**Methods**

**Grant number:** ES/T008121

**Sponsor:** UKRI

**Project title:** Water & Waste: Expanding safe water and waste management services access to off-grid urban populations in Africa

**Data set:** Survey of plastic and general waste collectors serving off-grid neighborhoods of Greater Accra, Ghana

## ****Overview and Objectives****

The waste collector survey is part of a convergent parallel mixed methods study of waste collectors and sub-collectors within Greater Accra, Ghana. In a qualitative component, focus group discussions (FGDs) were held with these groups, with a questionnaire survey of waste collectors and sub-collectors administered almost simultaneously. The FGDS explored business histories, waste collection operations, and barriers to waste collection expansion among other key themes: data from these FGDs will be archived separately. This data set was therefore generated by the questionnaire survey.

The survey sought to answer the following questions:

* To what extent do informal collectors facilitate waste separation and recycling of different types of waste in off-grid neighborhoods in Greater Accra?
* How does the value of different plastic resin types vary through the waste collection chain?
* How far are businesses in the sachet recycling chain vulnerable to fluctuations in recycled plastic prices and international policy initiatives? What other barriers do such businesses face?

## Study and sample design

For the sample design, waste collectors were divided into the following categories:

**General (mixed waste) collectors**: waste collectors mostly using tricycles to collect unsorted household waste.

**Sub-collectors for plastics**: mostly referred to as plastic pickers and people who buy plastic waste from pickers but do not sell it directly to plastic recycling companies.

**Main collectors for plastics**: Sometimes known as ‘agents’ who sell plastic waste directly to plastic recycling companies. They serve as the link between pickers and recycling companies.

Waste collectors who operate in the target area of the Water and Waste project (i.e 30 randomly selected Enumeration Areas) located in 14 districts of Urban Accra were considered as the target population for the study. Eligible EAs constituted those classified as urban by Ghana Statistical Service.  Within Greater Accra, they also met one or more of the UN-Habitat criteria for a slum (UN-Habitat 2016) or lacked waste management services, given the project's focus on waste.  Specifically, most households in eligible EAs lived in over-crowded or non-durable housing and lacked improved sanitation or water sources, secure tenure, or waste services.

Of the 14 districts, 9 districts encompassing 18 Enumeration areas were randomly selected.

For general collectors, selected district names were passed to the nine metropolitan authorities within Greater Accra region that contained those areas. The environmental health teams within each metropolitan authority then identified eligible general waste collectors as those working in the selected district based on their knowledge and records of registered waste collectors from which a random sample was drawn by the study team.

For sampling plastic main collectors, the sampling frame relied on the registration records of an Accra-based trade association, the Plastic Waste Collectors’ Association (PWCA). The PWCA secretary asked for membership groups in the selected metropolitan assembles to identify members to participate in the study, who worked in the selected district and a random sample was drawn by the study team from the list provided by the PWCA. Referral sampling was used to identify sub-collectors: each selected main collector participant was asked to bring at least one sub-collector from whom they purchased plastic waste to a church building in central Accra for interview. For all groups, only waste collectors aged 18 years or older were eligible for the study.

We estimated a required sample size of 170 (in total, across all waste collector types) to estimate the mean quantity of plastic waste gathered with a desired confidence interval width of 33kg waste/collector/day (level of confidence: 0.95), assuming a standard deviation of 100kg waste/collector/day in the absence of any recently published estimate of this figure for Accra’s waste collectors.

Sixty (60) of the questionnaire respondents were also recruited to FGDs under the mixed methods design. Six (6) Focus group discussions (FGD’s) were conducted, with separate groups for the three categories of waste collector. The composition of the groups is given as follows;

1. Two groups of 12 participants per focus group (Plastic waste main collectors)
2. Two groups of 12 participants per focus group (Plastic waste sub collectors/pickers)
3. Two groups of 6 participants per focus group (General waste collectors)

Ethical approval

The study was approved by the Faculty of Environmental and Life Sciences Ethical Review Committee, University of Southampton, UK (reference: 55755; approval date 19th August 2020) and by the Institutional Review Board of the Noguchi Memorial Institute for Medical Research, University of Ghana (Ref: 003/20-21; approval date: 2nd September 2020).

Field team recruitment, training, and organisation

The School of Public Health (SPH) project team comprised 6 enumerators, a Project Administrator, a Field manager and two Research Officers (RO). During the primary fieldwork, the Administrator and project researchers also served as enumerators. SPH made sure that those chosen for the study had previous expertise in collecting data using tablets during the hiring process (Table 2). Waste collectors from a particular EA were all invited to the interview location at Circle, and then a team of two randomly drawn from each group then carried out the interview.

Once the enrollment and matching process was complete, an effective three day training session was organized in-person, guaranteeing that all the COVID-19 restrictions were observed. This included use of the SurveyCTO mobile data collection platform (Dobility Inc. 2021) for survey data management. An introductory presentation was made to the members, presenting them to the general goals and project design. After the introductory session, there was a thorough review of the questionnaires for both the paper version and the surveyCTO platform to ensure the team understood the survey instrument and was well-equipped to collect the data from the field.

***Table 2: C****haracteristics of field staff for Ghana*

|  |  |  |  |
| --- | --- | --- | --- |
| **Role**  | **Code in Surveycto**  | **Qualification**  | **EXPERIENCE IN FIELD DATA COLLECTION IN RELATED FIELDS** |
| Field Manager/ Data manager  | Master access | B.A. Economics and Computer Science | 15 yrs |
| Research Officer/ Team leader | 3 |  M. Public Health  |  12 yrs  |
| Research Officer/ Team leader | 2 | M. Public Health  | 3 yrs  |
| Administrator/ Coordinator/ Enumerator  | 4 |  EMBA  |  6 yrs |
| Enumerator | 9 | Masters - Communication studies | 2 |
| Enumerator | 6 | Mpil – Health management | 10 |
| Enumerator | 12 | Masters – Public Health | 3 |
| Enumerator | 13 | Bsc. Info Tech Magt | 4 |
| Enumerator | 11 | B-Tech Accounting  | 4 |
| Enumerator | 14 | HND Accounting  | 4 |

## Community entry and sensitisation

The team in Ghana also engaged key stakeholders (assemblymen/women and opinion leaders) at the community level to inform them about the project objectives and sought their support to carry out the research in the various communities successfully. The field team first visited the Municipal Assembly to introduce the project to the Assembly officials and the Environmental Health Officers. After the introductions, the field team, with the assistance of the environmental health officers, visited the community to conduct the reconnaissance visit.

## Pre-testing of methodology

A two-day field test was implemented in Achimota Zoompack and a recycling hub in Kaneshie from August 8th–10th, 2022. This exercise was to determine whether the supervisors and enumerators had thoroughly grasped the training provided to them and could successfully carry out and imitate the actual data gathering exercise. Additionally, it was done to make sure they were fully aware of and comprehended their role as field personnel. A final meeting was held afterwards to go over the problems that were raised during the field pre-test.

## Waste collector survey implementation and methods

The data collection exercise was conducted over an 8 day period from 26th September – 5th October, 2022. Those nominated for interview were then invited via phone to a church community centre close to the recycling plant where the PWCA operates. Overall, we sampled 182 waste collectors across the selected EAs in the Greater Accra Region. Following seeking of informed consent (see consent form and participant information sheet), a questionnaire (also attached) was administered via SurveyCTO to cover volumes and types of waste collected, neighbourhoods served, business histories and finances, and barriers to waste collection expansion. English, Twi, Ga, and Ewe were the languages used to collect the data.

## Data management, processing, quality control, linkage and anonymisation

*Data management:* The finalised forms or questionnaires for the waste collector survey of the project were uploaded onto SurveyCTO platforms and downloaded into the Samsung TabA 2019 (T585) by the RAs. Each RA was given a unique identity code to access and download the forms from the surveyCTO platform and deploy for use in questionnaire administration to respondents or observation as guided by the protocols.

*Quality control:* Quality control measures undertaken during and following data collection included the following:

* Range checks were coded into SurveyCTO data entry forms, e.g., preventing negative counts of waste items.
* Checks and skip patterns were coded in SurveyCTO forms to ensure all required information was filled appropriately.
* Constraints were coded into SurveyCTO forms to restrict entry of future dates for date variables.
* Restrictions were placed on the number of characters entered for text field
* Enumeration Area ID (EA ID) entered twice, at the beginning and end of the questionnaire as a control check for accuracy.
* Field supervisors and CO-PIs routinely made random checks on the data collection process by following Research Assistants (RAs) to the field and observing the process.
* Field supervisors reviewed data queries and error logs working hand in hand with the data manager and RAs.
* Duplicate records were flagged and removed from the data using unique IDs
* All obsolete test data e.g pre-test data was omitted from the final dataset.

*Calculated fields:* To aid analysis, the following fields have been automatically calculated:

* Survey start / end time, upload time, and GPS coordinates: Automatically captured via tablets used for data capture.

*Anonymisation:* Field team member names and contact details have been removed, and comments in the data file have been screened for inadvertent disclosure of personal data.

*Data structure, linkage & related data resources:*

Csv file: 1 dataset has been generated for the waste collector survey; each record represents data generated from a waste collector. Based on the Team and the day the data was collected, distinct IDs were given to each record. In the example, WCST1D1001 indicates that Team 1 (T1) gathered the record on the first day of data collection (D1), and 001 indicates that this was the first interview conducted. T2 in the ID denotes that Team 2 gathered this information.

A related data collection from focus group discussions will be archived separately. References:

Dobility Inc. (2021) SurveyCTO Collect, Dobility Inc., Cambridge, Massachussets.