

Using a Smartphone App to Collect Time Use Data in Zambia

Thomas Daum, Hannes Buchwald,
Ansgar Gerlicher & Regina Birner



**Can smartphone applications
help to collect better data on time
use (and nutrition) in developing
countries?**





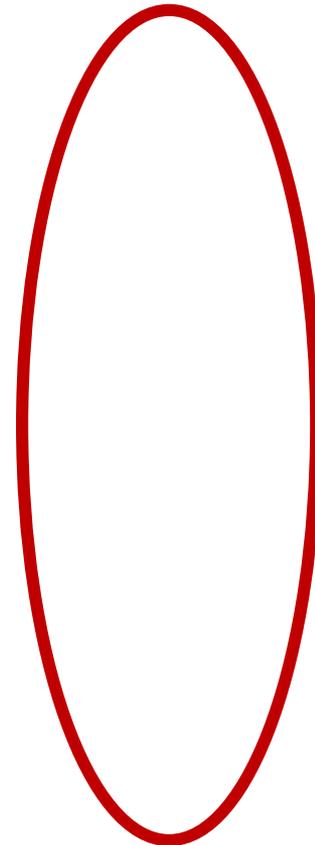
Why collecting time use data?

- Time has always mattered for agricultural development
- Calculation of agricultural labour productivity
- Reveal power relations and asymmetries (e.g. unpaid domestic work)
 - SDG 5: “achieve gender equality and empower all women and girls”
- How do new technologies, practices and policies effect the intra household allocation of time use (and vice versa)?
- Time poverty and wellbeing
- Farm system modelling etc.



How to measure time use and labor?

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



Reduction of Recall Period

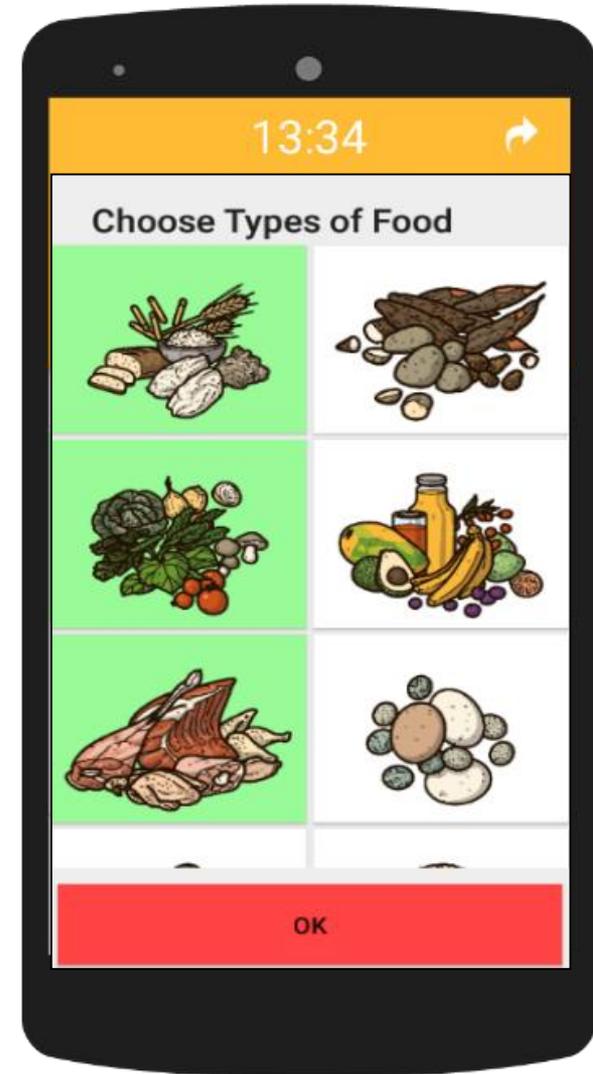
Pictorial time diaries in Ethiopia (Masuda et al., 2012)

- every 30 minutes beeper beeps and respondents place activity sticker in book with time grid
- no literacy and clock-based concepts of time required
- still cumbersome, does not allow simultaneous activities, coarse data given 30 minutes intervals



Time Tracker

- 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

Activity	Start	End	Piece-work	Food				
				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-conditions

- Pre-testing
 - App design (e.g. picture sizes, clicking duration, grouping)
 - Illustrations used
- Social context
 - Role of village authorities, social dynamics and beliefs
- Training



Sampling

- 2 stage random sampling based on RALS 2014/2015
- 62 HHs: 20 manual, 20 animal & 22 mechanical traction
 - head, spouse & one child
 - data collection for three days at five points of 2016/2017 farming season
 - respondents were borrowed smartphones
- 186 respondents (2790 days)
- around 15\$ costs 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





Comparison of “Timetracker” with 24 hours recall questions

	Land Prep			Planting			Weeding			Harvest			Processing		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Timetracker	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
24 hours recall												x			x



Comparison of selected activities during harvesting/processing (minutes)

	Men			Women		
	<i>Timetracker</i>	<i>24h-recall</i>	<i>Factor</i>	<i>Timetracker</i>	<i>24h-recall</i>	<i>Factor</i>
<i>Farming</i>	184.2 (19.5)	247.7 (21.4) **	1,3	213.1 (17.6)	270 (20.4) **	1,3
<i>Chores</i>	9.9 (2.9)	12.1 (2.7)	1,2	233.3 (13.0)	172.2 (12.5) ***	0,7
<i>Mobility</i>	197.3 (18.3)	112.5 (10.4) ***	0,6	89.7 (10.5)	97.3 (11.7)	1,1
<i>Social Life</i>	205.1 (22.6)	109.7 (12.0) ***	0,5	140.9 (14.1)	73.3 (9.1) ***	0,5



Comparison of selected activities during harvesting/processing (minutes)

	Men			Women		
	<i>Timetracker</i>	<i>24h-recall</i>	<i>Factor</i>	<i>Timetracker</i>	<i>24h-recall</i>	<i>Factor</i>
<i>Care</i>	6.2 (3.3)	42.6 (8.5) ***	6,9	51.1 (11.3)	180.4 (18.2) ***	3,5
<i>Farming</i>	184.2 (19.5)	247.7 (21.4) **	1,3	213.1 (17.6)	270 (20.4) **	1,3
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Comparison of selected activities during harvesting/processing (minutes)

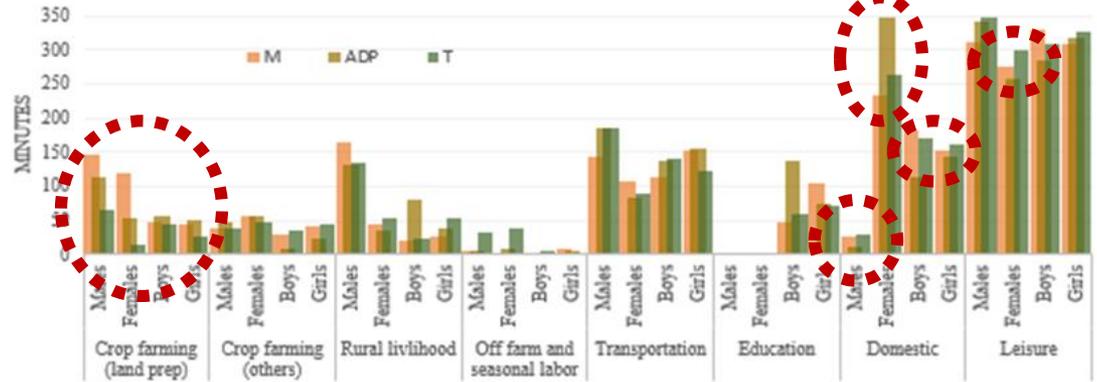
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The Invisible Hand that Rocks the Cradle: On the Limits of Time Use Surveys
(Lentz et al., 2018)

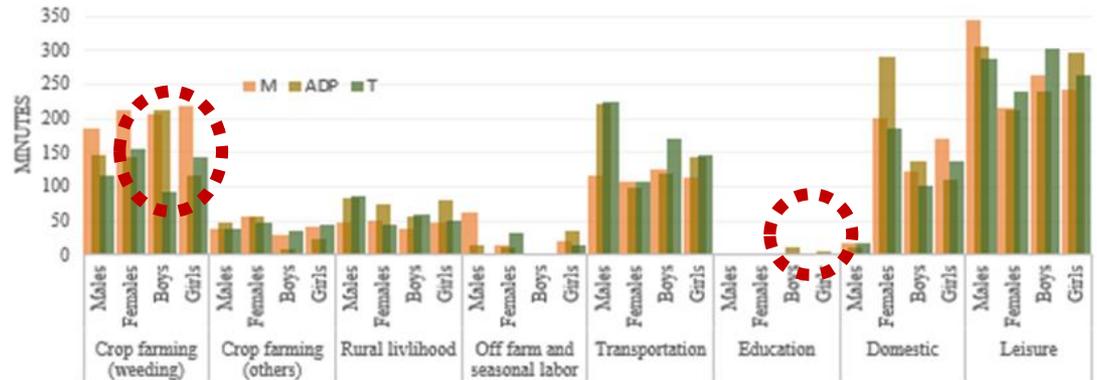


Activities across seasons (minutes)

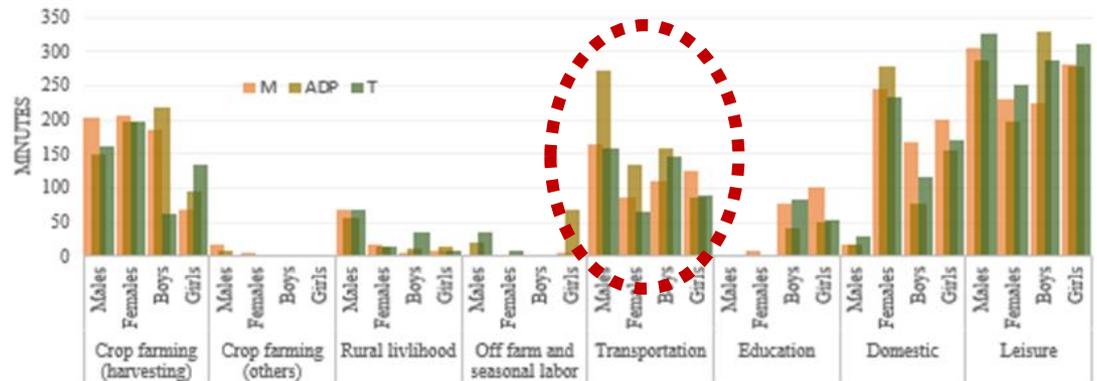
Daily activities during land preparation (without personal care)



Daily activities during weeding (without personal care)

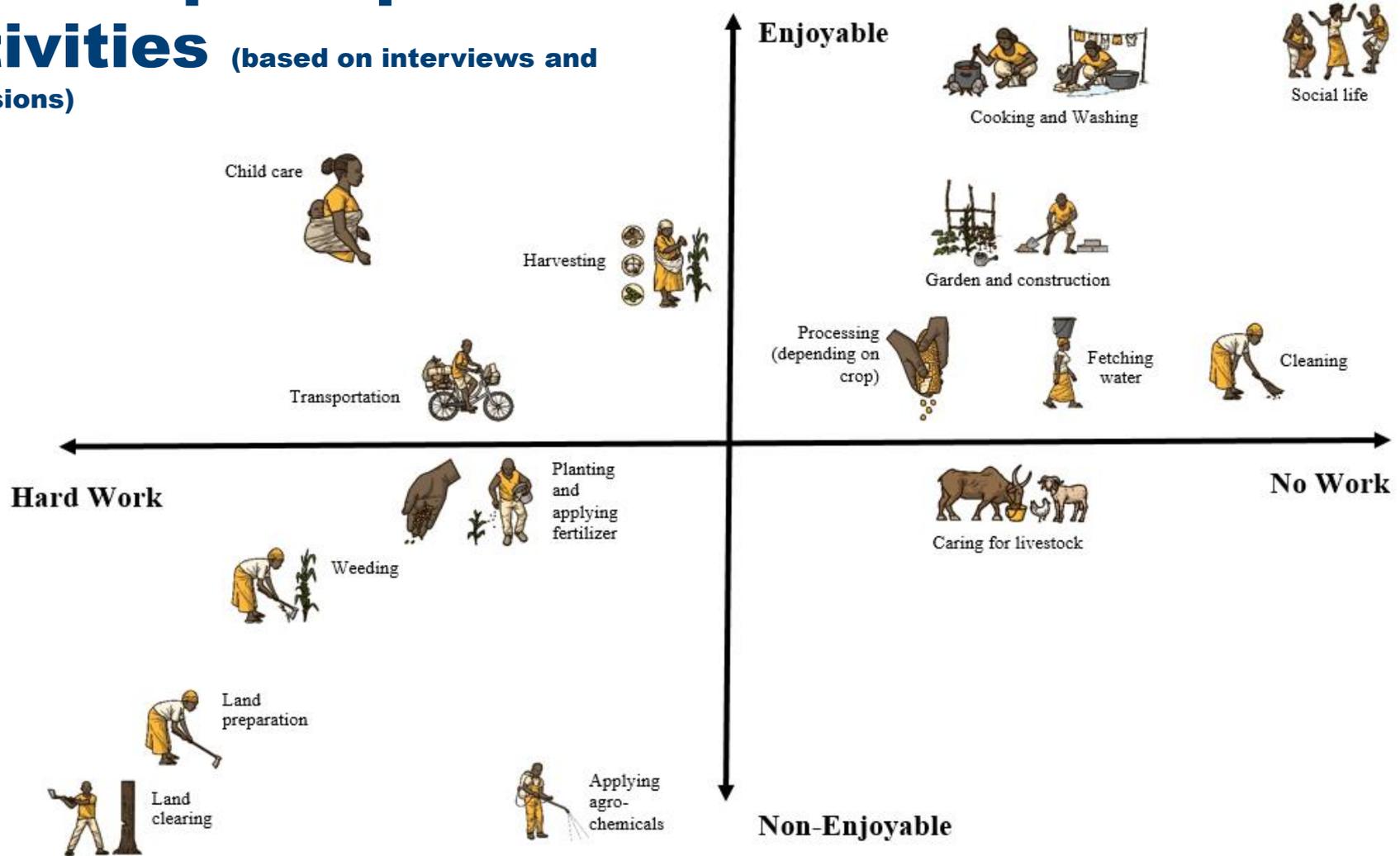


Daily activities during harvesting (without personal care)



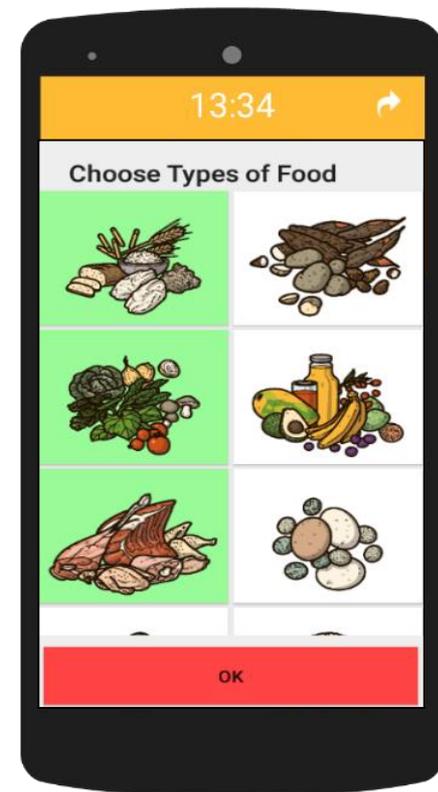


Stylized perceptions of activities (based on interviews and discussions)



Discussion

- Data validation
 - GPS, fitness trackers, cameras
- Secondary activities (i.e. care)
 - Involved persons
- Plug-ins
 - On satisfaction, meaning, happiness





Conclusion

- Smartphone apps can help to collect better data
- Untapped potential for further transdisciplinary uses and new research avenues (effects of e.g. new technologies, processed food, role of children, compositional data)
- Some questions remain but may be solved soon



More to read

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

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Ansgar Gerlicher², and Regina Birner¹

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.

Field Methods
1–20
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Original papers
Smartphone apps as a new method to collect data on smallholder farming systems in the digital age: A case study from Zambia
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ABSTRACT
Across the developing world, the spread of mobile- and smartphone has led to a surge in mobile services for rural populations. While the potentials of mobile services to provide development opportunities for smallholder farmers are widely acknowledged, the potentials to use smartphone applications to collect data on smallholder farming systems are little explored. Yet, researchers studying farming systems need good quality data. So far, data on smallholder farming systems is typically collected using household surveys. Survey questions are prone to recall biases, however, which can be substantial. This paper assesses whether smartphones can be used to collect data in real time and thus increase 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 analyse the effects of agricultural mechanization on intra-household time-use and nutrition in rural Zambia. While the early, descriptive results shed 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 farming systems, potentially in real time. It also suggests ways to combine data recorded by respondents with built-in sensors of smartphones and external sensors and thus shows fascinating new pathways for researchers in the digital age.

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Thank you!