

UNDERSTANDING INDIVIDUAL TRAVEL PATTERNS—ASSESSING THE REPRESENTATIVENESS OF A SMARTPHONE-BASED HOUSEHOLD TRAVEL SURVEY IN DAR-ES-SALAAM, TANZANIA.

CONTEXT

To make informed, coordinated decisions on transport investments and land-use planning, policymakers need reliable information on how individuals move around cities, as well as the constraints they face. These decisions affect the locations of households and businesses, influencing residents' quality of life and economic opportunities. Traditional methods for understanding individuals' travel patterns (e.g., purpose, mode, and cost) involve collecting travel diaries kept by respondents and supervised for completion by field staff over an extended period. These methods are resource intensive, are subject to recall errors, and are demanding on respondents.

Zegras et al. (2018) developed a methodology for conducting smartphone-based transportation surveys and applied it to Dar-es-Salaam, Tanzania. The authors examined the effectiveness of the smartphone-based data collection approach, focusing

particularly on non-participation bias.

INNOVATIVE DATA COLLECTION

The authors created a dataset that was highly informative about individuals' travel patterns as a function of their socioeconomic backgrounds, the purposes of their travels, and the associated costs. They combined face-to-face interviews with the analysis of big data from sensor-embedded smartphones and follow-up phone interviews to assess individual travel patterns in Dar es Salaam.

A total of 581 people from 300 households were randomly selected from among the respondents to the World Bank's 2014–15 Measuring Living Standards Survey. Each had already taken part in a face-to-face interview covering his or her socioeconomic background and travel patterns. The respondents were supplied with sensor-embedded smartphones capable of collecting and transmitting the time and global positioning system (GPS)

locations of individual movements at one-minute intervals for a one-month period. Journey records from their phones were then validated via follow-up phone interviews every three days, covering the origin, destination, route, purpose, and cost of each trip.

STATISTICAL CHALLENGES

The fundamental concern of this travel survey approach is possible biases resulting from non-randomization, non-participation, and non-response. The rate of non-participation (people never verifying or only partially verifying) is not negligible. Out of 581 candidates selected, 482 people provided at least one trip, and 345 people had at least one fully verified day using the interviewer follow-ups. Out of 13,944 person-days (581 candidate times 24 active survey days), 1574 person-days (11%) were verified based on the interviewer-based criterion. These biases raise concerns about the representativeness of the participants and the travel data collected. In this study, the authors assessed whether non-randomization, non-participation, and non-response biases existed.

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RESULTS

Some risk of non-randomization, non-participation, and non-response seems to exist. The authors found modest evidence of bias in observable characteristics influencing an individual's likelihood of not fully verifying any days. Several socioeconomic and demographic characteristics (e.g., married, widowed, holding a driver's license, working for the government) apparently did influence the number of days that were fully verified per individual. Similar biases emerge when one predicts the likelihood of a given day being verified. A possible solution includes enhancing the mobile phone training of participants and improving the interviewers' verification procedure.



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