

Feasibility of using interactive voice response (IVR) surveys for measuring dietary diversity in low-income rural settings

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Conclusions

IVR presents a potentially highly scalable, relatively low cost opportunity to collect dietary diversity data in low income, rural contexts

- Mobile access needs to be managed; purchase devices, choice of networks
- Response rates & accuracy unaffected by socio-economic characteristics
- DDS and % minimum DDS not statistically significantly different vs observations ($p > 0.08$)
- Accuracy to which individual food groups are reported varies – need for pre-testing

Why interactive voice response?

- Substantial and growing mobile phone penetration across SSA; 44% in 2017, 53% in 2025¹
- Smartphone adoption in SSA challenged by affordability issues; 15% in 2017, 36% in 2025¹
- Minimal literacy requirements vs SMS & USSD
- Lower cost and more scalable than telephone interviews
- Used for nutrition research in high-income countries
- Used in other domains in rural, low-income contexts

¹*The mobile economy Sub-Saharan Africa 2018, GSMA*

Study design

Location:

Bugiri & Kamuli Districts, Eastern Region, Uganda; Jan – Feb 2018

Multi-stage sampling:

12 respondents from 18 villages = 212 mother & child dyads

Concurrent methods for data collection:

(1) IVR survey (two days), (2) Direct observations (one day), (2) 24hr recall (one day)

Additional data collection

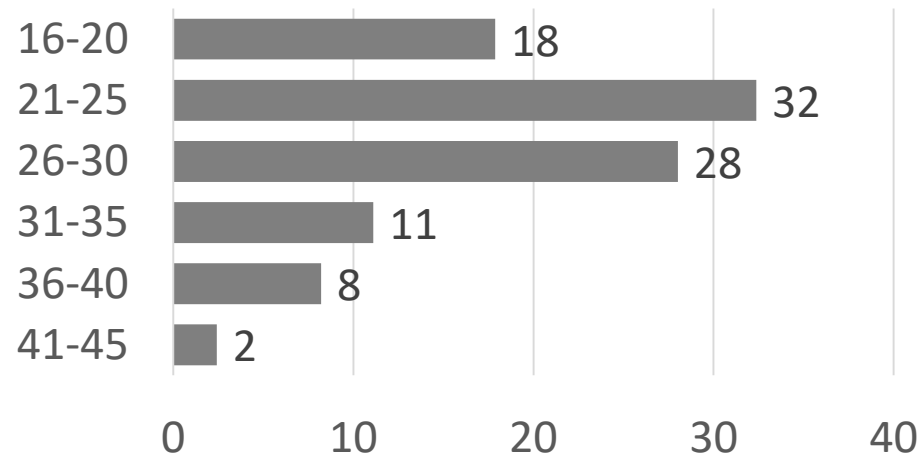
(1) Mothers' questionnaire (socio-demo), (2) Technology questionnaire (evaluation of methods)

IVR Survey:

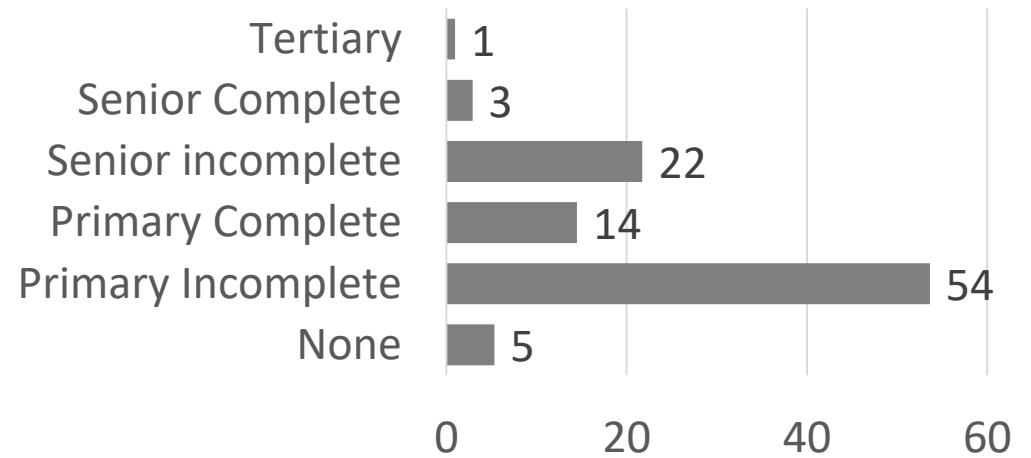
- Respondents provided basic phone, sensitised to method
- Questions (yes/no): 13 on mother's diet, 13 on child diet, 13 on time use
- 3 phone calls per research day; calls at 10:00, 15:00, 20:00
- Viamo platform used to administer surveys

Sample description (n=207)

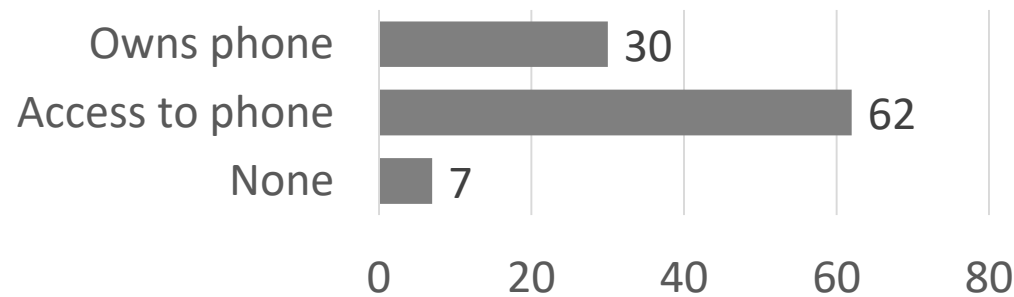
Age (years), n=207



Highest Education, n=206



Phone ownership, n=204



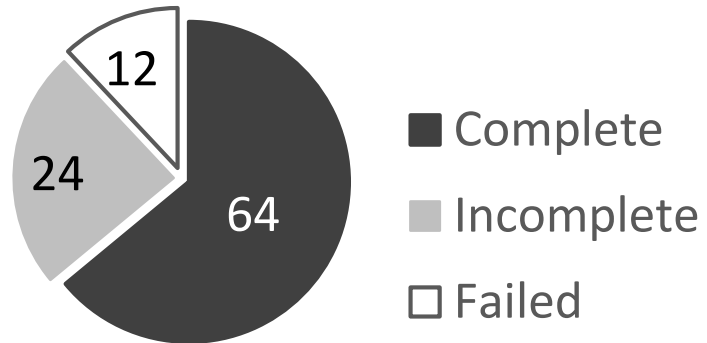
Literacy, n=203 50%

Poverty rate, n=165 24%

% of respondents on
< \$1.25/day (from PPI)

Response rates

Overall response (%) (n=1251)



97%

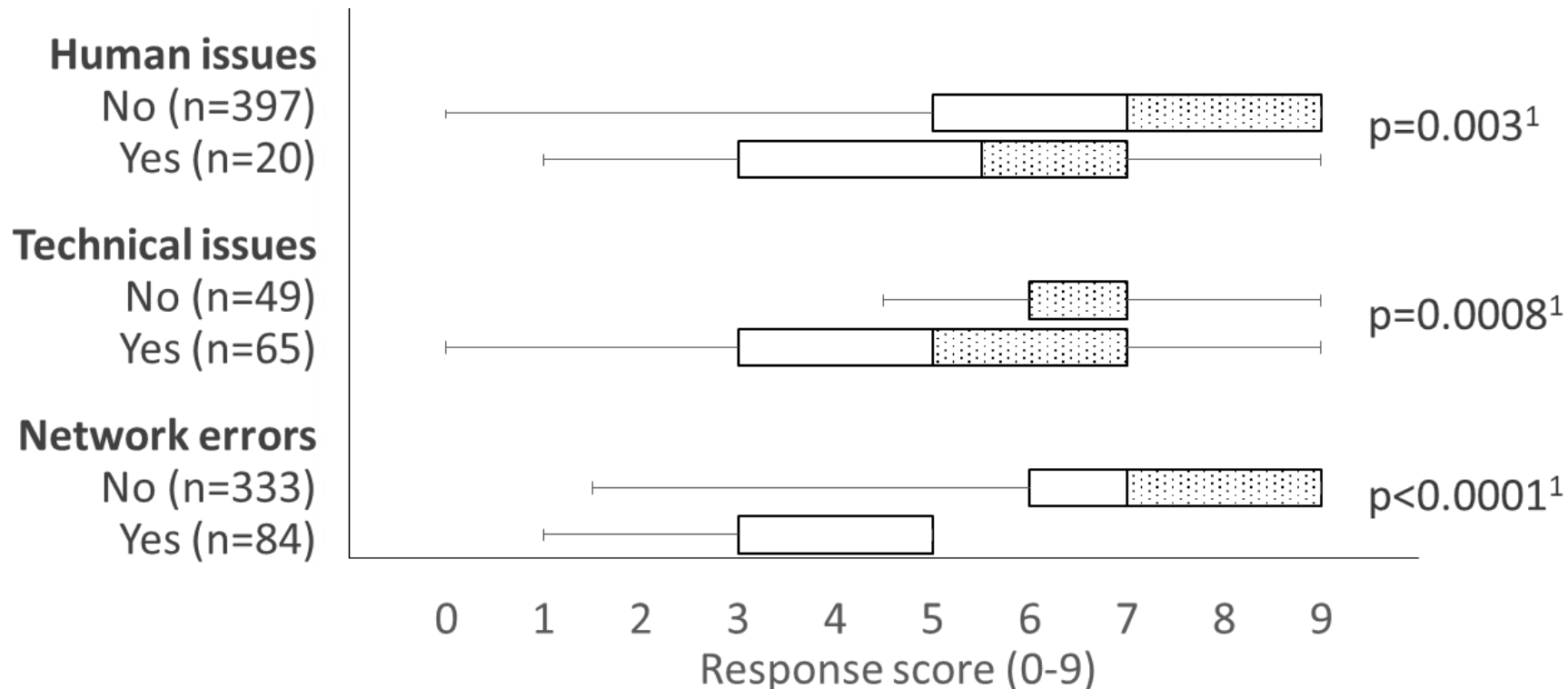
of respondents **completed**
at least one call (n=207)

Response by village (quartiles), n=1251

	Complete (%)	Incomplete (%)	Failed (%)
Maximum	83	12	5
Quartile 3	74	18	8
Median	63	26	11
Quartile 1	56	33	11
Minimum	38	36	26

Factors affecting response

- No **socio-economic characteristics** were found to affect response rates
 - Age, Literacy, Education level, Poverty Probability Index
 - Phone ownership, Frequency of mobile phone use, Number of phones in household
- **Contextual factors** were found to influence response:



¹Wilcoxon rank sum test


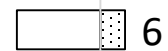
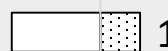
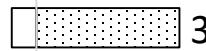

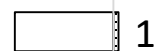

Measuring child dietary diversity

- No statistical difference in DDS & minimum DDS between methods
- However, there is a trend for IVR to underestimate DDS

N=83	Observations	Interactive voice response
DDS; median (IQR)	4 (3,4)	3 (2,4)
<i>Concordance¹</i>	<i>NA</i>	<i>k=0.419</i>
<i>Marginal homogeneity²</i>	<i>NA</i>	<i>p=0.089</i>
Minimum DDS (%)	59	49
<i>Concordance³</i>	<i>NA</i>	<i>k=0.417</i>
<i>Marginal homogeneity⁴</i>	<i>NA</i>	<i>p=0.153</i>

¹Weighted Cohen's Kappa, ²Stuart-Maxwell test, ³Cohen's kappa, ⁴McNemars test

Measuring food category intake

<i>N</i> =83	% Incidence ¹	IVR Agreement (%, k^2)	Omissions & Intrusions (%)
Dairy	25	95, 0.87	-2  2
Meat or fish	53	73, 0.48	-20  6
Nuts & legumes	60	69, 0.38	-22  10
Vit A rich fruit & vegetables	27	59, 0.22	-6  35
Eggs	4	83, 0.07	-2  14
Other fruit & vegetables	98	75, 0.04	-24  1
Staples	100	94, 0.00	-6  0

¹Percentage of respondents consuming a given food category from observations

²Cohen's kappa

Discussion

- Improving response rates
 - Conduct one call on following day, repeat until completed
 - Use dual SIM; or respondent's own phone
 - Increase sample size; marginal costs relatively low
- Reliability & Validity
 - Data is not statistically different from observations
 - Results indicate issue with questions/food categories, not IVR method
 - Extensive survey pretesting required

Conclusions

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Thank you!

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