

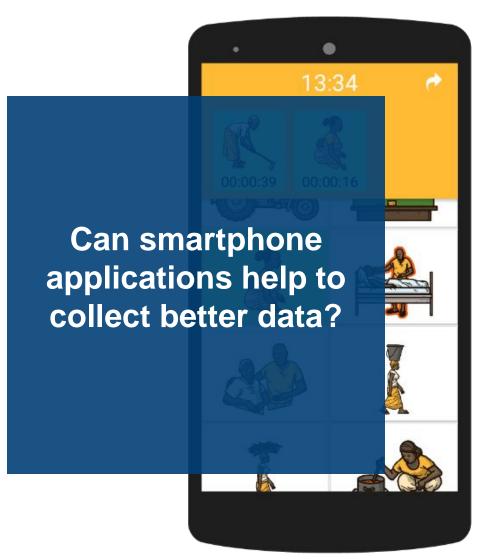
Times Have Changed.
Using a Pictorial
Smartphone App to
collect Time Use Data in
rural Zambia

Thomas Daum, Hannes Buchwald, Ansgar Gerlicher & Regina Birner





2.2 According to the sketch you indicated that your hh had fields cultivated or managed on behalf of absentee owners. Enumerator: Ask the respondent to give you the details abo Table 2.2.1 Fields Key Variables: CLUSTER, HH, FIELD Enumerator: What is the land-Enumerator: What is use of this field? the area of this field? What is Field II What are the FIELI 2 challenges of 3 4 measuring time use in 5 6 developing countries? 8 9 10 11 12 2=Femal =Both head and spouse 5=local govt. authorities 6=Other male hh member Other female hh member =husband's/man's parents 8=Non-hh male relative 8=wife's/woman's parents l=Faidherbia albida (musar 9=Non-hh female relative 9=husband's/man's other relatives 2=Gliricidia sepium 10=Non-hh male non-relative 10=wife's/woman's other relatives 3=Sesbania sesban 11=Non-hh female non-relative 4=Tephrosia vogelii (ububa)







## **Challenges for time use research**

Recall problems

Arthi et al. (2018) found that Tanzanian farmers report a work time that is four times higher when asked via a postharvest instead of a weekly survey

- Reasons for recall problems in developing countries
  - 1) Use of postharvest recall questions
  - 2) Seasonality of farming
  - 3) Lack of clock based time concepts
  - 4) People tend to have less-structured days
  - 5) Many surveys designed to be answered by the "household head"
  - 6) Influences of harvest produced? Intensity?





## How to measure time use and labor?

Criteria	Surveys (post-harvest)	Surveys Diaries (weekly)		Observ. (real time)
Recall Bias	High	Medium/High Low		No
Desirability Bias	Yes	Yes	Yes	Yes
Prerequisites			Literacy	
Costs	Low	Medium/High	Low	High

**Reduction of Recall Period** 





## Pictorial time diaries in Ethiopia (Masuda et al., 2012)

- book with a grid, activity stickers, and a clock, which beeps every 30 minutes
- for people without literacy and clock-based concepts of time
- still cumbersome, does not allow simultaneous activities, coarse data given 30 minutes intervals











### ICTs?

 spread of mobile phones and services

Adults who own a cell phone

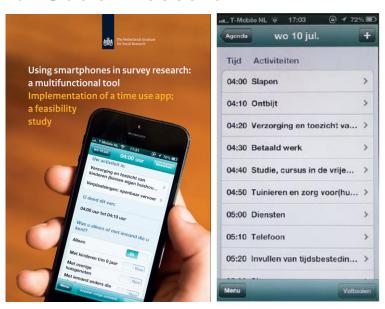
 Can this be utilized to collect data?

### Cell Phone Ownership Surges in Africa

Source: Spring 2014 Global Attitudes survey. Q68.

PEW RESEARCH CENTER

 See examples from developed countries: Fernee and Sonck from The Netherlands Institute for Social Research







## **Timetracker**

- respondents record time use and nutrition data in real-time based on illustrations
  - ✓ avoid recall biases
  - ✓ illiterate people can use app
  - offline (online) data transfer
  - smartphone are blocked
  - battery-life: up to five days







# **Example**

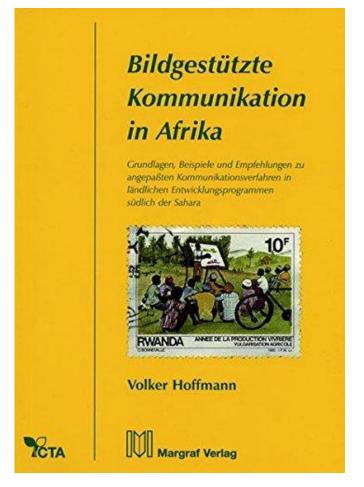
			Diam.			Food		
Activity	Start	End	Piece- work	Quantity	Cereals	Vegetables		Diversity Score
Sleeping	00:00:00	05:34:28	No					
Hygiene	05:34:51	05:46:48	No					
Walking	05:47:07	06:02:07	No					
Harvesting	06:02:27	12:01:59	No					
Eating	19:47:59	20:08:57	No	1	1	1	1	3
Chatting	20:09:46	20:31:38	No					
Sleeping	20:31:50	00:00:00	No					





# **Pre-testing and social context**

- Pre-testing
  - App design
    - Picture sizes
    - Clicking duration
    - Grouping)
  - Illustrations used (e.g. eating activity)







# **Pre-testing and social context II**

- Social context
  - Consider the role of village authorities, social dynamics and beliefs → careful introduction
  - emphasis on explaining why a smartphone app was used and why the participating households had to be selected randomly







## **Sampling**

- 2 stage random sampling based on RALS 2014/2015
- 62 HHs
  - head, spouse & one child
  - trained & practiced for one day
  - data collection at five points of 2016/2017 farming season
  - respondents were borrowed smartphones
- Recorded 2790 days
- Research costs: ca. 15\$ per data day







# **Data Quality**

Collection Round	"data entered/corrected by research team"
Land Preparation	0.6 %
Planting	0.8 %
Weeding	0.7 %
Harvesting	2.9 %
Processing	2.3 %





## How to measure time use and labor?

Criteria	Surveys (post-harvest)	Surveys (weekly)	Diaries (daily/weekly)	Observ. (real time)	Timetracker (real time)
Recall Bias	High	Medium/ High	Low	No	Low
Desirability Bias	Yes	Yes	Yes	Yes	Low (?)
Prerequisites			Literacy		No
Costs	Low	Medium/High	Low	High	Medium

**Reduction of Recall Period** 





# Comparison of "Timetracker" with 24 hours recall questions

	Lan	d Pre	р	Plar	nting		We	eding	3	Har	vesti	ng	Pro	cessi	ng
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
"Timetracker"	Х	Х	х	Х	х	Х	Х	Х	Х	Х	Х	х	Х	Х	Х
24 hours recall												х			Х





# Comparison of selected activities during harvesting

Minutes	Timetracker	24h-recall	Factor
Meeting	8 (5)	20 (6)	3,3
Farming	200 (15)	258 (17) **	1,3
Education	26 (9)	28 (8)	1,1
Chores	126 (12)	96 (10) *	0,8
Mobility	147 (13)	101 (10) ***	0,7
Social Life	172 (16)	78 (9) ***	0,5





# Comparison of selected activities during harvesting

Minutes	Timetracker	24h-recall	Factor
Care	24 (6)	119 (15) ***	5,0
Meeting	8 (5)	20 (6)	3,3
Farming	200 (15)	258 (17) **	1,3
Education	26 (9)	28 (8)	1,1
Chores	126 (12)	96 (10) *	0,8
Mobility	147 (13)	101 (10) ***	0,7
Social Life	172 (16)	78 (9) ***	0,5

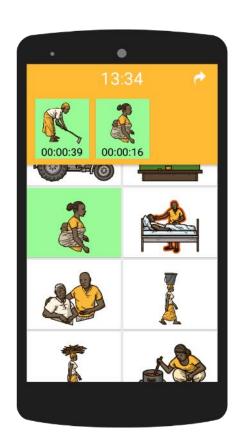
The
Invisible
Hand that
Rocks the
Cradle: On
the Limits
of Time
Use
Surveys
(Lentz et al.,
2018)





### **Discussion**

- Extrapolation of data
- Validation
  - GPS, fitness trackers, cameras
- Intensity of efforts
  - Fitness trackers
- Enjoyment of time use
  - Pop-up windows
- New "plug-ins" and camera
  - e.g., quality of extension, feeding of animals, input application









### **Conclusion**

- Well tailored smartphone apps that use visual tools provide new and much needed pathways for time—use researchers working in developing countries
- Smartphone apps also promise wide an untapped potential for further transdisciplinary uses







### More to read:

Times Have Changed:
Using a Pictorial
Smartphone App
to Collect Time-Use
Data in Rural Zambia

Field Methods
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#### Abstract

One challenge of collecting socioeconomic data, such as data on time-use, is recall biases. While time-use researchers have continuously developed new methods to make data collection more accurate and easy, these methods are difficult to use in developing countries, where study participants may have low literacy levels and no clock-based concepts of time. To contribute to the closing of this research gap, we developed a picture-based smartphone app called Time-Tracker that allows data recording in real time to avoid recall biases. We pilot tested the app in rural Zambia, collecting 2,790 data days. In this article, we compare the data recorded with the app to data collected with 24-hours recall questions. The results confirm the literature on recall biases, suggesting that using the app leads to valid results. We conclude that smartphone apps using visual tools provide new opportunities for researchers collecting socioeconomic data in developing countries.

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Contents lists available at ScienceDirect

### Computers and Electronics in Agriculture





Original papers

Smartphone apps as a new method to collect data on smallholder farming systems in the digital age: A case study from Zambia



Thomas Daum\*\*, Hannes Buchwald\*, Ansgar Gerlicher\*, Regina Birner\*

### ARTICLE INFO

Ryundic Smarthone appo Methodology ICTs Data collection Time use Notation

#### ABSTRACT

Across the developing work, the ground of mobile and smartphones has led to a surge in mobile services for rural populations. While the potentials of mobile services to provide development opportunities for smallholder ferming and worked and the potentials to use smartphone applications to collect data on smallholder ferming systems are little explored. Yet, necessive studying farming systems need good quality data. So far, date on smallholder-ferming systems little explored. Yet, necessive studying farming systems need good quality data. So far, date on smallholder-ferming systems is typically collected using household surveys. Survey quantions are prome to recall blasse, however, which can be substantial. This paper assesses whether smartphone can be used to collect data in real time and thus in crease the accuracy of socioeconomic and agronomic data collection. In this paper, we present a smartphone application that was developed for this purpose. We use the application to make the effects of agricultural menhanization on intra-household time-use and surrition in rural Zambia. While the early, descriptive results their interesting light on the effects of mechanization, the contribution of this study is primarily methodological. The study highlights the potentials of using smartphone applications to collect socioeconomic and agronomic data on smallholder-ferming systems, potentially in real time. It also suggest ways to combine data recorded by respondents with builbin amount of smartphones and external sensors and thus thows facilitating new pathways to reasonath on the digital age.

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