Multidimensional Poverty in the Solomon Islands According to National Definitions

Testing the Consensual Approach Module of Questions

Briefing Paper to PSSC-SPC

February 2017

Viliami Konifelenisi Fifita, Kingdom of Tonga

Hector Najera and Dave Gordon, Townsend Centre for International Poverty Research, University of Bristol

Shailen Nandy, Cardiff University

Email contact datails:

NandyS1@cardiff.ac.uk

Dave.Gordon@bristol.ac.uk

Contents

Introduction

The aim of the document is to produce a valid, reliable and additive measure of poverty for the Solomon Islands (Gordon, 2006; Nandy and Pomati, 2015; Guio et al, 2016) using data collected in the 2016 demographic and health survey (DHS). Following the successful use of a similar module in the 2012 Tonga DHS, a short module of questions was included in the 2016 Solomon Islands DHS, to ascertain what the population considered to be the necessities of life <u>for all people</u> of the Solomon Islands. Items considered essential by a majority of respondents were defined as 'socially perceived necessities' (SPNs), which after testing for validity, reliability and additivity, were included in a deprivation index. Respondents who reported lacking these items because they could not afford them were considered deprived; deprivation scores were summed to form a scale, with separate scales developed using items for children and adults. This approach makes it is possible to operationalise a measure of multidimensional poverty for children and adults of all ages, according to national definitions, as required by the Sustainable Development Goals (SDGs), namely Target 1.2.2. SPC-PSSC has previously been provided with briefing notes on the theoretical background to the approach, and on the Consensual Approach.[1] The purpose of this paper is to demonstrate what could be done with the data for the Solomon Islands. It is not a comprehensive report.

Clarification of key terms in this paper:

- **Suitability**: relates to the concept of socially perceived needs and is the appropriateness of an item to reflect what is considered as essential in society.

- **Validity**: identifies how accurately/correctly each item is a measure of deprivation. A test of criterion validity is to ensure that each item has a statistically significant association with a set of variables which are known *a prior* to be correlated with poverty (e.g. educational Attainment, Socio-economic status).

- **Reliability**: measures the degree to which an index produces stable and consistent results, i.e. if we have different samples we should get the same results using the same set of indicators.

- **Additivity**: assesses the relationship between multiple deprivation and severity, i.e. whether people with one deprivation is better off than people with two and so forth.

---

[1] These can be obtained from Dr Nandy, of Cardiff University: NandyS1@cardiff.ac.uk.

The document is organised as follows. The first section looks at the full list of potential indicators to measure poverty. The validity analysis is presented in the second section. The third section presents the results of the reliability analysis. The final section concludes the document.

Items considered for the analysis

A total of 23 items were considered for the analysis: 5 Household-level items, 10 Children-related items, 8 Adult-related items (Table 1). There are six items with high (>50%) deprivation rates. It is likely these items measure/reflect relative a high standard of living and thus might inadequate/inappropriate for measuring poverty in the context of the Solomon Islands. We retain these items for the following analyses given it is unclear whether or not they are valid and reliable indicators of poverty. On the other hand, the items '*three meals a day*' and '*two meals a day*', with very low proportions lacking them, seem to be measures of more severe deprivation and thus could potentially have issues regarding reliability and validity; they are retained as it is important to have measures of acute poverty in the Solomon Islands.

Table 1. Items on socially perceived needs ordered by % can't afford

Item	Lack can't afford
Enough money to purchase goods (Household)	76
Outdoor leisure equipment (children)	68
Enough money to replace broken furniture (Household)	68
Having own means of transportation (Household)	64
Visit friends and family in hospital or other institution (adult)	54
Get with friends/family for a drink or meal (adult)	51
Have all prescribed medicines (Household)	48
Presents once a year (adult)	48
New properly fitting shoes (children)	48
Make regular savings for emergencies (Household)	48
One meal with meat, fish or veg daily (children)	45
Participate in school trips (children)	44
Two pairs of properly fitting shoes (adult)	43
Replace worn out clothes (adult)	37
Some new, not second hand clothes (children)	33
Suitable place to study or do homework (children)	33
Money to spend each week (adult)	31
Celebrations on special occasions (children)	30
School uniform and equipment (children)	21
Enough beds for every child (children)	17
Clothes for social or family occasions (adult)	14
Three meals a day (children)	9
Two meals a day (adult)	3

"Don't want" omitted from the calculations (Has + can't afford = 100%).

Suitability

The Consensual Approach identifies the needs of the population by considering the judgment of individuals as to what items are essential for an acceptable standard of living. This is an attempt to differentiate between what people "want or desire" and what they "need".

Guio et al. (2012) drawing upon previous work on socially perceived needs consider an item as necessary when at least 50% of the population regard it as essential (Mack and Lansley 1985, Gordon et al. 2006). One condition for this to be a successful criterion is that it should be relatively invariant across population groups – i.e. there should be a high degree of consensus. To assess adaptive preferences across group, the following tables (2 to 4.1) provide the percentage of people who regarded a given item as essential by different population groups.

All five tables show that all 23 items were considered as essential by the population in the Solomon Islands and that there is little degree of variability across population groups. In other words, there is widespread consensus in the population about the importance of these items to the lives of people in the Solomon Islands today.

Table 2: Socially perceived needs (Household Items) by Socio-demographic and geographical variables.

		Enough money to replace furniture: Essential	Enough money to purchase goods: Essential	Make regular saving for emergencies: Essential	Have all medicine prescribed: Essential	Having own means of transportation: Essential
				Essential: Yes		
Sex of household member	Male	90	78	97	96	93
	Female	90	78	97	95	93
Educational attainment thee groups	Without education	90	79	96	94	93
	Primary	90	79	96	96	94
	Secondary	91	77	97	96	93
	Tertiary +	92	81	98	97	93
	Other do not know	87	80	95	92	88
Age groups	Child (<18)	90	78	96	95	94
	Adult	90	78	97	95	93
	Old people (60 +)	89	81	96	96	93
Gender of the Household Head	Male	91	79	97	95	93
	Female	89	77	97	96	93
Educational attainment household head	Without education	90	79	97	95	94
	Primary	90	79	96	95	94
	Secondary	90	77	97	95	92
	Tertiary	91	80	100	98	94
	Other	89	83	97	94	90
Family Structure - Vertical and Horizontal	1 Generation	92	78	97	96	94
	2 Generations	90	79	96	95	95
	3+ Generations	89	77	97	96	94
	1 Generation & Extended	91	75	99	95	87
	2 Generations & Extended	91	77	97	95	92
	3+ Generations & Extended	91	80	98	96	90
Number of children in HH'	0	91	80	97	96	92
	1	88	78	96	95	92
	2	90	80	96	94	93
	3	90	76	96	96	93
	4	91	80	96	96	94
	5	92	83	98	97	95
	6 or more	90	73	97	96	94
Number of adults in HH	0	100	100	100	100	82
	1	91	77	95	95	92
	2	90	78	97	95	94
	3	89	78	95	95	93
	4	91	80	96	95	94
	5	91	77	99	96	95
	6 or more	91	78	99	98	89
Number of children with Orphan or Vulnerability Status	Not Orphan or Vulnerable Children in HH	90	79	97	95	94
	Orphan Vulnerable Children in HH	88	72	96	97	91
Province	Choiseul	96	79	96	99	96
	Western	92	74	98	99	94
	Isabel	91	88	90	97	96
	Central	86	79	97	97	96
	Rennell-Bell	81	55	83	83	98
	Guadalcanal	94	87	100	99	97
	Malaita	93	80	97	94	96
	Makira-Ulawa	80	73	94	88	86
	Temotu	80	55	89	82	87
	Honiara	87	74	97	97	85
Town	Town	87	75	97	97	86
	Provincial centre	93	75	98	93	91
	Rural	91	80	96	95	95

Table 3.1: Socially perceived needs (Children Items) by Socio-demographic and geographical variables

		New properly fitting shoes: Essential	Three meals a day: Essential	Some new, not second-hand clothes: Essential	Celebration on special occasions: Essential	One meal with meat, chicken, fish or vegetarian daily: Essential
				Essential: Yes		
Sex of household member	Male	92	99	93	93	95
	Female	92	99	93	93	96
Educational attainment thee groups	Without education	91	99	93	93	96
	Primary	92	99	94	93	95
	Secondary	93	99	93	93	95
	Tertiary +	96	100	91	92	97
	Other do not know	93	99	93	92	93
Age groups	Child (<18)	92	99	94	94	96
	Adult	93	99	93	93	95
	Old people (60 +)	89	99	92	92	93
Gender of the Household Head	Male	92	99	93	93	95
	Female	94	99	93	95	96
Educational attainment household head	Without education	91	99	93	94	95
	Primary	91	99	94	94	95
	Secondary	93	100	93	92	96
	Tertiary	96	100	92	92	97
	Other	95	100	90	94	97
Family Structure - Vertical and Horizontal	1 Generation	92	99	91	92	91
	2 Generations	92	99	94	93	95
	3+ Generations	89	100	93	93	95
	1 Generation & Extended	92	97	86	86	95
	2 Generations & Extended	95	100	94	95	96
	3+ Generations & Extended	92	99	93	92	96
Number of children in HH'	0	93	99	90	91	91
	1	93	99	91	91	93
	2	90	99	95	93	96
	3	92	99	94	95	96
	4	91	100	93	93	95
	5	92	99	95	92	97
	6 or more	95	99	93	94	96
Number of adults in HH	0	100	100	98	100	100
	1	93	99	92	93	94
	2	92	99	94	94	96
	3	91	100	93	93	95
	4	90	100	94	94	96
	5	95	98	93	95	94
	6 or more	95	100	90	91	96
Number of children with Orphan or Vulnerability Status	Not Orphan or Vulnerable Children in HH	92	99	93	93	96
	Orphan Vulnerable Children in HH	93	99	95	93	97
Province	Choiseul	90	99	94	94	96
	Western	96	99	95	98	89
	Isabel	85	99	92	94	96
	Central	87	100	94	91	99
	Rennell-Bell	89	100	87	100	100
	Guadalcanal	95	100	96	95	93
	Malaita	95	100	93	93	97
	Makira-Ulawa	85	97	93	89	97
	Temotu	79	99	91	87	98
	Honiara	94	100	89	90	97
Town	Town	94	100	89	90	95
	Provincial centre	96	99	87	95	95
	Rural	92	99	94	94	95

Table 3.2: Socially perceived needs (Children Items) by Socio-demographic and geographical variables

		All school uniform and equipment: Essential	Enough beds for every child: Essential	Participate in school trips and events: Essential	Outdoor leisure equipment: Essential	Suitable place to study or do homework: Essential
				Essential: Yes		
Sex of household member	Male	98	99	89	80	97
	Female	98	99	89	79	97
Educational attainment thee groups	Without education	98	98	88	80	95
	Primary	99	99	89	80	97
	Secondary	98	99	89	78	97
	Tertiary +	98	100	92	79	98
	Other do not know	95	100	87	76	94
Age groups	Child (<18)	99	99	90	80	97
	Adult	98	99	89	79	97
	Old people (60 +)	96	99	85	77	96
Gender of the Household Head	Male	98	99	88	79	97
	Female	99	99	91	83	98
Educational attainment household head	Without education	98	98	88	82	96
	Primary	98	99	88	80	97
	Secondary	98	99	89	77	96
	Tertiary	98	99	93	79	99
	Other	98	100	88	78	96
Family Structure - Vertical and Horizontal	1 Generation	94	97	85	73	94
	2 Generations	99	99	89	81	97
	3+ Generations	98	98	89	78	96
	1 Generation & Extended	97	100	87	76	95
	2 Generations & Extended	98	99	90	77	97
	3+ Generations & Extended	98	98	90	82	99
Number of children in HH'	0	95	98	83	75	95
	1	96	99	85	77	95
	2	97	99	89	78	95
	3	98	99	89	81	98
	4	99	98	91	79	98
	5	99	99	88	83	98
	6 or more	100	99	91	79	98
Number of adults in HH	0	100	100	100	82	100
	1	98	99	89	81	97
	2	98	99	89	81	96
	3	97	99	88	79	96
	4	98	99	89	78	97
	5	99	99	89	83	98
	6 or more	99	99	92	74	99
Number of children with Orphan or Vulnerability Status	Not Orphan or Vulnerable Children in HH	98	99	89	80	97
	Orphan Vulnerable Children in HH	98	99	92	79	96
Province	Choiseul	99	99	85	79	99
	Western	98	98	88	78	95
	Isabel	97	97	88	74	98
	Central	100	100	85	60	98
	Rennell-Bell	100	100	93	64	94
	Guadalcanal	99	100	92	83	99
	Malaita	98	99	89	85	96
	Makira-Ulawa	97	99	82	78	95
	Temotu	97	100	82	85	92
	Honiara	98	99	94	74	97
Town	Town	98	99	93	75	98
	Provincial centre	99	99	87	78	98
	Rural	98	99	88	80	97

Table 4: Socially perceived needs (Adult Items) by Socio-demographic and geographical variables

|		Two pairs of properly fitting shoes: Essential	Two meals a day: Essential	Small amount of money to spend each week: Essential	Clothes for social or family occasions: Essential
		Yes: Essential			
Sex of household member	Male	92	94	95	97
	Female	90	94	96	98
Educational attainment thee groups	Without education	88	95	95	97
	Primary	90	94	96	98
	Secondary	93	93	96	98
	Tertiary +	94	94	96	97
	Other do not know	89	96	94	97
Age groups	Child (<18)	94	93	96	98
	Adult	91	94	96	98
	Old people (60 +)	87	94	94	97
Gender of the Household Head	Male	91	94	96	98
	Female	91	92	95	97
Educational attainment household head	Without education	90	95	96	96
	Primary	90	94	96	98
	Secondary	91	93	95	98
	Tertiary	92	93	95	96
	Other	91	97	96	98
Family Structure - Vertical and Horizontal	1 Generation	91	95	98	98
	2 Generations	91	94	96	98
	3+ Generations	90	96	96	98
	1 Generation & Extended	92	90	95	98
	2 Generations & Extended	93	93	94	98
	3+ Generations & Extended	88	93	94	96
Number of children in HH'	0	92	93	97	98
	1	90	92	95	97
	2	90	94	95	98
	3	91	95	94	98
	4	91	96	96	97
	5	90	93	97	97
	6 or more	93	95	96	98
Number of adults in HH	0	100	96	100	100
	1	90	94	98	98
	2	91	94	96	98
	3	90	94	96	97
	4	91	95	95	97
	5	93	93	94	99
	6 or more	91	93	94	96
Number of children with Orphan or Vulnerability Status	Not Orphan or Vulnerable Children in HH	91	94	95	98
	Orphan Vulnerable Children in HH	91	94	96	97
Province	Choiseul	90	93	96	97
	Western	96	92	94	99
	Isabel	91	94	94	98
	Central	79	100	98	97
	Rennell-Bell	93	100	87	100
	Guadalcanal	93	98	99	99
	Malaita	92	90	99	98
	Makira-Ulawa	83	99	92	98
	Temotu	83	98	96	98
	Honiara	92	91	89	95
Town	Town	92	92	90	95
	Provincial centre	93	84	97	97
	Rural	90	95	97	98

Table 4.1: Socially perceived needs (Adult Items) by Socio-demographic and geographical variables

		Replace worn-out clothes: Essential	To get with friends/family for a drink/meal: Essential	Presents for friends or family once a year: Essential	Money to visit friends and family in hospital or other institutions: Essential
				Yes: Essential	
Sex of household member	Male	92	84	91	95
	Female	93	82	92	95
Educational attainment thee groups	Without education	91	84	89	94
	Primary	93	83	92	95
	Secondary	93	84	92	96
	Tertiary +	93	85	94	97
	Other do not know	87	82	89	93
Age groups	Child (<18)	94	85	92	95
	Adult	93	83	92	96
	Old people (60 +)	90	81	90	93
Gender of the Household Head	Male	93	83	92	95
	Female	93	84	92	95
Educational attainment household head	Without education	93	87	89	94
	Primary	93	83	92	95
	Secondary	93	82	92	95
	Tertiary	91	83	93	96
	Other	88	85	92	97
Family Structure - Vertical and Horizontal	1 Generation	92	86	92	96
	2 Generations	94	84	93	96
	3+ Generations	93	84	92	94
	1 Generation & Extended	90	83	90	96
	2 Generations & Extended	93	83	92	96
	3+ Generations & Extended	89	80	90	94
Number of children in HH'	0	92	84	91	95
	1	92	83	91	95
	2	93	86	93	95
	3	93	82	91	95
	4	93	82	92	96
	5	93	79	91	94
	6 or more	94	86	93	97
Number of adults in HH	0	100	100	100	100
	1	94	85	92	93
	2	93	83	92	95
	3	93	83	92	95
	4	93	84	91	94
	5	94	87	94	96
	6 or more	90	80	90	96
Number of children with Orphan or Vulnerability Status	Not Orphan or Vulnerable Children in HH	93	83	92	95
	Orphan Vulnerable Children in HH	91	85	92	96
Province	Choiseul	93	86	90	95
	Western	95	79	94	98
	Isabel	89	86	94	96
	Central	92	77	89	98
	Rennell-Bell	87	77	100	90
	Guadalcanal	96	90	95	98
	Malaita	93	89	91	94
	Makira-Ulawa	93	69	86	89
	Temotu	89	81	91	85
	Honiara	89	80	90	96
Town	Town	89	80	90	96
	Provincial centre	90	78	89	97
	Rural	94	84	92	95

Assessment of adaptive preferences

The following analysis examines whether 'poor' and 'non-poor' people have similar views with regard to what constitutes a decent standard of living. Relative Risks Ratios (RRR's) were computed using basic needs indicators as proxies of poverty (response variable) and what people think about whether a given item was essential or not as predictors (adjusted by rurality, education and gender of household head). The RRR's were zero in most cases, indicating that the poor and the non-poor were equally likely to consider the items as "essential" (Set of plots 1). Similar to previous findings (Gordon and Pantazis, 1997; Nandy and Pomati, 2015), no major differences in opinions as to what items are essential for a decent standard of living were found between the deprived of basic needs and the not deprived group.

Set of plots 1: Basic needs deprivation and endorsing an item as essential. Relative Risk Ratios
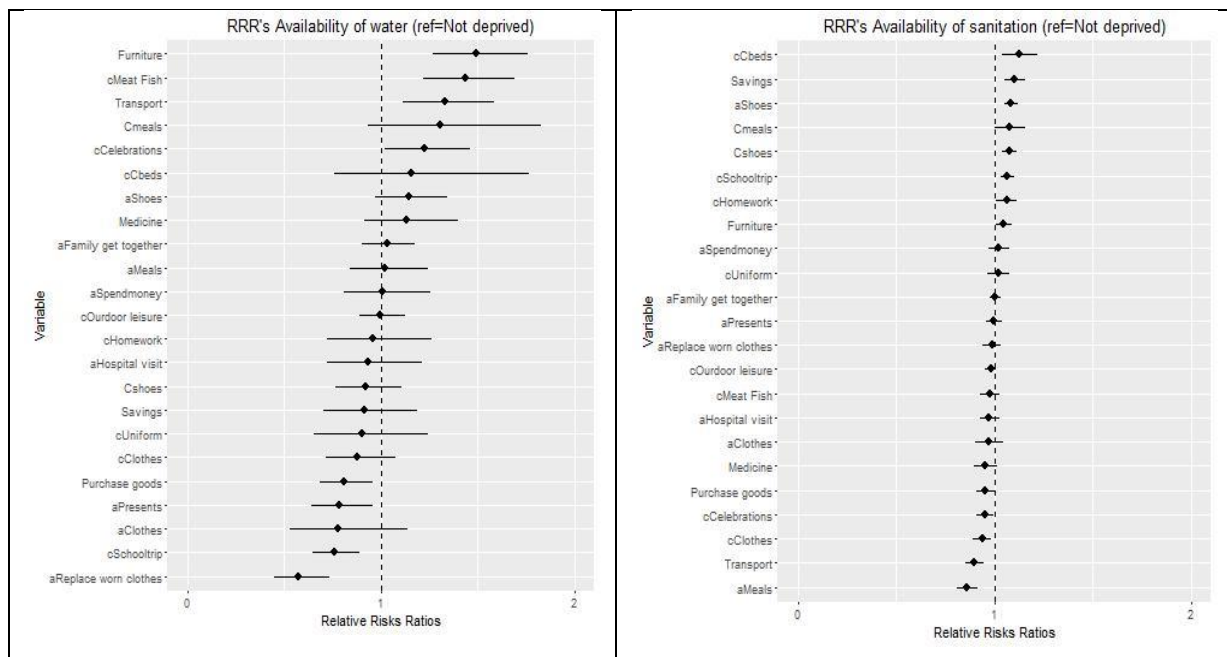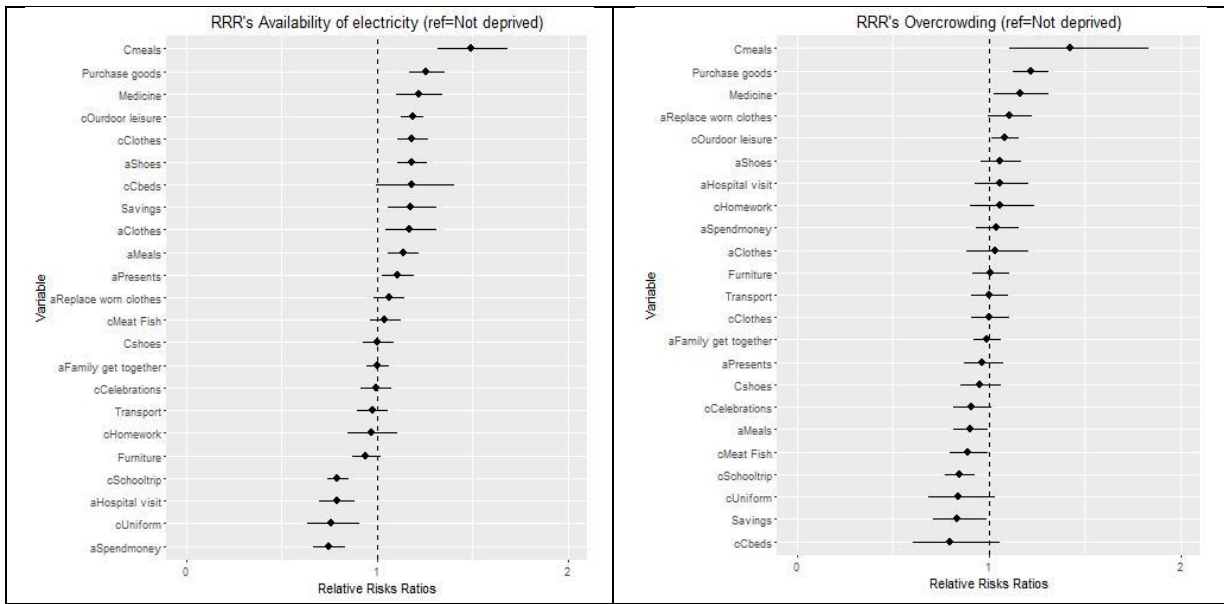
Validity analysis

Townsend's (1987) theory of relative deprivation states that poverty is the lack of resources overtime and material and social deprivation are its consequences (Gordon, 2006). A valid indicator of poverty must therefore show a significant association with proxy measures of resources or well-known predictors of poverty, such as health status, a capacity to pay bills, etc.

One way to assess the validity of individual items is by looking at the relationship between proxies of resources/poverty and deprivation. A Generalized Linear Model (GLM) was utilized for this purpose. Relative Risk Ratios (RRR's) were computed to facilitate the interpretation of the findings. The estimates adjust for rural/urban residence, the gender of the household head, and age of respondents. The hypothesis is that there will be a positive association between lacking a given item and the risk of being worse-off (i.e. unable to pay bills, having a low score on the household asset-based wealth index).

All five **household-level items** show that the risk of being worse off is higher for people lacking a given item relative to those who do not. For **children's items**, the association is almost always positive, however, there are some cases in which the relative risk ratios are zero, suggesting potential problems with item validity. However, given that the proxies available for this exercise are not ideal (e.g. 'keeping up with bills' may not be culturally appropriate for the context of the Solomon Islands), the potential problematic indicators should be those whose RRR's are negative or zero in both models: according to these criteria then the following children's items
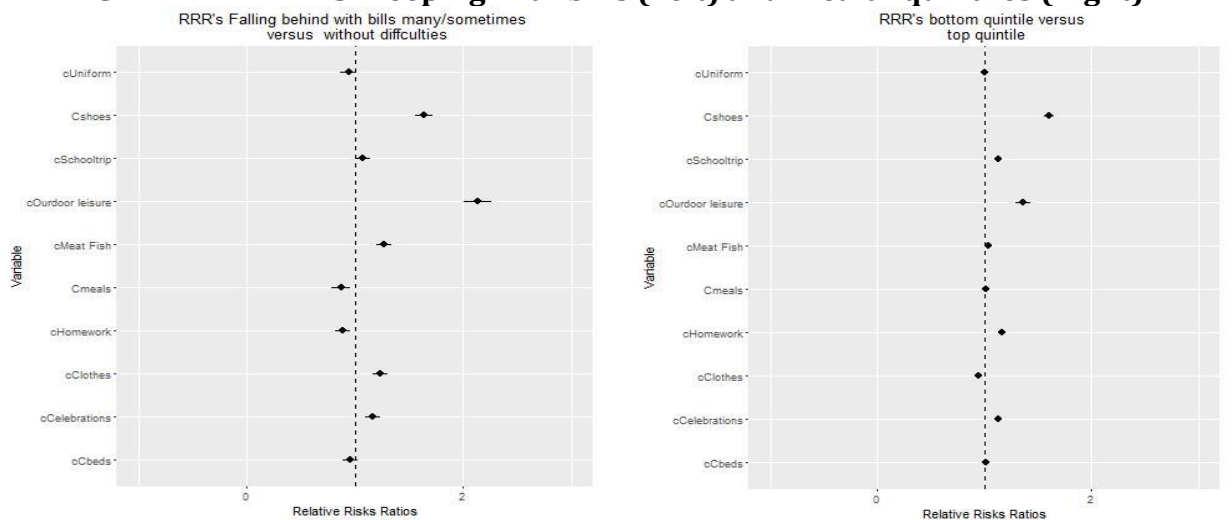
seem to have validity problems - *Uniforms, beds* and *meals*. These items were kept to assess whether they affect the reliability of the overall measure.

All **adult-related items** except two (*Meals* and *Clothes*) show a positive association between deprivation and the risk of being worse off. As in the previous cases, both were kept for the reliability analysis.
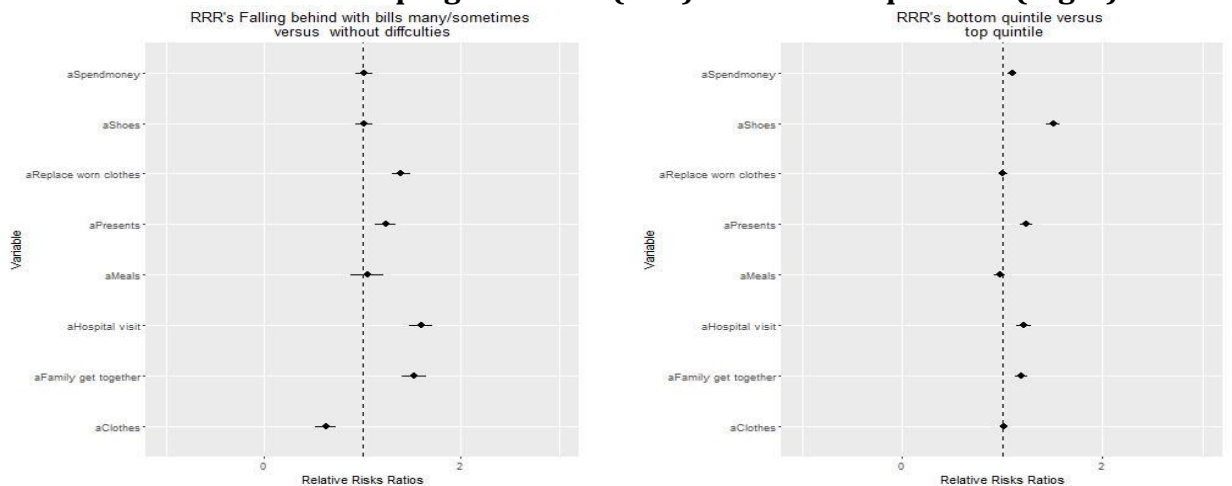
HOUSEOLD ITEMS: Keeping with bills (Left) and Wealth quintiles (Right)

RRR's Falling behind with bills many/some versus without diffculties

RRR's bottom quintile versus top quintile
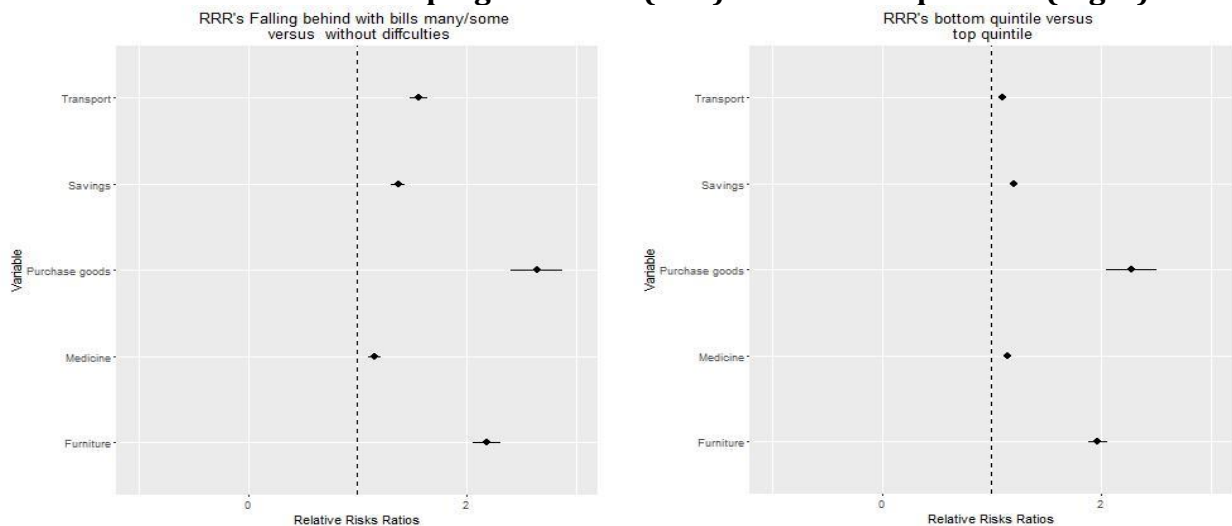
CHILDREN ITEMS: Keeping with bills (Left) and Wealth quintiles (Right)

RRR's Falling behind with bills many/sometimes versus without diffculties

RRR's bottom quintile versus top quintile

ADULT ITEMS: Keeping with bills (Left) and Wealth quintiles (Right)

RRR's Falling behind with bills many/sometimes versus without diffculties

RRR's bottom quintile versus top quintile

Reliability

Reliability looks at the internal consistency of a scale or index, i.e. the way in which indicators are related to one another. <u>This property is important as it provides some guarantee that poverty is being measured consistently across different samples given a set of indicators</u>. Cronbach's alpha (Cronbach 1951) was computed to assess reliability for the three sub-sets of indicators (Table 5). In all instances, alpha was higher than 0.7, which is considered sufficiently high in social sciences (Nunnally, 1981). However, two items - *two meals a day* (adult) and *three meals a day* (children) - seem to add little, and may even decrease, the reliability of the overall scales. Further testing can be done to see if these items should be retained.

Table 5. Reliability analysis

Household-level Items	Cronbach's Alpha if Item Deleted
Enough money to replace broken furniture (Household)	.624
Enough money to purchase goods (Household)	.654
Make regular savings for emergencies (Household)	.667
Have all prescribed medicines (Household)	.667
Having own means of transportation (Household)	.705
Total Alpha	**.712**

Children-related Items	Cronbach's Alpha if Item Deleted
New properly fitting shoes (children)	.766
Three meals a day (children)	.792
Some new, not second hand clothes (children)	.775
Celebrations on special occasions (children)	.773
One meal with meat, fish or veg daily (children)	.776
School uniform and equipment (children)	.771
Enough beds for every child (children)	.775
Participate in school trips (children)	.768
Outdoor leisure equipment (children)	.775
Suitable place to study or do homework (children)	.767
Total Alpha	**.792**

Adult-related Items	Cronbach's Alpha if Item Deleted
Two pairs of properly fitting shoes (adult)	.766
Two meals a day (adult)	.799
Money to spend each week (adult)	.758
Clothes for social or family occasions (adult)	.767
Replace worn out clothes (adult)	.755
Get with friends/family for a drink or meal (adult)	.748
Presents once a year (adult)	.741
Visit friends and family in hospital or other institution (adult)	.738
Total Alpha	**.784**

While Alpha is the most widely known reliability statistic, it does have some drawbacks (Revelle and Zinbarg, 2009). It is sensitive to multidimensionality, the number of items in the scale, and sample size. As an alternative, we can use Item Response Theory (IRT), a modern psychometric method which helps to assess further the properties of a scale (Harris, 1989). A two-parameter IRT model provides information on: (i) how well a given indicator helps to discriminate between the deprived and the not deprived (**discrimination**) and (ii) what level of latent severity of deprivation is associated with each indicator (**severity**). Both of these are useful measure when assessing the reliability of items in an index. Low discrimination and very high or low severity would suggest measurement problems of the indicators.

Table 6 shows discrimination and severity parameters for the items in the Solomon Islands DHS. Severity is measured in standard deviations since it is assumed that latent deprivation has a mean of zero and that people will be more – i.e. positive standard deviations - or less –i.e. negative - deprived from the mean. These estimates suggest that *two meals a day* might be a too severe measure of deprivation (i.e. standard deviation > 3). This could be corrected using a less severe threshold (i.e. three meals a day). The first five items have already been shown to be suitable from the perspective of socially perceived needs; however the IRT model suggests differently. Items with negative severity values are measures of relatively high standard of living.

All the indicators have good discrimination values (>0.4 when transformed to correlation coefficients) (Guio et al, 2012). It would be desirable to have higher values for *transport*, *three meals a day* and *two meals a day*.

Table 6 Two-parameter IRT Model (Ordered by severity)

Item	Severity	Discrimination
PURCHASEGO	-0.9	1.3
TRANSPORT	-0.8	0.5
FURNITURE	-0.7	0.9
OUTDOORLEI	-0.6	1.1
HOSPITALVI	-0.1	1.4
FAMILYGETO	0	1.6
MEDICINE	0.1	0.9
PRESENTS	0.1	1.5
CSHOES	0.1	1.2
SAVINGS	0.1	0.9
CMEATFISHV	0.2	0.8
CSCHOOLTRI	0.2	1.1
ADULTSHOE	0.2	1.2
REPLACEWOR	0.4	1.2
CCLOTHES	0.6	1.1
CHOMEWORK	0.6	1
SPENDMONEY	0.7	1
CCELEBRATI	0.8	1
CUNIFORM	1.2	1
CLOTHES	1.4	1.2
CBEDS	1.5	0.8
CMEALS	2.7	0.6
ADULTMEAL	3.7	0.6

Additivity

Additivity looks at the relationship between multiple deprivation and severity of poverty. Ideally, a person with a deprivation score of 2 will be worse off than someone with a deprivation score of 1. One way to assess additivity is by looking at the association between a proxy of poverty and deprivation using interaction plots (Gordon and Nandy 2012). This can be done using two-way ANOVA models. Although it is far from ideal (Montgomery, Gragnolati et al. 2000, Falkingham and Namazie 2002), the wealth index is the only continuous proxy of resources in the DHS data set[2].

The additivity test was conducted for all pairs of items. The plots below show those pairs of items for which there may be issue. Two items - *replace worn clothes* and *adult shoes* – appear to have additivity problems, since some people deprived of these two items can be 'better off' than those who might only lack one – i.e. have a higher asset index score. Similarly, *presents* and *clothes*

---

[2] Which is why this module of questions will be more effective is run in national household income and expenditure surveys (HIES).

show additivity problems. Given these items did not show reliability of validity problems, they were retained when producing the final deprivation index.

Final list of items and prevalence of poverty

Table 7 summarizes the results of the different tests. The asterisks indicate that an item failed on a particular test. Drawing upon Guio et al (2012), an item is only regarded as problematic when it fails more than one test. Given that this study lacked an adequate measure of resources, it is better to carefully interpret these results. *Two-meals a day* for adults clearly is an item which could raise concern. This appears to be a measure of extreme poverty and is perhaps too severe for use in a country like the Solomon Islands. Dropping this indicator would not affect the validity and reliability of the index, if anything it will improve. However, it would mean a loss of information with regard extreme poverty.

There were five items with low severity problems, and these seem to be measures of high standard of living. However, they are good discriminators of poverty and were acknowledged as "essential" (different from desirable) by the population. Careful consideration needs to be given to these items as their inclusion might affect estimates of the prevalence rate of poverty. However, this could be solved by selecting an optimal threshold (Gordon and Nandy, 2012).

Table 7. Summary of the results (* = failed the test)

Item	Suitability	Validity	Reliability (alpha)	Discrimination	Severity	Additivity
Enough money to purchase goods (Household)					*	
Enough money to replace broken furniture (Household)					*	
Having own means of transportation (Household)					*	
Have all prescribed medicines (Household)						
Make regular savings for emergencies (Household)						
Visit friends and family in hospital or other institution (adult)					*	
Get with friends/family for a drink or meal (adult)						
Presents once a year (adult)						*
Two pairs of properly fitting shoes (adult)						
Replace worn out clothes (adult)		*				*
Money to spend each week (adult)						
Two meals a day (adult)		*	*		*	
Clothes for social or family occasions (adult)						
New properly fitting shoes (children)						
One meal with meat, fish or veg daily (children)						
Participate in school trips (children)						*
Some new, not second hand clothes (children)						
Suitable place to study or do homework (children)						
Outdoor leisure equipment (children)					*	
Celebrations on special occasions (children)						
School uniform and equipment (children)		*				
Enough beds for every child (children)		*				
Three meals a day (children)		*				

Deprivation and Poverty Line Analysis

Figure 1 plots a cumulative percentage distribution of the population in the Solomon Islands by the number of deprivations (deprivation index score) they experience. Deprivation scores tend to show a steady increase and then a consistent decrease as the number of deprivation becomes higher. The Solomon Islands show a similar pattern but it is a bit "lumpy" when the score is between 0 and 2[3]. One in ten have no deprivation and then around 70% of the population lacks between 1 and 7 items. From 8+ deprivations there is a sharp decrease in multiple deprivation.

---

[3] The fall and rise in the cumulative distribution could be due to population socio-economic inequalities in which the group with zero deprivations has very special circumstances that protect them from poverty.

Figure 1. Cumulative percentage distribution by the number of deprivations. SPN index (All items)
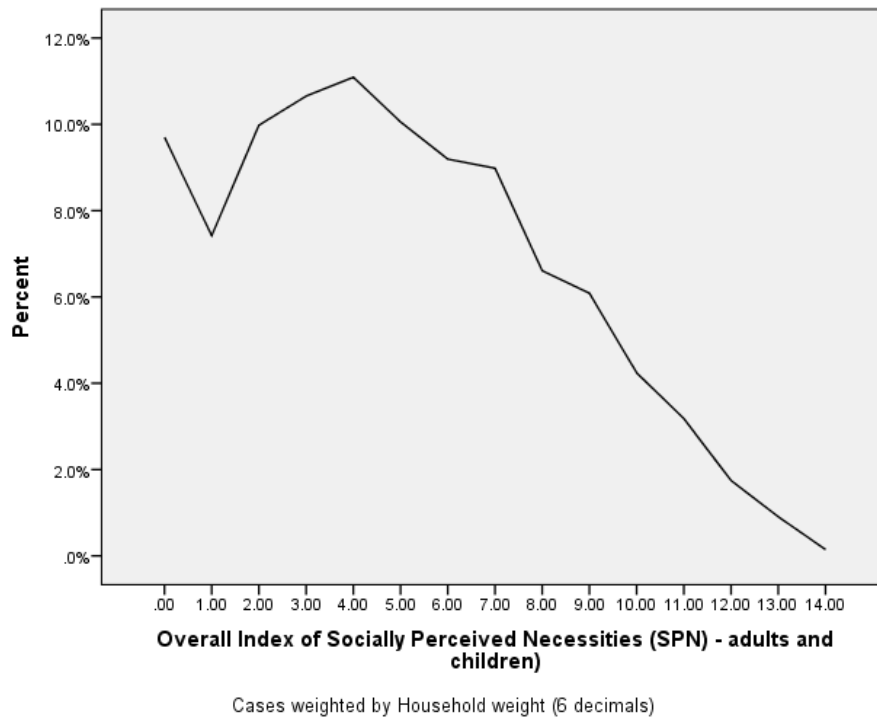

Cases weighted by Household weight (6 decimals)

Table 8 below show the mean deprivation score for different socio-economic groups. The 25th and 75th percentiles suggest that mean deprivation varies considerable within groups. Education attainment and household's head level of education are excellent predictors of mean deprivation. The size of the household seems to be another potential good explanatory variable of deprivation[4]. Orphan children seem to be slightly more severely deprived than non-orphan. Mean deprivation varies a lot across regions and towns and inhabitants of rural areas seem to be more severely deprived than those living in towns.

---

[4] Household with children are more likely to have higher deprivation scores due to the fact that more variables are taken into account in these cases.

Table 8. Mean deprivation score. (All Items) by Socio-demographic variables

		Overall Index of Socially Perceived Necessities (SPN) - adults and children)		
		Mean	Percentile 25	Percentile 75
Sex of household member	Male	5	2	7
	Female	5	2	7
Educational attainment thee groups	Without education	6	4	9
	Primary	5	3	7
	Secondary	4	2	6
	Tertiary +	3	0	4
	Other do not know	4	2	7
Age groups	Child (<18)	5	2	7
	Adult	5	2	7
	Old people (60 +)	5	3	8
Gender of the Household Head	Male	5	2	7
	Female	5	2	8
Educational attainment household head	Without education	7	4	9
	Primary	5	3	8
	Secondary	4	2	6
	Tertiary	3	1	5
	Other	5	2	7
Family Structure - Vertical and Horizontal	1 Generation	4	2	7
	2 Generations	5	3	7
	3+ Generations	5	3	8
	1 Generation & Extended	5	2	7
	2 Generations & Extended	4	2	7
	3+ Generations & Extended	4	2	7
Number of children in HH'	0	4	2	7
	1	4	2	7
	2	5	2	7
	3	5	2	7
	4	5	2	7
	5	5	3	7
	6 or more	5	3	8
Number of adults in HH	0	4	0	8
	1	5	3	7
	2	5	3	7
	3	5	2	7
	4	5	2	7
	5	5	2	8
	6 or more	4	1	6
Number of children with Orphan or Vulnerability Status	Not Orphan or Vulnerable Children in HH	5	2	7
	Orphan Vulnerable Children in HH	5	3	8
Province	Choiseul	4	2	6
	Western	4	1	6
	Isabel	5	3	7
	Central	6	4	8
	Rennell-Bell	5	1	7
	Guadalcanal	5	2	8
	Malaita	6	3	8
	Makira-Ulawa	6	4	8
	Temotu	5	3	8
	Honiara	3	0	6
Town	Town	4	1	6
	Provincial centre	4	2	6
	Rural	5	3	8

The literature on overlap between deprivation of basic necessities (water, sanitation, electricity, etc.) and socially perceived needs is scarce (Nandy and Pomati, 2015). However, a good SPN index should show high correlation with basic necessities given that Townsend's theory suggests that deprivation is a consequence of low resources. The four plots below show the relationship between mean deprivation and deprivation of basic needs such as drinking water, sanitation, electricity and overcrowding. All four plots clearly show that being deprived of basic needs is consistently associated with higher mean deprivation (SNP) scores.
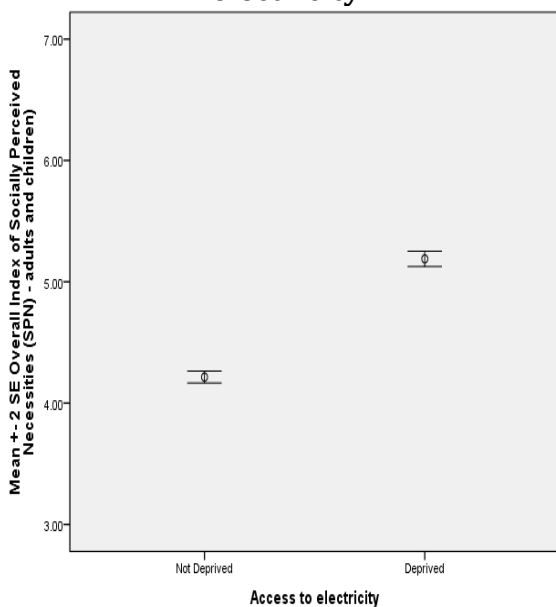
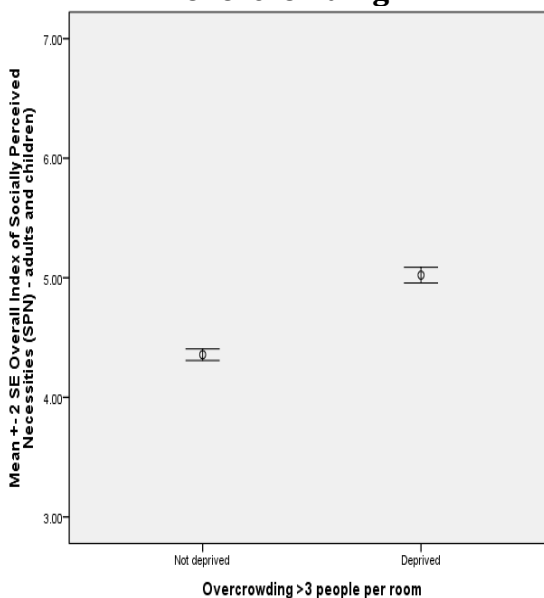## Overall SPN deprivation and access to drinking water
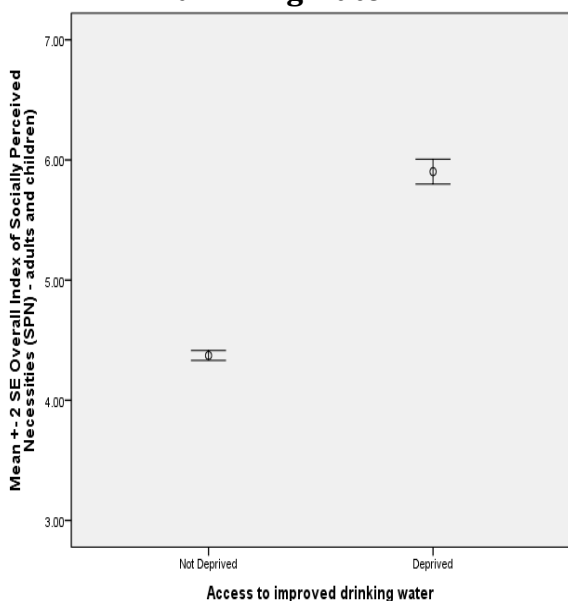
Overall SPN deprivation and access to sanitation
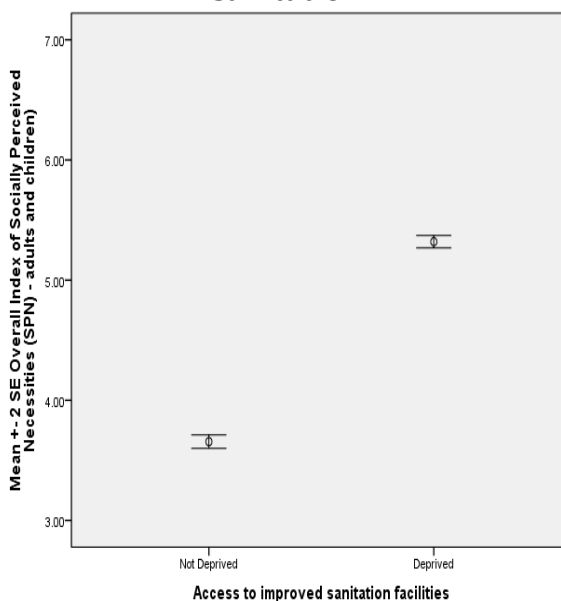
Overall SPN deprivation and access to electricity


Overall SPN deprivation and overcrowding

One of the predictions of Townsend's theory of relative deprivation is a negative relationship between resources and deprivation (Townsend, 1987). Townsend suggests that there is a breakpoint on the distribution of resources from which deprivation raises substantially. This inflection point, or elbow, correspondingly validates and sets the poverty line (Gordon, 2006).

The plots in figure 2 (below) shows the relationship between the wealth index and the deprivation index score (sum of deprivations using all 23 items). Although the wealth index is not an adequate measure of resources, the plot clearly shows the kind of association predicted

by Townsend. According to this plot, the poverty line should lie around the 4 or 5 deprivations. The poverty rate is equal to 52% with (5+) and 62% with (4+).

Figure 2

Cases weighted by Household weight (6 decimals)
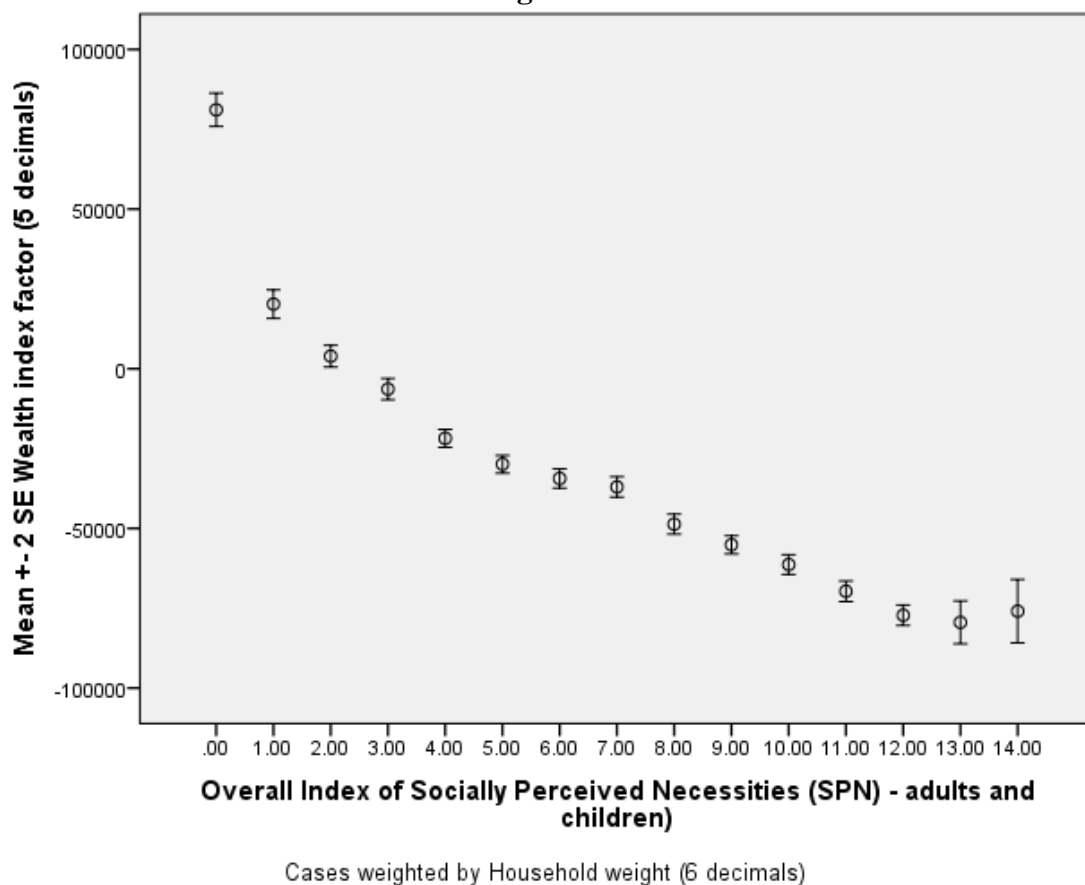
The following two plots (3, 4) show the relationship between the ability to keep up with bills, the wealth index quintiles and the deprivation score. Both plots show a clear association where, as expected, the groups with low level of resources (measured by the two proxies) are much more likely to have higher deprivation scores. People who do not reporting having to struggle to pay bills and with a higher score on the wealth index, also show significantly lower scores on the deprivation index.

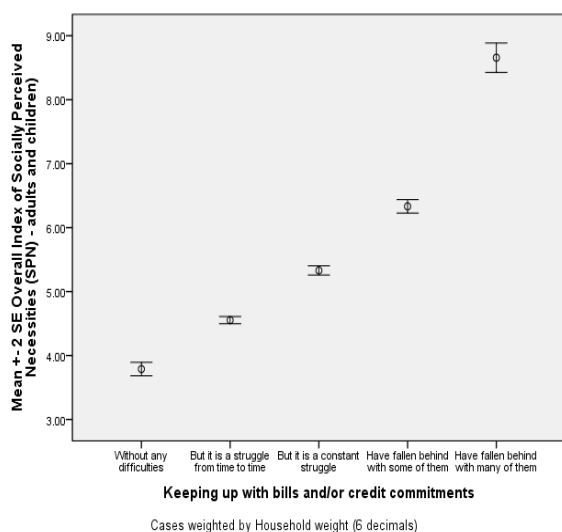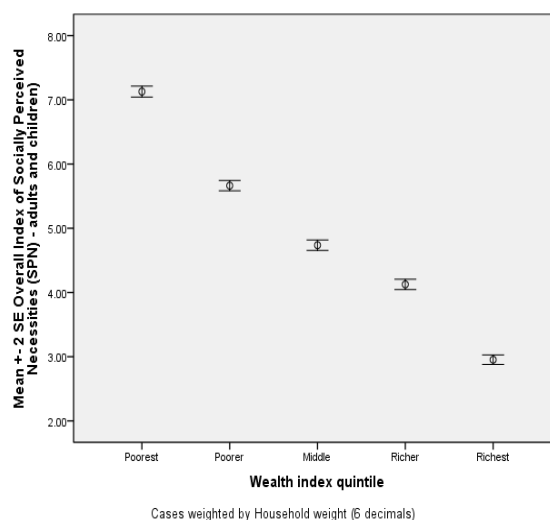**Figure 3. Mean deprivation score by ability of keeping up with bills**

Cases weighted by Household weight (6 decimals)

Figure 4. Mean deprivation score by wealth index quintile

Cases weighted by Household weight (6 decimals)

Conclusions

This briefing note has demonstrated that a valid and reliable indicator of poverty '*in all its dimensions*', based on *national definitions*, and reflecting the different and distinct needs of *children and adults of all ages*, as required by SGD target 1.2, can be developed using existing survey platforms (like the DHS) in the Pacific region. The data for the analyses presented here were collected in the Solomon Islands DHS; a similar module of questions was included in the most recent HIES for Tonga. The advantage of the HIES is that when data on household resources (income/expenditure) are used *in conjunction with* data on standard of living (i.e. deprivation of SPNs) this produces a much more reliable and meaningful socially-realistic measure of poverty. In this way, data would be produced to report on progress for both indicators of SDG target 1.2, as well as for SDG target 1.

The findings of this paper shows that the Consensual Approach leads to a consistent and accurate measure of poverty for the Solomon Islands, and that poverty affects around 50% of the population. This is a higher estimate than others, based on monetary measures.

The analysis suggests that while some adjustments to the questionnaire may be required to improve the overall validity and reliability of the measure, it nevertheless has the potential to be a reference for other countries in the region. PSSC-SPC and national statistical offices would need to discuss the choice of thresholds for some indicators which might be too severe and/or

the inclusion of additional questions to capture the most severe forms of deprivation. There is also a need to consider the adequacy of using measures of high standard of living (*Purchase goods*, *Transport, furniture, Outdoor leisure, Hospital visits*) even if the population of the Solomon Islands (and Tonga) consider these items to be "essential".

References

- Cronbach, L. (1951). "Coefficient alpha and the internal structure of tests." Psychometrika **16**: 297-334.

- Falkingham, J. and C. Namazie (2002). Measuring health and poverty: a review of approaches to identifying the poor. London, DFID Health Systems Resource Centre.

- Gordon, D., & Pantazis, C. (1997b). Measuring poverty: Breadline Britain in the 1990s. In D. Gordon & C. Pantazis (Eds.), Breadline Britain in the 1990s. Aldershot: Ashgate.

- Gordon, D. (2006), The Concept and measurement of poverty, in C. Pantazis; D. Gordon & R. Levitas, ed., 'Poverty and Social Exclusion in Britain: The Milenium Survey', Bristol Policy Press, pp. 29-69.

- Gordon, D. & Nandy, S. (2012), 'Measuring Child Poverty and Deprivation: Measurement, concepts, policy and action' in Minujin, A and Nandy, S *Global child poverty and well-being*, The Policy Press. University of Bristol, pp. 57-102.

- Guio, A.; Gordon, D. & Marlier, E. (2012), 'MEASURING MATERIAL DEPRIVATION IN THE EU: Indicators for the whole population and child-specific indicators', Technical report, EUROSTAT.

- Harris, D. (1989), 'Comparison of 1-, 2-, and 3-Parameter IRT Models', Educational Measurement: Issues and Practice 8(1), 35--41.

- Pantazis (Eds.), Breadline Britain in the 1990s. Aldershot: Ashgate.Gordon, D. and S. Nandy (2012). Measuring child poverty and deprivation. Global Child Poverty and Well-Being: Measurement, Concepts, Policy and Action. A. Minujin and S. Nandy. Bristol, The Policy Press**:** 57-101.

- Mack, J. and S. Lansley (1985). Poor Britain. London, Allen and Unwin.

- Montgomery, M., M. Gragnolati, K. Burke and E. Paredes (2000). "Measuring living standards with proxy variables." Demography **37**(2): 155-174.

- Nandy, S. & Pomati, M. (2015), 'Applying the Consensual Method of Estimating Poverty in a Low Income African Setting', Social Indicators Research 124(3), 693--726.

- Nunnally, J. (1981). Psychometric testing. New York, McGraw-Hill Publishing Company Ltd.

- Pantazis, C., D. Gordon and R. Levitas (2006). Poverty and social exclusion in Britain: the Millennium Survey. Bristol, The Policy Press.

- Revelle, W. & Zinbarg, R. (2009), 'Coefficients Alpha, Beta, Omega, and the glb: Comments on Sijtsma', Psychometrika 74(1), 145-154.

- Townsend, P. (1987). "Deprivation." Journal of Social Policy **16**(2): 125-146.