EVALUATION OF THE DRIVERS OF URBAN IMMUNISATION IN UGANDA: A CASE STUDY OF KAMPALA CITY MAY 2020

A report by the Infectious Diseases Research Collaboration (IDRC), Uganda

Infectious Diseases
Research Collaboration

2C Nakasero Hill Road
P.O. Box 7475 Kampala, Uganda
Tele: +256 (0) 312 281 479
Tele: +256 (0) 414 530 692

Email: Prof. Moses Kamya, PhD
mkamya@idrc-uganda.org
www.idrc-uganda.org

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Acronyms and Abbreviations

CCEOP	Cold Chain Equipment Optimization Platform
CHAI	Clinton Health Access Initiative
cMYP	Comprehensive Multi-Year Planning
DHS	Demographic and Health Survey
DPT	Diphtheria Pertussis Tetanus
EA	Enumeration area
EPI	Expanded Programme on Immunisation
FCE	Full Country Evaluations
FGD	Focus Group Discussion
FIT	Freight in Time
Gavi	Gavi, The Vaccine Alliance
GVAP	Global Vaccine Action Plan
HMIS	Health Management Information System
HPV	Human Papillomavirus
HSCC	Health Sector Coordinating Committees
HSIS	Health Systems and Immunisation Strengthening
HSS	Health Systems Strengthening
ICC	Interagency Coordinating Committee
IDI	In-depth interview
IDRC	Infectious Diseases Research Collaboration
INFUSE	Innovation for Uptake, Scale and Equity in Immunisation
KII	Key Informant Interview
LMC	Leadership, Management and Coordination
M&E	Monitoring and Evaluation
MoH	Ministry of Health
NCC	National Coordinating Committee
NITAG	National Immunisation Technical Advisory Group
PCA	Program capacity Assessment
PEF	Performance Engagement Framework
PFP	Private for Profit
PIE	Post Introduction Evaluation
PNFP	Private Not for Profit
SOP	Standard Operating Procedure
STEP	Strategic Training Executive Programme (STEP)
TA	Technical Assistance
TWG	Technical Working Group
UBOS	Uganda Bureau of Statistics
UNICEF	United Nations International Children's Emergency Fund
WHO	World Health Organization

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Evaluation Team

This report presents findings from the Evaluation of the drivers of urban immunization: a case study of Kampala', prepared by the Infectious Diseases Research Collaboration (Uganda). This work is intended to inform evidence-based improvements for immunization delivery in urban cities/countries and, more broadly, in low-income countries, with a focus on contributions from Gavi. The contents of this publication may not be reproduced in whole or in part without permission from the evaluation team.

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Infectious Diseases Research Collaboration 2C Nakasero Hill Road

P.O.Box 7475 Kampala, Uganda
Telephone: +256 (0) 414 530 692
Email: Prof. Moses Kamya, PhD mkamya@idrc-uganda.org
www.idrc-uganda.org

Gavi, the Vaccine Alliance
Evaluation and Learning Unit
Global Health Campus
Chemin du Pommier 40
1218 Grand-Saconnex
Geneva, Switzerland

Executive summary

Introduction: With increasing urbanization, immunisation programs need to adapt to urban environments to reach every child. Urban areas in Uganda have poor vaccination coverage, inequities in coverage, and experience vaccine preventable disease outbreaks. There is limited evidence about the drivers of immunisation service delivery in urban settings in Uganda, and how they may differ from rural settings. The Infectious Diseases Research Collaboration (IDRC) evaluated the drivers of urban immunisation between June and December 2019 to assess the current immunisation strategy and propose a new approach. Specifically, the evaluation was designed to: determine the effectiveness of the current the Uganda Expanded Programme on Immunisation (EPI) immunisation service delivery model in Kampala city, the drivers of immunisation coverage, and the extent to which the EPI is adapting to these drivers. ***The scope of this report focuses on the demand-side barriers.***

Methods: The evaluation employed a parallel convergence mixed methods design. We conducted secondary data analysis, document reviews and partner mapping, Key Informant Interviews (KIIs), Focus Group Discussion (FGDs) and In-Depth Interviews (IDIs). Fact checking interviews were conducted at national and global levels to validate findings. Study participants included EPI focal persons and health workers at different levels and community members. A household survey to quantify the drivers of the coverage in Kampala city was conducted among 590 caregivers of children aged 12 - 23 months. Quantitative data were analysed using a logistic regression model. The primary outcome variable was vaccination status (i.e. full immunisation). The transcripts from IDIs, KIIs and FGDs were imported and managed using Nvivo software. Analysis was primarily deductive (with flexibility to allow new themes to emerge) using a coding framework informed by the Social Ecological Model (SEM). Results are presented according to a conceptual framework that outlines the demand and supply side drivers of immunisation services.

Findings: Access to immunisation was found to be high (DPT1 coverage was 96%). The dropout rate from DPT1 to DPT3 was 17.3% suggesting a decrease in utilization over time. Full immunisation coverage (i.e. those who received all vaccines in the current immunisation schedule regardless of timeliness) was 41.4%, and was lowest among children of caregivers of low socioeconomic status but uniformly distributed between formal and informal settlements. Of the fully vaccinated children, only 26.5% received all vaccines on time. Almost half of the children received immunisation from both public and private health facilities. Appreciation of the benefits of immunisation encouraged caregivers to fully vaccinate their children. The main barriers to vaccination reported by caregivers were: lack of information and misconceptions on immunisation, frequent vaccine stock outs at health facilities, delays at health facilities, competing priorities of caregivers and perceived marginalization of refugees. A key health system barrier reported by key informants was lack of a follow up system for immunisation to identify and trace defaulters. The evaluation found that the EPI model has not sufficiently adapted to the challenges of immunisation in an urban setting.

Conclusion: UNEPI uses the same approach to deliver immunisation services nationwide. However, this model has suboptimal effectiveness in Kampala city as reflected by high dropout rates, low full immunisation coverage rates, and poor timeliness of immunisation. This evaluation highlights key demand side barriers to immunisation in Kampala city – many of which are not reflected in adaptation by the EPI. The main adaptation mechanism is engagement of the private sector in immunisation services delivery as a way of increasing access and minimizing delays at public health facilities. However, its effectiveness is sub optimal due to inadequate support by MoH.

Recommendations: In the near term (<1 year), the Ministry of Health/UNEPI should 1) develop an urban immunisation strategy, 2) develop a deliberate communication strategy for routine immunisation for Kampala city, 3) develop a targeted social mobilization strategy for Kampala city, 4) strengthen private sector engagement in immunisation, 5) sstreamline the vaccine delivery system and 6) adequately support health facilities to offer free immunisation services, provide refresher training to foster client centered care. In the longer term (>1 year), the MOH/UNEPI should consider use of electronic registries for immunisation in urban settings as this could improve coverage data, assist in defaulter tracking for dropouts or children without immunisation cards. Finally, this evaluation raised some issues for further study including: 8) the MOH/UNEPI should evaluate why some divisions perform better than others, and 9) this evaluation should be complemented with a more detailed study of the supply side drivers of immunisation coverage in Kampala city.

1.0 BACKGROUND

1.1 Immunisation in urban settings

In 2018, 55 percent of the world's population was estimated to live in urban areas globally and this is projected to increase to 68 percent by 2050, with Asia and Africa urbanizing most rapidly (1). While urbanization is generally a positive force for economic growth, poverty reduction and human development, it is closely linked to an increasing rate of urban dwellers residing in relatively small settlements of less than 500,000 inhabitants particularly in low and middle income countries (1). Significant disparities exist in health services coverage, including immunisation, and health outcomes of people living in urban areas, especially between the richest and poorest residents (2). In the past decade, the number of un/under immunised children living in urban areas of resource limited countries has increased significantly.

Urban settings pose unique barriers to the delivery and utilization of immunisation services including: 1) Transient populations and seasonal migration that complicates the estimation of target populations for routine immunisation services and makes it difficult for health workers to trace immunisation defaulters, 2) Inflexible employment situations that may restrict opportunities to utilize immunisation services, 3) Unfavourable scheduling and spatial placement of vaccination sessions for urban dwellers, 4) Multiple cultures that require service adaptations, and 5) A mix of private and public healthcare providers, which can lead to challenges in coordinating and managing the provision of immunisation services (3). Also, patients may face long waiting times at health facilities, which may increase the likelihood of incomplete immunisation (3). Health workers in urban areas may have low motivation which may stem from the challenges of urban living, including high cost of living, low pay, and lack of identification with the community they serve (4).

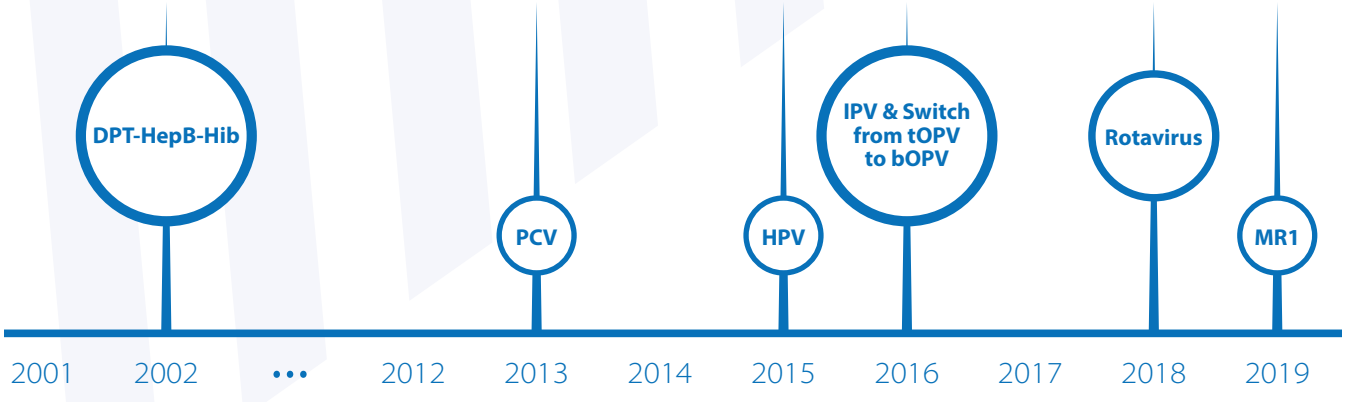
The World Health Organization's Expanded Program on Immunisation (EPI) was designed over 40 years ago to support universal immunisation for all children with a focus on overcoming geographic barriers to accessing services for rural populations. This model successfully helped increase immunisation coverage rates. However, given that the majority of the world's population now lives in urban areas, the traditional rural EPI model requires adaptation to meet the needs of the growing urban population.

Gavi, the Vaccine Alliance and its partners recognize the need to improve coverage and equity and reduce the risk of disease outbreaks by prioritizing approaches to reach every child, especially in urban areas. This is reflected in the Global Vaccine Action Plan 2011 – 2020 (GVAP), in which strategic objective three calls for "Reaching Every District" as a step towards reaching underserved populations to reduce disparities and achieve more equitable coverage in immunisation (5). In addition, the Urban Immunisation Working Group was constituted in January 2017 to create awareness about inequities in urban areas and support the development of strategies aimed at improving immunisation outcomes, especially in underserved urban areas like slums.

1.2 Immunisation in Uganda

Immunisation in Uganda is managed by the Uganda National Expanded Program on Immunisation (UNEPI) with support from partners such as WHO, UNICEF, PATH, CHAI, CDC and JSI, whose goal is to ensure that every child and high-risk group is fully vaccinated with high quality and effective vaccines against the target diseases (6). UNEPI receives support from different sources which include Gavi through partners, government of Uganda and Gavi grants (for specific new vaccine introductions or campaigns as well as cross-cutting technical assistance, health system strengthening, and cold chain equipment optimization). With support from Gavi, the vaccination package has increased from six to thirteen vaccines as shown in figure 1 below. Other vaccines recommended for introduction by the National Immunisation Technical Advisory Group (NITAG) include: MR2 and Td booster dose in 2021, Yellow Fever and Meningitis A in 2022.

Figure 1. New vaccine introductions in Uganda



According to UDHS reports, full immunisation coverage estimate for Uganda has improved from 37% in 2001, to 46% in 2006, 52% in 2011 and 55% in 2016. The proportion of the unimmunised children has declined from 13% in 2001 to 8.7% in 2006, 4.0% in 2011 and 1% in 2016 (7–10)

1.3 Immunisation in Kampala City

1.3.1 Study setting

Socio-demographic characteristics: Kampala is Uganda's most densely populated city and major regional trade and transport hub in Uganda. It is divided into five administrative divisions: Central, Kawempe, Makindye, Lubaga and Nakawa. It is characterized by diverse socio-economic and ethnic backgrounds, has numerous crowded slums, on-going rural-urban migration, and high fertility. According to the KCCA annual reports, the estimated night population of Kampala is 1.6 million persons and approximately 4.5 million in the day due to the huge influx of workers from surrounding districts. The annual population growth rate of Kampala is 3 percent and 60 percent of the population resides in slum areas (11). According to the 2016 Uganda Bureau of Statistics population report, 51.4 percent of the population are females with 20.2 percent of child bearing age and the proportion of live births is estimated at 4.9 percent, while the children below five years make up 17.7 percent of the population (11). Kampala has approximately 78,501 refugees and asylum seekers from Democratic Republic of Congo, Eritrea, Rwanda, Somalia, Burundi, South Sudan, Ethiopia, Sudan, Pakistan and Central African Republic (12–14). The refugees are spread across Kampala's five administrative divisions, and approximately 10 percent of the refugees are under five years of age. The ever-increasing urban population is characterized by densely populated substandard houses, social and economic isolation, irregular land ownership, low standards of sanitation, and limited access to basic infrastructure and social services (4,15).

Health characteristics: According to KCCA health facility master list in 2018, there are a total of 1,448 health facilities in Kampala city. Nearly all (98%) are privately owned; 94 percent are Private for Profit (PFP), 4 percent are Private Not for Profit (PNFPs) and the remaining 2 percent are public health facilities.

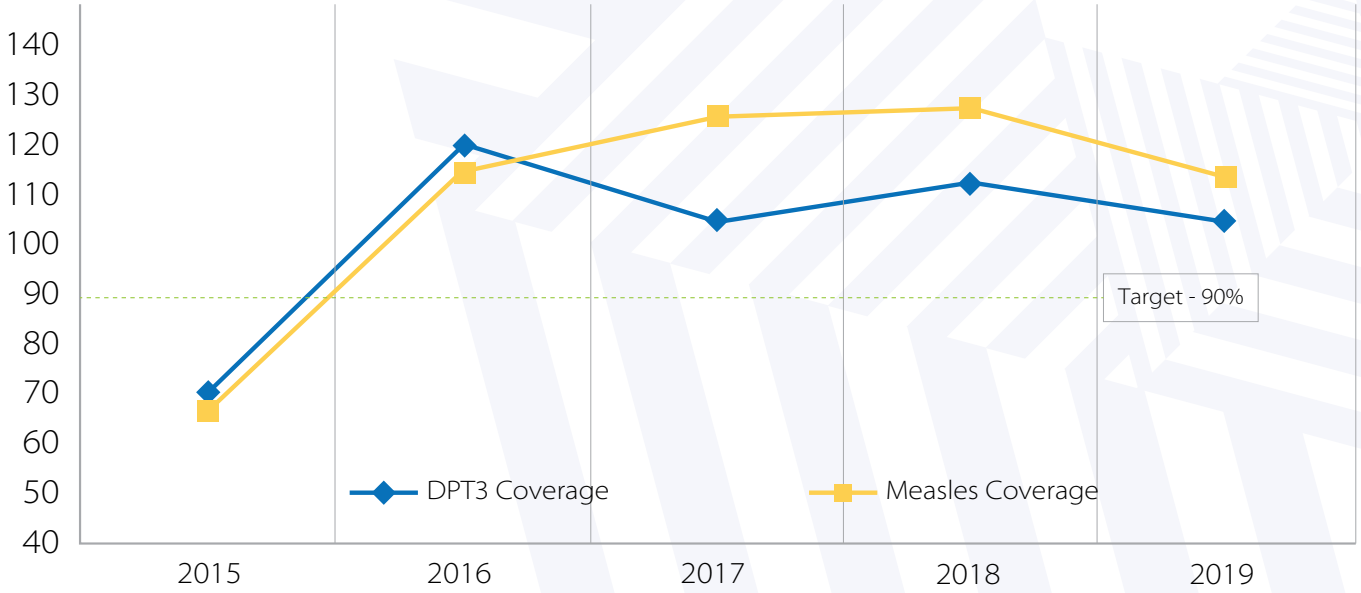
Socio-economic characteristics: Kampala city is Uganda's commercial and economic hub, it contributes approximately 60% of Uganda's GDP and accounts for 80% of the country's industrial sector. Kampala like the rest of the country has a very dynamic growing urban informal sector; it employs about 90% of the total non-farm private sector workers. It is estimated that over 55% micro enterprises operating in the country are located in Kampala. (KCCA strategic plan 2014/15-2018/19). Trade is by far the most important activity with 72% of the informal sector employment, manufacturing 23% and services 6%.

1.3.2 Immunisation coverage in Kampala city

Full immunisation coverage estimates for Kampala city from household survey data sources have declined from 77 percent in 2010 (16) to 43% in 2015 (17), 51% in 2016 (10), and 48% in 2017 (18). Timeliness of vaccination is also low at 45.6% (16). The Uganda equity assessment of 2016 found that 53 percent of children nationwide were under-immunised and Kampala city was the district with the highest number of under immunised children (19). Also, in 2017 there were measles outbreaks in all divisions of Kampala and suburbs of Wakiso district in which 67 cases were identified. The most affected age group were children under one year (20).

However, administrative data from HMIS show that DPT3 and measles coverage estimates for Kampala have consistently been higher than the national targets of 90% as shown in figure 2 below. The inconsistency between the presence of measles outbreaks despite the high measles coverage estimates indicate that there are challenges related to immunisation service delivery, uptake, or reporting in Kampala city.

Figure 2. Trends of DPT 3 and measles coverage in Kampala (2015-2019)



1.3.3 EPI model for immunisation service delivery in Kampala

Immunisation services are delivered through a decentralized system of governance. Provision of high-quality immunisation services to the population is a mandate of Kampala City Council Authority (KCCA) Department of Public Health and Environment (DPHE). Management and planning for immunisation services is mainly done by the director DPHE and EPI focal persons at district, division and health facility levels. The district (Kampala City) is responsible for planning and distribution of vaccine supplies while the divisions are responsible for support supervision and monitoring. The health facilities provide immunisation services and community linkage through Village Health Teams (VHT). The detailed roles at each level are included in the annexes

Out of the 1,448 facilities in Kampala city, 301 (20%) offer immunisation services with 17 (6%) being public health facilities. Table 1 shows the breakdown of facilities offering immunisation services in KCCA by ownership and division.

Table 1. Health facilities offering immunisation services in KCCA, by ownership

DIVISION	OWNERSHIP			
	Public Health Facilities N(%)	Private For Profit N(%)	Private Not For Profit N(%)	Total N(%)
Central	3 (17.7)	18 (7.1)	7 (23.3)	28 (9.3)
Kawempe	3 (17.7)	54 (21.3)	4 (13.3)	61 (20.3)
Makindye	3 (17.7)	68 (26.8)	5 (16.7)	76 (25.3)
Nakawa	6 (35.3)	64 (25.2)	5 (16.7)	75 (24.9)
Rubaga	2 (11.8)	50 (19.7)	9 (30)	61 (20.3)
Total	17 (100)	254 (100)	30 (100)	301 (100)

Source: KCCA health facility master list

Immunisation service delivery in Kampala city is supported by partners such as; WHO, UNICEF, Interaid and PATH. These partners support several immunisation activities as summarized in the table below

Table 2. Partners supporting immunisation in Kampala

Partner	Activities supported/Implemented	Period
UNICEF	Supports KCCA under the Partner Engagement Framework (PEF) since 2018. The support includes; distribution of vaccines, cold chain maintenance, outreaches, community mobilization, supervision and performance review meetings.	2018-2020
PATH	Supports activities for HPV coverage improvement	2018-2019
Interaid	Support the implementation of maternal and child health including immunisation activities among refugee communities	2019
AFENET	Supports national supervision of surveillance activities for Vaccine Preventable Diseases (VPD) and data improvement activities	
WHO	Support towards Adverse Events Following Immunisation (AEFI) and VPD surveillance	

1.4 Rationale

Several surveys have reported low immunisation coverage rates in Kampala city and the equity assessment of 2016 identified inequities in coverage rates. In addition, measles outbreaks have been reported to occur in Kampala. Given these observations, it is not clear what facilitates or hinders optimal immunisation coverage and equity in Kampala city. Immunisation coverage and equity is influenced by drivers on the demand side - in terms of how individuals seek, access, and utilize services - and on the supply side in terms of how services are communicated and delivered. This evaluation aims to determine the effectiveness of the current EPI immunisation service delivery model in Kampala city, the drivers of immunisation coverage, and the extent to which the EPI is adapting to these drivers. Study findings will inform the planned development of urban immunisation guidelines that will eventually feed into the urban health strategy for Uganda.

2.0 EVALUATION METHODS

2.1 Purpose

The purpose of this study evaluation is to evaluate the approach of UNEPI and partners to providing immunisation services in urban contexts and generate recommendations to inform the current development of the Uganda urban immunisation strategy. A secondary purpose is to generate evidence and learning from the Uganda context that will inform Alliance partners and other country EPI programs on how to best adjust strategies to address the unique characteristics of immunisation in an urban context. The evaluation was conducted between June 2019 and December 2019 and focused on the drivers of immunisation in an urban context - Kampala city.

2.2 Evaluation question

Our evaluation questions are as follows:

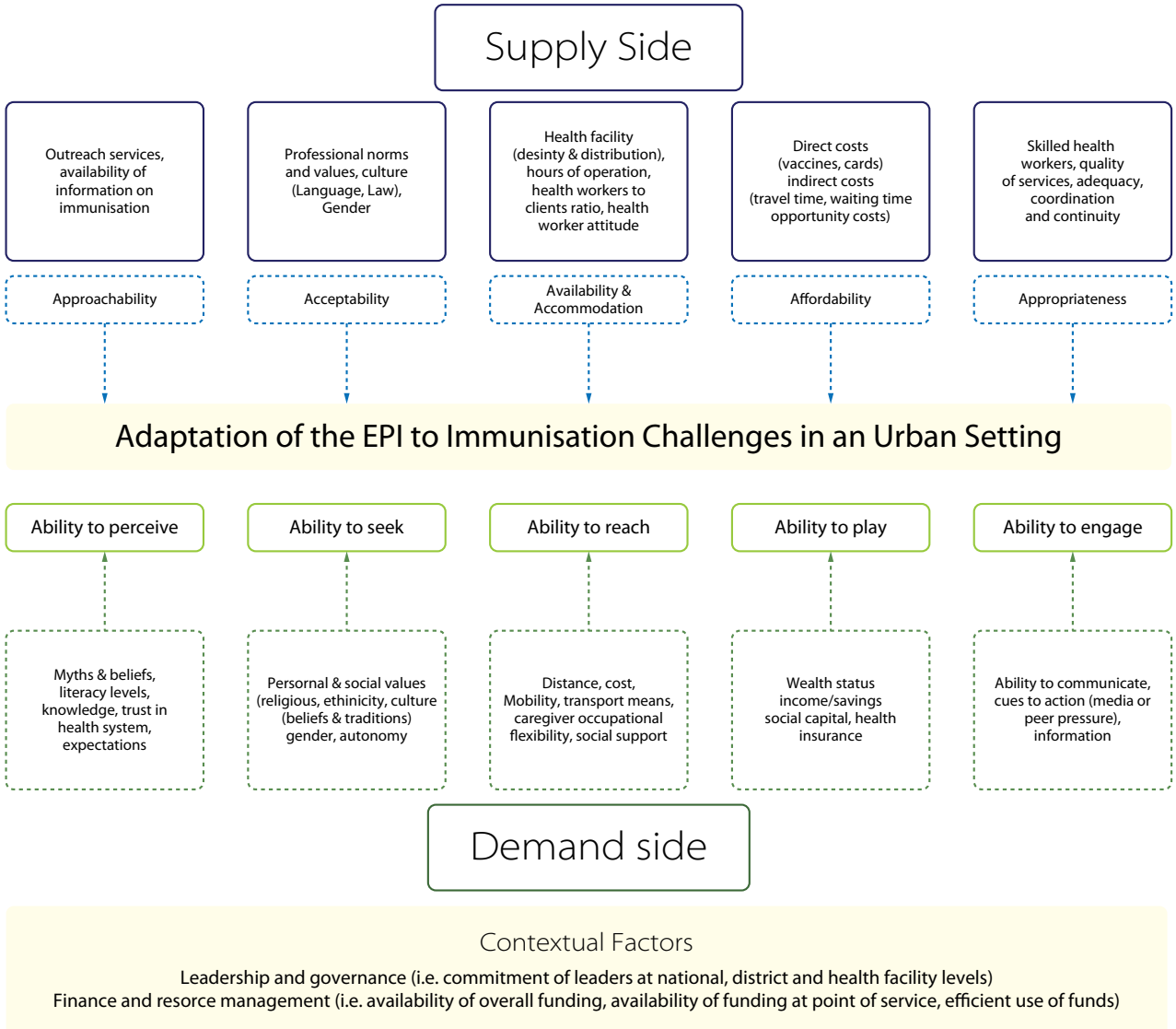
- To what extent is the EPI model for delivery of immunisation services in Kampala effective?
- What are the drivers and challenges of immunisation coverage in Kampala city?
- To what extent is the EPI program adapting to the challenges of immunisation in an urban context?

2.3 Evaluation Framework

The evaluation was guided by a conceptual framework (Figure 3) adapted from three conceptual frameworks that have been used to explain the demand and supply factors of immunisation services. These frameworks include; (a) defining access to healthcare by Bailie et al 2015 (21) (b) the Global Routine Immunisation Strategies and Practices (GRISP) recommended by WHO (22) and (c) a landscape analysis of routine immunisation in Nigeria (23). Our framework proposes that access to immunisation services is achieved through the interaction between five corresponding dimensions identified on the supply (service providers) and demand (service seeking) sides, which are influenced by contextual domains. The supply constructs are across the top (approachability, acceptability, availability and accommodation, affordability, and appropriateness) and the demand constructs are across the bottom (ability to perceive, ability to seek, ability to reach, ability to pay, and ability to engage). Each construct on the supply side influences and is influenced by the opposing construct on the demand side. For example, approachability of the immunisation services directly influences caregivers' ability to perceive the need for immunisation. The constructs are also ordered from left to right, where first a caregiver must perceive the need for immunisation services, then seek services, then reach and pay for services, before fully engaging to receive the services. The blue boxes indicate the factors that may influence each of the supply and demand constructs.

This framework guided data collection and analysis. We hypothesized that most of the demand side drivers were at the individual, interpersonal and community levels and most of the supply side drivers were at the facility, sub-national, national and global levels. The contextual factors were considered at all levels.

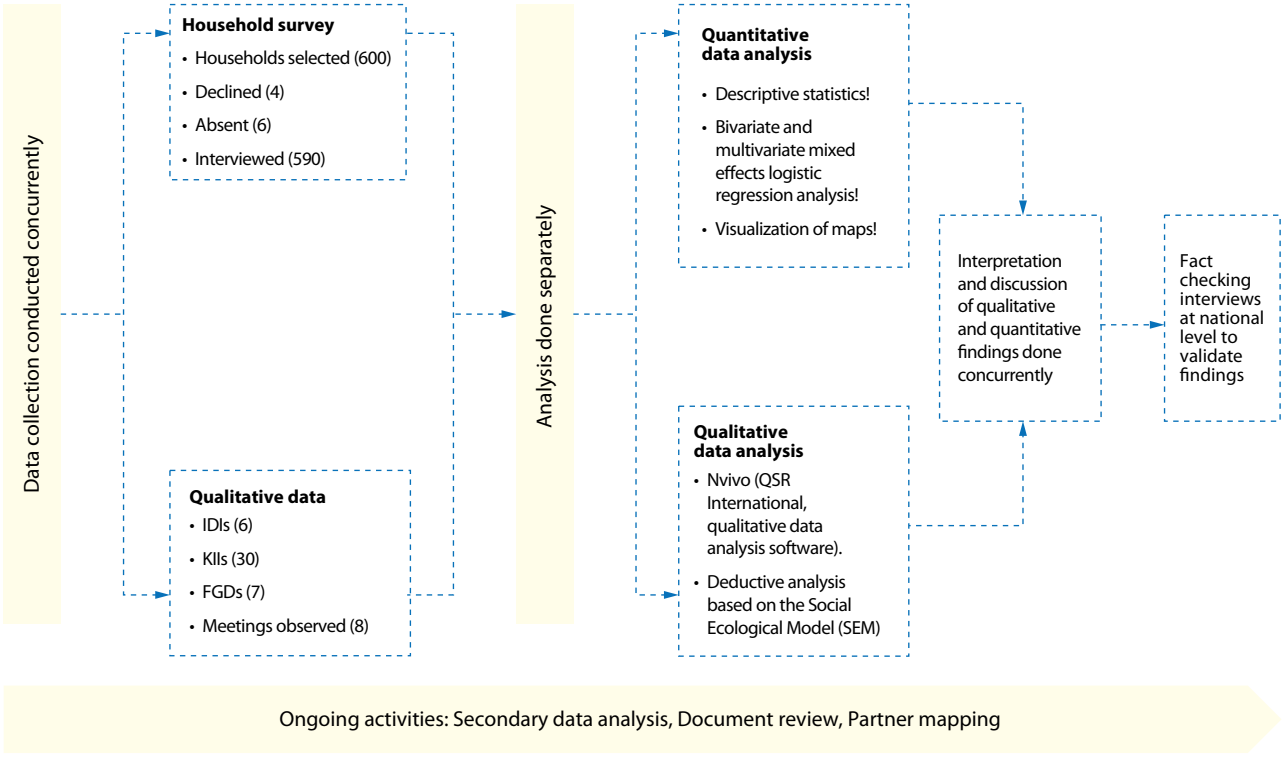
Figure 3. Conceptual Framework showing demand and supply side drivers of coverage and equity



2.4 Evaluation approach

The evaluation employed a parallel convergence mixed methods design (24,25). We analyzed secondary data, conducted document reviews and partner mapping, qualitative data collection through Key Informant Interviews (KIIs), Focus Group Discussion (FGDs) and In-Depth Interviews (IDIs) and a household survey. We also conducted fact checking interviews at national and global levels to validate findings

Figure 4. Evaluation design



2.5 Data collection

2.5.1 Secondary data analysis, document review and partner mapping

Documents reviewed include Gavi, MoH, and partner annual reports, end of project and evaluation reports, EPI technical group presentations, and technical briefs from EPI and its partners. In addition, Uganda national plans/strategies, policies, guidelines, presentations and published articles were also reviewed. Information gathered included immunisation coverage, ongoing and previously completed activities/interventions, areas of operation, and future plans for urban immunisation. The documents reviewed shed light on some of the main challenges of immunisation service delivery in Kampala city and how the EPI is adapting to these challenges.

A partner mapping exercise was conducted to identify organizations supporting immunisation in Kampala. Data collection to support the partner mapping included document review and KIIs with EPI partners and the EPI technical working group.

We conducted secondary data analysis on immunisation coverage rates, disparities, and trends. Data sources included Gavi Full Country Evaluation household survey and health facility data, the EPI coverage survey, routine data from HMIS, measles line list from KCCA, and the Equity assessment conducted by UNICEF (Table 4).

2.5.2 Qualitative data collection

Qualitative data collection involved KIIs, IDIs, and FGDs. Participants in the KIIs and IDIs were purposively selected based on their knowledge, experience and duration of engagement with the EPI program. Participants in the FGDs were purposively selected to include different sub-populations within Kampala city such as slum dwellers, refugee and fishing communities. Preliminary literature review highlighted these subpopulations as having unique challenges in accessing immunisation services. Table 3 provides details on the purpose, data collected and data sources for all data collection methods in Steps 1 and 2.

Table 3. Overview of Step 1-2 data collection methods

Data collection method and instrument	Purpose	Data required	Data sources
Document Review	To gain insight into the main challenges of immunisation service delivery in Kampala city and how the EPI is adapting to these challenges.	Challenges of urban immunisation service delivery and how EPI is adapting to these challenges.	Gavi documents/reports, MoH/EPI reports, Uganda national plans/strategies, policies, guidelines, presentations and published articles.
Secondary Data Analysis	To describe disparities in immunisation coverage and trends.	Immunisation coverage data.	Gavi Full Country Evaluation household survey and health facility data, the EPI coverage survey, Routine data from HMIS, measles line list from Kampala Capital City Authority (KCCA) and the Equity assessment conducted by UNICEF.
Key Informant interviews	To understand perspectives of key stakeholders on the delivery of immunisation services in Kampala city.	Key stakeholder perspectives on the facilitators and barriers in the delivery of immunisation services in Kampala city.	Ministry of health (UNEPI), KCCA EPI focal persons, EPI technical working group members
In depth interviews	To understand mothers' / caregivers' experiences with immunisation services in Kampala city.	Mother and caregiver experiences with immunisation in Kampala city.	Mothers/caregivers who access and those that have difficulty accessing immunisation services.
Focus group discussions	To understand community perceptions regarding immunisation	Community perceptions, of immunisation and its delivery in Kampala city.	Community members where immunisation of children was low or are known to be resistant to immunisation.

2.5.3 Data sources

We attended meetings and conducted a household survey, 7 FGDs, 6 IDIs and 30 KIIs with individuals at various levels as described in table 4 below.

Table 4. Qualitative data sources

Source	No.	Description of data sources: June 2019- February 2020
FGDs	7	Women from a low uptake area, Somali women, South Sudanese, Indians, Men from a slum area, Women from a slum area, research assistants. Each FGD included ten to twelve participants.
IDIs	6	Community members opposed to immunisation
KIIs	10	National-level KIIs: UNEPI, Uganda Health Federation, WHO, UNICEF, CHAI, AFENET, JSI, Living Goods, Interaid, PATH
	15	Fact checking KIIs: UNEPI, KCCA (Division Medical Officers (DMOs), EPI focal persons, VHTs)
	5	Global-level KIIs
Meeting Observations	8	EPI technical working committee (3), Technical Coordination Committee (1), KCCA performance review meeting (1), Joint appraisal (1), UNEPI annual stakeholders meeting (1), UNEPI MR campaign rollout planning meeting (1)

We also quantitatively analyzed secondary data sources, including Health Management Information System (HMIS) data, KCCA health facility master list and KCCA vaccine order and supplies list as described in table 5.

Table 5. Quantitative data sources

Source	Period	Description of data sources
HMIS	July 2015-present	Immunisation data for all antigens, staffing norms
KCCA health facility master list	2018	List of health facilities (private and public) in Kampala city by services provided
KCCA vaccine order and supplies list	July 2017- January 2019	Vaccines ordered and supplied
KCCA mapping of slums and associated coordinates	2018	List of slums and associated coordinates
Household survey	September 2019 – November 2019	Caregivers of children aged 12-23 months in Kampala city

2.5.4 Household Survey

The purpose of the household survey was to quantify the drivers of the coverage in Kampala city. Using sample size for two proportions, and setting the level of significance at 5%, Power at 80%, a design effect of 2, and non-response rate of 10%; we estimated that 553 children would be required to get a 50% difference in coverage between children with a specified barrier and those without the barrier. The survey was conducted in all the divisions within Kampala city among mothers/caregivers with children aged 12 – 23 months. The household survey questionnaire was adapted from the Uganda Demographic Health Surveys (26), WHO, UNICEF urban tool kit and prior cross-sectional community surveys (16). Data were collected by trained research associates using tablet computers. Data collection took place between September to November 2019.

The unit of observation was the household and the primary sampling unit was Enumeration Area (EA). We employed multistage sampling to the select the households. Kampala was divided into three sampling strata; lower, middle and upper based on income poverty and the number of measles cases as described below;

1. Lower income group: Parishes with income poverty of more than 5% and reported a minimum of 10 cases of measles in 2017.
2. Middle income group: Parishes with income poverty of 2.5% - 5% and reported less than 10 measles cases in 2017.
3. Upper income group: Parishes with income poverty of less than 2.5% and reported less than 10 measles cases in 2017.

Based on the rounded up sample size of 600 children and using a rule of thumb approach (27), we selected 30 EAs (10 EAs were randomly selected from each stratum above). The number of households in each EA was selected using probability proportional to size sampling, and determined after household listing The measure of size was the number of households per EA (according to the 2014 census). An eligible household was defined as one with a child aged 12 – 23 months. Household selection was done prior to the main survey. The survey interviewers interviewed only the pre-selected households.

2.6 Data analysis methods

The evaluation employed a mixed methods approach with both qualitative and quantitative data analysis tools.

2.6.1 Quantitative data analysis

Descriptive characteristics are summarized as proportions. The format for reporting the access and utilization of the immunisation services was adopted from the Microplanning for Immunisation Service Delivery Using the Reaching Every District (RED) Strategy (27). The RED strategy was developed in 2002 by WHO, UNICEF and other partners to help improve immunisation systems. We present the immunisation coverage to represent the access to immunisation, and then the dropout rates to represent the utilization of immunisation.

Two parameters are used to describe the immunisation coverage in this report:

1. Completion of the recommended immunisation schedule irrespective of the time the vaccines are received. This information provides an insight on who is able to access the immunisation services. Full immunisation was defined as whether a child received all thirteen antigens (BCG, DPT1, DPT2, DPT3, PCV1, PCV2, PCV3, IPV, Measles, Polio0, Polio1, Polio2, and Polio3). Never immunised was defined as a child who has not received any dose of any antigen.
2. Completion of the recommended immunisation schedule within the recommended time periods (timeliness of vaccination) which ensures optimal immune response to the vaccines received and therefore getting the necessary level of protection against the diseases (see Annex 2).

Principal component analysis was used to generate a wealth index based on ownership of common household items. Items with binary variables whose means were less than 0.1 or greater than 0.8 were removed from this analysis in order to improve the power of the principal component. Households were ranked by wealth scores and grouped into four tertiles to give a categorical measure of

socioeconomic position.

2.6.2 Qualitative data analysis

All the IDIs, KIIs, and FGDs were audio recorded and transcribed before being translated into English if conducted in the local language. The transcripts from both the interviews and FGDs were imported and managed using Nvivo (QSR International, qualitative data analysis software). Analysis was primarily deductive using a coding framework informed by the Social Ecological Model (SEM) (28), for categorizing the data in relation to the key research questions about facilitators and barriers to immunisation service delivery. Alongside the deductive analysis, coding was flexible with new codes being added and existing codes being modified inductively based on the data to allow new themes to emerge

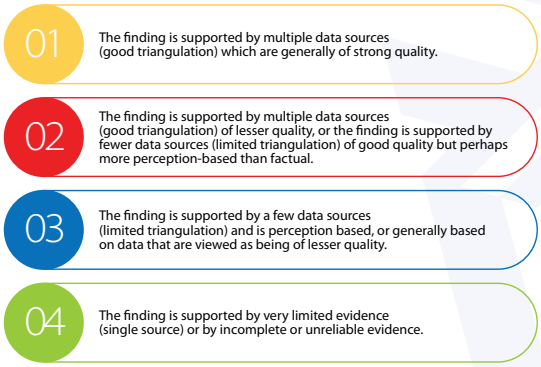
2.6.3 Root cause analyses (RCA)

To identify underlying causes of identified challenges and successes, we applied root cause analyses. We constructed diagrams of causal chains to visually illustrate the dynamic links between observed challenges and possible root causes. The process was iterative as RCAs were continually refined through testing assumptions against multiple data sources and through collective deliberation.

2.7 Strength of Evidence

A robustness ranking scale adapted from Gavi FCE 2.0 (17) was used to assess different robustness dimensions for the evidence related to the evaluation questions (Figure 5). A strength of evidence rating is assigned using a four-point scale as a general guide for ranking findings and describing the rationale behind the ranking. The ranking process helped identify which findings needed additional triangulation and validation. The team underwent a validation process that included adding data and reassessing the overall finding statement, robustness, and strength of evidence.

Figure 5. Approach to ranking the strength of evidence



2.8 Stakeholder engagement

To ensure quality and harness stakeholder buy in, we consulted key stakeholders at different phases of the evaluation. During protocol development, the team regularly consulted with Gavi, UNEPI and KCCA to develop evaluation questions and methods. During implementation, Gavi provided technical support; UNEPI, KCCA and UBOS provided technical input in selection of enumeration areas and training of the survey team. The preliminary results were presented at several high level meetings including (1) UNEPI and Partners meeting held at the Ministry of Health (6th November 2019); (2) The Joint Annual Review (JAR) (28th November 2019). Our results were extremely well received during these presentations and important feedback was provided. During report writing, the team conducted several fact checking interviews with key in-country stakeholders to validate the findings

2.9 Ethical considerations

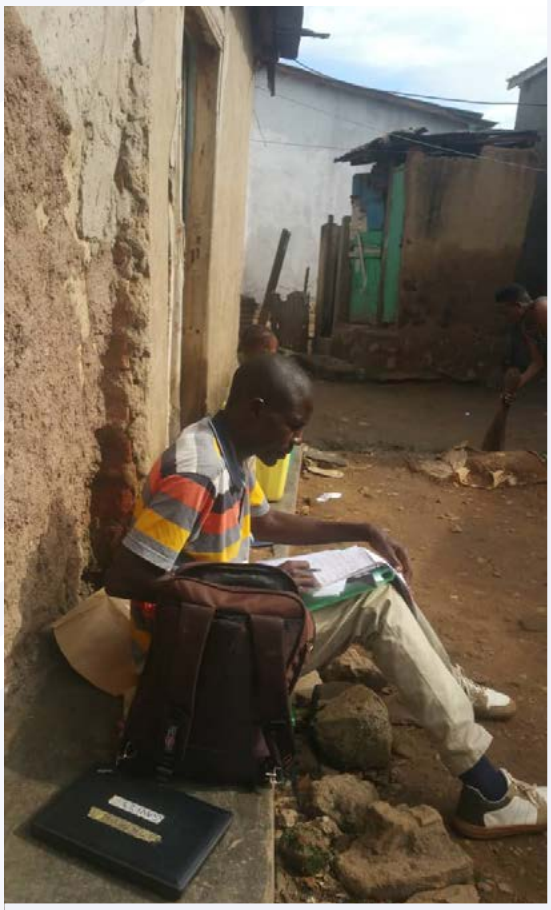
Approval of the evaluation was sought from Makerere University School of Biomedical Sciences Research and Ethics Committee (SBS IRB), and the Uganda National Council for Science and Technology (UNCST). Administrative clearance was sought from the Ministry of Health and Kampala Capital City Authority (KCCA). The research team sought approval from the UNEPI manager to attend and observe ongoing immunisation related meetings. Voluntary informed consent was sought from respondents prior to interviews. To ensure confidentiality, all data including respondents' names, titles, and contact information were secured in a lockable cabin and only accessible to the evaluation team. Quotes were not attributed to any individuals. Individually identifiable information was not included in any reports or other external communication of findings from the evaluation.

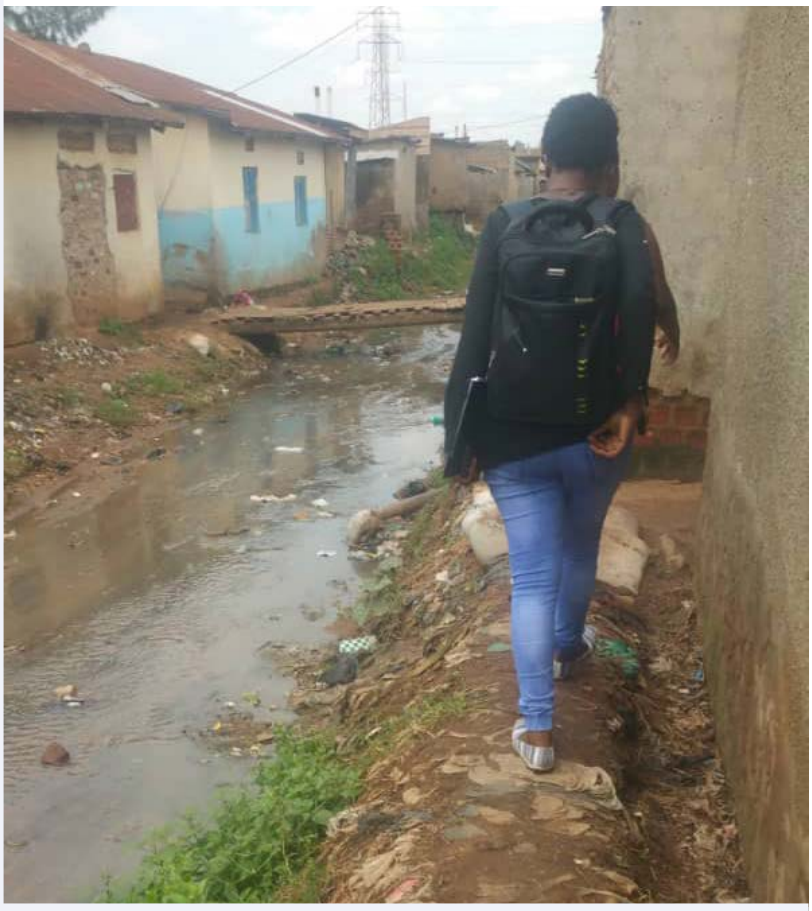
2.10 Limitations

This evaluation has some limitations. In depth qualitative data collection relies heavily on key informants and is prone to recall and respondent bias. We triangulated data from interviews and conducted fact checking interviews to minimize these biases. Our evaluation was focused on Kampala city – however, a significant number of people working in Kampala city live in the surrounding districts. Immunisation coverage and barriers among populations who dwell in Kampala city may be different from those among populations of surrounding districts that move into the city for work. Our household survey was done in households of people resident in Kampala and thus our findings are generalizable to Kampala residents but may have an additional limitation of household surveys which are more likely to capture respondents who are at home during the day, who may not represent the typical Kampala resident. Our findings focused on a major city in Uganda might not be representative of all urban settings in Uganda, which range widely in level of economic development and other factors such as cultural norms that influence demand, access, and use of the health care system, as well as norms, attitudes, and practices among health care providers. We have not collected data comprehensively from the less visible partners working in Kampala City who support immunisation activities; a more comprehensive partner mapping would be more informative. Our evaluation focused largely on the demand side factors affecting immunisation coverage in urban areas. The supply side factors and the engagement of the private sector were not fully evaluated at this stage. This limited our ability to make definitive conclusions or recommendations on adaptation of the EPI to challenges of immunisation in Kampala. Lastly, we had a very small sample of children in the HHS who were never immunised and due to the small sample size, it is difficult to draw conclusions about the characteristics of the unimmunised child in Kampala city.

Next steps

The second phase of our evaluation will focus on a detailed evaluation of the supply side drivers of immunisation coverage in Kampala





3.0 EVALUATION FINDINGS

This evaluation was conducted from June to December 2019 in Kampala city. The findings are presented by evaluation question starting with the coverage survey results (Section 3.1), then we discuss the facilitators and barriers to uptake of immunisation services (Section 3.2) followed by EPI adaptations to the challenges of immunisation in Kampala city (Section 3.3).

3.1 Effectiveness of the current EPI model for immunisation service delivery in Kampala city

We determined the effectiveness of the current EPI model for immunisation service delivery in Kampala city using estimates of full immunisation coverage, timeliness of vaccination and DPT1-DPT3 dropout rate from the household survey.

The household survey was conducted in 600 randomly selected households evenly divided between lower, middle, and upper income parishes in Kampala city. Among the 600 households there were 647 children; 51 children were excluded (47 due to more than one child in the household, 6 were absent, and 4 declined); in total, 590 children were enrolled in the survey (a 98 percent response rate).

Key findings

Our findings show that 41% of the surveyed children were fully immunised, 57.6% were partially immunised, 26.5%were immunised on time and the overall DPT1-DPT3 dropout rate was 17.3%. These findings Indicate sub optimal effectiveness of the EPI model for immunisation service delivery.

- The proportion of children that received DPT1 was high (95.9%) indicating good access to immunisation services, however the high DPT1-DPT3 dropout rate indicates poor utilization
- The combination of high dropout rates and the low proportion of children vaccinated on time implies that there is pool of children with incomplete or no immunity. This poses a risk for outbreaks and transmission of vaccine preventable diseases. These findings are consistent with findings from the EPI coverage survey report 2017 and UDHS 2001-2016 (11–13,29–31).
- There was no significant difference between immunisation coverage in the sampling locations near slum areas versus non-slum areas
- Almost half (47.8%) of the children received immunisation from a mix of public and private health facilities.
- Caregivers cited proximity of health facilities to their places of residence as the main reason for choice of health facility for immunisation services, which broadly speaks to convenience.
- Overall, involvement of the private sector has increased access to immunisation services and reduced distance to the nearest facility as reflected in the survey findings.

3.1.1 Socio-demographic characteristics

Of the 590 children enrolled in the evaluation, the median age was 2.1 years, 306 (51.9%) and 97.6% were born in Uganda. 95% of the children's mothers had attended antenatal care at least once and two-thirds gave birth in a hospital. The majority of the children came from households headed by males (n=439, 74.4%), and 63% of the household heads had attained at least secondary education (Table 6).

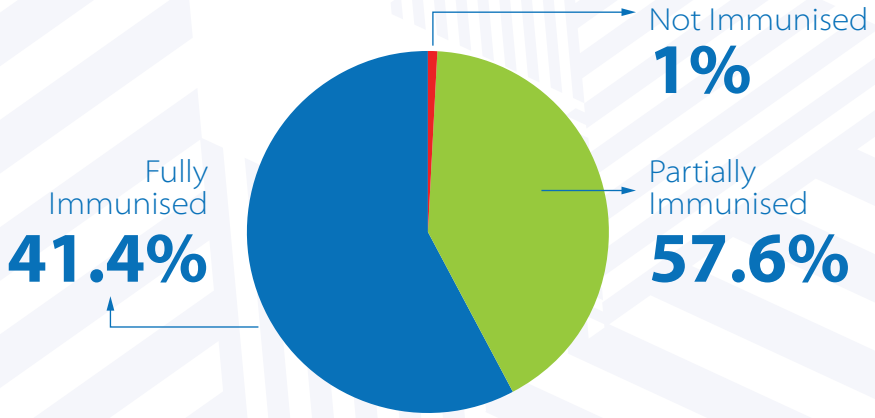
Table 6. Characteristics of study participants (N=590)

Characteristic	Categxory	n (%)
Sex	Male	306 (51.9)
	Female	284 (48.1)
Country of birth	Uganda	576 (97.6)
	Other	14 (2.4)
Antenatal		
Mother attended Antenatal care at least once	No	12 (2.0)
	Yes	561 (95.1)
	Other (mother was absent)	17 (2.9)
Where did you go for Antenatal care	Hospital (Private / Public)	388 (65.8)
	Private Clinic	42 (7.1)
	Health center III/IV	138 (23.4)
	Other (mother was absent)	1 (0.2)
Delivery		
Place of delivery	Home	10 (1.7)
	Hospital (Private / Public)	393 (66.6)
	Private clinic	68 (11.5)
	Health center III / IV	100 (16.9)
	Others (on road to hospital)	19 (3.2)
Household head		
Sex of the Household Head	Male	439 (74.4)
	Female	151 (25.6)
Highest Level Of Education	None	40 (6.8)
	Primary	93 (15.8)
	Secondary	208 (35.3)
	Tertiary	166 (28.1)
	Declined to answer	83 (14.1)

3.1.2 Completion of the immunisation schedules

Of the 590 children sampled, 244 (41.4%) had received all the vaccines in the current immunisation schedule for Uganda (see annex 2). More than half, 340 (57.6%) were partially immunised, which is consistent with findings from previous surveys (7–10,16,17). Six children (1%) had never received any vaccine (Figure 6). The DPT3 coverage was 79.3%.

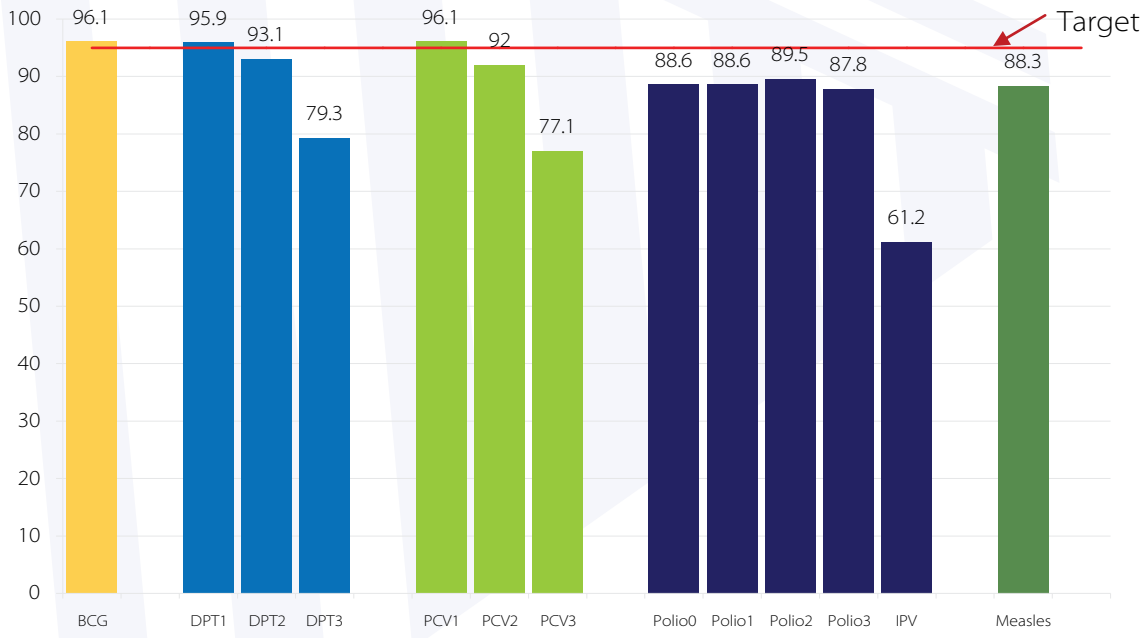
Figure 6. Immunisation coverage in Kampala city



Source: Gavi Evaluation household survey, 2019

Figure 7 shows the coverage by vaccine. The proportion of children that received DPT1 was high (95.9%) indicating good access to immunisation services. There was high coverage of vaccines given at birth (BCG and Polio0) at six weeks (DPT1, PCV1 and Polio1) and ten weeks (DPT2, PCV2 and Polio2). There was a drop in coverage with DPT3, PCV3 and Polio3 that are delivered at 14 weeks. The lowest observed coverage was for IPV at 61.2%. the figure shows a discrepancy in coverage for vaccines that are routinely administered at the same time such as DPT1 (95.9%) versus Polio 1 (88.6%) suggesting missed opportunities. Measles coverage (88.3%) is below the national target of 95%.

Figure 7. Immunisation coverage by vaccine in Kampala city

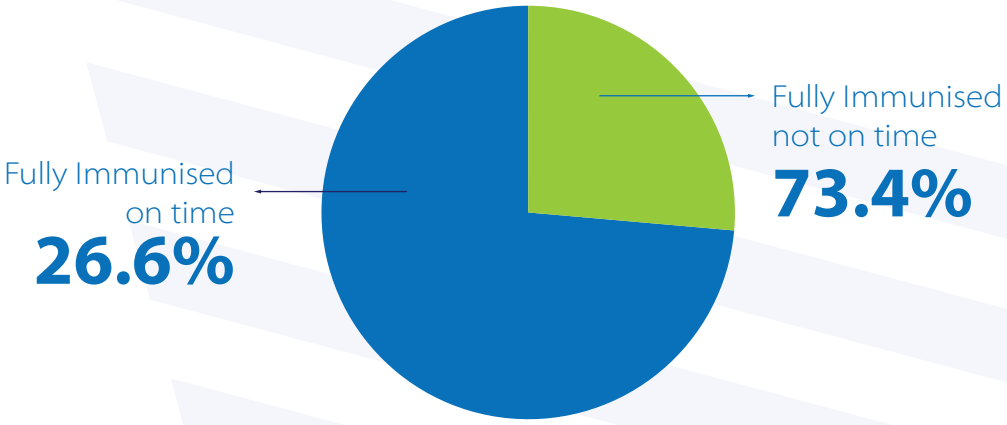


Source: Gavi Evaluation household survey, 2019

a. Timeliness of vaccination

Overall, only 65 of the 590 (11%) children completed their full vaccination schedule on time (Figure 8), indicating low effectiveness of the current EPI model for immunisation service delivery in Kampala city. Table 7 shows coverage by antigen and coverage on time. Coverage for each individual vaccine was high but coverage on time was quite low (less than 60%). there was a tendency to improve in the timeliness of the vaccines that are provided in multiple phases with more children receiving the second vaccine in time compared to the first vaccine. This was observed for polio2 (44%) compared to Polio1 (41%), DPT2 (52%) compared to DPT1 (50%), and PCV2 (50%) compared to PCV1 (48%). Unfortunately, the improvement waned off by the third vaccine.

Figure 8. Timeliness of vaccination in Kampala city



Source: Gavi Evaluation household survey, 2019

Table 7. Number and proportions of vaccinated and those with timely vaccination

	Overall	
Vaccine	Coverage (N=590), n (%)	Coverage on time (N=590), n (%)
BCG	567 (96)	325 (55)
Polio0	523 (89)	281 (48)
Polio1	523 (89)	240 (41)
Polio2	528 (89)	258 (44)
Polio3	518 (88)	255 (43)
IPV	361 (61)	185 (31)
DPT1	566 (96)	295 (50)
DPT2	549 (93)	309 (52)
DPT3	468 (79)	301 (51)
PCV1	567 (96)	286 (48)
PCV2	543 (92)	293 (50)
PCV3	455 (77)	293 (50)
Measles	521 (88)	(45)

Source: Gavi Evaluation household survey, 2019

b. Characteristics of never immunised children

Table 8. Case description of the zero dose children

Characteristic	Zero dose child					
	1	2	3	4	5	6
Sex	Female	Female	Male	Female	Male	Male
Age of the primary care giver	25	23	25	33	25	63
Sex of the household head	Female	Male	Male	Male	Female	Male

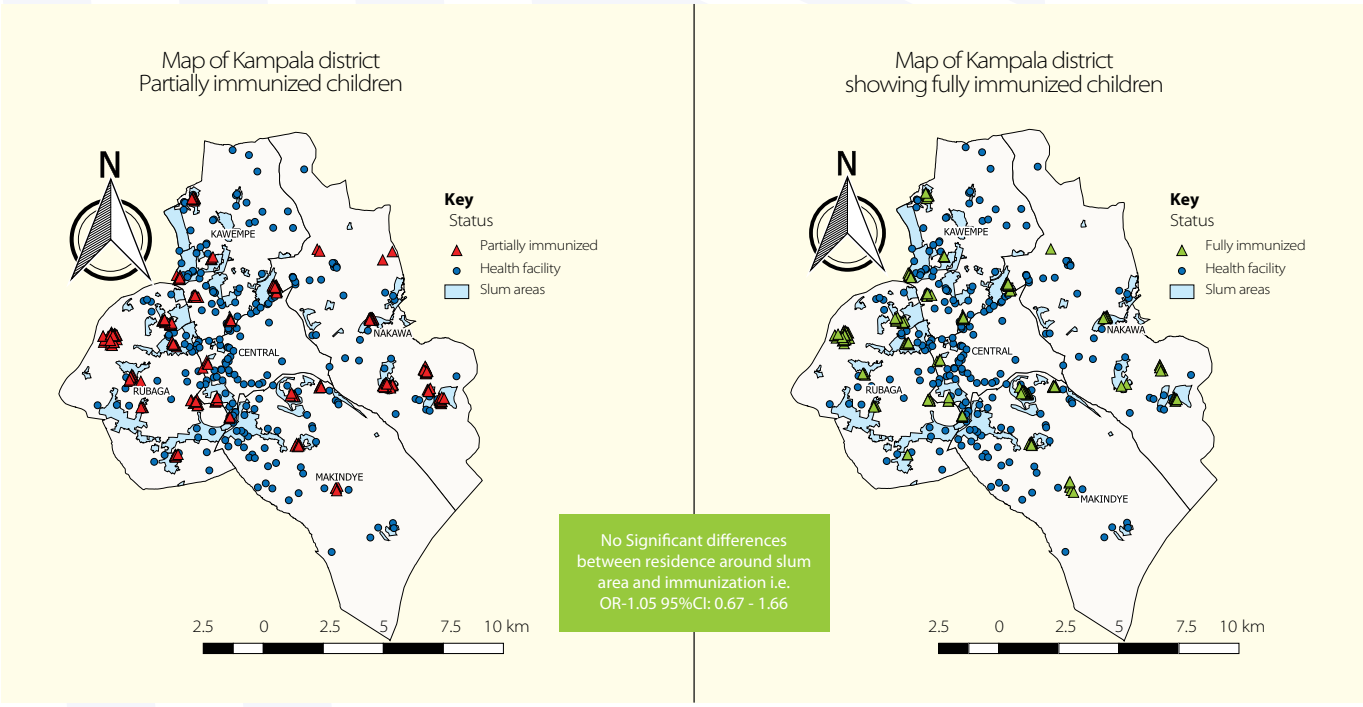
Characteristic	Zero dose child					
	1	2	3	4	5	6
Sex	Female	Female	Male	Female	Male	Male
Educational level	Primary	Tertiary	Secondary	Don't know	None	Secondary
Wealth index	Poor	Less poor	Poor	Less poor	Poor	Less poor
Division	Kawempe	Rubaga	Rubaga	Rubaga	Rubaga	Nakawa
Residence (Slum/ non-slum)	Slum	Non-slum	Non-slum	Non-slum	Non-slum	Slum
Nationality	Uganda	Uganda	Uganda	Uganda	Non-Ugandan	Uganda
Religion	Catholic	Anglican	Catholic	Pentecostal	Muslim	Anglican
Reasons for not vaccination	Parents were too busy to take their child for vaccination	Belief that vaccine is dangerous Fear of side effects Treat free commodities with suspicion	Declined to respond	"Not me who decides"	Lack of access to information about vaccines Counteracting religious beliefs	Declined to respond

We found six unimmunised children, half of these were female. More than half (4/6) were resident in Rubaga division.

c. Characteristics of the fully and partially immunised children

Figure 9 shows the divisions of Kampala city, the distribution of slums and the locations of the partially versus fully immunised children based on the survey results. There was no significant difference in immunisation coverage between slum areas (41.8%) versus non slum areas (40.9%) in the sampling locations in slum areas versus non-slum areas

Figure 9. Map of Kampala showing the location of partially and fully immunised children



Source: Gavi Evaluation household survey, 2019

Table 9 below shows the characteristics of the fully and partially immunised. Majority of the partially immunised children were from households with the lowest wealth indices. Makindye was associated with increased likelihood of being fully immunised

Table 9. Characteristics of fully versus partially immunised children

Characteristic	Category	Immunisation Un / partially (n=346) - n (%)	Fully (n=244) n (%)	Bi variate Or (95% ci)	P-value	Multivariate Or (95% ci)	P-value
Wealth index	Poor	192 (55.5)	106 (43.4)	Reference		Reference	-
	Less poor	154 (44.5)	138 (56.6)	1.71 (1.23 – 2.39)	0.003	1.98 (1.24-2.43)	0.001***
Residence	Non-slum	169 (48.8)	117 (47.9)	Reference		Reference	-
	Slum	177 (51.2)	127 (52.1)	0.99 (0.61 – 1.64)	0.992	1.53 (0.88 -2.69)	0.128
Division	Central	22 (6.4)	14 (5.7)	Reference		Reference	
	Kawempe	52 (15.0)	41 (16.8)	1.23 (0.93 – 1.63)	0.143	1.99 (0.52 - 1.90)	0.976
	Rubaga	113 (32.6)	73 (29.9)	0.97 (0.66 – 1.43)	0.886	0.89 (0.38 - 2.10)	0.781
	Makindye	32 (9.3)	61 (25.1)	2.90 (1.74 – 4.83)	<0.001	1.96 (1.00 – 3.86)	0.050*
	Nakawa	127 (36.7)	55 (22.5)	0.66 (0.33 – 1.32)	0.231	0.48 (0.14-1.62)	0.226
Sex of the household head	Male	268 (77.5)	171 (70.1)	Reference		Reference	
	Female	78 (22.5)	73 (29.9)	1.50 (0.92 – 2.43)	0.097	1.53 (0.93-2.53)	0.094
Sex of the child	Male	178 (51.5)	127 (52.1)	Reference		Reference	
	Female	168 (48.5)	117 (47.9)	1.13 (0.74 – 1.73)	0.545	1.01 (0.64-1.59)	0.976
Age category of primary caregiver	<20	25 (7.2)	9 (3.7)	Reference		Ref	
	21 – 30	202 (58.4)	138 (56.6)	2.01 (0.77 – 5.28)	0.149	0.54 (0.08 – 3.48)	0.499
	31 – 40	84 (24.3)	74 (30.3)	2.63 (0.81 – 8.47)	0.102	0.57 (0.08 – 4.29)	0.571
	Above 40	35 (10.1)	23 (9.4)	1.98 (0.67 – 5.88)	0.206	0.56 (0.08 – 3.69)	0.530
Number of ANC visits	Below 4 times	86 (24.9)	63 (25.8)	Reference		Reference	
	4 times and above	250 (72.3)	174 (72.3)	1.28 (0.86 – 1.90)	0.209	1.36 (0.77 – 2.43)	0.280
	NA	10 (2.8)	7 (2.9)	1.20 (0.54 – 2.66)	0.640	-	-
Religion	Catholic	117 (33.8)	81 (33.2)	Reference		Reference	
	Anglican	96 (27.8)	61 (25.0)	0.93 (0.66 – 1.32)	0.686	0.81 (0.51 – 1.28)	0.354
	Muslim	74 (21.4)	62 (25.4)	1.05 (0.71 – 1.57)	0.799	0.84 (0.47 – 1.52)	0.561
	Pentecostal	44 (12.7)	34 (13.9)	1.04 (0.59 – 1.81)	0.894	1.02 (0.54 – 1.94)	0.945
	Others	15 (4.3)	6 (2.5)	0.70 (0.43 – 1.13)	0.137	0.17 (0.01 – 2.12)	0.162
Education level of household head	At most primary	141 (40.8)	75 (30.7)	Reference		Reference	
	At least secondary	205 (59.2)	169 (69.3)	1.59 (1.01 – 2.51)	0.045	1.29 (0.72 – 2.31)	0.369
Parity (n=396)	4 or less	203 (89.4)	157 (92.9)	Reference		Reference	
	Greater than 4	24 (10.6)	12 (7.1)	0.58 (0.21 – 1.62)	0.289	0.52 (0.19 – 1.40)	0.184
Place of delivery	Public facility	282 (84.5)	211 (89.0)	Reference		Reference	
	Private facility	46 (13.8)	22 (9.3)	0.72 (0.42 – 1.25)	0.235	0.74 (0.45 – 1.24)	0.242
	Home / TBA	6 (1.8)	4 (1.7)	0.87 (0.21 – 3.55)	0.840	1.52 (0.31 – 7.37)	0.591
Distance to health facility	< 20 Meters	153 (44.2)	114 (46.7)	Reference		Reference	
	20 – 50 meters	87 (25.1)	56 (23.0)	0.81 (0.50 – 1.31)	0.374	0.77 (0.44 – 1.35)	0.349
	Above 50 meters (but within Kampala)	7 (2.0)	14 (5.7)	3.10 (1.28 – 7.58)	0.015	2.11 (0.41 – 10.90)	0.361
	Outside Kampala	99 (28.7)	60 (24.6)	0.77 (0.59 – 0.99)	0.049	0.95 (0.64 – 1.42)	0.791
Transportation costs	None	194 (57.1)	134 (54.9)	Reference		Reference	
	< 5000	128 (37.7)	99 (40.6)	1.27 (0.95 – 1.71)	0.104	1.72 (0.89 – 3.33)	0.102
	> 5000	18 (5.2)	11 (4.5)	0.91 (0.42 – 1.97)	0.811	0.99 (0.28 – 3.49)	0.990

***Statistically significant difference based on a p-value<0.05

Source: Gavi Evaluation household survey, 2019

a. Where do people go for immunisation services?

Majority of the vaccinated children received their vaccines from only private health facilities 170 (55%) while 135(44.3%) received vaccines from only public health facilities. Eighty-seven children (59.2%) changed from public to private for profit (Table 10).

Table 10. Type of health facility visited by caregivers throughout children's vaccination visits

Characteristic	Frequency	Percentage (%)
Visited one type of HF in Kampala (n=305)		
Visited only public facilities	135	44.3
Visited only private for-profit facilities	113	37.0
Visited only private not for profit facilities	57	18.7
Changed facility types in Kampala (n=147)		
Changed from public to PNFP facilities	9	6.1
Changed from public to PFP facilities	87	59.2
Changed from PNFP to public facilities	5	3.4
Changed from PFP to public facilities	22	15.0
Changed from PNFP to PFP	15	10.2
Changed from PFP to PNFP	9	6.1
Changed to facility types outside Kampala (n=13)		
Changed from public to facilities out of Kampala	3	23.1
Changed from PNFP to facilities out of Kampala	2	15.4
Changed from PFP to facilities out of Kampala	8	61.5
Changed from other districts to Kampala (n=44)		
Changed from out of Kampala to public	11	25.0
Changed from out of Kampala to PNFP	5	11.4
Changed from out of Kampala to PFP	28	63.6

The major reason for choice of health facility for vaccination was proximity to the home of the child (94.5%). When we stratified further by vaccination status (i.e. fully / not immunised and DPT3), the main reason for vaccination did not change (Table 11)

Table 11. Reason for choice of health facility to receive vaccination services

Characteristics	Fully (n=244)	Partially (n=346)	DPT3 (n=468)
Proximity to the home of the child	223 (91.4)	322 (93.1)	437 (93.4)
Near to workplace	13 (5.3)	11 (3.2)	20 (4.3)
Place of delivery	34 (13.9)	42 (12.1)	62 (13.3)
Services being offered free of charge	92 (37.7)	107 (30.9)	166 (35.5)
User fees	25 (10.3)	32 (9.3)	49 (10.5)
Friendly health worker	55 (22.5)	66 (19.1)	104 (22.2)
Health worker comes on time	26 (10.7)	41 (11.9)	52 (11.1)
Short queues	15 (6.2)	28 (8.1)	32 (6.8)
Quick service	34 (13.9)	43 (12.4)	68 (14.5)

Characteristics	Fully (n=244)	Partially (n=346)	DPT3 (n=468)
Availability of the vaccines	46 (18.9)	58 (16.8)	89 (19.0)
Flexible working hours	7 (2.9)	1 (0.3)	7 (1.5)
Advised to go there	-	7 (2.0)	5 (1.1)
Availability of other specialized services	11 (4.5)	16 (4.6)	23 (4.9)
Trust the credibility of health worker/health facility	17 (7.0)	-	(6.2)

3.2.2 Dropout rates

The dropout rate was and 8.1% between DPT1 and measles, and 17.3% between DPT1 and DPT3; indicating low effectiveness of the current EPI model for immunisation service delivery in Kampala city.

On average among children who received DPT1 but did not complete DPT3, primary caregivers were 29.5 years old. Majority (62%) did not have mothers as their primary caregivers. Our crude findings indicate that attaining at least secondary education level and receiving any immunisation message through media are protective of dropping out from DPT3 (Table 12).

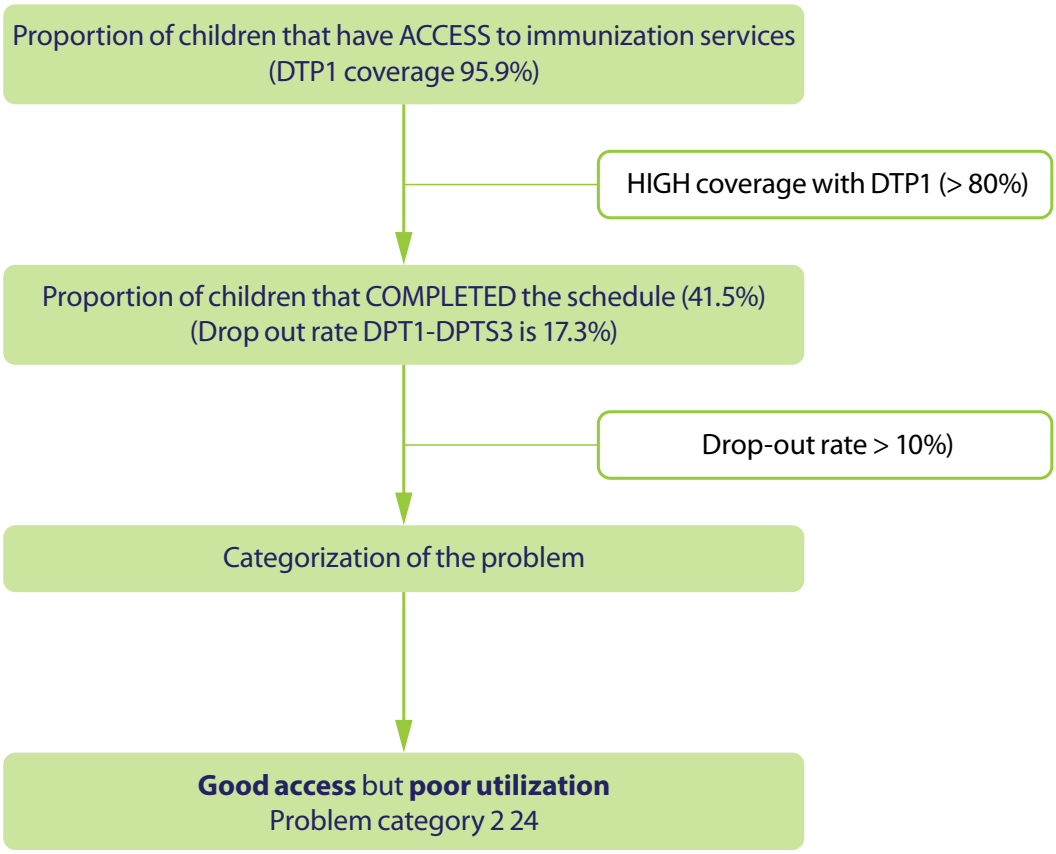
Table 12. Characteristics of DPT1-DPT3 drop out children

Characteristic	Categories	DPT1-DPT3 Drop out (n=101)	Completed (n=465)	Crude OR (95CI)
Age of the primary care giver	Mean (SD)	29.5 (9.99)	29.7(8.31)	
Is mother the primary care giver	No	63 (62.4)	279 (60.0)	Reference
	Yes	38 (37.6)	186 (40.0)	0.90 (0.58 – 1.51)
Sex of the household head	Male	73 (72.3)	350 (75.3)	Reference
	Female	28 (27.7)	115 (24.7)	1.18 (0.72 – 1.89)
Educational level	At most primary/unknown	50 (49.5)	154 (33.1)	Reference
	At least secondary	51 (50.5)	311 (66.9)	0.51 (0.32 – 0.78)
Wealth index	Poor	57 (56.4)	224 (48.2)	Reference
	Less poor	44 (43.6)	241 (51.8)	0.72 (0.47 – 1.11)
Any immunisation message through media	No	52 (51.5)	170 (36.6)	Reference
	Yes	49 (48.5)	295 (63.4)	0.54 (0.35 – 0.84)
Parity	4 or less	98 (97.0)	436 (93.8)	Reference
	Greater than 4	3 (3.0)	29 (6.2)	0.46 (0.14 – 1.54)
Sex of child	Male	52 (51.5)	247 (53.1)	Reference
	Female	49 (48.5)	218 (46.9)	1.16 (0.75 – 1.78)
ANC visits attended	Below 4	22 (21.8)	117 (25.2)	Reference
	>=4 times	74 (73.3)	338 (72.7)	1.16 (0.69 – 1.96)
	NA	5 (4.9)	10 (2.1)	2.66 (0.83 – 8.53)
History of any adverse event	No	63 (62.4)	309 (66.5)	Reference
	Yes	38 (37.6)	156 (33.5)	1.19 (0.76 – 1.87)

Characteristic	Categories	DPT1-DPT3 Drop out (n=101)	Completed (n=465)	Crude OR (95CI)
Division	Central	3 (3.0)*	30 (6.5)	Reference
	Kawempe	12 (11.9)	77 (16.6)	1.56 (0.41 – 5.91)
	Rubaga	42 (41.6)	134 (28.8)	3.13 (0.91 – 10.79)
	Makindye	9 (8.9)	84 (18.0)	1.07 (0.27 – 4.22)
	Nakawa	35 (34.6)	140 (30.1)	2.50 (0.72 – 8.67)
Residence	Non-slum	47 (46.5)	227 (48.8)	Reference
	Slum	54 (53.5)	238 (51.2)	1.10 (0.71 – 1.69)
Facility where the child received immunisation	Private	52 (52.5)	301 (65.9)	Reference
	Public	47 (47.5)	158 (34.4)	1.72 (1.11 – 2.67)
Distance of residence to health facility	< 20 meters	37 (36.6)	226 (48.6)	Reference
	20.1-50.0 meters	28 (27.7)	112 (24.1)	1.53 (0.89 – 2.62)
	50.0-110 meters	2 (2.0)*	19 (4.1)	0.64 (0.14 – 2.88)
	Outside Kampala city	34 (33.7)	108 (23.2)	1.92 (1.14 – 3.23)

Figure 10 summarizes the assess to immunisation (coverage of DPT1), the utilization of the immunisation services (drop out DPT1 to DPT3) and classification of the immunisation challenges in Kampala according to the RED criteria.

Figure 10. Summary of the access and utilization of immunisation services in Kampala city



Source: Gavi Evaluation household survey, 2019

3.2 Facilitators and barriers of immunisation coverage in Kampala city

This section discusses the facilitators and barriers of immunisation coverage in Kampala City. The facilitators and barriers are presented according to the conceptual framework (Figure 11) using the supply-side and demand side dimensions of accessibility: 1) Approachability and Ability to perceive, 2) Acceptability and Ability to seek, 3) Availability, Accommodation and ability to reach, 4) Affordability and Ability to Pay, 5) Appropriateness and Ability to Engage. Each finding is assigned a strength of evidence rating on a scale of 1 (high) to 4 (low).

Figure 11. Summary of facilitators and barriers of immunisation coverage in Kampala city

Approachability and the Ability to perceive.

- Among fully vaccinated children, caregivers cited understanding the benefits of immunisation as the primary reason they chose to fully vaccinate their children.
- Conversely, inadequate information on the benefits of immunisation was the primary reason other caregivers did not fully vaccinate their children. This was due to the lack of an active program to provide sufficient information about the need for immunisation through social mobilization or routine service delivery. This in part due to limited budget for routine social mobilization, demotivated social mobilizers due to the post-activity payment system and high staff turnover in private health facilities. As a result of inadequate information on immunisation, there is fear and mistrust of the vaccines which is aggravated by negative influence from significant others and media.

Acceptability and the Ability to Seek

- Refugees faced unique challenges in the acceptability of immunisation services. Refugees reported marginalization when it came to accessing immunisation services. Marginalization was felt through: being skipped in queues, being left out during mass immunisation campaigns and rude health workers. They also felt left out of communications on immunisation as the mainstream media mostly used local languages when announcing immunisation services.
- Gender dynamics in the household limited some mothers' ability to seek immunisation services for their children due to pressure from their husbands not to vaccinate.
- Availability, Accommodation and the Ability to reach
- Delays at health facilities coupled with caregivers competing time demands deterred caregivers from accessing immunisation services. 9.4% of caregivers mentioned long queues as a challenge to accessing immunisation services at health facilities. Caregivers reported a) frequent delays in the commencement of immunisation b) delays experienced as health workers waited for a requisite number of children before opening the multiple dose vaccine vials, c) caregiver's competing time demands.
- Key informants at district level reported a high attrition rates at private health facilities coupled with no motivation to conduct immunisation outreaches as the main challenges at private health facilities.
- Caregivers and key informants at various levels reported frequent vaccines stock outs which were attributed to (a) inadequate stock at national level that resulted in the rationing of vaccines at different levels and (b) limited distribution system of vaccines from satellite health facilities to lower level health facilities.
- From the household survey, 17.3% of respondents mentioned that their children were partially vaccinated because they were not with their primary caregivers.

Affordability and Ability to pay

- Hidden costs such as i) payment for immunisation cards, ii) payment for the immunisation service, iii)) transport costs as well as iv) costs associated with meeting special requirements at immunisation points such as buying pampers deterred caregivers from accessing immunisation services.

Appropriateness and Ability to Engage

- Lack of a follow up system for immunisation makes it difficult to identify and trace defaulters due to the migrant nature of the population in Kampala City which leads to inaccurate reporting.

3.2.1 Approachability and the Ability to perceive.

Approachability of immunisation services relates to the ways that the health system educates caregivers about the need and importance of immunisation. This includes elements such as transparency, information sharing regarding vaccinations and services, and outreach activities.

The *ability to perceive* refers to the ability by caregivers to identify the need for immunisation among children. This is influenced by health literacy, health beliefs, trust, and expectations.

The caregivers' perceptions of needs and desire for immunisation services is influenced by the approachability of the health care system and their ability to perceive the benefits.

***Finding**: Among fully vaccinated children, caregivers cited understanding the benefits of immunisation as the primary reason they chose to fully vaccinate their children. Conversely, inadequate information on the benefits of immunisation was the primary reason other caregivers did not fully vaccinate their children. This was due to the lack of an active program to provide sufficient information about the need for immunisation through social mobilization or routine service delivery. This in part due to limited budget for routine social mobilization, demotivated social mobilizers due to the post-activity payment system and high staff turnover in private health facilities.*

1. Appreciation of the benefits of immunisation among fully immunised children.

From the household survey, 244 (41.4%) of the children were fully immunised. Of the 244 fully immunised children, 97% stated that their understanding that immunised children are protected from diseases prompted them to fully vaccinate their children (Table 13). A secondary reason was having seen on television the suffering of children who were not immunised (21%). These most commonly cited reasons point to the fact that caregivers understood the link between diseases and immunisation; in other words, they were able to perceive the benefits of immunisation.

Table 13. Reasons for full immunisation of children

Reason	Freq (n=244)	Percentage (%)
Understanding that immunised children are protected from diseases	236	96.7
Having seen on television the suffering of children who were not immunised (e.g. paralysis from polio)	50	20.5
Perceived benefits of immunisation	8	3.3
Conviction that responsible parents understand that immunisation is a child's right	2	0.8

* *The question allowed for multiple choice responses*

Source: Gavi Evaluation household survey, 2019

The appreciation of the benefits of immunisation was also supported by qualitative data from FGDs. In all FGDs, community members cited their children acquiring better immunity as a major reason for immunisation. They also noted that the children got mild forms of a disease during outbreaks.

Based on personal experiences, they noted that certain diseases like polio that were common in the past are rarely seen and linked this phenomenon to immunisation. In an FGD with women in a low uptake area of immunisation, a mother of an immunised child described how her child who had contracted measles was well enough to go to school in comparison to another child that was not immunised:

> *"For me I live with my sister's child who was living in the village but the child has suffered from measles every now and then. And my own child who I immunised, he got measles but he was strong and he could even go to school. I was actually just sympathetic to let him stay home because I didn't want him to spread the disease to other children at school." (FGD with women in area with low uptake)*

2. Reasons for partial immunisation of children

Among those children who were partially immunised, the caregiver respondent provided the reasons for partial immunisation (Table 14). Nearly all respondents (99.4%) cited that they had inadequate information on immunisation, and 40 percent of respondents (n=138) cited inadequate information as their *only* reason for partial immunisation. Others cited inadequate information as well as another reason: vaccine stock outs (20.5%), child not living with mother (17.3%), and long waiting times for immunisation at facilities (15.9%).

Table 14. Reasons for partial immunisation of children

Reason	Frequency (n=346)	Percentage (%)
Inadequate information on immunisation	344	99.4
Vaccines stock outs	71	20.5
Child not living with mother	60	17.3
Long waiting time	55	15.9
Hidden costs	18	5.2

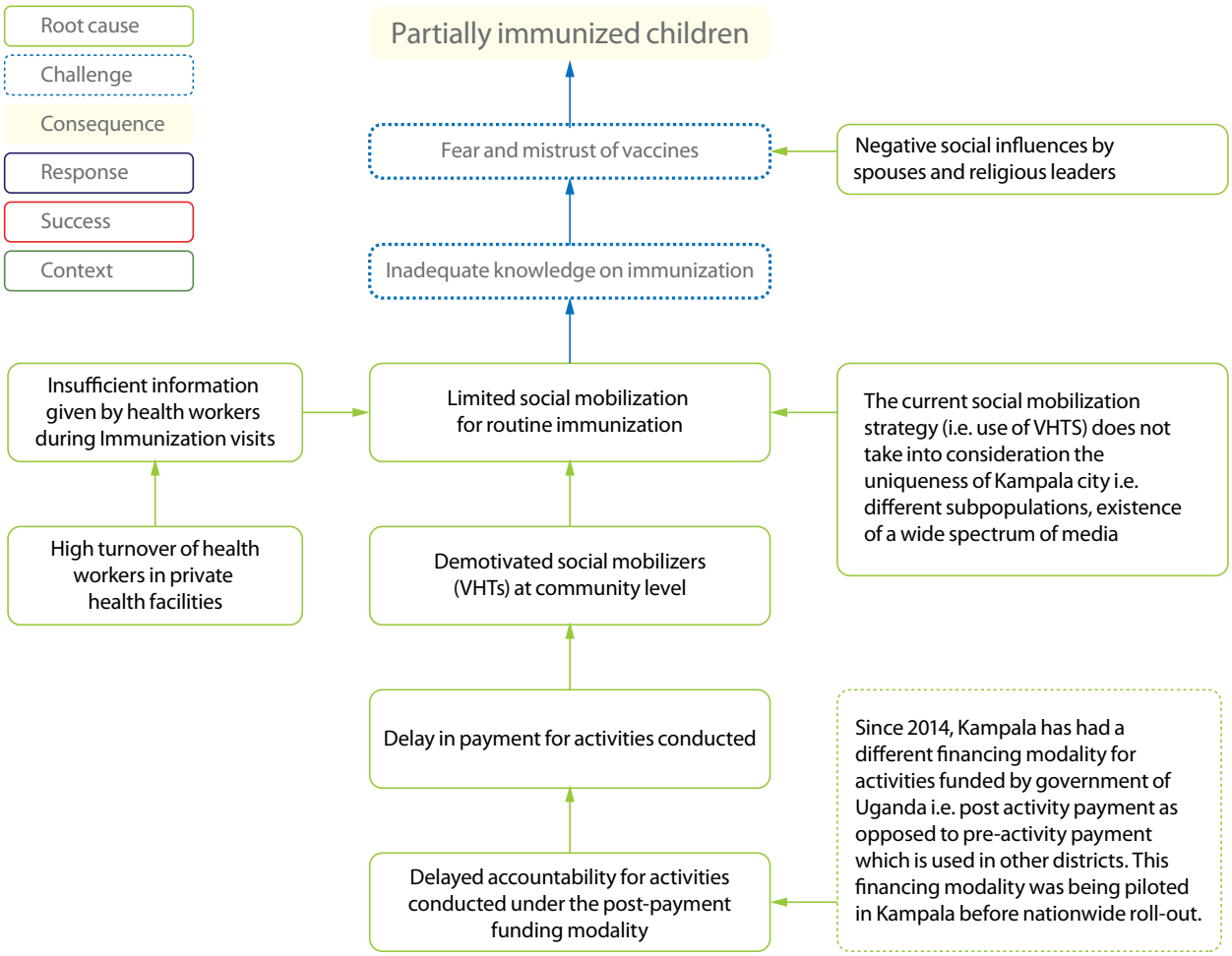
Reason	Frequency (n=346)	Percentage (%)
Discrimination of minority groups	2	0.6
Reasons reported in combination to inadequate information on immunisation (n=344)		
Inadequate information, Vaccines stock outs	71	12.1
Inadequate information, Socioeconomic organization (such as child not living with mother) in the urban setting	60	10.2
Inadequate information, Long waiting time	55	9.4
Inadequate information, Hidden costs	18	3.1
Inadequate information, Discrimination of minority groups	2	0.3

*These were assessed in the 346 respondents with un/partially immunised children and the question allowed for multiple responses.

Source: Gavi Evaluation household survey, 2019

2. Inadequate knowledge and communication on immunisation

Figure 12. Root cause analysis for caregiver's lack of knowledge on immunization



Analysis of household survey data showed that lack of knowledge on immunisation was the main reason for partial immunisation of children. From Table 14 above, 99.4 percent of respondents whose children were partially vaccinated mentioned lack of knowledge as the key reason for not fully vaccinating their children. Among those who did not know about immunisation, several were convinced that their children were fully vaccinated and yet they had received fewer vaccines while others claimed they did not have access to information on vaccination. Our findings show that the inadequate knowledge on immunisation among caregivers was due to the lack of an active program by the EPI to provide context specific social mobilization on immunisation in Kampala city, (see the root cause analysis on the right) as discussed below

3. Insufficient information given by health workers

Anytime health workers interact with caregivers - whether through campaigns, outreaches, or routine immunisation - is an opportunity to improve the approachability of the health system and provide information on immunisation. According to the caregivers, health workers always emphasized the need to come back for follow up visits however, no explanations about the vaccines received or their benefits were shared.

> *"They also do not tell us why they are immunizing. They just tell us the government has decided that we take our children for immunisation but they do not first sensitize us about its benefits." (FGD with men from slums)*

The limited information relayed by health workers is exacerbated by high turnover rates of health workers at private health facilities. The turnover results in loss of trained staff which ultimately affects the quality of immunisation services in the private facilities including health education, cold chain maintenance, data collection, record keeping, and as well immunisation skills as reported in the KII at the division level:

> *"There is high staff turnover, especially in private health facilities which sometimes leaves a notable knowledge gap with regards to immunisation. Many times after training health workers in private health facilities, they don't stay long enough and often, when new ones are hired, they make lots of mistakes in administering vaccines, data capture as well as cold chain maintenance" (KII, division level)*

Limited budget for routine social mobilization

Social mobilization is a key way that the EPI educates caregivers about the importance of immunisation. However, respondents at national and district levels reported that there was limited social mobilization for immunisation which was more pronounced during campaigns as compared to routine immunisation.

> *"...I've never seen the budget for KCCA which is talking about immunisation. So there's no support for immunisation activities, especially mobilizing for routine immunisation. We don't have a budget". (KII at district level)*

An underlying reason for the inadequate budget is that - particularly during immunisation campaigns - there is limited consideration of the uniqueness of Kampala city for social mobilization. Key informants at district level reported that during campaigns, MoH considers Kampala as one district and allocates funds based on the district night population. However, immunisation services are consumed by a much bigger population; both day and night population. As such, the allocated funds are not enough and therefore, not all villages are reached by community social mobilizers.

> *"In Kampala, each division is equivalent to a district but previous planning have been looking at Kampala as a whole district yet the divisions are big that is where the challenges are." (KII at division level)*

Demotivated social mobilizers

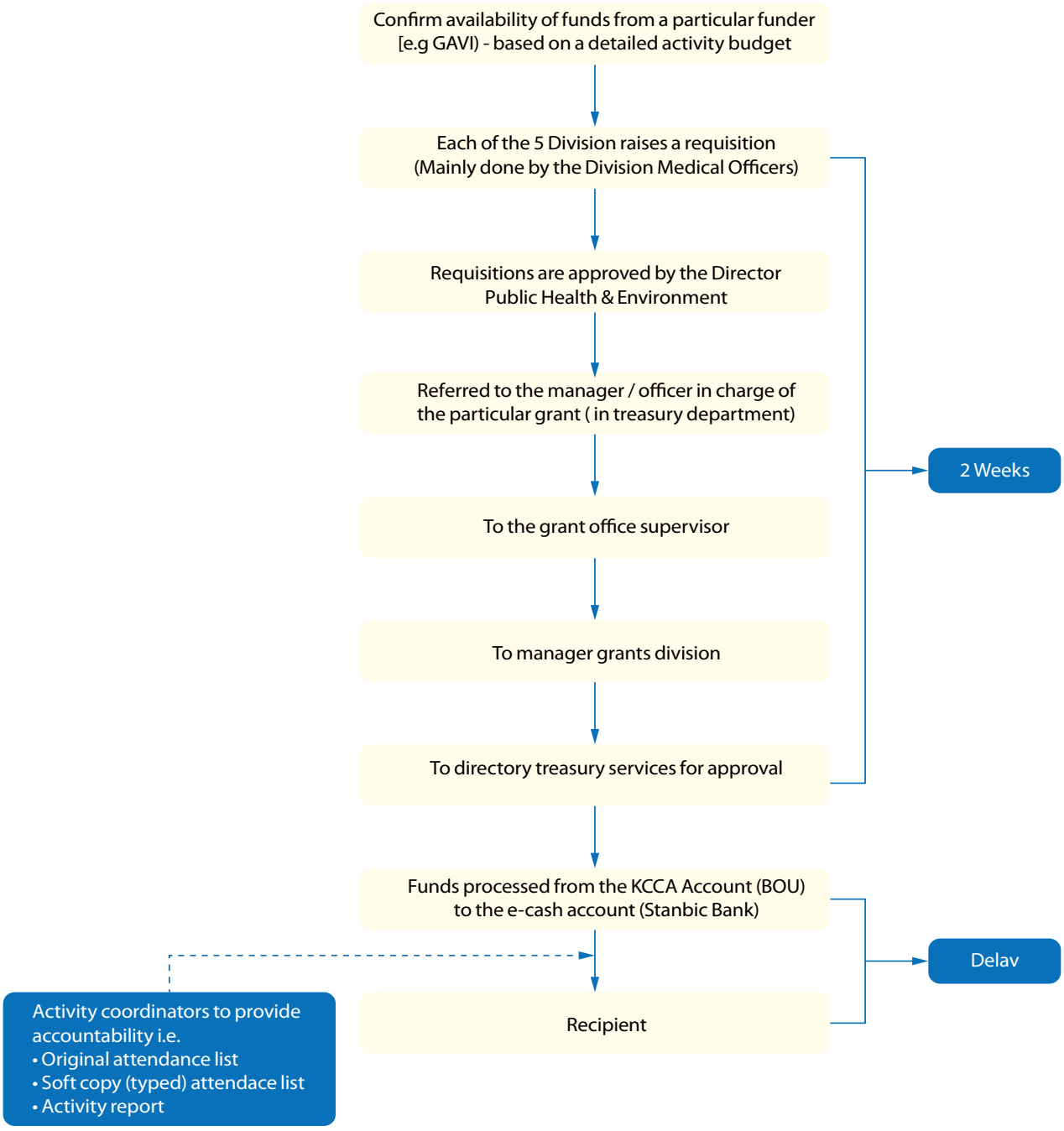
An opportunity for Kampala is the existence of Village Health Teams (VHTs) in Uganda. These ideally are the main community mobilization engine. However, owing to a lack of funding for their allowances, they are generally perceived as unmotivated by higher levels of the health system.

> *"VHTs do a great job of mobilization, community sensitization generally but all that is voluntary work. Sometime back they were promised some facilitation but it never came. So, VHTs got demoralized. You imagine this, a person doing that much work without getting anything in return." (KII, parish level)*

Even when funds are available, payment is often delayed. A major contributor to these delays is a new payment system as of 2014 for health activities in Kampala which is a post activity payment modality of KCCA (see Figure 12 below). The system was introduced by the Ministry of Finance in an effort to enhance accountability but it is bureaucratic.

> *"The allowances should also be timely, not these things of 'submit your national ID number and registered mobile money number' then we wait for a year without getting the allowances!" (KII, division level)*

Figure 13. Process of funds flow in the post activity payment modality piloted in Kampala City



Before 2014, Kampala city was using the pre-activity payment modality in which funds for mobilization were advanced before activity implementation; this is still the primary system being implemented in other districts. This modality posed a challenge in getting post-activity accountabilities from activity implementers. As such, the Ministry of Finance decided to pilot a post- activity payment modality in Kampala city beginning in 2014. The post-activity payment modality is configured to an E-Cash system where funds are sent to recipients through mobile money after activities have been implemented (see figure below). In this payment system, activity coordinators are required to prepare and submit accountabilities (i.e. both original and soft copies of attendance list and an activity report) to the next level (i.e. from division VHT coordinator to division EPI focal person to division District Medical Officer). This process is tedious and time consuming, yet the coordinators are not facilitated for it. As a result, accountabilities are not submitted in time which consequently results into delayed payment.

Finding: In the absence of adequate information on immunisation, caregivers' perceptions of the benefits of immunisation are influenced by the experiences and beliefs of their family, community, and the media. This had led to fear and mistrust of vaccines.

Community beliefs on negative side effects resulting from immunisation

Community members expressed fears of side effects they perceived resulted from immunisation – these side effects included sterility, swelling and death.

Fear of sterility: FGDs with women and men from low uptake areas and slums mentioned fear of sterility. The concerns of sterility ranged from girl children being unable to conceive in the future to complete destruction of the reproductive system. Community members were particularly skeptical about the HPV vaccine that targeted young girls and not the boys. In the quote below, a mother expresses the concerns she has about the HPV vaccines causing sterility to her child in the future:

> *"They say that they immunise girl children for cervical cancer and yet they don't immunise the boys. For me I have concerns with that thing; doesn't that thing affect our children; don't those injections affect them or even their reproductive system in future? Will they be able to give birth in future?" (FGD with women in area with low uptake)*

Fear arising from deaths and swelling believed to result from immunisation; the death of children in the community was perceived as being directly linked to immunisation when the incidents took place soon after the child in question was immunised. The deaths linked to immunisation were either experienced within their own families, witnessed from people they knew or from stories narrated within their communities.

> *"At that time, there was a rampant epidemic of measles in 1990s. However, many of the children who were vaccinated died. For instance, in my case, I lost my child a few months after she was vaccinated. In this area, most people fear that the same scenario may happen again. Over eight children that I knew died in this area." (IDI with resident from a slum)*

> *"My sister's child was immunised and the child got a big swelling that lasted almost a month, it actually became real sickness. I can assure you from that moment I stopped taking my child for immunisation. Without telling lies, Musawo, that was the last time I took my child for immunisation. The moment I saw that, I never took her back. All along I used to take my child for immunisation but that really scared me." (IDI with resident from a slum)*

Doubts about the quality of vaccines: Some community members had doubts about the quality of the vaccines. These doubts ranged from thoughts of vaccines being from older batches, expired vaccines or even fake vaccines. Some community members thought that vaccines were not of the right quality when children had some effects after vaccination. In the quote below, a caregiver says the reason for not immunizing among other is the vaccines may be fake.

"Let me take you back, the government introduced a type of condom called "Engabo". Then they came and informed us that the same type of condom had holes which means that even the government itself can also distribute expired vaccines. So, we fear and wonder if the vaccines really works". (IDI from a low uptake area)

Religious leaders reinforce community concerns on immunisation

Some religious leaders have concerns about the outcome of immunisation and therefore advise their congregations to desist from the activities:

> *"Some pastors do preach against immunisation in their churches. They claim that the "whites" have a sinister motive of ensuring Africans don't produce any more children in the future. Africa. These pastors claim that whites use drugs to cause infertility among girls disguised as vaccines for immunisation" (KII at Parish level)*

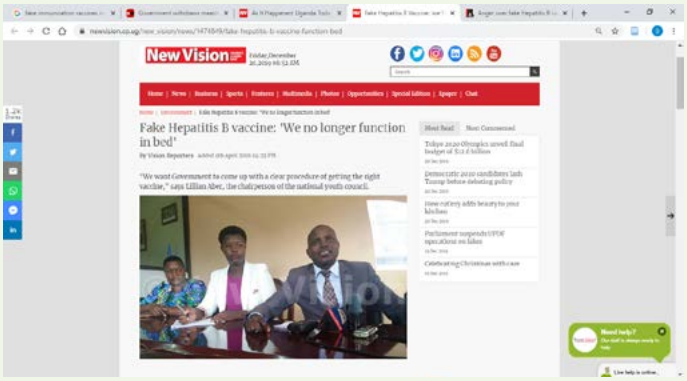
The media provides conflicting messages that counter immunisation campaign messaging

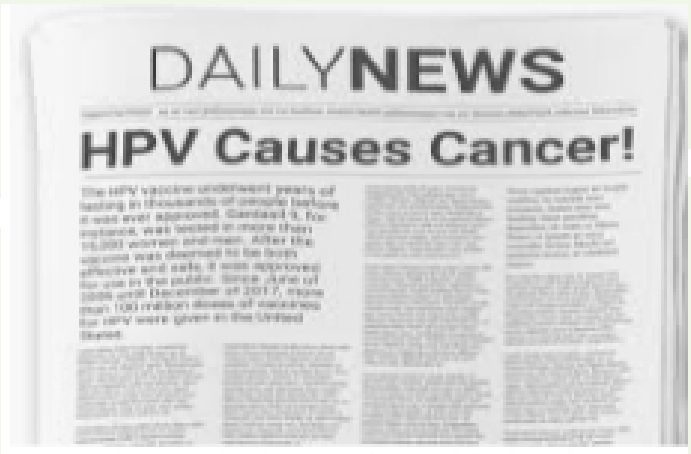
From the household survey, the majority of the respondents (n=354, 66.9%) said they got information about immunisation from the media (TV, Radio and newspapers). Our findings reveal vaccine hesitancy and refusal among some community members after hearing about and reading negative messaging regarding immunisation. These included vaccines being fake, new vaccines under trial only in Africa and AEFIs.

> *"Yes, in the new vision and everywhere in all the papers that the doctors are immunizing children with fake medicine. Two, it came on an international news I think so... where they said that some European organizations are trying out the efficacy of some medicine and they are not trying it out on their people but they have sent it to Africa and they mentioned some of countries" (KII, leader from a low uptake area).*

> *"Like again I have told you, read even the new vision. I think even last month I got some in my office but my secretary didn't come. I asked her to keep some for future reference she would have showed it to you. It clearly stated that most of the health officers immunise children with fake medicines now why should we risk the life of our children?" (KII, leader from a low uptake area)*

Negative Messaging On Immunisation





Positive Messaging On Immunisation

For some populations in Kampala City, the education and outreach provided by the EPI and partners are not sufficiently informing caregivers about the benefits of immunisation. These approaches are insufficient to overcome the influences of community fears and mistrust of immunisation. If caregivers do not perceive the benefits of immunisation, they will not follow through to seek services.

Robustness of findings

Finding	Ranking	Robustness Criteria
Among fully vaccinated children, caregivers cited understanding the benefits of immunisation as the primary reason they chose to fully vaccinate their children. Conversely, inadequate information on the benefits of immunisation was the primary reason other caregivers did not fully vaccinate their children. This was due to the lack of an active program to provide sufficient information about the need for immunisation through social mobilization or routine service delivery. This in part due to limited budget for routine social mobilization, demotivated social mobilizers due to the post-activity payment system and high staff turnover in private health facilities.	1	This finding is factual and is supported by data from the household survey, FGDs at sub-national level and KIIs both at national and sub-national levels.
In the absence of adequate information on immunisation, caregivers' perceptions of the benefits of immunisation are influenced by the experiences and beliefs of their family, community, and the media. For some populations, this had led to fear and mistrust of vaccines.		

3.2.2 Acceptability and the Ability to Seek

Acceptability refers to cultural and social factors determining how the immunisation services are provided. These aspects may include professional values, norms, culture and gender.

The ability to seek refers to caregivers' decision to initiate and seek immunisation services. The ability to seek is influenced by personal and social values, culture, gender and autonomy.

Finding: *Refugees faced unique challenges in the acceptability of immunisation services. Refugees reported marginalization when it came to accessing immunisation services. Marginalization was felt through: being skipped in queues, being left out during mass immunisation campaigns and rude health workers. They also felt left out of communications on immunisation as the mainstream media mostly used local languages when announcing immunisation services.*

Marginalization by health workers

In focus group discussions, respondents from the refugee community expressed concerns regarding what they experienced as marginalization by health workers during immunisation. They reported that when they visited the government health facilities they were skipped in queues and attended to last, irrespective of having arrived first at the health facility. They also reported that they were asked to pay for services that were offered free of charge to Ugandans:

> *"For the daughter, when she went for immunisation, they immunised the other Ugandan children for free and they even gave them the vaccine but for her she had to pay; she paid 10,000 UGX." (FGD Southern Sudanese Refugees)*

Refugees also reported that they were left out of the door to door mass immunisation campaigns. They were reportedly told by the health providers delivering the service that it was restricted to Ugandans. In the quote below, a south Sudanese refugee describes how they were left out during a mass immunisation exercise:

> *"The door to door mass immunisation for polio, when I was in Namuwongo, health workers came and knocked on the door. I have six children and I opened the door and they communicated in English and they talked in Luganda. They asked me if I am a refugee and I said I am a refugee and they said this immunisation is only for Ugandans." (FGD-Sudanese refugees)*

Community members were also reluctant to utilize the immunisation citing rude health workers who often belittled them; yelling at them handling their children roughly. The refugee community particularly felt disrespected by the individuals carrying out immunisation as they yelled at them or even never explained what exactly they were doing when they interacted. In the quote below a mother narrates her unpleasant experience with a health worker during the door to door immunisation campaign.

> *"Some of them don't talk well. I think they think that Somalis don't understand English. You know people are different. Some Ugandans are good people and some are very bad. One day, those people came to my house and they asked, 'do you have any children' and I said 'yes'. They said, bring them for immunisation and I said "which kind of immunisation?" I have right to ask. And they started talking in Luganda that Somalis have bad manners. 'You bring your kid. If you want bring the child and if you do not want to it is up to you)." (FGD with Somali women)*

Communication challenges

Refugee communities reported that messages on immunisation are often communicated in local languages that they did not understand. A Village health team member involved in offering immunisation services among the refugee community reported that despite announcements being put out on immunisation over the radio and television, the refugees were missed because they did not watch local television where the announcements are placed. She (VHT) thought the announcements were not enough to create awareness on immunisation among refugees. In the quote below, a refugee expresses the need for targeted messages in the refugee community.

> *"Announcements are put on local television and not every Somali watches or listens to local television. Yet health workers will just ask, 'Haven't you been hearing the announcements that we are going to immunise?' That is not enough." (FGD with Somali women)*

Refugee communities felt the immunisation services offered were not acceptable to them – due to cultural and language challenges – which limited their health care seeking behaviour.

Spousal pressure not to immunise

Finding: Gender dynamics in the household limited some mothers' ability to seek immunisation services for their children due to pressure from their husbands not to vaccinate.

Some women reported that one of the reasons for not immunizing their children was refusal by their spouses. According to the household survey, 74.4% of surveyed households were headed by males. In two FGDs conducted with women, some respondents mentioned not taking their children for immunisation following instructions from their husbands.

> *"That baby was immunised and it died immediately. My husband works in the neighborhood of that baby's family THAT DIED and from there he came and told me that I should never dare take his children for immunisation." (IDI with woman from a low uptake area)*

However, some women opposed their spouses' instruction against vaccination. Some mothers stealthily took the children without the husbands' consent but this resulted in domestic violence especially when the children experienced AEFIs.

> *"My sister we lost our children, I swear. The woman (his wife) immunised the child when I was away, I beat her up for her stupidity and up to now we are still separated." (FGD with men in a slum)*

Overall, some subpopulations faced barriers in seeking immunisation services, particularly among refugee communities and in some households where the male head of household prevented the wife from seeking immunisation.

Robustness of finding

Finding	Ranking	Robustness Criteria
Refugees faced unique challenges in the acceptability of immunisation services. Refugees reported marginalization when it came to accessing immunisation services. Marginalization was felt through: being skipped in queues, being left out during mass immunisation campaigns and rude health workers. They also felt left out of communications on immunisation as the mainstream media mostly used local languages when announcing immunisation services.	2	This finding is supported by data from FGDs and interviews with VHTs.
Gender dynamics in the household limited some mothers' ability to seek immunisation services for their children due to pressure from their husbands not to vaccinate	2	This finding is factual and is supported by data from FGDs and IDIs.

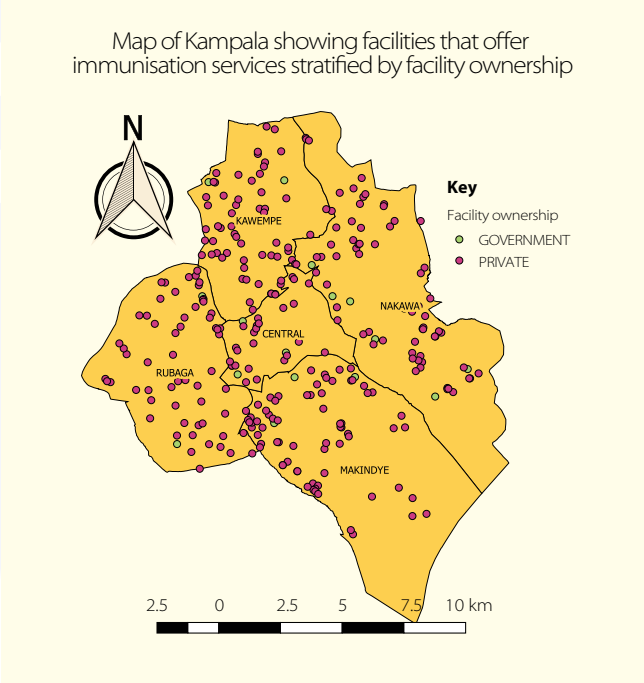
3.2.3 Availability, Accommodation and the Ability to reach

Availability and accommodation refer to the fact that immunisation services can be reached both physically and in a timely manner. This constitutes the physical existence of health resources with capacity to produce services. Elements include geographic location, accommodation, hours of opening, appointments.

Ability to reach refers to the notion of personal mobility and availability of transportation, occupational flexibility and knowledge about immunisation that would enable caregivers to physically reach service providers.

The availability of services is dependent on the location of static immunisation sites. As shown in table 1, only 301 of the 1,448 health facilities in Kampala City offer immunisation services and only 17 of those (6%) are public facilities. These health facilities are distributed all over the five divisions in Kampala (Figure 13) with half of the facilities found in Makindye (n=76) and Nakawa (n=75) divisions as shown in the map below. This is followed by Kawempe (n=61) and Rubaga (n=61); Central (n=28) has the least number of health facilities.

Figure 14. Map of Kampala showing facilities that offer immunisation services stratified by facility ownership



1. Delays at health facilities and caregivers competing time demands.

Finding: *Delays at health facilities coupled with caregivers competing time demands deterred caregivers from accessing immunisation services. 9.4% of caregivers mentioned long queues as a challenge to accessing immunisation services at health facilities. Caregivers reported that barriers to accessing immunisation services include a) frequent delays in the commencement of immunisation, b) delays experienced as health workers waited for a requisite number of children before opening the multiple dose vaccine vials, and c) caregiver's competing time demands.*

2. Delays in the commencement of immunisation services at health facilities

Caregivers reported delays in the commencement of immunisation services at the health facilities. The long waiting times were linked to the way health facilities were run. Health workers at public health facilities reportedly took a long time to start the immunisation process and as a result, caregivers that reported to the health facility early had to wait a long time; sometimes several hours before their children eventually got immunised. Of caregivers in the household survey, 9.4% mentioned long queues as a challenge to accessing immunisation services at health facilities. This is illustrated by the following quote:

> *"…., secondly the health workers start late, sometimes you go early by 8:00AM you are already at the health facility but the health worker comes in at 10:00am or sometimes 11:00am." **(IDI with community member)***

3. Delays due to waiting for a requisite number of children before opening multiple dose vaccine vials

Caregivers also reported that they experienced other delays at the health facilities as health workers waited for a requisite number of children before opening the multiple dose vaccine vials. This resulted in caregivers waiting a long time at the health facilities. In cases where the requisite number of children was not attained the caregivers present were asked to return at a later date and they found this arrangement an inconvenience as illustrated by the following quote from an FGD with caregivers.

> *"R: …, parents find it hard because the provider will not immunise your child until the number of children around is enough to use up all the doses in the bottle. So you will get to the facility and you will sit there waiting for more children to be brought so you can get the vaccines and yet we also have other things to do at home". **(FGD with women in area with low uptake)***

WHO guidance on immunisation service delivery instructs health care workers to open a multi-dose container of vaccines for every eligible child, even if there is only one child. However, as Heaton et al. 2017 have noted (29), in practice this may put a burden on the frontline health care worker to strategize when to open a new multi-dose container in order to maximize the use of every dose, which can impact wastage and coverage.

4. Caregiver's competing time demands

Delays at the points of immunisation were a barrier to accessing immunisation services, especially when caregivers had other competing time demands such as work. Caregivers who could not take off time from their work either postponed immunisation or gave it up all together as illustrated in the following quote from an FGD with women from one of the slum areas.

"Others have jobs that they can't leave to attend immunisation... When they wake up in the morning, they take their children to these women that babysit them as they go to work. They never get time off their jobs all the time and yet over the weekend they do not do what...never immunise." (FGD with women from a slum)

Overall, the majority of caregivers in Kampala city live in close proximity to health facilities which facilitates the ability to reach services.

Robustness of finding

Finding	Ranking	Robustness Criteria
Delays at health facilities coupled with caregivers competing time demands deterred caregivers from accessing immunisation services. 9.4% of caregivers mentioned long queues as a challenge to accessing immunisation services at health facilities. Caregivers reported that barriers to accessing immunisation services include a) frequent delays in the commencement of immunisation, b) delays experienced as health workers waited for a requisite number of children before opening the multiple dose vaccine vials, and c) caregiver's competing time demands.	1	This finding is factual and is supported by data from the household survey, FGDs and IDI.

5. Challenges at private health facilities in Kampala

Finding; Key informants at district level reported high attrition rates at private health facilities coupled with no motivation to conduct immunisation outreaches as the main challenges at private health facilities.

High attrition rate of health workers in private health facilities

Respondents noted that the challenge with private health facilities offering immunisation services was the high turnover of health workers. This was a problem because it affected the quality of immunisation services offered since the trained/mentored health workers did not stay for long. This was described by the EPI focal person in the quote below.

"Private health facilities have a lot of staff turnover. Today you go and do mentorship on a health facility, you mentor all the health workers who are involved in immunisation. After one month you go back and find that all that lot have gone. They have put in new people and so you need to go back. This means training has to be continuous. But imagine funding might only be for one quarter and yet by the time you visit the health facility again the next quarter you find a new person who doesn't know how to do a micro plan. You need to start again." **(IDI EPI Focal person)**

No motivation for private facilities to conduct immunisation outreaches

According to some of the district respondents, there was no motivation for private facilities to conduct outreaches since the facilitation for health facility staff for outreaches was very little. On weighing the opportunity costs, it was inevitable that private facilities could only afford to offer immunisation at their premises. Furthermore, the private facilities tended to be profit making in nature and so asking them to offer immunisation services for free as required for immunisation was not profitable business for them as described by the EPI focal person in the quote below.

"So we are asking the private sector to also give immunisation services for free. This is a big challenge given that they have to make profit. We are giving fee vaccines and yet we are using their power and health workers. So they complain and it's a challenge on the supply side." **(IDI EPI Focal person)**

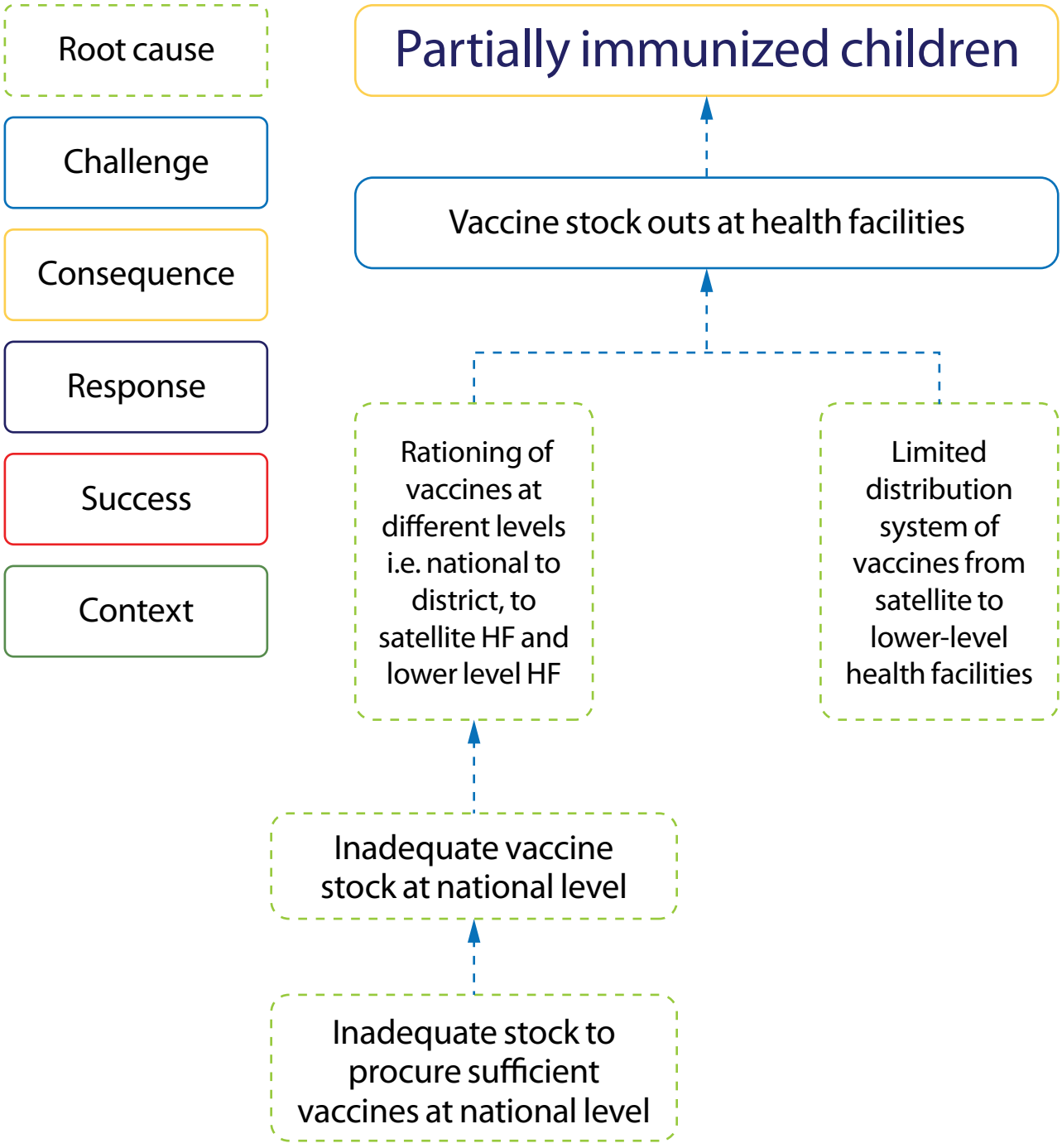
Robustness of finding

Finding	Ranking	Robustness Criteria
Key informants at district level reported a high attrition rates at private health facilities coupled with no motivation to conduct immunisation outreaches as the main challenges at private health facilities.	2	This finding is supported by data from FGDs and IDIs.

6. Frequent vaccine stock outs

Finding: *Caregivers and key informants at various levels reported frequent vaccines stock outs which were attributed to (a) inadequate stock at national level that resulted in the rationing of vaccines at different levels and (b) limited distribution system of vaccines from satellite health facilities to lower level health facilities, as summarized in the figure below.*

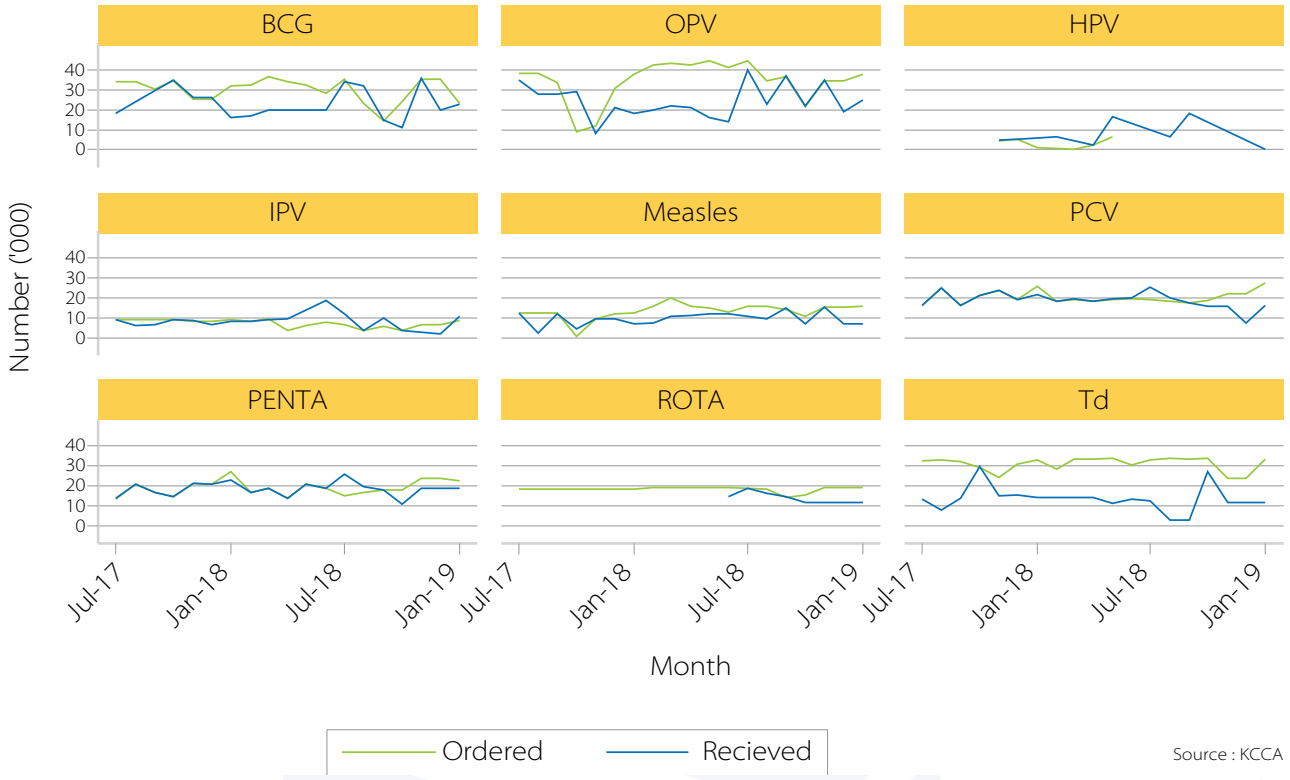
Figure 15. Root cause analysis for vaccine stock outs in Kampala City



From the household survey, the second most frequently mentioned challenge in accessing immunisation services was vaccine stock outs (see Table 15). Stock outs were reported by caregivers visiting private as well as those visiting public health facilities for their last immunisation. Our findings indicate that vaccine stock outs were experienced at national and district levels, as well as satellite and lower level health facilities which were due to (a) Inadequate funds to procure sufficient vaccines at national level and (b) limited distribution of vaccines from satellite to lower level health facilities.

7. Inadequate funds to procure sufficient vaccines at national level.

Figure 16. Quantities of antigens ordered and recieved by KCCA (July 2017 to January 2019)



Source : KCCA

While in the FY 2018/2019, 18 billion Uganda shillings was required to procure sufficient vaccines for the whole country, only 11 billion was released. This resulted in inadequate vaccine stock at national level and consequently at the lower levels. Data from the Central Vaccine Stores (CVS). show that in the period between January and June 2019, stock levels for several vaccines (DPT, PCV, HPV, measles and BCG) fell below the minimum recommended level of 1.5 months of stock and consequently, the National Medical Stores (NMS) had to ration vaccines to all districts. In addition, data from KCCA shows that from July 2017 to January 2019, the amounts of several vaccines distributed were consistently lower than the amounts requested as shown in figure on the right.

Vaccine stock outs were also reported by KIIs at various levels as shown in the quotes below;

> *".....the truth is there are stock outs; very big stock outs commonly for measles, PCV and even BCG and OPV. So, I can say stock outs are at two levels in my capacity. There is the health facility, but also the Division Vaccine Stores (DVS) where you went they may have but what they do is that they over ration". (KII, district level)*

> *".....you go to the DVS and they tell you that these guys from NMS are also having issues and this is what they have supplied. We request according to what you need to use in that particular month but you find that you don't get what you need". (KII, EPI focal person)*

Limited distribution of vaccines from satellite to lower level health facilities

In Kampala city, access to government of Uganda vaccines by health facilities is cascaded i.e. from the DVS at KCCA to satellite health facilities to lower level health facilities. Our findings show that there is no functional distribution system of vaccines from satellite health facilities to the lower level health facilities which leads to vaccine stock outs at these facilities.

> *".... we've been having transport issues actually, but what do we do if we don't have transport to distribute the vaccine? Of course that is a challenge. KCCA doesn't have cars to transport vaccines. But we've been writing to UNICEF to help us with a car for distribution sometimes". (KII, division level)*

Robustness of finding

Finding	Ranking	Robustness Criteria
Caregivers and key informants at various levels reported frequent vaccines stock outs which were attributed to (a) inadequate stock at national level that resulted in the rationing of vaccines at different levels and (b) limited distribution system of vaccines from satellite health facilities to lower level health facilities..	1	This finding is factual and is supported by data from the household survey and KIIs both at national and sub-national levels.

7. Socio Economic organization in the urban setting

Finding: *From the household survey, 17.3% of respondents mentioned that their children were partially vaccinated because they were not with their primary caregivers.*

From the household survey,*17.3%* of respondents mentioned that their children were partially vaccinated because they were not with their primary caregivers. Children were reported to have been left with their grandparents and aunties. Also, the nature of work in the urban setting is such that some mothers leave homes very early and return late in the night. Studies by (30) indicate that children whose caregivers (other than the parents) were not aware of the importance and schedule of immunisation were more likely to be partially vaccinated.

Robustness of finding

Finding	Ranking	Robustness Criteria
From the household survey, 17.3% of respondents mentioned that their children were partially vaccinated because they were not with their primary caregivers.	1	This finding is factual and is supported by data from the household survey and KIIs both at national and sub-national levels.

3.2.4 Affordability and Ability to pay

Affordability refers to the economic capacity for people to spend resources and time to use immunisation services resulting from the prices of services, any related expense and opportunity costs related to loss of income.

Ability to pay for immunisation refers to the capacity to generate economic resources -through income, assets, savings, or loans -to pay for immunisation services without catastrophic expenditure. This could also be through social capital or health insurance.

8. Hidden costs for immunisation

Finding: Hidden costs such as i) payment for immunisation cards, ii) payment for the immunisation service, iii)) transport costs as well as iv) costs associated with meeting special requirements at immunisation points such as buying pampers deterred caregivers from accessing immunisation services.

Finding: Hidden costs such as i) payment for immunisation cards, ii) payment for the immunisation service, iii)) transport costs as well as iv) costs associated with meeting special requirements at immunisation points such as buying pampers deterred caregivers from accessing immunisation services.

Caregivers reported hidden costs associated with accessing immunisation services at health facilities in Kampala. Payment for immunisation cards was reported to cost USD $1.30 (5,000 Ugandan shillings) on average in both private and public health facilities. Lack of money to pay for the cards hindered some mothers from seeking immunisation services at health facilities.

> *"Eh even selling of the cards as you see. They are selling them at 5,000 shillings. Sometimes, mothers have walked all the way to the health facility to immunise and are chased away because they don't have the money to buy the immunisation card. Sometimes women take exercise books (notebooks) but these are not allowed by the health workers." KII, VHT –Kampala*

> *"Health workers demand that you buy immunisation cards before accessing immunisation services. Even after buying the immunisation card, you will again pay for immunisation at the end". (FGD, women from a slum)*

Caregivers also reported that they had challenges in raising the money to transport them to the health facility as well as meeting special requirements when presenting at the health facility like buying a pamper for the child before they can be immunised.

> *"Yes and yet some people do not even have money for transport to go to the health center for immunisation. And also you need to have pampers for the child when you take them to the facility because they may pass urine." (FGD, women from a slum)*

Robustness of finding

Finding	Ranking	Robustness Criteria
Hidden costs such as i) payment for immunisation cards, ii) payment for the immunisation service, iii)) transport costs as well as iv) costs associated with meeting special requirements at immunisation points such as buying pampers deterred caregivers from accessing immunisation services.	1	This finding is factual and is supported by data from the household survey and KIIs both at national and sub-national levels.

3.2.5 Appropriateness and Ability to Engage

Appropriateness *refers to the fit between services offered and caregivers' needs, including the timeliness, technical and interpersonal quality, adequacy, coordination and continuity of the immunisation services provided.*

Ability to engage *relates to the participation and involvement of the caregiver in decision making and immunisation decisions determined by their capacity and motivation to participate and commit to its completion.*

9. Challenges of follow up in Kampala city

Finding: *Lack of a follow up system for immunisation makes it difficult to identify and trace defaulters due to the migrant nature of the population in Kampala City which leads to inaccurate reporting.*

In order to provide appropriate immunisation services, health workers need to know which individual children have received which vaccines and follow up with children who have defaulted. In the current paper-based reporting system at health facilities, health workers track the children who have visited their facility and the vaccination doses they have received - but it does not allow health care workers to know whether those children have received other vaccines at other facilities. Thus, there is an unclear denominator for the facility to use in reporting coverage or dropouts. This is particularly challenging in Kampala City, where there is a large migrant population and as noted above, children may receive immunisation services at multiple facilities.

District stakeholders described the population in Kampala as migrant, which made it challenging to complete the required rounds of immunisation. For example, when health workers revisited the places where immunisation outreaches had been carried out for follow up, the people that had been immunised before would have left the area. In addition, respondents reported that many people come into the city from all over the country and receive immunisation services during their stay after which they leave. Many of these are lost to follow up. This is compounded by our observation that the immunisation cards currently issued by Ministry of Health do not have a provision to record the health facility or outreach point where a child was vaccinated - this in turn results in inaccurate reporting. One of the division EPI focal persons describes the migrant population of Kampala in the quote below,

> *"The challenge is the follow up system, you find a lot of people who haven't completed because they moved and their information was not entered in the child register. When you are reviewing, that child is marked as not having completed immunisation but if the child was followed up well, one can say that they have been receiving immunisation somewhere else and when I update my register, I will not end up reporting them as having missed immunisation." (KII, EPI focal person)*

Robustness of finding

Finding	Ranking	Robustness Criteria
Lack of a follow up system for immunisation makes it difficult to identify and trace defaulters due to the migrant nature of the population in Kampala City which leads to inaccurate reporting.	1	This finding is factual and is supported by data from the household survey, KIIs and IDI.

3.3 Adaptations of the EPI to challenges of immunisation in Kampala city

The urban characteristics of Kampala city make the EPI program context in Kampala unique compared to that in rural districts. Here below we discuss the adaptations that the MoH and KCCA have put in place in an effort to respond to the urban challenges of the EPI.

3.3.1 Engagement of the private sector in immunisation services delivery as a way of increasing access to immunization services and minimizing delays at public health facilities

Our findings show that non / partially immunized children were uniformly distributed across slum and non-slum communities, and that children from the poor wealth index were more likely to be non / partially immunized than those in the rich wealth index. Our findings also showed that some caregivers experienced delays at public health facilities which were mainly due to long waiting time; few staff, high turnover; delay to start and the implementation of the open vial policy. In the 2007 Health Systems Strengthening (HSS) proposal for Gavi financial support, Uganda included a strategy to strengthen the capacity of the private sector to deliver immunisation and other child health services (31). This strategy was adapted in the reprogrammed Gavi HSS work plan of 2014 (32). The strategy was to be

implemented in Kampala city, but with plans for subsequent scale up to the rest of the country. The activities conducted in this strategy were: (1) Accreditation and mapping of private clinics in Kampala city (2) Purchase of 100 cold chain refrigerators for 100 private clinics (3) Training of health workers from private clinics in immunisation, IDSR and reporting (4 groups of 50 participants each). This strategy is relevant, and has generally been effective but can be strengthened to be optimal. Challenges faced by the private sector in immunization services delivery in Uganda include; high attrition rate of health workers, high electricity bills to run the fridges and transport costs incurred when picking vaccines from satellite health facilities.

3.3.2 Weaknesses and challenges of the EPI model of immunization service delivery in Kampala city

Here below, we report the adaptation gaps of the EPI model.

- **Limited engagement of religious and cultural leaders to reduce negative social influence**. We found that negative social influence by spouses, cultural and religious leaders exacerbate fear and mistrust of vaccines. Unlike in other districts, there are numerous religious (churches, mosques) and cultural institutions in Kampala whose leaders have large spheres of influence (i.e. attract large numbers of followers). We found that these opinion leaders are not continuously engaged in awareness creation for routine immunization.
- **Limited use of social media by MOH/UNEPI to counteract negative messages on immunization**. In Kampala city, people have rapid and widespread access to information from various sources including social media, misconceptions, misinformation and conflicting messages are likely to occur which result in fear and mistrust of vaccines. Despite the frequent negative messages, there are no strategies in place to address this gap.
- **Inadequate support supervision from KCCA and limited time spent by supervisors at facilities during supervision.** Our findings show that there is high staff turnover of health workers in private health facilities which creates knowledge gaps on immunisation. KCCA conducts mentorship and support supervision of health workers in private health facilities to increase their knowledge on immunisation service delivery, but coverage is limited because of the high number of health facilities and limited availability of transportation. We found that no partner supports any intervention to address this barrier.
- **Inadequate vaccine delivery system.** We found that vaccine stock outs were frequently experienced at lower level health facilities, which was attributed to limited vaccine distribution system. Currently, UNICEF sometimes offers transportation for distribution of vaccines from the KCCA vaccine stores to satellite health facilities but a comprehensive distribution system is lacking.
- **Absence of a follow up system for immunization.** Lack of a follow up system for immunisation makes difficult to identify and follow up defaulters which leads to inaccurate reporting. This is further exacerbated by the migrant/mobile nature of the population in Kampala city.
- **Reliance on traditional social mobilization structures creates gaps in awareness on routine immunisation among some communities.** Reliance on the traditional social mobilization structures in Kampala (such as through engagement of political and local council leaders, health workers at facility level and VHTs at community level) excludes some closed communities such as Eritreans, Indians and Karamojong that require targeted approaches. There also limited efforts to engage non-health actors (e.g. boda-boda associations, market vendors, Taxi associations, etc.) for social mobilization.
- **Inadequate and delayed facilitation for VHTs for immunisation activities.** Our findings show that VHTs are not motivated to conduct community mobilization. There is no official salary for VHTs; however, KCCA gives a Standard Daily Allowance (SDA) to each VHT for every immunisation activity they are engaged in. The high cost of living and delayed receipt of allowances demotivates VHTs in Kampala.

4.0 DISCUSSION

We conducted an evaluation to understand whether and how the EPI programme is adapting to the demand side challenges to uptake of immunisation services in Kampala City. Our findings show that; more than half of the surveyed children (57.6%) were partially immunised and only 26.5%were immunised on time. These findings are consistent with other reports (7–10,16,17). Despite the low overall coverage, the proportion of children that received DPT1 was very high (95.9%) indicating good access to immunisation services. In contrast, dropout rates were high (17.3%) implying that utilization was low which could explain the low full vaccination coverage observed in Kampala. Given that the majority of children are partially vaccinated and, even among those fully vaccinated, the majority had delayed receipt of vaccines beyond the recommended schedule implies that there is pool of children with incomplete or no immunity. The presence of such a large pool of susceptible children is a risk factor for outbreaks and transmission of vaccine preventable diseases. Despite the low overall coverage, there is heterogeneity for instance, Makindye and Central divisions had higher coverage than other divisions. There is need for more in depth studies to understand why some divisions are performing better than others in the same environment.

Several studies have reported that the largest number of un / partially immunised children reside in urban slums (33–35). In contrast, we found that un / partially immunised children were uniformly distributed across slum and non-slum communities, and that children from the poor wealth index were more likely to be un / partially immunised than those in the rich wealth index. This may suggest that the poor do not only reside in slum communities. Currently, government and partners support outreaches in all parishes but with a major focus on informal settlements. This emphasis on informal settlements does not match the survey results showing consistent needs across formal and informal settlements. Also, MoH/KCCA have engaged the private sector in immunisation service delivery with support from Gavi, fridges were allocated to some private health facilities in Kampala city. KCCA prioritized allocation of UNEPI fridges to private health facilities in the affluent areas to target children in formal settlements.

Child care dynamics. Children in urban settings are more likely to be cared for by caregivers other than their mothers. These caregivers in some cases did not have full information of the vaccination status of the children in their care and thus did not follow up with the scheduled vaccination of the children. Previous studies have shown that mothers who stayed at home were more likely to complete immunisation for their children (36). There is need for an innovative system for tracing immunisation defaulters. Such innovations may include working with VHTs to register all children under one year who are due for immunisation, establish an incentivized community mobilization structure in Kampala, having SMS and phone based reminder systems and a provision for contacts in the immunisation child register.

Our findings indicate that inadequate information on and knowledge of immunisation among caregivers is a key barrier to full immunisation of children in Kampala city. In the urban context where people have rapid and widespread access to information from various sources including social media, misconceptions are more likely to occur. Furthermore, the diverse and high population density in urban settings facilitates the rapid and wide spreading of negative messages on immunisation. This is exacerbated by the lack of an EPI social mobilization program targeting the urban context.

Most caregivers of partially immunised children did not know that their children had missed some vaccines and did not know when a child is considered fully vaccinated. This may be partly due to the introduction of new vaccines. Our findings also reveal that while caregivers were aware of where immunisation services are located and how much is “charged”, they did not always utilize the services. In light of the several vaccines that have been introduced in the recent past, information about the newer vaccines is not well communicated. There is need for continuous communication of routine immunisation and a deliberate communication strategy should be designed to discuss the benefits of immunisation, allay fears, address misconceptions and provide information on the current immunisation schedule.

Vaccine management and availability: frequent stock outs were a major reason reported by caregivers for not immunising their children. EPI focal persons attributed vaccine stock outs to errors in quantification, lack of transportation and inadequate funding: errors in quantification were partly due to the discrepancy in the night and day population. The EPI reported that many districts experienced vaccine stock outs during the 2018/2019 financial year, however the situation was worse in Kampala. Frequent vaccine stock outs are commonly reported in Kampala and must be addressed to improve utilisation of immunisation services (37). There is an urgent need for an equitable distribution plan and further evaluation to understand the additional underlying causes of the frequent vaccine stock outs in Kampala.

Delays at health facilities were mainly due to due to long waiting time; few staff, high turnover; delay to start and the implementation of the open vail policy. Given that the urban population livelihood is dependent on daily income, long waiting time for immunisation activities at health facilities increases the likelihood of incomplete immunisation. We suggest deployment of more staff on immunisation service delivery days, regular capacity building in areas with high staff turnover especially the private sector and increasing supervision and incentivizing high performers, providing flexible times and places for immunisation service delivery e.g. places of worship and over weekends and reviewing of the open vial policy. In addition, the post financing modality in Kampala is causing un intended consequences for immunisation such as decline in outreaches and demoralizing VHTs – there is need to re consider prepayment or review the post payment to reduce delays in re imbursement.

Role of the private sector in immunisation service delivery. Almost half (47.8%) of the children received immunisation from a mix of public and private health facilities. Caregivers cited proximity of health facilities to their places of residence as the main reason for choice of health facility for immunisation services, which broadly speaks to convenience. Un like other districts where access is limited to 5km radius, there is a health facility offering immunisation services within a kilometer in Kampala. Private health facilities are more

widely spread than public health facilities, but provide immunisation services at a cost thus making them less accessible to the poor. Efforts to support the private sector to provide free or subsidized immunisation services are needed to improve coverage in Kampala city. Given that majority of immunisation services are provided by private health facilities, there is need to understand the dynamics of private health facilities.

Adaptations of the EPI to challenges of immunisation: There is limited adaptation by the EPI to the challenges of immunisation in Kampala city. In 2007, following the realization that the private sector was a key player in immunisation service delivery and that it had limited capacity to provide immunisation services, Uganda included a strategy to strengthen the capacity of the private sector to deliver immunisation and other child health services in the Health Systems Strengthening (HSS) proposal for Gavi financial support (31). This strategy was adapted in the reprogrammed Gavi HSS work plan of 2014 (32) and implemented in Kampala city with plans for subsequent scale up to the rest of the country. However, this intervention was not evaluated for effectiveness, impact and sustainability.

In 2018, UNICEF supported identification and mapping of hard to reach communities including the urban poor (in slum areas), internally displaced and refugee populations. This was followed by linking communities to both public and private health facilities based on proximity to the communities. Facilities were encouraged to conduct outreaches in the mapped areas. However, the outreaches were not conducted consistently due to inadequate funding to the private sector. There are few partners supporting immunisation in Kampala city and their support does not directly address the barriers identified in this evaluation.

Currently there are plans to develop urban immunisation guidelines that will eventually contribute to MoH urban health strategy. There are also plans to develop the urban health communication guidelines and implementation plan. The findings of this evaluation and additional evaluation of the supply side and private sector are needed to inform the urban health plans.

5.0 CONCLUSION

Effectiveness of the current EPI model for delivery of immunisation services in Kampala city is sub optimal as reflected by the high DPT1 – DPT3 dropout rate (17.3%), low full immunisation coverage (41.5%) and only 26.5%of these were on time. We found that the immunisation challenge cuts across both the formal and informal settings, and the poorest populations. The main barriers to immunisation in Kampala city include inadequate knowledge on immunisation among caregivers, frequent vaccine stock outs at health facilities, delays at health facilities, perceived marginalization of refugees, child not living with mother, and the challenges of doing social mobilisation in the complex city setting. There is minimal adaptation by the EPI to the challenges of immunisation in Kampala city. The main adaptation mechanism is engagement of the private sector in immunisation services delivery as a way of increasing access and minimizing delays at public health facilities. However, its effectiveness is sub optimal due to inadequate support by MoH. The EPI plans to develop urban immunisation strategy with support from Gavi under the coverage and equity proposal. Our results will inform this process.

6.0 RECOMMENDATIONS

In order to improve uptake of immunisation services in Kampala city, we recommend the following;

Short Term (<1 Year)

1. **Development of a long-term urban immunisation strategy:** The Ministry of Health/UNEPI should develop an urban immunisation strategy which prioritizes urban specific programming for immunisation services in Kampala city and other urban centers. Our findings show that there is no specific policy that targets the complexity of urban settings such as Kampala city.
2. **Need for a deliberate communication strategy for routine immunisation**: Our findings indicate that inadequate information on and knowledge of immunisation among caregivers is a key barrier to full immunisation of children in Kampala city. Most caregivers of partially immunised children did not know that their children had missed some vaccines and did not know when a child is considered fully vaccinated. There is need to design a communication strategy on routine immunisation highlighting the benefits of immunisation, addressing misconceptions and providing information on the current immunisation schedule
3. **Targeted social mobilization strategy for Kampala:** our findings show that there was limited social mobilization for immunisation. Some caregivers felt left out of communications on immunisation as the mainstream media mostly used local languages when announcing immunisation services. The Ministry of Health/UNEPI should develop a social mobilization strategy that addresses the complexity of an urban setting. The strategy should consider;
    a. *Using various channels to target the different sub populations through existing associations (e.g. boda boda, taxi associations and market vendors).*
    b. Customize IEC materials to reach different populations. MoH/KCCA should deliberately engage closed communities e.g. Indians, Ethiopians and Eritreans in immunisation through their leadership structures.
    c. Make a deliberate effort to continuously sensitize the public about immunisation on social media platforms
4. **Strengthen private sector engagement in immunisation:** our findings show that involvement of the private sector in immunisation service delivery has increased access to immunisation services. However, challenges such as; inadequate staff allocated to immunisation;

limited or no facilitation to conduct immunisation services and lack of transportation for vaccines and supplies persist. The MoH/KCCA should continue taking advantage of the large private sector to strengthen immunisation and other health services in Kampala and other urban settings. These efforts should include improving the standards and coordination of the private sector, private sector supervision, and how to incentivize the private sector to deliver free services and reduce the staff turnover

5. **Streamline the vaccine delivery system:** Our findings show that limited distribution system for vaccines contributed to vaccine stock outs at health facilities. MoH/UNEPI should consider deliberate investment in the distribution chain for vaccines and supplies in Kampala considering the high number of immunisation sites.
6. **Patient provider interactions:** our results show that some caregivers were reluctant to utilize immunisation services citing unfriendly health workers and hidden costs such as payment for immunisation cards and immunisation services at some health facilities. MoH/UNEPI should adequately support health facilities to offer free immunisation services, provide refresher training to foster client centered care.

Long term (>1 year)

Introduction of electronic registries: our findings showed that there was no follow up system for immunisation making it difficult to identify and trace defaulters due to the migrant nature of the population in Kampala City. The Ministry of Health/UNEPI should consider use of electronic registries for immunisation in urban settings as this could improve coverage data, assist in defaulter tracking for dropouts or children without immunisation cards.

Study further: There is need to understand why some divisions of Kampala city are performing better than others in the same environment.

7.0 LESSONS LEARNED

Here below we present lessons learned from implementing this evaluation.

General lessions learned:

1. Continuous engagement of key stakeholders during design and implementation of evaluation ensures that the findings are relevant and timely.
2. Given the complexity of Kampala city, i.e. the diverse ethnic groups, social economic set up (gated communities, slums, and refugee settlements), it is difficult to access and conduct interviews. Multiple levels of clearance and involvement of community leaders are key to successful data collection.

Lessons learned for KCCA and EPI program in Uganda

3. The unimmunised and partially immunised children in Kampala city are evenly distributed in both formal and informal settlements.
4. Caregivers seek immunisation services from a mix of private and public health facilities, but predominantly from private. Further harnessing and strengthening the public private partnership can help improve equitable access to immunisation in Kampala.
5. Despite the presence of multiple communication and social mobilisation channels in Kampala city, majority of caregivers are not adequately sensitized about immunisation services.

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ANNEXES

Annex1: Roles of each level of immunisation service delivery

Table 15. Roles of each level of immunisation service delivery in Kampala city

District	Division	Health Facility	Community: VHT / Parents / caregiver
Planning / forecasting, ordering and storing of vaccines and other EPI logistics Distribution of vaccines and other EPI logistics to lower level health facilities Routine cold chain maintenance and repair Support supervision and on job training Monitoring for action e.g. monitoring outreaches, coverage, dropout rate and vaccine wastage Feedback to HSD/HFS and community on immunisation performance, Active search and surveillance e.g. for AFP,NNT and measles cases	Support supervision and on job training Distribution of vaccines and other EPI logistics to lower level health facilities Monitoring outreaches, coverage, dropout rate and vaccine wastage Provide feedback to health facilities and community on EPI performance In charge of microplanning	Estimate, order and store vaccines and other logistics Plan and provide immunisation services (static& outreaches Screen for immunisation status to reduce missed opportunities Counsel/Health educate parents/caretakers Maintain fridge temperature within the recommended ranges (+20C to +80C) Monitor vaccine wastage, coverage and dropout rate Work with VHTs to conduct Home visits and track defaulters plus left outs	Participate in management of immunisation at HF Take children for immunisation Ensure children complete the immunisation schedule Defaulter & left out tracking Mobilize caretakers for immunisation services Plan for immunisation services at community level Safe storage of Immunisation cards Demystify rumors
		Timely and complete reporting Give feedback to community on EPI performance Defrost the fridges Involve the community in management of immunisation Ensure injection safety and waste management disposal Fill and balance/ update vaccine Injection Materials Control Book (VIMCB) daily	

Annex2: Current immunisation schedule for Uganda

Vaccine Antigen	Dosage	Doses	Min. Interval Per Dosage	Min. Age at Start	Mode of Administration	Site of Administration	Storage Temperature	Remarks
BCG	0.05ml up-to 11 mo, 0.10ml after 11 mo	1	N/A	At birth (or first contact)	Intradermal	Rt. Upper arm	+2 to +8	Only use diluent provided
DPT - HepHib	0.5ml	3	4 weeks	At 6 wks (or first contact after that age)	IM	Lt. thigh upper outer aspect	+2 to +8	Do not freeze
Polio	2 drops	3	4 weeks	At birth or within the first 2 wks (Polio 0) and 6 wks or first contact after 6 wks (Polio 1)	Oral	Mouth	+2 to +8	
Measles	0.5ml	1	N/A	At 9 Mo (or first contact after that age)	SC	Lt. upper arm	+2 to +8	Only use diluent provided
PCV	0.5ml	3	4 weeks	At 6 wks (or first contact after that age)	IM	Rt. thigh outer upper aspect	+2 to +8	
HPV	0.5ml	2	6 weeks	After the first contact with 10 years old girl out of school or girl in Primary 4	IM	left upper arm	+2 to +8	Do not freeze
IPV	0.5ml	1	N/A	At 14 wks (or first contact after that age)	IM	Right upper outter aspect of the thigh	+2 to +8	Do not freeze
Rota	1.5ml	2	1 month (4 weeks)	At 6 weeks	Orally - slow administration on inner aspect of the check	Mouth	+2 to +8	Do not freeze
Tetanus Toxid	0.5ml	5	TTI&TT2: One Month TT2&TT3: Six Months TT2&TT4: One year TT4&TT5: One year		IM	Upper arm	+2 to +8	Do not freeze

INFECTIOUS DISEASES
RESEARCH COLLABORATION

2C NAKASERO HILL ROAD
P.O. BOX 7475 KAMPALA, UGANDA
TELE: +256 (0) 312 281 479
TELE: +256 (0) 414 530 692

EMAIL: PROF. MOSES KAMYA, PHD
MKAMYA@IDRC-UGANDA.ORG
WWW.IDRC-UGANDA.ORG