A case study of admissions data from Kawempe National Referral Hospital: further evidence to inform the strategy to relieve overcrowding in Kampala

The USAID Maternal Child Health and Nutrition (USAID MCHN) Activity

The USAID MCHN Activity is a five-year program (January 2020 to December 2024) funded by USAID/Uganda to improve maternal, newborn, child health and nutrition (MCHN) outcomes in Uganda. This is achieved through provision of targeted technical support at national and subnational levels to (1) develop and rollout MCHN strategies, and high-impact practices and interventions; (2) strengthen coordination and cooperation within and between Government of Uganda (GoU) sectors; and (3) increase the use of data for planning, decision making and learning. The Activity also supports improved delivery of MCH and Nutrition services in Kampala particularly for the urban poor, through strengthened service delivery systems in the public and private sectors. The MCHN Activity closely collaborates with government of Uganda (GoU) structures at all levels, private sector entities, other USAID-supported Activities, and development partners to both support and leverage their efforts to improve MCHN outcomes in Uganda.

The MCHN Activity is implemented by a consortium led by FHI 360 that includes EnCompass LLC, Makerere University School for Public Health, Save the Children, and the Uganda Healthcare Federation.

Background

Mortality rates for Kampala are unreasonably high. With just 4% of Uganda's population, Kampala accounts for 11% of all reported maternal deaths and 20% of total reported child morbidity in the country (DHIS2 FY2019/2020). These numbers are likely underestimated given the low reporting rates into the routine health information system by healthcare facilities in Kampala (64% reporting rate compared to a national average of 85%). The situation in Kampala is further complicated by the high volume of patients from outside the city who seek care in Kampala, and by the complex network of public and private facilities located in the city. Facilities within Kampala provide a comprehensive array of healthcare services, yet quality is often poor and linkages and referral processes between facilities are disjointed and inefficient. As a result, the national and regional referral hospitals are congested with cases that could have been optimally managed at lower-level facilities, prolonging waiting times and increasing the likelihood of poor outcomes, particularly for women and children experiencing complications. However, information on from where and for what conditions women are referred has not been systematically analyzed.

This brief summarizes findings from quantitative and spatial analyses of maternity admissions into Kawempe National Referral Hospital (KNRH) over a 14-month period. We articulate recommended next steps for continued learning to inform data-driven action plans to relieve overcrowding and improve quality of care in Kampala's healthcare facilities. A full report is available.

This is one of the briefs in a series understanding and addressing overcrowding of health facilities in Kampala.

Findings from the desk review as well as continued consultations with Ministry of Health (MOH), Kampala Capital City Authority (KCCA), and facility leadership highlight the need to strengthen the capacity of health centers in Kampala and surrounding districts of Mukono, Mpigi, Wakiso and Kayunga to appropriately manage obstetric and newborn complications (e.g. postpartum hemorrhage, pre-eclampsia/eclampsia, sepsis, breathing difficulties at birth, etc.). There is a further need to reduce self-referrals and patient-choice referrals from private to public facilities. This analysis aims to inform capacity strengthening workplans and targeted technical assistance for the healthcare facilities that the MCHN Activity is supporting in Kampala and prioritized facilities supported by other implementing partners.

MCHN Activity's Kampala strategy

The MCHN Activity collaborates and coordinates directly with the Kampala Capital City Authority (KCCA) and with 28 high-volume healthcare facilities in Kampala – which contribute 80% of the maternal, newborn, and child health and nutrition services in the city – to improve access to quality services, particularly for the urban poor, and to reduce congestion and improve the quality of maternal, newborn and child health and nutrition services. The MCHN Activity uses a health system strengthening lens to address key gaps in service delivery systems and processes, and a total market approach to leverage public and private providers, civil society and community-based groups for improved outcomes.

Findings from quantitative and spatial analyses of admissions into Kawempe National Referral Hospital (KNRH)

The Kawempe Hospital was established as a national referral hospital in 2018, with a 200-bed capacity. Its mandate and mission are to provide quality, maternal and newborn health services, and enhance research and medical training in line with the Uganda MOH Policies. KNRH provides a wide range of services including surgical and non-surgical obstetrics and gynecology, newborn care, child and adolescent health, nutrition, and diagnostics (radiology and laboratory). The immediate catchment area of KNRH includes the KCCA area and surrounding districts of Wakiso, Mukono, Mpigi, Kayunga, Butambala, Luwero, Buikwe, Mityana, Mubende.

KNRH registers an average of 23,000 deliveries per year (1,860 per month), and conducts 8,500 caesarian sections per year (708 per month) - data for July 2019 – June 2020. During the same period, KNRH registered 111 maternal and 1,659 perinatal deaths. The hospital experiences acute challenges due to an overwhelming number of referrals into its maternity and perinatal wards. To better understand the context and causes of the overcrowding and to inform effective strategies to relieve it, the USAID MCHN Activity, working closely with hospital team, gathered and analyzed data on maternal and perinatal admissions for the period July 2019 through August 2020. The specific objectives are to:

1. Understand the geographical distribution of incoming referrals and major indicators for the referrals;
2. Facilitate the development of action plans for strengthening capacity of facilities persistently referring for specific condition(s); and
3. Provide a baseline against which to measure progress toward strengthening the referral system within Kampala city, and reducing congestion at KNRH.

Methods

Data on key characteristics of maternity and perinatal admissions at KNRH were extracted from hospital in-patient registers including the maternity, labor and post-natal wards and operating theater registers. These registers recorded women admitted in labor or suspected labor. Data were collected by 14 data collectors, working for a total of 21 days between October and December 2021. Variables extracted from registers included date of admission; age of patient; mode of delivery; birth outcome; whether patient was booked at KNRH, referred in from another facility or self-referred; initial reason for admission; and final diagnosis provided by KNRH. If a patient was referred in from another facility, data collectors gathered the name and district of referring facility; for women who self-referred, data collectors recorded her home district. For all women, data collectors recorded the home village of the patient.

We stratify all analyses by type of patient (booked at KNRH, facility referral or self-referral) because there are fundamental differences in the context and causes of referrals for each population, and the interventions needed to improve timely access to quality care for them. We have excluded all observations that were missing patient type (n=134; 0.4% of observations) from further analyses. Total analysis dataset includes 36,401 observations. Data were entered into Excel, imported into and analyzed in Stata v15. Maps were created in ArcGIS v10.5.1 using ArcMap.

Questions by Type of Patient

Booked at KNRH

What are the ages of women? What are the modes of delivery? What are the outcomes among these women? Where do they live? How many live in Kampala's urban slum areas?

Facility referrals

Which facilities are contributing the bulk of the referrals into KNRH? For what indications? What proportion of these patients are complicated deliveries? What proportion come from inside/outside Kampala? What is the capacity of the referring facilities relative to the conditions for which they are sending women? How accurate are the initial indications for referral relative to the final diagnosis?

Self-referrals

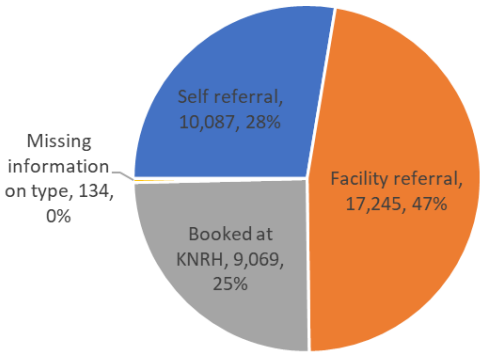
From where are women coming (districts/villages)? From how far away? For what reasons? Which facilities are they bypassing along the way? What is the capacity/what are the gaps of these facilities that are bypassed? What can be done to strengthen these facilities and to provide quality care closer to these women's homes? Why do women seek care at KNRH rather than from a facility closer by?

Results

Quantitative analyses of admissions by type of patient

Over the 14-month period, 36,535 maternal and perinatal admissions were extracted from facility registers (i.e., all patients recorded in the maternity admissions facility registers). This represents 103% of all maternity/perinatal admissions into KNRH and 51% of all admissions into KNRH during the same period, when compared to HMIS reports (data not shown). One quarter of maternity/perinatal admissions into KNRH were women who were booked for ANC and/or delivery there (Figure 1); whereas almost half (47%) were women referred in from another facility, and the remainder (28%) were women who self-referred into KNRH (Figure 1).

Figure 1: Distribution of admissions by type of patient (N=36,535)



There were no substantial differences in age distribution among type of patients. Women booked at KNRH were slightly older on average (26.4 years) compared to women referred by other facilities (25.2 years), though this has few programmatic implications (data not shown).

A substantial number of observations were without data on delivery type and birth outcome (Figures 2 and 3); thus, these results should be interpreted with caution. Cesarean deliveries appear most common among women who are referred by other facilities (28.5%), followed by women who self-refer (25.5%) suggesting that referrals into KNRH are, in part, often for suspected or confirmed need for surgical intervention. Regarding birth outcomes, approximately 2.8% of referrals (self- and facility-referred) experienced an intrapartum stillbirth or early newborn death (both outcomes potentially impacted by timing and quality of intrapartum and immediate postpartum care). Proportionally fewer women booked at KNRH experienced these outcomes (1.6%).

Figure 2. Distribution of modes of delivery by type of patient

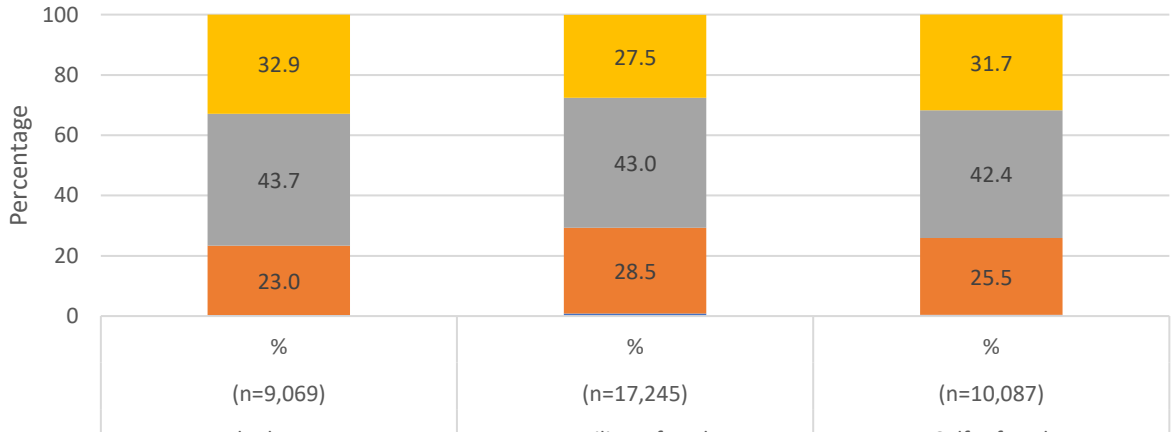
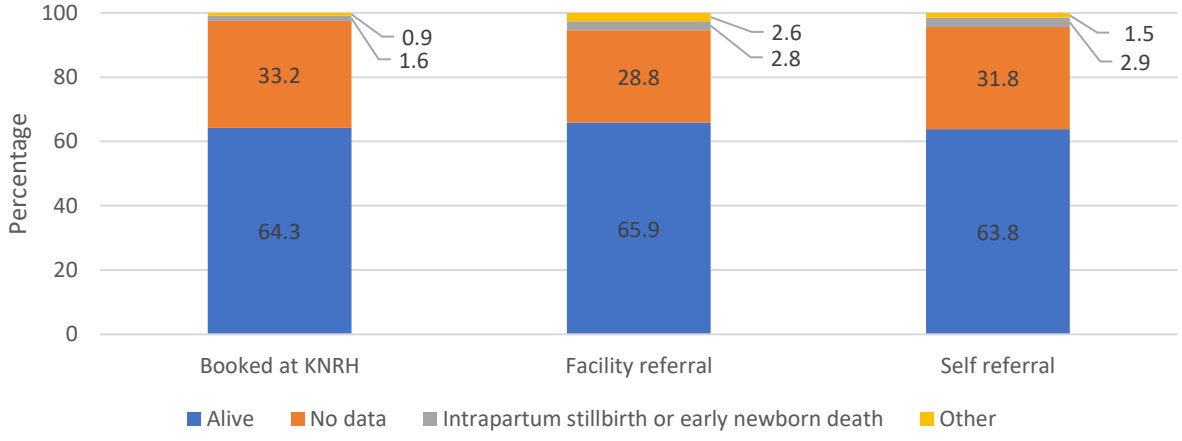


Figure 3. Distribution of birth outcomes by type of patient



Initial reasons (i.e. indications) for referral varied considerably across patient type (Table 1). However, indications are difficult to analyze given the lack of standardized categories and lack of context available such as whether the woman was referred/admitted in normal labor or with a complication (obstetric or fetal/newborn), and the timing of referral (before onset of labor, during labor, or post-delivery). However, in general, women who self-refer into KNRH did so for reasons that are more similar to women booked at KNRH than to women referred by other facilities, though with substantially more self-referred women reporting obstetric or perinatal complications.

Final diagnosis may be a more informative variable than *initial indication*, yet almost half of observations did not have a final diagnosis available (data not shown). Women booked at KNRH were slightly more likely to be without a final diagnosis than other women (50.9% vs. 47.0%). An observation level analysis of differences between initial indication and final diagnosis is planned. For example, for the 25% of self-referrals who delivered by cesarean (Figure 2), it would be helpful to know the indication for referral vs. the final diagnosis provided by KNRH. In short, however, recorded data on indications for referral and admission as well as final diagnoses lack standardized classifications limiting the ability to make useful comparisons.

Further investigation: Comparing the initial indication for referral with the final diagnosis provided by KNRH is warranted. Among women who were facility referred, this analysis will help identify areas of poor diagnosis capacity and inadequate specificity on referral slips/registers. Among self-referrals, it could provide a better understanding of the conditions that prompt women to seek care at KNRH, often bypassing closer facilities.

Table 1: Initial indication for referral recorded at admission.

	Total (n=36,401) %	Booked at KNRH (n=9,069) %	Facility referrals (n=17,245) %	Self-referrals (n=10,087) %
Normal or potentially non-emergent conditions	**56.9%**	**82.4%**	**34.8%**	**72.2%**
In labour	43.6%	70.3%	20.5%	59.2%
Previous scar	9.2%	9.9%	8.4%	10.1%
Multiple pregnancy	1.1%	0.4%	1.6%	0.8%
Rupture of membranes	3.1%	1.8%	4.3%	2.1%
Ostensible obstetric complication	**19.9%**	**5.8%**	**34.2%**	**8.5%**
Obstructed labour/malpresentation	10.5%	1.5%	19.4%	3.4%
Hypertension/pre-eclampsia/ eclampsia	5.9%	2.9%	9.5%	2.5%
Antepartum Hemorrhage	2.1%	1.1%	2.7%	2.1%
Post-partum Hemorrhage	1.4%	0.3%	2.5%	0.5%
Ostensible fetal/newborn complication	**15.5%**	**3.8%**	**24.9%**	**10.0%**
Birth before arrival	6.2%	0.9%	10.7%	3.2%
Preterm/prematurity	5.0%	2.2%	6.8%	4.5%
Fetal Distress	1.8%	0.1%	3.5%	0.3%
Amniotic Fluid Disorders	1.6%	0.4%	2.3%	1.3%
Fetal demise/Fresh Still Birth	1.0%	0.2%	1.5%	0.6%
Other	**3.9%**	**2.9%**	**4.3%**	**3.6%**

*other includes many indications all accounting for <=1.5% other than "missing" which accounted for <0.5% for all patient types. Indications included post-date, infections, anemia, cord accidents, medical conditions, etc.

Spatial analyses of self-referrals and facility referrals

The vast majority (98%) of observations have geo-data that enables spatial analyses. Overall, three-quarters of women admitted into KNRH came from Kampala, either as their home address (booked patients and self-referrals) or referred by facilities located in Kampala (Table 2); however, by patient type, the distribution of originating/home district differs. Among women booked at KNRH, 90% live in Kampala district, and 9.3% in Kayunga district, and the home district of self-referrals is distributed similarly – most women are from Kampala district (92%) and another 7.5% from Kayunga. The remaining 0.5% of self-referrals (or approximately 36 women per month) come from other districts (indicated in light orange in Map 1).

Further investigation: For women booked at KNRH, further spatial analysis by village will help answer the extent to which women living in urban slums are using KNRH for ANC and maternity services.

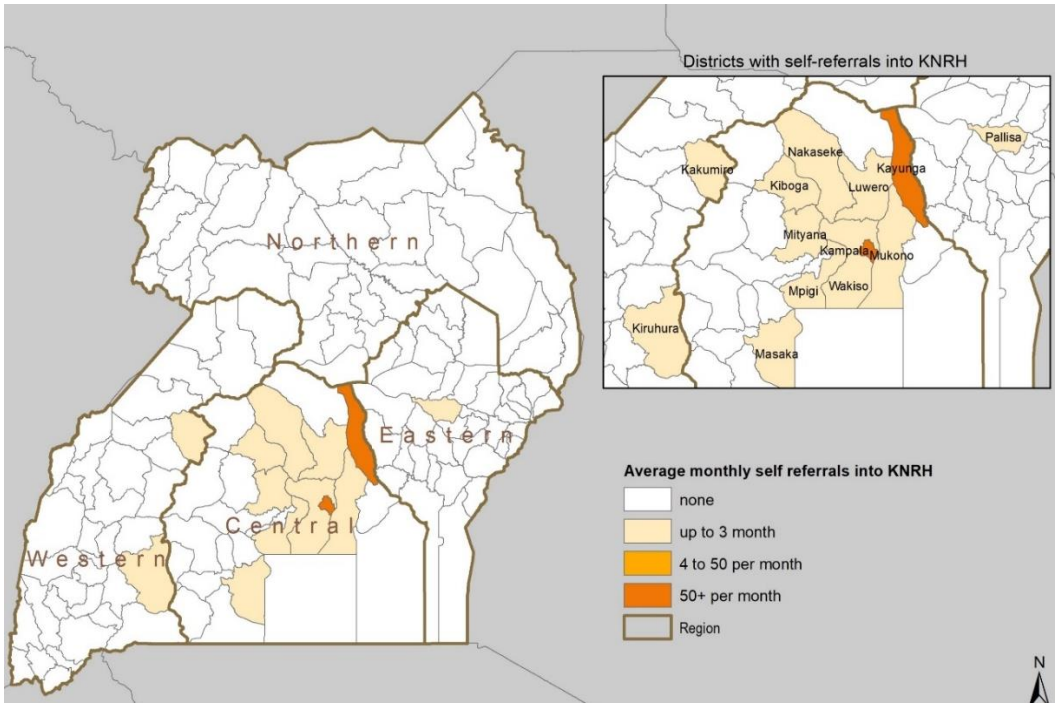
However, women referred in by other facilities are less likely to come from Kampala than those self-referring – though more than half (56.2%) are referred in by facilities within Kampala. Just under one quarter of facility referrals (23.0%) come from Wakiso district and the remaining originate in districts across the country (Map 2).

Almost three-quarter of facility referrals (72%) come from just 18 facilities, and more than half come from the ten facilities in and around Kampala indicated on Map 3. In Map 3, the monthly volume of referrals into KNRH is indicated by the color/size of the symbol. Of these 10 facilities, just one is private not-for-profit (Nurture Africa Special Clinic) and the rest are public (six HC III; two HC IV; one referral hospital).

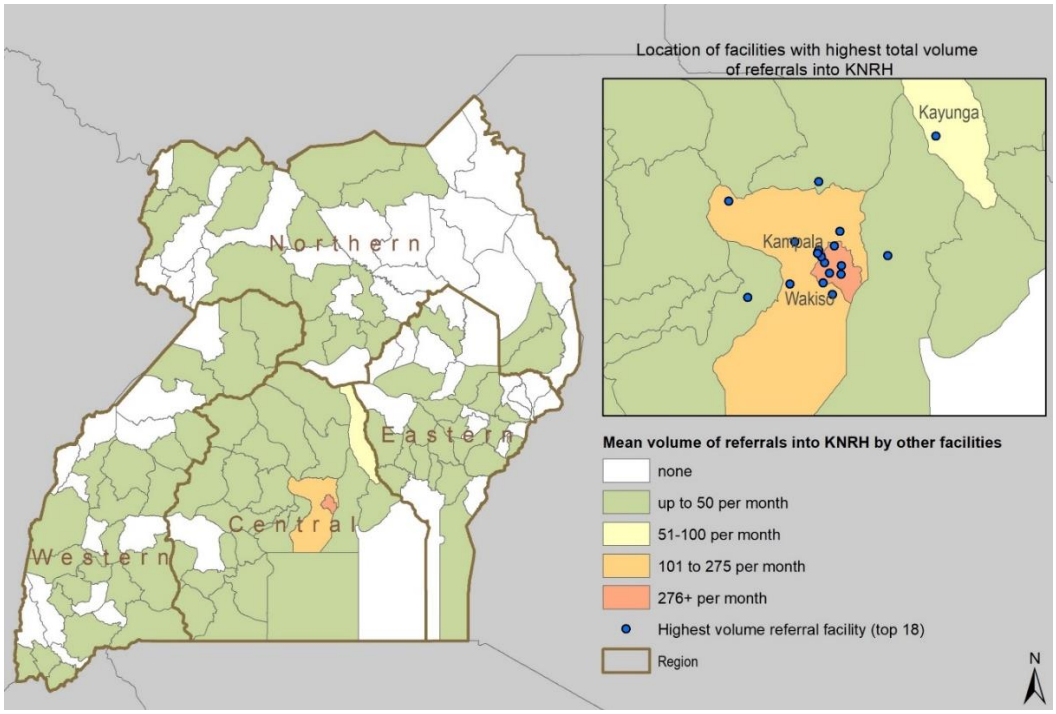
Table 2: Spatial analyses of maternity and perinatal admissions into KNRH

	Total (n=36,401) %	Booked at KNRH (n=9,069) %	Facility referrals (n=17,245) %	Self-referrals (n=10,087) %
Originating/Home District				
Kampala	74.9%	90.0%	56.2%	92.0%
Wakiso	10.9%	0.5%	23.0%	0.4%
Kayunga	8.1%	9.3%	7.9%	7.5%
Luwero	1.5%	0.1%	3.3%	0.0%
Mukono	1.4%	0.0%	3.1%	0.0%
Elsewhere	3.2%	0.1%	6.7%	0.1%

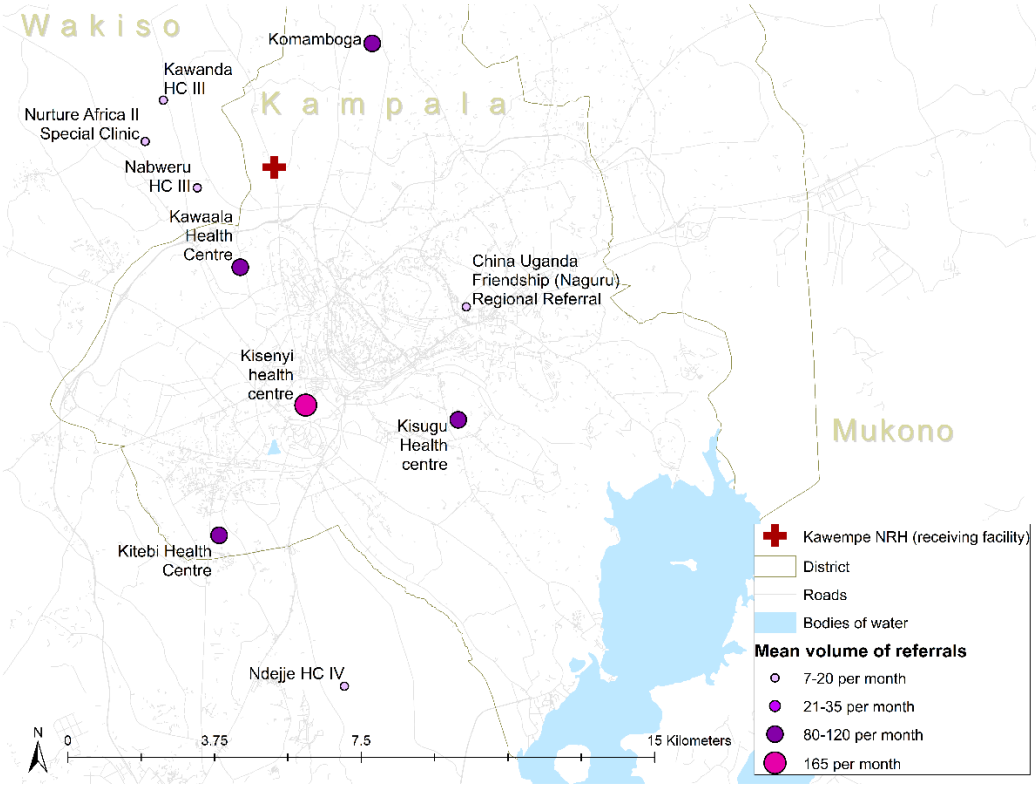
Map 1: Monthly volume of self-referrals into KNRH, by home district (July 2019 – August 2020)



Map 2: Monthly volume of facility referrals into KNRH by originating district (July 2019 – August 2020)



Map 3: Facilities in and around Kampala accounting for more than half of maternity/perinatal referrals into KNRH (July 2019 – August 2020)



Capacity of high-volume referrers in Kampala to manage obstetric and newborn complications

Further investigation: One area for further investigation must be identifying facilities that are/should be providing high-level care and identifying the gaps that need to be filled to ensure they have the capacity to manage the conditions for which women are being referred into KNRH. We are doing this for facilities that were included in the USAID's MCHN Activity's baseline assessment. For other facilities in Kampala, and for facilities outside Kampala, we will seek to locate and/or gather additional data. Comparing facility capacity to reasons women are being referred will help target and tailor any investment and technical

The USAID's MCHN Activity has rich, recent facility capacity data on five of the six highest volume referral facilities within Kampala district, and the potential to locate or gather facility capacity data from additional facilities.

Using the baseline data, we preliminarily investigated five of the six high-volume referrers in Kampala for recent performance of: 1) emergency obstetric and newborn care (EmONC) signal functions, and 2) emergency newborn services (Table 3). None of these high-volume referral facilities could be designated as even moderately providing these critical service packages, thus identifying priority areas to intervene. Targeted investment and technical assistance to improve capacity of these facilities to manage obstetric and newborn complications should be prioritized.

Table 3: Recent performance of EmONC signal functions and emergency newborn services among facilities in Kampala that refer a high volume of maternal/perinatal patients into KNRH

Facility Name	Kawaala	Kisenyi	Kisugu	Kitebi	Komamboga	China Uganda (Naguru)
Type	HC III	HC IV	HC III	HC III	HC III	National Referral
Division	Rubaga	Central	Makindye	Rubaga	Kawempe	Nakawa
Basic EmONC Signal Functions performed in 3 months prior to baseline assessment						
Total BEmONC signal functions	0	0	0	4	1	0
Antibiotics						
Oxytocics						
Anticonvulsants				✓		
Assisted vaginal delivery				✓		
Manual removal of placenta				✓	✓	
Removal of retained products						
Newborn resuscitation				✓		
Emergency newborn services performed in the 3 months prior to the assessment						
Total emergency newborn services	0	0	0	2	0	0
Corticosteroids				✓		
Antibiotic for newborm sepsis						
Aantibiotics for pPROM						
Oxygen for newborns				✓		
IV for newborns				---		

--- not answered

Recommended Next Steps and Further Analyses

Below is a summarized list of recommendations and next steps:

Develop plan to improve quality of data related to admissions/referrals, and to strengthen tools used to extract data for ongoing monitoring of overcrowding/referrals:

- Strengthen the data quality around referral indication and final diagnosis recorded in registers. For example, "signs and symptoms" and "in labour" as indications for referral are not sufficiently informative to support use of data for improved quality or for programming to reduce referrals. Similarly, *rupture of membranes* should be better defined because rupture alone does not indicate a problem, as would a preterm premature rupture of membranes (PPROM) or a premature rupture of membranes at term. All these conditions have different clinical implications.
- Develop standardized approach to record referral indications in registers and referral slips to ensure a minimum level of information that allows classification by: 1) whether the woman is experiencing a complication vs. is in normal labor (no complication); 2) whether referral/admission occurred before onset of labor, during labor or post-delivery; and 3) whether the referral is related the woman or the newborn.
- Outcome data should be recorded/extracted for mother and newborn separately. Further, extracting maternal outcomes beyond survival status would be useful (e.g. ICU admission, blood transfusion, fistula).

Incorporate these findings into the development of facility-specific action plans for capacity strengthening and to inform the Urban Service Delivery Pilot. Use the findings to identify segments of the population using KNRH that should be most targeted for decongestion and care at other facilities. To that end, below are proposed further investigations:

- Examine the causes of referrals from Kayunga Hospital relative to the availability of EmONC services at the hospital and within Kayunga district.
- Identify facilities that are bypassed by self-referrals and by facility referrals. Conduct analysis of facility capacity relative to most common indications for referral to identify opportunities for targeted strengthening to interrupt the bypassing and to encourage women to seek care closer to their home.
- Gather client perspectives among women who come from far and bypass apparently "high functioning" facilities to get to KNRH. We are conducting qualitative interviews with clients to determine perspectives and preferences for place of delivery and for definitive care for complications.
- Gather perspectives from high-volume referring facilities, in particular the KCCA facilities, to understand the context and causes of referral from the originating facility, and the extent to which overcrowding or other systems factors within their own facilities drives referral. These perspectives should guide strategies for both KCCA and the GOU-managed health facilities.
- Link with work on private sector to conduct sub-analyses of private health facilities (PNFP and PFP) in Kampala to investigate their BEmONC and CEmONC capacity, relative geographic location to Kampala and other high-volume referral facilities, and opportunities for creating space for increased referrals to provide health facilities, to inform public-private partnerships.
- Deeper dives and sub analyses on some indications for referral:
    - Conduct a one-to-one comparison of reason for referral and final diagnosis to understand "misdiagnosis" by referring facility (among "referred in" and "booked" clients only)
    - Examine facility referrals for women who had a birth before arrival (BBA) (10.7%). Knowing more about the outcomes among these women may inform areas for skills building and inform ways to improve efficiency of referral to ensure women do not deliver en route between the sending and receiving referral facility.
    - There is a large proportion of women referred as "in labour". This group should be examined to determine if they can be further disaggregated.
    - Fetal Distress and Amniotic Fluid Disorders are conditions that can only be detected clinically meaning they should not be indications for self-referrals.
- Investigate whether there are geographic differences (district by district) in the reasons for facility referrals from districts outside Kampala and Kayunga.
- Cost-distance raster to determine journey time and time to services.