

IN-BRIEF NOTES

Proxy Coverage of Mobile Phone Surveys in Low- and Middle-Income Countries: A Family Profile

Mahmoud Elkasabi¹

¹ RTI International

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In many low- and middle-income countries (LMICs) where mobile-phone sharing among family members is common, interviewing proxy-covered populations (persons who do not own mobile phones but who are potentially accessible through devices owned by other household members) is an opportunity survey practitioners should use, especially given that proxy-covered populations have distinct characteristics as opposed to directly covered and not-covered populations. This can be done by treating mobile phones as a tool for accessing all proxy-covered users who live with the owner in the same household. To encourage practitioners in this direction, in this research note, we explore the family profile of data from eight LMICs to understand the relationship between proxy-covered adults and other family members. As expected, we found that proxy-covered adults are more likely to be wives, daughters, and sons.

Introduction

Traditional landline telephones have not been widely adopted in many low- and middle-income countries (LMICs) due to limited infrastructure, making them an unsuitable mode for data collection. However, the rapid growth of mobile-phone networks in recent years has transformed communication in LMICs. Consequently, mobile-phone ownership has increased exponentially, making mobile phones as common in many LMICs as in developed countries. This shift has naturally led to an interest in utilizing mobile phones for survey data collection, especially during the COVID-19 pandemic when restrictions on movement necessitated remote data collection methods (e.g., Adali et al. 2021; Carletto et al. 2023; Nind, Coverdale, and Meckin 2022).

Elkasabi and Khan (2023) explored the structure of mobile-phone coverage in several LMICs, focusing on the relationship between mobile-phone penetration rates (mobile-phone subscriptions per 100 inhabitants) and actual coverage rates (percentage of individuals who own at least one mobile phone). As per the definition of penetration rates, these rates may overestimate mobile-phone coverage, particularly in countries where individuals often subscribe to multiple mobile network providers, mostly for cost saving and to benefit from promotions and offers; for example, many mobile network providers offer cheaper rates for calls within their

own network (Pew Research Center 2019). Another reason for potential overestimation is that the numerator in penetration rates includes mobile phones used for business purposes. As expected, Elkasabi and Khan (2023) found that penetration rates that are often used as a proxy for coverage are significantly higher than actual coverage rates in most of the studied countries. This discrepancy suggests that penetration rates may not accurately reflect the extent of coverage and should not be used as a sole metric for assessing mobile-phone survey feasibility in these contexts. As expected, they found that mobile-phone owners in LMICs tend to be more urban, literate, male, older, and wealthier. They identified the “proxy-covered population,” which includes individuals who do not own a personal mobile phone but who have potential access through devices owned by other household members. As 15–30% of the adult population is identified as proxy-covered population, covering this proxy-covered population could substantially increase the overall mobile-phone coverage rate in many LMICs.

In this research note, we use recent data from the Demographic and Health Surveys (DHS) conducted in eight countries between 2021 and 2023, with response rates ranging from 97.3% to 99.7%, as shown in [Table 1](#). All datasets for all surveys considered in this study are publicly available on the DHS website (<https://dhsprogram.com/>). The DHS are in-person surveys that provide national and subnational estimates of demographic and health indicators using stratified multistage probability samples. In the first stage, census enumeration areas are selected proportionally to their population size, followed by a systematic selection of households. Demographic data, such as gender, age, and education, are collected about all household members. Additionally, specific questionnaires target women aged 15–49 and men of reproductive age (usually 15–49, 15–54, or 15–59). As DHS target individuals in specific age range, we had to limit our analysis to individuals aged 15–49.

Coverage structure and background characteristics

As indicated in [Table 1](#), a good proportion of adults in most studied countries own personal mobile phones. In 5 of the 8 countries, more than 80% of adults own personal devices. Except in Mozambique, only a small percentage of adults live in households without any mobile phones. In all countries, a sizable percentage of adults do not own personal mobile phones, but at least one of their household members does.

We used binomial logistic regression model to explore the potential differences in direct coverage versus proxy-coverage according to background characteristics and family profile. As indicated in [Figure 1](#), as opposed to proxy-covered adults, directly covered adults are less likely to be women, and more likely to be older, literate, and married. They also are more likely to live in households with higher income and to live in urban areas. See Table A.1 in the supplementary materials for full results of the regression models.

Table 1. Mobile phone coverage of adults aged 15–49 years by survey selected for this study.

Country	Year	Household response rate ¹	n ²	No mobile phones at home (not-covered individuals)		Non-personal mobile phone (proxy-covered individuals)		Personal phone (directly covered individuals)	
				(%) ³	CI ⁴	(%) ³	CI ⁴	(%) ³	CI ⁴
Nepal	2022	99.7	11622	1.76	(1.30 , 2.22)	13.3	(12.32 , 14.27)	84.95	(83.79 , 86.10)
Kenya	2022	97.9	29698	2.82	(2.53 , 3.11)	18.23	(17.52 , 18.94)	78.95	(78.15 , 79.75)
Burkina Faso	2021	99.6	15624	1.2	(0.93 , 1.47)	16.56	(15.58 , 17.54)	82.24	(81.24 , 83.24)
Cote d'Ivoire	2021	99.3	14177	1.8	(1.45 , 2.15)	13.34	(12.49 , 14.19)	84.86	(83.93 , 85.79)
Tanzania	2022	98.7	13103	7.97	(7.02 , 8.92)	25.3	(24.01 , 26.59)	66.73	(65.10 , 68.36)
Ghana	2022	99.3	13769	2.14	(1.69 , 2.58)	14.55	(13.78 , 15.32)	83.31	(82.42 , 84.21)
Mozambique	2022-23	97.3	11627	19.92	(18.25 , 21.59)	24.61	(23.51 , 25.72)	55.46	(53.72 , 57.21)
Senegal	2023	98	13531	2.28	(1.78 , 2.79)	17.13	(15.89 , 18.37)	80.59	(79.45 , 81.72)

¹ households interviewed/households occupied.² number of adults aged 15-49 years who completed the DHS individual questionnaires and are considered for our analysis.³ weighted estimates using the DHS survey weights.⁴ 95% Confidence Interval (CI) calculated considering the complex sample design features using the R survey package (Lumley 2020).

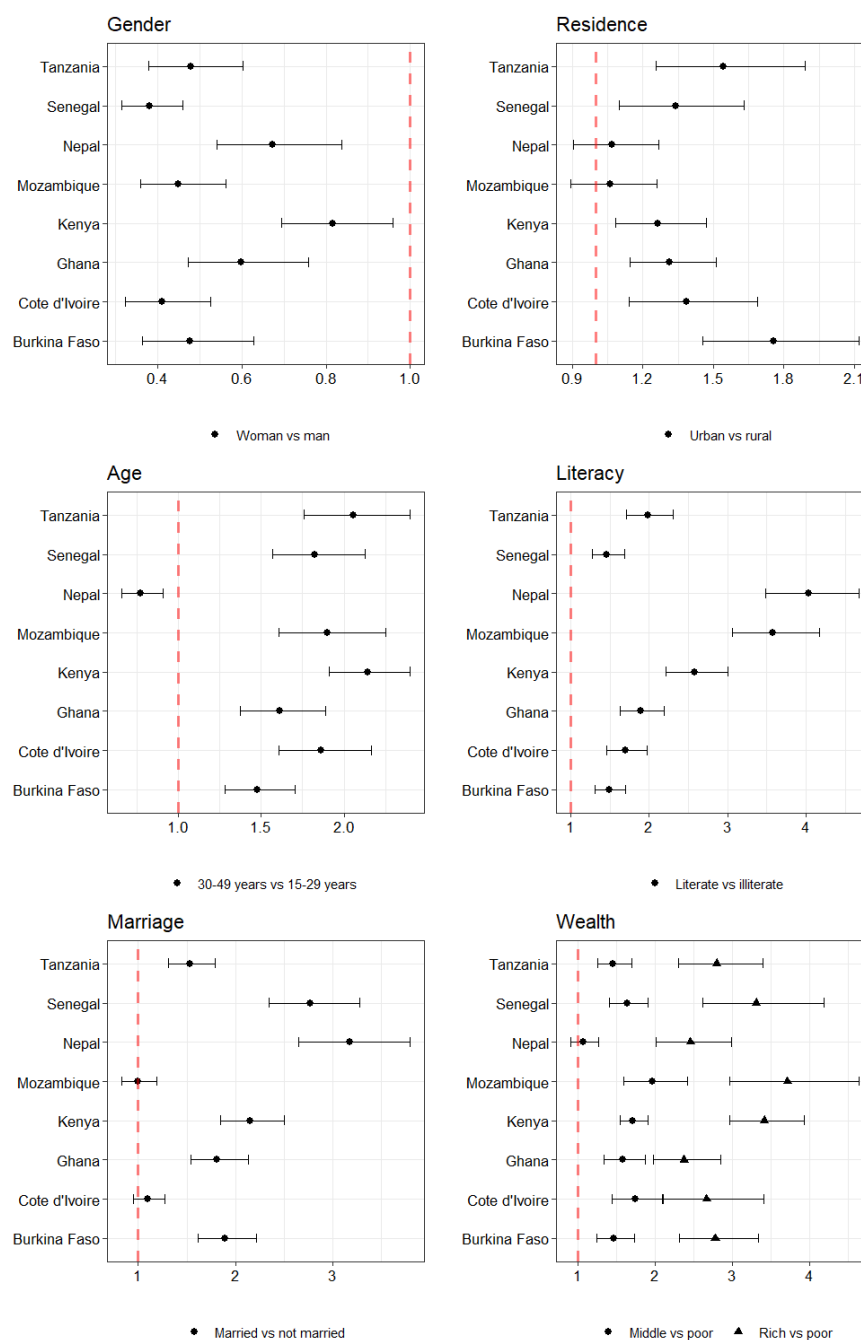


Figure 1. Odds ratio of mobile phone ownership among adults (directly- versus proxy-covered) by background characteristics

Family Profile of Covered Population

As indicated in [Figure 2](#), proxy-covered adults are more likely to be wives, daughters, or sons and less likely to be the head of the household. This result is consistent across all studied countries. In most countries, odds ratios (ORs) were not statistically significant, meaning that no difference was detected in the likelihood of wives, daughters, or sons owning a mobile phone in these countries. In Nepal, sons are more likely to be directly covered than wives and daughters (difference between OR of sons and of wives or daughters are statistically significant). In Senegal, sons and daughters are more likely to be

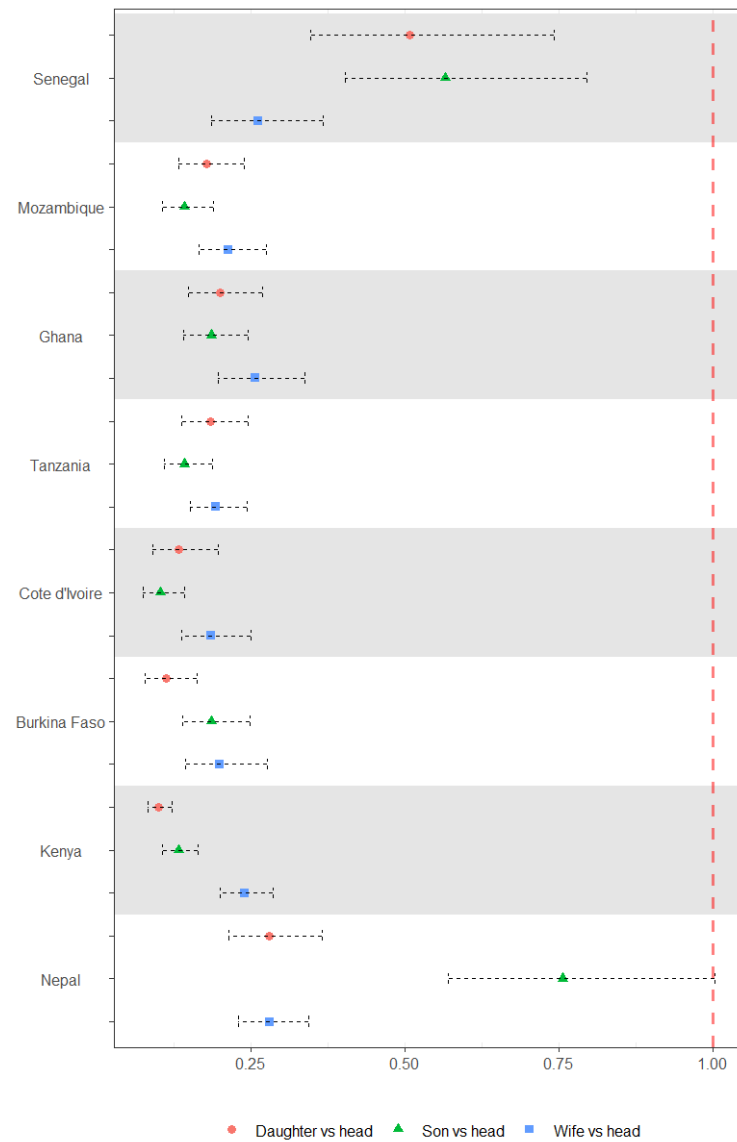


Figure 2. Odds ratio of mobile phone ownership among adults (directly- versus proxy-covered) by family profile

directly covered than wives (difference between OR of sons or daughters and of wives are statistically significant). Finally, in Kenya, wives are more likely to be directly covered than sons and daughters (difference between OR of wives and of sons or daughters are statistically significant).

Discussion

This research note updates findings from Elkasabi and Khan (2023) based on more recent data from eight countries. The note also explores the relationship between the individual and the household head as a proxy for the family profile with a focus on the following roles: household heads, wives, daughters, and sons. All results are consistent with results from Elkasabi and Khan (2023). Although the results about the family profile are expected, the analysis provided evidence-based findings.

Based on the findings of this research note and those of Elkasabi and Khan (2023), we recommend that survey practitioners take steps to include the proxy-covered population in mobile phone surveys to minimize coverage bias. This can be achieved by treating mobile phones as an instrument to access all potential respondents within a household, rather than focusing solely on the primary owner of the device. By adopting this approach, the coverage of the mobile phone surveys will increase by 13–25 percentage point (i.e., percentage of proxy-covered individuals in [Table 1](#)), and survey estimates are likely to be more accurate and reflective of the broader population.

Lead author's contact information

Mahmoud Elkasabi
RTI International
melkasabi@rti.org

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REFERENCES

- Adali, T., Y. Koyuncu, T. A. Sinan, A. Hancioğlu, E. Taştı, F. Kreuter, A. B. Ergöçmen, et al. 2021. “Surveys in Covid-19 and Post Covid-19 Days.” 2021. <https://turkiye.unfpa.org/en/publications/surveys-covid-19-and-post-covid-19-days>.
- Carletto, C., H. Chen, T. Kilic, and F. Perucci. 2023. “Positioning Household Surveys for the next Decade.” *Statistical Journal of the IAOS*, 1–24.
- Elkasabi, M., and A. Khan. 2023. “The Evolution of Mobile Phone Surveys in Low-and Middle-Income Countries: A Study of Coverage Structure.” *International Journal of Public Opinion Research* 35 (4): edad031. <https://doi.org/10.1093/ijpor/edad031>.
- Lumley, T. 2020. *Survey: Analysis of Complex Survey Samples*. R package version 4.0.
- Nind, M., A. Coverdale, and Meekin. 2022. “Updated Rapid Evidence Review – Synthesis of the 2021 Literature.” National Centre for Research Methods. 2022. <https://eprints.ncrm.ac.uk/id/eprint/4602>.
- Pew Research Center. 2019. “Mobile Divides in Emerging Economies.” Pew Research Center. <https://www.pewresearch.org/internet/2019/11/20/mobile-divides-in-emerging-economies/>.

SUPPLEMENTARY MATERIALS

Supplementary information

Download: <https://www.surveypractice.org/article/126650-proxy-coverage-of-mobile-phone-surveys-in-low-and-middle-income-countries-a-family-profile/attachment/255950.docx>
