

Monetary-based poverty measurement: Recommendations for the Pacific

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Background



- This presentation an expanded version of those given at the UNITAR SDG trainings in Vanuatu (September 18, 2019) and Fiji (September 24, 2019).
- The content draws from:
 - Decades of research and technical assistance by the World Bank to countries across the world, as well as new work that is currently ongoing.
 - Vast survey methodology literature.
 - Results from consumption experiment conducted in RMI and presented at May 2019 PSMB meeting in Auckland.
- The objective of this presentation is to explain the rationale for monetary poverty measurement (SDG 1.1.1 and SDG 1.2.1) and lay out a draft set of recommendations that adapt international best practices to the unique Pacific context.

Introduction to monetary poverty

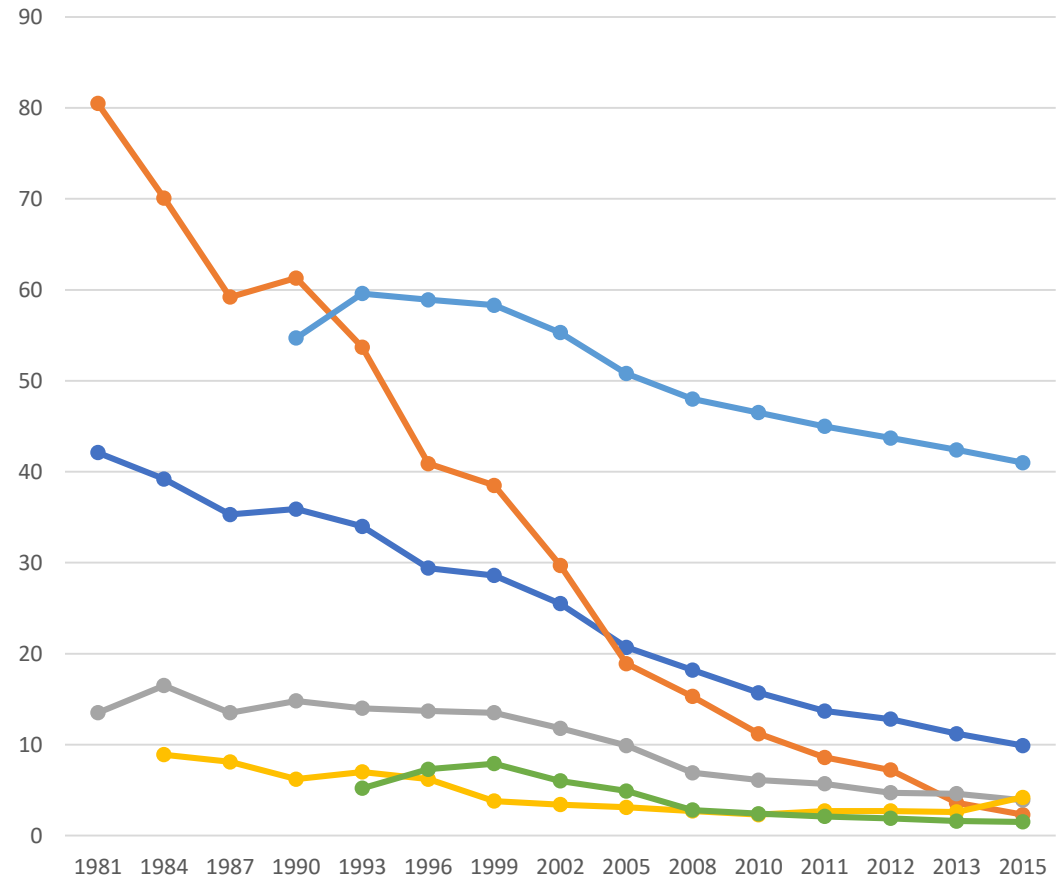


- **Poverty** is an incredibly complex and culturally specific concept which is hard to quantify for a single country much less develop a measure which permits comparisons across disparate contexts across the world.
- Comparable measures are needed though to **monitor global progress** in poverty reduction and for development partners and governments to **target interventions**.
- One measure that is used to inform these decisions is **monetary poverty**, which can be based on either income or consumption.

Global poverty monitoring

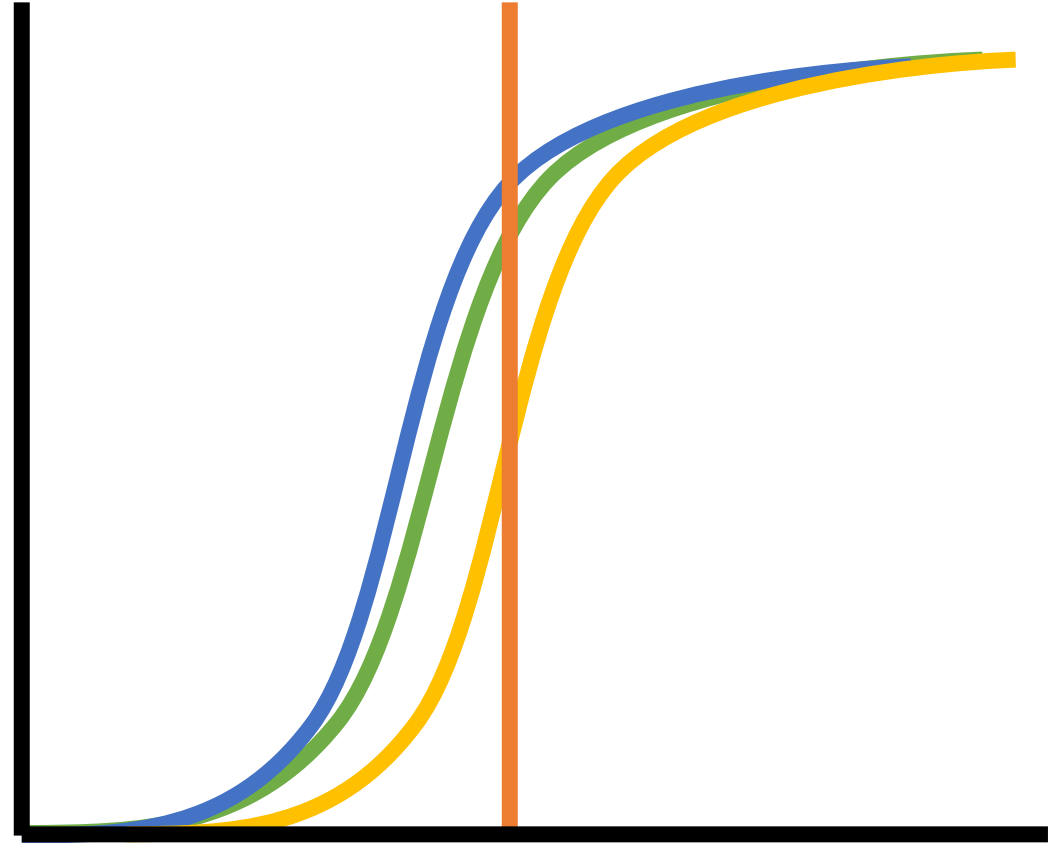
The World Bank monitors global poverty reduction through the international USD 1.90 per person per day poverty line...

- 1 World
- 2 East Asia & Pacific
- 3 Latin America & Caribbean
- 4 Middle East & North Africa
- 5 Sub-Saharan Africa
- 6 Europe & Central Asia



National poverty monitoring

... while countries usually rely on a combination of monetary poverty measured with a national poverty line, as well as qualitative or non-monetary measures (not covered here).



Why three different measures?



- The **international poverty line** allows countries to understand their relative level of poverty compared to the rest of the world.

SDG 1.1.1. Proportion of population below the international poverty line, by sex, age, employment status and geographical location.

- The **national monetary poverty line** is a line that is appropriate to one specific country and allows policymakers in that country to understand patterns of poverty within the country and to measure progress over time.

SDG 1.2.1. Proportion of population living below the national poverty line, by sex and age.

- The **non-monetary poverty measure** is also used to understand relative deprivation within a country, but using a culturally specific definition that covers aspects of poverty that are not directly related to household finances.

SDG 1.2.2. Proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions.

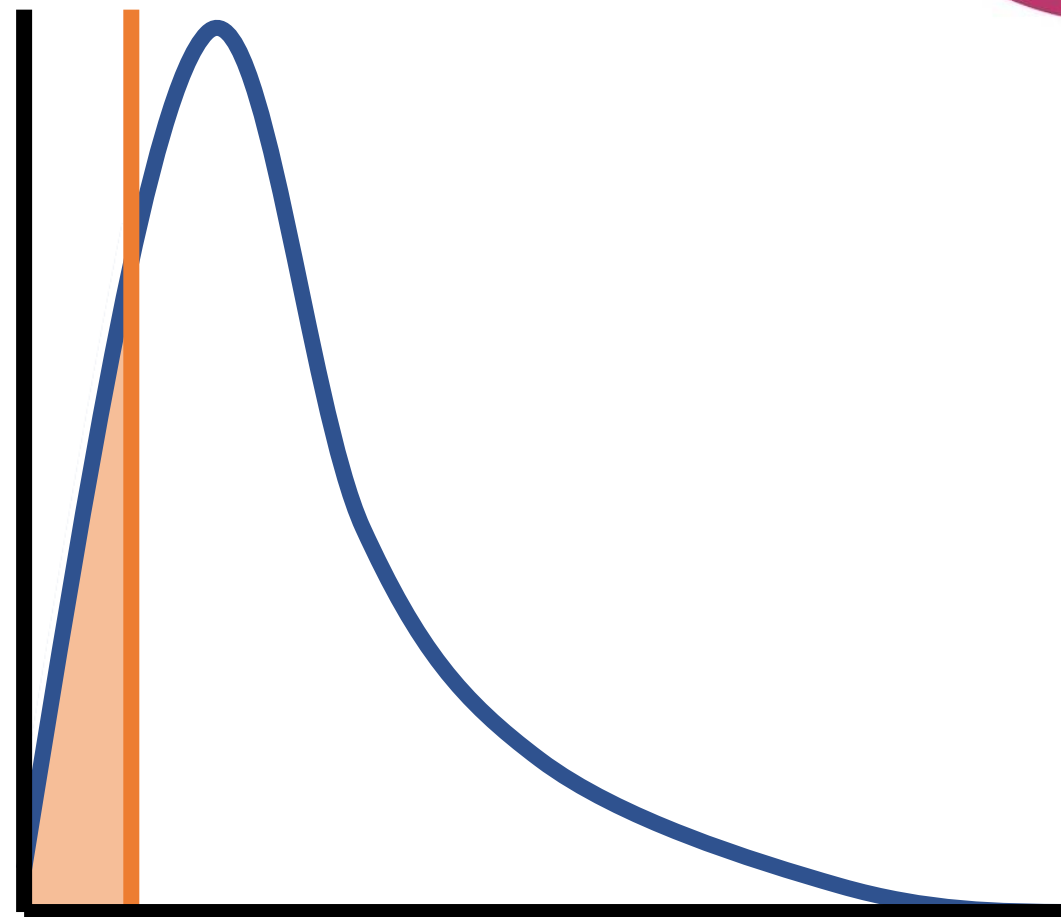
How is monetary poverty measured?

In order to measure poverty, an analyst requires two types of data:

1. A consumption aggregate*
2. A poverty line

Each household has its own **consumption aggregate**. When these values are graphed, the result is the **consumption distribution**.

The poverty line crosses the consumption distribution and **all those living below the poverty line are considered poor**.



*Some countries use income instead of consumption (Fiji). In that case the graph would represent the income aggregate but the calculation remains the same.



Food consumption

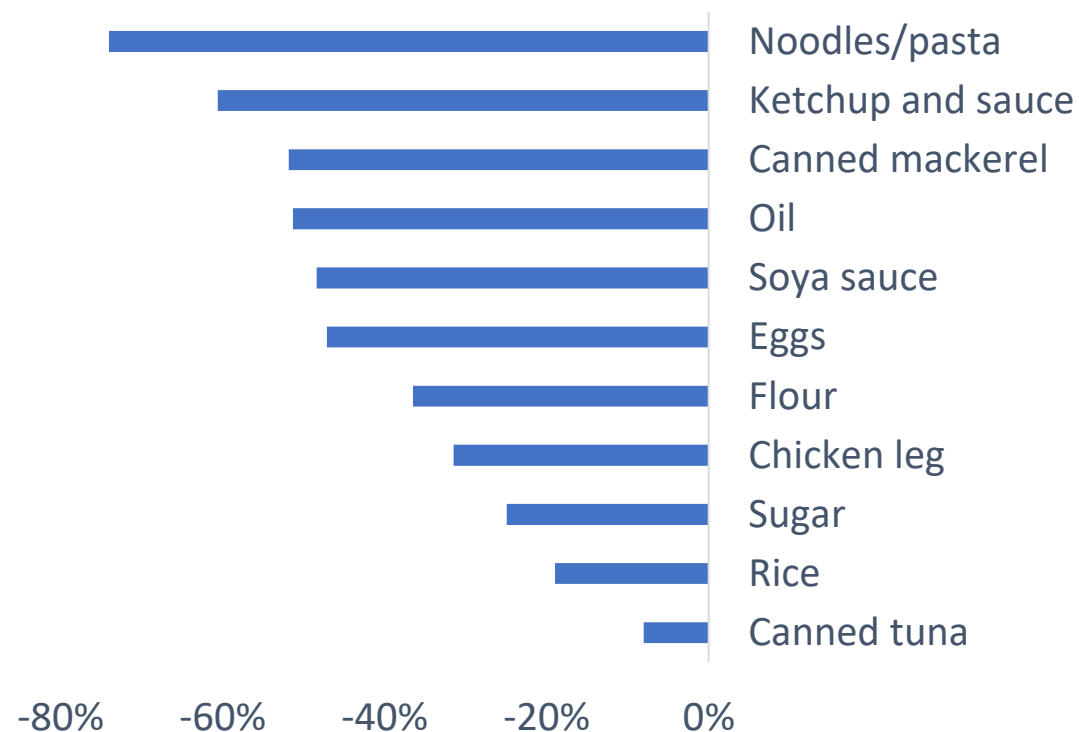
Purchased, produced, received, eaten away from home

How is a consumption aggregate constructed?

Step 1. Add up all **food spending** in the household, including:

- Purchased food (adjusting for stocks if using a diary).
- Market price equivalent for home produced food.
- Market price equivalent for in-kind food payments, gifts of food, and rations.
- Food purchased and consumed outside of the household (individual level).

Caution: Universal net de-stocking indicates data quality problems



Source: RMI consumption experiment

Purchased food

- Based on the recommendations of the May 2018 PSMB, food consumption should be collected with a 7-day recall methodology.
- Example from Kiribati 2019/2020 HIES:

5. FOOD RECALL

[1] GRAIN, CEREALS AND RELATED

H1501a. In the last 7 days, did any member of this household consume any of the following in the household?

- | | | |
|----|---|---|
| 01 | <input type="checkbox"/> / <input type="checkbox"/> | Rice |
| 02 | <input type="checkbox"/> / <input type="checkbox"/> | Flour, wheat, maize |
| 03 | <input type="checkbox"/> / <input type="checkbox"/> | Flour (in-awai, etc) |
| 04 | <input type="checkbox"/> / <input type="checkbox"/> | Bread (sliced, loaf, square, rolls, French) |
| 05 | <input type="checkbox"/> / <input type="checkbox"/> | Local bread |
| 06 | <input type="checkbox"/> / <input type="checkbox"/> | Biscuits cracker (cabin...) |
| 07 | <input type="checkbox"/> / <input type="checkbox"/> | Biscuit sweet (chocolate flavoured, cookies...) |
| 08 | <input type="checkbox"/> / <input type="checkbox"/> | Cakes |
| 09 | <input type="checkbox"/> / <input type="checkbox"/> | Pancake/Pan-doughnut |
| 10 | <input type="checkbox"/> / <input type="checkbox"/> | Doughnuts |
| 11 | <input type="checkbox"/> / <input type="checkbox"/> | Other bakery products, eg nem, quiches, pizzas etc |
| 12 | <input type="checkbox"/> / <input type="checkbox"/> | Mixes and doughs for the preparation of bakery products |
| 13 | <input type="checkbox"/> / <input type="checkbox"/> | Noodles, pasta |
| 14 | <input type="checkbox"/> / <input type="checkbox"/> | Breakfast cereal (rice pops, cornflakes, oatflakes, wheatbix and other cereal...) |
| 15 | <input type="checkbox"/> / <input type="checkbox"/> | Starches (tapioca, sago and other starches) |
| 16 | <input type="checkbox"/> / <input type="checkbox"/> | Other grain or cereals product |

- In the last 7 days, how much [ITEM] did your household consume? (quantity and units)
- How much of this consumption was purchased with cash?
- How much of this consumption was paid in exchange (barter)?
- What was exchanged? (item, amount, unit)
- How much of [ITEM] consumed was home produced?
- How much of [ITEM] was received as a gift?

Home production, gifts, in-kind payment, rations



- In the last 7 days, how much [ITEM] did your household consume? (quantity and units)
- How much of this consumption was purchased with cash?
- How much of this consumption was paid in exchange (barter)?
- What was exchanged? (item, amount, unit)
- How much of [ITEM] consumed was home produced?
- How much of [ITEM] was received as a gift?
- The information collected in these questions is used to estimate the market price value of goods that are home produced or received as gifts, in-kind payments, or rations (such as after a natural disaster).
- These calculations are done at as highly disaggregated level as possible because prices are highly local, subject to having a minimum number of observations.
- Complications arise if there are not enough price observations.

Unit prices

- In most countries, “unit prices” are used to price home production. This approach uses the prices from the survey to estimate the price of goods the household did not buy.
- For example, if the household consumes 2 mangos, one of which is purchased in the market for 50 cents, and one of which is harvested from a tree, the total value for mangos consumed would be 1 dollar.
- The standard approach can be problematic in the Pacific, however, as unit prices can be difficult to calculate because of the low density of markets.
- The main alternative would be to include a specialized price survey in the HIES which captures prices from local markets and/or key informants.

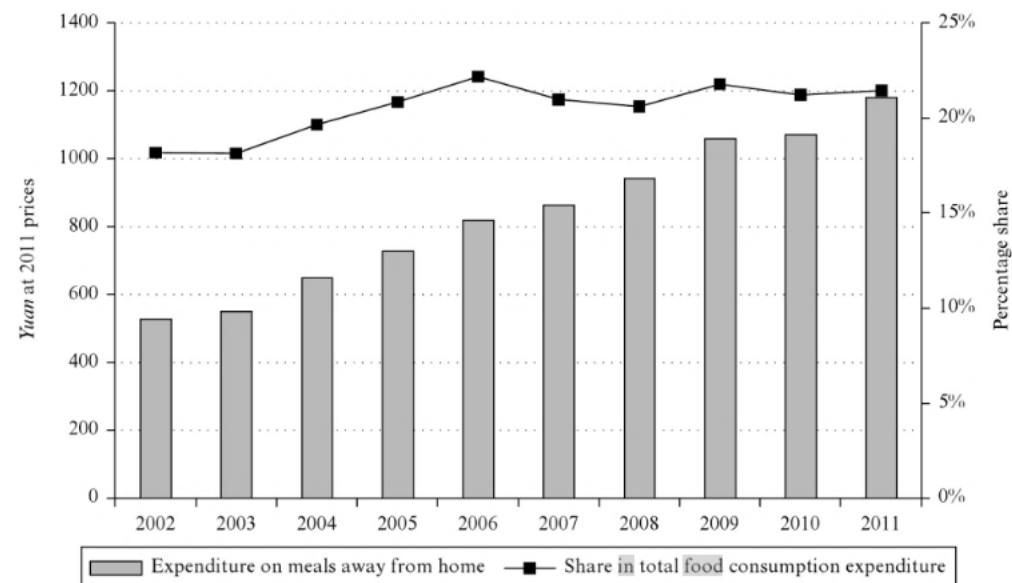
Breadfruit in Tonga 2015

- During the analysis of the consumption data from the Tonga 2015 HIES, the team found very high levels of breadfruit consumption in Ha'apai (pink bar in the graph).
- There were not enough price observations for breadfruit in Ha'apai, however, to estimate a market price (most was home produced), so the unit value from Tongatapu was used.
- Ha'apai quickly become the most prosperous island in Tonga.



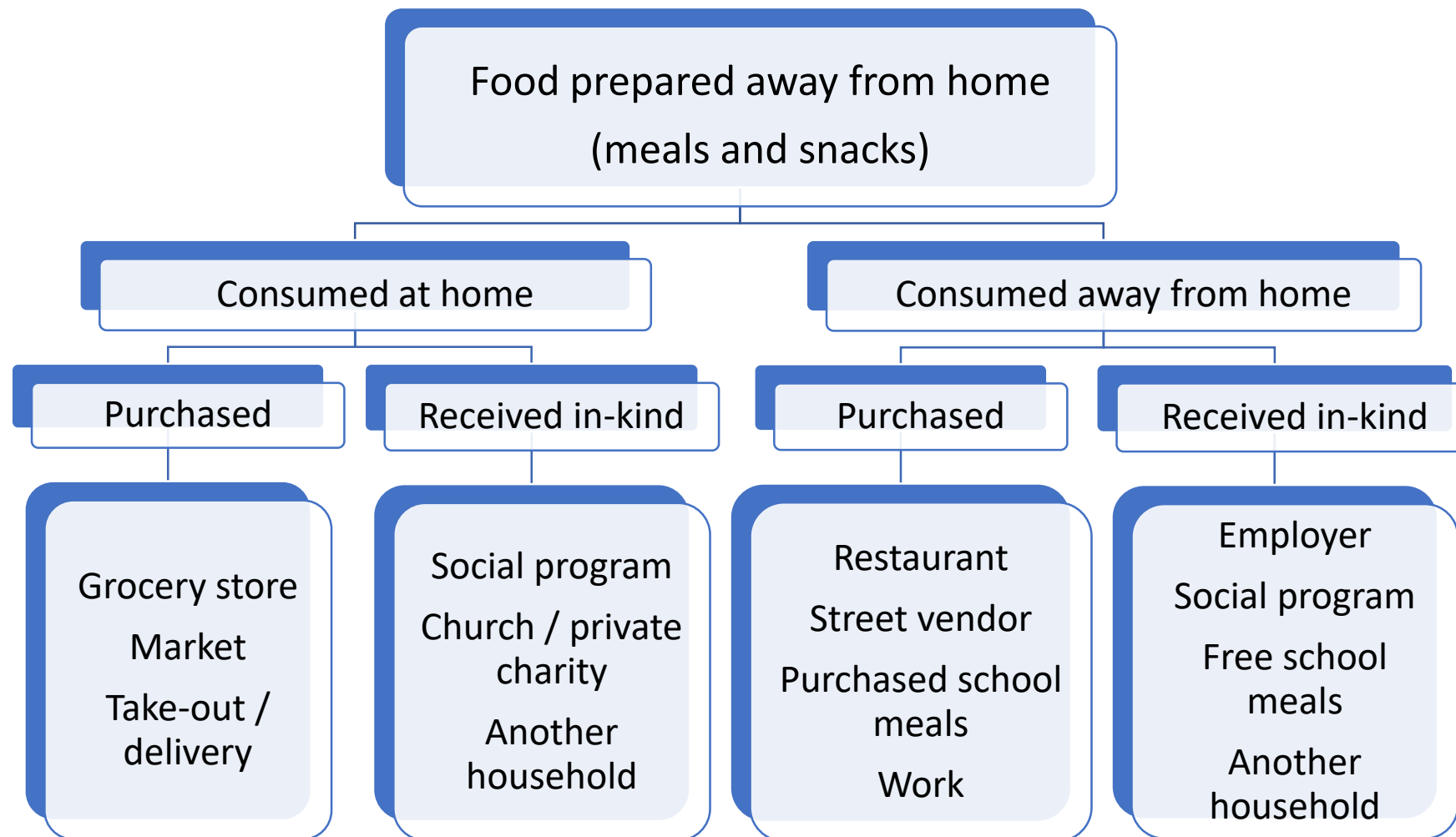
Prepared meals and food away from home

- The consumption of prepared food and food outside the home is rapidly growing across the developing world – particularly in urban areas.
- The percentage of households reporting meals outside increased from:
 - 20% to 46% between 1981 and 1998 in Egypt
 - 23% to 39% between 1994 and 2010 in India
- Household per-capita expenditure on food away from home rose at an average annual rate of 9.5% in China from 2002 to 2011.



Source: You, J., 2014. Dietary change, nutrient transition and food security in fast-growing China. *Handbook on Food: Demand, Supply, Sustainability and Security*, pp.204-245.

Prepared meals



Take-away and food delivery



Prepared meals purchased and brought into the home also count as purchased food and must be captured:

H1510a. In the last 7 days, did any member of this household consume at HOME, takeaway food of the following prepared meals?

MULTI-SELECT: YES/NO

h1510a

- 01 ☐ / ☐ Buatoro
- 02 ☐ / ☐ Fruit Salad
- 03 ☐ / ☐ Packed food
- 04 ☐ / ☐ Boiled crops (banana, kumala, taro)
- 05 ☐ / ☐ BBQ beef
- 06 ☐ / ☐ BBQ chicken
- 07 ☐ / ☐ BBQ fish
- 08 ☐ / ☐ Pizza, pasta, or similar
- 09 ☐ / ☐ Burgers, sandwiches, hot dogs
- 10 ☐ / ☐ Chinese food
- 11 ☐ / ☐ Other takeaway meals

H1510n. Specify other takeaway meals consumed at home

TEXT

h1510an

.....



Nonfood consumption

Eligible non-food spending, health, education

Eligible non-food consumption



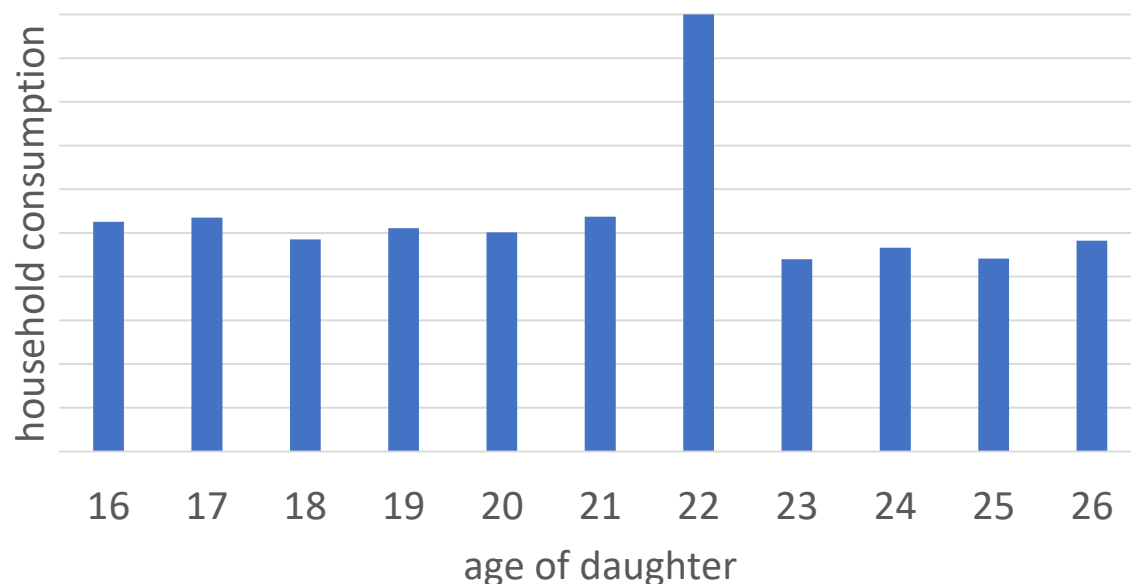
Step 2. Add up all eligible non-food spending, excluding:

- “lumpy” expenditure or expenses that are large but infrequent, such as weddings, births, deaths, hospitalization, etc.
- difficult-to-cost items which are (theoretically) equally available to all individuals (public services and leisure time),
- investment and other business-related expenses,
- repayment of loans, interest payments, purchase of financial assets, and taxes paid,
- transfers out of the household (including gifts, remittances, and religious contributions).

This measure is then annualized.

Lumpy expenditure

Consider a poor household with one child – a daughter. The daughter decides to get married at age 22, and the family pays for a lavish wedding, as per the local custom. The wedding is partially paid by **selling some household assets** and partially paid by **borrowing**.



Consumption is lower following the wedding because the household **no longer has the assets** they sold and has to **consume less** while they **pay off their loan**.

While the wedding was an important family and cultural obligation, it **did not fundamentally change the welfare status of the household**.

Transfers out of the household (gifts given)



- The inclusion of transfers out of the household is one area in which the historic method of poverty estimation in the Pacific diverges with international best practice.
- From an intuitive perspective, as [monetary poverty focuses on spending to promote the material good of the household](#), it does not make sense to include gifts given.
- From a strictly accounting perspective, since transfers out are counted as gives received by the household that receives the transfer, including them in both measures would be [double counting](#).
- “Average living standards could be increased without limit if each household were simply encouraged to donate its income to another household, and so on; nothing would have changed except our measure of welfare.” (Deaton & Zaidi, 2002).

Health spending

Health spending is a complicated topic as certain aspects should certainly be included because they are welfare enhancing (such as preventative care and cosmetic procedures) and certain aspects excluded as they are lumpy expenditures (such as hospitalization), but other spending, including doctor visits and treatment for illness could either be considered a welfare enhancing (and included) or a regrettable necessity (and excluded).

Health spending

(adapted from Mancini & Vecchi - forthcoming)

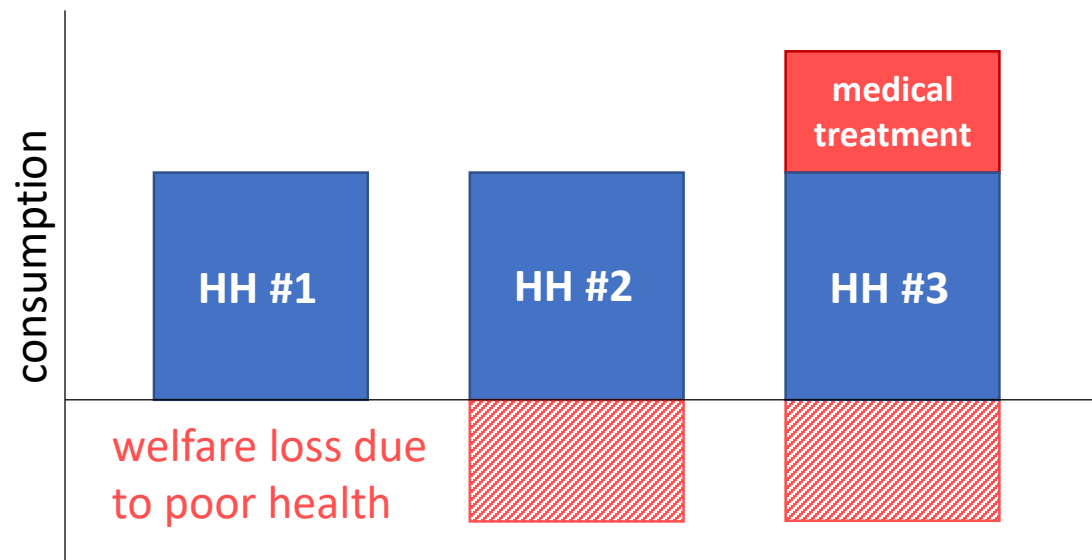


The principle is illustrated with the hypothetical story of three neighbors.

At the start of the year all three households have identical levels of welfare.

But then the household heads fall ill in households #2 and #3. The (theoretical) welfare loss is shown shaded in red.

Household #2 does not seek treatment, but household #3 spends money to go to the doctor and purchase medication.



The paradox is that if **health spending is included**, household #3 looks better off than household #1, even though all they did was pay to recover the health they lost, but if **health spending is excluded**, all three households look the same, even though household #3 received treatment to recover and household #2 did not.

Health spending

- Deaton and Zaidi (2002) recommends basing the decision as to whether to include health expenditures based on the elasticities.
- If health spending is a normal good (which should be included) we would expect higher elasticities as health consumption would change with total consumption.
- If health spending is a regrettable necessity (which should not be included), we would expect low elasticities, as people are forced to spend if they get sick.

Health spending



- Deaton and Zaidi (2002) recommends the exclusion of health expenditures based on the elasticities below as most are quite low (below 1).

- Here are the elasticities for a selected group of recent surveys in the Pacific.

Country	Year	Elasticity
Vietnam	1993	0.86
Nepal	1996	0.75
Kyrgyz Republic	1996	0.74
Ecuador	1995	--
South Africa	1993	1.14
Panama	1997	0.80
Brazil	1997	0.85

Country	Year	Elasticity
Fiji	2013	12.0
FSM	2013	2.44
Samoa	2013	1.44
Solomon Islands	2013	0.58
Tonga	2015	2.90

Health spending

Since 2002, however, questionnaires have evolved to capture health spending in much more detail. Therefore we can now consider three types of health expenditure: **preventative and elective care** (including routine check-ups and cosmetic procedures), **urgent care** (treatment for an illness), and hospitalization and other rare high priced events.

Economic theory says that **preventative and elective care should be included** (as they could be foregone if the household chooses) and hospitalization should be excluded (as it is a lumpy expenditure).

The main remaining question is whether to include **urgent care**.

Health spending elasticities

Preventative & Elective

Country	Year	Elasticity
Fiji	2013	1.43
FSM	2013	10.44
Samoa	2013	2.90
Solomon Islands	2013	3.46
Tonga	2015	4.48

Urgent Care

Country	Year	Elasticity
Fiji	2013	3.67
FSM	2013	2.02
Samoa	2013	4.84
Solomon Islands	2013	0.32
Tonga	2015	3.73

Hospitalization

Country	Year	Elasticity
Fiji	2013	4.33
FSM	2013	5.83
Samoa	2013	--
Solomon Islands	2013	--
Tonga	2015	--

- Elasticities are distorted due to the inclusion of hospitalization in most aggregates.
- Substantial classification issues.

Education spending



- Many of the same issues present for health spending also exist for education. In addition, the inclusion of education spending can be controversial as some economists see it as an investment (as children will care for parents as they age).

- Deaton and Zaidi (2002) recommends the inclusion of education expenditures based on these elasticities.

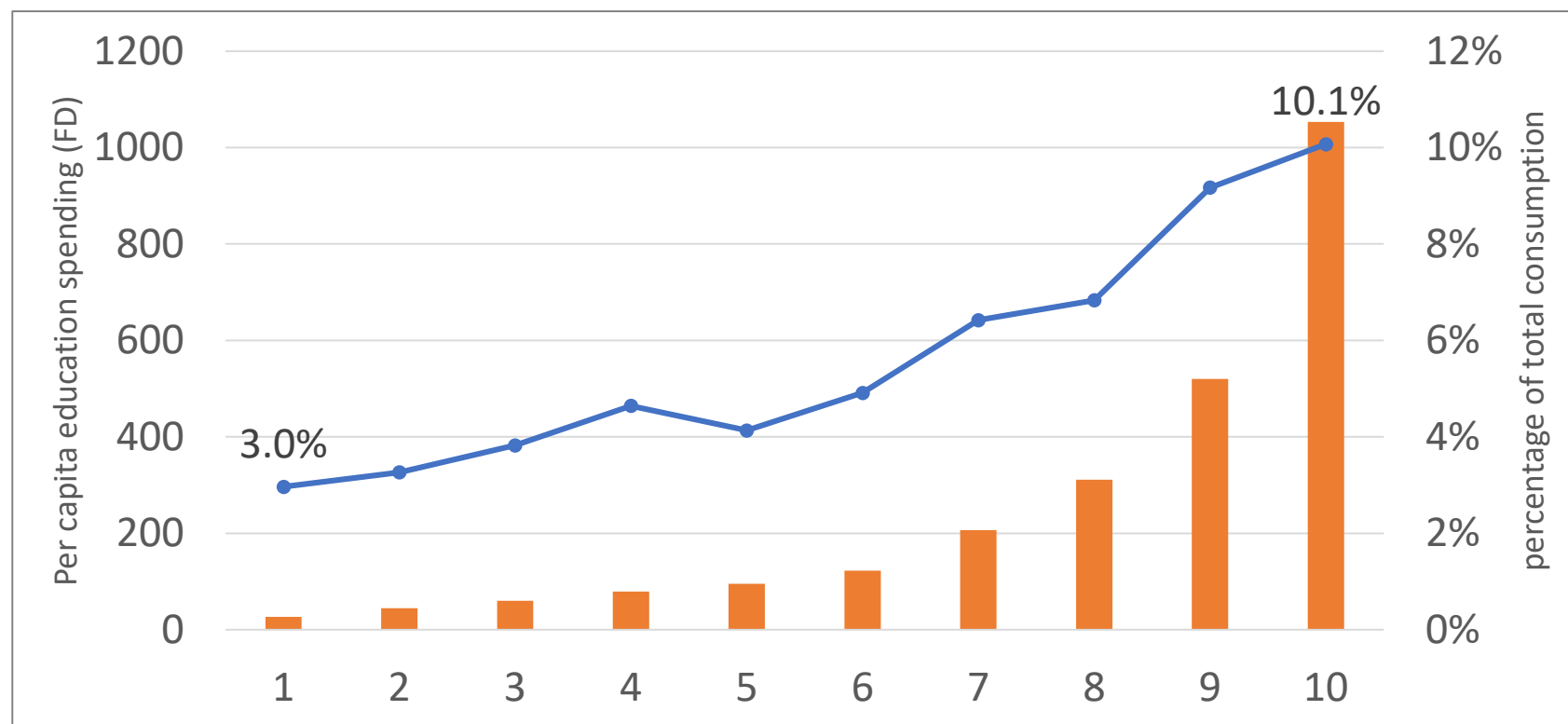
- Here are the elasticities for a selected group of recent surveys in the Pacific.

Country	Year	Elasticity
Vietnam	1993	1.35
Nepal	1996	1.65
Kyrgyz Republic	1996	0.68
Ecuador	1995	1.38
South Africa	1993	1.32
Panama	1997	1.24
Brazil	1997	1.25

Country	Year	Elasticity
Fiji	2013	4.18
FSM	2013	1.36
Samoa	2013	1.18
Solomon Islands	2013	1.40
Tonga	2015	1.41

Education spending in Fiji

- Elasticity is particularly high in Fiji, with the highest decile spending a share of total consumption three times higher than the lowest decile.





Accounting for assets

Use value of household assets, imputed rent of dwelling

How is a consumption aggregate constructed?



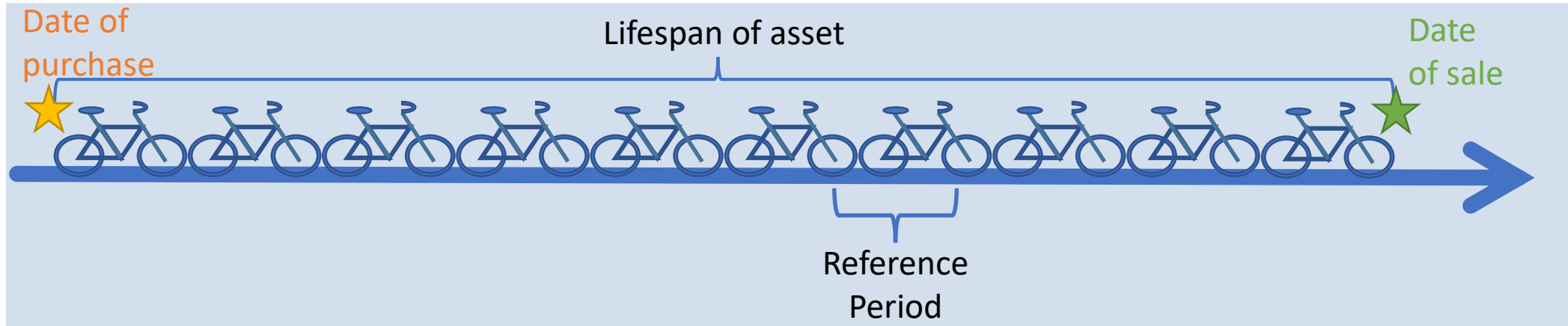
Step 3. Calculate the **use value of assets** and **rental equivalent**.

These two values are important parts of the consumption aggregate, particularly in places like the Pacific where most households meet their food needs readily and reliably. These measures are **calculated instead of collected**.

Excluding these items will have a tendency to overestimate poverty and underestimate inequality.

These two measures should also be annualized.

Use value of assets



“Use value” is used instead of the purchase price since households own durable assets for long periods of time and derive benefits from their use throughout that period. The purchase price would show up only as a spike in consumption in one year and may be missed entirely by the survey.

Questions required for use value of durables



Example: Air conditioner

- Does any member of this household own an air conditioner?
- How many air conditioners does this household own?
- In regards to your household's most recent or latest air conditioner, how many complete years has your household owned this asset?
- In regards to your household's most recent or latest air conditioner how did your household acquire this asset?
[R: purchased new, purchased secondhand, received new as gift, received secondhand as gift.]
- How much did your household pay for this air conditioner?
- How much could your household receive if you were to sell this air conditioner today?

Questions required for use value of durables



Below are examples of the depreciation rates and the “consumption flow” or the value added to the consumption aggregate from a list of assets from the 2018 Maldives HIES.

Item	depreciation rate	consumption flow	n
Air conditioner	0.1188	1,442	1,701
Bicycle	0.2083	366	1,905
Car/Jeep	0.0742	12,083	142
Computer/Laptop	0.1148	1,091	2,349
Fan	0.2083	363	3,720
Iron	0.2240	53.6	3,934
Mobile phone	0.1976	1,920	4,308
Motor cycle	0.0787	4,943	1,708

Item	depreciation rate	consumption flow	n
Radio/Set	0.1731	43.5	2,028
Refrigerator	0.1190	536	3,502
Rice cooker	0.2387	106	3,162
TV	0.1188	749	3,553
Telephone	0.1541	44.7	101
Washing machine	0.1678	455	3,923
Water pump	0.1256	226	3,117

Adapted from Manchin and Vecchi (forthcoming)

Imputed rent



- Households clearly benefit from having and living in a shelter.
- In the case of those that rent their dwelling, it is easy to estimate the value they receive as it is equal to the rent – with the caveat that in some contexts employees receive subsidized rent as part of their employment package and these values should be excluded (i.e. only un-subsidized market rents used).
- But there are only certain areas of the country where renting is common (mainly urban areas). Most households own their homes.
- It makes sense to include rent for those that pay (market prices) for it, but what is the best method for calculating the equivalent for home owners?

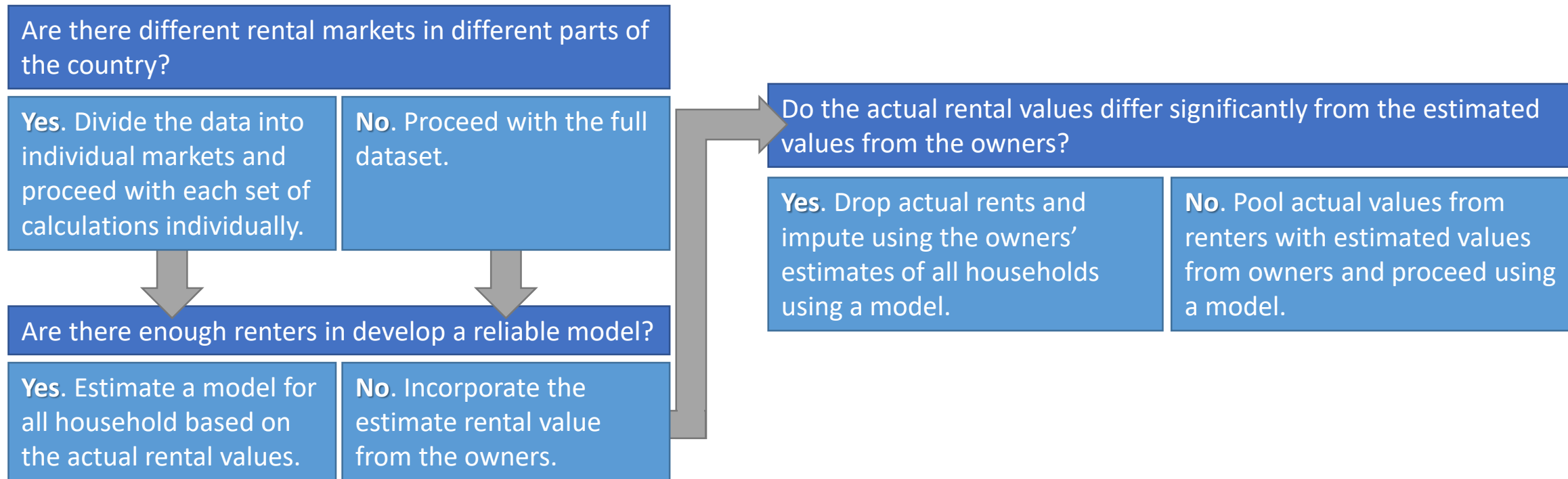
Imputed rent



- One option would be to **use the sale price** of the home, **but** in some places houses are transferred only rarely and often through families rather than on the open market.
- Another option is to use the characteristics of the dwelling to **create a model** to estimate the rental equivalent, **but** this approach requires a substantial number of rented home on which to base the model.
- A common approach is to **ask households** what the equivalent rent would be, **but** this question can be hard to estimate if no one in the community rents and studies have shown that homeowners tend to overvalue their dwellings.
- There is also a Pacific-specific option for rural dwellings built by the occupants themselves. If the **cost of construction** could be accurately measured (including gifted and gathered materials and gifted labor), a **depreciation rate** could be calculated based on the life expectancy of the dwelling (4-5 years?), **but** this approach would only work for “bush construction” and would need to be coupled with another option for other types of dwellings.

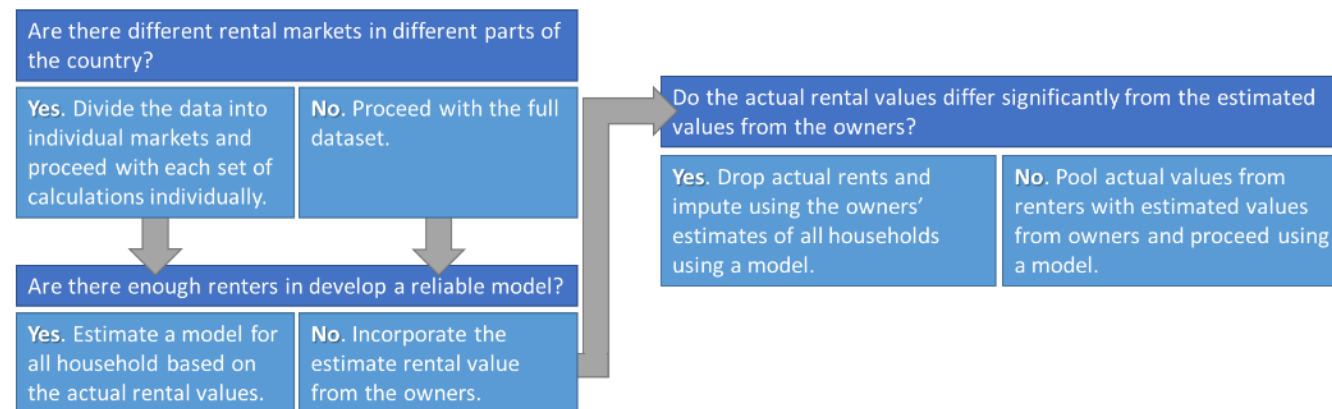
Recommendation

Since no option is universally perfect for places with few renters, the World Bank recommends the following approach:



Rent in the 2012/2013 Samoa HIES

- Using the [2012/2013 Samoa HIES](#) as an example and following the decision path from the previous slide...
- Starting with the basic raw statistics, the percentage of households reporting actual rent was less than 5 percent of the total observations (n = 2,348).
 - 59 were in Apia (12%)
 - 50 were in NW Upolu (6.5%)
 - 1 was in the rest of Upolu (0.2%)
 - None were in Savaii (0%)



Differences in rental markets?



- Generally it is common knowledge among those working in the NSO if there are different rental markets in different parts of the country, but it can be demonstrated quantitatively.
- In Apia, 18 of the 59 rental dwellings are closed European houses with corrugated iron roofs and concrete walls, with main supply electricity and an indoor kitchen. The mean rent for a dwelling of this type is 303 tala.
- In North West Upolu, only 2 of the 50 rental dwellings have these characteristics, and the mean rent for these dwellings is 48 tala.
- There are different rental markets because the characteristics of housing differs by location and price of similar dwellings is different in different parts of the country.

Thin markets?

Are there different rental markets in different parts of the country?

Yes. Divide the data into individual markets and proceed with each set of calculations individually.

No. Proceed with the full dataset.



Are there enough renters in develop a reliable model?

Yes. Estimate a model for all household based on the actual rental values.

No. Incorporate the estimate rental value from the owners.

- A general guideline is that a minimum of 15 – 25% households should participate in a rental market to develop a reliable model, and even then there are caveats.
 - 59 were in Apia (12%)
 - 50 were in NW Upolu (6.5%)
 - 1 was in the rest of Upolu (0.2%)
 - None were in Savaii (0%)
- It is necessary to incorporate the estimated rental value from owners.



Differences in actual vs. estimated rents?



Do the actual rental values differ significantly from the estimated values from the owners?

Yes. Drop actual rents and impute using the owners' estimates of all households using a model.

No. Pool actual values from renters with estimated values from owners and proceed using a model.

- This is a more complicated question to answer and requires more in-depth statistical analysis.
- As a first step, we compare the average rent actually paid and the estimated rent. Nationally the **mean actual rent is 122 tala** compared to **108 tala for estimated rent**, but we know that renters are concentrated in more expensive housing markets.

Differences in actual vs. estimated rents?



Apia	
actual	estimated
175	214

North West Upolu	
actual	estimated
73	114

Rest of Upolo	
actual	estimated
28*	63

Savaii	
actual	estimated
--	77

* Only one observation

- Comparing within region, the data shows that owners have consistently higher values as their estimated rents than do those that rent.
- But perhaps it is possible that owners actually just have better housing?

Incorporating econometrics



- To answer the question if owners have better housing, we need to employ a more complicated statistical approach – regression analysis using an econometric model.
- Using econometrics, we “control for” various characteristics of housing, in the same way as we separated the analysis by region on the previous slide. In this way, we can compare the actual and expected values of rent on the same type of dwellings.

Differences in actual vs. estimated rents?

		Linearized				
rent		Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
actual		-39.92079	28.89944	-1.38	0.170	-97.18132 17.33974
region						
North West Upolu		-100.2987	31.01833	-3.23	0.002	-161.7575 -38.83983
Rest of Upolu		-151.0877	28.20606	-5.36	0.000	-206.9744 -95.201
Savaii		-137.0415	29.58448	-4.63	0.000	-195.6593 -78.42361
_cons		213.9139	27.10644	7.89	0.000	160.206 267.6219

Apia	
actual	estimated
175	214

North West Upolu	
actual	estimated
73	114

Rest of Upolu	
actual	estimated
28*	63

Savaii	
actual	estimated
--	77

Incorporating econometrics

- Running a much more complicate model including the region, house type, roof material, floor material, wall material, year built, kitchen location, toilet facilities, and type of electrical connection, the analysis still shows that owners over-estimate the value of their dwelling compared to renters.

	Linearized					
rent	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
actual	-43.05022	21.91926	-1.96	0.052	-86.48042	.3799851

Dropping actual rents

Do the actual rental values differ significantly from the estimated values from the owners?

Yes. Drop actual rents and impute using the owners' estimates of all households using a model.

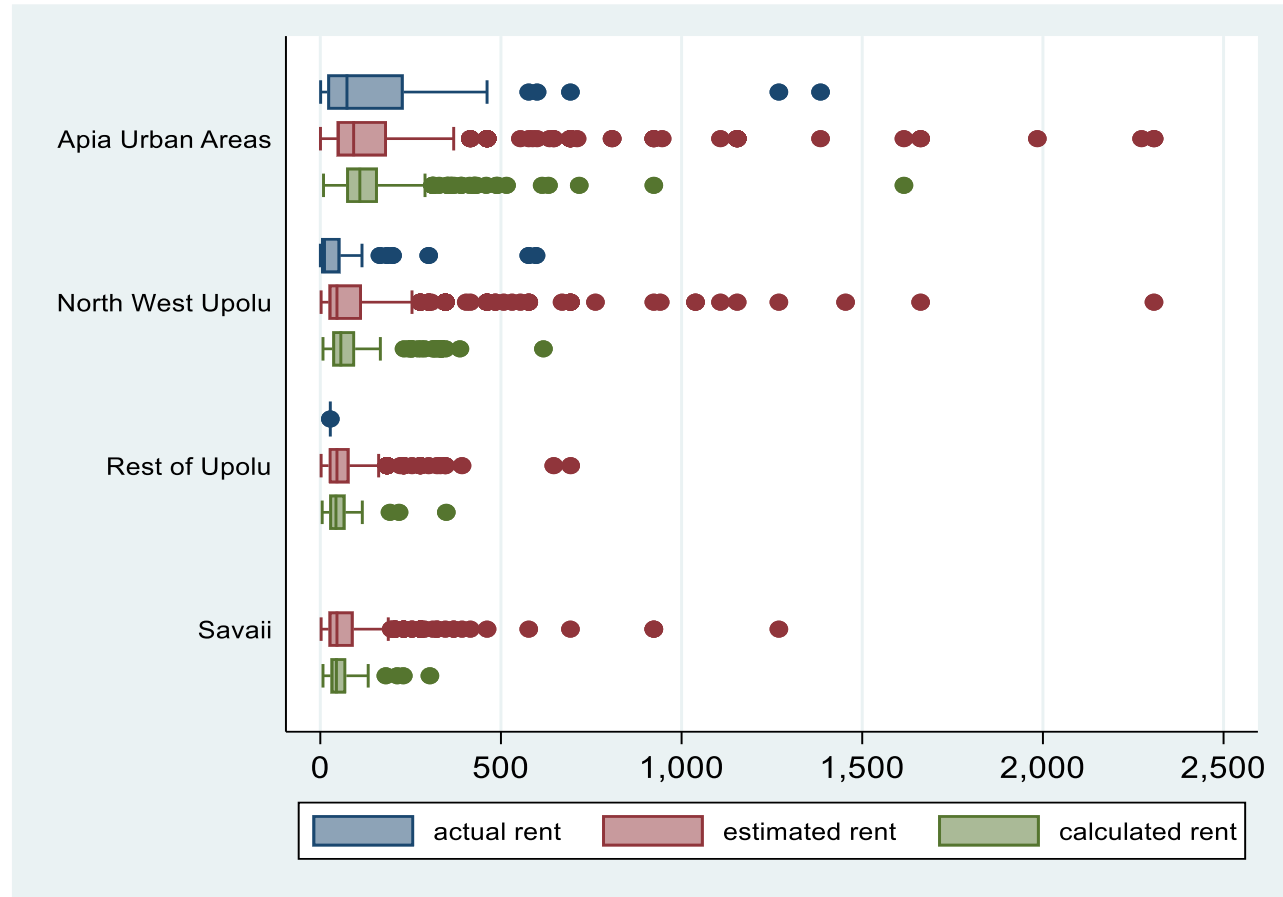
No. Pool actual values from renters with estimated values from owners and proceed using a model.

- Here the analyst must make a choice between being 100% right for a small percentage of households, and being slightly wrong for some households but consistent for all households. Since the ultimate objective of well-being analysis is to accurately rank households, it is recommended to be slightly wrong in the actual amount for some to be consistent for all.

- Since we now know there are systematic differences between actual and estimated rents, we know that we cannot simply pool the two values together.

Econometrics for prediction

- Therefore the next step is remove the actual rents from the dataset and use an econometric prediction model based on the dwelling characteristics.
- This process is done separately on Apia and the rest of the country because we concluded previously that there were different rental markets.



Econometrics for prediction

- The table below shows the actual, expected, and calculated rent paid for each of the four regions:

Apia			North West Upolu			Rest of Upolu			Savaii		
actual	estimated	calculated	actual	estimated	calculated	actual	estimated	calculated	actual	estimated	calculated
175	214	128	73	114	76	28*	63	49	--	77	52

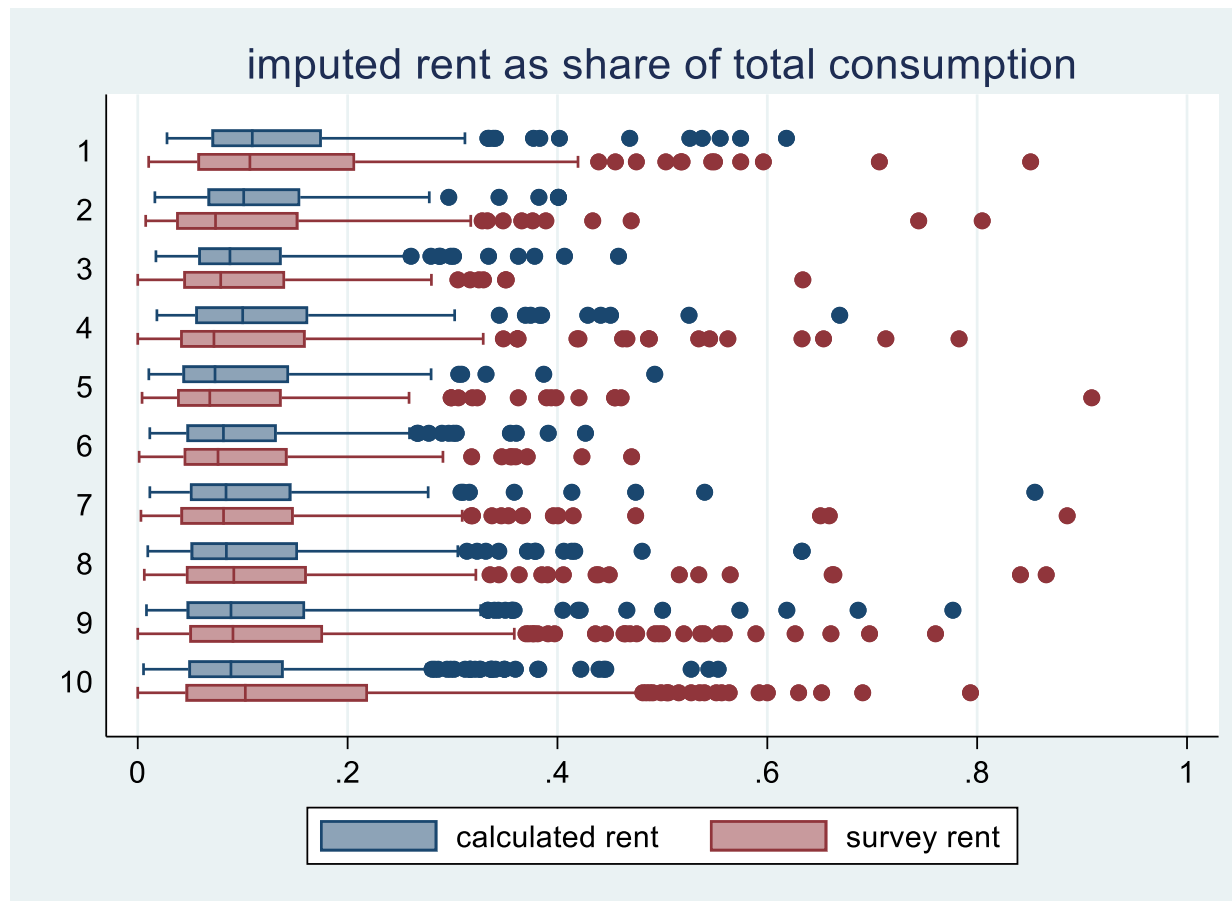
- For the example of a closed European houses with corrugated iron roofs and concrete walls, with main supply electricity and an indoor kitchen, the calculated rent is:

Apia	North West Upolu	Rest of Upolu	Savaii
156 tala	140 tala	105 tala	121 tala

Which approach is more believable?

The calculated rent approach better addresses outliers and generally provides a more robust estimation of the value received by households from their dwelling.

Average share = 12%



What are the implications?

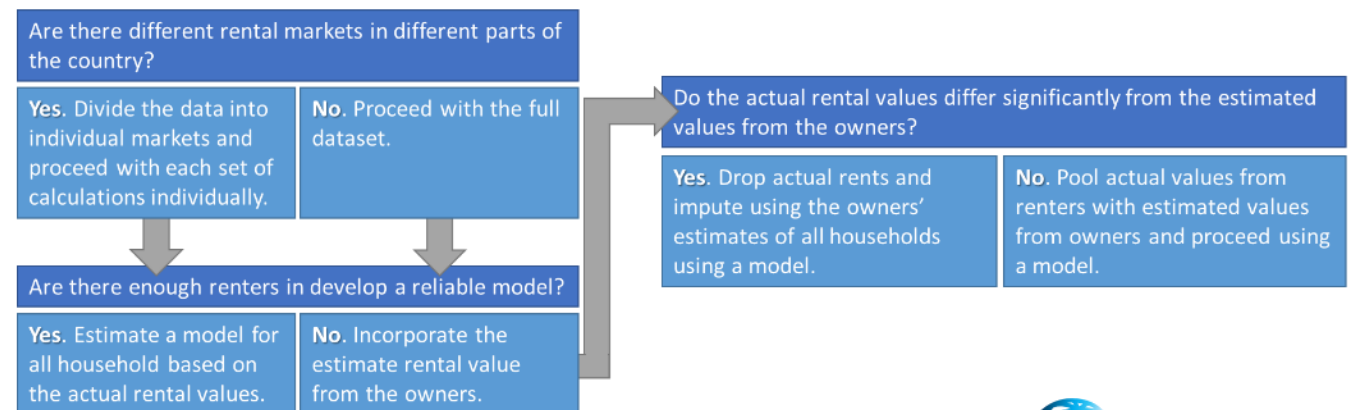


Most households do not shift deciles, but there are major changes for some.

		adjusted deciles										Total
		1	2	3	4	5	6	7	8	9	10	
original deciles	1	144	20	0	0	0	0	0	0	0	0	164
	2	10	135	28	6	0	0	1	0	0	0	180
	3	1	20	121	42	3	1	0	0	0	0	188
	4	1	2	29	125	40	8	0	0	0	0	205
	5	0	1	3	23	123	42	4	0	0	0	196
	6	0	1	1	3	25	139	55	5	1	0	230
	7	0	0	0	3	5	26	158	52	4	0	248
	8	1	0	0	3	2	2	23	185	49	2	267
	9	1	0	0	2	0	0	4	28	206	36	277
	10	0	1	0	1	1	0	1	3	29	356	392
Total		158	180	182	208	199	218	246	273	289	394	2,347

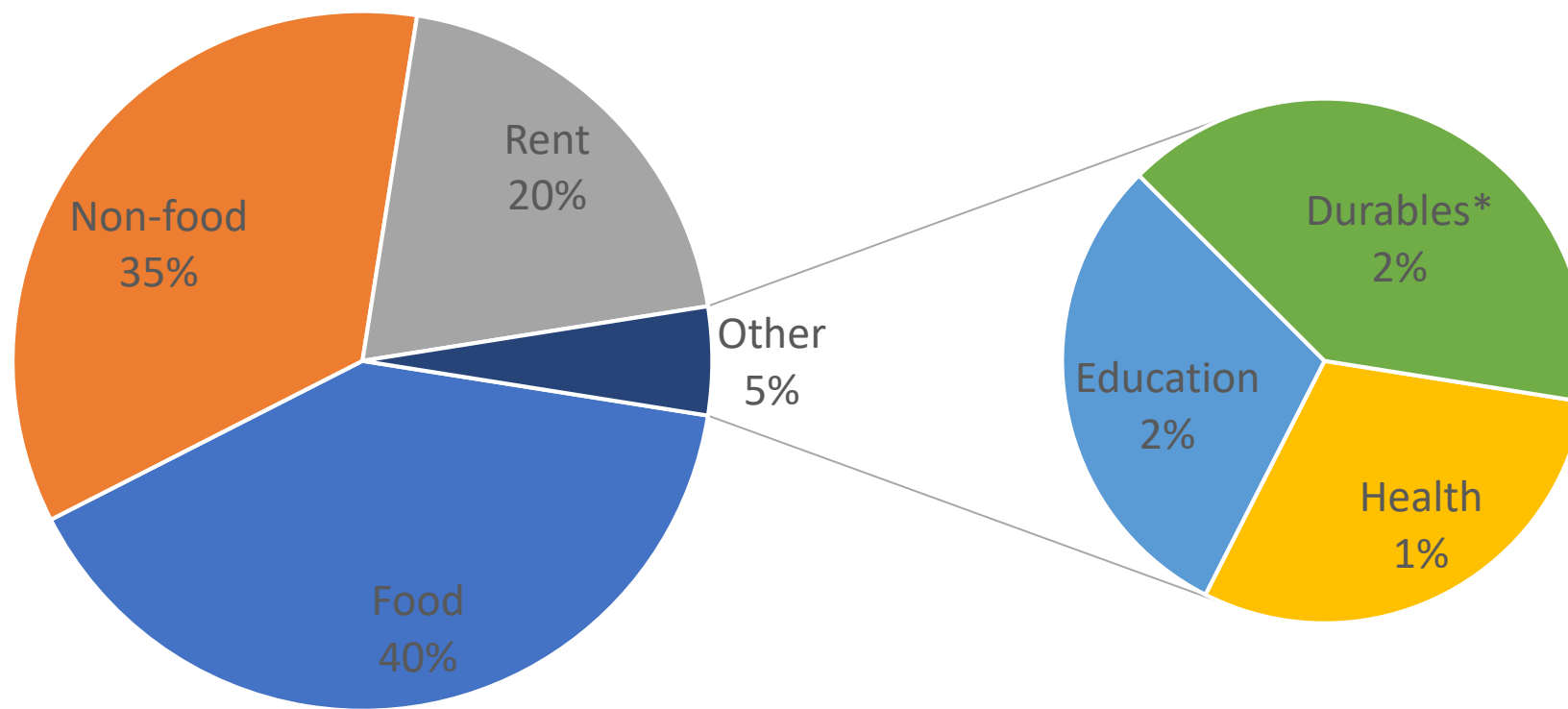
Questions for calculating rent

- The hardest part of calculating imputed rent is that it is not possible to know how many renters will be in the sample until after the survey. Therefore the recommendation in the questionnaire design phase is to add as many questions as relevant to estimate the equivalent rental value of a dwelling, and always ask for the homeowner's estimate. This approach gives the maximum number of options during the design phase.



How much does it matter?

- Generally in the Pacific...



With transfers out of the household (gifts given) being approximately 5%.

* Based on RMI experiment only

How is a consumption aggregate constructed?



Consumption aggregate is the annualized sum of:

1. Food spending
2. Eligible non-food spending
3. Use value of durables
4. Imputed rent

This total is then put into per capita or **per adult equivalent** terms, and spatial and temporal **price deflators** are applied.

Adult equivalent measures



- Adult equivalence measures are often used in the calculation of national poverty lines to **account for differences in the food requirements of adults and children** (as opposed to **per capita measures which assume all household members to consume the same average amount**).
- Adult equivalence measures are particularly common in contexts with young populations.
- The Pacific has historically used the **OECD measure**, which defines adults as those aged 15 years and older, and children as those under age 15. All children are then considered to consume at one-half the rate of adults.

Adult equivalent measures

- Comparing four options: **household size**, **OECD** adult equivalence, **FAO** adult equivalence, and one proposed by **Claro et al (2010)**.
- The choice of method does not matter much to the ranking (all measures are highly correlated) but can make a significant impact on the headcount.

country	year	Average correlation between methods	Poverty Headcount			
			Per capita	OECD	FAO	Claro
Lao	2012	0.979	1.1	10.5	15.4	22.7
Vietnam	2014	0.978	0.1	1.1	1.7	2.8
Myanmar	2015	0.984	0.2	2.9	3.9	6.4
Indonesia	2016	0.958	0.2	1.8	3.5	6.5

Partakers?

- Adjusting the per adult equivalent measure to account for “partakers” is a relatively new recommendation coming from the survey literature.
- In many cultures, meals are often shared with non-family members, up to several times a week. The survey captures the food consumed outside the household if it is the respondent that is dining away, but rarely adjusts for others taking meals in the respondent’s home.

H2201. In the last 7 days, did any non-household member (visitor) join in a meal consumed in this home?	SINGLE-SELECT 01 <input type="radio"/> Yes 02 <input type="radio"/> No
H2202. In the last 7 days, how many meals did you share at home with a guest aged 0 to 5 years old?	NUMERIC: INTEGER -----
H2203. In the last 7 days, how many meals did you share at home with a guest aged 6 to 15 years old?	NUMERIC: INTEGER -----
H2204. In the last 7 days, how many meals did you share at home with a guest aged 16 to 65 years old?	NUMERIC: INTEGER -----

Deflators



- Since the **cost-of-living** differs from one part of the country to another, and since there may be **seasonal variation** in the prices faced by households, analysts usually apply either **spatial** (based on geography) or **temporal** (based on time) deflators, or both, to the consumption aggregates so that they are comparable across the country.
- An alternative is to calculate separate poverty lines, but since this approach does not allow for inequality analysis, therefore it is usually not recommended as best practice.

Deflators



- There are three common price deflator measures used for price adjustments: **Paasche**, **Laspeyres**, and **Fisher**.*
- It is not necessary to use the same adjustment methodology for both spatial and temporal price adjustment.

Adjustment	Spatial	Temporal
Paasche	Uses budget shares of given sub-national location	Uses budget shares of the current period
Laspeyres	Uses budget shares of a reference population	Uses budget shares of the reference year
Fisher	Accounts for both as it is an average of the Paasche and Fisher indices	

* John Gibson also advocates for the use of the Weighted Country-Product-Dummy method.

Standard recommendation on deflators



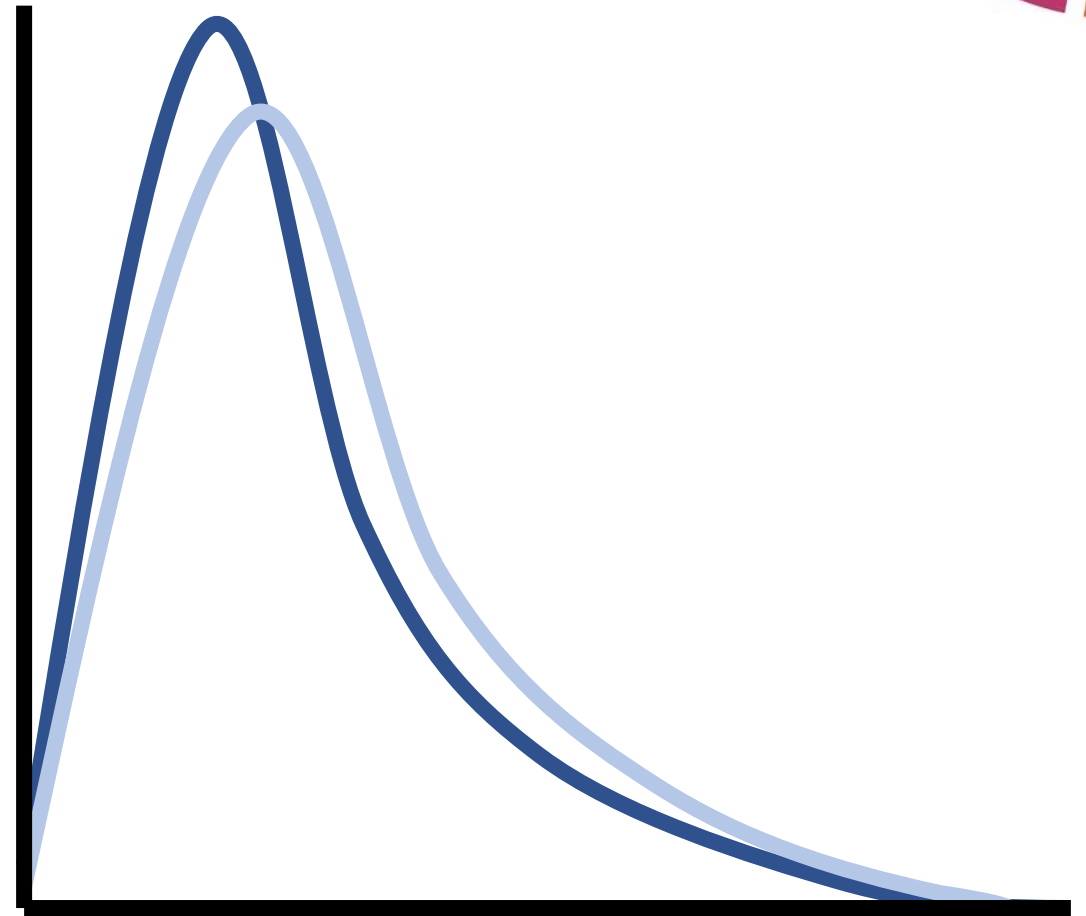
- Calculate **price deflators** using a Paasche index for **spatial** deflators and a **Fischer** index for **temporal** deflators.
- A Paasche index is recommended for spatial deflators because it takes into account that households make different consumption decisions when they are faced with different prices. The basket should reflect the consumption the household's location.
- A Fisher index is recommended for temporal deflators because both the Paasche and Laspeyres indices have drawbacks for temporal measures. Taking the average between the two mitigates these concerns
- Apply these deflators to the nominal household consumption total spending to obtain the final real household consumption.

How is a consumption aggregate constructed?

Consumption aggregate is the annualized sum of:

1. Food spending
2. Eligible non-food spending
3. Use value of durables
4. Imputed rent

This total is then put into per capita or **per adult equivalent** terms, and spatial and temporal **price deflators** are applied.



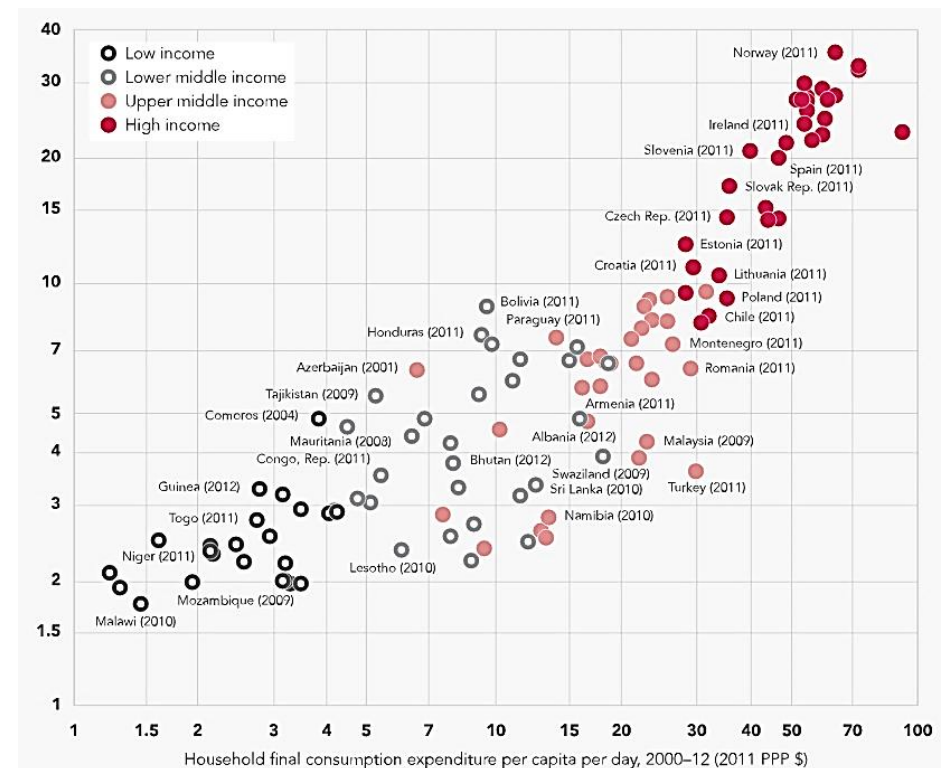
Poverty lines



- There are two types of poverty lines for poverty analysis: **international poverty line(s)** for global comparisons and **national poverty lines** for regional and national analysis.
- The current international poverty lines of **\$1.90** per person per day in 2011 dollars and adjusted using the 2011 Purchasing Power Parity rates was introduced in September 2015. These are calculated by the World Bank poverty economists and the International Comparison Project (ICP) team.
- As companions to the IPL, the World Bank also measures poverty based on the **Lower Middle Income Poverty Line** (USD 3.20 per capita per day) and the **Upper Middle Income Poverty Line** (USD 5.50 per capita per day).

Background of the IPL

- An International Poverty Line (IPL) is necessary since national poverty lines vary according to national context (i.e. **richer countries tend to have higher poverty lines**).
- This represented the third revision of the initial \$1 per day number developed in 1991 using the 1985 PPPs, following \$1.08 in 1993 PPPs, and \$1.25 in 2005 PPPs.
- The original line \$1 per day IPL was developed as the simple average of the poverty lines for the 15 poorest countries for which data was available. A robustness check conducted in 2015 for the 15 poorest countries for which data was available gave exactly \$1.90 as well.



Source: Jolliffe & Prydz (2016)

National poverty line

A **national poverty line is more complicated** as it needs to take into account the conditions and norms of life in an individual country or region. The World Bank recommends a **Cost-of-Basic-Needs** poverty line which is based in a **basket of food actually consumed by poor people** (including unhealthy or foods low in nutritional value) rather than a group of foods artificially assembled to meet certain nutritional criteria.



Calculating a national poverty line



Step 1. Calculate the food component of the cost-of-basic-needs poverty line by **pricing a food basket** based on the consumption of a **relevant reference population** and the **caloric requirements** of the national population.

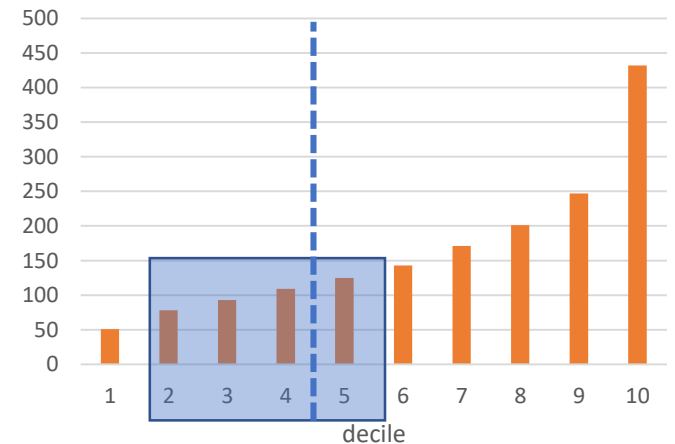
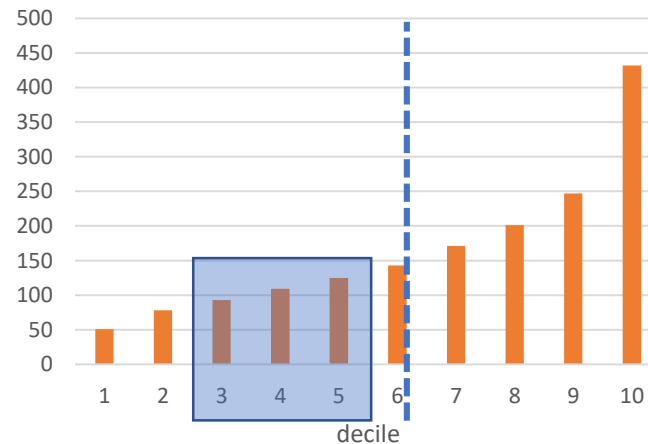
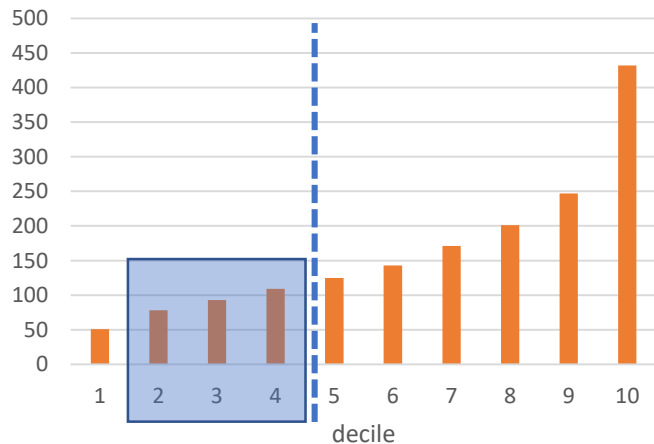
Step 2. Use the **relationship between food and non-food spending** of this reference population to **calculate the non-food component of the poverty line**. Combine these two measures to form that national cost-of-basic-needs poverty line.

Step 3. Apply to consumption aggregate to **perform poverty analysis**.

Relevant reference population



- The food basket should be calculated from the deciles of the consumption distribution around the poverty line. The top and bottom deciles should always be excluded as they are outliers in the distribution.
- Since the food poverty line will change every time the reference population changes, this approach is often an iterative process.

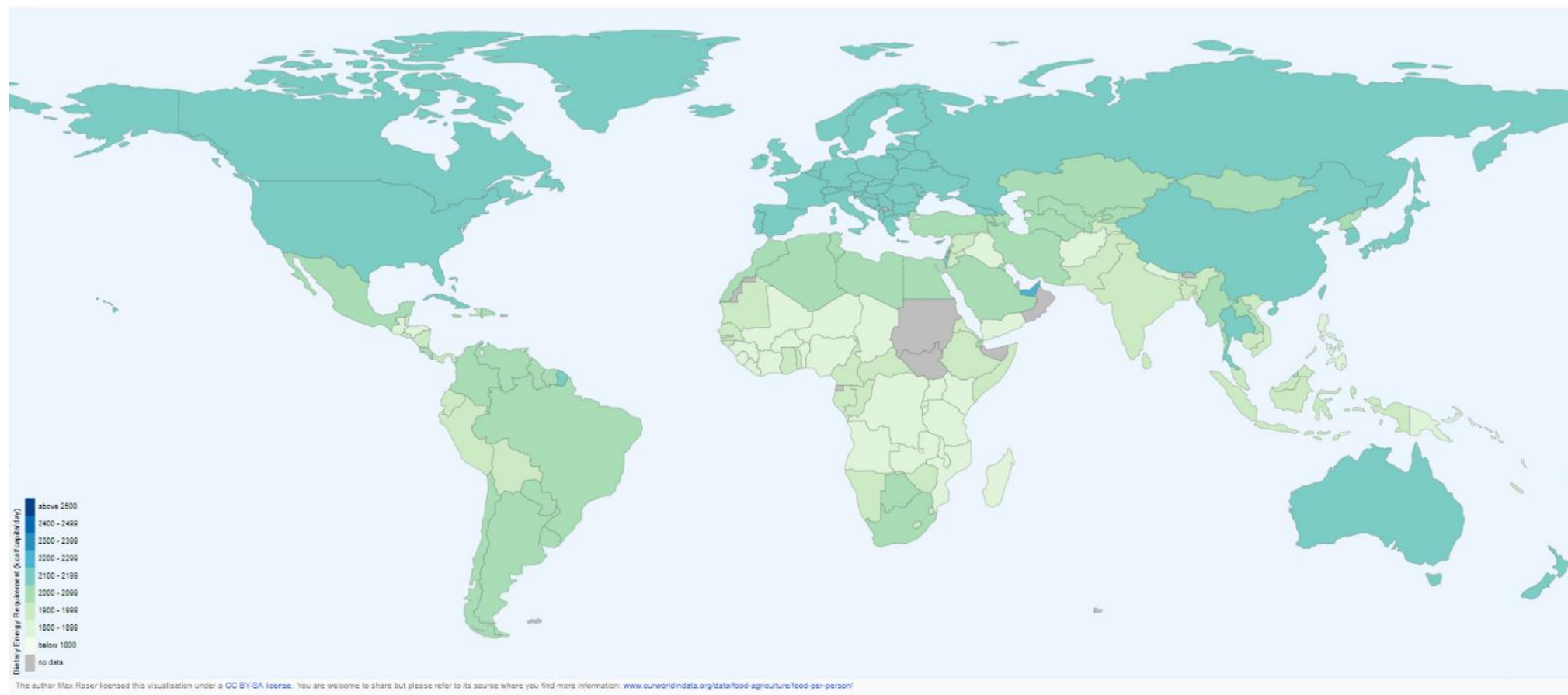


Caloric requirements of national population

- In order to construct a food basket, it is necessary to determine the required minimum of calories per adult per day. The FAO has issued some guidelines on the appropriate values but not all countries in the Pacific are covered.
- In addition, the minimum daily requirements from FAO are considered too low by many countries and higher thresholds are used.

Country	Minimum Daily Calories
Fiji	1860
Kiribati	1770
Samoa	1810
Solomon Islands	1730
Vanuatu	1730

Minimum dietary energy requirement (FAO)



Food poverty line



Overview of steps to determine food poverty line:

1. Start with basket shares.
2. Determine how those shares translate in calories for a given minimum calorie requirement.
3. Look up the calories per 100g for each item.
4. Determine the number of grams needed to reach the share of the calories.
5. Use the survey to determine the cost per 100g.
6. Determine the total cost per item (amount x cost)
7. Sum over all items in the basket.

Food poverty line

1. Start with basket shares.

2. Determine how those shares translate in calories for a given minimum calorie requirement.

3. Look up the calories per 100g for each item.

Step 2. Determine the food poverty line.

Item	Share of basket	Share of calories	Calories / 100g	Total amount	Cost / 100g	Total cost (USD)
Fish	25%	500	66	758g	0.13	0.99
FAFH*	20%	500	122	410g	0.40	1.64
Chicken	15%	300	339	88g	0.27	0.24
Rice	15%	200	184	109g	0.11	0.12
Coconut	5%	100	233	43g	0.06	0.03
Tinned mean	5%	100	158	63g	1.95	1.23
Taro	5%	100	86	116g	0.13	0.15
Biscuits	5%	100	439	23g	1.09	0.25
Bread fruit	5%	100	387	26g	1.38	0.36
	100%	2,000				5.00

4. Determine the number of grams needs to reach the share of the calories.

5. Use the survey to determine the cost per 100g.

6. Determine the total cost per item (amount x cost)

7. Sum over all items in the basket.

*Food Away From Home

Food Away From Home



- As noted earlier, food purchased and consumed away from home is a growing share of consumption across the world.
- While the price of FAFH is straightforward, converting this measure into calorie equivalents is more complicated and requires some assumptions.
- There are two main approaches:
 1. Incorporating a [restaurant survey](#) into the HIES data collection. This approach collects the composition of common restaurant and street vendor meals by location, which are then converted into calories.
 2. Making the [assumption](#) that the per-calorie cost of FAFH is the same as the per-calorie cost of food prepared and consumed at home, and that the composition of food eaten in restaurants is similar to that prepared at home.

Food Away From Home

1. Start with basket shares.
2. Remove the FAFH line.
3. Rescale basket shares.

- Assigning calories using assumptions

Item	Share of basket	Share of calories	Calories / 100g	Total amount	Cost / 100g	Total cost (USD)	Total cost (rescaled)
Fish	25% 31%	500	66	758g	0.13	0.99	0.04
FAFH*	20%	500	122	410g	0.40	1.64	
Chicken	15% 19%	300	339	88g	0.27	0.24	0.05
Rice	15% 19%	200	184	109g	0.11	0.12	0.02
Coconut	5% 6%	100	233	43g	0.06	0.03	0.00
Tinned mean	5% 6%	100	158	63g	1.95	1.23	0.12
Taro	5% 6%	100	86	116g	0.13	0.15	0.01
Biscuits	5% 6%	100	439	23g	1.09	0.25	0.07
Bread fruit	5% 6%	100	387	26g	1.38	0.36	0.09
	80% 100%	1500				5.00	0.40

3. Multiply rescaled basket share by cost per 100g.

4. Sum.

5. Decide if it is necessary to use a multiplier to account for restaurant expenses / preparer's time.



Non-food component of the poverty line



Step 3. Determine the non-food component.

- Use the relationship between food and non-food spending of the reference population to calculate the non-food component of the poverty line. Combine these two measures to form that national cost-of-basic-needs poverty line.
- These calculations can be quite complex, but the main idea is that the non-food component is the non-food share of total spending by households whose food spending is close to the food poverty line.

Non-food component of the poverty line



There are a number of different approaches to calculating the non-food component of the poverty line, but nearly all countries currently use one of the methods proposed by Martin Ravallion. Here we will consider three options:

- Regression method based on an Engel curve
- Ravallion upper poverty line
- Ravallion lower poverty lines.

Regression method

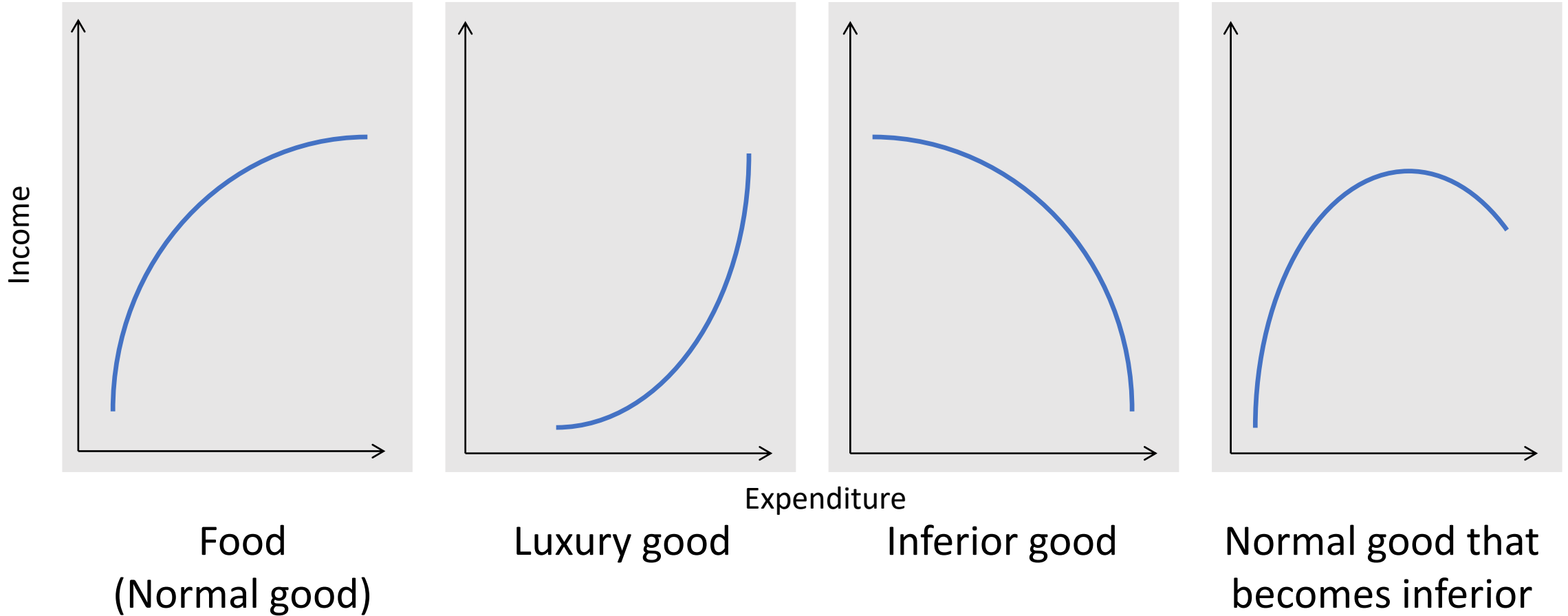


An Engel curve describes how spending on a particular good or service varies according to the household's income.

Each of the curves on the previous page can be represented as a quadratic function (with linear terms to estimate the slope and square terms to identify the inflection points).

The regression method uses econometrics to predict the shape of the curve describing the relationship between food spending and consumption.

Examples of Engel's curves



Non-parametric approaches

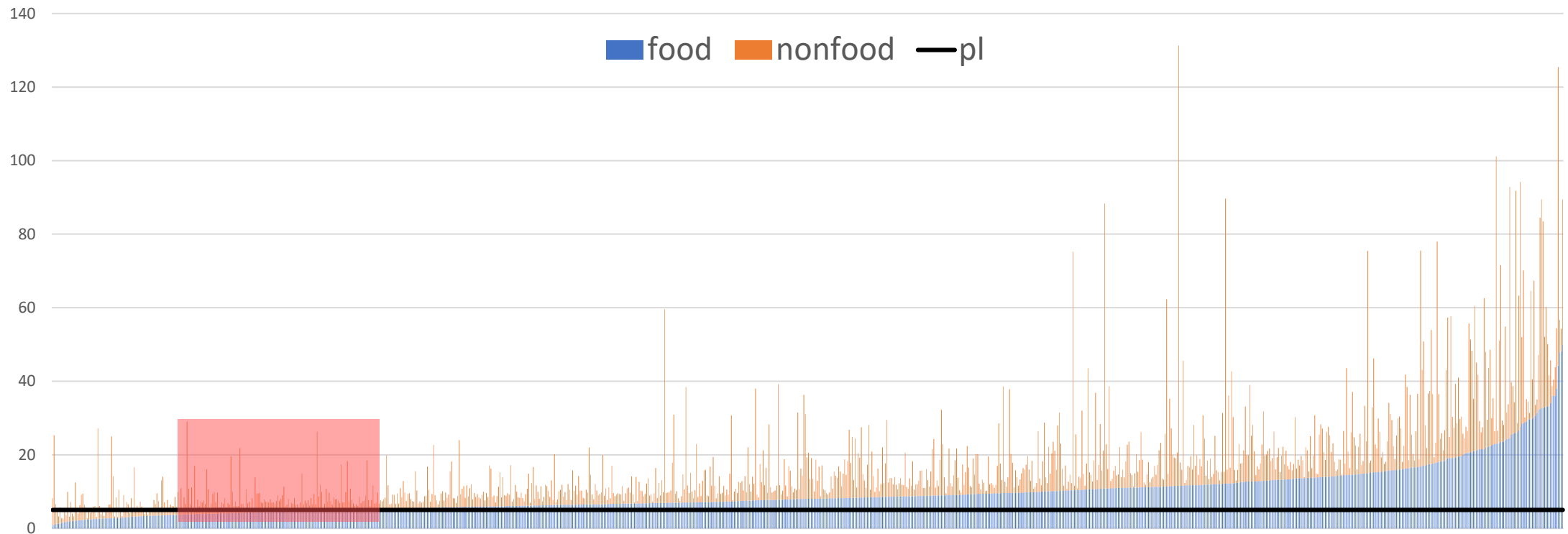


The Ravallion upper poverty line and Ravallion lower poverty lines are based on a non-parametric approach. These methods use the spending patterns of the poor around the poverty line to estimate the non-food share of the poverty line.

- The Ravallion upper poverty line uses per adult equivalent food consumption around the food poverty line.
- The Ravallion lower poverty line uses per adult equivalent total consumption around the food poverty line.

Non-food component of the poverty line

The black line represents the food poverty line. Where it meets the blue area (food spending) represents households whose food spending is equal to the food poverty line.



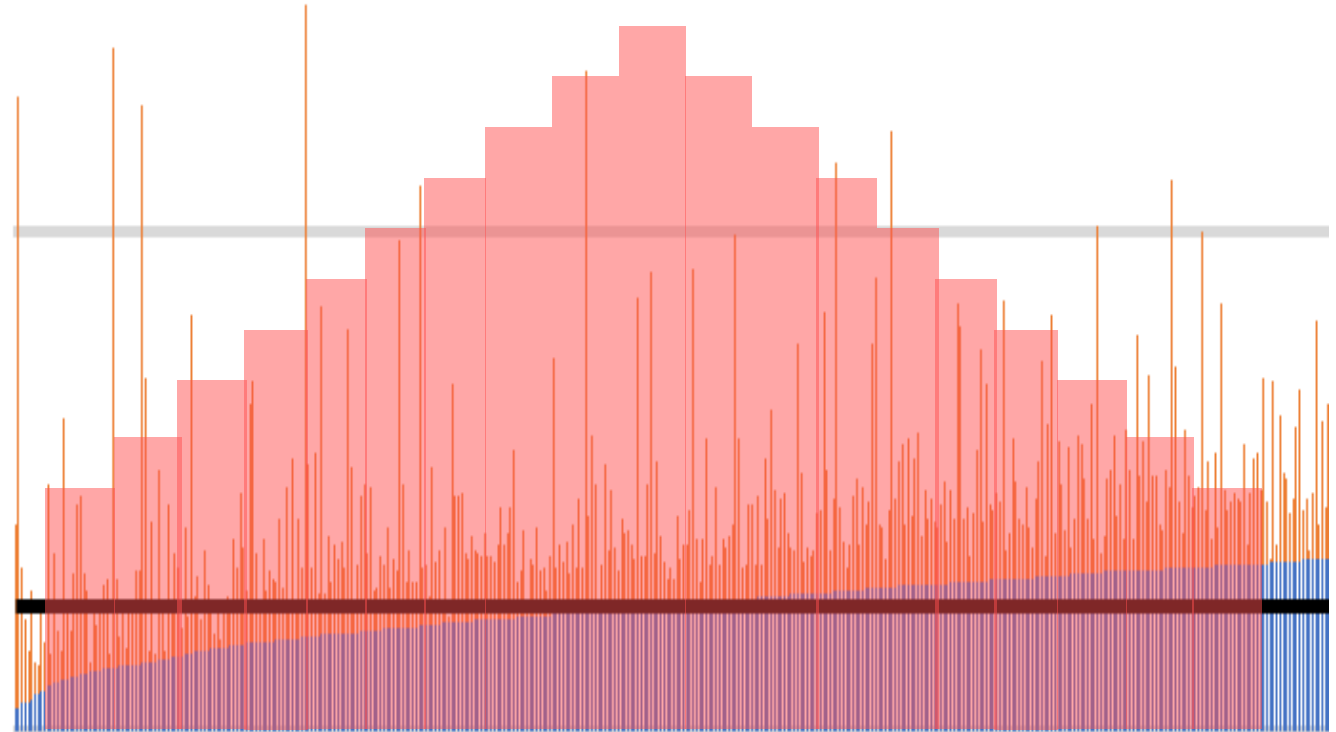
Ravallion upper poverty line



Step 1: Obtain average total per adult equivalent consumption for households whose food consumption is $\pm 1\%$ of the food poverty line.

Step 2: Repeat for households around $\pm 2\%$, continuing up to $\pm 10\%$.

Step 3: Take average of all averages. This average becomes the non-food component of the total poverty line.

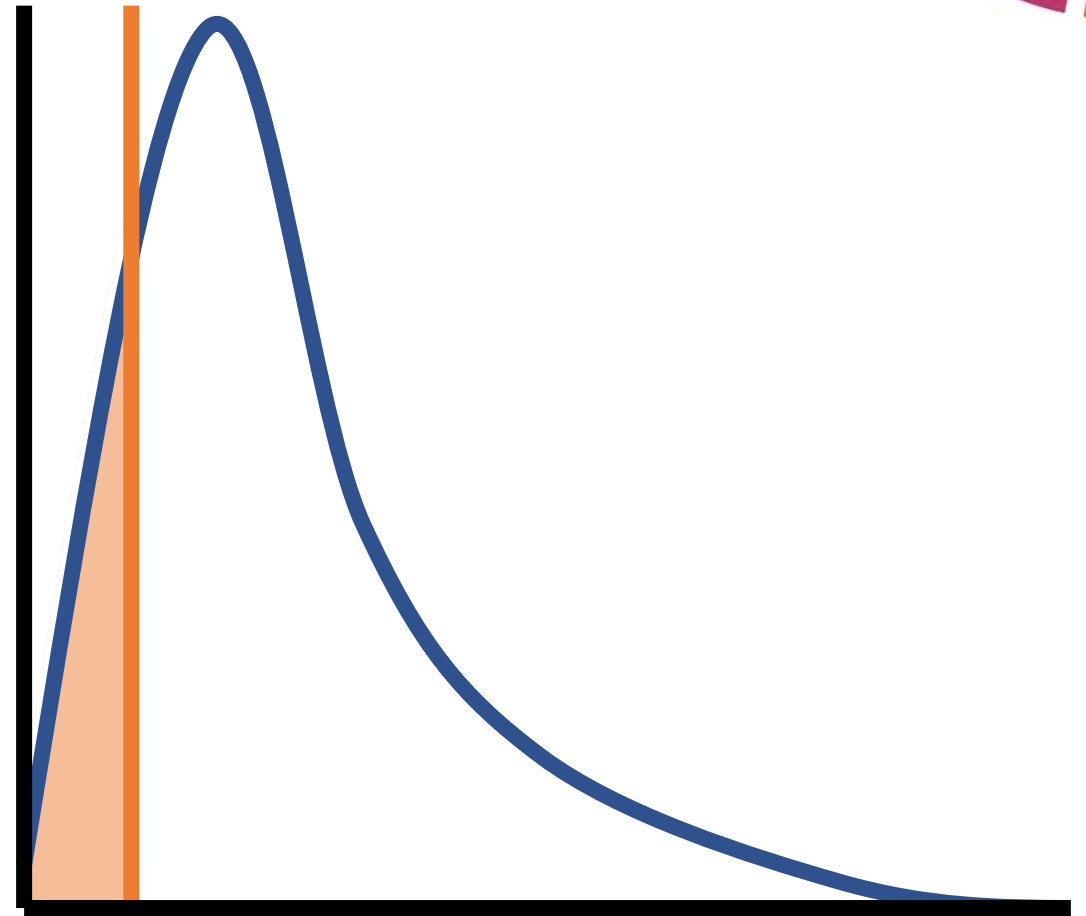


How is monetary poverty measured?

Each household has its own **consumption aggregate**. When these values are graphed, the result is the **consumption distribution**.

The poverty line crosses the consumption distribution and **all those living below the poverty line are considered poor**.

Poverty headcount = Total population of individuals living in households with consumption less than the poverty line divided by the total population.



FGT poverty measures



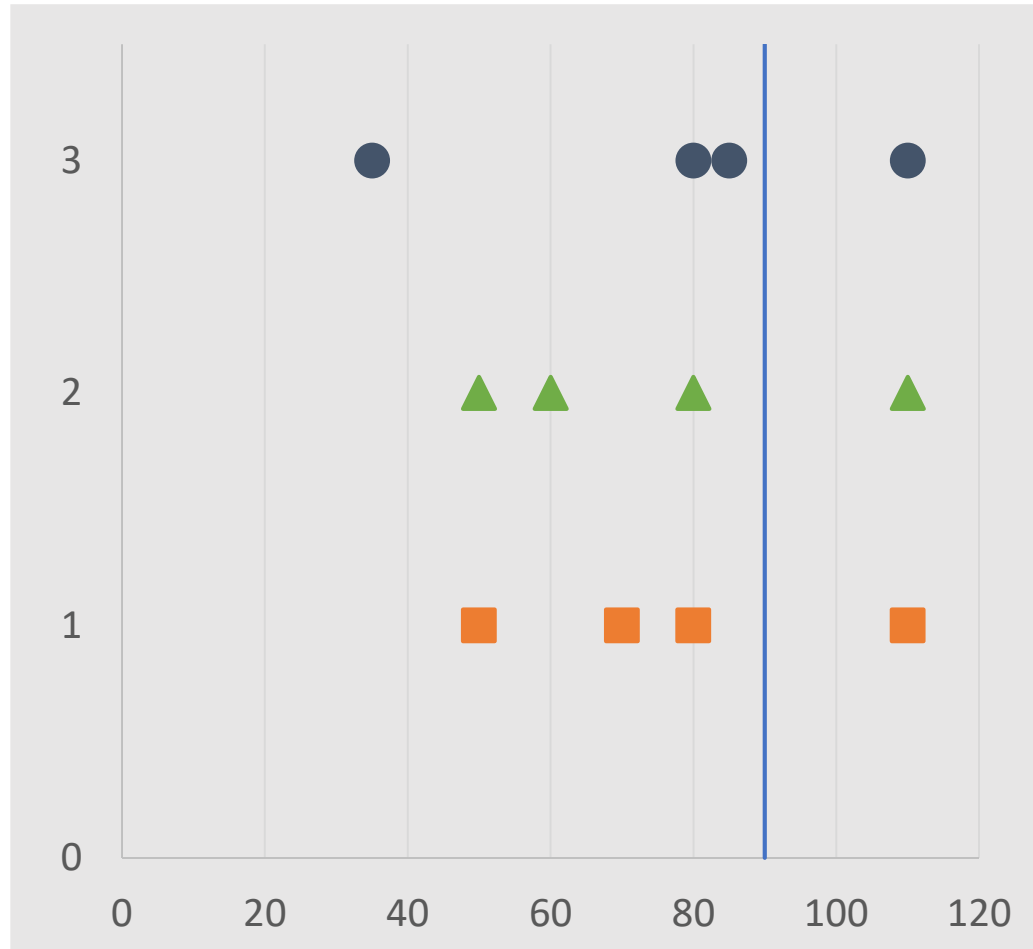
Foster, Greer & Thorbecke (1984) are the most common set of measures used in poverty analysis.

$$FGT_{\alpha}(\tilde{x}, z) = \frac{1}{n} \sum_{i=1}^n \left(\frac{z - \tilde{x}_i}{z} \right)^{\alpha}$$

FGT are a family of measures as the α takes different values ($\alpha \geq 0$)

1. $\alpha = 0 \rightarrow P_0$: Headcount (Incidence of poverty)
2. $\alpha = 1 \rightarrow P_1$: Average Poverty Gap (Depth/Intensity)
3. $\alpha = 2 \rightarrow P_2$: Average Squared poverty gap (Severity/Inequality)

Example data



The next set of examples uses sample data for a population of four individuals under three different sets of conditions.

Individual	pl	Case 1	Case 2	Case 3
1	90	50	50	35
2	90	70	60	85
3	90	80	80	80
4	90	110	110	110



FGT P_0 - Headcount



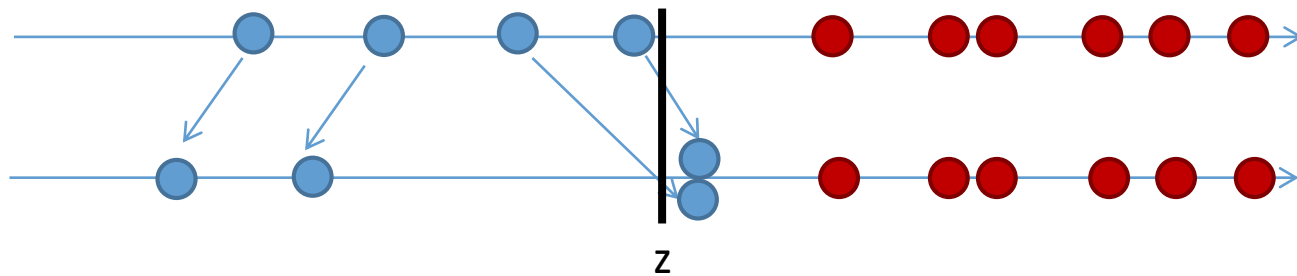
The headcount poverty statistic is the percentage of the population living below the poverty line.

Individuals	pl	Case 1		Case 2		Case 3	
	z	x	poor?	x'	poor?	x''	poor?
1	90	50	1	50	1	35	1
2	90	70	1	60	1	85	1
3	90	80	1	80	1	80	1
4	90	110	0	110	0	110	0
$P_0 =$		$\frac{3}{4} = 0.75$		$\frac{3}{4} = 0.75$		$\frac{3}{4} = 0.75$	

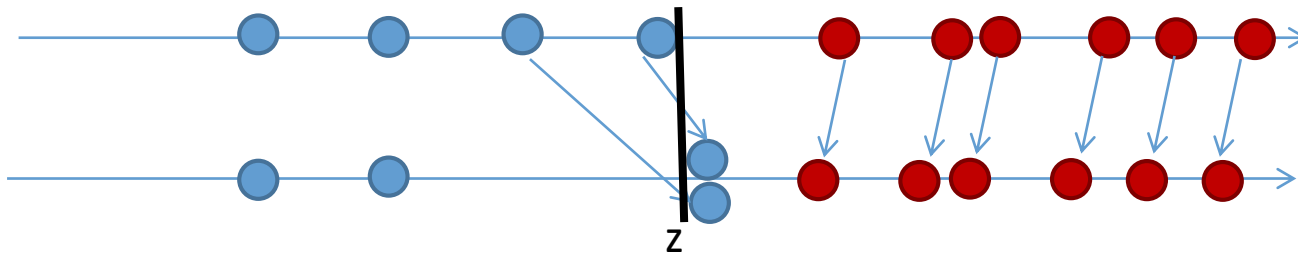
Why is the headcount not sufficient?



Using only the headcount index, these two policy interventions look identical.



In this example poverty is halved by means of regressive transfers among poor.



In this example poverty is halved by means of progressive transfers from non-poor to poor

FGT P_1 – Poverty Gap

The poverty gap is the average shortfall, as expressed as a percentage of the poverty line.

$$\frac{90 - 50}{90} = 0.44$$

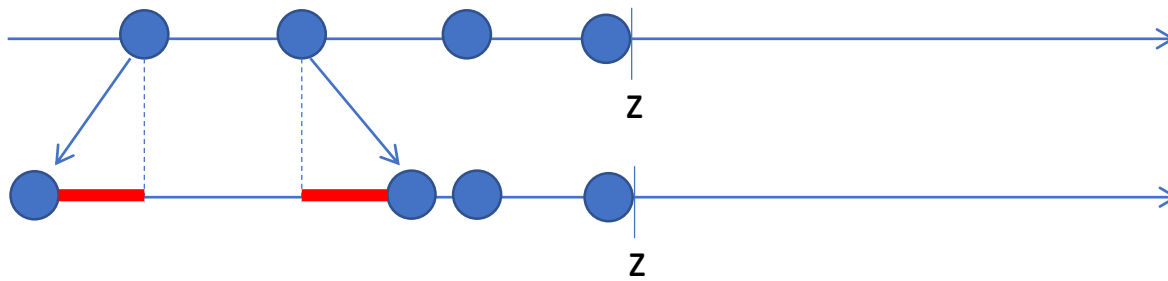
$$\frac{0.44 + 0.22 + 0.11 + 0}{4} = 0.1925$$

Individuals	Case 1			Case 2		Case 3	
	x	z	g^1	x'	g^1	x''	g^1
1	50	90	0.44	50	0.44	35	0.61
2	70	90	0.22	60	0.33	85	0.06
3	80	90	0.11	80	0.11	80	0.11
4	110	90	0	110	0	110	0
$P_1 =$	0.19			0.22		0.19	

Why is the poverty gap not sufficient?



This policy change does not show a difference in either the headcount or poverty gap.



Insensitive to regressive transfers among the poor

FGT P_2 – Squared Poverty Gap



The average squared poverty gap gives more weight to those who are further from the poverty line.

$$\left(\frac{90 - 50}{90}\right)^2 = 0.1936$$

$$\frac{0.19 + 0.05 + 0.01 + 0}{4} = 0.0625$$

Individuals	Case 1			Case 2		Case 3	
	x	z	g^2	x'	g^2	x''	g^2
1	50	90	0.19	50	0.20	35	0.37
2	70	90	0.05	60	0.11	85	0.003
3	80	90	0.01	80	0.01	80	0.01
4	110	90	0	110	0	110	0
$P_2 =$	0.06			0.08		0.10	

Stata / R / SAS



- Regardless of the decisions made in the calculation of the consumption aggregate and poverty line, it is **essential that the analyst use a software capable of handling the calculations correctly and maintaining a record of the steps.**
- Possible choices include Stata, R, or SAS. Excel, while useful for some part of the analysis, cannot be used for the core calculations as it cannot be used for the imputed rent calculations or account for the stratified cluster design in calculating the standard errors.
- The do / R files should be retained and archived as part of the survey documentation process.

Poverty line over time



- In most countries, the poverty line is only recalculated rarely, perhaps once every 10 – 15 years or when a major methodological change is introduced (such as switching to CAPI).
- Instead the poverty line from the previous survey is adjusted using CPI data to the midpoint of data collection for the new survey.
- In this way, it is possible to measure changes in poverty over time.

Recommendations



1. SDG 1.1.1 should be measured using the USD 1.90 PPP per capita per day International Poverty Line. SDG 1.2.1 should be measured using a national cost-of-basic-needs poverty line based in national survey data.
2. Food consumption should include purchases (including prepared meals and food consumed away from home), gifts received, food provided in-kind, home production, and rations.
3. Non-food consumption should include the use value of assets, imputed rent, education spending, health spending on preventative and elective procedures, but **exclude** “lumpy” expenditures, investment, loans, interest, taxes, and transfers out of the household (including gifts, remittances, and religious contributions).
4. Imputed rent should be calculated using the proposed decision path to account for local price differences and compensate for owners’ tendencies to overvalue their dwelling.

Recommendations



5. Countries should continue to use the OECD per adult equivalent instead of per capita measures to adjust the consumption aggregate for household composition.
6. The reference population for the consumption basket should always exclude the top and bottom decile, and otherwise use an iterative approach to determine the correct part of the distribution.
7. Poverty analysis should use the FGT measures, including poverty headcount, poverty gap, and poverty severity.
8. All data cleaning and calculations should be done using replicable methods in a statistical analysis program such as Stata or R. The do / R studio files should be retained and archived along with the dataset.

Questions for the PSMB's decision



The list below includes areas currently not covered in the recommendations. What should be the process and timeline for finalizing the recommendations?

1. How should home production be priced? Unit values? Market survey? Other?
2. When calculating the number of calories per 100g of prepared meals, should a multiplier be used? If so, how should the value be determined?
3. Should urgent care health spending be included in the non-food consumption aggregate?
4. Should the household composition adjustment take into account partakers?
5. What method should be adopted with regard to price deflators?
6. Should there be a regional caloric requirement? How should that value be set?
7. What method should be used for calculating the non-food component of the poverty line?
8. How should the poverty line be adjusted over time?

Next steps



Once the [PSMB agrees on a set of recommendations](#), this slide presentation will be updated with those recommendations, expanded, and serve as the basis for a companion text document.

The text document will be [formally adopted by the PSMB](#), and then disseminated to members.

The World Bank will develop [training materials](#) (including a dummy dataset and example [Stata / R code](#)), and, along with SPC and other development partners, [initiate a program of training in the region](#) in partnership with SPC, prioritizing those countries with recently completed, or soon to be completed HIES.

D&Z(2002) Health & Education



Table 3. 2: Elasticity of Health and Education Expenditures

Country	Year	Health Expenditures			Education Expenditures		
		Estim. elasticity	t- statistic	R squared	Estim. elasticity	t- Statistic	R squared
Vietnam	92-93	0.86	33.2	0.19	1.35	46.8	0.43
Nepal	1996	0.75	20.9	0.15	1.65	43.5	0.48
Kyrgyz Republic	1996	0.74	14.3	0.14	0.68	13.1	0.13
Ecuador	94-95	--	--	--	1.38	46.6	0.37
South Africa	1993	1.14	58.7	0.40	1.32	67.2	0.45
Panama	1997	0.80	29.2	0.25	1.24	54.9	0.49
Brazil	96-97	0.85	31.0	0.26	1.25	47.9	0.45



Annex

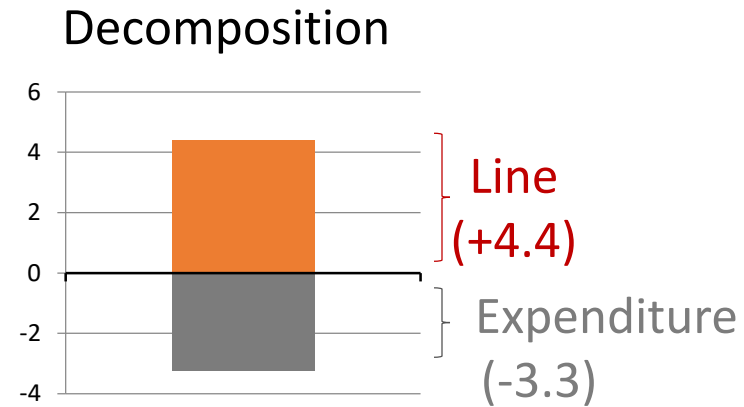
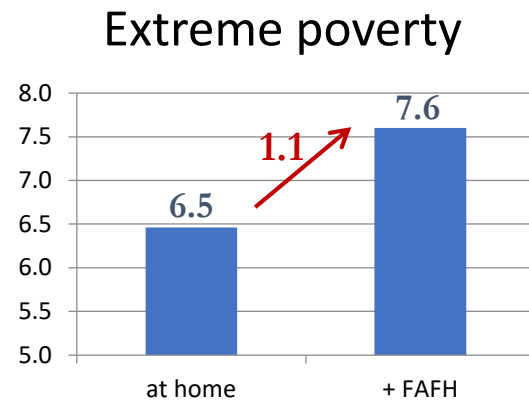
Impact of food away from home on the poverty line



Impact of Food Away from Home on National Poverty Line

Renos Vakis

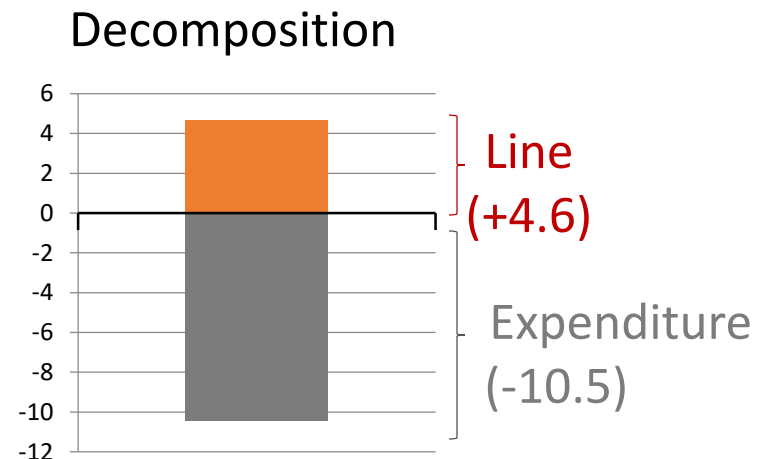
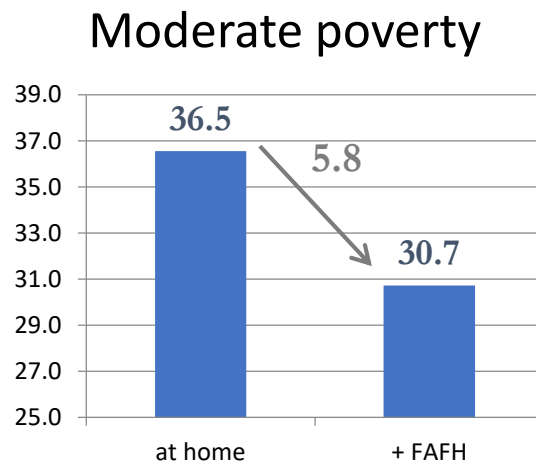
Impact on poverty rates (Peru 2010)



1.1 pp represents:

17% increase in the poverty rate

(337,500 individuals)

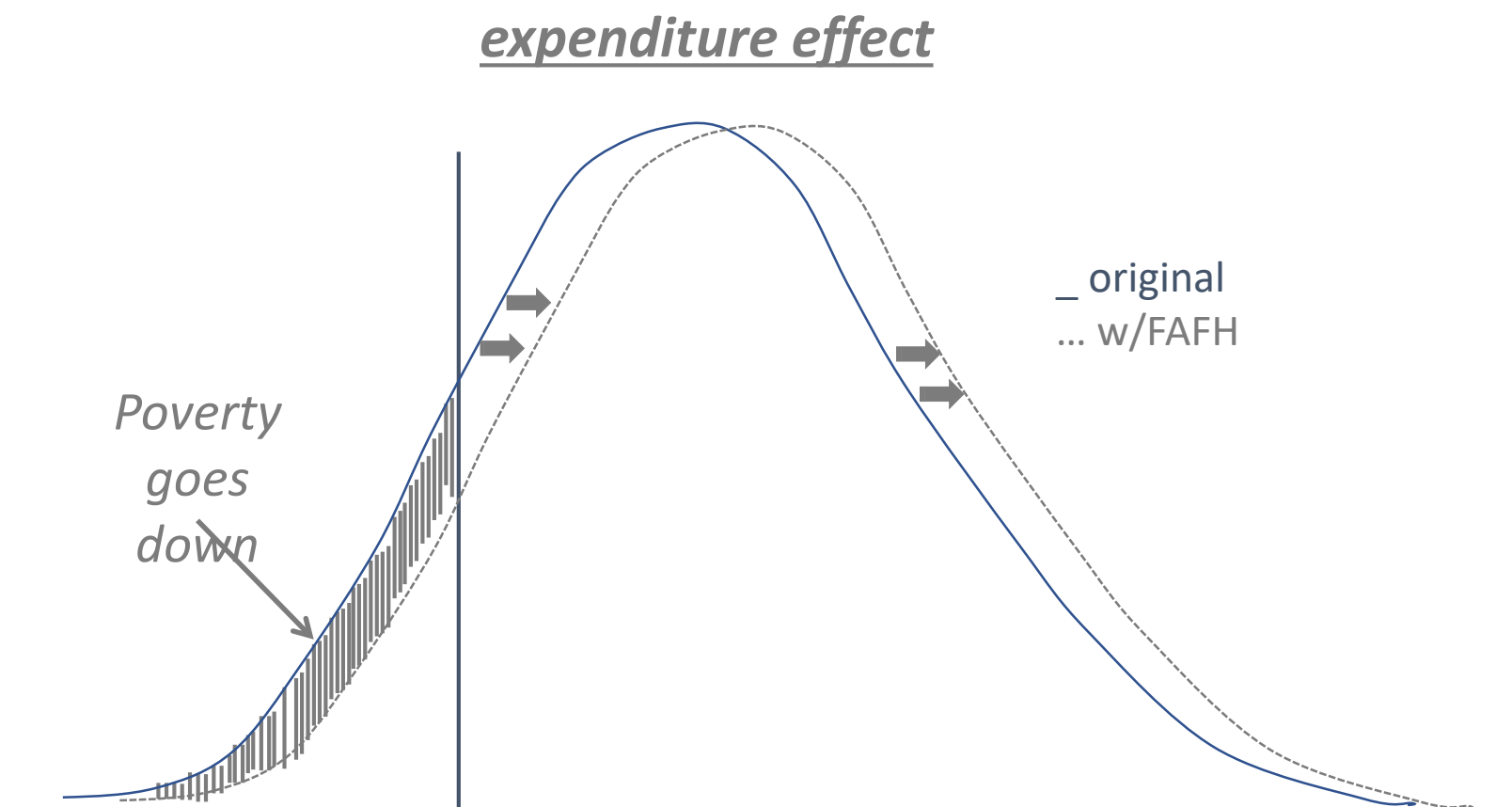


5.8 pp represents:

16% decrease in the poverty rate

(1,725,500 individuals)

Expenditure versus poverty line effects



Expenditure versus poverty line effects

