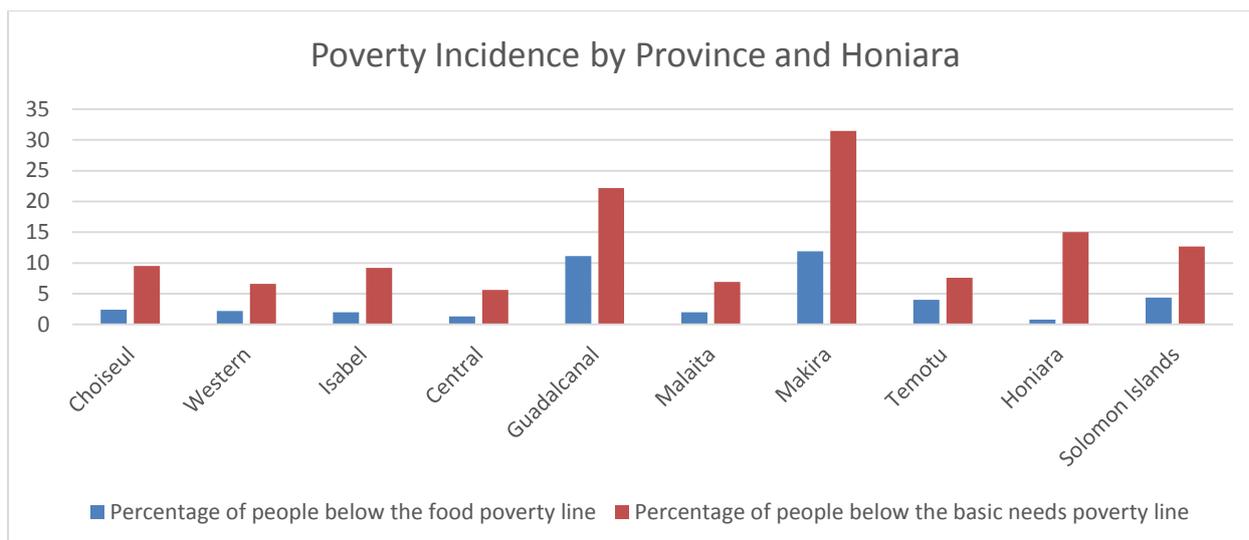
on food is just equal to the food poverty line. This cost of basic non-food goods also varies by location. All households whose expenditures fall below the basic needs poverty line are deemed to be poor.

The poverty line is highest in Honiara and lowest in Temotu. The capital city, Honiara, has the highest basic needs poverty line: meeting basic needs costs twice as much money in Honiara than in most other provinces due to the higher cost of both food and non-food goods. This situation, typical in Melanesia, is due mainly to poor infrastructure and lack of market integration. This is exacerbated by very high urban housing prices because of poorly functioning land markets. Some of the high cost of living in Honiara appears to spill over into Guadalcanal, which has the second highest poverty line. The three provinces with the lowest poverty lines are Choiseul, Malaita, and Temotu, where the cost of meeting basic needs is less than one-half of that in Honiara.



Poverty incidence and geographic distribution of the poor

About 12.7 percent of the population in Solomon Islands lives below the poverty line and are classified as “poor”, but poverty incidence is significantly higher in the Makira and Guadalcanal provinces. Poverty prevalence varies considerably across provinces, being higher than the national average in Makira, Guadalcanal, and Honiara. In Makira, almost one-third of the population is poor and in Guadalcanal about one in five persons lives in poverty. Poverty rates in the other provinces (excluding Honiara) are in the 7-10 percent range, but Honiara’s poverty rate of 15 percent is also higher than the national average. The overall incidence of “food poverty”, however, is quite low in the Solomon Islands though there is substantial variation across provinces. In the country as a whole, only 4.4 percent of the population live under the food poverty line, though the rate is higher for Makira and Guadalcanal.



Depth and severity of poverty are also higher in Makira and Guadalcanal provinces.

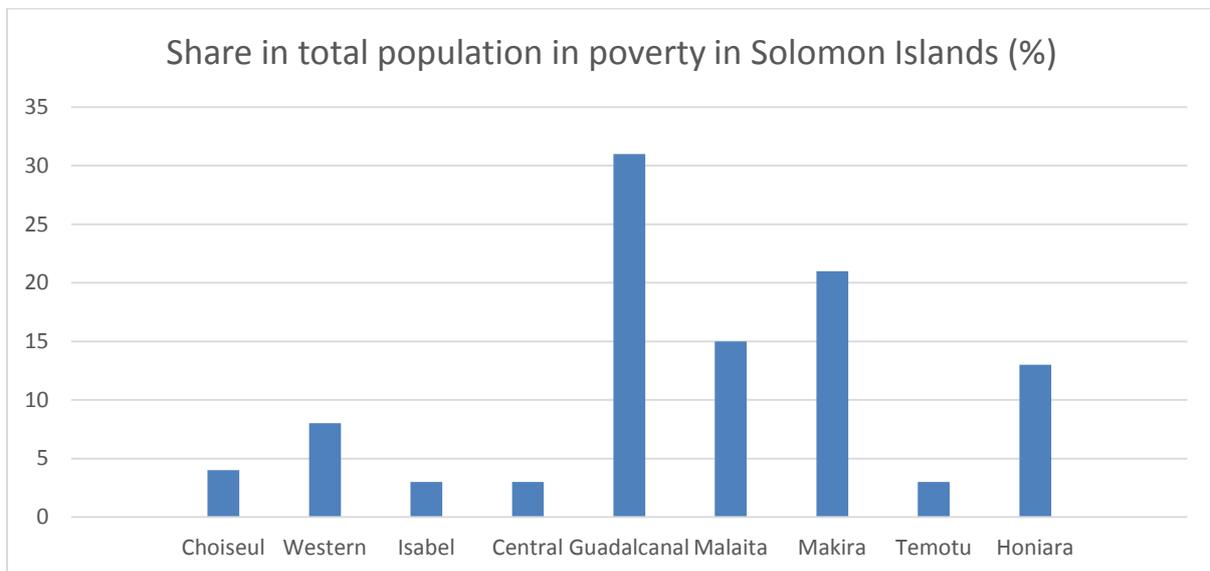
The poverty rate in Guadalcanal changes from 1.7 times the national average to 2.9 times the national average when more focus is placed on poverty severity. Many of the poor in Guadalcanal are extremely poor and live substantially below the basic needs poverty line. A more muted form of this pattern occurs in Makira where the relative risk of poverty changes from 2.5 times the national average to 3.1 times the national average when more focus is placed on more severe poverty.

Poverty rates are conditioned by both prices and incomes. The cost of living in Honiara is significantly higher than in the rest of the country. Hence, in spite of higher nominal incomes in Honiara, the risk of someone being in poverty is higher there than for the country as a whole. But the poverty risk in Makira is much higher than in Honiara despite much lower cost of living there, indicating that, in Makira, low income is the primary driver of poverty. In Guadalcanal, though nominal incomes are higher than in many other provinces, they are not sufficiently high to compensate for the higher price level there, likely influenced by the higher prices in the capital city.

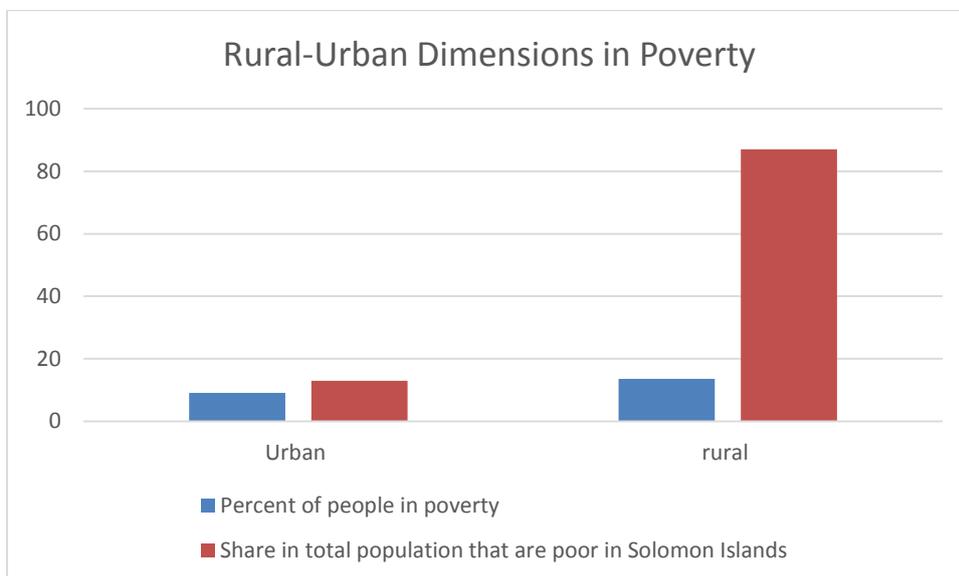
The higher rates of poverty observed in Makira and Guadalcanal are also due to significant weather-caused devastations just before and during the survey period. The 2012/13 HIES was conducted in the aftermath of the January 2012 torrential rains and flooding that destroyed homes and crops in much of Guadalcanal which was declared a disaster area. Also, in June 2012, the eastern part of Makira province experienced extensive flash floods and landslides due to unusually heavy rains; agriculture, the main source of livelihoods, sustained major damage as crops were uprooted and planting materials destroyed. Again, in December 2012, cyclone Freda impacted both Makira and Guadalcanal provinces causing extensive damage to food gardens and general economic activities. The combined effects of these weather-related events partly explain the higher rates of poverty in these two provinces.

When considering the absolute number of persons under poverty, Guadalcanal province, which has the combination of higher poverty risk as well as larger population size, accounts for the biggest share of persons living in poverty in the Solomon Islands. Almost three-quarters of the persons living in poverty in Solomon Islands live in the three provinces of Guadalcanal, Makira, and Malaita. Even though poverty incidence is higher than

the national average in Honiara, it accounts for less than 15 percent of the poor in the country given the smaller number of people living in city as compared to those living in the provinces.



Poverty in Solomon Islands is largely a rural phenomenon. Not only are rural households more likely to be poor compared to urban households, the bulk of the poor, about 87 percent, live in rural areas. Almost all of the more severely poor – those below the food poverty line – live in the rural areas.



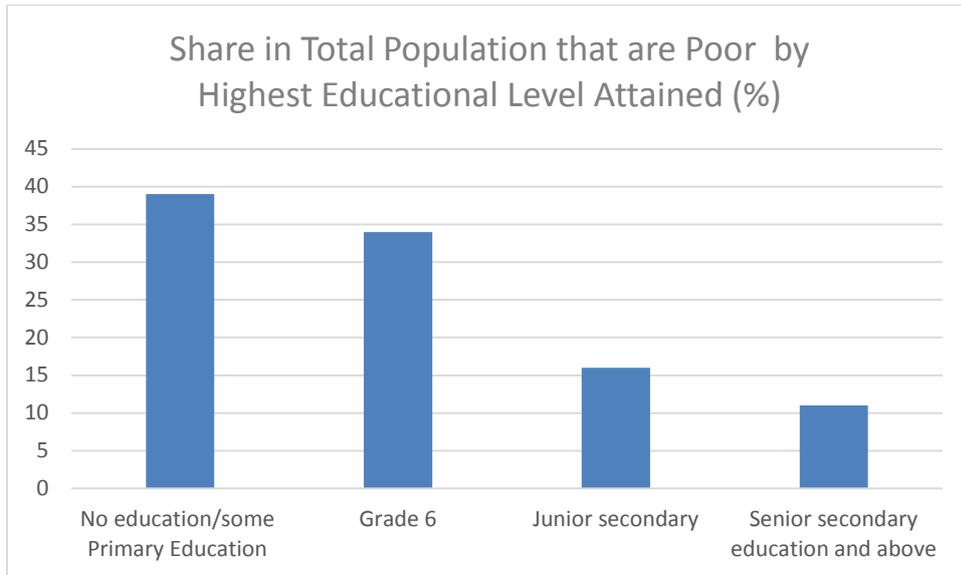
Poverty, age, and gender

While the poverty rate increases slightly with age of the household head, it does not vary as much by gender of the household head. Age and gender are easily identifiable characteristics of people that can be potentially used for targeting antipoverty interventions. In Solomon Islands, the poverty rate goes up with the age of the household head, and is highest for people in households where the age of the household head exceeds 50 years. On

the other hand, the poverty risk for female headed households is slightly less than for male headed households. Male headed households account for 92 percent of the total number of people that live in poverty.

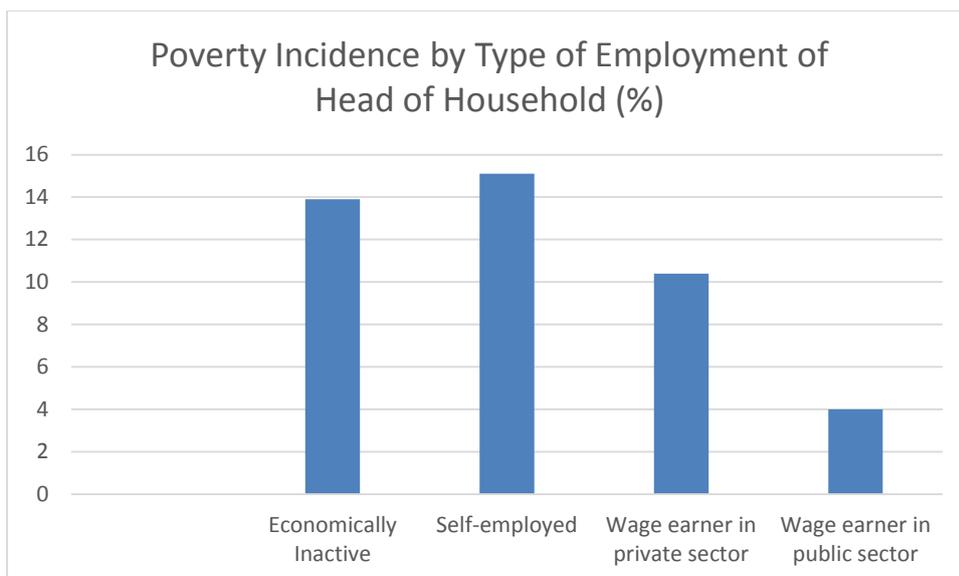
Poverty and education

Schooling has a big imprint on poverty in the Solomon Islands. About 40 percent of those that are poor in Solomon Islands live in households in which the head of the household does not have at least six years of primary schooling. The number of poor households declines clearly and steeply with higher education attainment of the household head.



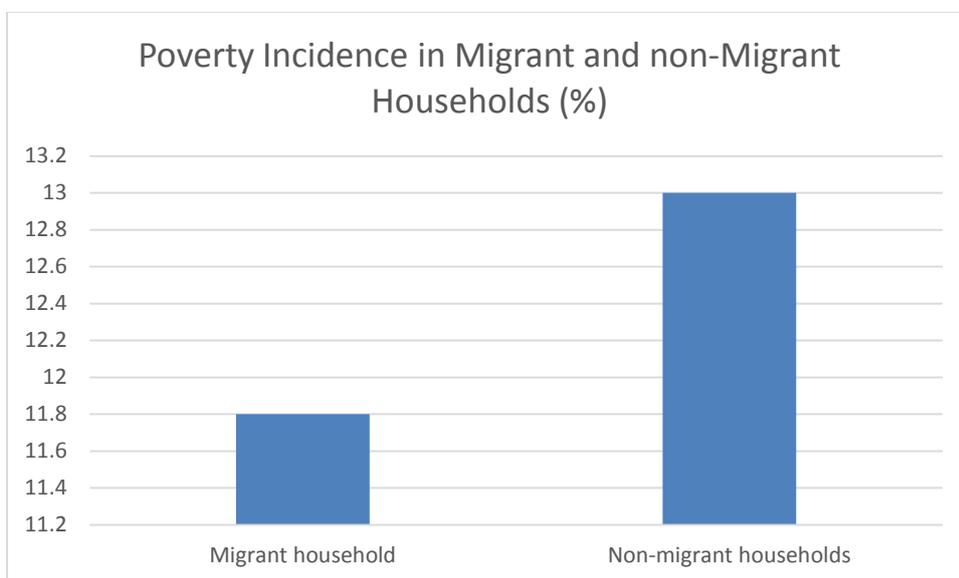
Poverty and economic activity

Poverty rates are significantly lower among wage workers compared to other working Solomon Islanders. While people living in wage-earning households account for 30 percent of the total population, they account for only 19 percent of the population in poverty. Poverty rates among wage workers in the public sector is especially low (4 percent). However, poverty prevalence is not that different between the inactive and the self-employed, a point to note in designing poverty targeted programs. In fact, about two-thirds of the poor live in households where the household head is self-employed.



Poverty, migration, and ethnicity

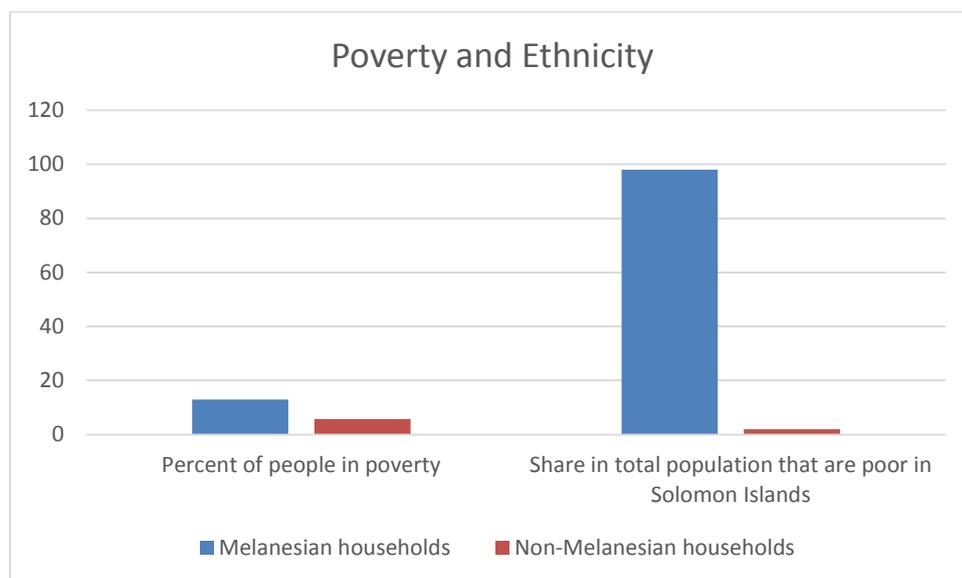
Contrary to conventional view, migrant households are significantly less likely to be poor than non-migrant households, especially when poverty severity is taken into account. Migration² is an important fact of life in the Solomon Islands with one-fifth of the population living in households that have moved across provinces. Despite obvious challenges faced by migrating households in a country governed by customary land rights, migrant households face a lower risk of being poor than non-migrant households. The bulk of the poor – 81 percent – live in non-migrant households.



Much like the population structure, the vast majority of the poor in Solomon Islands are Melanesians. Poverty rates among households headed by Melanesians (13 percent) are

² Migration refers to the movement of people from their original place of birth to another province irrespective of purpose.

significantly lower than those headed by non-Melanesians (5.7 percent), and the latter account for less than 3 percent of the total number of poor.



Poverty rates, 2005-2013

The national poverty rate of 12.7 percent estimated for 2012/13 is substantially lower than the SINSO/UNDP's poverty estimate of 23 percent using the 2005/06 HIES; however, a simple comparison of the two estimates at their face values must be avoided because there are significant differences in data collection methods as well as in the method used in quantifying poverty. Significant changes were made in both questionnaire design and survey implementation modality in the 2012/13 HIES. Significant changes were also made in the way the welfare indicator and poverty lines were constructed. These non-sampling differences between the 2005/06 and 2012/13 HIESs mean that direct comparisons cannot be made between poverty rates reported here and those reported in the 2008 SINSO/UNDP report.

Multiple evidence suggests that poverty dropped in the post-conflict period of 2005-2013, but some degree of caution needs to be exercised in drawing conclusions on the actual extent of the decline. When a common estimation method is applied to both 2005/06 and 2012/13 datasets, a drop of 8 percentage points in poverty incidence is observed between 2005/06 and 2012/13. It is indeed the case that, after four consecutive years of negative growth, the arrival of the Regional Assistance Mission to Solomon Islands (RAMSI) in mid-2003 improved law and order rapidly and laid the foundations for resumed economic activity and better economic opportunities for the poor. In fact, Solomon Islands' real gross domestic product is estimated to have increased by 72.3 percent over 2003-2014, with even the informal economy expanding by 31.7 percent. In 2010 alone, the economy grew by 9.7 percent. Also, the much more rapid expansion of the services sector, especially in the retail and trade sub-sector, likely buoyed employment opportunities for the poor in urban areas, especially in Honiara. However, because it is not possible to fully account for effects arising out of differences in data collection methods between the 2005/6 and 2012/13 surveys, it will be prudent to apply some degree of caution in making conclusions about the actual extent of the decline in poverty over 2005/6 and 2012/13. Given this, it may be best to treat the estimated 8 percentage points decline in poverty rate as being slightly indicative in magnitude, but very much likely in the right direction.

1. The 2012/13 Household Income and Expenditure Survey

This poverty profile is based on the Household Income and Expenditure Survey, conducted by the Solomon Islands National Statistical Office (SINSO). The survey ran from October 2012 until November 2013, with interviews spread evenly over time. It will herewith be referred to as the 2012/13 HIES and it follows on from the previous HIES in 2005/06 (albeit with differences in design and implementation that preclude easy comparison of the results for the two surveys). The survey is based on a sample that is stratified over urban and rural areas of all ten provinces, with the exception of no urban areas in Rennell and Bellona and no rural areas in Honiara. The sample frame came from the 2009 census and the target primary sampling units (PSU) were 384 of the census enumeration areas selected with probability proportional to size. Within each PSU, a target of 12 households was to be surveyed to give a final sample of just over 4600 households. The achieved sample size was just under 4500 and there are approximately 4360 households with usable consumption data who the poverty calculations are based upon. The sampling weights take account of the deviations of the final sample size from the planned sample size.

In order to measure expenditures on household consumption the HIES used both a diary method, with each household asked to keep a 14-day record of all acquisitions (purchases, own-production, gifts and takings from stocks) and various household-level recall modules. These recalls covered varying periods from one week to one year for individuals' expenditures on education, health, travel, clothing, communications and alcohol, tobacco, and betelnut (as reported by a single reporter in the household) and either three month or one year recalls for expenditures on utilities, land and housing, vehicles, household goods and services, ceremonial expenses, insurance and loans. All of these various recall periods were designed to end on the same day (for the same household), regardless of duration and the last day of the recall was to be the day before the diary starts so that there should be no duplication of a particular item of expenditure recorded in two places. A final notable aspect of the expenditure measurement is that because the majority of households in the Solomon Islands do not pay land or dwelling rents, the HIES asked respondents to report an estimate of how much they would pay monthly if they were to rent their current dwelling.

With the exception of this imputed rent question, the HIES questions are on an acquisitions basis rather than a consumption basis. The information required to estimate the value of service flows from durable goods (age, life expectancy, purchase price and salvage value) was not asked in the survey, since the primary motivation for the HIES was in rebasing the CPI which operates on an acquisitions basis. It is difficult to assess how much this limitation affects the results since most surveys in the region use a typical HIES design of getting data on acquisitions rather than on service flows. An exception was the 1996 Papua New Guinea Household Survey (PNGHS) where an inventory of 16 durable assets was used to collect data on the purchase price (or value if it was a gift) and date of acquisition of each asset, and the price that it would realise if sold, with straight-line depreciation used to calculate annual service flows from these durable goods. In that survey, consumption from durable goods was just two percent of total household consumption, and even in Port Moresby where households had the most durables, the service flow from these items averaged just 4.9 percent of total household consumption (Gibson and Rozelle, 1998). While the availability of durable goods in the Solomon Islands in 2012/13 is likely to be greater than it was in Papua New Guinea in 1996, for many rural areas that lack electricity there will be limits on the sort of durable items available. Thus the omission of this type of consumption from the welfare aggregate used in

the Solomon Islands may not cause too much bias in the poverty estimates, especially since the highest ownership of durable goods (and hence the most valuable service flows) will be for the non-poor.

Another feature of the survey that should be borne in mind when interpreting the results is that the data were extensively cleaned and processed by the Statistics for Development Division of the Secretariat of the Pacific Community (SPC), with every food quantity transaction in the diaries given metric-equivalent weights, and annualized values created for all expenditures from both the diaries and the recall modules. These processed data were all organized according to 9-digit COICOP (Classification of Individual Consumption According to Purpose) codes and it was neither desirable nor feasible to reverse much of the processing done by SPC.³

³ In contrast to expenditure aggregates created by SPC, in the current analysis food consumption comes only from the diary, since this is the only source of quantities which are needed for forming the food poverty line.

2. Poverty Lines and Poverty Measures

The regional poverty lines measure differences over space (and potentially time) in the cost of obtaining a poverty line level of consumption. Since the survey was staggered over time at a roughly even pace in each province no allowance is made for temporal inflation since it should not interfere with these spatial comparisons (that is, it is assumed to be the same in each province). The anchor for the poverty lines is baskets of locally consumed foods that provide 2200 calories per day, where the foods in the basket are based on the actual consumption patterns of poor households rather than the judgement of experts. This same normative standard is used for food poverty lines in neighbouring countries (e.g. Papua New Guinea) and full details on the formation of the poverty lines are in the appendices (associated *Stata* do files can be made available). After the food poverty lines are calculated an allowance is then added for the cost of non-food consumption, once again based on the observed consumption patterns of poor households in the Solomon Islands.

The food poverty lines

The first step in implementing this cost-of-basic needs (CBN) method of forming poverty lines is that households were ranked according to the value of annual consumption per adult equivalent, where the equivalency scale counts children aged 0-6 as 0.5 of an adult and all other age groups are 1.0. This adult equivalence factor was based on scales originally calculated using three methods in Papua New Guinea (and the same factor is also used in some other countries in the region). The initial ranking of households used the provincial food price level calculated from a country-product-dummy (CPD) regression on province-level median prices (see appendices) and the poverty line calculations were carried out as described below. Thereafter the ratio of the (preliminary) lower poverty lines for each region to the value of the lower poverty line in Honiara was used as an implicit spatial deflator to create real annual consumption per adult equivalent, and a re-ranking was carried out and the steps were repeated until convergence occurred.

The households containing the poorest quintile of people were identified, ranked according to annual expenditure on consumption per adult equivalent. It is the diets of this group that anchor the food poverty lines. For households in this quintile, the mean daily quantity available of each food was calculated for 64 food groups that also had median prices by province calculated.⁴ The total calories available from these foods averaged 2580 per day and a further 130 calories were added to account for the sum of all other foods (including meals). Details of the food-by-food quantities, the calorie contents and edible fractions, and the scaled quantities in the food poverty line basket are reported in Appendix I. The quantities of each food were then scaled down slightly so that the calories provided by these foods equalled 2200 (include an allowance for the unquantified foods).

The all-other foods, which are the ones that provide an average of 130 calories per day, cover over 300 9-digit COICOP codes and contribute just 5 percent of the cost of the food poverty line. Thus, it is inefficient to try to include these foods as specific items in the poverty line. Instead a contribution for these foods is derived from an extrapolation from the 64 foods whose daily cost sums to 95 percent of the food poverty line. The extrapolation is described below, and to justify the approach it needs to be noted that these all-other foods are of two

⁴ As noted in the appendices, a few of these groups were slight variants of each other (e.g. 2nd grade canned Taiyo in 100g cans, and in 360g cans) and so were combined prior to having average prices calculated and this reduced the number to 54 sets of province-level food prices. A further aggregation was to combine Rennell and Bellona with Central Province since there were too few observations on prices in Rennell-Bellona.

types: those that are quantifiable but have too few transactions in the diaries to enable their average prices to be calculated for each province; and, those that are inherently unquantifiable, such as meals.

Consider first the minor foods that could be quantified (that is, excluding the 64 more important quantified foods that had their average prices per province calculated). The value and quantity for each of these foods was aggregated up to broader, 4-digit COICOP levels, and then at this more aggregated level they were given calorie conversion factors and the calories and spending on these foods was summed to household totals. The implied calories per dollar for these quantified-but-minor foods was then used to impute a calorie contribution from unquantifiable foods like meals, where it was assumed that there is a 50 percent processing premium for such foods (that is, calories are more expensive when bought in the form of a meal compared with buying calories in the form of ingredients). This calculation enabled a calorie contribution from spending on meals to be derived, and putting that together with the calories and spending on the other minor-but-quantified foods that had been aggregated to 4-digit COICOP level enabled a household average calories per dollar to be calculated for all of the foods that contributed the five percent of the food poverty line that was not contributed by the 64 major foods.

On average, for the mix of these minor foods that is chosen by the households containing the poorest quintile of people, spending \$1.90 per year would provide one calorie per day. In contrast, the annual cost per daily calorie for the majority part of the food poverty line coming from the 64 major foods ranges from \$1.23 per calorie in Choiseul to \$2.32 in Honiara. Thus, the minor foods do not appear to be especially more expensive than the 64 major foods that are the focus of most of the food poverty line calculations (especially since it was *a priori* assumed that unquantified foods like meals had a 50 percent processing margin that should raise the average cost per calorie).

Given the similarity in cost per calorie, and also noting that the precise assumptions should not matter too greatly since these minor foods provide so few calories in the food poverty line, the allowance for them is calculated by a simple extrapolation. Specifically, the scaled quantities for the 64 foods contribute 2086 calories per day, so the sub-total cost of these 64 foods in each province is inflated up by $(2200/2086)$.⁵ Thus, this extrapolation takes the inter-provincial price variation revealed for the 64 quantified foods that supply 95 percent of the poverty line calories and applies the same pattern to derive the cost of a further 114 calories $(2200-2086)$ to get to the total cost of the food poverty line.⁶

The second issue with the food poverty line concerns the question of how to identify the households containing the poorest quintile of people, which are the households whose food budgets anchor the food poverty line in observed behaviour. An iterative process is used, to ensure that the definition of this group is consistent with the food poverty line that is ultimately calculated.

In the first iteration, where the households who are home to the poorest quintile were identified using the deflator provided by the County Product Dummy method, the food poverty line ranged from a highest value of \$5,095 in Honiara to a low of \$2,657 in Choiseul. This is the annual cost to buy a basket of foods that would provide 2200 calories per day, at a

⁵ This sub-total cost is based on the median price per food per province reported in Appendix I, Table 2.

⁶ The 114 calories is the scaled-down version of the 130 calories noted above, which was the average sum of the calories from all the minor foods, for households containing the poorest quintile of people.

standard that is typical of the diets of the poorest quintile of Solomon Islanders. If this poverty line had been anchored in the diets of the second poorest quintile, it would be somewhat more costly and it would move somewhat closer towards the typical Honiara diet (there are proportionately more people from Honiara in the second quintile than in the poorest quintile), making the cost of living disadvantage of Honiara a little less apparent. Specifically, anchoring to the second quintile the simple average cost of the poverty line across provinces would be about six percent higher and the average cost in provinces outside of Honiara relative to Honiara would be 0.67 rather than 0.62. Once the series of calculations described below are carried out, the final food poverty lines range from \$2,710 in Choiseul to \$5,100 in Honiara.

In order to get from the initial food poverty line to the final food poverty line, the non-food component also has to be calculated using methods described below. The reason is that the initial ranking of households used to find the reference group whose diets anchor the food poverty line was not based on a deflator calculated specifically for the poor. To form a deflator that is poverty-specific, the ratio of the lower poverty line in each region to the value of this lower poverty line in Honiara is used (thus inflating everything to Honiara prices), and after this is calculated the quintiles are reformed and the food poverty line is re-estimated. The steps are then repeated. Five iterations of this process were carried out, and these resulted in the final food (and total) poverty lines which are reported in Table 1 below.

The non-food component of the poverty lines

The food poverty line has to be scaled up to get to the total poverty line that also allows for required non-food consumption. There are two generally used methods of deriving the non-food allowance: the more generous uses a non-food allowance that is calculated from the food budget shares of those households whose food spending exactly meets the food poverty line, w^U . In other words, the food poverty line, z^F , is inflated upwards by the budget share (which requires an iterative solution to estimate): $z^U = z^F / w^U$. This is referred to as the “Basic Needs Poverty” line and is used to generate the headline poverty numbers for the country, including for intertemporal comparisons. Another widely used scaling principle, which gives a lower poverty line, is to add to the food poverty line the typical value of expenditure on non-food consumption by households whose total expenditure just equals z^F . This is more austere because these households displace some required food consumption, given that they don’t actually spend their total budget on food (Ravallion, 1994). If the food budget share of households whose total expenditure just equals z^F is w^L , the “lower poverty line” is calculated as: $z^L = z^F + z^F(1-w^L)$ and is used principally as another indicator to gauge poverty severity. It is also the ratio of this lower poverty line which is used as the deflator to put the value of consumption of households from all provinces into Honiara prices when any ranking in real terms is used. The different food shares needed for calculating these non-food allowances and total poverty lines are found from a regression of food budget shares on total expenditures (deflated by the food poverty line), demographics and regional dummy variables to capture differences across space in the cost of the non-food allowance. Details of this regression are reported in Appendix II.

Table 1: Provincial Poverty Lines (SBD\$ Per Adult Equivalent Per Year)

Province	Food Poverty Line	Lower Poverty Line	Ratio to Honiara	Upper Poverty Line
Choiseul	2713	3530	0.49	4263
Western	3145	3887	0.54	4377
Isabel	3753	4613	0.64	5163
Central (+ R-B)	3178	3786	0.53	4111
Guadalcanal	4137	5253	0.73	6118
Malaita	2931	3465	0.48	3737
Makira	3011	3862	0.54	4562
Temotu	2851	3336	0.46	3569
Honiara	5099	7185	1.00	10334

The upper poverty lines vary from just under \$3,600 per adult equivalent per year in Temotu to just over \$10,300 in Honiara. The ratio of almost three between the poverty line in the capital city and in the cheapest areas is typical of Melanesia where infrastructure is bad, markets are poorly integrated, traditional staples are bulky and costly to transport, labour costs are high so services are expensive, and urban housing prices are very high because of poorly functioning land markets. Some of the high cost of living in Honiara appears to spill over into Guadalcanal, which has the second highest poverty lines. The poverty line in Guadalcanal becomes relatively lower as a more generous living standard is considered, being just below 60 percent of Honiara at the upper poverty line but over 80 percent of Honiara at the food poverty line. The three provinces with the lowest poverty lines are always Choiseul, Malaita and Temotu, where the cost of living is less than one-half of that in Honiara once non-food consumption is taken into account.

The poverty measures

The P_α class of poverty measures of Foster, Greer and Thorbecke (1984) is used. This class contains several commonly used poverty measures as special cases. These include the head-count index, which indicates the incidence but not the depth, of poverty, and the poverty gap index – the overall shortfall between the poverty line and the expenditure level of the poor, as a ratio to the product of the poverty line and the population size – which measures the average depth of poverty. The poverty gap index is insensitive to the distribution of expenditures amongst the poor, so to capture this aspect the poverty gaps can be weighted. With the P_α class of measures, the higher the value of the poverty aversion parameter, α the higher the weight on the poverty gaps of the poorest people. The general formula is:

$$P_\alpha = 1/n \sum_{i=1}^q (g_i/z)^\alpha,$$

where n is the total population, q is the number who are poor, z is the poverty line, and g_i is the poverty gap, $g_i = z - y_i$, (y_i is expenditure per adult-equivalent in the i^{th} household). When $\alpha=0$, the P_0 measure is the head-count index, when $\alpha=1$ the P_1 measure is the poverty gap index. These two, plus the P_2 measure (the squared poverty gap, which is also known as the poverty severity index), are used in this study. In keeping with most studies of poverty, the poverty measurements reported are based on the number of persons living in poor households, rather than on the number of poor households.⁷

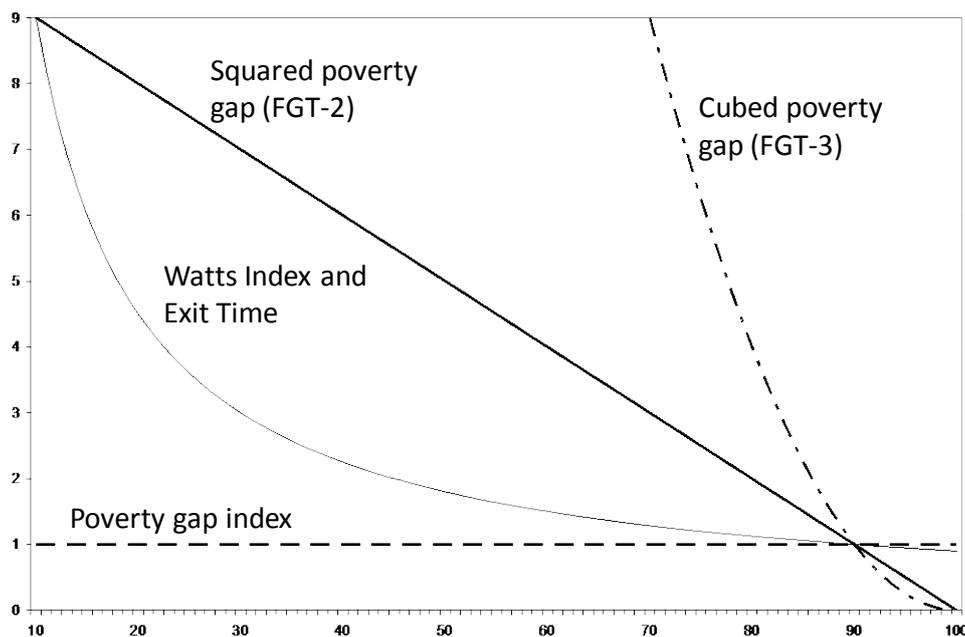
⁷ The two approaches do not give the same answer because poor households tend to be larger than average, so household-level calculations understate the poverty rate amongst persons.

The P_α class can be additively decomposed into the contribution from each (non-overlapping) sub-group to the total level of poverty. This is reported below as the ‘share’ of poverty for various sub-groups, such as regions or types of households. Another useful manipulation of the P_α measures is to calculate the ‘risk’ of poverty, which is the poverty rate for a particular subgroup relative to the overall average, and this is also reported below.

Reweighting for non-compliance and measurement error

Distributionally-sensitive poverty measures like P_2 are vulnerable to measurement error. Morduch (2006) notes that many surveys include responses from some households about consumption that are implausibly close to zero and if these observations are taken at face value they can have a large impact on poverty measures. The reason for this impact is that every dollar of measurement error at the low end of the distribution has a far larger impact on the calculated poverty statistic than does a dollar of mis-measurement closer to the poverty line. This effect is illustrated in Figure 1, where it is shown that for the widely used squared poverty gap, a measurement error that made someone appear as if they lived on just 10 percent of the poverty line would have a nine times larger impact on the calculated poverty statistics than a measurement error that made someone appear as if they were living at 90 percent of the poverty line, when in both cases the two individuals truly lived exactly at the poverty line.

Figure 1: Weight placed on a measurement error for poor individuals at different incomes relative to an individual at 90 percent of the poverty line



Source: Morduch (2006)

This sensitivity to measurement errors is in contrast to other uses of household expenditure data, such as providing base expenditure weights for a CPI, where what is estimated is an average that should be unaffected by random measurement errors. Consequently a more thorough cleaning of the data is required before estimating poverty statistics than for many other uses, and in some cases the results for particular households have to be ignored because they are unlikely to be true records. For the current analysis, 51 households were dropped because their food consumption records were so incomplete that it appeared that fewer than 750 calories per person per day were available, 54 households were dropped because calories

appeared to exceed 13,000 per person per day, and nine households were dropped because they appeared to have negative food consumption.⁸ After these 114 households were dropped the available sample size was $n=4364$ and these households were reweighted to represent the total population of each strata that the survey represented before the dropping of households.

⁸ Such negative values come about because starting and ending food stocks are measured for each food. If an apparent net stock increase is not covered by a recorded inflow into the household (a purchase, a gift, or own-production) it will wrongly appear as negative consumption. This highlights the difficulty of measuring consumption as a residual from an inflows and outflows approach.

3. Poverty Profile of the Solomon Islands

Basic welfare profile

A basic welfare profile is reported in Table 2 to show differences between provinces, between the overall urban and rural sectors, between quintiles of real total consumption per adult equivalent, and between the poor and non-poor (defined in terms of the upper poverty line).⁹ There are three indicators that are derived from household budgets – real total consumption, the food budget share, and available calories – and one non-monetary quantitative indicator, the percentage of young children (age five years and below) who are stunted, which is defined as being shorter than two standard deviations below the median height for their age and gender in the reference standards from the World Health Organization (WHO).

Table 2: Welfare Profile by Location and Economic Status for Solomon Islands

	Real total cons per adult equiv (mean)	Food budget share (mean)	Available Kcal per adult equiv/day (median)	% of young children who are stunted
Solomon Islands	19305	0.599	3290	37.9%
Choiseul	20337	0.535	3028	36.4%
Western	22374	0.590	3366	43.2%
Isabel	16875	0.646	2871	37.2%
Central	18013	0.662	3330	36.4%
Rennell-Bellona	22102	0.652	3369	41.8%
Guadalcanal	17567	0.597	3612	32.5%
Malaita	19188	0.658	3498	36.8%
Makira	15059	0.598	3335	45.7%
Temotu	22122	0.675	3972	34.3%
Honiara	21205	0.389	2375	37.6%
Rural	18229	0.637	3452	38.3%
Urban	24022	0.424	2539	36.0%
Quintile 1 (poorest)	7381	0.681	2231	42.9%
Quintile 2	11937	0.643	2721	40.4%
Quintile 3	15728	0.612	3326	37.2%
Quintile 4	21463	0.598	3978	36.8%
Quintile 5 (richest)	40037	0.508	4860	32.6%
Non-poor	21198	0.590	3431	37.2%
Poor	6342	0.680	2152	43.4%

The provinces with the lowest average real total consumption per adult equivalent are Makira and Isabel, while it is highest in Western. The real value of consumption for rural residents is three-quarters that of urban residents, while the gap between richest and poorest quintiles is almost 6:1. The food budget share averages 0.6 while in Honiara it is just below 0.4; the next lowest is Choiseul at 0.54 while the highest food shares are in Temotu. In general, there are abundant dietary calories available for consumption (but not necessarily consumed since the survey does not directly ask about food intakes). The median calories per adult equivalent are 3290, and range from 2375 in Honiara to 3972 in Temotu, and from 2150 for the poor to 3430 for the non-poor.

⁹ The results for Rennell and Bellona are separated from Central in this table; three of these welfare indicators do not rely on the pricing of the poverty line so the small sample size is less of a constraint.

Just over one-third of young children are stunted when compared to the WHO growth standards and this non-trivial rate of stunting is typical of developing countries. However, it is somewhat lower than the rate in neighbouring PNG where around one-half of young children are stunted. Across provinces, the highest stunting rate is in Makira, at close to one-half; this difference from elsewhere is statistically significant ($p < 0.03$) and corroborates the highest poverty rate being in this province. The stunting rate is lower for urban children, for children of non-poor households, and has a gradient between the households containing the richest quintile of people and the poorest quintile that varies by ten percentage points (stunting rates of 33 percent for the richest quintile versus 43 percent for the poorest quintile). The patterns of child stunting are similar if different reference standards (e.g. from the U.S. or U.K.) are used.

Poverty prevalence at the national level

The proportion of the Solomon Islands population who live in households where the value of consumption per adult equivalent is below the upper poverty line is 12.8 percent (the standard error of this estimate, taking account of the complex sample design, is 1.3 percent). The estimated incidence of poverty at the lower poverty line is 8.1 percent (with a standard error of 0.5 percent), while at the food poverty line it is 4.4 percent (with a standard error of 0.2 percent). It should be noted that people living in households below the food poverty line may have access to more than 2200 calories per adult equivalent per day but they are still counted as food poor because they might eat one or two particularly cheap foods that give a lower quality diet (in terms of the price per calorie) than is normal for poor people. It is generally the case, however, that dietary calories in the Solomon Islands are not in short supply, as seen from the average calories available in the poorest quintile exceeding the threshold of 2200 calories.

Combining the head-count and poverty gap indices gives the average consumption level of the poor, and this appears to be just about three-quarters of the value of the upper poverty line ($1 - P_1/P_0 = 0.747$). There is currently considerable enthusiasm for social transfers amongst development practitioners, and although it is infeasible for the Solomon Islands to implement at this stage of its development, one way to illustrate the aggregate size of the poverty gap is to contemplate what sized transfers would be needed to eliminate poverty. Such an exercise assumes that transfers could be perfectly targeted (and have no administrative costs and no disincentive effects) so that people received just enough to close their poverty gaps. This calculation shows that it would require an ongoing transfer of just over SBD\$200 million per year (in terms of Honiara prices) to people living in poor households in order to raise the value of their consumption up to the level of the upper poverty line.

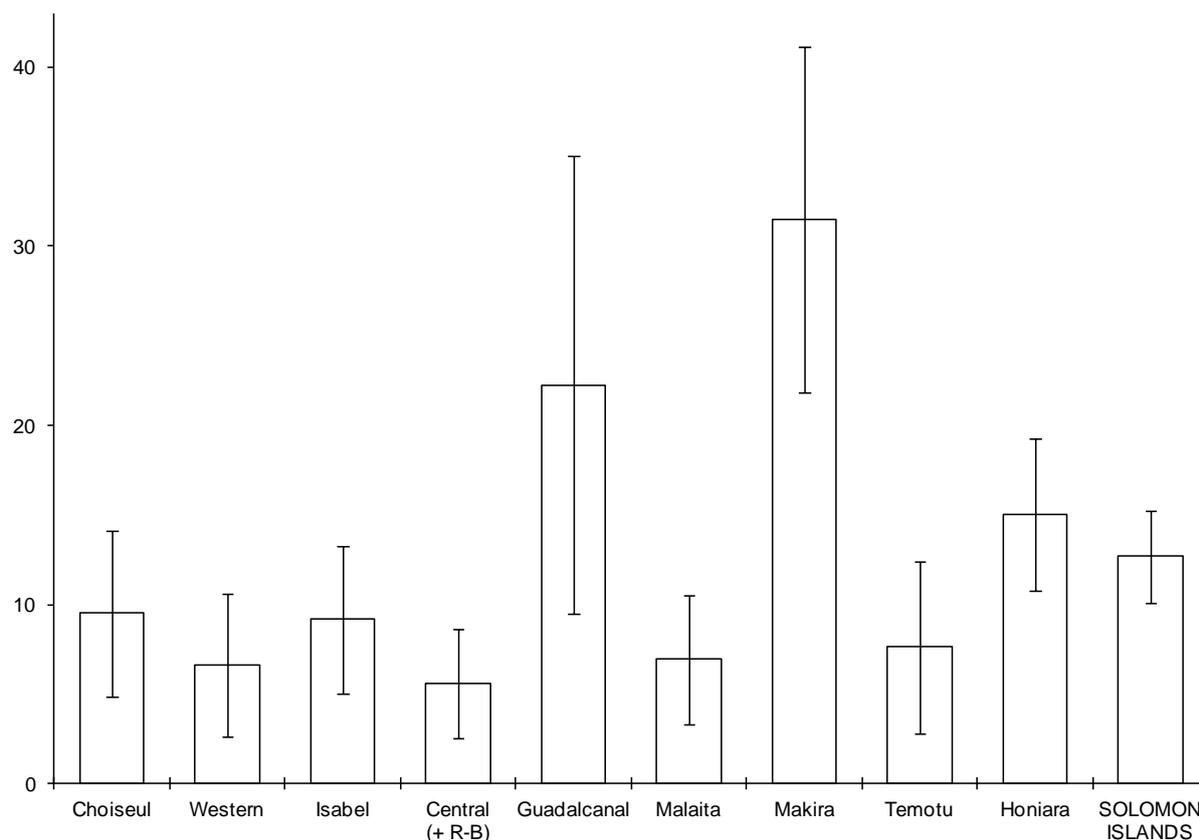
The regional pattern of poverty

Finding out where poor people live, and how areas compare in terms of poverty rates, is one of the most basic contributions made by a poverty profile. The poverty comparisons presented here are for each province of the Solomon Islands, except that Rennell-Bellona is included with Central Province. Although the HIES has separate strata for the rural and urban sectors of each province (except Honiara which is solely urban) the sample sizes are too small to allow reliable estimates of urban and rural poverty rates within provinces. Moreover, the urban areas in provinces (except Honiara) are comprised of small towns with relatively low population density and a livelihood pattern which is not economically distinctive from that of the surrounding rural areas. Furthermore, the main price differences are between provinces, since each province is on a different island or group of islands (except for Honiara

and the remainder of Guadalcanal) and this introduces larger price differences than between urban and rural areas within the same province.

Figure 2 presents estimates of the headcount poverty rate for each province (at the upper poverty line) and also gives the Solomon Islands average poverty rate. The error bars show the 95 percent confidence intervals, based on standard errors that account for the sampling weights, clustering and stratification. The poverty rankings across provinces do not change much if different poverty lines and different poverty indices are used. The full set of estimates, for all poverty lines and all poverty indices, are reported in Table 3.

Figure 2: Percentage of Population Below Upper Poverty Line



The two provinces with higher poverty rates than elsewhere are Makira and Guadalcanal (excluding Honiara). In Makira, almost one-third of the population lives in households that have consumption per adult equivalent below the (upper) poverty line. Even allowing for the sampling errors (shown by the error bars in Figure 1), it can be confidently concluded that the poverty rate in Makira is higher than the rest of the country ($p < 0.001$). The same conclusion is less firm for Guadalcanal ($p < 0.09$).¹⁰ An inspection of the poverty lines and nominal consumption estimates suggests that poverty is higher in Guadalcanal because the price level is higher than in other areas (except for Honiara); in this regard the price level is undoubtedly influenced by the higher prices in the capital city and even though nominal incomes are also higher in Guadalcanal than in many other provinces they are not sufficiently high to compensate for the higher price level. In contrast, households in Makira appear to have low

¹⁰ These conclusions are unchanged at more austere poverty lines. A test for equality of headcount poverty rates in Guadalcanal versus the rest of the country has $p < 0.07$ at both the lower poverty line and the food poverty line. In contrast, hypothesis tests of Makira versus the rest always give highly significant results of $p < 0.01$.

nominal incomes, while the price level is not atypically low. Amongst the other provinces there are no statistically significant differences in poverty rates, as seen by the overlap in the confidence intervals.

Table 3: FGT Poverty Measures by Province, For Three Poverty Lines

	Headcount ($\alpha=0$)			Poverty Gap Index ($\alpha=1$)			Poverty Severity Index ($\alpha=2$)		
	Rate	Share	Risk	Rate	Share	Risk	Rate	Share	Risk
	Food Poverty Line								
Solomon Islands	0.044	1.00	1.000	0.010	1.00	1.000	0.003	1.00	1.000
Choiseul	0.024	0.03	0.539	0.005	0.02	0.487	0.002	0.03	0.508
Western	0.022	0.07	0.494	0.002	0.03	0.217	0.000	0.01	0.100
Isabel	0.020	0.02	0.452	0.001	0.01	0.149	0.000	0.00	0.041
Central (+R-B)	0.013	0.02	0.288	0.001	0.01	0.138	0.000	0.00	0.064
Guadalcanal	0.111	0.45	2.519	0.028	0.51	2.850	0.009	0.51	2.862
Malaita	0.020	0.13	0.453	0.004	0.11	0.383	0.001	0.11	0.405
Makira	0.119	0.23	2.701	0.029	0.25	3.016	0.010	0.26	3.134
Temotu	0.040	0.04	0.912	0.011	0.05	1.128	0.005	0.06	1.392
Honiara	0.008	0.02	0.189	0.001	0.01	0.107	0.000	0.01	0.062
	Lower Poverty Line								
Solomon Islands	0.082	1.00	1.000	0.020	1.00	1.000	0.008	1.00	1.000
Choiseul	0.044	0.03	0.535	0.011	0.03	0.555	0.004	0.03	0.567
Western	0.038	0.07	0.460	0.008	0.06	0.404	0.002	0.04	0.267
Isabel	0.055	0.03	0.673	0.008	0.02	0.390	0.002	0.01	0.211
Central (+R-B)	0.024	0.02	0.291	0.004	0.01	0.197	0.001	0.01	0.120
Guadalcanal	0.175	0.38	2.139	0.052	0.45	2.527	0.021	0.49	2.747
Malaita	0.051	0.17	0.619	0.009	0.12	0.417	0.003	0.10	0.347
Makira	0.212	0.22	2.601	0.059	0.24	2.873	0.024	0.26	3.083
Temotu	0.051	0.03	0.624	0.016	0.04	0.799	0.007	0.04	0.926
Honiara	0.043	0.06	0.532	0.008	0.04	0.370	0.002	0.03	0.276
	Upper Poverty Line								
Solomon Islands	0.127	1.00	1.000	0.032	1.00	1.000	0.013	1.00	1.000
Choiseul	0.095	0.04	0.746	0.021	0.03	0.662	0.008	0.03	0.633
Western	0.066	0.08	0.521	0.013	0.06	0.412	0.004	0.04	0.303
Isabel	0.092	0.03	0.719	0.015	0.02	0.453	0.004	0.01	0.279
Central (+R-B)	0.056	0.03	0.441	0.007	0.01	0.203	0.002	0.01	0.122
Guadalcanal	0.222	0.31	1.745	0.073	0.40	2.264	0.032	0.45	2.519
Malaita	0.069	0.15	0.545	0.012	0.10	0.376	0.004	0.08	0.293
Makira	0.315	0.21	2.469	0.088	0.23	2.717	0.038	0.25	2.963
Temotu	0.076	0.03	0.598	0.020	0.03	0.607	0.008	0.03	0.665
Honiara	0.150	0.13	1.180	0.032	0.11	1.000	0.011	0.10	0.865

The results reported in Table 3 for the other poverty lines, and for the poverty gap and poverty severity index show the same ranking of provinces. However, moving to increasingly more austere poverty lines or to poverty measures that are more sensitive to the depth and severity of poverty does reveal two additional patterns. First, poverty rates in Guadalcanal get higher relative to poverty rates elsewhere, as measures sensitive to the distribution of living standards are considered or when moving to increasingly austere poverty lines. This pattern is

seen from the results in the “risk” columns which rise from 1.7 for Guadalcanal using the headcount and upper poverty line to 2.9 using the squared poverty gap and food poverty line. In other words, the poverty rate in Guadalcanal goes from 1.7 times the average to 2.9 times the average when more focus is placed on the extreme poor, either by considering the distribution of living standards amongst the poor (using the ‘poverty severity index’) or by moving to a much lower (food) poverty line. This suggests considerable inequality in Guadalcanal, with some of the poor there being extremely poor, with livelihoods a long way below the upper poverty line. A more muted form of this pattern occurs in Makira, where the relative risk of poverty grows from 2.5 using the headcount at the upper poverty line to 3.1 at the food poverty line and when using the squared poverty gap measure. The higher rates of poverty observed in Makira and Guadalcanal are also due to significant weather-caused devastations just before and during the survey period. The 2012/13 HIES was conducted in the aftermath of the January 2012 torrential rains and flooding that destroyed homes and crops in much of Guadalcanal which was declared a disaster area. Also, in June 2012, the eastern part of Makira province experienced extensive flash floods and landslides due to unusually heavy rains and agriculture, the main source of livelihoods, sustained major damage as crops were uprooted and planting materials destroyed. Again, in December 2012, cyclone Freda impacted both Makira and Guadalcanal provinces causing extensive damage to food gardens and general economic activities. The combined effects of these weather-related events partly explain the higher rates of poverty in these two provinces.

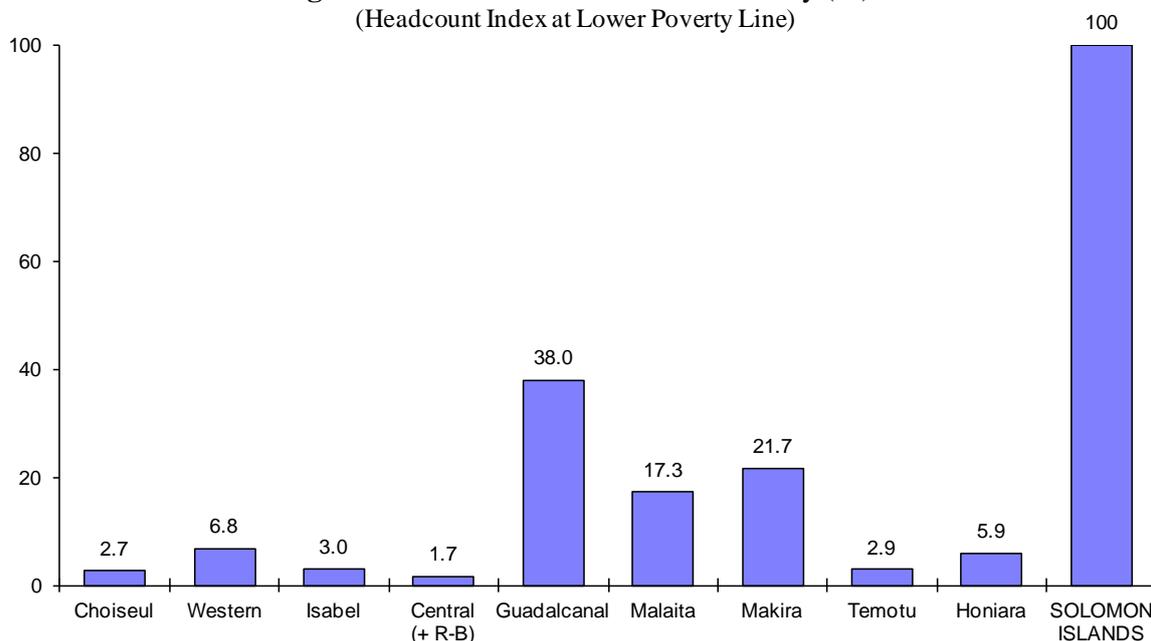
The converse pattern occurs in Honiara where, for seven out of the nine combinations of poverty lines and poverty measures in Table 3, the risk of poverty is lower than the average but at the upper poverty line when using the headcount measure it appears that poverty in Honiara is higher than average. Thus the pattern shown in Figure 2 is somewhat misleading because that is the only combination of poverty lines and poverty measures to make Honiara appear to have a higher than average poverty rate. In fact, the relative risk measure for poverty in Honiara falls all the way to 0.06 (that is, it is just six percent of the average) when considering the lowest (food) poverty line and the measure most sensitive to the distribution within the poor. Thus the people who are measured as poor in Honiara under the upper poverty line appear to have living standards that are clustered just below that line, and the problem of some people having livelihoods a long way below that line (as occurs in Guadalcanal) seems to be less of an issue in Honiara.

In addition to the poverty rates and the ‘risk’ measure that puts poverty rates into relative terms, the ‘share’ of poverty measure captures the importance of a region in terms of the combined effect of population and of the relative rate of poverty compared with the national average. These shares may provide a helpful antidote to just ranking provinces according to poverty rates, since there may be a high poverty rate in a small province but the majority of the poor may live in other provinces. In fact this antidote is not needed for the Solomon Islands since the provinces with the highest poverty rates also contribute the most to the total amount of poverty. Specifically, the most succinct description of the pattern for the poverty shares in Table 3 is that, averaging over results for the three poverty lines, three-fifths of national headcount poverty, two-thirds of the national poverty gap, and three-quarters of the national poverty severity index is contributed by just two provinces – Guadalcanal and Makira. If that pattern is broken down, about one-quarter of the poor in the Solomon Islands are located in Makira, regardless of poverty line or poverty measure used. The share of the poor located in Guadalcanal ranges from one-third to one-half, depending on the poverty measure and poverty line. In keeping with the pattern observed for the relative risk of

poverty, Guadalcanal’s share of the total poor rises when distributionally sensitive measures are considered and when more austere poverty lines are used.

To provide a visual guide to this composition of the total poor, Figure 3 illustrates the share of poverty, for the headcount index at the lower poverty line. This combination is chosen since it provides a reasonable midpoint for a pattern that varies between the food poverty line where Guadalcanal and Makira combine to make a larger contribution and the upper poverty line where those two provinces make a smaller contribution to total poverty. With the exception of those two provinces, which account for 60 percent of total poverty at the lower poverty line, the only other province to contribute a significant share is Malaita where 17 percent of the poor are located. Thus any intervention based on reaching the greatest number of poor in the fewest places would tend to prioritize activity in these three provinces.

Figure 3: Contribution to National Poverty (%)
(Headcount Index at Lower Poverty Line)



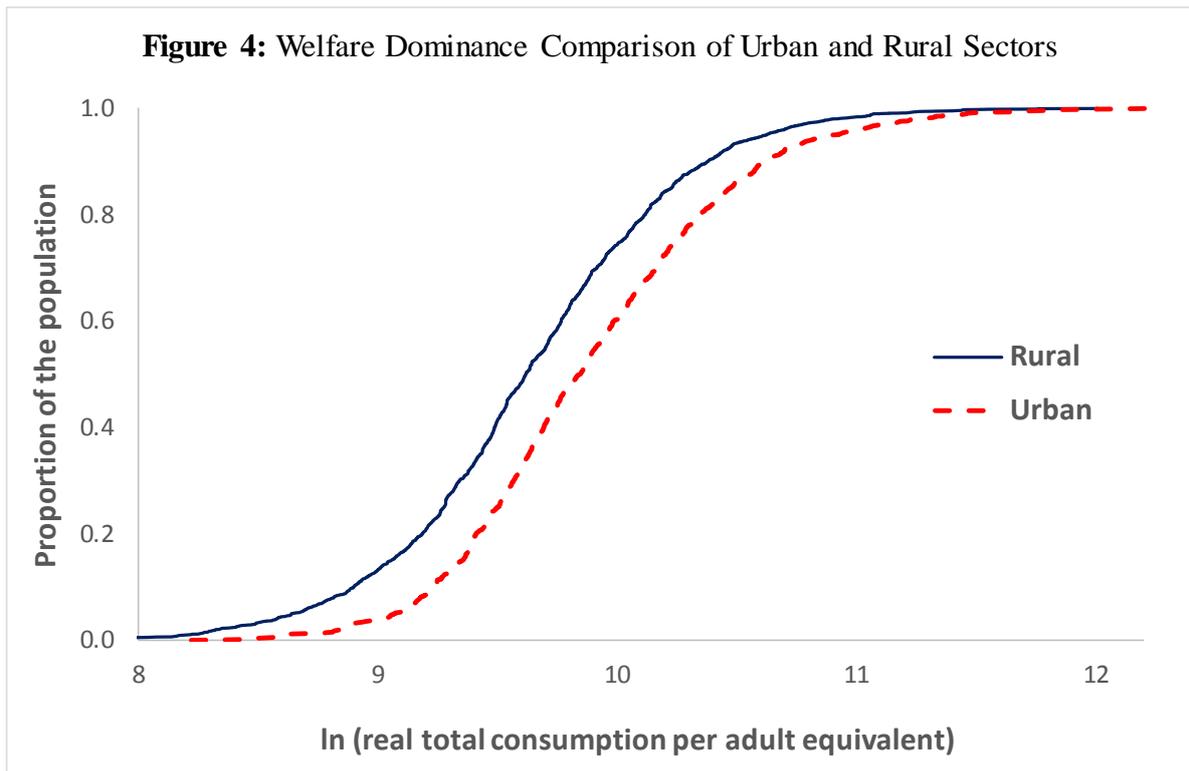
Another spatial breakdown of poverty is between the aggregate urban and rural sectors, and this is shown in Table 4. When interpreting these results it should be recalled that the small sample size means that the poverty lines vary by province but not by urban and rural sectors within provinces. Overall, between 87-99 percent of the poor are found in rural areas, with the higher percentage obtained when using more austere poverty lines and the poverty severity index. In other words, more of the total poverty is found in rural areas if the attention is focused on the poorest.

Table 4: FGT Poverty Measures for the Rural and Urban Sectors

	Headcount ($\alpha=0$)			Poverty Gap Index ($\alpha=1$)			Poverty Severity Index ($\alpha=2$)		
	Rate	Share	Risk	Rate	Share	Risk	Rate	Share	Risk
Food Poverty Line									
Solomon Islands	0.044	1.00	1.000	0.010	1.00	1.000	0.003	1.00	1.000
Urban	0.005	0.02	0.113	0.001	0.01	0.064	0.000	0.01	0.037
Rural	0.053	0.98	1.202	0.012	0.99	1.213	0.004	0.99	1.220
Lower Poverty Line									
Solomon Islands	0.082	1.00	1.000	0.020	1.00	1.000	0.008	1.00	1.000
Urban	0.026	0.06	0.323	0.005	0.04	0.223	0.001	0.03	0.165
Rural	0.094	0.94	1.154	0.024	0.96	1.177	0.009	0.97	1.190
Upper Poverty Line									
Solomon Islands	0.127	1.00	1.000	0.032	1.00	1.000	0.013	1.00	1.000
Urban	0.091	0.13	0.712	0.019	0.11	0.601	0.007	0.10	0.519
Rural	0.136	0.87	1.066	0.035	0.89	1.091	0.014	0.90	1.110

Another way to compare the distribution of living standards is to use welfare dominance curves, which show if the ranking of two groups holds over all possible poverty lines. In these curves, for any value of real consumption (where the lower poverty line is used as the deflator to adjust for spatial cost of living differences) on the horizontal axis, the proportion of the population whose consumption level is lower than that value is shown on the vertical axis.¹¹ The curves in Figure 4 show that living standards in urban areas have first order dominance over those in rural areas, since the curves never cross. In other words, not matter what poverty line or what poverty statistics was used, one would always find a higher proportion of the rural population living under that line than would be the case for the urban population.

¹¹ The distribution of consumption is skewed (e.g. the mean is about one-quarter higher than the median), so a log transformation is used so that the curves highlight the part of the distribution where most of the population are located.



Age, gender and poverty

Age and gender are easily identifiable characteristics of people that can potentially be used for targeting antipoverty interventions. Table 5 contains estimates of poverty rates according to the age and gender of the household head. The poverty rate goes up with the age of the household head, and is highest for people in households where the age of the household head is in the oldest age range, exceeding 50 years. This pattern is the same for all poverty lines and all poverty indices, and is easily seen by the ‘risk’ values in Table 5. The incidence of poverty for female-headed households appears lower than average, with a ‘risk’ of poverty that ranges from 0.6-0.9 of the national average, being lower risk at the lower poverty lines. The share of the poor living in female headed households ranges from five to eight percent.

Table 5: Distribution of Poverty by Age and Gender of the Household Head

	Headcount ($\alpha=0$)			Poverty Gap Index ($\alpha=1$)			Poverty Severity Index ($\alpha=2$)		
	Rate	Share	Risk	Rate	Share	Risk	Rate	Share	Risk
Food Poverty Line									
Solomon Islands	0.044	1.00	1.000	0.010	1.00	1.000	0.003	1.00	1.000
0-30 years	0.012	0.03	0.280	0.003	0.04	0.351	0.001	0.04	0.297
31-40 years	0.041	0.27	0.923	0.008	0.23	0.787	0.003	0.23	0.790
41-50 years	0.046	0.32	1.040	0.010	0.31	1.012	0.004	0.34	1.099
51+ years	0.060	0.37	1.353	0.015	0.41	1.500	0.005	0.39	1.422
Male	0.046	0.95	1.036	0.010	0.94	1.024	0.003	0.94	1.025
Female	0.026	0.05	0.596	0.007	0.06	0.736	0.002	0.06	0.723
Lower Poverty Line									
Solomon Islands	0.082	1.00	1.000	0.020	1.00	1.000	0.008	1.00	1.000
0-30 years	0.051	0.08	0.626	0.010	0.06	0.483	0.003	0.05	0.402
31-40 years	0.072	0.26	0.885	0.017	0.25	0.858	0.006	0.24	0.829
41-50 years	0.086	0.33	1.056	0.021	0.32	1.019	0.008	0.32	1.038
51+ years	0.100	0.34	1.225	0.028	0.37	1.358	0.011	0.39	1.403
Male	0.083	0.93	1.017	0.021	0.94	1.024	0.008	0.94	1.024
Female	0.066	0.07	0.811	0.015	0.06	0.736	0.006	0.06	0.739
Upper Poverty Line									
Solomon Islands	0.127	1.00	1.000	0.032	1.00	1.000	0.013	1.00	1.000
0-30 years	0.066	0.06	0.515	0.017	0.06	0.522	0.006	0.06	0.480
31-40 years	0.118	0.27	0.924	0.030	0.27	0.914	0.011	0.26	0.899
41-50 years	0.139	0.34	1.091	0.033	0.31	1.012	0.013	0.31	1.007
51+ years	0.152	0.33	1.191	0.042	0.35	1.288	0.017	0.37	1.329
Male	0.128	0.92	1.005	0.033	0.93	1.015	0.013	0.94	1.022
Female	0.120	0.08	0.944	0.027	0.07	0.832	0.010	0.06	0.759

Poverty and education

The relationship between poverty and education is critical because education is the major human capital investment that individuals can make to improve their livelihoods. The better educated usually have higher incomes and thus are less likely to be poor. Table 6 contains estimates of poverty rates by the completed education level of the household head. At the food poverty line and lower poverty line there is a monotonic relationship of lower poverty rates when moving from one completed educational level to another. For example, people who live in a household where the household head did not complete primary school have a headcount poverty rate of 12 percent at the lower poverty line while those whose head has some form of tertiary education (college, university, technical/vocational) have poverty rates of just one percent. Approximately one half of the total poor live in households where the head did not complete six years of primary schooling.

Table 6: Distribution of Poverty by Highest Education Level of the Household Head

	Headcount ($\alpha=0$)			Poverty Gap Index ($\alpha=1$)			Poverty Severity Index ($\alpha=2$)		
	Rate	Share	Risk	Rate	Share	Risk	Rate	Share	Risk
	Food Poverty Line								
Solomon Islands	0.044	1.00	1.000	0.010	1.00	1.000	0.003	1.00	1.000
Nil/some primary	0.070	0.50	1.593	0.018	0.58	1.863	0.006	0.60	1.916
Grade 6	0.048	0.30	1.099	0.009	0.25	0.905	0.003	0.23	0.864
Junior secondary	0.038	0.15	0.871	0.008	0.14	0.864	0.003	0.15	0.865
Senior secondary	0.019	0.05	0.440	0.002	0.02	0.197	0.001	0.02	0.171
Tertiary	0.003	0.01	0.075	0.000	0.01	0.045	0.000	0.00	0.027
	Lower Poverty Line								
Solomon Islands	0.082	1.00	1.000	0.020	1.00	1.000	0.008	1.00	1.000
Nil/some primary	0.120	0.46	1.472	0.034	0.52	1.659	0.013	0.55	1.768
Grade 6	0.098	0.32	1.195	0.022	0.29	1.058	0.007	0.26	0.970
Junior secondary	0.078	0.16	0.961	0.018	0.15	0.899	0.007	0.15	0.895
Senior secondary	0.029	0.04	0.351	0.006	0.03	0.273	0.002	0.02	0.221
Tertiary	0.010	0.02	0.120	0.002	0.01	0.105	0.001	0.01	0.076
	Upper Poverty Line								
Solomon Islands	0.127	1.00	1.000	0.032	1.00	1.000	0.013	1.00	1.000
Nil/some primary	0.158	0.39	1.240	0.048	0.46	1.476	0.020	0.50	1.610
Grade 6	0.161	0.34	1.260	0.037	0.31	1.132	0.013	0.28	1.037
Junior secondary	0.123	0.16	0.962	0.030	0.16	0.928	0.012	0.16	0.941
Senior secondary	0.045	0.04	0.352	0.011	0.04	0.333	0.004	0.03	0.281
Tertiary	0.065	0.07	0.512	0.009	0.04	0.287	0.002	0.03	0.195

In countries such as the Solomon Islands where many adults did not complete primary schooling, another correlate of poverty that is often examined is self-reported literacy since there may be avenues open for people who did not complete a schooling cycle to gain literacy skills (e.g. through church-run adult reading programs). The 2012/13 HIES did not ask respondents to self-report whether they could read or write, so this important aspect of the poverty profile cannot be examined. This is an example of the tradeoff that survey designers face when a very intensive method of consumption measurement, such as a diary, is used; there simply is not enough time or patience amongst respondents to allow space in the survey for questions about many of the correlates of poverty.

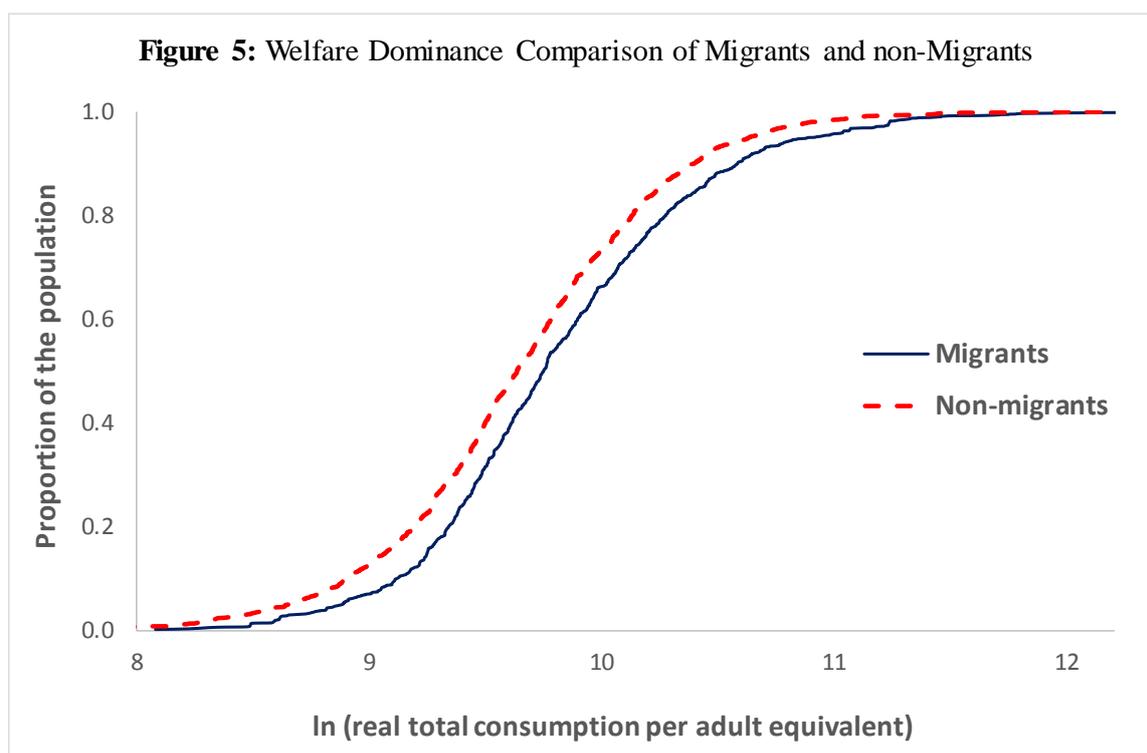
Migration, ethnicity and poverty

The other main human capital investment that people can make, either in conjunction with or instead of educational investments, is to move to where economic opportunities are greater. Migration can be a contentious issue in the Solomon Islands, as it is in other parts of Melanesia, in part because the poorly functioning land market makes in-coming migrants seem a threat rather than an opportunity to traditional landowners in migrant-receiving areas, and also because of the social implications of diverse and sometimes distrusting cultural groups living in close proximity with each other. Nevertheless, migration is an important fact of life, with one-fifth of the population living in households where the household head was born in a different province to the current province of residence (for urban areas this fraction is two-thirds). The relationship between the migrant status of the household head and poverty is examined in Table 7.

Table 7: Distribution of Poverty by Migrant Status of the Household Head

	Headcount ($\alpha=0$)			Poverty Gap Index ($\alpha=1$)			Poverty Severity Index ($\alpha=2$)		
	Rate	Share	Risk	Rate	Share	Risk	Rate	Share	Risk
Food Poverty Line									
Solomon Islands	0.044	1.00	1.000	0.010	1.00	1.000	0.003	1.00	1.000
Non-migrant	0.050	0.91	1.135	0.011	0.94	1.173	0.004	0.96	1.197
Migrant	0.020	0.09	0.459	0.003	0.06	0.311	0.001	0.04	0.214
Lower Poverty Line									
Solomon Islands	0.082	1.00	1.000	0.020	1.00	1.000	0.008	1.00	1.000
Non-migrant	0.090	0.88	1.102	0.023	0.90	1.123	0.009	0.92	1.148
Migrant	0.048	0.12	0.591	0.010	0.10	0.510	0.003	0.08	0.408
Upper Poverty Line									
Solomon Islands	0.127	1.00	1.000	0.032	1.00	1.000	0.013	1.00	1.000
Non-migrant	0.130	0.81	1.018	0.034	0.83	1.043	0.014	0.85	1.067
Migrant	0.118	0.19	0.929	0.027	0.17	0.829	0.009	0.15	0.733

The results in Table 7 show that the poverty rate is lower for people who live in households headed by a migrant. At the lower poverty line, the risk of being poor in migrant households ranges from two-fifths to three-fifths of the national average poverty rate, and the risk of migrants being poor is especially low when considering the poverty severity index. These differences are statistically significant, so for example, the hypothesis of equal headcount poverty rates at the lower poverty line for people in migrant and non-migrant households would be rejected at the $p < 0.01$ level ($F_{(1,362)} = 7.1$). The welfare dominance curves in Figure 5 show that the conclusion of lower poverty for migrant-headed households would be found with any poverty line and any poverty statistic (since the poverty incidence curve for migrants is always below the curve for non-migrants).



It is important to emphasize that the relationship shown in Table 7 and Figure 5 is not necessarily causal – people who live in migrant households may have various systematic differences that distinguish them from non-migrants in both observed (e.g. education) and unobserved (e.g. entrepreneurship) dimensions. It may be these attributes, rather than migration *per se*, that causes the lower poverty shown in the table and figure. Nevertheless, these results may serve as an antidote to any belief that migrants, such as those living in urban squatter areas, are amongst the poorest people in the Solomon Islands.

The vast majority of people in the Solomon Islands are Melanesian but there are also some pockets of Polynesians and Micronesians as well as some people from overseas ethnic groups. The poverty profile according to the ethnicity of the household head is shown in Table 8. It appears that poverty is lower for people living in households that are headed by someone who is not a Melanesian and this group contributes less than three percent of the total number of poor.

Table 8: Distribution of Poverty by Ethnicity of the Household Head

	Headcount ($\alpha=0$)			Poverty Gap Index ($\alpha=1$)			Poverty Severity Index ($\alpha=2$)		
	Rate	Share	Risk	Rate	Share	Risk	Rate	Share	Risk
	Food Poverty Line								
Solomon Islands	0.044	1.00	1.000	0.010	1.00	1.000	0.003	1.00	1.000
Non-melanesian	0.032	0.03	0.736	0.002	0.01	0.188	0.000	0.00	0.060
Melanesian	0.045	0.97	1.012	0.010	0.99	1.035	0.003	1.00	1.041
	Lower Poverty Line								
Solomon Islands	0.082	1.00	1.000	0.020	1.00	1.000	0.008	1.00	1.000
Non-melanesian	0.042	0.02	0.514	0.010	0.02	0.468	0.002	0.01	0.311
Melanesian	0.083	0.98	1.021	0.021	0.98	1.023	0.008	0.99	1.030
	Upper Poverty Line								
Solomon Islands	0.127	1.00	1.000	0.032	1.00	1.000	0.013	1.00	1.000
Non-melanesian	0.057	0.02	0.449	0.015	0.02	0.473	0.005	0.02	0.409
Melanesian	0.130	0.98	1.024	0.033	0.98	1.023	0.013	0.98	1.026

Poverty and economic activity

The ability to earn cash is an important determinant of whether a person is poor or not. Even in the Solomon Islands, where a large share of household consumption is self-produced, cash incomes are needed for essential non-food items such as school fees, kerosene, and garden tools. Cash also can improve diet quality by allowing consumption of purchased protein and energy-dense staples, and provides insurance for periods of agricultural stress. Thus it is important to examine the relationship between poverty and economic activities; here the main activity of the household head in the week prior to the survey is used to classify households into four groups: those working for cash as wage or salary earners in the public sector; those who are wage or salary earners in the private sector, which includes NGOs and churches; those who work on own-account, either as employers (a very small group), or making or selling items for sale in informal businesses, and also including semi-subsistence farmers; and, finally those who are not economically active. The relationship between poverty and these economic activity groups of the household head is described in Table 9.

The results in Table 9 confirm a well-known pattern, which is that that people living in households where the household head earns wages have significantly lower poverty rates than

other Solomon Islanders. In total, the people living in wage-earner households account for 30 percent of the population but their share of headcount poverty ranges from just nine percent at the food poverty line to 19 percent at the upper poverty line. A possibly less well-known pattern is that amongst those households whose head earns wages, there seems to be a considerable premium for being in the public sector; at the lower poverty line the poverty rate for people in public sector wage earner households is less than one-quarter that of those with a wage-earner head in the private sector ($p<0.04$). At the upper poverty line the poverty rate for people in households with a private sector employee as the household head have poverty rates that are over 2.5 times higher than for public sector employee households and this difference is also statistically significant ($p<0.01$).

Table 9: Distribution of Poverty by the Economic Activity of the Household Head

	Headcount ($\alpha=0$)			Poverty Gap Index ($\alpha=1$)			Poverty Severity Index ($\alpha=2$)		
	Rate	Share	Risk	Rate	Share	Risk	Rate	Share	Risk
Food Poverty Line									
Solomon Islands	0.044	1.00	1.000	0.010	1.00	1.000	0.003	1.00	1.000
Public-sector wage	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000
Private-sector wage	0.022	0.09	0.491	0.006	0.12	0.642	0.003	0.14	0.786
Own-account	0.062	0.79	1.411	0.014	0.78	1.396	0.005	0.77	1.382
Not econ active	0.039	0.12	0.878	0.007	0.10	0.745	0.002	0.09	0.617
Lower Poverty Line									
Solomon Islands	0.082	1.00	1.000	0.020	1.00	1.000	0.008	1.00	1.000
Public-sector wage	0.010	0.01	0.122	0.001	0.01	0.068	0.000	0.00	0.034
Private-sector wage	0.047	0.10	0.573	0.013	0.11	0.631	0.005	0.13	0.706
Own-account	0.109	0.74	1.329	0.027	0.75	1.339	0.010	0.76	1.354
Not econ active	0.081	0.14	0.995	0.019	0.13	0.928	0.006	0.11	0.801
Upper Poverty Line									
Solomon Islands	0.127	1.00	1.000	0.032	1.00	1.000	0.013	1.00	1.000
Public-sector wage	0.040	0.04	0.318	0.006	0.02	0.194	0.002	0.02	0.137
Private-sector wage	0.104	0.15	0.818	0.027	0.15	0.821	0.011	0.15	0.834
Own-account	0.151	0.66	1.184	0.040	0.69	1.232	0.016	0.70	1.260
Not econ active	0.139	0.15	1.090	0.032	0.14	1.001	0.012	0.13	0.923

The other feature apparent from Table 9 is that the incidence of poverty is the same for people whose household head participated in no economic activity and those where the head was involved in own-account activity. While the point estimates are slightly higher for the people in households where the head is engaged in own-account activity there is no statistical significance in the difference ($p<0.22$ at the lower poverty line and $p<0.66$ at the upper poverty line). The own-account households comprise three-quarters of total poverty for all poverty measures at the food poverty line and lower poverty line and at least two-thirds of total poverty at the upper poverty line. These results suggest that there is no basis to especially target households where the head is too old, too sick or otherwise incapable of engaging in economic activity, since this group is not poorer than the majority of households who are involved in own-account activity. Instead, the big economic divide in the Solomon Islands is between those households with access to wage incomes (especially from the public sector) and those without.

4. Poverty Prevalence in Solomon Islands 2005/6-2012/13

Revisiting poverty estimate for 2005/06

How does the poverty rate and the spatial poverty profile estimated from the 2012/13 HIES compare with previous estimates of poverty for the Solomon Islands? The existing evidence is from UNDP (2008), and is based on an analysis of the 2005/06 HIES. The UNDP reported a national headcount poverty rate of 23 percent, for a cost of basic needs poverty line, with the highest poverty rate in Honiara, at 32 percent. However, this prior evidence on poverty in the Solomon Islands is clouded by several methodological shortcomings that exaggerated the poverty rate in Honiara.

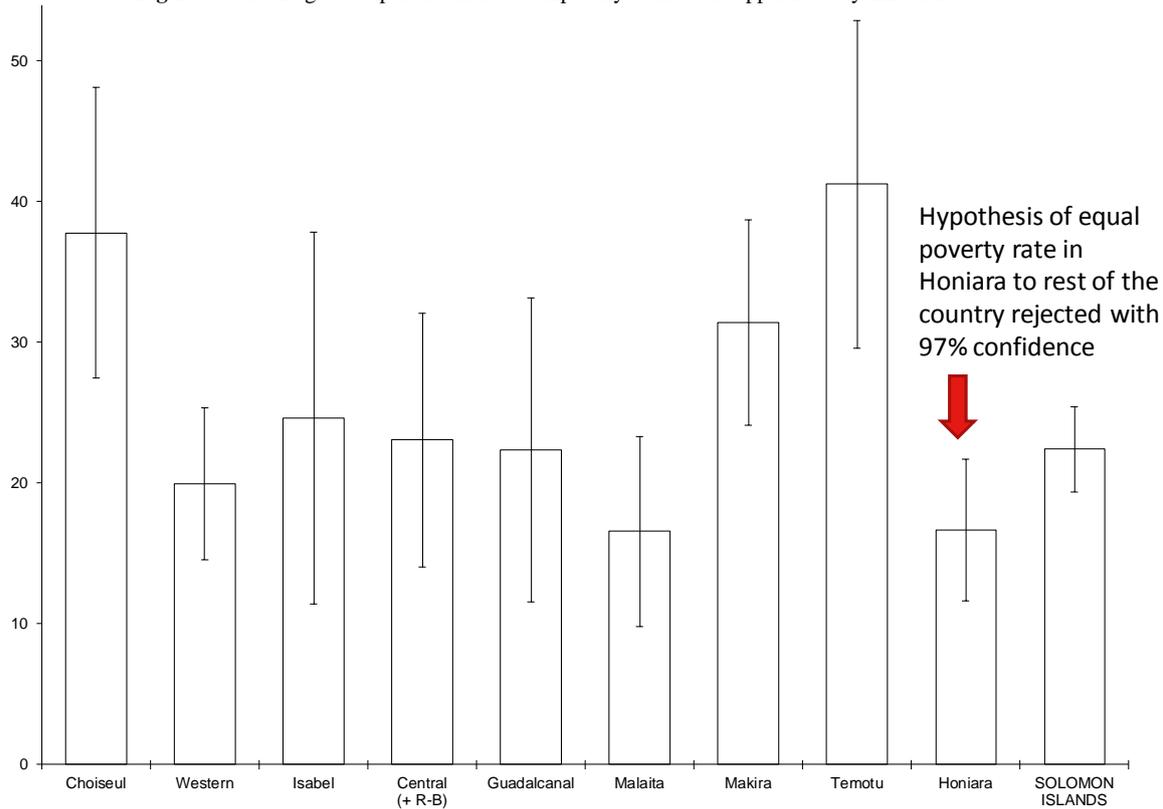
The first shortcoming in the UNDP analysis is the use of separate and unequal food baskets for Honiara, other urban areas, and rural areas. The Honiara basket referred to a higher standard of living so it follows that a higher share of the population were below that standard than if the lower standard applied to rural households was used. For example, the Honiara basket had only one-sixth as much cooking banana as the rural basket but 2.5 times as much rice; the income elasticity of demand for rice is much higher than it is for cooking banana, because it is a more preferred food, so the Honiara basket provided a higher standard of living. In general, a small country with no major differences in environment, religion, or culture is a plausible setting for using a single basket of foods because introducing separate baskets for different groups introduces the risk that these baskets refer to different standards of living.¹²

The bias from separate food baskets was exacerbated by two other errors in the UNDP study. Retail prices were used to calculate the cost of the Honiara basket but hypothetical selling prices (as reported by respondents) were used elsewhere. Second, the calorie content used in the cost calculations for rice and noodles, which contributed one-quarter of spending in the diaries, were for the cooked form (only one third of the raw calories, due to water absorption) but the quantities in the diaries were for uncooked foods. By reducing the calories from rice and noodles, people looked hungrier (especially in Honiara, where these foods had a large share in the basket), so the foods in the basket were scaled up by a higher amount, artificially increasing the cost of the food poverty line in Honiara. Another error with an unknown bias is that the reference group of households (the poorest three deciles) whose food budgets anchor the food poverty line was formed from a ranking that was in nominal terms, so it would have too many households from remote areas where prices are lower. This error was exacerbated by the procedure used to calculate the non-food allowance which did not rely on consumption patterns of households in different areas who had the same real standard of living.

The revised poverty profile for 2005/06, based on a temporally comparable consumption aggregate and upper poverty line (basic needs poverty line) is shown in Figure 6. Once the errors in the UNDP analysis are corrected, Honiara had a significantly ($p < 0.04$) lower poverty rate than the rest of the Solomon Islands in 2005/06, which is the same pattern as for most combinations of poverty lines and poverty measures in 2012/13 (see Table 3, above).

¹² A method to test if separate food baskets refer to the same standard of living (based on the weak axiom of revealed preference) is given by: Arndt, C., & Simler, K. (2010) Estimating Utility-Consistent Poverty Lines with Applications to Egypt and Mozambique. *Economic Development and Cultural Change*, 58(3), 449-474. There are very few examples of separate sub-national baskets referring to equal standards of living.

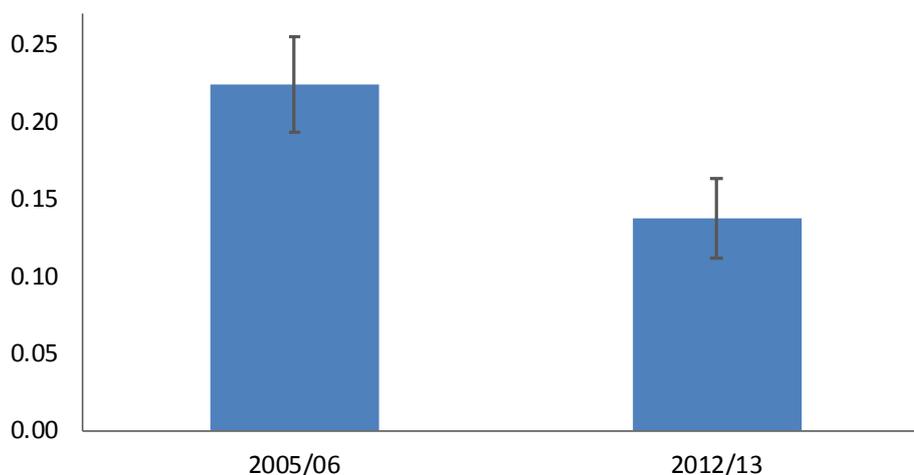
Figure 6: Percentage of Population Below Temporally Consistent Upper Poverty Line in 2005/06



Poverty prevalence between 2005/06 and 2012/13 using consistent methodology

If a comparable poverty line and consumption aggregate are used for 2005/06 and 2012/13, the national headcount poverty rates are 22 percent and 14 percent (Figure 7). The comparison of poverty rates between the two years is limited to just the poverty headcount rate at the upper poverty line (basic needs poverty line), based on the recommendation of Lanjouw and Lanjouw (2001) for making consistent poverty comparisons from surveys with different definitions for the consumption aggregate. In order to make the consumption aggregates as comparable as possible, several components used in the cross-sectional poverty profile for 2012/13 based on the comprehensive consumption aggregate (as used in Tables 2-9 and Figures 2-5) are not included in the temporally consistent aggregate, as described in detail in Appendix III.

Figure 7: Headcount Poverty Rate, Upper Poverty Line



While the comparison in Figure 7 suggests a statistically significant fall in poverty ($p < 0.00$), this result must be interpreted with care, since there are at least three important non-sampling differences between the two surveys. First, significant changes were made in both questionnaire design and survey implementation modality in the 2012/13 HIES. Second, the 2012/13 HIES data went through a comprehensive process by SPC to clean the data and convert all quantities to metric units but no similar process was applied to the 2005/06 data. The food consumption estimates for 2012/13 also include a component due to measured stock changes; this might be expected to make no difference, on average, since the Solomon Islands is non-seasonal so stock increases and decreases should net out. But in reality, respondent fatigue means that ending food stocks are not measured as thoroughly as starting food stocks, so an apparent net destocking is added to food consumption and there was no similar effect in play in 2005/06.

However, it is indeed the case that, after four consecutive years of negative growth, the arrival of the Regional Assistance Mission to Solomon Islands (RAMSI) in mid-2003 improved law and order rapidly and laid the foundations for resumed economic activity and better economic opportunities for the poor. In fact, Solomon Islands' real gross domestic product is estimated to have increased by 72.3 percent over 2003-2014, with even the informal economy expanding by 31.7 percent. In 2010 alone, the economy grew by 9.7 percent. Also, the much more rapid expansion of the services sector, especially in the retail and trade sub-sector, likely buoyed employment opportunities for the poor in urban areas, especially in Honiara. However, because it is not possible to fully account for effects arising out of differences in data collection methods between the 2005/6 and 2012/13 surveys, it will be prudent to apply some degree of caution in making conclusions about the actual extent of the decline in poverty over 2005/6 and 2012/13. Given this, it may be best to treat the estimated 8 percentage points decline in poverty rate as being slightly indicative in magnitude, but very much likely in the right direction.

Overall conclusion

Poverty in the Solomon Islands is overwhelmingly rural. When measures that account for the severity of poverty (the distribution amongst the poor) are used, up to 99 percent of the total poverty is in the rural sector if measured at the lowest standard of living considered here – the Food Poverty Line. After allowing for an austere level of non-food expenditure in the poverty line there is a very slight shift in the burden of poverty towards urban areas; the share of poverty that is in rural areas at the Lower Poverty Line and using the Poverty Severity Index is 97 percent, or 96 percent if using the Poverty Gap Index. Even with the Headcount Index, which does not consider the distribution of living standards amongst the poor, 94 percent of the total poverty is in the rural sector.

Even if comparisons are limited to Honiara versus the rest of the country, similar patterns are shown except when using the most generous ('upper') poverty line. Specifically, at the Lower Poverty Line and using the Headcount Index, the share of national poverty in Honiara is just 5.9 percent, while the shares of the Poverty Gap and Poverty Severity indices are four percent and three percent. Only at the Upper Poverty Line was the rate of poverty in Honiara unable to be statistically distinguished from the national level poverty rates.¹³ Similarly, once the errors in the UNDP report on the 2005/06 survey are corrected, the poverty rate in Honiara appeared to be significantly lower than in the rest of the Solomon Islands. While the UNDP report indicated that one-fifth of the (Upper Poverty Line) poor in the Solomon Islands in 2005/06 were located in Honiara, the corrected estimate for that year is that Honiara contributed less than one-half of that fraction of the total amount of poverty. While the finding that poverty is overwhelmingly a rural phenomenon in the Solomon Islands may seem at odds with the existing literature, once errors in that literature are corrected the rural nature of poverty in the Solomon Islands is confirmed. Moreover, the rural nature of poverty likely reflects long-standing and difficult to change factors, such as unfavourable geography and weak infrastructure which act to limit markets and limit the opportunities for the diversification of livelihoods through enhanced cash earning opportunities.

¹³ This lack of a statistically significant difference in poverty, as measured at the Upper Poverty Line, between Honiara and the rest of the Solomon Islands also holds if using the temporally consistent aggregate that does not include imputed rents.

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Appendix I

The Formation of the Food Poverty Line

The food poverty line aims to price a basket of food that poor people actually eat, where quantities in the basket are scaled up or down to reach a pre-chosen calorie target. Thus one needs average quantities of each food available to households, which comes from the HIES survey database in the form of the metric annualized quantities that SPC created when creating and cleaning the diary dataset (and also from the measured food stock changes). One also needs calorie contents and estimates of the fraction of the food that is edible (since the target is in terms of calories and calories only come from the edible portion and not from things like coconut husks).

The other thing needed is prices of each food, which need to be sufficiently widely available that there is adequate sample size to enable estimating different average prices across geographical strata (such as provinces). Moreover, the items priced have to be sufficiently specific that we are confident that the quality referred to is the same across locations and over time (so that they can be priced in a future price survey if the food poverty line is to be updated to account for inflation). The options are to obtain these prices either from the survey records of acquisitions by households (line by line transactions in the diaries) or from a price survey carried out in conjunction with the household survey. For some foods, both types of information are available, so the price survey data can be used as a cross-check on the results that come from the transactions level data in the diaries. It should be noted that the focus is on specific foods (e.g. “20 kg Solrais” whose COICOP code is 11100101) rather than less specific groups (e.g. “rice in all forms” whose COICOP code is 111001) or even broader groups that combine distinct types of food (e.g. “bread and cereals” – COICOP 111). In this regard, the formation of the food poverty line is just the same as for a CPI regimen that needs particular specifications to have prices observed, where those specific items may represent price movements for broader groups.

Obtaining Food Prices

The most disaggregated 9-digit COICOP code provides suitable specificity but there are approximately 380 COICOP codes used in the survey for food alone. Many of these items are acquired too infrequently (according to the HIES diaries) to be useful for calculating average prices in different localities. Moreover, for any food poverty line priced with this specificity it would be very difficult to update prices in the future since it would be hard to gather prices for all of these specific items in locations spread across the Solomon Islands. Furthermore, most of the infrequently purchased items have only a minor share in the total food budget (with some exceptions) so poverty line updating would require a price collection effort that was disproportionate to the importance of these items in contributing to cost-of-living differences across the Solomon Islands.

Based on these considerations, a starting point was to consider the leading 70 COICOP codes, ranked in terms of the annualized value of food expenditure for own-use reported in the diaries by the HIES sample. Amongst these 70 codes, the one with highest value of consumption was 11100102 (Solrais: Other) and the one with the least was 11704533 (Pumpkin). In total, the foods covered by these 70 codes accounted for 90 percent of the total value of food expenditure for own-use recorded by the HIES, whereas the foods covered by the other 310 COICOP codes account for the remaining 10 percent. But even though the foods covered by these 70 codes had a high total value there were six that appeared to either have too few transactions available in the diaries to provide a sufficient sample of prices (that

is, there are a few high value transactions recorded for Buma, Bulk Pork, Cocoa, Live Swine, and Sea Cucumber which cause them to have a high total value even though there are few transactions for these foods listed in the diaries) or else they refer to a non-specific item that could not be priced since it is not clear what representative specification to use when constructing a price survey (Other processed food).¹⁴

For the remaining 64 of these most important COICOP food codes, amongst all of the transactions recorded in the diaries for these foods, the calculated prices for the food poverty line come just from the transactions that were for own use, that were classified as products, and that were purchased for cash. The reason for these restrictions is that the price reported for product transactions for own-use purchased for cash should mimic what a price survey would find; in particular, there is no reliance on the hypothetical prices that gifted and self-produced items might have sold for, which HIES diary-keeping respondents are asked to report. Since the aim is to capture differences across areas of the Solomon Islands in the cost of buying a particular basket of food, restricting attention to purchases for cash and not using hypothetical prices is the correct thing to do since it places all regions on a consistent basis for comparison. It should be noted that this is a different approach than used in the poverty analysis on the 2005/06 HIES, which mixed together market prices for Honiara with hypothetical prices for all other areas, and treated them as if they were measuring the same thing (which likely overstated the costs of living in Honiara).

However, even with these restrictions on the set of transactions to use, and with the focus on the most finely defined COICOP codes, there still appears to be considerable heterogeneity in the descriptions of the products purchased. Hence, it is not clear that they refer to the exact same item everywhere, in the way that a price survey would gather prices for a particular specification. Therefore the description field for every record was inspected and within each COICOP code attention was restricted to a group of transactions that were described in a homogenous way. The data available from the SPC already included a calculated unit price for each transaction, where a considerable amount of cleaning had been applied to the data and especially to transactions where these unit prices were more than two standard deviations above or below the strata specific mean. These unit prices were calculated based on quantity and number fields where non-metric weights were converted by SINSO and SPC into metric equivalents. Thus all food items in the diaries in the data provided by SPC had either “Gram” or “Milliliter” quantities assigned to them.

The median unit prices for each province were then calculated for each of these 64 COICOP food groups (the associated *Stata* do file *extract_prices.do*, which refers to these as the n64 group, can be made available on request). However, for ten of these very specific items, the median prices were unable to be calculated for every province because too few transactions were recorded in the diaries in some provinces. For each of these items the reported prices in provinces with enough transactions (and also the calorie contents) appeared to be almost the same as for another very similar item with more transactions reported in the diaries. It was therefore decided that the median prices for these ten COICOP food groups would be obtained by combining them with a very similar COICOP group that had similar prices prior to the calculation of the medians.¹⁵ The particular combinations were as follows:

¹⁴ These six items are still part of the food poverty line, along with the 310 items not being described here, but have an effect through the group of foods whose prices are not individually specified and instead contribute to the cost of buying the food bundle via an assumption about the cost per calorie, as described below.

¹⁵ In general, the need to do this and the fact that after doing this a classification scheme with approximately 400 finely defined foods can be reduced to 54 specific foods and a remainder that accounts for only a small fraction

- COICOP: 11100203 “Flour - all others” combined with 11100201 “Flour - plain white (25kg bag)”
- COICOP: 11100401 “Plain bun” combined with 11100301 “Bread – white sliced loaf”
- COICOP: 11100503 “Butter cracker” combined with 11100505 “All other biscuits”
- COICOP: 11201504 “Whole chicken” combined with 11201506 “Live chicken”
- COICOP: 11302233 “Reef fish – unspecified” combined with 11302234 “Deep water fish – unspecified”
- COICOP: 11302303 “Crab – mud crab” and 11302304 “Crab – other crab” combined with 11302302 “Crab – coconut crab”
- COICOP: 11302508 “Canned tuna/Taiyo” combined with 11302502 “Tuna (second grade TAIYO: 180g can)”
- COICOP: 11704510 “Other cabbage” combined with 11704509 “Fern Cabbage”
- COICOP: 21307901 “Solbrew beer” combined with 21307902 “SB beer”

These combinations also are noted in Appendix I, Table 1 in the column headed “Extra COICOP”. This table also gives some of the other input information used for the food poverty line such as the calorie contents and edible fractions for each food.

The other aggregation that was necessary to obtain median prices for each province was to combine Rennell and Bellona with Central Province, which recreates a situation that existed administratively prior to 1993. While there are ethnic differences between Rennell-Bellona (primarily Polynesian) and Central (mostly Melanesian) the Rennell-Belona population of just over 3000 people (and 190 households in the HIES sample) is simply too small to enable separate price and poverty estimates for this province. In contrast, other provinces in the Solomon Islands have populations of at least 20,000 people and HIES samples of at least 300 households.

After these aggregations it was possible to calculate median prices for all provinces, for each of the finely specified foods (including these that aggregated similar COICOP codes) with the exception of four in Temotu, and one in each of Choiseul and Isabel. Also, amongst the median prices that were calculated, three province-item combinations were more than 2.5 standard deviations above the national mean price for the item, and these were considered to be outliers and were set to missing. To impute the prices for these nine missing values, a country-product dummy (CPD) regression was estimated. Consider J regions and K goods, where the relationship between the prices of goods in different regions is assumed to follow:

$$p_{k,j} = \rho_j \eta_k u_{k,j}$$

where ρ_j is the price level in region j relative to the base region and η_k is the price level of good k relative to the base good, and $u_{k,j}$ is a random disturbance term. Although this is a multiplicative relationship it can be estimated with a log-linear regression, which not only provides a way to fill in the missing prices, it also recovers the average (food) price level for each province. This average price level can be used as a starting deflator for constructing spatially real household consumption per adult equivalent, which is the ranking variable needed for identifying the reference group of households whose food budgets anchor the food poverty line. These starting deflators (relative to Honiara=1.0) were as follows: Choiseul

of total food spending suggests that the 9-digit COICOP classification is probably too detailed for the level of dietary diversity in the Solomon Islands).

0.67, Western 0.80, Isabel 0.77, Central (incl Rennell-Bellona) 0.85, Guadalcanal 0.97, Malaita 0.74, Makira 0.75, Temotu 0.67. The median prices by province for each finely defined COICOP 9-digit food group (including imputations for the nine missing values) are reported in Appendix I, Table 2.

Obtaining Food Poverty Line Quantities

The quantities of each finely defined COICOP 9-digit food group available to each household for consumption come from the diaries and from the records of starting and ending food stocks. The design of the HIES treats consumption as a residual, after all in-flows and out-flows of food into the household are tracked, but noting that some disposals of food such as wastage and feeding household food to animals are not accounted for. It is also the case that any errors in measuring in-flows or out-flows will accumulate and affect the residual, and so the food quantity available for consumption that is estimated with HIES data should be considered as a bound on what actually is consumed. Nevertheless, the HIES does track items destined for business use or for use by other households and details on these transactions are not used in the food poverty line calculations.

The same division used with the food prices, of $n=64$ individually specified items and then an aggregate of the remaining 300 or so items, was applied to the quantities. The full details are in *extract_food_qty.do* (which can be made available on request). The transaction-level quantities available in the HIES diary database were already in metric terms, based on cleaning carried out by SPC, and these were used for the $n=64$ group without modification. For each of these finely defined COICOP 9-digit food groups the starting and ending food stocks were also obtained, with ending food stocks given a negative value (they are an out-flow from the household) before adding to the starting stocks and to the net acquisitions in the diary. The quantity available of each of these foods was then converted into calories, using the calorie content and edible fraction values reported in Appendix I, Table 1.

For the remaining foods, which had too few transactions in the diary to allow median prices to be calculated for each province (and hence also were mostly just small contributors to food budgets), two procedures were applied, depending on whether quantities were reported or not. Each quantified food was aggregated to 4-digit COICOP level, and then given calorie conversion and edible content factors as shown in Appendix I, Table 3.

The rough approximation to the actual edible fraction and calorie content for more finely defined 9-digit COICOP items should not matter, since, in aggregate, the 300 foods covered by this procedure add up to less than ten percent of the value of food expenditure for own-use and an even smaller share of poverty line calories. The same aggregation procedure (using the Appendix I, Table 3 values) was also used for estimating the calories obtained from stock changes of these foods.

Table 1: Assumptions Used for Creating Cost of Basic Needs Food Poverty Line Basket, Average Quantities and Average Calories

Group	Name	COICOP9	Extra COICOP	Calories per kg	Edible fraction	kg per AE per year	Impl Cal/day	Dbl Chk Cal	Scal Qty	Scaled Cal
1	Rice (Solrais - 20kg bag)	11100101		3830	1.00	9.2276	97	97	7.86	83
2	Rice (Solrais - other)	11100102		3830	1.00	33.0291	347	348	28.14	295
3	Flour (25 kg bag) + other	11100201	11100203	3433	1.00	1.7296	16	16	1.47	14
4	Bread sliced white + buns	11100301	11100401	2370	1.00	1.5574	10	10	1.33	9
5	Biscuits (Cabin biscuit)	11100501		3674	1.00	0.3183	3	3	0.27	3
6	Butter crackers + other	11100503	11100505	3674	1.00	0.3053	3	3	0.26	3
7	Cakes - ring cake	11100601		2420	1.00	0.5992	4	4	0.51	3
8	Cakes - local pudding	11100603		2420	1.00	1.9468	13	13	1.66	11
9	Cakes - all other	11100604		2420	1.00	0.4073	3	3	0.35	2
10	Noodles	11100901		3529	1.00	2.2143	21	21	1.89	18
11	Beef mince	11201101		2233	1.00	0.0400	0	0	0.03	0
12	Chicken whole + live	11201504	11201506	2040	0.72	0.6479	3	3	0.55	2
13	Chicken wings	11201509		2310	0.70	0.3544	2	2	0.30	1
14	Corned beef	11202002		1921	1.00	0.0108	0	0	0.01	0
15	Other Canned Meat	11202004		1921	1.00	0.0949	0	1	0.08	0
16	Fish - Tuna	11302231		1274	0.82	16.2994	47	47	13.89	40
17	Fish - Reef + other fresh	11302233	11302234	1398	0.74	23.3468	66	66	19.89	56
18	Crabs (coconut, mud, other)	11302302	11302303/11302304	630	0.42	3.4097	2	2	2.91	2
19	Shell fish	11302310		860	0.65	8.6373	13	13	7.36	11
20	Canned tuna (Taiyo 2nd, 180g + oth)	11302502	11302508	2000	1.00	1.4309	8	8	1.22	7
21	Canned tuna (Taiyo 2nd, 360g)	11302511		2000	1.00	0.1213	1	1	0.10	1
22	Canned tuna (Taiyo 2nd, 100g)	11302512		2000	1.00	0.1159	1	1	0.10	1
23	Eggs	11403501		1700	0.88	0.0664	0	0	0.06	0
24	Cooking Oil	11504009		8560	1.00	0.2326	5	5	0.20	5
25	Sweet banana	11604204		1030	0.70	8.5342	17	17	7.27	14
26	Cooking banana	11604205		1110	0.65	51.7680	102	103	44.11	87
27	Breadfruit	11604206		1030	0.80	34.3249	77	78	29.25	66
28	Coconut (green)	11604208		390	0.20	13.9288	3	3	11.87	3
29	Coconut (dry)	11604209		3837	0.65	63.6751	435	436	54.25	371
30	Mango	11604223		290	0.65	0.3770	0	0	0.32	0
31	Watermelon	11604224		320	0.90	2.2018	2	2	1.88	1
32	Pawpaw	11604228		450	0.85	8.3000	9	9	7.07	7
33	Pineapple	11604231		470	0.90	1.3807	2	2	1.18	1
34	Ngali nuts	11604310		4330	0.80	3.3192	32	32	2.83	27
35	Peanuts	11704505		5516	0.69	0.5154	5	5	0.44	5
36	Chinese cabbage	11704506		220	1.00	0.7309	0	0	0.62	0
37	Cabbage (Bush, Slippery)	11704507		220	1.00	12.6087	8	8	10.74	6
38	Cabbage (Fern + Other)	11704509	11704510	220	1.00	14.5231	9	9	12.37	7
39	Tomatoes	11704511		176	1.00	2.4137	1	1	2.06	1
40	Beans	11704512		280	1.00	4.7373	4	4	4.04	3
41	Eggplant	11704528		260	1.00	2.3772	2	2	2.03	1
42	Pumpkin	11704533		270	0.85	2.0431	1	1	1.74	1
43	Kumara	11704601		1144	0.84	216.6541	570	572	184.60	486
44	Cassava	11704602		1295	0.87	92.3505	285	286	78.69	243
45	Taro	11704603		1117	0.84	43.5233	112	112	37.08	95
46	Yams	11704604		1140	0.81	13.7713	35	35	11.73	30
47	Pana	11704606		1140	0.81	11.7132	30	30	9.98	25
48	Sugar	11804903		3935	1.00	2.5012	27	27	2.13	23
49	Salt	11906001		0	1.00	1.3049	0	0	1.11	0
50	Coffee	12106702		2150	1.00	0.1520	1	1	0.13	1
51	Tea	12106801		2150	1.00	0.0797	0	0	0.07	0
52	Beer (Solbrew + Other)	21307901	21307902	347	1.00	0.1551	0	0	0.13	0
53	Betelnut	23108901		1100	0.45	9.8965	13	13	8.43	11
54	Mustard leaf (use with betelnut)	23108902		420	1.00	0.4869	1	1	0.41	0
CALORIES - ALL OTHER FOOD (INCL MEALS)								134		
TOTAL							2582			2086
COST - ALL OTHER FOOD (INCL MEALS)								253		

Definitions of column headings

COICOP9	The detailed code for the food
Extra COICOP	Detailed code for a second food that groups with the first food due to insufficient variation in prices
Calories per kg	The calorie content of the food
Edible fraction	The edible fraction of the food
kg per AE per year	The average kg available per adult equivalent per year for households containing the poorest quintile of people (in spatially real terms)
Impl Cal/day	Product of the quantity, calorie content and edible fraction
Dbl Chk Cal	Double check on the calories, by averaging at the household level rather than average quantities and multiplying by cal content and edible %
Scal Qty	Scaled quantity for each food to create a food basket that provides 2200 calories
Scaled Cal	Calories from the scaled basket

Table 2: Median Price (\$/kg) For Individual Foods (unique 9-digit COICOP codes with some exceptions)

Group	Choiseul	Western	Isabel	Central+RB	Guadalcanal	Malaita	Makira	Temotu	Honiara
1	12	10	13	12	9	9	15	14	9
2	13	12	14	15	14	13	14	15	12
3	11	10	12	10	9	9	11	12	9
4	20	20	13	27	18	21	21	14	17
5	50	50	50	50	57	45	60	60	40
6	40	40	160	91	160	45	136	64	45
7	13	20	29	50	50	29	24	21	33
8	5	6	8	8	5	8	7	8	10
9	16	20	7	50	45	32	32	29	24
10	35	35	35	35	47	29	35	35	29
11	75	80	80	100	70	54	96	77	68
12	40	42	48	33	45	48	25	29	40
13	45	55	50	35	30	48	50	42	34
14	88	103	103	94	88	103	82	96	100
15	51	51	51	51	51	44	51	51	40
16	5	8	20	7	10	9	10	8	11
17	6	10	20	8	10	7	5	7	18
18	15	7	10	10	10	8	15	3	10
19	4	4	7	4	3	4	2	4	7
20	44	44	44	44	44	39	44	47	39
21	39	33	39	42	36	39	44	39	34
22	60	55	60	65	63	56	60	67	55
23	15	57	28	18	51	31	17	32	50
24	28	28	15	28	15	25	18	25	20
25	3	4	3	4	3	3	3	6	6
26	3	3	3	3	3	4	3	2	7
27	4	4	2	1	4	3	9	2	7
28	1	2	3	2	2	1	1	1	3
29	1	1	1	1	2	1	1	1	3
30	2	10	3	4	8	13	1	5	8
31	6	6	6	5	6	5	4	3	6
32	3	4	3	5	3	2	4	2	5
33	6	6	5	5	6	4	4	2	8
34	1	1	1	1	9	1	1	1	18
35	8	13	6	6	5	5	6	3	5
36	8	9	5	14	10	8	10	4	11
37	4	5	8	12	13	6	10	5	10
38	4	5	10	13	12	6	6	10	9
39	8	10	13	8	16	6	6	3	13
40	5	6	10	8	12	6	8	6	14
41	3	5	3	6	8	5	6	3	7
42	2	3	1	3	3	3	3	2	5
43	3	4	4	3	5	3	2	3	7
44	2	3	3	3	5	3	4	2	6
45	4	3	6	3	6	5	2	4	7
46	4	5	2	4	4	4	5	2	8
47	3	4	1	3	3	3	2	4	7
48	18	18	20	20	18	19	20	20	16
49	9	10	12	12	10	10	10	10	9
50	75	75	120	100	150	75	100	100	50
51	88	88	141	118	176	59	118	118	59
52	42	30	36	41	36	39	42	45	36
53	5	8	5	12	17	5	5	10	14
54	20	27	20	27	27	13	13	25	33

Notes: Food groups are defined in Appendix Table 1, at 9-digit COICOP level in most cases (some are aggregations of 9-digit COICOP)

Table 3: Assumed Calorie Content and Edible Fraction for Aggregations of Minor Foods

COICOP4	Description	Calories/kg	Edible fraction
111	Bread and cereals	3100	1.00
112	Meat	2000	0.85
113	Fish and sea food	1300	0.75
114	Milk, cheese and eggs	1700	0.88
115	Oils and fats	8000	1.00
116	Fruit	1300	0.70
117	Vegetables	900	0.90
118	Sugar, jam, honey, chocolate and confectionery	3900	1.00
121	Coffee, tea and cocoa	2150	1.00
122	Mineral water, soft drinks, fruit and vegetable juices	500	1.00
211	Spirits	1600	1.00
213	Beer	350	1.00
231	Narcotics	750	0.70

The average calories per dollar (based on the annualized values calculated by SPC) from all of these quantified foods was then used to derive a calorie contribution from unquantified foods like meals. It was assumed that there is a 50 percent processing premium for such foods (that is, calories are more expensive when bought in the form of a meal compared with buying them in the form of ingredients). In other words, for each household, the calories per dollar for the foods that Appendix I, Table 3 describes were multiplied by 0.66 and then multiplied by that household's annualized spending on meals, in order to impute the calories available to that household from this spending on meals.

After these procedures, an estimate existed for each household of the available calories from the quantities of each of 64 finely specified foods (coming from the diaries and from stocks), and the total spending and calorie availability for an aggregate of all other foods. When these estimates were combined with demographic details on the household the apparent calories per person per day could be examined for implausible values. Setting thresholds of 750 calories and 13,000 calories per person per day, any household where the diary and stock records together implied available calories outside these bands was dropped since such estimates likely reflect an incomplete record. For example, if interviewers were less thorough in measuring ending stocks than starting stocks, there will be an apparent net destocking which adds to the available calories and can cause implausibly high values. Conversely, if measured ending stocks are not covered from in-flows (production, purchases, gifts) it will appear as if consumption is lower during the 14 days than it truly was (for some households it may even appear as negative). After applying these rules, 114 households were dropped from the analysis and the sampling weights for the remaining 4364 households were scaled up (at strata level) so as to still add up to the total population of the Solomon Islands (see *reweight.do*, which can be made available on request, for detail).¹⁶

To get from the household level database of food quantities and calories to the food poverty line next required forming a tentative *lower poverty line*, which adds a non-food allowance to

¹⁶ For poverty analysis one is particularly interested in the distribution of consumption at the lower tail and the results are sensitive to outliers. The same is not true for other uses of HIES data, where it may be expected that errors cancel out when estimating totals or average budget shares for the CPI weights. Hence this dropping of observations does not imply anything negative about the overall quality of the HIES data.

the food poverty line, using the methods described in Appendix II. The reason for ‘jumping ahead’ to forming a tentative poverty line with food and non-food components in order to construct the food poverty line is that a spatial deflator is needed to compare households across different areas of the Solomon Islands in terms of their *real* monetary welfare rather than using a nominal ranking which would tend to include too many households in low cost of living areas in the group whose food budgets anchor the food poverty line. The starting deflator from the CPD regression that was used for the initial ranking only considered inter-provincial differences in food prices so a more comprehensive deflator is to use the ratio of the lower poverty line, which also accounts for non-food spending by poor households.

Putting aside the detail about how the non-food allowance for the lower poverty line was calculated, the next modelling assumption is the choice of where in the ranking of households (in terms of real consumption per adult equivalent) should attention be focused when looking at food budgets. The UNDP poverty analysis of the 2005/06 HIES reports a national poverty rate of 22.7 percent for a basic needs poverty line, and this implies that the households that contain the second poorest quintile of people would be an appropriate anchoring group for forming a diet that is eaten by poor people in the Solomon Islands. However, there are several technical errors in the UNDP poverty analysis which likely had the effect of making poverty in 2005/06 seem too high (and too heavily concentrated on Honiara) which are discussed in the section of the main report on Temporal Comparisons. It therefore became apparent that once the initial poverty lines were formed using the 2011/12 HIES that the headcount poverty rate was less than 20 percent, so attention switched to the households containing the poorest quintile to use as the appropriate reference group.¹⁷ The composition of this group of households containing the poorest quintile of people changed with each iteration through the process of forming the food poverty line, calculating non-food allowances and using the ratio of the lower poverty lines as a spatial deflator to then re-rank households, but the general principal of using the average food quantities of this group stays the same.

Specifically, the reference group of households provided an average quantity (and implied calories) available per adult equivalent per day from each of the 64 separately defined foods. This is a single national basket rather than varying across provinces, since there is no good reason to introduce regional variation in the poverty line basket for a small country like the Solomon Islands, especially since such variation may confuse standard of living differences with cost of living differences. It should be noted that use of a single national basket appears to differ from what was doing in the UNDP poverty analysis, which is another reason why poverty in Honiara appeared higher since the standard of living for the poverty line was likely set at a higher standard of living than in the rest of the country. The single national basket is priced in each province, using the provincial median prices in Appendix I, Table 2. The average annual cost to get one calorie per day for the full year from the foods that are individually specified ranged from \$1.23 per calorie in Choiseul to \$2.32 in Honiara with a population-weighted average (for the poorest quintile) of \$1.58.

¹⁷ For more discussion on the need for the cost-of-basic-needs poverty line reference group to come from a point in the distribution that is consistent with the headcount poverty rate see: Pradhan, M., Suryahadi, A., Sumarto, S., & Pritchett, L. (2001). Eating like which “Joneses?” An iterative solution to the choice of a poverty line “reference group” *Review of Income and Wealth*, 47(4), 473-487. The effect of using a richer reference group than those who are ultimately found to be poor is not trivial; using the second poorest quintile rather than the poorest one raises the average cost of the poverty line across provinces by about six percent and the average cost in provinces outside of Honiara relative to Honiara would be 0.67 rather than 0.62, since using a richer reference group puts more weight on foods that are relatively cheaper in Honiara.

The annual spending on, and available calories from, all of the other foods showed that for the mix of foods chosen by households containing the poorest quintile, spending \$1.90 per year on this group of foods would provide one calorie per day. The average calories per day available from this group of foods was just 134 for the reference group households, compared with 2448 calories coming from the 64 individually specified foods. The fact that only five percent of available daily calories came from these more than 300 9-digit COICOP codes (and noting that this includes an allowance for takeaway meals), and the fact that on average this group of foods do not appear to be especially more expensive in terms of price per calorie (at \$1.90 versus \$1.58) made it straightforward to use a simple extrapolation approach to account for the calories from (and the cost of) all of the unspecified foods in the food poverty line basket. Specifically, after scaling quantities so that the poverty line basket provided 2200 calories, the scaled quantities for the 64 foods were found to contribute a sub-total of 2086 calories per day, so the sub-total cost of these 64 foods in each province is inflated up by $(2200/2086)$. Thus, this extrapolation takes the inter-provincial price variation that is revealed for the 64 quantified foods that supply 95 percent of the poverty line calories and applies the same spatial pattern to derive the cost of a further 114 calories $(2200-2086)$ to get to the total cost of the food poverty line.

Appendix II

Forming the Consumption Aggregates and the Non-Food Poverty Lines

The data provided by SPC had already undergone considerable processing to produce annualized expenditure estimates for every detailed 9-digit COICOP code. These estimates used information from both the HIES diaries and also from the various modules where information was gathered by recall. One of these modules covered “individual expenditures” on education, travel, health, clothing, communication, and alcohol, kava, betelnut and tobacco.¹⁸ The recall periods for these items varied from one week to one year. Another module covered “household expenditures” on land and housing, utilities, insurance, tax, ceremonies, services, vehicles, and what were called “assets” which covered a range of household goods from blankets through to durable goods like televisions. The items covered by this module all had a one year recall, except for fuel (one week) and ceremonies (three months). Finally, the “household characteristics module included dwelling tenure expenditures, with owner-occupiers (approximately 95 percent of all households) asked to estimate the rent they would pay for their dwelling.

For any categories of expenditure where information could come from both diary and recall, the SPC analysts determined which was the more reliable and used that source for the annualized expenditures. In order to maintain consistency with the aggregate generated by SPC, their *Stata* data file *agg_expenditure.dta* was used as the starting point for forming the consumption aggregate. But one difference is that for this poverty analysis the estimate of food consumption is based just on diary records, since these have the quantities needed for the food poverty line. In contrast, the household aggregate expenditure made by SPC uses the modules for some foods (e.g. Beer).

Items that are not part of consumption for members of the particular household studied and that are ignored when forming the consumption aggregate include:

- Items destined for business use (beneficiary group code 55)
- Items to give away to other households or the community (beneficiary group code 53)¹⁹

In addition, there are particular items that are dropped because they relate to investment rather than to consumption, or else to acquiring costly items that will provide service flows over many years. A general feature of the HIES that weakens its usefulness for measuring household consumption is that it gathers data on acquisitions and provides insufficient detail for calculating service flows (except for the hypothetical rent question). In particular, while it asks about how many items are available to the household for things like vehicles or durable goods, it does not ask about their age or acquisition date, the current salvage value or the acquisition value (except for anything acquired in the last 12 months). Ideally, in order to calculate the service flow from items that are available to be consumed for longer than the reference period (3 or 12 months etc) one would use straight-line depreciation based on acquisition cost, life expectancy, and salvage value. Of course all sorts of items are more long lived than the survey reference period, including things like blankets, pots and pans and so on, and even in consumption-focused surveys these items do not have questions asked about

¹⁸ The prompting of whether such expenditure had occurred used a form that covered each member of the household roster but the reporting was with a single household form and so may not match what would come from a personal diary, given the likely reliance on proxy reporting.

¹⁹ Ideally, items to give away should be recorded as an incoming transaction (e.g. a purchase, or own-production) and the outgoing gift is subtracted from the incoming, to net back to zero. But this does not seem to be the case and if the outgoing gift is subtracted it often results in apparent negative consumption of the item.

their age, life expectancy, salvage value and acquisition value outside of the reference period. The available modeling options in these circumstances are either to ignore all such items so that the consumption aggregate is only for things consumed within the reference period (but even the storability of food shows that this would limit attention to a very small set of items) or to use the acquisitions estimates as an imperfect proxy for consumption while addressing some of the largest sources of error.

The second approach is used here, of relying on acquisitions data from the individual and household expenditures modules, with some exceptions noted below. For a household that acquired a non-food item during the survey reference period, where that item has some durability and continues to provide services after the end of the survey, their non-food consumption will be overstated because the item is treated as being ‘used up’ within the reference period. Conversely, for households who are consuming services from non-food items that they acquired before the survey reference period their consumption will be understated. Since richer households are more likely to be acquiring new goods, and since acquisitions prices overstate the value of the services consumed from the good, treating acquisitions as consumption tends to overstate the inequality in consumption, and therefore will also tend to overstate poverty for a given mean level of consumption. Another way to consider this likely overstatement of poverty is to consider the food budget share, which is used for deriving a non-food allowance for the poverty line; this food share will be lower if non-food acquisitions are treated as consumption and a lower food share will lead the food poverty line to be scaled up by a larger fraction, to give a higher value of the poverty line and more poverty than if it were possible to base measured consumption on service flows for all non-food items. Hence it seems unlikely that this modeling assumption would lead to an understatement of poverty, especially because the major durable owned by the poor (their dwelling) does have service flows measured using the hypothetical rent question.

The two main groups of items whose acquisitions do not contribute to the estimate of non-food consumption are vehicles and outboard motors (but vehicle maintenance, other vehicle-related expenses like registrations, and spending on vehicle fuel are counted), and purchases of land and other costs for constructing houses (since the hypothetical rent question should already cover service flows for the dwelling lived in). Expenses for the maintenance of a house, including costs for adding any extensions, are included since these are more of a recurring nature. In contrast, land purchase and construction expenses are more in the nature of an investment and so should be excluded from a consumption measure (Deaton and Zaidi, 2002).

The non-food allowance

The two sets of food shares that are needed to scale the food poverty line up to the lower and upper poverty lines that each included an allowance for non-food consumption can be found from the following food Engel curve:

$$w = \alpha + \beta \ln \left(\frac{x}{n \cdot z^F} \right) + \sum_{k=1}^K \gamma_k n_k + \varepsilon \quad (1)$$

where w is the food budget share, x is total expenditure on consumption, n is the number of persons (in adult-equivalent terms), z^F is the food poverty line, and n_k is the number of people in the k^{th} demographic category. The lower poverty line uses the non-food spending of households with total expenditure equal the cost of the food poverty line, so $\ln(x/(n \cdot z_j^F)) = 0$, and

$w^L = \hat{\alpha} + \sum_{k=1}^K \hat{\gamma}_k \bar{n}_k$ where \bar{n}_k is the mean of the demographic variables for the reference group

of households used to form the poverty line basket of foods. In contrast, finding the food budget share of those households whose food spending exactly meets the food poverty line, w^U requires a numerical solution, given by: $n \cdot z^F = x \cdot w^U$. This can be substituted into equation (1) to give:

$$w^U = \alpha + \beta \ln(w^U)^{-1} + \sum_{k=1}^K \gamma_k n_k \quad (2)$$

Using $w-1$ to approximate $\ln w$, an initial solution of $w_0 = (\alpha_k + \beta) / (1 + \beta)$ can be found, where

$\alpha_k = \hat{\alpha} + \sum_{k=1}^K \hat{\gamma}_k \bar{n}_k$ gives the combined effect of the intercept and the demographic variables

for the reference group of households. This estimate can be improved upon by iteratively solving the following equation, t times (Ravallion, 1994):²⁰

$$w_t^U = w_{t-1}^U - \frac{(w_{t-1}^U + \beta \ln w_{t-1}^U - \alpha_k)}{1 + \beta / w_{t-1}^U} \quad (3)$$

The results in Appendix II, Table 1 from estimating equation (1) show that food budget shares are significantly higher in all provinces outside of Honiara, reflecting the lower non-food costs of living in those areas. These higher food shares are especially apparent for Temotu, Malaita and Central (including Rennell and Bellona). Nevertheless, the difference in food shares between provinces is less than what was implied by the (incorrect) poverty analysis of the 2005/06 HIES.

Table 1: Food Engel Curve Regression for Calculating Scaling Factors for Poverty Lines

	Comprehensive Aggregate			Temporally Comparable Aggregate		
	Coefficient	Std Error	t-stat	Coefficient	Std Error	t-stat
Choiseul	0.1079	0.0095	(11.40)	0.1601	0.0097	(16.45)
Western	0.1733	0.0090	(19.34)	0.2174	0.0089	(24.31)
Isabel	0.1801	0.0090	(20.12)	0.1966	0.0094	(20.83)
Central (+ R-B)	0.2177	0.0086	(25.28)	0.2286	0.0085	(27.01)
Guadalcanal	0.1393	0.0129	(10.81)	0.1391	0.0130	(10.69)
Malaita	0.2270	0.0088	(25.68)	0.2826	0.0086	(32.88)
Makira	0.1265	0.0101	(12.51)	0.1455	0.0110	(13.23)
Temotu	0.2389	0.0145	(16.46)	0.2289	0.0146	(15.73)
# children (0-6)	-0.0018	0.0031	(0.58)	-0.0043	0.0030	(1.44)
# children (7-14)	-0.0178	0.0029	(6.21)	-0.0208	0.0028	(7.38)
# adults	-0.0201	0.0017	(11.51)	-0.0237	0.0017	(14.07)
$\ln(x/n \cdot z^F)$	-0.1380	0.0060	(23.13)	-0.1364	0.0063	(21.74)
Intercept	0.6812	0.0142	(48.03)	0.7635	0.0130	(58.76)
<i>R</i> -squared (<i>p</i> -value)	0.337 (<i>p</i> <0.001)			0.375 (<i>p</i> <0.001)		

Note: The omitted province whose conditional food budget share is given by the intercept is Honiara. The comprehensive consumption aggregate includes imputed rent, while the temporally comparable aggregate does not.

Once the effect of the demographic variables in the regression are taken account of, the food share for calculating the lower poverty line ranges from 0.6 in Honiara to 0.83 in Temotu. In other words, anywhere from 17 percent to 40 percent of the value of the food poverty line in

²⁰ Equation (3) was calculated twice so as to iterate to the food budget share that is needed for the upper poverty line, with the details provided in *expenditures.do* (which can be made available on request).

each province will be added to that line, so as to account for the minimal non-food expenditure of households whose total expenditure just equals the food poverty line.

For the more generous non-food allowance, based on those households whose value of food consumption just equals the food poverty line, the food budget shares calculated after two iterations of equation (3) range from 0.5 in Honiara to 0.8 in Temotu, while the population-weighted average of the budget share (using counts of people in the poorest quintile) for the provinces outside of Honiara is 0.7. These calculated budget shares imply that the food poverty line needs to be scaled up by a factor that ranges from 1.25 ($=1/0.8$) in Temotu to 2 ($=1/0.5$) in Honiara. On average, the scaling factor is 1.4 for the provinces outside of Honiara. Using these scaling factors provides the poverty lines in Table 1 of the main report.

In contrast, the scaling factors used with the 2005/06 HIES, which were not based on equations (1) to (3) and instead just used the average non-food expenditure of an incorrectly identified reference group of households (the lowest three deciles in terms of nominal expenditure) ranged from 1.44 for rural areas to 2.24 for Honiara. While the rural scaling factor used in 2005/06 is similar to what is calculated here (although the calculation here also includes the small towns in the provinces), the factor for Honiara appears to be high. Moreover, this high scaling factor for Honiara has an especially large effect on the finally calculated poverty line since the food poverty line in Honiara was also overstated in 2005/06 due to the use of market prices there but farm gate prices elsewhere, the use of a separate food basket that was likely of much higher quality in Honiara than elsewhere, and various calculation errors that acted to skew the food basket and make the cost of a food poverty line standard of living in Honiara seem higher than it truly was.

References

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- Ravallion, M. 1994. *Poverty Comparisons* Harwood Academic Publishers, Chur.
- Stata Program Used for Creating Expenditure Aggregate and Non-Food Allowances

Appendix III

Temporal Comparisons and Comparable Consumption Aggregates

In order to compare poverty in 2005/06 and 2012/13, two analytical tasks were required: first, a comparable consumption aggregate had to be created in both years; second, either the base period poverty line needed to be updated or the later period poverty line backdated so that the cost of obtaining the same poverty line standard of living was calculated for each year. The existing poverty lines for 2005/06 are biased and are not spatially consistent (they give a higher standard of living in Honiara than elsewhere) so it would be unwise to update those lines. Instead the 2012/13 poverty lines in Table 1 (of the main report) are backdated to 2005/06, but with the caveat that they are redefined to be consistent with the temporally comparable consumption aggregate. Since it was non-food components of consumption (particularly housing) that needed to be adjusted to make the 2005/06 and 2012/13 data comparable, this required re-estimating the food Engel curve in Appendix II to calculate a new non-food allowance in both years. Implicitly the non-food allowance captures the effects of both prices and quantities (with neither observed, which is why the allowance is derived indirectly from the food Engel curve). When the non-food allowance is either updated or backdated by recalculating the Engel curve, it implicitly allows both price and quantity to change, whereas the ideal inflation adjustment would be to change just the price in order to account for changes in the cost of living at that particular welfare standard. Any rise in living standards from 2005/06 to 2012/13 would see the implicit quantity of non-food items rise (Engel's Law) and so the updating method of estimating the Engel curve in both years likely means that the later year non-food allowance is set at a higher welfare level than in the earlier year. In other words, this procedure is more likely to cause a spurious increase in measured poverty than it is to bias the temporal comparison towards finding a fall in poverty. This caveat should be kept in mind when interpreting results of the temporal comparisons.

In order to produce a temporally consistent consumption aggregate, adjustments were required for both 2012/13 (the aggregate described in Appendix II) and 2005/06. The main change was in terms of dwelling services, with imputed rent removed from the 2012/13 aggregate and the food Engel curve re-estimated (results reported in Table 1 of Appendix II). The removal of imputed rent was required because the 2005/06 questionnaires had no questions that allowed respondents to report how much they would pay to rent their owner-occupied dwellings. Notwithstanding this, the file left by the consultants who worked on the 2005/06 survey (entitled "working copy of total household expenditure.xls") had a column with imputed rents, which contributed just under five percent of total household expenditures. There was no documentation to explain how these figures had been estimated (only five values were used, so it is likely that the consultants assigned dwellings into particular categories with pre-set imputed rents) so the safest approach was to drop this component from the aggregates in both years.

The appropriate combination of poverty lines and poverty measures to use when comparing surveys where there may be some change in the consumption aggregates is the headcount index at the upper poverty line (Lanjouw and Lanjouw, 2001). The revised upper poverty line for 2012/13 ranged from SBD\$3,162 (Malaita) to SBD\$8,784 (Honiara) with an average value of SBD\$4,453. The revised values for each province are reported in Appendix III, Table 1 (final column). On average, removing imputed rent from the 2012/13 upper poverty line reduced the value by about 15 percent. A corresponding change also is made to the consumption aggregate for 2012/13 so there is no necessary reason for headcount poverty estimates for that year to alter, using the temporally comparable aggregate rather than the

comprehensive aggregate used in the cross-sectional profile. Notwithstanding that point, the headcount poverty rate for 2012/13 does rise slightly, from 13 percent to 14 percent, as a result of omitted imputed rents from the consumption aggregate and the poverty line (this suggests that including imputed rent has a slight equalizing effect).

In order to get from the revised upper poverty line for 2012/13 to a comparable poverty line for 2005/06, two steps were required. First, the food poverty line had to be backdated, and second, the food Engel curve estimated on a temporally comparable aggregate for 2005/06. The need for these two steps might be eliminated if the Solomon Islands had province-specific CPI deflators, since one could then use those to backdate the province-specific values in the last column of Appendix III, Table 1. But the CPI is only available for Honiara and if this was used as the deflator for all provinces it would lock in place the regional pattern of spatial price differences found in 2012/13. Moreover, the CPI puts more weight on foods that are consumed higher up the income distribution than the foods in the food poverty line basket, and there is no guarantee of a similar inflation rate for the two groups of foods.

Table 1: Poverty Lines for Temporal Comparisons (SBD\$ per adult equivalent per year)

Province	Food Poverty Line 2012/13	Inflation Factor (based on 13 foods)	Food Poverty Line (2005/06)	Upper Poverty Line (2005/06)	Revised Upper Poverty Line 2012/13
Choiseul	2713	1.82	1487	2002	3474
Western	3145	1.80	1745	2333	3701
Isabel	3753	2.16	1740	2446	4549
Central (+ R-B)	3178	1.68	1891	2471	3682
Guadalcanal	4137	2.24	1847	2496	5476
Malaita	2931	2.34	1254	1664	3162
Makira	3011	2.02	1489	1997	3944
Temotu	2851	1.93	1475	2126	3302
Honiara	5099	2.28	2234	3747	8784

In principle, the price of each item in the food poverty line could be backdated from 2012/13 to 2005/06, since diary surveys are used in both years and the available information on prices is from the transaction records of the diaries. However, the diary transactions in 2005/06 were classified using a 5-digit scheme that had only 220 food groups compared with the 380 9-digit COICOP codes used in 2012/13. When a concordance was attempted it was clear that many items in 2012/13 would have to be aggregated to match the broader detail in the earlier year, and so the provincial median prices for 2012/13 in Table 2 of Appendix I would not necessarily be comparable with provincial median prices calculated for 2005/06. The concordances were easier to establish for the more important foods and so the following procedure was used:

- The top 10 food items, in terms of their share of the food poverty line for each province in 2012/13, were identified.
- The pooled set of these ‘top 10’ foods gave a group of 13 foods: rice (two types), noodles, fish (two types), cooking banana, breadfruit, dry coconut, cabbage (two types), kumara, cassava, and taro. These 13 foods contributed 78-83 percent of the cost of the food poverty line in each province, with an overall mean of 80 percent. The only food that was ‘forced in’ to the group by being in the top 10 by the costs in most provinces, whilst being somewhat more minor elsewhere, was breadfruit, which ranked as only the 22nd most costly component of the food poverty line in Central (which includes Rennell-Bellona) while it ranged from the 4th to the 12th most costly component elsewhere.

- The food poverty line quantities in Table 1 of Appendix I were used to calculate the cost of this subset of the food poverty line in 2012/13. The same quantities were combined with median prices by province for the same 13 foods in 2005/06 and the cost of the subset food poverty line was calculated (details are in the *Stata* file *temporal_prices.do* which can be made available on request). The apparent inflation factor for each province, in terms of major foods in the food poverty line was calculated and is reported in Appendix III, Table 1 above. This inflation factor varied from 1.68 to 2.34 and on average is a little higher than the inflation factor of 1.78 calculated for the Food component of the Honiara CPI from December 2005 to March 2013 (roughly the centered period of the 2012/13 survey).
- The province-specific inflation factors were applied to the full food poverty line, to derive the 2005/06 cost of the 2012/13 food poverty line (shown in the 3rd column of Appendix III, Table 1 above).

The results of estimating the food Engel curve for 2005/06 are shown in Appendix III, Table 2, with Honiara as the omitted region. The specification of the Engel curve is the same as what is described in Appendix II, with the food poverty line used as part of the denominator of the per capita expenditure term coming from column 3 of Appendix III, Table 1 above.

Table 2: Food Engel Curve Regression for Calculating Non-Food Allowance, 2005/06

	Coefficient	Std Error	t-stat
Choiseul	0.1299	0.0150	(8.68)
Western	0.1347	0.0142	(9.51)
Isabel	0.1017	0.0144	(7.05)
Central (+ R-B)	0.1502	0.0125	(12.03)
Guadalcanal	0.1273	0.0120	(10.59)
Malaita	0.1395	0.0107	(13.01)
Makira	0.1324	0.0132	(10.06)
Temotu	0.0861	0.0145	(5.94)
# children (0-6)	0.0073	0.0028	(2.61)
# children (7-14)	-0.0078	0.0031	(2.53)
# adults	-0.0130	0.0020	(6.43)
$\ln(x/n \cdot z^F)$	-0.0757	0.0061	(12.37)
Intercept	0.6795	0.0177	(38.31)
<i>R</i> -squared (<i>p</i> -value)	0.183 ($p < 0.001$)		

The data manipulations that preceded the Engel curve estimation, along with the commands for deriving the non-food allowance and upper poverty from the estimated coefficients are recorded in a *Stata* file which can be made available on request: *temporal_poverty.do*. In comparison with the consumption aggregate provided in the file left by the consultants who worked on the 2005/06 survey (entitled “working copy of total household expenditure.xls”) several components were removed either because they do not belong in a consumption aggregate (see Deaton and Zaidi, 2002 for guidance) or in order to improve the comparability with the way that the 2012/13 consumption aggregate was constructed. The items removed to improve comparability were vehicle purchases and imputed rent. The items that were removed because they should not have been included in a household consumption aggregate in the first place were expenses on dwelling construction (these are an investment in capital goods) and the value of cash and food given to other households (this entails a double count,

since the food and cash transfers will be counted as part of the consumption of the recipients, so cannot be part of the consumption of the donors).

The upper poverty line that results from using the Engel curve coefficients and applying them to the revised 2005/06 food poverty line is reported in the 4th column of Appendix III, Table 1 above. The increase in the cost of the upper poverty line standard of living from 2005/06 to 2012/13 ranged from 1.5 to 2.3, and was highest for Honiara.

One final adjustment was made before making the temporal poverty comparisons. The poverty estimates for 2012/13 were based on a subset of the sampled households that appeared to have the most reliably measured consumption. Specifically, households were removed for having implausibly high or implausibly low values of calorie availability, and this trimming removed approximately the bottom 1.3 percent and top 1.2 percent of the sample. Even though the temporal poverty comparisons are restricted to using the headcount index, and so are not as sensitive to outliers as is the poverty severity index, to ensure better comparability a similar trimming of the sample was applied to the 2005/06 data. Since calorie data were not calculated, this trimming was in terms of real total consumption per adult equivalent, where the upper poverty line is used as the spatial deflator. After these various adjustments, the headcount rate in 2005/06 was calculated to be 22.4 percent and this was significantly higher than the headcount rate in 2012/13. Notwithstanding this difference, there are important variations in procedures between the two surveys that cannot be adjusted for, unlike the variations in consumption aggregates. These variations reduce the weight that can be placed on the inference of a fall in poverty, as noted in the main report.

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