

Summary of ME&L Survey Methodologies

1. Overview of ME&L activities

R4D conducted two primary data collection exercises in 2017 to estimate the outcomes from the implementation of its market shaping activities and to fill in knowledge gaps around the diagnosis and treatment of pneumonia in Tanzanian health facilities. These exercises were conducted in collaboration with the Reproductive and Child Health Section (RCHS) of the Ministry of Health, Community Development, Gender, Elderly, and Children (MoHCDEG), IDinsight, the President's Office – Regional Administration and Local Government (PO-RALG), National Institute of Medical Research (NIMR), Muhimbili University of Health and Allied Sciences (MUHAS), and EDI Limited. The two exercises were:

- **Health Facility and ADDOs Survey:** nationally-representative survey of public health facilities in all 26 mainland regions of Tanzania to track the availability, stocking, and dispensing of pediatric amoxicillin¹ in all tiers of the public health system (dispensaries, health centers, and hospitals).
- **Diagnosis and Prescription Study:** clinical study conducted in three regions of Tanzania to measure the rates of pneumonia misdiagnosis and mis-prescription by comparing health care provider diagnosis to the result of a lung ultrasound examination.

Details on the sampling methodology, survey instruments, primary research questions, and indicators for each data collection exercise are provided below.

2. Health Facility and ADDOs Survey

2a. Sampling Methodology²

Prior to Round 1 data collection, a stratified two-stage sampling method was used to select a representative sample of public health facilities across the 26 mainland regions of Tanzania to be included in the baseline and subsequent rounds of data collection. The process included:

1. Randomly select three councils from each of the 26 regions of mainland Tanzania^{3,4}
2. Randomly select facilities based on the category of facility from each council:
 - One district hospital was selected per council (if available)⁵
 - One health center was selected per council (if available)
 - Seven dispensaries were selected per council⁶

¹ Pediatric amoxicillin encompasses the two pediatric formulations of amoxicillin: amoxicillin dispersible tablets (amox DT) and amoxicillin oral suspension (amox OS).

² Details on methodology, research questions, and indicators are drawn from documentation prepared by IDinsight for reporting to R4D.

³ One and two councils were sampled from Mbeya and Songwe regions, respectively. In 2016, the Songwe region was created from the western part of Mbeya region. Two councils in Kagera region were excluded because the survey was piloted in those areas. Two councils from Arusha region were replaced at the request of the survey firm, EDI, due to the councils being located inside national parks, which would have presented significant logistical difficulties.

⁴ Councils were weighted according to the proportion of public health facilities in each council so that councils with a higher number of public health facilities would have a greater probability of being selected.

⁵ District hospitals were over-sampled since one of the survey objectives focused on the availability of electricity and oxygen at district hospitals.

⁶ Councils with fewer than seven dispensaries included all dispensaries.

The sample was therefore comprised of 53 district hospitals, 50 health centers, and 521 dispensaries, for a total of 624 public health facilities – out of a total of 61 district hospitals, 477 health centers, and 4,471 dispensaries in Tanzania (according to Tanzanian Government Open Data information from July 2016⁷).

The ADDOs sample was constructed using a different sampling method. Three regions (Kagera, Pwani, and Mtwara) were purposively selected because they were not involved in the implementation of interventions addressing child health in ADDOs in the recent past. Twenty-five percent of the ADDOs in each of the three selected regions were then randomly selected for a total sample of 135 ADDOs.⁸ Approximately 45 ADDOs were selected in each region.

When possible, the same facilities were surveyed in each round of data collection to create panel data that allowed for outcomes within each facility to be compared over time. Of the 624 public health facilities in the sample, 622 were surveyed during all three rounds of data collection. Two public dispensaries from the original sample were temporarily closed and unavailable for surveying during this second round of data collection. They were operating again in Round 3.

During Round 2, 11 of the 135 ADDOs (8.1%) were replaced due to closure (N=10) or unavailability of an appropriate respondent (N=1).⁹ During Round 3, four ADDOs (3.0%) were replaced due to closure (N=4) or refusal (N=1). Replacement ADDOs were found in the same district as the original ADDOs in all cases.

2b. Primary Research Questions and Indicators

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| 1. What are the availability and stocking levels of pediatric amoxicillin in public health facilities? | <p>Primary indicators:</p> <ul style="list-style-type: none">• Percent of facilities with non-expired pediatric amoxicillin in the dispensing outlet or stock room on the day of visit <p>Secondary indicators:</p> <ul style="list-style-type: none">• Percent of facilities that have ever stocked pediatric amoxicillin• Percent of facilities that experienced a stock-out (one day or more without stock) of pediatric amoxicillin in the last 90 days |
| 2. How many treatments of Amox-DT (and other pneumonia treatments) have been dispensed in public health facilities over the three months prior to data | <p>Primary indicator:</p> <ul style="list-style-type: none">• Volume of Amox-DT units dispensed over the past three months <p>Secondary indicator:</p> <ul style="list-style-type: none">• Percent of pneumonia diagnoses prescribed pediatric |

⁷ The list of active public health facilities at the dispensary, health center, and district hospital level was downloaded from MoHCDGEC's Health Facility Registry in January 2017.

⁸ The list of open ADDOs in Kagera, Pwani, and Mtwara regions was obtained from Pharmacy Council (the accreditation department for ADDOs) on 2 February 2017.

⁹ If an ADDO could not be located or was permanently closed, the research officer was instructed to find the next geographically closest ADDO as a replacement.

collection?

amoxicillin

3. What level of knowledge do providers have of the correct pneumonia diagnosis and treatment guidelines?

Primary indicator:

- Percent of providers whose first-choice preference for treatment of non-severe pneumonia is amox DT

Secondary indicator:

- Percent of providers who correctly name the symptoms of pneumonia according to the IMCI guidelines
- Percent of providers who correctly name the assessments they should be undertaking when examining a child with respiratory symptoms according to the IMCI guidelines

4. What are the availability levels of pediatric amoxicillin in ADDOs?

Primary indicators:

- Percent of ADDOs that had non-expired pediatric amoxicillin in stock on the day of the visit

Secondary indicator:

- Percent of ADDOs who have ever heard of amox DT

2c. Survey Instruments

- **Facility Questionnaire:** conducted with the facility in-charge to gather description about the facility and availability of oxygen treatment, pulse oximeters, and electricity.
- **Patient Questionnaire:** conducted with one clinician who diagnoses and treats children under five to assess provider knowledge of pneumonia diagnosis and treatment. This questionnaire also collects diagnosis and treatment information from patient registers.
- **Dispense Questionnaire:** conducted with the dispensing outlet head or staff member of each dispensing outlet to assess availability and stocking levels of peds amox in dispensing outlets.
- **Stock Questionnaire:** conducted with the head pharmacist of every stock room to assess availability and stocking levels of peds amox in the stock room.
- **ADDO Questionnaire:** conducted with owner of ADDO or person authorized to dispense medicines to collect information on ADDO background and sales, pneumonia and amoxicillin knowledge, and pediatric amoxicillin availability and stocking. The ADDO survey also included stock counts and dispensing register audits.

3. Diagnosis and Prescription Study Sampling Methodology

3a. Sampling methodology

This study was conducted with 93 healthcare providers across 83 facilities (5 hospitals, health centers, and 67 dispensaries) in the Pwani, Dodoma, and Tabora regions¹⁰ in Tanzania.

¹⁰ These regions were selected because they: 1) give a mix of rural and urban areas, 2) give a mix of high- and low-performing regions, 3) are accessible but geographically dispersed, and 4) are areas where R4D plans to pilot interventions to address misdiagnosis.

Facility selection

Within each region, we employed a stratified sampling strategy to select the facilities to be included in the study. Three districts were randomly selected within each region, and within each district, we randomly selected one district hospital, one public health center, and seven public dispensaries.¹¹ The heads of all facilities consented for the facility to take part in the study. We were unable to complete data collection at all facilities selected for the study; where this occurred we randomly selected replacement facilities (of the same facility type where possible) within the same district.

Provider selection

Providers were eligible to be included in the study if they: 1) worked full time at the facility; 2) were responsible for the assessment, diagnosis, and treatment of children under 5; and 3) would be available for observation in the following days. One provider per facility was randomly selected from a list of eligible providers. After the facility in-charge granted permission for the study team to observe this provider, the provider, her/himself, was approached for consent.¹² In some cases, we were unable to observe a provider for the full length of a facility visit (e.g., due to illness or family emergencies). Where this occurred, another eligible provider was randomly identified from the original list.

Patient selection

Enumerators observed all patients seen by the providers during their time at the facility and completed observation checklists for all children under 5. Following the consultation, enumerators asked the caregiver of any child who was under 5 and had respiratory symptoms (cough or difficulty breathing) to consent for LUS verification of the provider's diagnosis. Children who were under two months old were ineligible due to technical difficulties with performing LUS on such small children. Children with severe illness, who were immediately referred to a higher-tier facility were also ineligible for LUS.¹³

3b. Primary Research Questions and Indicators:

1. Do providers adhere to the IMCI guidelines recommended by the Tanzanian Pediatric Standard Treatment Guidelines (P. STGs) to diagnose pneumonia in children under 5?

Primary indicators:

- Percent of **providers** who carry out assessments according to the IMCI guidelines
- Percent of **cases** where the provider carried out assessments for pneumonia according to the IMCI guidelines

Secondary indicators:

- Percent of providers who correctly name the symptoms of pneumonia according to the IMCI guidelines

¹¹ In four districts there was no eligible hospital, so a seventh dispensary was randomly selected.

¹² In seven cases the facility in-charge did not consent for us to observe the randomly selected provider, all due to unavailability of the provider on the day (the provider was on night shifts (N=1), working on outreach that week (N=1), or had not turned up for work that day(N=5)). In ten cases, we recorded that the provider her/himself did not (N=1), or had not turned up for work that day(N=5)). In ten cases, we recorded that the provider her/himself did not consent to observation; we did not collect the provider's reason for refusal. However, we believe that this option was chosen by enumerators in order to randomly reselect providers in cases where the first provider had become unavailable (also, N=10), so it is likely that these ten cases do not represent true refusal of observation.

¹³ Over the observation period, two children with respiratory symptoms were referred to a higher-level hospital and so were not eligible for LUS scan.

- Percent of providers who correctly name the assessments they should be undertaking when examining a child with respiratory symptoms according to the IMCI guidelines
2. How frequently do providers misdiagnosis and/or mis-prescribe pneumonia in children under 5 years of age seeking care for respiratory symptoms?
- Primary indicators:**
- Percent of children under five under- and over-diagnosed with pneumonia, as confirmed by lung ultrasound examination
 - Percent of children under five under- and over-prescribed pediatric amoxicillin
- Secondary indicator:**
- Percent of providers whose first-choice preference for treatment of non-severe pneumonia is amox DT
3. What is the prevalence of childhood pneumonia among those who seek care at public health facilities?
- Primary indicator:**
- Percent of all patients seen at facilities that are children under 5 with pneumonia, as confirmed by lung ultrasound
- Secondary indicator:**
- Percent of children under 5 seeking care at facilities who have respiratory symptoms

3c. Survey Instruments

- **Facility Questionnaire:** conducted with the facility in-charge prior to starting data collection at each given facility to collect background information on the facility, as well as the number and names of all full-time providers who diagnose children under five in outpatient services. This list of providers was used as the sampling frame for the provider selection.
- **Pre-observation Questionnaire:** conducted with each provider in the sample prior to any direct observations took place to collect demographic information on each provider.
- **Direct Observation Questionnaire:** filled out by study enumerators as they observed health care providers conducting patient consultations. Enumerators collected data on what questions providers asked, as well as what procedures or test they conducted.
- **Post-observation Questionnaire:** conducted with each provider in the sample at the end of the direct observation period at each facility to assess provider knowledge of pneumonia diagnosis and treatment protocols.
- **Ultrasound Examination Questionnaire:** completed by study ultrasound technicians during each ultrasound examination. Questionnaire includes identifying information for each patient and an algorithm for technicians to follow when interpreting the ultrasound scans.
- **Dispensing Outlet Questionnaire:** completed by study enumerators each morning that data collection took place at health facilities to track how many units of amox DT and amox OS were available in the facility dispensing outlets and stock rooms.