

Measuring Food Consumption: The Foundations

LECTURE 5

1

Where we stand

- What justifies our interest in collecting **data on food** consumption?
- **Food consumption expenditure** is a key component of any measure of **living standards** (lecture 1), **poverty** (lecture 14), and much more
- There are **additional research objectives**, which are useful to keep in mind when designing the food module of the questionnaire:
 - nutrition and food security
 - consumer price indices
 - informing National Accounts
 - ...

2

Main references for this lecture

most useful also for the next two lectures



3

Questionnaire design challenges for food module

- 1. Acquisition vs. consumption
- 2. Recall vs. diary and length of reference period this lecture
- 3. List of food items
- 4. Meal participation
- 5. Timing of visits
- 6. Food away from home
- 7. Non-standard measurement units

4

1. Acquisition vs. consumption

5

Definitions

- **Acquisition**
coming into possession, taking control of goods
- **Consumption**
utilizing goods (*i.e.* eating, in the case of food)
- **Mode of acquisition:**
 - purchase
 - own-production
 - in-kind receipt

6

Acquisition vs. consumption

what to do with the chicken?

- All goods that are **consumed** have been **acquired** in some way
- However, acquisition and consumption do not necessarily take place during the same **reference period**
- During a given period, say previous week, three possibilities:
 - a chicken is acquired and eaten ($A = C$)
 - a chicken is acquired, but not eaten ($A > C$)
 - a chicken is eaten, but has been acquired earlier ($A < C$)

7

Why definitions matter

- Acquisition and consumption are measured for **different purposes**:
 - 1) Interest in **consumption** is justified by interest in estimating a number of things: standard of living, calorie intake, etc.
 - 2) Interest in **acquisition** is justified by interest in food security (availability)
 - 3) Interest in acquisition from **purchases** (i.e. food expenditure) is justified by CPI weighting, and informing national accounts
- Based on survey objectives, **concept(s)** of interest must be clear, and the **questionnaire** must be unambiguous

8

Current practice

Smith et al. (2014)

- Smith et al. (2014) review **100 surveys** from developing countries
- They find that both consumption and acquisition are commonly collected, but **poor questionnaire design** is common
- About 25% of surveys were found to include **poorly worded questions, ambiguity**

9

Approaches to data collection

Conforti et al. (2017: 44)

Typically, data on food are collected in one of three ways:

- A. **Acquisition**
Households report on food they acquired through purchases, own production and in-kind transfers. Actual consumption of the same food is not reported.
- B. **Combination of acquisition and consumption**
Households report on food they acquired through purchases, without specifying the amount of food consumed. Then, they report consumption of food derived from own-production or received from transfers.
- C. **Consumption**
Households report on food actually consumed, specifying whether that same food was purchased, own-produced or received as a transfer.

10

Common questionnaire design issues

Consider the following **examples**. Comment on each of them by answering these questions:

1. From collected data, could we estimate **food consumption**? Acquisition? Purchase? All of the above?
2. What about **unit values**?
3. Can you see any **flaws** in questionnaire design?

11

Rule out (or 'filter') question

Burundi (2006)

Food expenditures in the last 15 days

11. Did you consume (product)? Yes No → next product	12. Did you buy any? Yes No → q15	13. How much did you pay? (value)	14. How much did you buy? (quantity)	15. Did you harvest or take from stocks? Yes No	16. How much? (quantity)
Food products					
1. Haricot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Patate douce	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Banane a biere	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13

Common questionnaire design mistakes

Evidence from Smith et al. (2014: 14-15)

1. Acquisition surveys: **filter question** on something else (18%)
2. Routine month surveys: ambiguity about whether respondents should report on the **routine month** in the recall period, or only those months in which the food item in question is consumed (13%)
3. **Ambiguity** on whether to report on acquisition or consumption (7%)
4. Data collected on **food harvested** rather than **food consumed** from home production (3%)

17

Should we collect data on acquisition or consumption?

- **It depends** on the purpose of the survey (lecture 4)
- **Welfare analysts** would want **consumption** (lectures 1-2)
- **Statisticians** (and others) are also interested in **acquisition** to construct weights for their CPIs
- Conforti et al. (2017) finds that the difference in estimated mean acquisition and mean consumption is small, but acquisition is much more variable

18

Recommendation # 1

FAO and WB (2018: 53-55)

Always collect data on all **modes of acquisition** (**purchase, own-production, in-kind receipts**), irrespective of whether focus is on amount consumed or acquired.

If not, there will be **underestimation** of both consumption and acquisition.

- Pay special care to **in-kind receipts** that are likely to be missed (e.g., payments for labor and social programs).
- Be careful not to **duplicate information** captured in other modules (e.g., employment or social assistance)

19

Recommendation # 2

FAO and WB (2018: 53-55)

Surveys should be designed so that it is clear to respondents, enumerators, and data users **what information (consumption, acquisition, or both) is requested and reported**

- If **consumption**: it should be clear whether it is food **intended** for consumption (including food waste) or food **actually** consumed (net of food waste)
- If **purchases**: recommended to **add an extra question** on how much was consumed out of those purchases, to avoid mixing acquisitions from purchases with consumption from own-production and in-kind receipts

20

Recommendation # 3

FAO and WB (2018: 53-55)

Avoid sources of **incomplete or ambiguous enumeration**

- Do not use **filter questions** on consumption to rule out acquisition (and vice versa)
- Avoid filter questions that focus on food purchases
- For own-production, the question must be worded to clearly indicate food consumed from **own-production** rather than food **harvested**. If not, values reported may include food entering the household's production stocks (that is, not for immediate consumption).

21

2. Recall vs. diary and length of reference period

22

Definitions: recall and diary

Data on household food consumption (or acquisition) commonly collected in one of two ways:

1. Respondents are interviewed and asked to **recall** consumption during a specified period (past week, past month...).
2. Households are asked to keep a **diary** over a reference period (days, weeks...) and record consumption at the moment it takes place.

23

Definitions: recall period and reference period

- **Recall period:** the period over which respondents are asked to recall their consumption
- **Reference period:** the period over which data collection happens
- For example:
 - Households are interviewed about food consumption in the past 7 days, over 4 weekly visits
 - 7 days = recall period, 28 days = reference period

24

Example of recall questionnaire

Zambia Living Conditions Monitoring Survey (LCMS VII) 2015

Section 11A. Household Expenditure

Q1	PURCHASE		OWN PRODUCTION		GIFT, FOOD FOR WORK, HELD FOOD				
	Q2	Q3	Q4	Q5	Q6	Q7			
<p>LAST 7 DAYS</p> <p>Did this household purchase/consume/prepare any food during the last 7 days?</p> <p>READ OUT: YES 1, NO 2, DON'T KNOW 3</p> <p>FILL IN PER: NEXT ITEM</p>	<p>During the last 2 weeks, how much did you purchase for your household (ITEMS) (DO NOT ASK)?</p>	<p>How many (UNIT) of items did your household purchase for their use?</p>	<p>During the last 2 weeks, how many (ITEMS) of items did your household produce?</p>	<p>How much would this have cost (ITEMS) if you had to buy it?</p>	<p>During the last 2 weeks, how many (ITEMS) of items did your household receive without payment?</p>	<p>How much would this have cost (ITEMS) if you had to buy it?</p>			
	VALUE IN KWACHA	QUANTITY	UNIT CODE	QUANTITY	UNIT CODE	VALUE IN KWACHA	QUANTITY	UNIT CODE	VALUE IN KWACHA
Other food expenses:									
25 Food items (incl. Group 26) not asked									
26 Food items (incl. Group 25) asked									

25

Example of diary

Kenya Integrated household budget survey 2015, seven-day reference period

CD01	CD02	CD03	CD04	CD05	CD06	
Date	ITEM CODE	Description of item	Mode of acquisition of consumption item	Quantity consumed	PRICE	Consumption
			PURCHASED 01 OWN PRODUCE 02 OWN STOCK 03 GIFT 04 RELIEF 05 PROVIDED BY FRIENDS 06 (KATHINDINDA MUKUNGU) FISHING 07 WATER 08 OTHER (SPECIFY) 99			GRAMS 01 KILOGRAMS 02 METRES 03 LITRES 04 NO/PIECE 05
2015-07-15		radio hour	Own Produce	02	3	14
2015-07-15		offage	Purchased	01	1	18
2015-07-15		fish	Purchased	04	000	05

26

Diary or recall?

- Which approach is better, in terms of the quality of collected data?
- Both methods have **pros and cons**
- In particular, they both have the potential to generate **measurement error**, for different reasons
- Let us see how to evaluate the risks associated to either choice

27

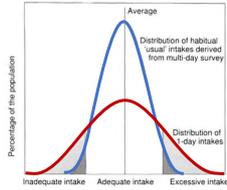
Problems with recall

- Memory can fail: **biases** related to length of recall period
- Long** recall period
 - Tendency to forget, or **memory decay**
 - More likely if expenditure is perceived as ordinary, **not salient**
 - Leads to **under-reporting** of consumption
- Short** recall period
 - Telescoping**: tendency to mistakenly report consumption that has actually taken place **outside** the recall period
 - More likely if expenditure is perceived as extraordinary, **salient**
 - Leads to **over-reporting** of consumption

28

Length of recall period and shape of the distribution

Rosalind Gibson (2005: 139)



- Suppose we interview individuals on food intake using a **multi-day recall**. The distribution of food intake is the **blue curve**.
- Now suppose we interview the same individuals using a **1-day recall**. We obtain the distribution of intakes represented by the **red curve**.
- Due to the short recall, total variance will be higher, and the distribution will be 'wider and fatter'.
- Conclusion: a **short recall overestimates variance**, that is exaggerates the incidence of both inadequate and excess intake.

29

Problems with diary

- In principle, **diary avoids memory fails**, as it is compiled close to the moment in which event (consumption or purchase) occurs
- In practice, diary keeping introduces other problems:
 - **Respondent burden and fatigue**, particularly when length of diary increases: evidence of "diary exhaustion" (Brzozowski, Crossley and Winter 2017; Gibson 2013)
 - To reduce these issues, high levels of supervision are needed, which imply **high implementation costs** (FAO study of Bangladesh 2010 HIES showed good results with enumerator visits every two or three days)

30

Alternative methods are unsatisfactory – I/II

Usual month approach

- Respondents are asked to report consumption for the "usual month" during the previous year
- Advocated by Deaton and Grosh (2000) to capture typical consumption
- At best, it is not more effective than simple recall; at worst, it introduces errors related to education of respondents, due to cognitive burden (Fiedler and Mwangi 2017: 25; Friedman et al. 2017)

31

Alternative methods are unsatisfactory – II/II

Bounded recall

- First visit to household establishes the bound of the recall period for a second visit, which is when the interview actually takes place
- Meant to avoid telescoping errors
- Not yet enough evidence that it offers significant advantages in data quality (Gibson, 2005), while it is more costly to administer (double the visits)

32

Do these “details” matter?

- Large body of evidence finds that the choice between **diary and recall**, and of the **length of recording periods**, can **significantly affect results**
- Important papers that studied the impact of survey methodology on consumption and poverty statistics:
 - SHWALITA study in Tanzania (Beegle et al. 2012, Gibson et al. 2015, de Weerd et al. 2016)
 - Niger (Backiny-Yetna et al. 2017)

33

The importance of questionnaire design – Tanzania

Beegle et al. (2012)

Journal of Development Economics 86 (2012) 3–18
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Journal of Development Economics
journal homepage: www.elsevier.com/locate/econbase

Methods of household consumption measurement through surveys: Experimental results from Tanzania

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ARTICLE INFO
ABSTRACT
KEYWORDS

34

Overview

Beegle et al. (2012)

- Focus on food consumption
- Benchmark (“gold standard”): [personal diary with daily visits](#)
- **Experimental design** compares benchmark with 7 alternative questionnaires, which vary by method of data capture (recall or diary), level of respondent, length of reference period, number of items in the recall list (which we will cover in lecture 6)

35

Fielding eight alternative consumption questionnaires

- “Our survey experiment entailed fielding [eight alternative consumption questionnaires](#) randomly assigned to 4,000 households in Tanzania.”
- If **questionnaire design** did not matter, **results** from data collected through different questionnaires **should not differ too much**

36

Table 1
Survey experimental consumption modules

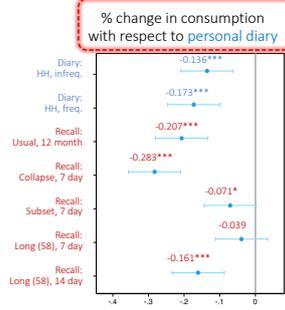
Module	Consumption measurement	Food content	N households
1	Long list (58 food items) 14 day	Quantity from purchases, own-production, and gifts/other sources; Shilling value of consumption from purchases	504
2	Long list (58 food items) 7 day	Quantity from purchases, own-production, and gifts/other sources; Shilling value of consumption from purchases	504
3	Subset list (17 food items; subset of 58 foods) 7 day	Quantity from purchases, own-production, and gifts/other sources; Shilling value of consumption from purchases	504
4	Collapsed list (11 food items covering universe of food categories) 7 day	Shilling value of consumption	504
5	Long list (58 food items) Usual 12 month	Consumption from purchases: number of months consumed, quantity per month, Shilling value per month Consumption from own-production: number of months consumed, quantity per month, Shilling value per month Consumption from gifts/other sources: total estimated value for last 12 months	504
6	Household diary, frequent visits 14 day diary		503
7	Household diary, infrequent visits 14 day diary		503
8	Personal diary, frequent visits 14 day diary		503
			4029

Notes: Frequent visits entailed daily visits by the local assistant and visits every other day by the survey enumerator for the duration of the 2-week diary. Infrequent visits entail 3 visits: to deliver the diary (day 1), to pick up week 1 diary and drop off week 2 diary (day 8), and to pick up week 2 diary (day 15). Households assigned to the infrequent diary but who had no literate members (about 18% of the 503 households) were visited every other day by the local assistant and the enumerator.
Non-food items are divided into two groups based on frequency of purchase. Frequently purchased items (charcoal, firewood, kerosene paraffin, matches, candles, lighters, laundry soap, toilet soap, cigarettes, tobacco, cell phone and internet, transport) were collected by 14-day recall for modules 1-5 and in the 14-day diary for modules 6-8. Non-frequent non-food items (utilities, durables, clothing, health, education, contributions, and other; housing is excluded) are collected by recall identically across all modules at the end of the interview (and at the end of the 2-week period for the diaries) and over the identical one or 12-month reference period, depending on the item in question.

37

Results: diary vs. recall

- Results of a regression of log consumption on dummies indicating module assignment
- Benchmark module: personal diary
- Differences between diaries and recall **not clear-cut**: other questionnaire features have larger impact



Better data, but at a price

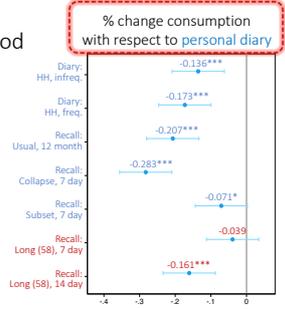
diary supervision and costs

- Quality of reporting in household diaries did not vary much with **frequency of visits**.
- Notable exception: **illiterate households**, where infrequently supervised diary dramatically underestimates consumption
- Personal diary with frequent (daily or 2-daily) supervision has variable **cost at least 6 times as much as recall**



Results: length of recall period

- Same instrument (recall module, long list), except increase recall period from 7 days to 14 days:
 - 12% average per capita consumption (0.161-0.039)
 - + 8 points poverty headcount rate (see page 14 in the paper)



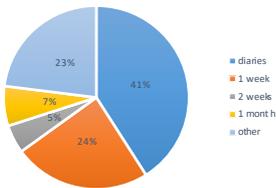
Recap of the evidence

- **Recall vs. diary:** questionnaire design choices matter for results on consumption, poverty, nutrition...
- In order to yield high-quality data in low-income and rural contexts, **diary requires frequent, costly supervision**
- **Recall period:** food consumption tends to be underestimated with longer recalls
- Little evidence in support of **alternative methods** (e.g., “usual month” and “bounded recall”)

47

Current practice

Smith et al. (2014)



- Variety of recall periods
- “other” includes the **usual-month** approaches and multiple recall periods

48

Recommendations

FAO and WB (2018: 50-53)

1. While a **diary approach** may be the “gold standard” with close supervision and careful implementation, it is not suitable for resource-constrained statistical offices in low- and middle-income countries
2. Low-income countries are advised to adopt **recall interviews and a 7-day recall period**, as this method provides a good balance between accuracy and cost-effectiveness
3. Any survey using diary methods must be closely supervised to ensure compliance. The reference period should not exceed **2 weeks**.

49

Recommendations

FAO and WB (2018: 50-53)

3. The “usual month” approach should not be used.
4. Any change in recall period or data collection method (diary vs. recall) should be accompanied by an **experimental component** aimed at assessing the change in survey estimates.
5. The evidence in Beegle et al. (2012), De Weerdt et al (2016), and Backiny-Yetna et al. (2017) will hopefully serve as a useful reminder.

50



Lessons learned

- Quality data on **food consumption** are **crucial** for several research objectives, living standards measurement being one of them
- **Questionnaire design matters**: large impact on final results
- This lecture has explored some **foundational choices** in the design of the food module:
 - Should we measure **consumption** or **acquisition**?
 - Should we use **diary** or **recall**? How should the reference period be set?
- **Experimental evidence** provides guidance (recommendations 1-5 in the previous two slides).

51

References

Required readings

FAO and The World Bank, 2018. Food data collection in Household Consumption and Expenditure Surveys. Guidelines for low- and middle-income countries. Rome. Sections 2.1, 2.3, 3.1, 3.3.

Smith, L. C., Dupriez, O., and Troubat, N. 2014. Assessment of the reliability and relevance of the food data collected in national household consumption and expenditure surveys. International Household Survey Network. Sections 3.1, 3.2, 3.3.

Suggested readings

Backiny-Yetna, P., Steele, D., and Djinja, I. (2014). The impact of household food consumption data collection methods on poverty and inequality measures in Niger. World Bank Policy Research Working Paper 7090. World Bank, Washington, DC.

Beegle, K., De Weerdt, J., Friedman, J., and Gibson, J. (2012). Methods of household consumption measurement through surveys: Experimental results from Tanzania. Journal of Development Economics, 98, 3-18.

Brazzowski, M., Crossley, T. F., & Winter, J. K. (2017). A comparison of recall and diary food expenditure data. Food Policy, 72, 53-61.

Conforti, P., Grünberger, K., & Troubat, N. (2017). The impact of survey characteristics on the measurement of food consumption. Food Policy, 72, 43-52.

De Weerdt, J., Beegle, K., Friedman, J., and Gibson, J. (2016). The challenge of measuring hunger through survey. Economic Development and Cultural Change, 64(4), 727-758.

Fiedler, I. L. and Mwangi, D. M. 2016. "Improving household consumption and expenditure surveys' food consumption metrics: developing a strategic approach to the unfinished agenda". IFPRI

Friedman, J., Beegle, K., De Weerdt, J. and Gibson, J. 2017. Decomposing response error in food consumption measurement: implications for survey design from a randomized survey experiment in Tanzania. Food Policy, 72: 94-111.

Gibson, J., Beegle, K., De Weerdt, J., and Friedman, J. (2013). What does variation in survey design reveal about the nature of measurement errors in household consumption? The World Bank. Gibson, R. S. (2005). Principles of nutritional assessment. Oxford University Press, USA.

52

Thank you for your attention

C4D2 TRAINING 53

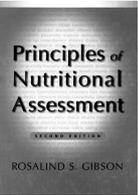
53

Homework

C4D2 TRAINING 54

54

Exercise 1 – Engaging with the Literature



- Read Gibson (2005) chapter 5 "Measurement Error in dietary assessment".
- Write a short essay (not to exceed 3,000 characters) where you summarize the main findings.

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55

Exercise 2 – Acquisition vs. consumption

Look at the following examples of recent questionnaires. Ask yourself what they would allow you to estimate:

- total value of food consumption?
- total value of food acquisition?
- both?
- none?

For each example, shade the parts of the diagram for which you would be able to provide an estimate.

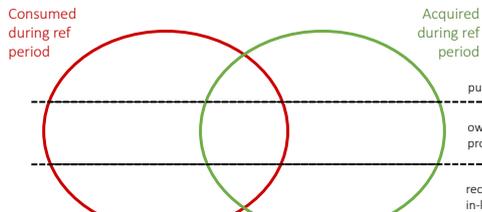
56

Example 1

SECTION 5A: FOOD LAST 7 DAYS

F		D		S		A		E		G	
Over the past one week (7 days), did you or others in your household consume any (SPEC)?		How much in total did your household consume in the past week?		How much came from your choice?		How much did you spend?		How much came from own production?		How much came from gifts and other sources?	
INCLUDE FOOD BOTH EATEN COMMUNALLY IN THE HOUSEHOLD AND THAT EATEN SEPARATELY BY INDIVIDUAL HOUSEHOLD MEMBERS.		IF NONE RECORDED AND SKIP TO Q5.		IF NONE RECORDED AND SKIP TO Q5.		IF NOT CONSUMED FROM OWN PRODUCTION RECORD 0.		IF NONE RECORDED.		IF NONE RECORDED.	
YES...1 NO...2 ▶ NEXT ITEM		SEE UNIT CODES		SEE UNIT CODES		SEE UNIT CODES		SEE UNIT CODES		SEE UNIT CODES	
QUANTITY	UNIT CODE	QUANTITY	UNIT CODE	BBB	QUANTITY	UNIT CODE	QUANTITY	UNIT CODE	QUANTITY	UNIT CODE	
CEREALS											
1	Wheat										
2	Barley										
3	Rice										
4	Maize										
5	Sorghum										
6	Millet										
7	Other cereal (SPECIFY)										

57



58
