Juba Settlement and Facilities Distribution Profile

MAPPING REPORT

April, 2021

UN HABITAT
FOR A BETTER URBAN FUTURE

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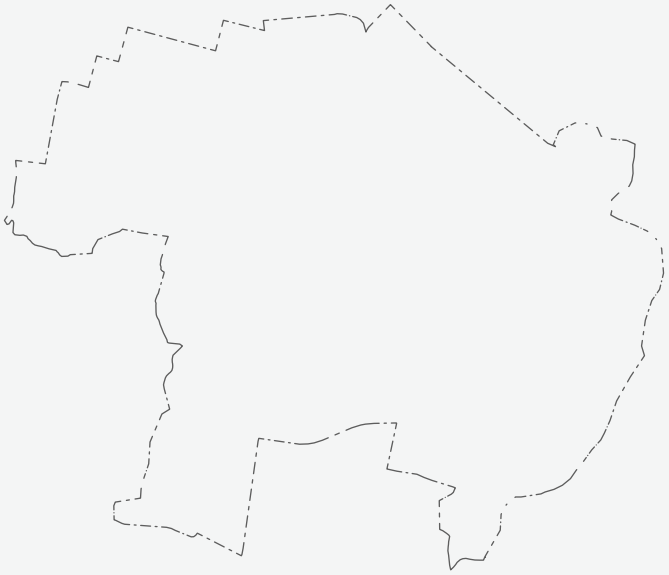

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Cover photo: View of Juba, South Sudan © Tom McShane/ Flickr

Contents

List of Acronyms

DAS – Data and Analytics Section, UN-Habitat

GEE – Google Earth Engine

SDGs – Sustainable Development Goals

SSP – South Sudan Pound

GHS-POP – Global Human Settlement Gridded Population

GPWv4 – Gridded Population of the World Version 4

UNDESA – United Nations Department of Economic and Social Affairs

SANSA – South Africa National Space Agency

PART 1 INTRODUCTION

1.1 Background

The COVID-19 pandemic has disproportionately affected cities and urban areas – from transmission risks to impacts on both the way of life and the vibrancy of urban economies. Among other things, the pandemic has also heightened an already existing challenge in cities – that of lack of sufficient data to understand risks and to prioritize projects/ interventions. UN-Habitat's experience supporting countries through the pandemic has noted an acute shortage in relevant and up to date data in urban areas, which is critical for development of short- and long-term response and recovery interventions to the pandemic, and build resilience to future related pandemics. Within the framework of its "COVID-19 Response Plan and Campaign", UN-Habitat emphasizes on the importance of up-to date and high resolution multi-sectoral urban data for effective response and recovery interventions.

One area of data interest for UN-Habitat and other partners has been on mapping of vulnerabilities in cities, particularly within areas where the urban poor live (slums and informal settlements). In 2020, UN-Habitat implemented data collection exercises in slums and informal settlements in Kenya and Uganda, which identified key vulnerabilities among these communities, as well as the shortcomings of interventions which are not informed by data and clear sustainability plans. In surveys undertaken in 5 slums in Nairobi for example, it was established that while many organizations supported the setting up of handwashing stations in the early days of the pandemic, the sustainability plan on how to supply water (and soap) to the mostly manually fed facilities was not clear, which made many of these facilities unreliable. Recommendations from these studies emphasized on the need to focus on sustainability of interventions, which triggered a much-needed discussion on the design and implementation of related response interventions.

Based on experiences from Kenya and Uganda, UN-Habitat commissioned the current survey in Juba, a city with severe shortages in openly available data across indicators. This report summarizes findings from the survey and related data collection activities, which was implemented between November 2020 and March 2021.

1.2 Survey objective

Following success of previous initiatives in Kenya, the current study was initiated in Juba, South Sudan to compile basic data, and to map risks and vulnerabilities in the urban area – where acute data shortages have historically been noted. Within the framework of a larger project titled "COVID-19 response in poor urban areas of Juba city" implemented through funding from the Swedish International Development Cooperation Agency (SIDA), UN-Habitat commissioned this survey with the main aim of producing and compiling key data that would help understand the local conditions and risks related to COVID-19, contribute to better targeting of response interventions as well as inform planning processes in the long term. The specific objectives of the survey, which was undertaken in partnership with the Juba Municipality and other local actors were to;

a) Compile existing data from official sources across sectors for Juba;
b) Undertake a comprehensive mapping of basic facilities available in Juba using digital tools and through a participatory process involving local youths;
c) Generate high resolution geospatial data for Juba, and undertake COVID-19 risk assessment in Juba's neighbourhoods; and
d) Make data-based recommendations on the required interventions to help Juba municipality respond to and enhance resilience to the COVID-19 pandemic.

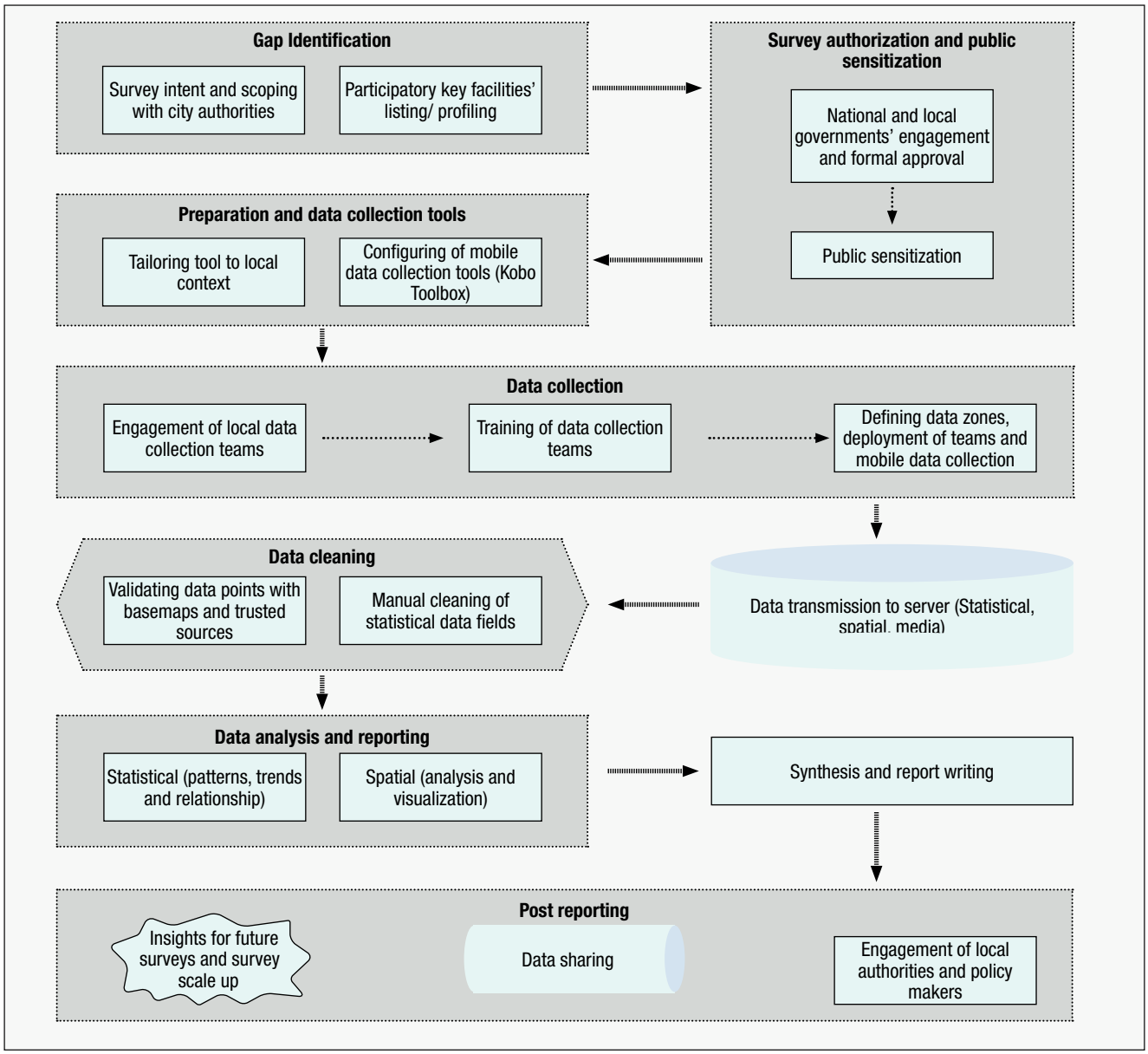
All the collected data, the findings and recommendations which are presented in this report in draft form will be validated through a webinar with Juba Municipality officials, and shared publicly through UN-Habitat and Juba Municipality official channels. Equally, all data generated from this survey will be shared with Juba Municipality and also made publicly available through UN-Habitat's open data website (data.unhabitat.org). The open dissemination of the survey findings and the data is anticipated to help organizations working in Juba to improve their programming, while UN-Habitat and Juba municipality will use the data to inform future projects and investments on provision and/or improvement of basic infrastructure in the city.

1.3 Survey approach

The survey and associated analyses were implemented by UN-Habitat's Data and Analytics Section and the Regional Office for Africa in collaboration with Juba Municipality. Methodologically, the survey adopted a mixed methods approach, which combined desk review, primary data collection and geospatial analysis. Desk review was used to collect background data on Juba and prevailing trends in COVID-19 cases and interventions; field mapping was used to collect data on available facilities and their conditions as well as to profile organizations working within the city; and image processing and geospatial analyses were employed to assess Juba's urban structure and to model COVID-19 risks and vulnerabilities.

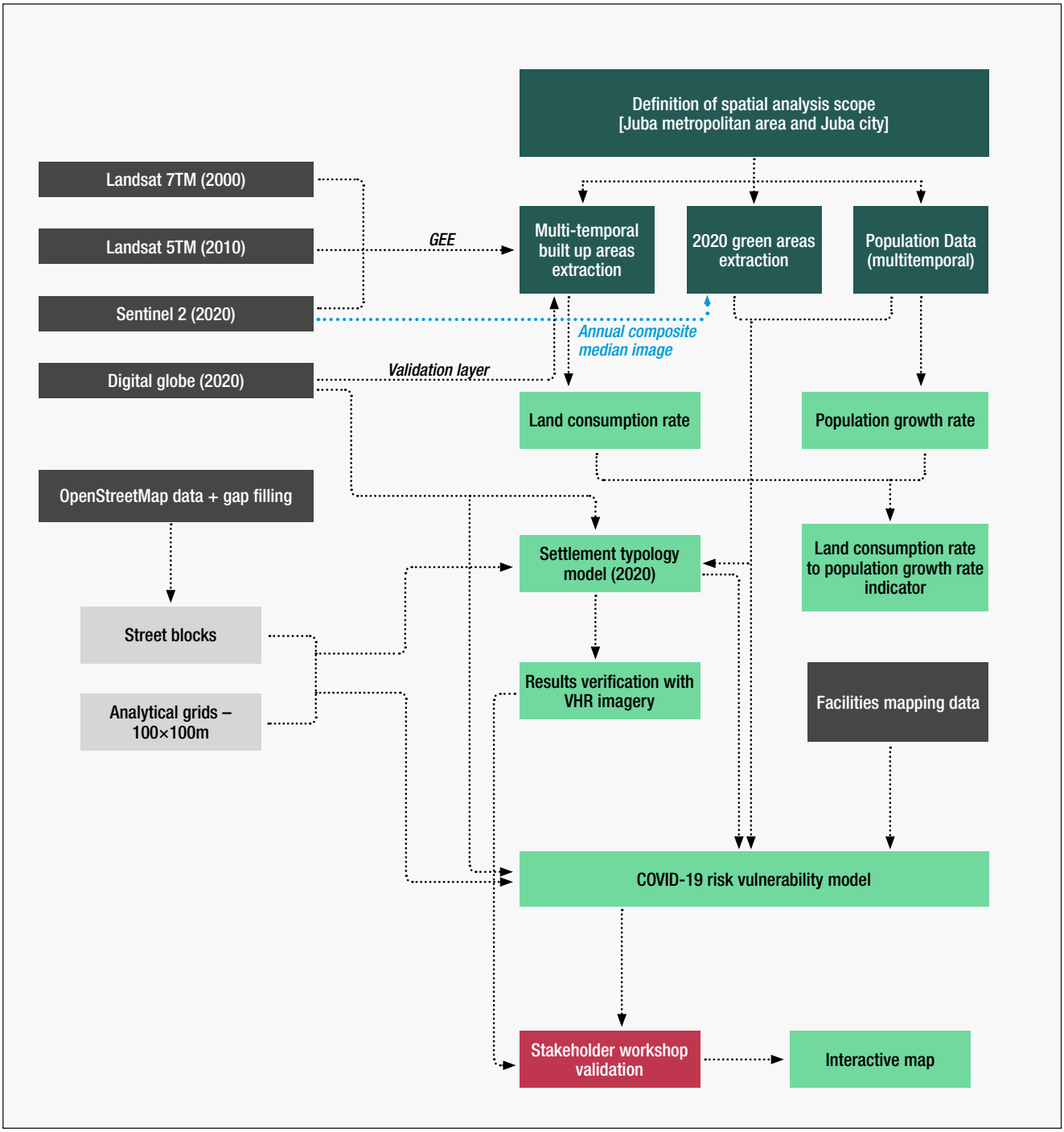
The facilities mapping component of the survey followed the methodology implemented by UN-Habitat in other settlements in Kenya and Uganda, in which the physical locations of all major urban services were mapped by a team of Juba based youth volunteers using the KoboCollect mobile phone application. Figure 1.1 summarizes the approach adopted in the facilities mapping.

Figure 1.1. Facilities Mapping Approach



The assessment of Juba's settlement pattern and COVID-19 risk vulnerabilities was based on an approach developed by UN-Habitat's Data and Analytics Section, which considers elements such as settlement typology, anticipated levels of interaction, population densities as well as access to basic services such as water and handwashing facilities. Figure 1.2 summarizes the adopted approach for analyzing Juba's settlement pattern and assessing its COVID-19 vulnerabilities.

Figure 1.2 Settlement pattern and COVID-19 risk assessment approach



This report presents the findings from the different components of the survey and is organized in five parts:

a) **Introduction** – which provides a background on the need for the study and its objective;
b) **Juba's socio-demographic profile** – which summarizes the key indicators in Juba across the social, demographic, environmental and economic sectors;
c) **Juba's facilities distribution and impacts on quality of life and COVID-19 risks** – which presents results from the field-based facilities mapping survey implemented in Juba in partnership with the city municipality and youth volunteers;
d) **Juba's urban form/structure and COVID-19 vulnerabilities** – which presents a detailed analysis of Juba's urban setup, its spatial urbanization trends over time, a modelled settlement pattern, as well as a risk assessment of COVID-19 risks in the city; and
e) **Conclusions and recommendations** – which provides COVID-19 specific and data-informed recommendations on the required interventions.

Jebl Road Children © William Leonard / Flickr.jpg

PART 2 JUBA'S SOCIO-DEMOGRAPHIC PROFILE

2.1 Overview

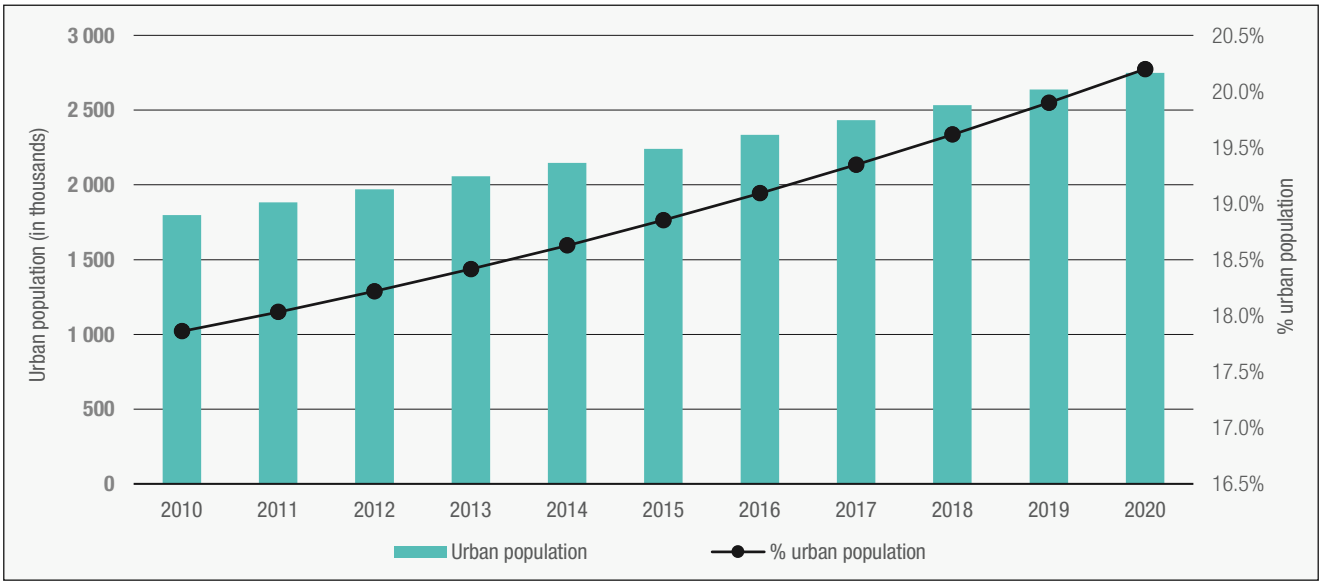
This part gives the overall picture of South Sudan across socio-economic indicators and sets the context for the subsequent analysis on COVID-19 vulnerabilities in Juba. While the intention for this part, whose analysis is largely based on literature review, was to compile information for Juba, lack of city level data meant that analysis and presentation of findings could only be done at the South Sudan urban level. The results presented here are derived from reports from relevant ministries and agencies in South Sudan, evidence and data generated by UN-Habitat, World Bank, UNDESA, The WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP) and The United Nations Educational, Scientific and Cultural Organization (UNESCO).

2.2 Urban population trends

UN estimates show that the urban population in South Sudan has steadily increased since the country gained independence in 2010 to 2020 (Figure 2.1). However, the country is still largely rural, with only 20.2 % of the total population estimated to live in urban areas in 2020 (UNDESA, 2018). Between 2010 and 2020, the urban population grew at an average annual rate of 3.4% (Calculations from UNDESA urban population projections). South Sudan's urban population for 2020 was estimated at 2,749,000 and is projected to reach 4,164,000 by 2030. Juba – the country's largest city – accounted for 14.7% of the total urban population in 2020, a share that has not changed much since 2010 (14.2%) (UNDESA, 2018). Juba's population is projected to increase from 403,000 in 2020 to 617,000 by 2030.

Many of urban dwellers in South Sudan live in poor living conditions in slums and informal settlements where they lack access to basic services and infrastructure, live in overcrowding conditions and do not have access to steady livelihood opportunities. According to UN-Habitat data, the share of slum households in urban areas is quite high in South Sudan, with nearly all the urban households (97.3 %) living in slum conditions in 2018. A slum household is defined as a group of individuals living under the same roof lacking one or more of the following conditions: access to improved water, access to improved sanitation, sufficient living area, housing durability, and security of tenure.

Figure 2.1: Urban population (% of total population)



Data Source: UNDESA, 2018

Box 1 **History of urbanization in Juba**

Juba, South Sudan's capital comprises three of the 16 payams of Juba County: Juba, Kator and Munuki. The border of Juba municipality is not readily available, which makes it difficult to authoritatively define the area. For example, in 2009, JICA estimated the urbanized area of Juba to be around 52 km², which is smaller than greater Juba, which UN-OCHA had in 2007 estimated as covering 336 km². What is clear however is that Juba has been expanding over the years, with majority of growth happening westwards and southwards.

Forced displacement and return have been a key characteristic of the development of Juba town. Although fluctuating significantly at times, Juba's population has increased steadily over the years. When Juba became the capital of the Southern Sudan regional government in 1956, it had a population of about 10,600 people. During the first civil war (1955–72), Juba's population increased to around 56,737, making it the largest settlement in the South. The (relative) peace that followed the end of the civil war saw the town expand again to 83,787 inhabitants by 1983, a growth rate of 47%. It was estimated at the time that well over 80% of this growth was accounted for by migrants to the town.

Expansion was marked by the uncontrolled growth of informal settlements and non-permanent housing. According to Mills (1985), less than 15% of all housing could be considered permanent - of the roughly 22,000 buildings in Juba in 1979, at least 18,000 were traditional mud-walled tukuls with grass-thatched roofs. Only a small number of buildings were erected on plots officially allocated by the authorities. For example, over 2,000 new plots were created between 1972 and 1975, but only 170 were officially allotted. Demolitions of informal settlements to build services or simply upgrade an area were common in the 1970s, forcing those who could not afford to stay to move to the outskirts of what was by then Juba town. The policy of re-division of the South (called 'Kokora'), enacted in the 1980s, divided Southern Sudan into three regions: Equatoria, Upper Nile and Bahr El Ghazal, and called upon all Southerners to return to their home areas, forcing many non-Equatorians out of Juba.

During the second civil war (1983–2005), Juba, which by then included Mangalla, Rajaf, Gondokoro and Wangar payams, was a garrison town under the Government of Sudan (GoS), while the Sudan People's Liberation Movement/Army (SPLM/A) controlled the surrounding areas of Katigiri and Lobonok payam in Juba County. As during the first civil war, Juba experienced repeated large fluctuations in its population. A major attack on Juba by the SPLM/A in 1992, for example, forced many of its inhabitants to flee to Khartoum, while persistent insecurity from the late 1990s resulted in the displacement of large numbers of people from Juba County to Juba town. Civilians escaping attacks by the Lord's Resistance Army (LRA) in Northern Uganda and fighting between the GoS and the SPLM/A over Torit, Kapoeta and Lafon came to Juba in search of protection. WFP reports suggest that, in 2002, camps in Juba town and its environs were hosting over 45,000 IDPs. When the Comprehensive Peace Agreement (CPA) was signed in 2005, Juba town was home to approximately 250,000 people, including 163,000 residents and 87,000 IDPs, a growth rate of 450% since 1973 (equivalent to 14% per year). By this time, over 30,000 plots of land were formally occupied in Greater Juba, alongside an estimated 86,000 squatter shelters.

Juba's expansion further accelerated in the post-CPA period. More than 2 million IDPs were said to have returned to Southern Sudan, together with over 330,000 returning refugees from neighboring countries, many of whom decided to stay in Juba rather than return to their home areas. While there are no exact population figures for Juba and/or the existing figures vary significantly, some news reports in 2007 and 2008 put Juba's population as high as one million people. Other studies estimated Juba's population during the 2005 – 2010 period at between 406,000 and 600,000. The 2009 census estimated Juba's population at 230,195, which was refuted by the Government of South Sudan as a gross underestimate.

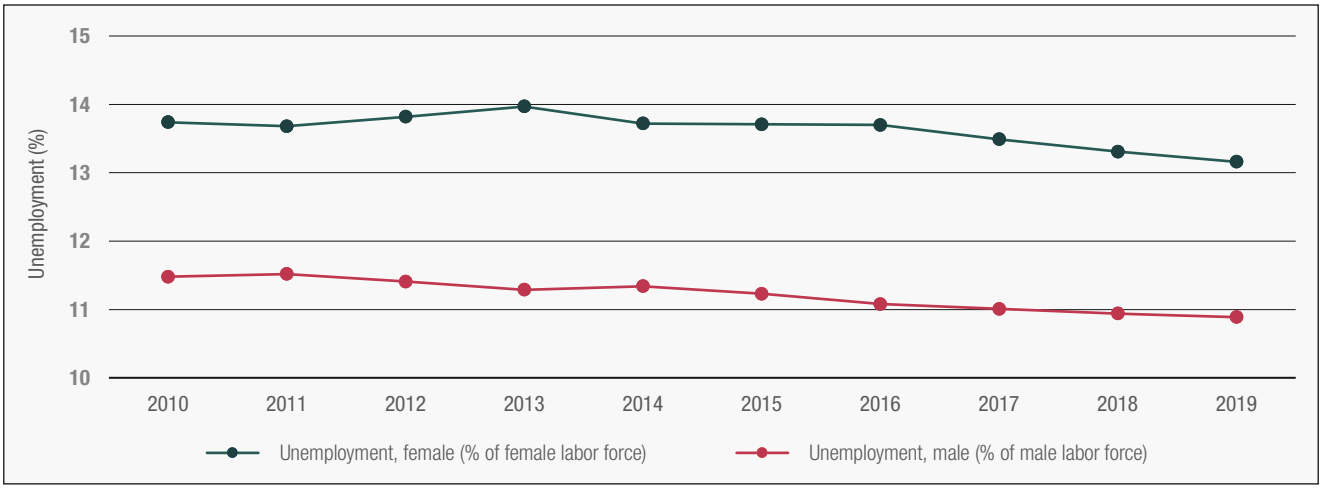
Adopted from Martin, E., I. Mosel, 2011. City limits: urbanisation and vulnerability in Sudan: Juba case study

2.3 Employment, poverty trends and quality of life

Data from the International Labour Organization indicates that the unemployment[1] rate in South Sudan remained relatively stable since the country gained independence, with estimated values of 12.6 % in 2010 and 12.7 % in 2020 (ILO, 2021[2]).

Unemployment rate refers to the share of the labor force that is without work but available for and seeking employment. Significant variations are reported between age groups and gender categories, with the highest unemployment rate observed among youth aged 15-24 (18.6 %) and women (13.2 %) compared to male (10.9%) in 2019 (Figure 2.2). The high unemployment rate due to slowdown in economic activity and low literacy rates is likely to further undermine South Sudan's economic prospects in the medium to long term.

Figure 2.2: Unemployment by gender trends in South Sudan



Data Source: International Labour Organization, ILOSTAT database.

South Sudan is one of the poorest countries in the world, with the country having some of the worst levels of development and social equality on the Human Development Index (low HDI value of 0.433 in 2019 ranking the country at 185 out of 189 countries and territories). The poverty headcount ratio was at 76.4% in 2016, suggesting that 7 out of 10 people were living on less than $1.9 a day at 2011 international prices (World Bank, 2021). As a measure of the depth of poverty, the poverty gap at $1.9 a day (2011 PPP) was reported at 40.8 % in 2016. This is the mean shortfall in income or consumption from the poverty line $3.20 a day expressed as a percentage of the poverty line (World Bank, 2021).

Prevalence of moderate or severe food insecurity in the population is considerably high in South Sudan, with a reported value of 84.9% in 2018 (FAO, Faostat 2020). The high level of food insecurity could possibly be attributed to massive displacement of populations that have disrupted agriculture crop production and market systems, resulting from economic crises and the effects of years of conflict. In 2018, the percentage of people who lived in households classified as severely food insecure[3] was 63.7 % indicating that most households were not able to meet their basic food needs (FAO, Faostat 2020).

In terms of health conditions, life expectancy at birth for the total population was estimated at 57.6 years in 2018, an improvement from 2010 when it was estimated to be 54.8 years. Like in many other countries, women generally live longer than males in South Sudan, with the life expectancy at birth for females being on average 3 years higher than that of their male counterparts (59.1 and 56.1 years) (UNDESA, 2018).

1. Unemployment rate refers to the share of the labor force that is without work but available for and seeking employment.
2. https://data.worldbank.org/country/south-sudan?view=chart
3 A household is classified as severely food insecure when at least one adult in the household has reported to have been exposed, at times during the year, to several of the most severe experiences described in the Food Insecurity Experience Scale (FIES) questions, some of which include been forced to reduce the quantity of the food, skipping meals, having gone hungry, or having to go for a whole day without eating because of a lack of money or other resources.

Limited access to preventive public health interventions, due to recurrent conflict, humanitarian and economic crises in South Sudan could be a risk factor for the low life expectancy. Antenatal care (ANC) is one such public health intervention that promotes healthy pregnancy for the mother and higher chances of survival and good health for newborns. In Juba county, use of ANC services is low – in 2019, only 58.7 % of pregnant women had four or more ANC visits according to the 9th Annual Report 2019 produced by the Ministry of Health. Vaccination coverage is also low with only 66.3 % of children having received the 3rd dose of pentavalent and 59.6 % having received the 1st dose against measles in Juba County in 2019.

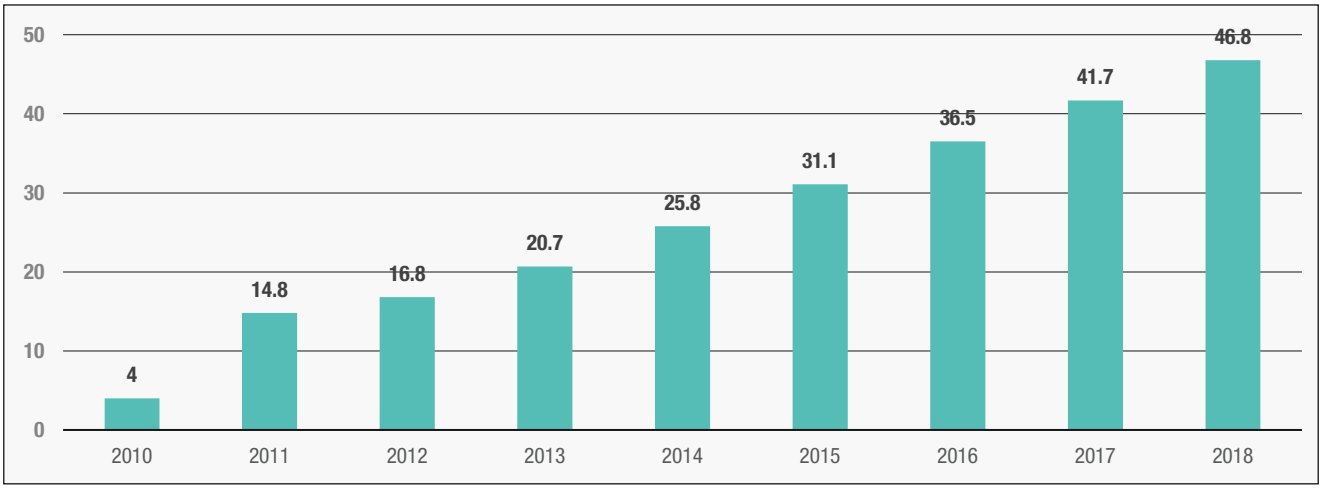
The country is therefore far from achieving the 90% target set by WHO that is required for the prevention of deaths due to vaccine-preventable diseases. South Sudan has one of the highest maternal mortality ratio (MMR) and under-five mortality rates (UMR) in the world. In 2019, the MMR was estimated at 789 maternal deaths per 100,000 live births (compared to 238 per 100,000 in developing countries) while the UMR was 95 per 1,000 live births (compared to 35 per 1,000 in developing countries) (WHO South Sudan Annual Report 2019). Data from the 2019 report by the Ministry of Health showed that 75% of births occurred in health facilities with skilled attendants in the Central Equatorial State where Juba is located. This implies that for about a quarter (25%) of births, mothers did not use health facilities with the help of skilled birth attendants, which increase the risks of health complications including death for the mothers and their newborns.

Juba street © BBC World Service/ Flickr

2.4 Electricity and access to technology

According to the World Bank data, less than half of South Sudan's urban population (46.8 %) had access to electricity in 2018. Although this has been a steady increase from only 4 % in 2010 (Figure 2.3), progress in increasing access to the electric grid has been slow and the country is striving for a system that runs primarily on renewable energy and reaches more homes (World Bank, 2021).

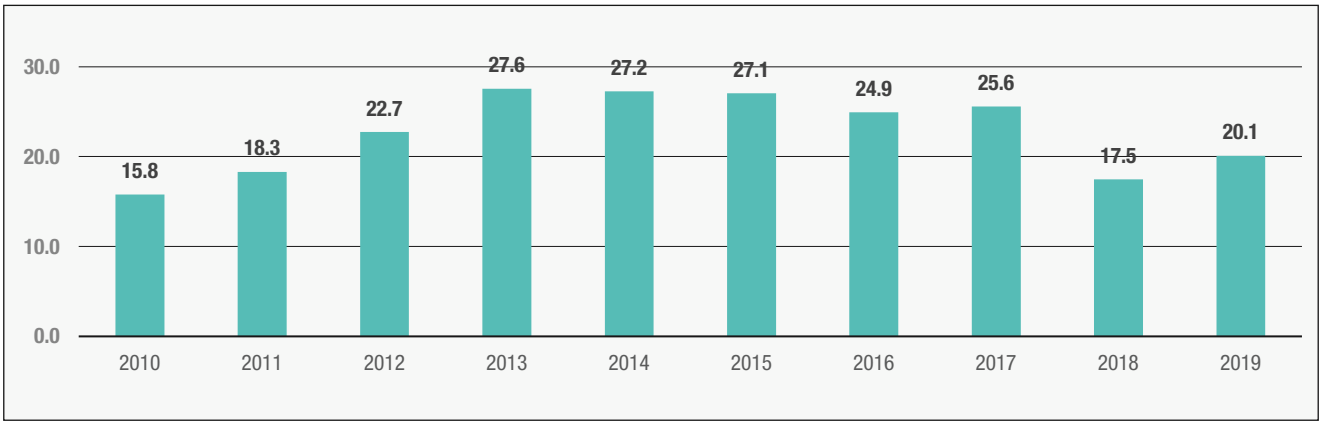
Figure 2.3: Urban population with access to electricity (%)



Data Source: https://data.worldbank.org/country/south-sudan?view=chart

In 2017, only about 8 % of South Sudan's population used the internet (International Telecommunication Union (ITU), World Telecommunication/ICT Indicators Database2020). Internet users are individuals who have used the Internet (from any location) in the last 3 months via a computer, mobile phone, personal digital assistant, games machine, digital TV etc. Mobile cellular subscriptions in South Sudan was reported at 20.09 per 100 people in 2019, which was higher than the value reported in 2015 (15.78/100 people) but lower than the highest value recorded in the country in 2013 (27.55/100 people) (Figure 2.4) (International Telecommunication Union (ITU) World Telecommunication/ICT Indicators Database, 2020). Mobile cellular telephone subscriptions are subscriptions to a public mobile telephone service that provide access to the Public Switched Telephone Network (PSTN) using cellular technology. The indicator includes (and is split into) the number of postpaid subscriptions, and the number of active prepaid accounts (i.e. that have been used during the last three months).

Figure 2.4: Mobile cellular subscriptions (per 100 people) (%)

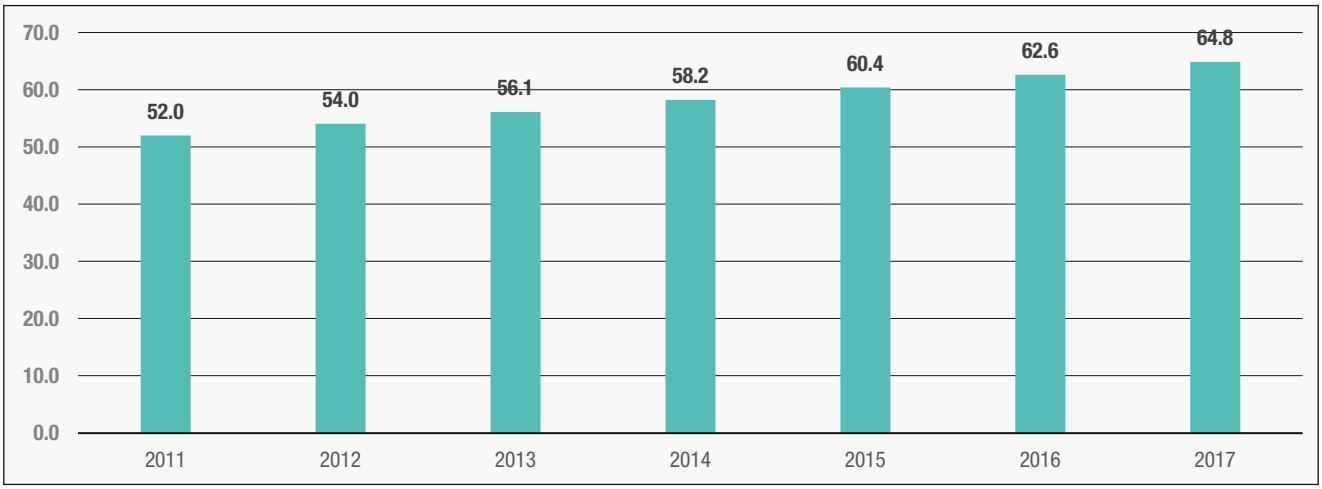


Data Source: https://data.worldbank.org/country/south-sudan?view=chart

2.5 Water and sanitation

As the urban population of South Sudan continues to rapidly expand, basic services such as sanitation have failed to keep pace with the change. The WHO/ UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP) has produced regular estimates of the levels of water and sanitation indicators for the urban population in South Sudan. According to the 2017 JMP report, the urban population with access to at least basic drinking water services was 64.8 % in 2017, an increase from 52.0 % in 2011 (Figure 2.5) (WHO & UNICEF, 2017). Basic drinking water service is defined as coming from an improved source, provided collection time is not more than 30 minutes for a round trip. Improved water sources are those free from fecal and priority chemical contamination and include piped water, boreholes or tube wells, protected dug wells, protected springs, and packaged or delivered water. A further 20.4 % of the urban population in South Sudan used improved basic drinking water services that require collection time of more than 30 minutes and are therefore classified as having access to limited drinking water services.

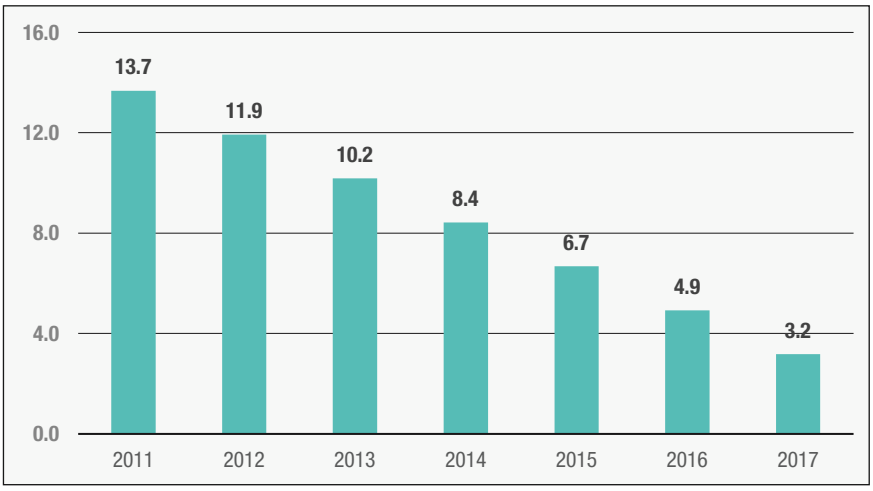
Figure 2.5: Urban population using at least basic drinking water sources (%)



Data Source: https://washdata.org/data/household#!/table?geo0=country&geo1=SSD

Populations that have no drinking water service at all and collect water directly from surface water sources such as rivers, lakes and irrigation canals face serious risks to their health and well-being. JMP estimates suggest that only 3 % of South Sudan's urban population still relied on untreated surface water in 2017, which was an improvement from 13.7 % in 2011 (Figure 2.6). In 2017, majority of urban households (77.4 %), that had access to improved drinking water acquired it from non-piped sources. Piped improved water source was extremely low at 7.8 % (WHO & UNICEF, 2017).

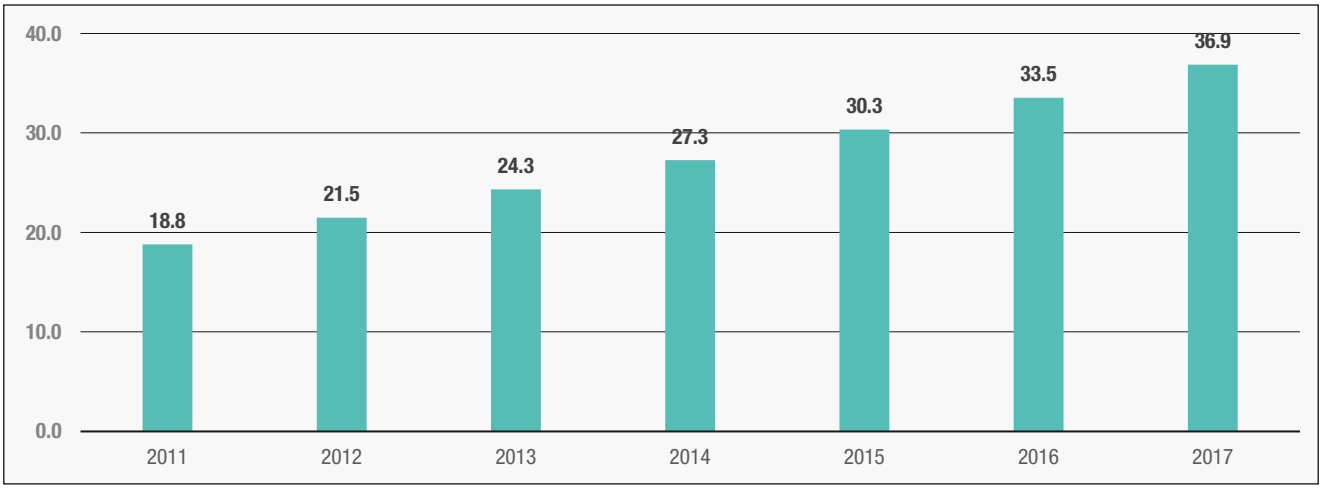
Figure 2.6: Urban population using surface drinking water sources (%)



Data Source: https://washdata.org/data/household#!/table?geo0=country&geo1=SSD

In 2017, it was estimated that the urban population with access to at least basic sanitation services was 36.8 %, which was almost double the recorded values in 2011 (18.8 %) (Figure 2.7). This share includes people using at least improved sanitation facilities that are not shared with other households (WHO & UNICEF, 2017). Improved sanitation facilities include flush/pour flush to piped sewer systems, septic tanks or pit latrines, ventilated improved pit latrines, compositing toilets or pit latrines with slabs. In addition, 17.2% of the urban population used improved sanitation facilities shared between two or more households and are therefore classified as having limited sanitation services (Figure 2.8). Improved latrine was the main type of improved sanitation facilities in 2017 - with 32.8 % of the urban population using the improved latrines compared to 20.9 % of the population who used septic tank and only 0.4 % who had access to a facility with sewer connection (WHO & UNICEF, 2017).

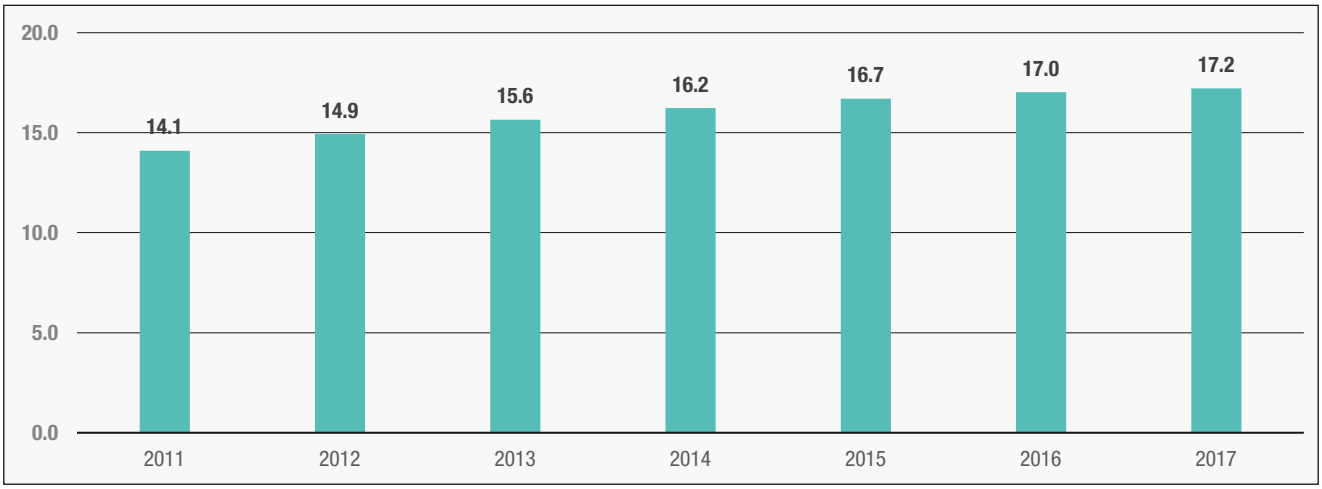
Figure 2.7: Urban population with access to at least basic sanitation services (%)



Data Source: https://washdata.org/data/household#!/table?geo0=country&geo1=SSD

Data reported by JMP indicates that open defecation is still an issue for the urban population of South Sudan. In total, 12.5% of the urban population were still practicing open defecation in 2017, that is defecating in the open such as in fields, forest, bushes, open bodies of water, on beaches, in other open spaces or disposed of with solid waste (WHO & UNICEF, 2017).

Figure 2.8: Urban population using limited service sanitation services (%)



Data Source: https://washdata.org/data/household#!/table?geo0=country&geo1=SSD

2.6 Education

UNESCO data suggest that South Sudan has one of the highest out-of-school rates for primary school age children in the world (62 % in 2019). This means that out of 100 children of official primary school age, 62 did not attend primary or secondary school during the 2019 academic year (UNESCO, 2019).

The gross enrollment ratio[4] for primary education was 85.3 % and 60.4 % for males and females respectively in 2015, while the total rate was 73.0 %. At secondary school level, the gross school enrollment rate was 11.0 % in 2015, with boys having a much higher enrollment than girls (14.2 % vs. 7.7 %) (UNESCO, 2019). In Jubek state which contains Juba, the percentage of secondary school students that dropped out of school out of the total enrolment was 5.5 % in 2018 (National Education Statistics Booklet, 2018, Ministry of General Education and Instruction (MoGEI) of the Republic of South Sudan). The Ministry of Education booklet also reports that 2,760 children dropped out of primary school in Jubek in 2018.

A total of 15,537 students were in secondary school in Jubek in 2018 with majority being male (60.8 % vs. 39.2 % of female students). At primary school level, the number of male and female students enrolled in schools in Jubek were almost equal with 41,726 (49.9%) of boys and 41,974 (50.1%) of girls. This indicates a larger gender disparity in favor of boys at secondary school level compared to primary school level (Table 2.1). A similar pattern is observed at university level where only 23 % of the students enrolled are female.

Table 2.1: Number of students in primary school, secondary school and university in Jubek state, 2018

	Primary	Secondary	University
Male	41,726 (49.9%)	9,446 (60.8%)	5,810 (77.0%)
Female	41,974 (50.1%)	6,091 (39.2%)	1,737 (23.0%)
Total	83,700 (100%)	15,537 (100%)	7,547 (100%)

Data Source: National Education Statistics Booklet, 2018, Ministry of General Education and Instruction (MoGEI) of the Republic of South Sudan.

In 2018, youth literacy rate in South Sudan was estimated at 47.9 % (people aged 15-24), which was higher than the adult literacy rate which averaged 35.5 % (for people ages 15 and above). Male adults were more likely to be literate than their female counterparts (40.3% vs. 28.9%). Adult literacy rate is the percentage of people ages 15 and above who can both read and write with understanding a short simple statement about their everyday life (UNESCO, 2019). The adult literacy rate averaged at 32 % in the period 2010 to 2015 which is low considering the average is 67 % across Africa (Africa Development Bank, 2018 African Economic Outlook). Combined with low levels of school enrollment this is likely to influence the employment rate as it undermines the quality of personnel available in the labour market supply.

Children at Kapuri School, Juba, South Sudan © United Nations Photo/ Flickr.

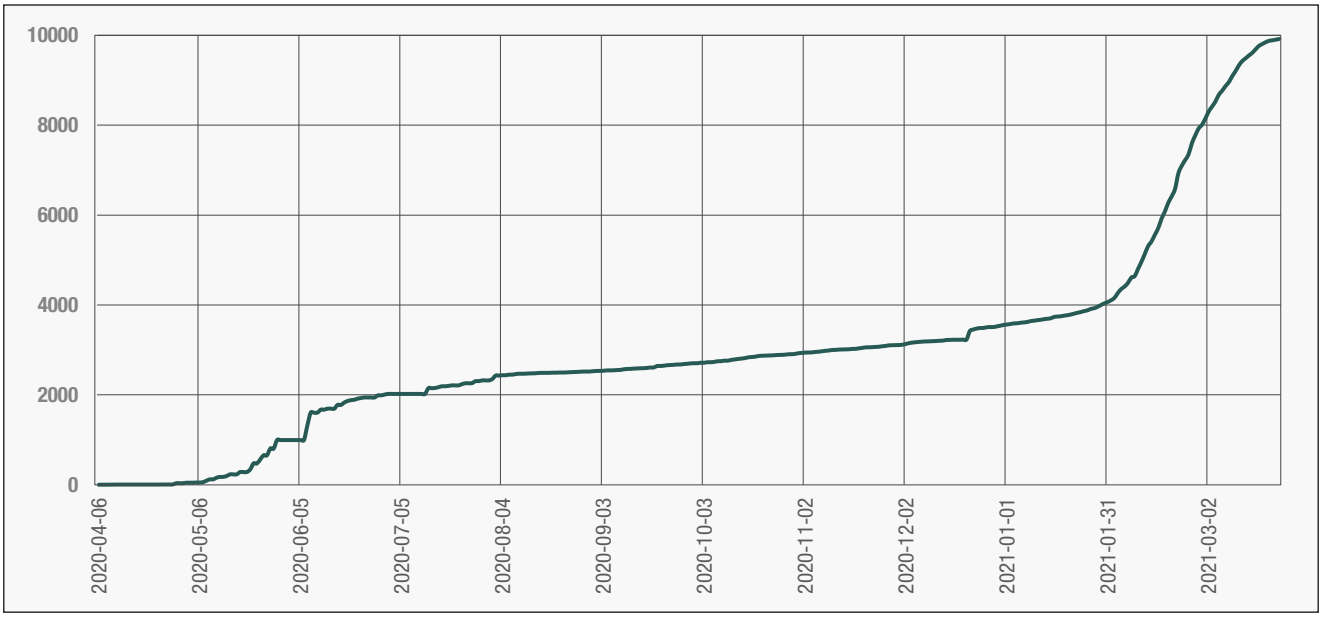
4. Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education considered.

2.7 COVID-19 trends in South Sudan

South Sudan recorded its first COVID-19 case on 6th April 2020. In the first one month, only 49 cases had been recorded, which increased to 994 infections by the end of the third month. Unlike other countries where cases were doubling every few days, the situation in South Sudan has been different, with only 9,919 cases confirmed and 106 COVID-19 related deaths recorded as of 23rd March 2021 (Figure 2.9). This translates to a prevalence of only about 88 infections per 100,000 population.

Some of the containment measures imposed by the Government of South Sudan to reduce risks and the virus spread included temporary closure of learning and religious institutions, ban on gatherings, sports events, guidelines on physical distancing, closure of borders, night curfews and ban on inter-state movements, as well as mandatory quarantine for inbound travelers.

Figure 2.9: COVID-19 trends in South Sudan



Data Source: https://data.humdata.org/search?groups=ssd&q=&ext_page_size=25

PART 3 JUBA FACILITIES DISTRIBUTION AND IMPACTS ON QUALITY OF LIFE AND COVID-19 RISKS

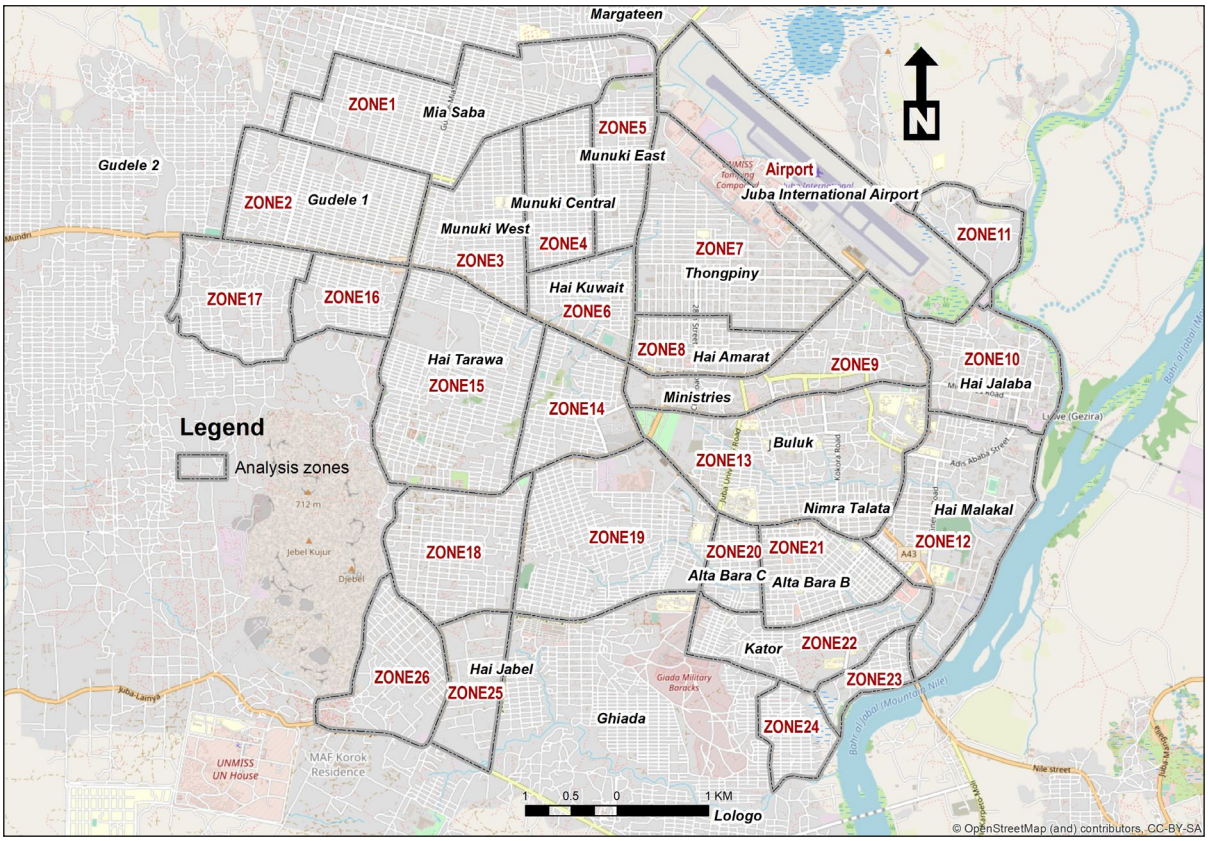
3.1. Introduction

This part presents results from the facilities' mapping component of the survey across 15 main facility types. It describes, for each mapped facility category the distribution of the facilities, their current status and reliability, costs associated with their use as well as the institutions supporting their setup and maintenance. User experiences are also presented for some facilities

3.2. Facilities Mapping Scope and Field Mapping Approach

A major challenge facing the entire survey was unavailability of the official boundary for Juba Municipality, as well as its sub-divisions (Payams and Bomas/quarter councils). This not only made it difficult to properly delineate the survey area, but also impossible to undertake detailed analysis at the official administrative sub-unit level. Despite this, the survey covered the three major Payams of Juba municipality (Munuki, Juba and Kator), under which are 54 quarter councils. To facilitate a detailed spatial analysis – in the absence of an administration map of the city – the survey defined 26 analysis zones about equal in area, except for densely populated areas which have smaller zones. The zoning was largely based on street blocks created using major roads and observable spatial settlement characteristics based on satellite imagery. Among these zones, 10 are high-population density areas and 16 are low-population density areas; as expected, denser areas a very close to the center of the capital (Figure 3.1).

Figure 3.1: Survey analysis zones



Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021
Disclaimer: The boundaries and names shown, and the designations used on this map do not imply official endorsement or acceptance by UN-Habitat.

Using the approach summarized in Figure 1.1 and after about two months of preparatory work (including getting necessary approvals), data was collected throughout the survey area defined in Figure 3.1 between 2nd and 23rd February, 2021. The data collection was implemented by 32 locally recruited data collection volunteers, 4 supervisors and 2 team leaders who were trained over a period of one week on the data - requirements and use of the adopted digital data collection application - KoboCollect[5] (Figure 3.2). The volunteers were grouped into teams of 8 people, and each member was assigned a specific section within the data collection neighborhoods over the data collection period. Each group of 8 volunteers was headed by a field supervisor, and also included a representative from Juba Municipality and a local guide.

UN-Habitat staff in South Sudan Country Office (Juba) and Headquarters (Nairobi) provided overall oversight and quality checks for the survey. Juba Municipality, under the leadership of the municipal executive implemented community sensitization on the survey, as well as overall guidance, insights and navigation support during the data collection. The UNDP office in Juba provided logistical support during the data collection phase.

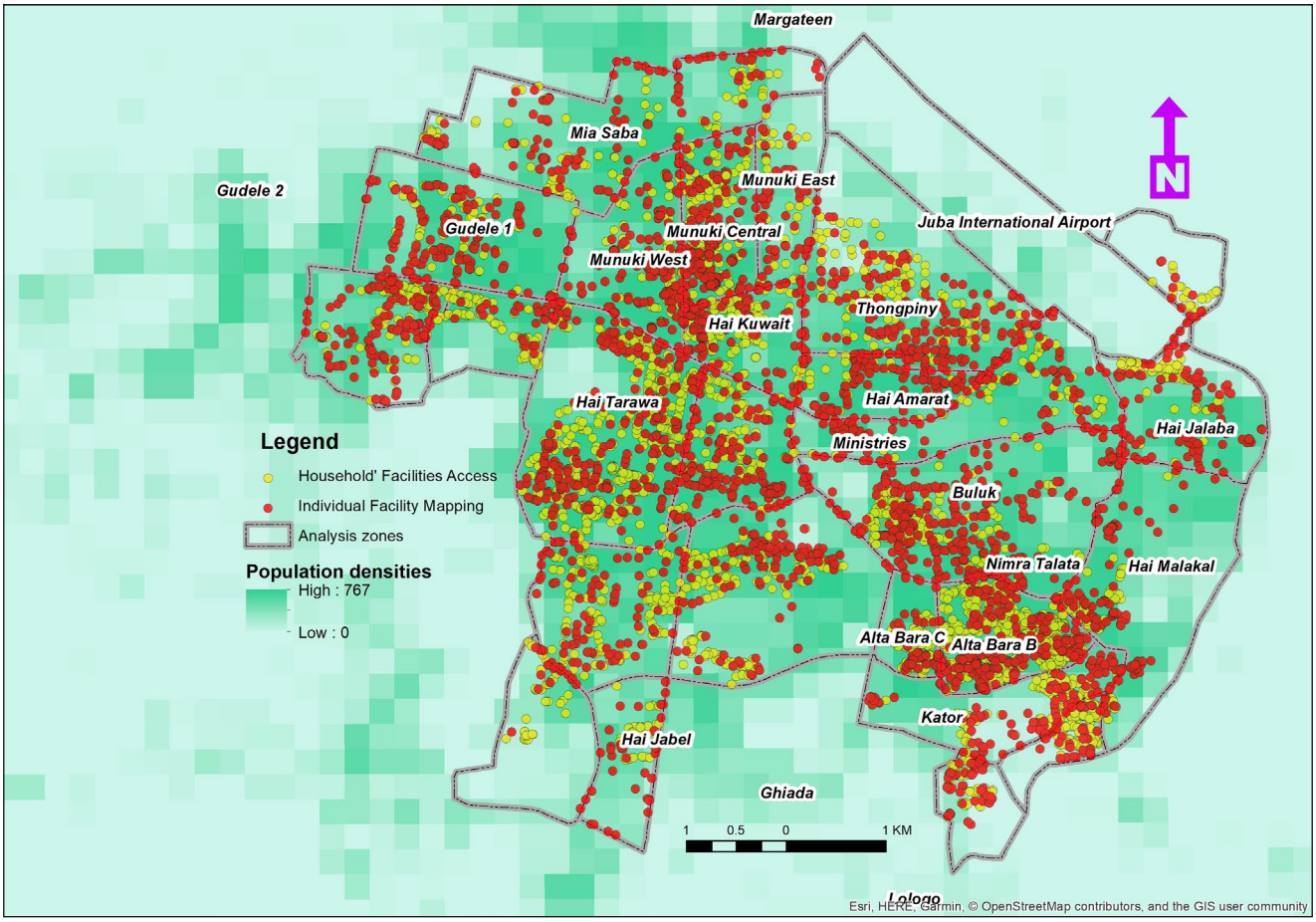
Figure 3.2: Data collection teams during one of the training sessions, Juba.

A total of 8,006 data points were mapped, which constituted 3,360 individual facilities (basic service and infrastructure service points) and 4,646 facilities' users. The facilities data represented facilities in 17 categories: water points, communal sanitation facilities, handwashing facilities, health facilities, public open spaces, education facilities, social/community halls, markets, transport stops, waste collection areas, local organization/NGO offices, pharmacies/chemists, religious facilities, local administrative offices, police stations/posts, security lights, and garages.

Figure 3.3 is an overlay of the mapped data points[6] with modelled-disaggregated population data , indicating more data points in areas with higher predicted population densities such as Munuki, Hai Amarat and Alta Bara.

5. https://www.kobotoolbox.org/
6. https://ghsl.jrc.ec.europa.eu/ghs_pop.php

Figure 3.3: Mapped data points (facilities and facilities users) versus population distribution



Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021
Disclaimer: The boundaries and names shown, and the designations used on this map do not imply official endorsement or acceptance by UN-Habitat.

3.3. Survey Findings

This section presents the findings from the survey. The section is organized into five thematic sub-sections, based on the role of each mapped facility in the urban area. The sub-sections and facilities under each are presented below:

- Basic settlement infrastructure – which includes water points, sanitation facilities, handwashing facilities, health facilities, and education facilities;
- Quality of life[7] – which includes public open spaces, and solid waste management facilities;
- Social infrastructure – which includes community/social halls, and religious facilities;
- Transport infrastructure – which includes public transport stops; and
- Governance and urban safety – which includes local administration offices, police stations/posts, local organizations, and security lighting.

7. Quality of life is multi-dimensional, and this survey only investigated only two components of it.

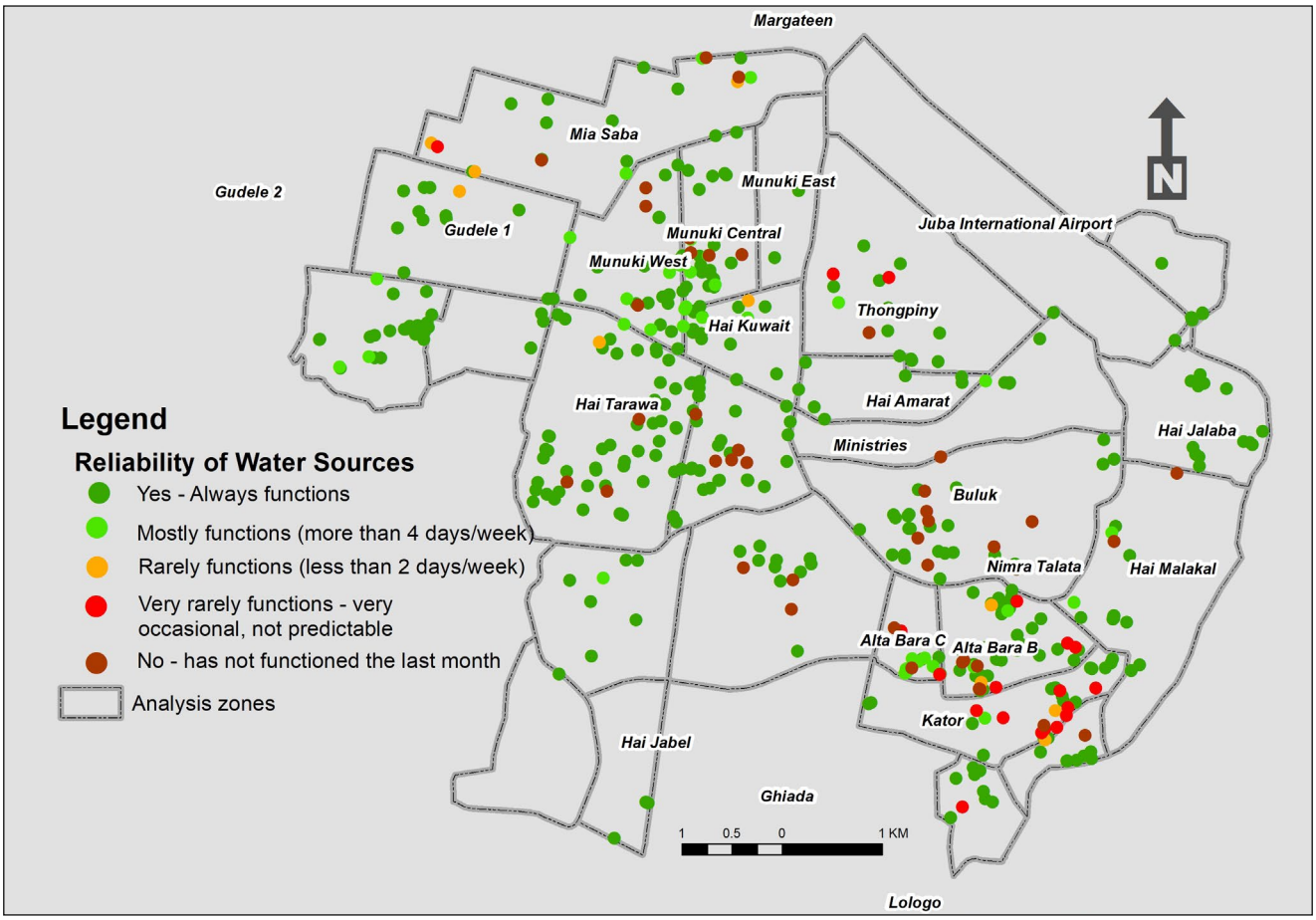
3.3.1. Basic Settlement Infrastructure

State of Water Supply

A total of 455 water points were mapped during the data collection phase, which included 151 community wells/boreholes or hand pumps, 85 municipal water public water points, 59 water kiosks, 55 water filling stations, 42 stationed water bowsers, 14 private boreholes/hand pumps, and 6 stagnant pools.

Notable clusters of unreliable water points were identified at Munuki central (mostly associated with unpredictable municipal water supply), East of Hai Tarawa and Buluk (associated with dysfunctional hand pumps) and Alta Bara B (associated with a mix of dysfunctional hand pumps and unpredictable municipal water supply (Figure 3.4).

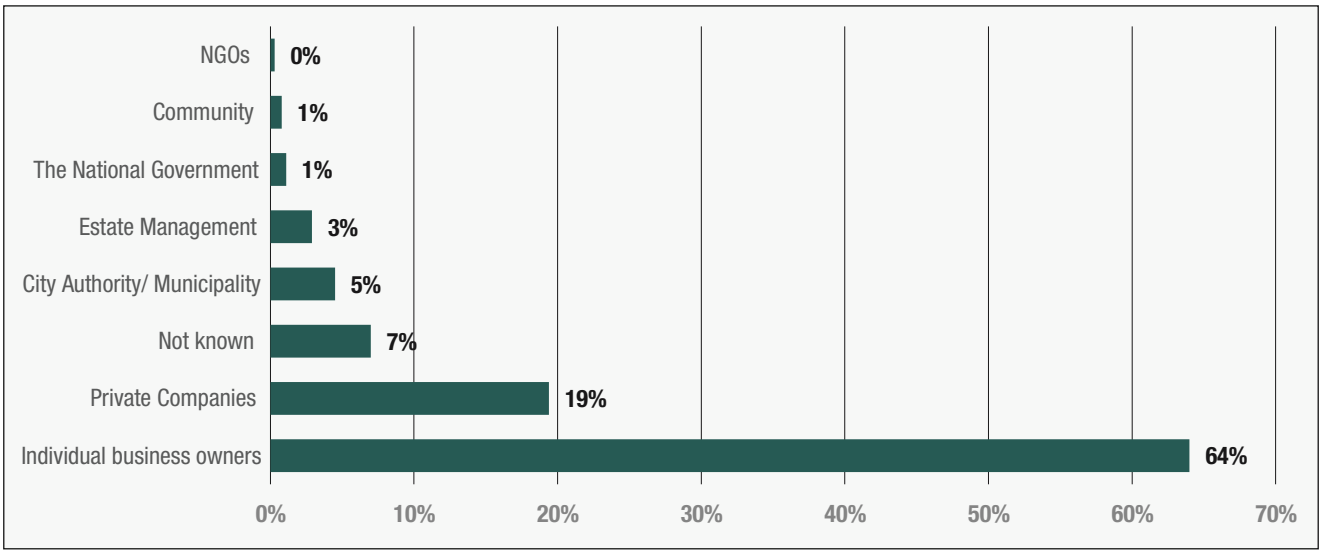
Figure 3.4: Reliability of water points



Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021
Disclaimer: The boundaries and names shown, and the designations used on this map do not imply official endorsement or acceptance by UN-Habitat.

Of the mapped facilities, 83% of water service providers are either individual business owners or private companies (Figure 3.5).

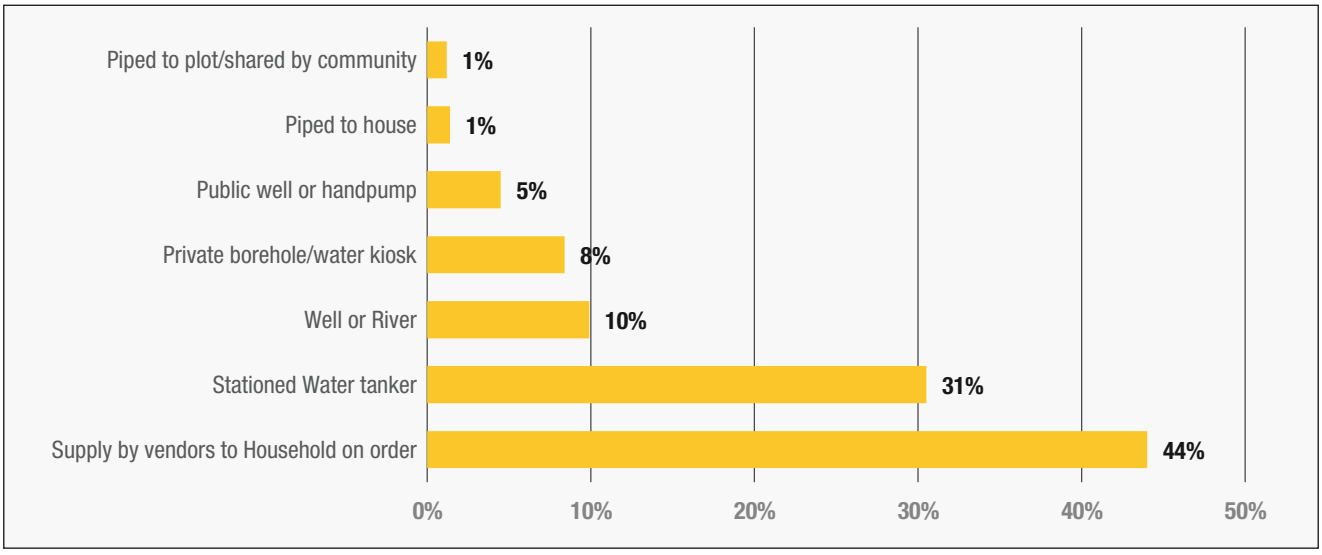
Figure 3.5: Water service providers in Juba



Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021

From facility users' interviews, the survey established that three quarters of the city residents' access water for household use either from stationed water tankers or vendors who supply on order[8]; while only 2% of the respondents had access to piped water either within house or plot (Figure 3.6). Piped water, which is associated with convenience in water supply and access is only accessible to a very small minority. Existing data shows that 13% of Juba residents are connected to municipal piped water supply[9], which in analysis implies that even the households connected to piped water also depend on alternative water sources.

Figure 3.6. Sources of household water

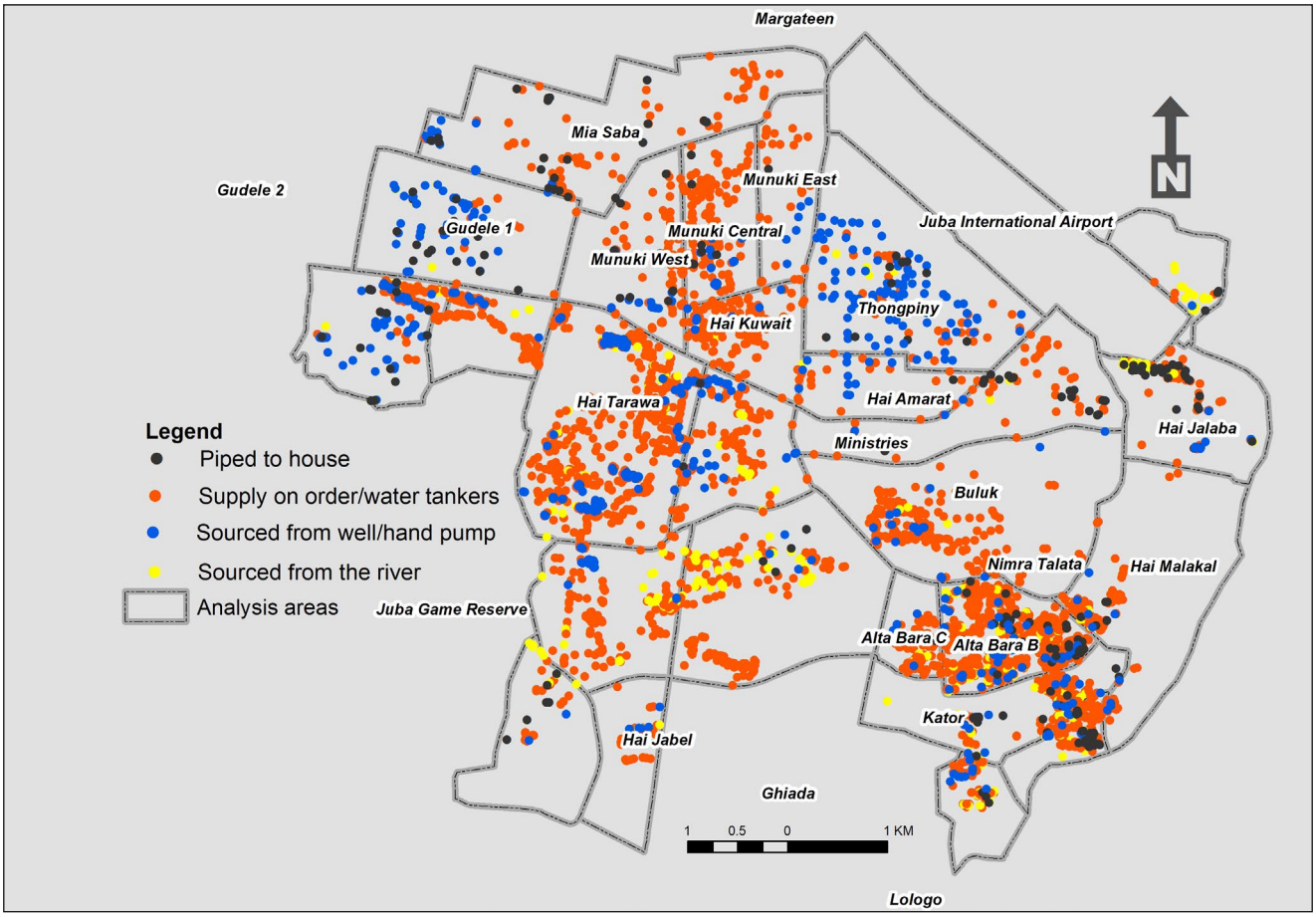


Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021

8. Note that facilities' mapping survey could not capture all water tanker facilities because they are mobile facilities.
9. https://reliefweb.int/report/south-sudan/less-60-south-sudanese-access-clean-water

Spatial analysis of this data established that there are higher densities of hand pumps and wells at Thongpiny and Gudele 1 areas, while piped water is mostly available in Hai Jalaba, parts of Gudele 1, Mia Saba and Alta Bara areas (Figure 3.7).

Figure 3.7: Nature of water access by locations



Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021
Disclaimer: The boundaries and names shown, and the designations used on this map do not imply official endorsement or acceptance by UN-Habitat.

The city's water consumption ranges from 20 liters to about 300 liters per household per day, averaging at about 200 liters/household/day. With family sizes averaging at 6.5[10], this implies water consumption at an average rate of 30 l/c/d (liters per capita per day). Analysis on cost of water services revealed that water from all sources except 3 (public hand pumps, wells and rivers) is acquired at a cost (averaging at 500 South Sudan Pound (SSP)(USD. 3.8) for the 250 liters drum or SSP. 50/USD. 0.4 for the 20 liters' container). Very often, despite water from hand pumps, wells and rivers being free, it has to be transported from considerable distances to homes – averaging at 500 meters for rivers and 100 meters for wells. Figures 3.8a, b and c captures common conditions and scenes around the city's water supply.

10. The average family sizes were 6.3 based on National Bureau of Statistics (NBS) National Baseline Household Survey (2009), and 6.5 based on the sampled households during survey.

Figure 3.8 a, b and c: A public hand pump, a water tankers and a homestead where water is supplied by a vendor and stored in drums

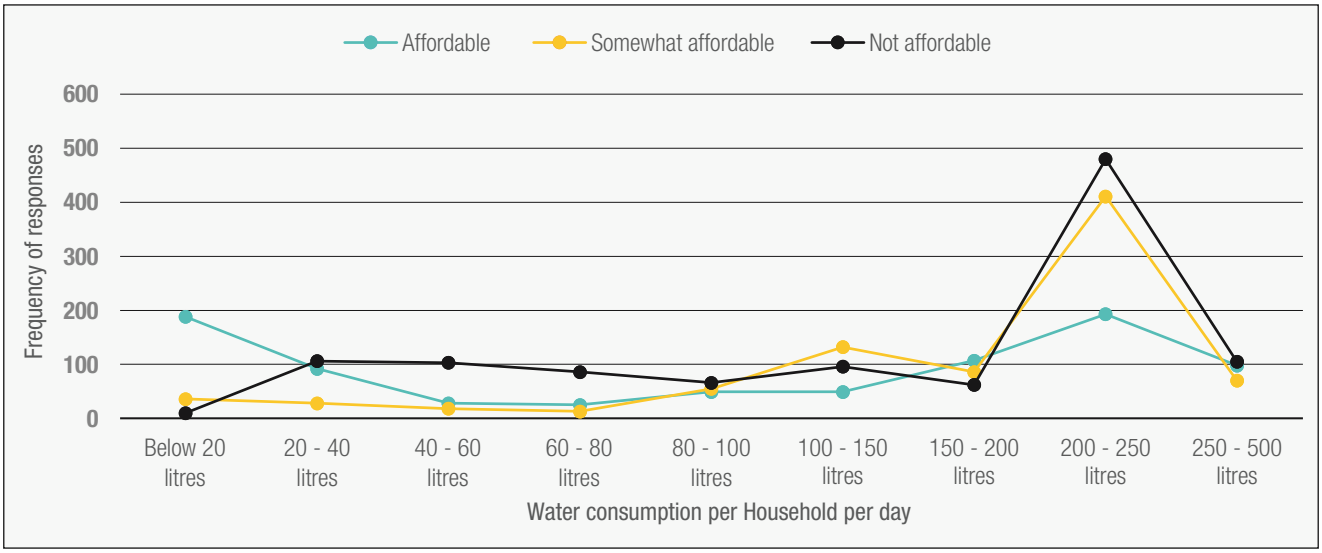
UN-Habitat, 2021 / Field Survey

UN-Habitat, 2021 / Field Survey

UN-Habitat, 2021 / Field Survey

Further analysis on service affordability showed that affordability reduces as household water consumption increases, but only to certain quantities. Consumers of less than 40 liters of water per household per day rated water as affordable, those consuming between 40 – 80 liters rated it as unaffordable, while households consuming more than 100 liters per day rated water as 'somewhat affordable'. This could imply that households consuming above 100 liters have better financial means to meet their needs than those consuming less (Figure 3.9).

Figure 3.9: Rating of water affordability for residents based on daily household water consumption

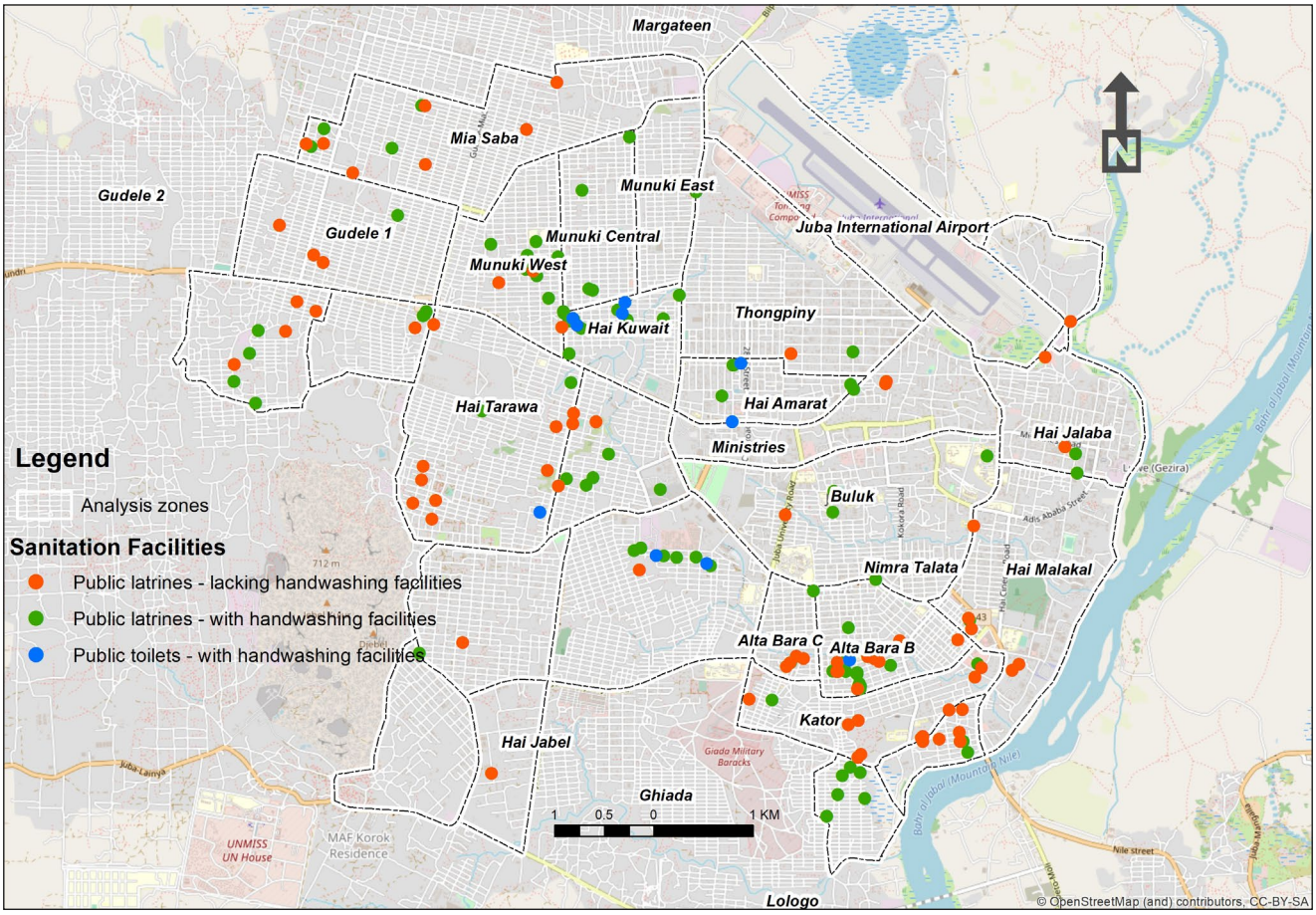


Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021

State of Sanitation

A total of 156 communal sanitation facilities were mapped during the data collection phase, which included 8 flush toilets, 114 toilets, 30 shared bathrooms, and 4 facilities with both toilets and bathrooms. The survey established that 38% of all sanitation facilities do not have handwashing facilities, and of those with handwashing facilities, a third of them (31%) do not have soap, water or both throughout the day. Most affected zones include Alta B and C, Hai Tarawa and Gudele1 (Figure 3.10). Key informant interviews further established that the city does not have a citywide sewerage system, and toilets are connected to septic tanks.

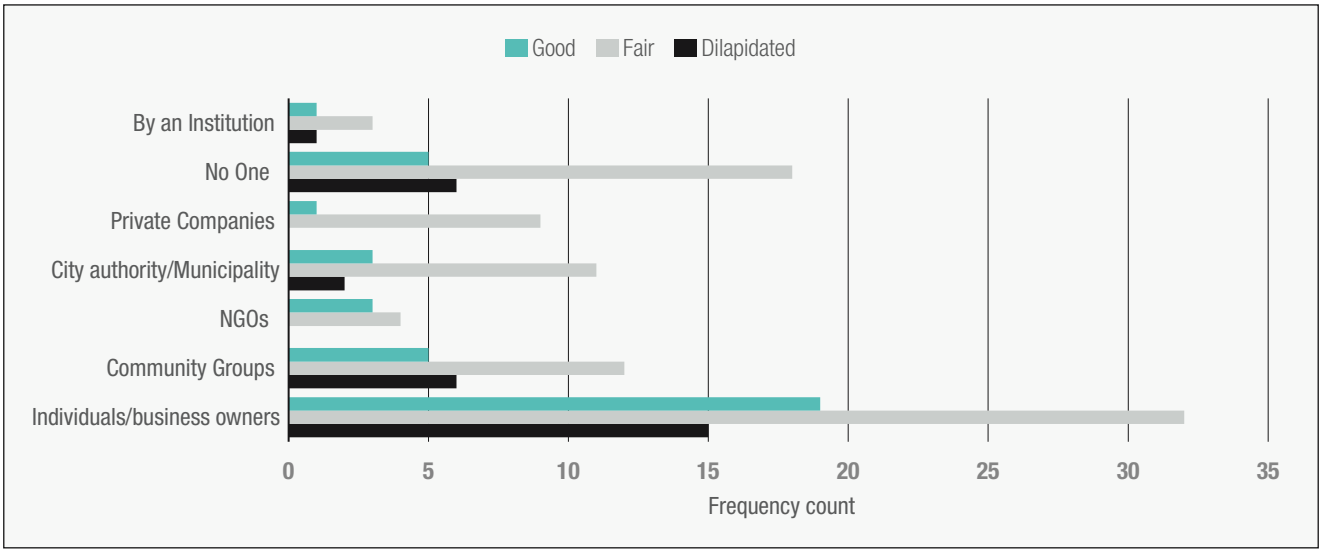
Figure 3.10: Locations of mapped sanitation facilities



Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021
Disclaimer: The boundaries and names shown, and the designations used on this map do not imply official endorsement or acceptance by UN-Habitat.

Sanitation facility users from the facilities survey opined that majority of the facilities are in fair conditions (57%), 25% being in good condition, and 18% in dilapidated condition. It further was established that majority of sanitation facilities in good conditions are managed by individuals and private business owners (Figure 3.11).

Figure 3.11: Management of sanitation facilities



Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021

Figure 3.12 a-c: A latrine facility with a handwashing station, a latrine slab and a squat toilet

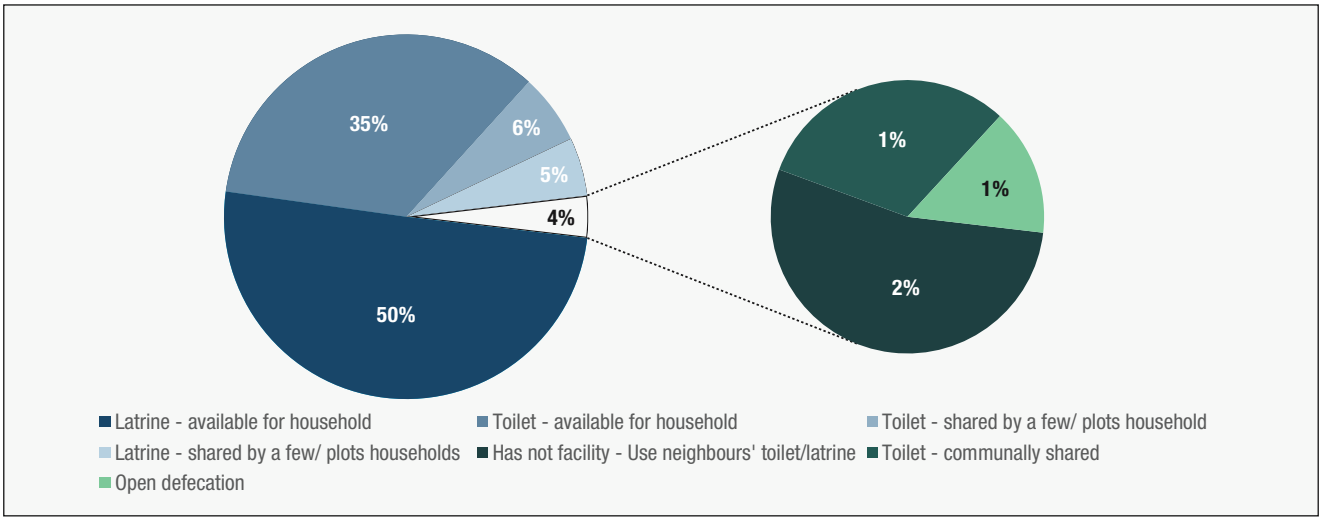
UN-Habitat, 2021 / Field Survey

UN-Habitat, 2021 / Field Survey

UN-Habitat, 2021 / Field Survey

The survey data shows that 50% of the household respondents use latrines available at the household level, while 35% uses toilets, also available at the household level (Figure 3.13 and 3.12 a-c). With Latrines in urban areas having been found by studies to be lacking in sustaining hygiene standards, this is particularly concerning during the COVID-19 period. Further, there were concerning cases of respondents who rely either on their neighbors' toilets or on open defecation.

Figure 3.13: Sanitation facilities used



Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021

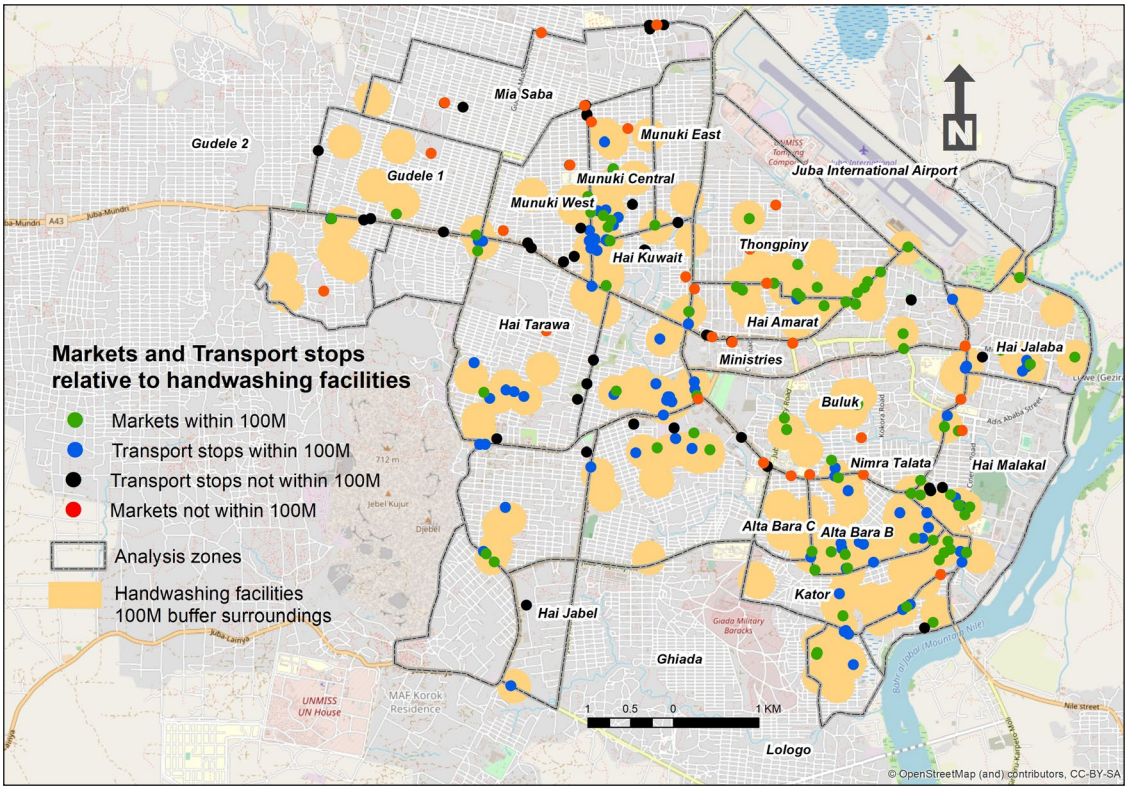
An estimated 14% of the household respondents use sanitation facilities shared by more than one family, and even though only 8% of this proportion pay to access toilet facilities (at costs of SSP. 50 – 100 per day), majority of them walk 50 – 100 meters to access the facilities, which could encourage open defecation during the night.

State of Sanitation

A total of 229 handwashing facilities were mapped during the survey. Analysis of this data reveals major variations in provision of the services across zones, in which there are generally more handwashing facilities within commercial areas of the city – which is expected and desirable. Locations where markets and transport stops are better covered by handwashing facilities include Munuki Central, Thongpiny and Alta Bara.

Gaps identification through spatial mapping revealed that there are clusters of transport stops that need to be equipped with handwashing facilities; they include along Gudele Road (between Gudele 1 Market and St. Kizito Catholic Church), along Malakia Road (between Garang's Memorial Park and the University of Juba), along Airport Road (between Charter Bank and Bombo Supermarket), and a few areas around Mia Saba and Hai Tarawa blocks (Figure 3.14). Facilities that mostly lack soap and water are clustered around the central part of Gudele 1, Western and Central Munuki, and Alta Bara B and C (Figure 3.15).

Figure 3.14 and 3.15 Locations of handwashing facilities relative to markets and transport stops; and reliability of handwashing facilities



Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021
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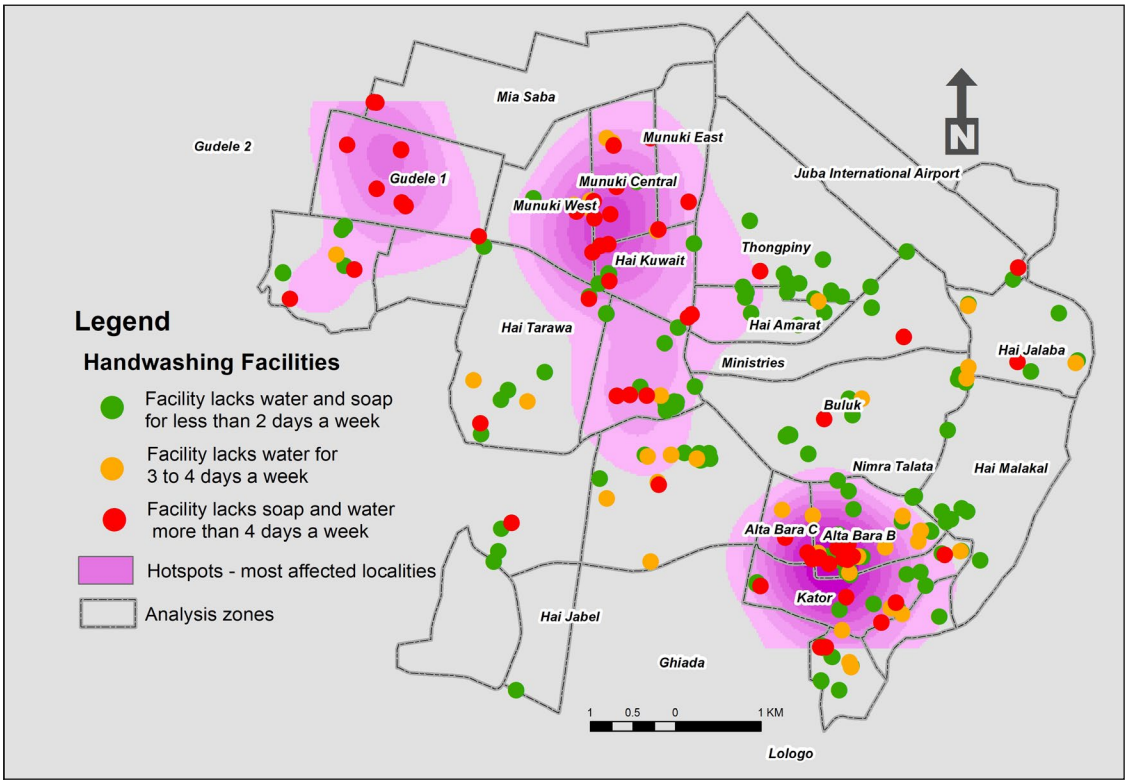
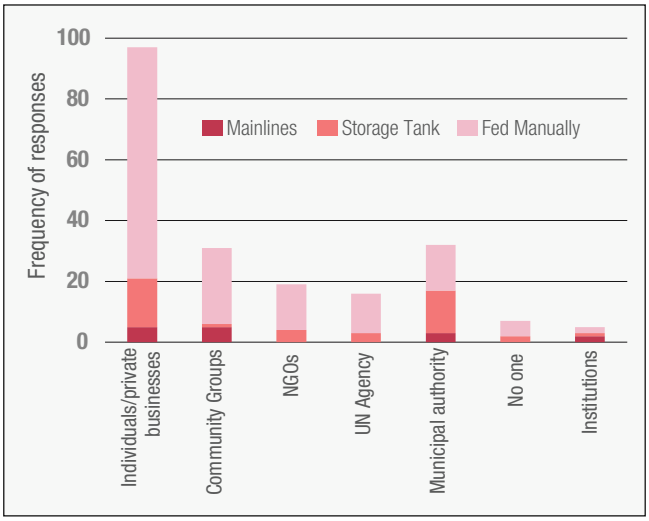


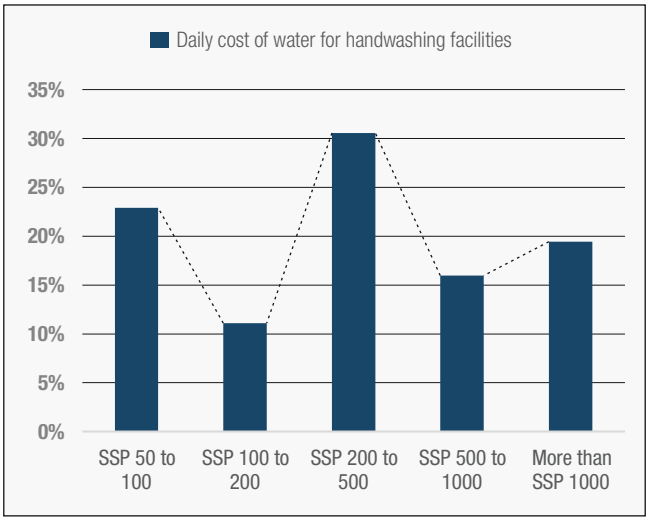
Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021
Disclaimer: The boundaries and names shown, and the designations used on this map do not imply official endorsement or acceptance by UN-Habitat.

The survey further identified that almost half of all handwashing facilities were managed by individuals and private businesses (47%), followed by the municipal authority (15%) and community groups (14%) (Figure 3.16).

Majority of the hand washing facilities are manually fed (72%), while more than three quarters (79%) of all facilities, small and big capacity, use purchased water – with costs averaging between SSP. 200/USD. 1.5 and 500/USD. 3.8 per day (Figure 3.17 and Figure 3.18 a and b). The significant cost of water, combined with the need for regular labor to manually feed handwashing facilities with water and the central role of the private sector (who often operate with profit motive) impact negatively on the facilities' sustainability, a plausible explanation on the declining number of new facilities over time.

Figure 3.16 and 3.17: Management of handwashing facilities; and average costs of water for handwashing by facilities





Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021

Figures 3.18 a and b: A handwashing station requiring drainage intervention and a small station being used by a child; both stations are not connected to water mains (are fed manually or through tankers)

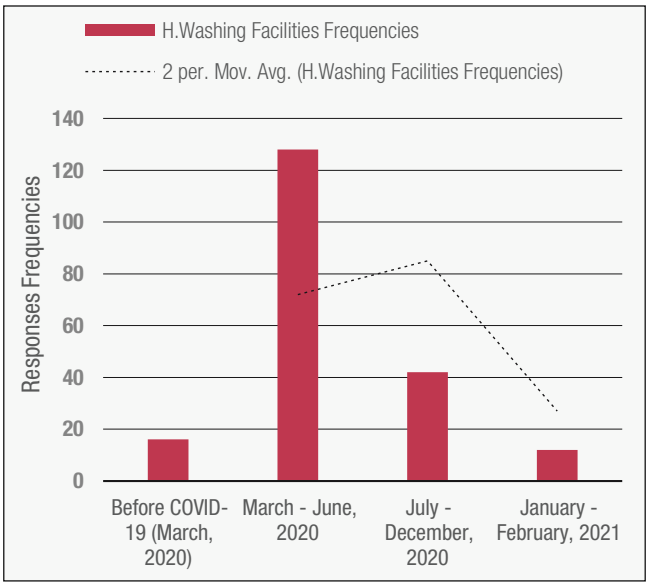
UN-Habitat, 2021 / Field Survey

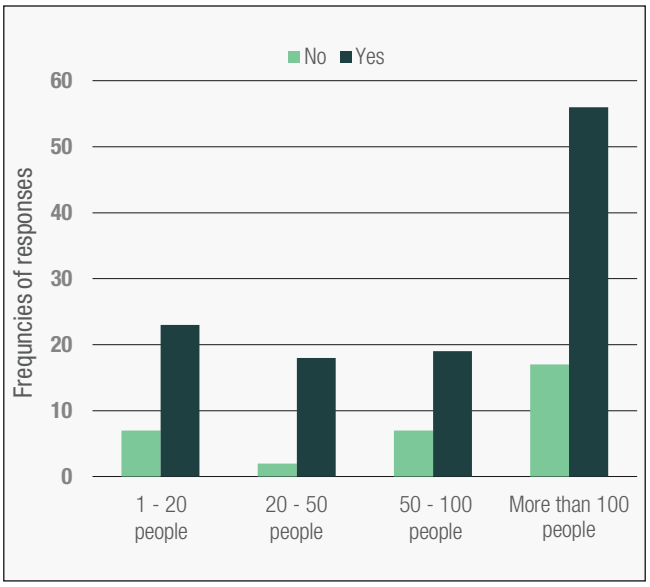
UN-Habitat, 2021 / Field Survey

Outside their homes, only about a half of the respondents (53%) reported to have access to handwashing facilities, which points to a huge deficit in the provision and access to handwashing facilities. On the other hand, the pace of setting up new handwashing facilities peaked in the first three months after the first case of Covid-19 was reported in the country and has since been on a steady decline (Figure 3.19).

Among residents that reported to have access to handwashing facilities, only 57% and 48% reported having access to facilities constantly equipped with water and soap respectively (Figure 3.20). From data layers overlay analysis, it is established that only a quarter of the city residents have adequate access to handwashing facilities equipped with soap and water while outside their homes.

Figure 3.19 and 3.20: Trends in setting up handwashing facilities, and availability of soap and water to handwashing facilities



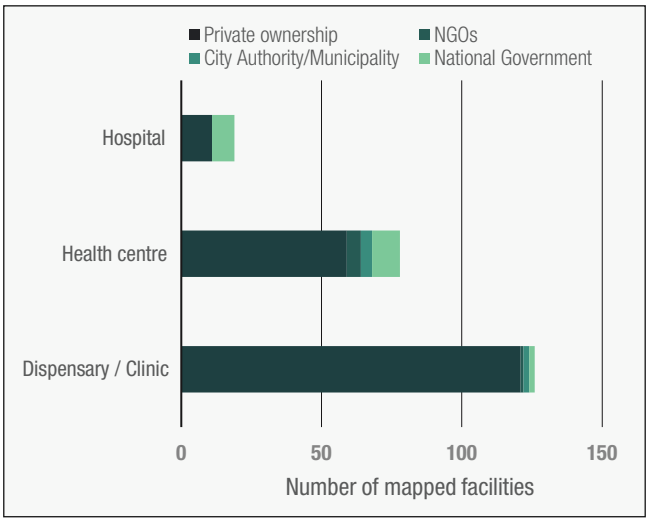


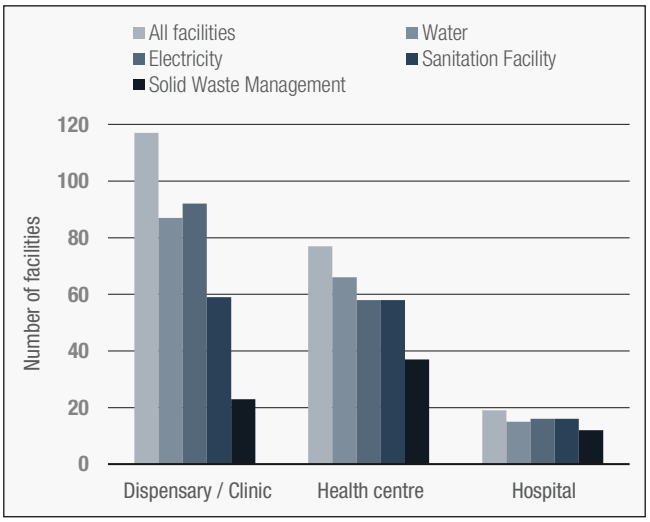
Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021

Access and State of Health Facilities

A total of 213 health facilities were mapped in the city, 55% being dispensaries, 36% being health centers and 9% being hospitals. Facility densities are high at Thongpiny, Mimra Talata and Hai Tarawa (Figure 3.23). Up to 70% of all facilities are under the management of the private sector, with the national government and the municipal authority managing about half of the hospitals and 20% of the health centers (Figure 3.21). More than 70% of hospitals and health centers have water, electricity and sanitation facilities. On the other hand, dispensaries have wider gaps in access to services with 40% of them lacking sanitation and solid waste management facilities, and 20% lacking connection to water and electricity (Figure 3.22).

Figure 3.21 and 3.22: Management of health facilities, and their access to services

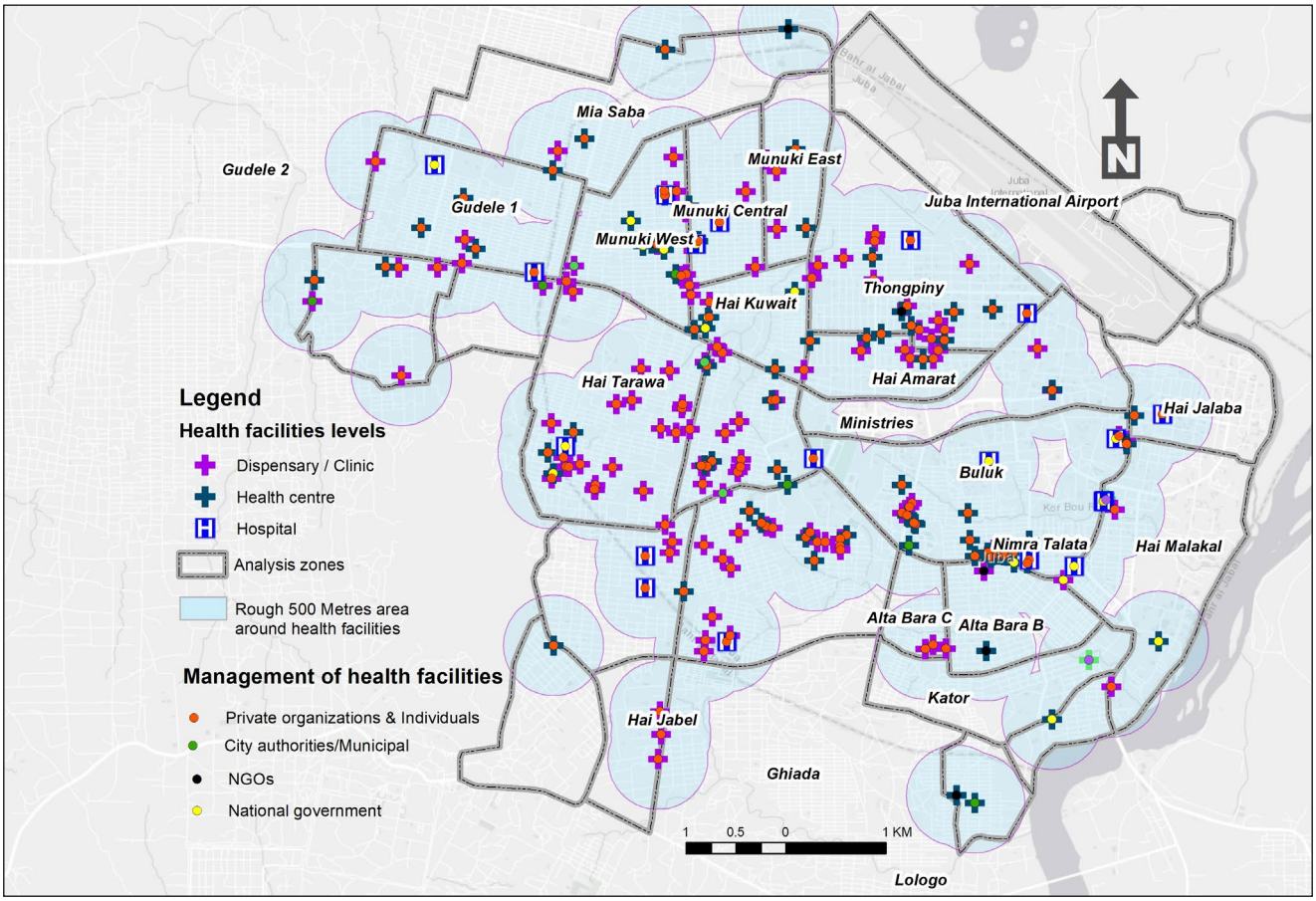




Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021

Appraising facilities by observation during data collection, the data team found 90% of hospitals, 70% of health centers, and 55% of dispensaries in good condition. The remaining 10% of the hospitals and 30% of health centers were in fair conditions, while 43% and 2% of the dispensaries were in fair and poor conditions respectively.

Figure 3.23: Location and proximity analysis map for health facilities, and their conditions



Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021. Disclaimer: The boundaries and names shown, and the designations used on this map do not imply official endorsement or acceptance by UN-Habitat.

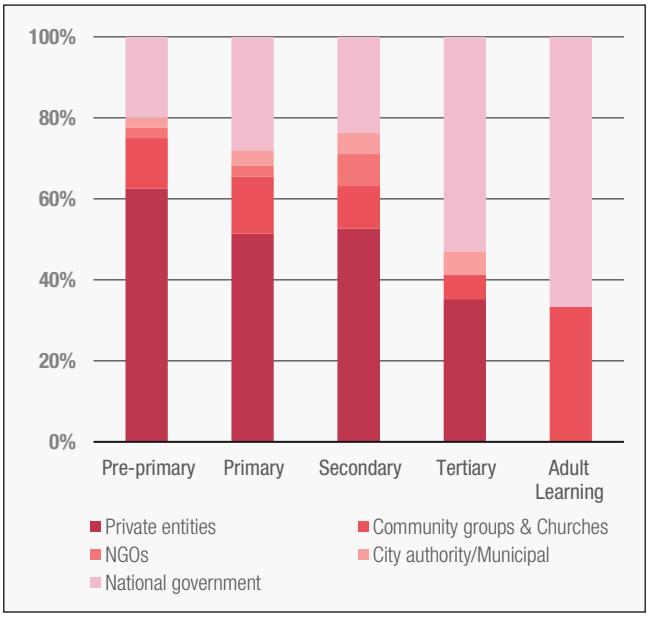
Analysis of the distances to the facilities shows that almost everyone in the analysis area can access a health facility within 500 meters from their homes (Figure 3.23); beyond access to facilities, this survey recommends additional research into access to services in health facilities, including the aspects of convenience, affordability, efficiency and level of services.

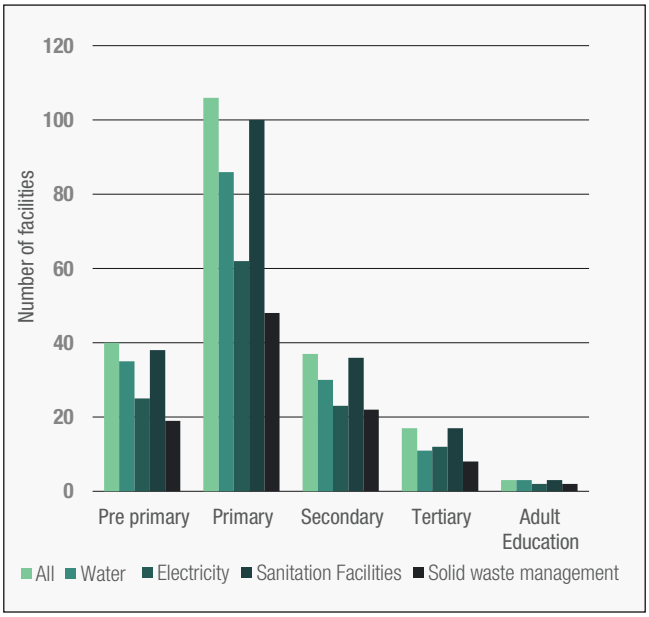
Access and State of Health Facilities

A total of 203 education facilities were mapped during the survey, 83 of which constituted multiple levels of learning, mostly combining pre-primary and primary schooling, and/or primary and secondary schools. By levels of education, 20% of the facilities were pre-primary schools; 52%, primary schools; 18% secondary schools; 8% tertiary institution; and 1%, adult learning institutions. Moreover, more than a half of all education institutions at the levels of pre-primary, primary and secondary are privately managed (Figure 3.24).

Further, it is noted that about 20% of all education facilities did not have access to water at the time the survey was carried out (schools were open during the survey period). The gaps on access to sanitation facilities are smaller but are wider for solid waste management facilities (Figure 3.25). This is concerning noting that water and waste management are vital in sustaining desired hygiene levels, particularly in response to COVID-19.

Figure 3.24 and 3.25: Access to services by education facilities, and management of facilities



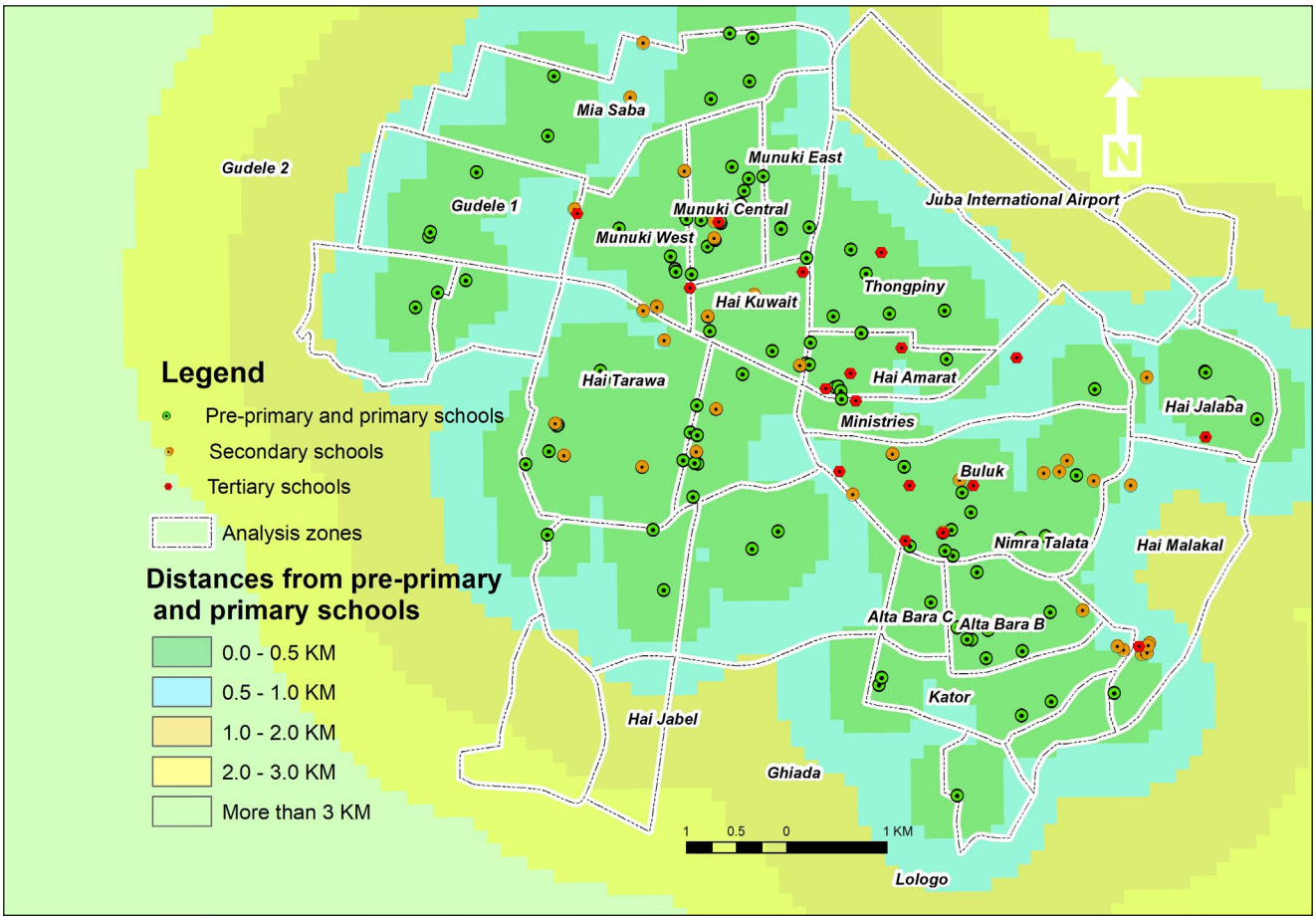


Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021

Analysis on distances from settlements' locations to pre-primary and primary schools using gridded population data (GHSL) established that at least 20% of the city population live more than 1 km from a primary and pre-primary education facility – which could translate into a similar proportion of pupils (Figure 3.26).

While the survey could point to locations that require additional facilities to overcome the distance barrier (Hai Malakal, Hai Jabel and Gudele), additional studies to identify the capacity of existing facilities is proposed for better informed proposals.

Figure 3.26: Locations of education facilities, and access service areas for pre-primary and primary schools.



Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021
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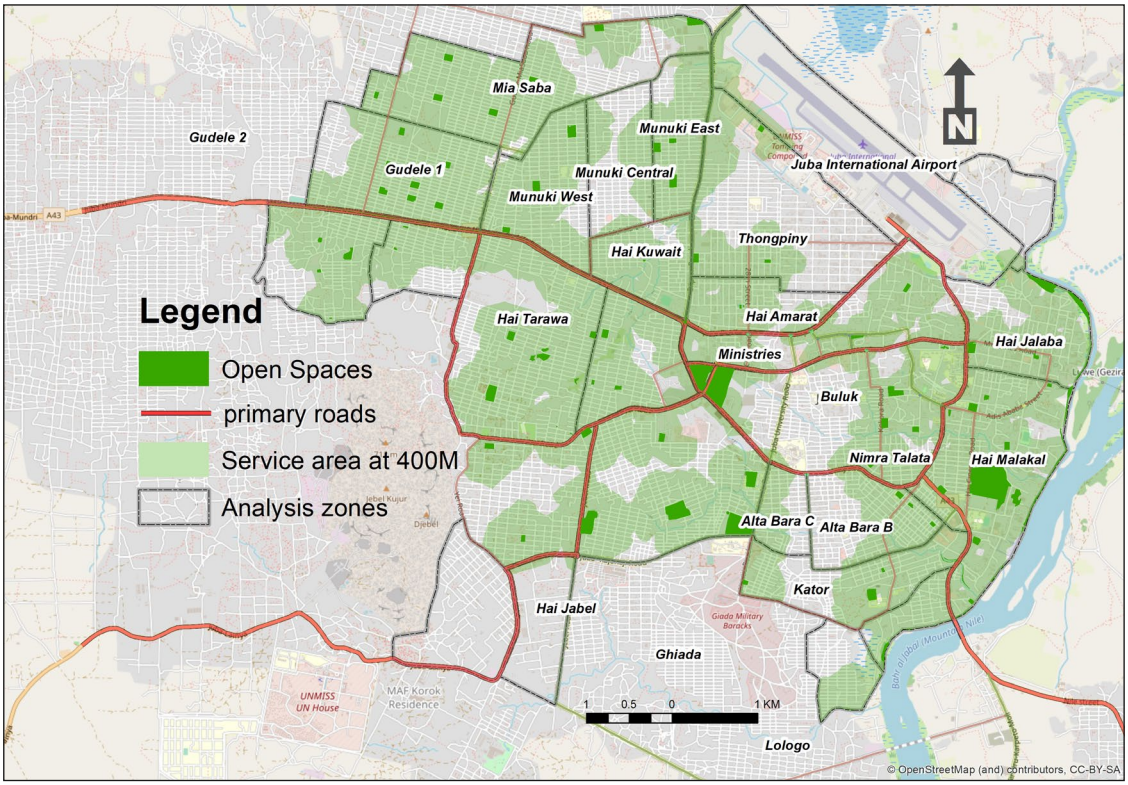
3.3.2. Quality of Life

Access to open spaces

During the study, we mapped out open public spaces both during the field survey and through interpretation of very high-resolution satellite imagery. Based on the data extracted from both sources, open public spaces account for 2.1% of Juba's analysis area, with majority of these being pocket and neighborhood open spaces[11]. The existing spaces are largely open areas accessible to all for sports and recreation but are mostly unmaintained and unequipped with support infrastructure e.g. waste collection bins, benches, fences and barriers and children-play facilities among others (Figure 3.27 and 3.28). The average area of mapped open spaces is 6,800 SqM/1.7 acres (approx.), which is slightly smaller than the size of a standard football field.

In terms of access, approximately 63% of the population within the analysis area can access an open public space within a walking distance of 400 meters (Figure 3.27).[12] Areas with poor access to public open spaces include north east of Thongpiny, Buluk, and Alta Bara B.

Figure 3.27 and 3.28: Spatial analysis of access to open spaces, and a community playfield



Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021.
Disclaimer: The boundaries and names shown, and the designations used on this map do not imply official endorsement or acceptance by UN-Habitat.

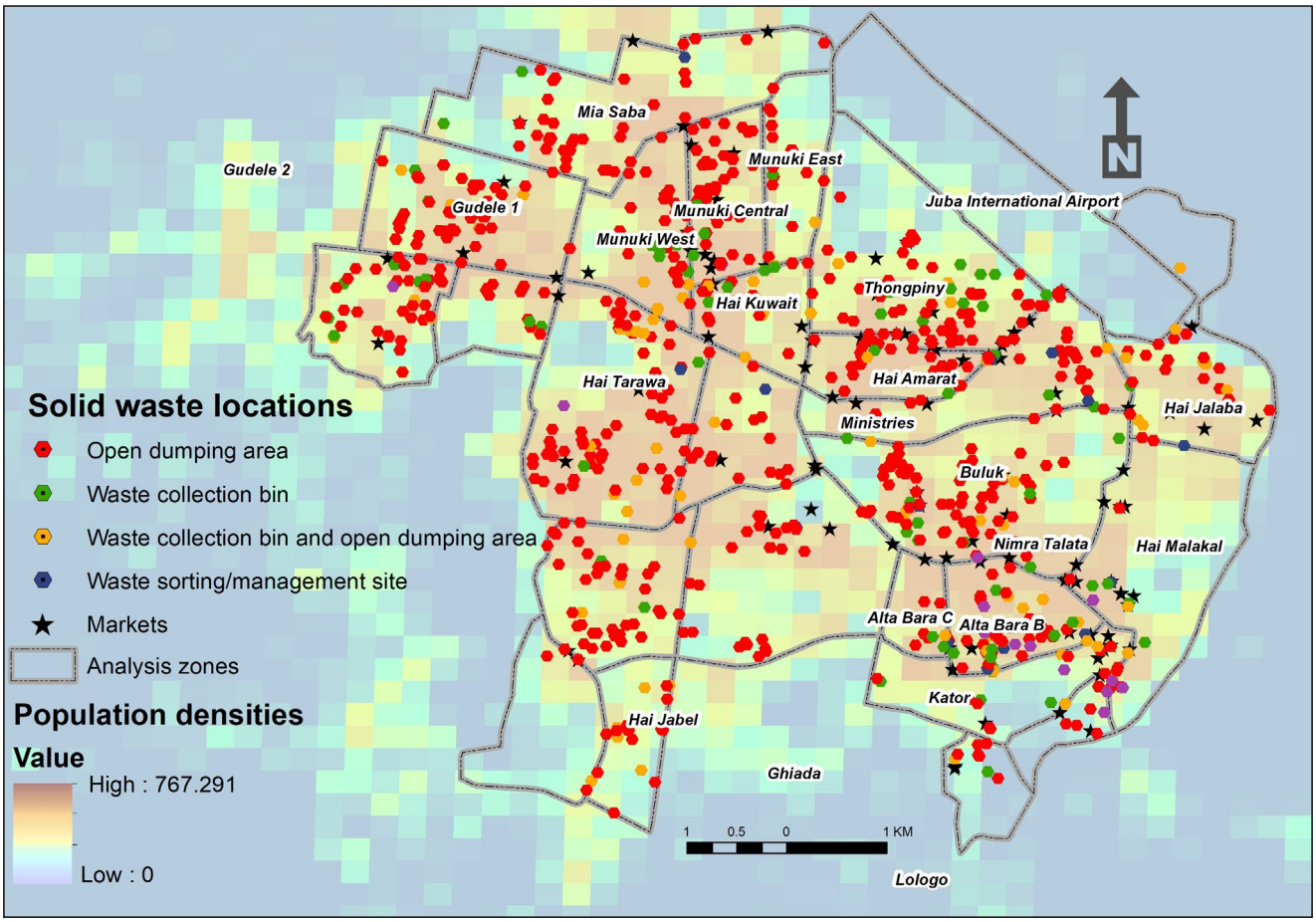
UN-Habitat, 2021 / Field Survey

11. Local or pocket parks refer to recreational spaces usually 0.03-0.04 ha in size and located no more than 400m from the average resident(Refer to UN-Habitat's City-wide Public Space Strategy: link).
12. Computation follows global SDG 11.7.1 methodology (link) and population data is sourced from GHSL

Access to open spaces

Locations with a significant numbers of waste collection bins include Thongpiny and Alta Bara. Mapping shows that locations mostly affected by open waste dumping, such as south of Hai Tarawa and Buluk, have high settlement densities; there is also a strong relationship noted between market locations and open dumping areas (Figure 3.29 and 3.30).

Figure 3.29 and 3.30: Mapped solid waste disposal locations, and waste management approaches



Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021
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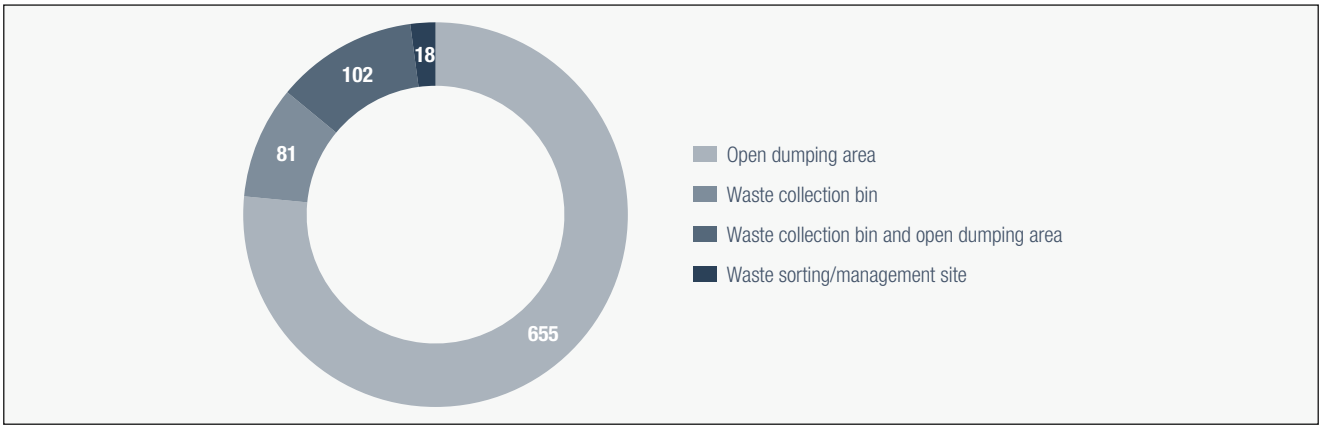
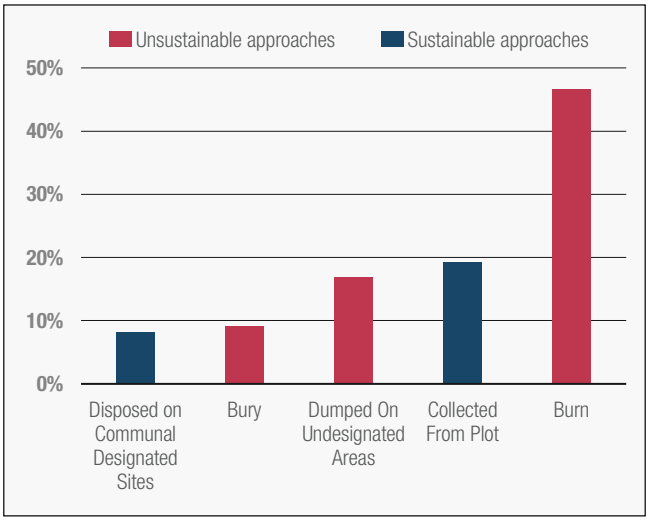
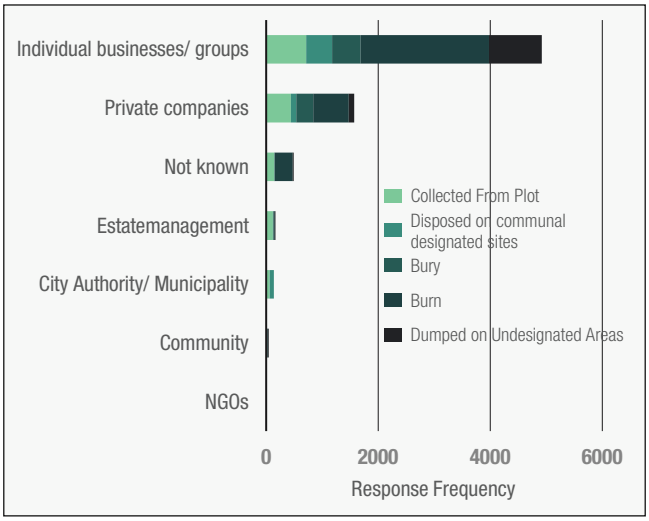


Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021

Data shows that at least three quarters of solid waste generated by the city is managed poorly at source. Unsustainable waste handling approaches such as open dumping and burning are employed by about 60% of respondents (Figure 3.31). Complementary data on facilities mapping shows that 77% of all waste disposal points are open dumps (Figure 3.32 and 3.33 a and b). With almost half of the waste from households being burnt, it can be deduced that 50% the city waste is burnt from open dumps while 25% is collected and managed, and the rest left unmanaged on open sites. While city authorities do not burn or poorly manage the waste they collect, they only manage a small proportion of city waste, leaving over 60% to the private sector, or individuals, majority of whom have poor waste management strategies.

Figure 3.31 and 3.32: Solid waste management approaches and managing authorities





Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021

Only households where solid waste is collected from homes pay for the serving; payments range between SSP. 1,000/USD. 7.7 to 3,000/USD. 23 per month or SSP. 200/USD. 1.5 per sack of waste.

Figure 3.33 a and b: Poorly managed solid waste areas in the city

UN-Habitat, 2021 / Field Survey

UN-Habitat, 2021 / Field Survey

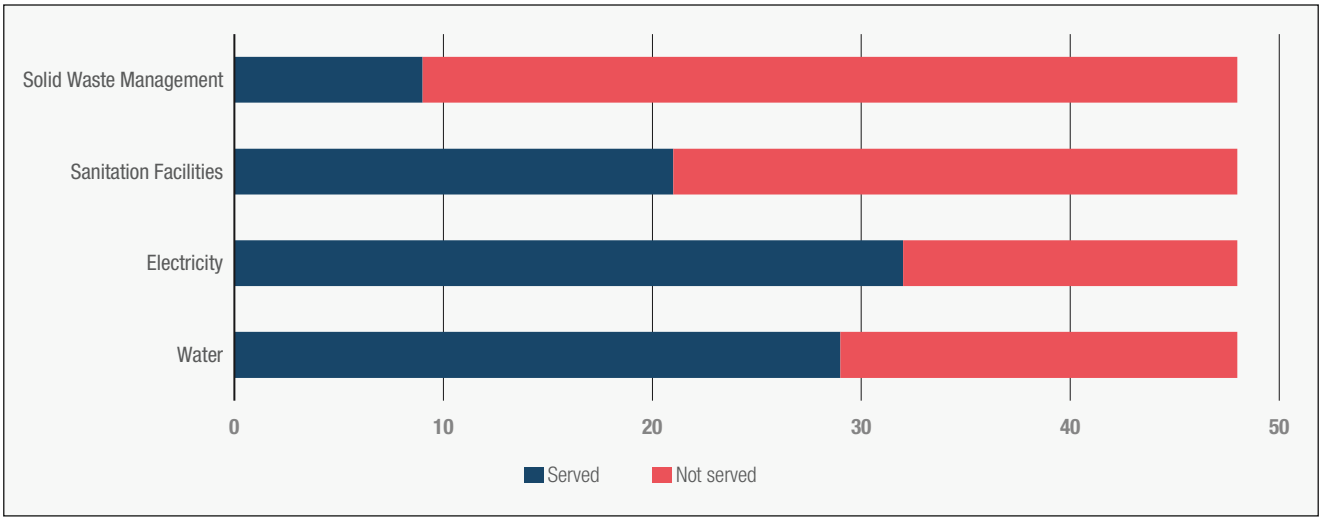
3.3.3. Social Infrastructure

A total of 48 social/community halls were mapped during the survey. 78% of the halls are open for all, while the remaining 22% are reserved for youth and women groups. An assessment of halls' conditions by the data collection team established that most halls are generally in fair conditions, with only 2 of the 48 halls being rated as dilapidated.

Despite the generally fair condition of the halls, more than half do not have both sanitation and solid waste management facilities, about 40% of all the halls lack electricity and 45% do not have water services (Figure 3.34). In terms of management about half of the mapped halls are public entities with 10 (21%) halls being managed by the municipality and 12 (25%) by community groups. For the privately managed halls, 22 (46%) halls are managed by individuals and 4 (8%) by NGOs.

The cost of accessing the halls varies by facility, and ranges between SSP. 100/ USD. 0.8 to SSP. 250/USD. 1.9 per person for group meetings or to access an event.

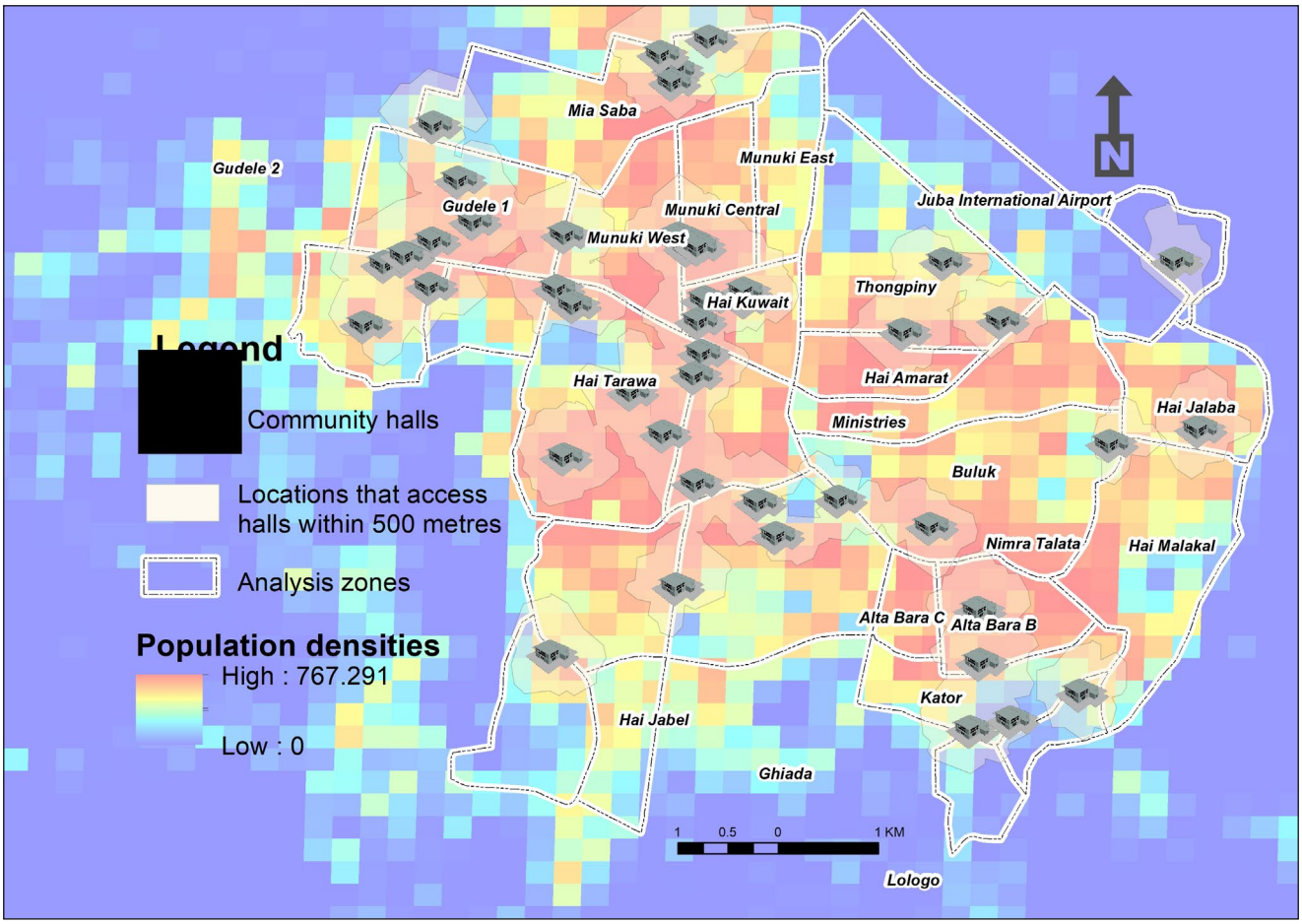
Figure 3.34: Services available in social halls



Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021

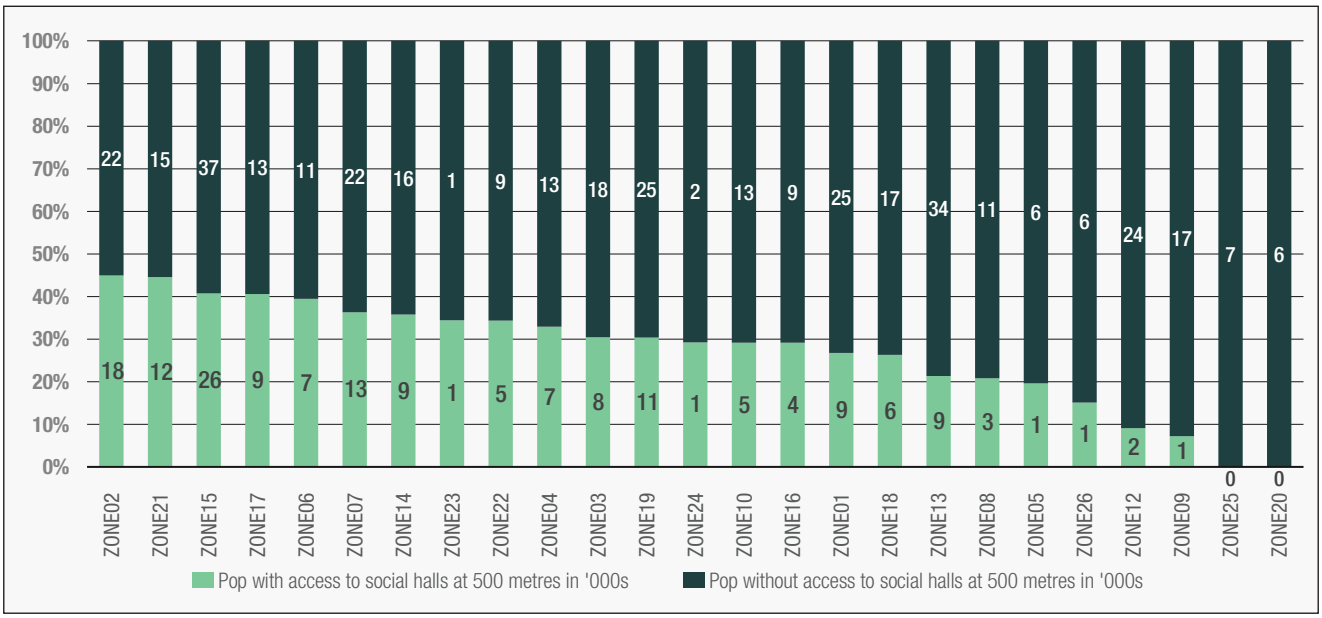
An assessment of spatial inequalities through mapping overlays of gridded population data and service areas at 500 meters from hall locations revealed that while about half of the population within all analysis zones can access a hall facility within 500 meters walking distance along the road network, this proportion is only about 20% in zones 5 (Munuki East), 26 (West of Hai Jabel), 12 (Hai Malakal), 9 (Ministries), 25 (Hai Jabel) and 20 (Alta Bara C). However, looking at actual populations without access to halls, the zones that draw more attention are zones 15 (Hai Tarawa), 13 (Buluk), 19 (West of Alta Bara C) and 1 (Mia Saba), all of which have at least 25,000 persons living outside the 500m walking distance to a social hall (Figure 3.35 and 3.36).

3.35: Social halls locations and service areas at 500 meters



Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021
Disclaimer: The boundaries and names shown, and the designations used on this map do not imply official endorsement or acceptance by UN-Habitat.

Figure 3.36: Access to hall facilities by zones and populations

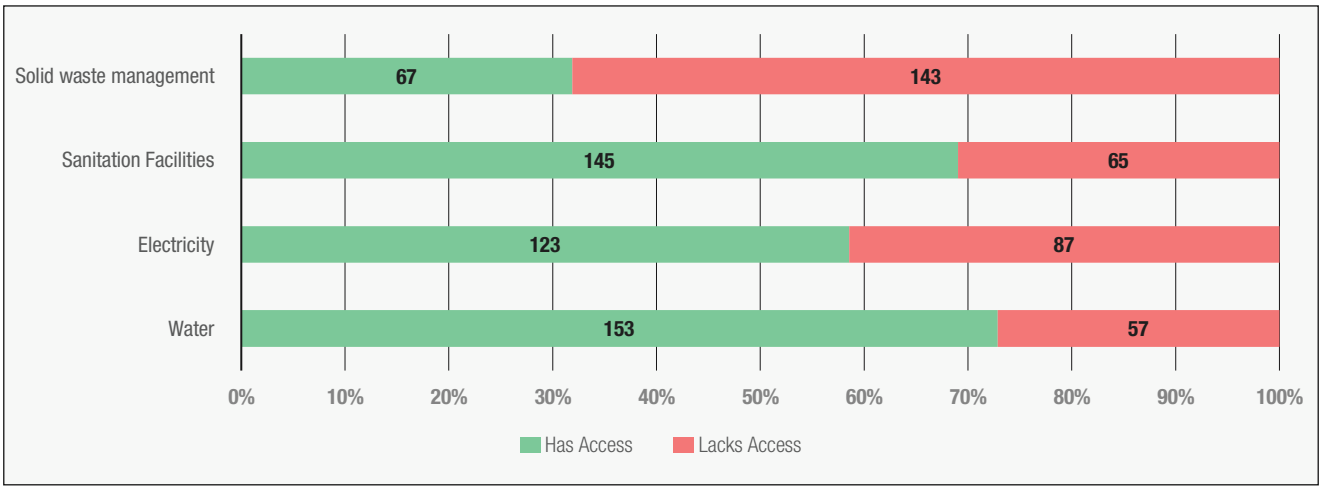


Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021

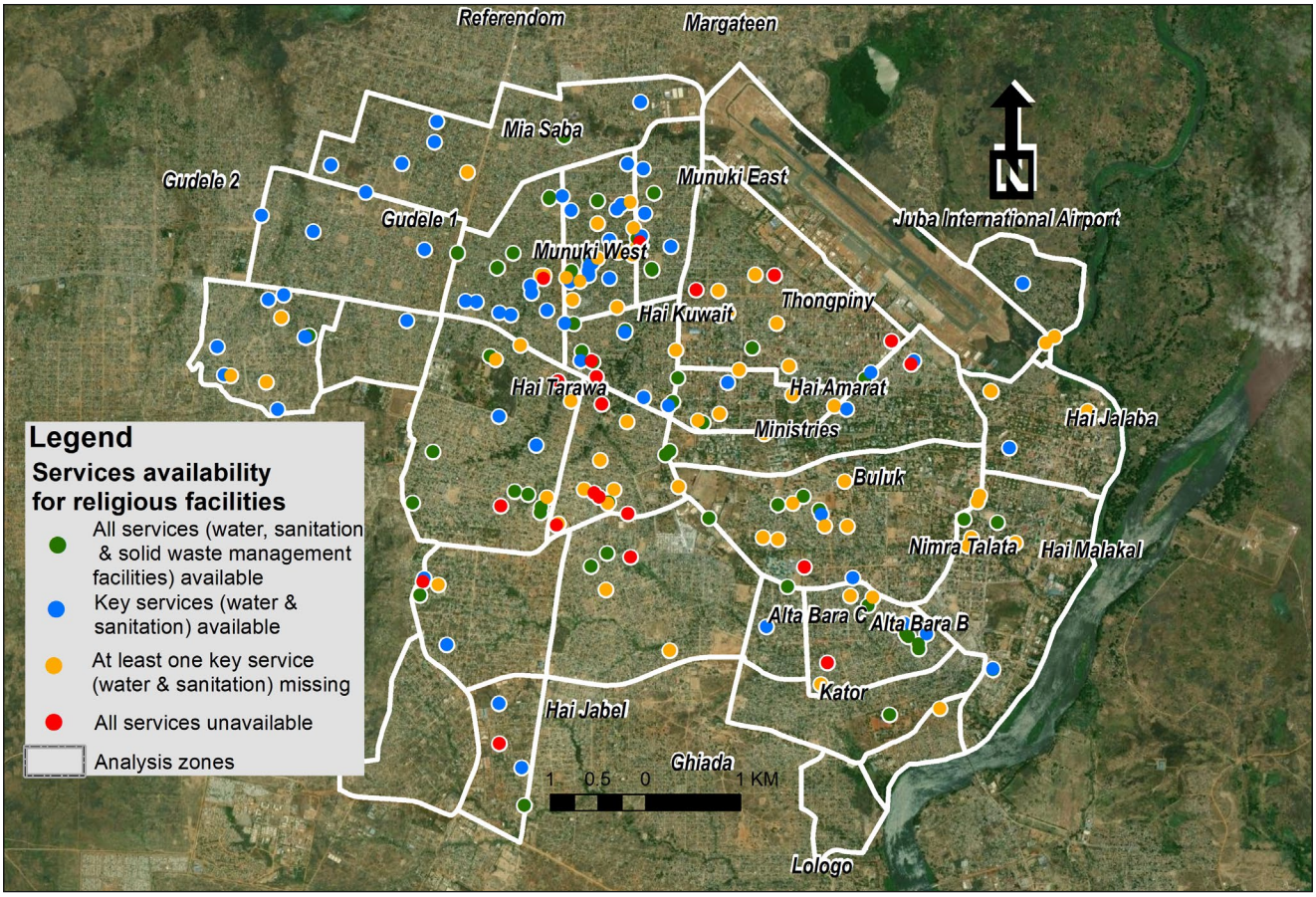
A focus on religious facilities revealed that about a third of all mapped facilities (210) lack access to water and sanitation facilities, and almost 70% lack solid waste management amenities (Figure 3.37).

This trend is observed in most of the analysis zones, although higher numbers of underserved facilities are found at Munuki, Hai Tarawa and Buluk areas (Figure 3.38). The lack of water services in religious facilities is particularly an area of concern for COVID-19 spread risk, since these areas attract population concentrations.

Figure 3.37 and 3.38: Access to services and locations of religious facilities



Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021



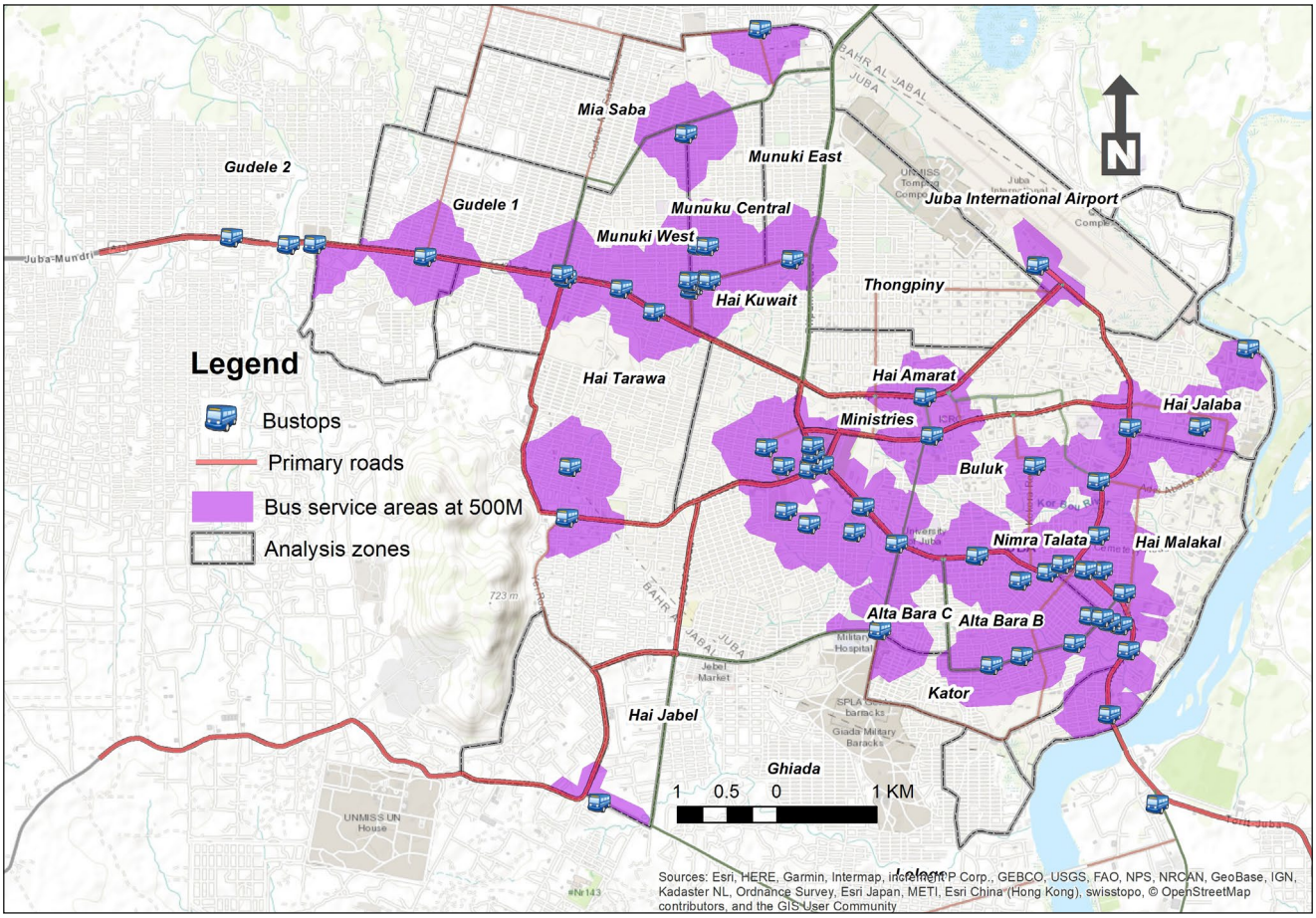
Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021
Disclaimer: The boundaries and names shown, and the designations used on this map do not imply official endorsement or acceptance by UN-Habitat.

3.3.4 Transport Infrastructure

From key informant interviews, the survey established that the common modes of public transport in Juba are mini busses and vans. Mapping data shows areas along major roads (Gudele road, Malakia road and Gombura street) as having better access to public transport, with unserved routes being accessed by motorbike taxis/boda boda.

Spatial analysis and population data overlays reveals that only 42% of the city population can access bus stops within 500 meters from their homes[13]. Access is better around the government square (ministries), Nimra Talata, Alta Bara and poor around Thongpiny, Hai Tarawa, Mia Saba and Hai Jabel (Figure 3.39).

Figure 3.39: Locations and service areas of transportation stops



Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021
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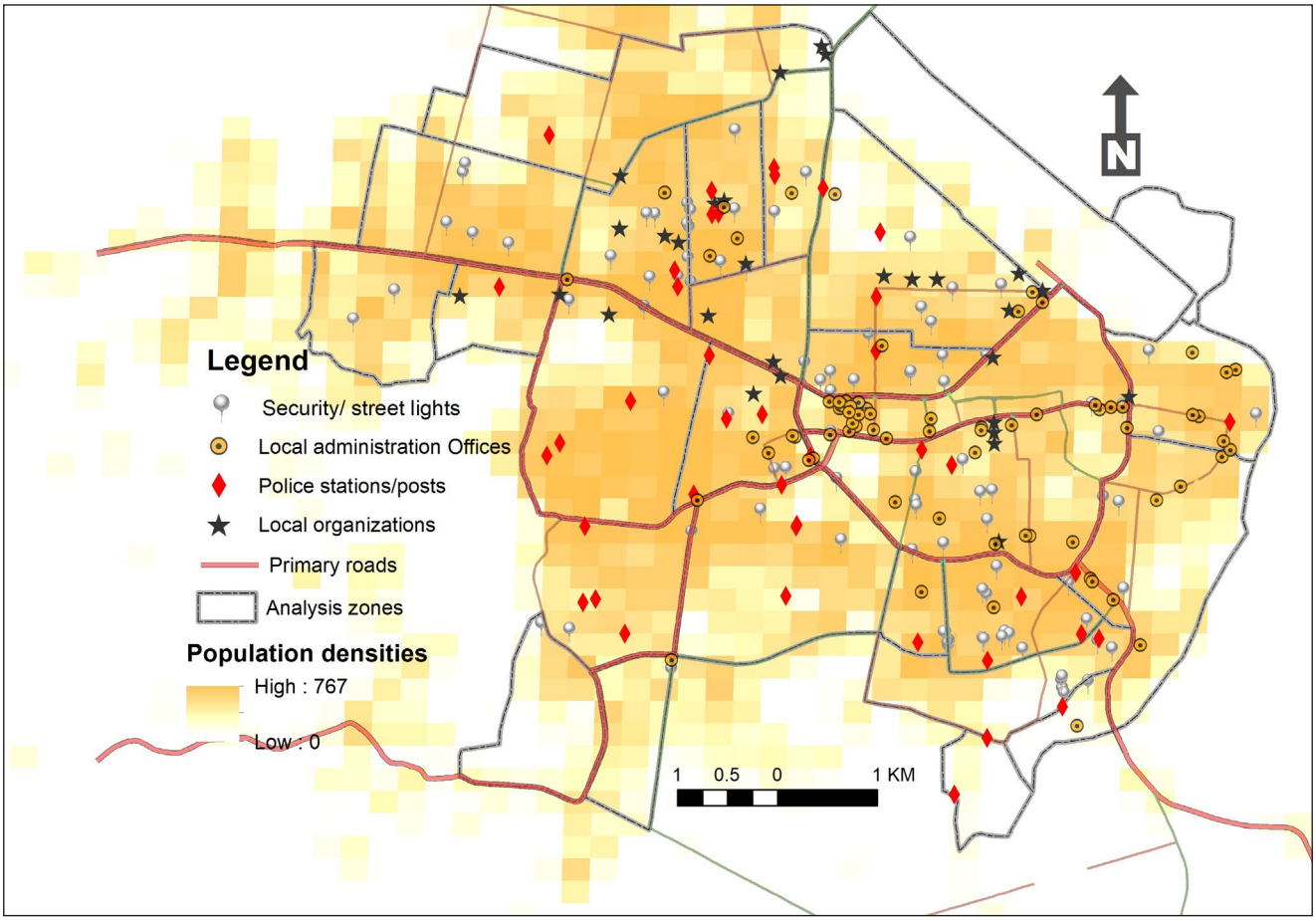
13. Refer to SDG indicator 11.2.1 computation metadata (link)

3.3.5 Governance and Urban Safety

Government offices in Juba are concentrated at 'Ministries' area which is a central location, both spatially and against city population distribution. There are more offices to the east and north of the city, but few to the south east. While police stations have an almost even coverage of the city, streets lights' mapping identified Hai Tarawa and Jabel as comparatively undeserved. Local organizations are mostly located to the north of city. More services are required in the southern areas, particularly Hai Tarawa where population densities are notably high (Figure 3.40).

Figure 3.40: Locations of administration offices, local organizations offices and streetlights



Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021
Disclaimer: The boundaries and names shown, and the designations used on this map do not imply official endorsement or acceptance by UN-Habitat.

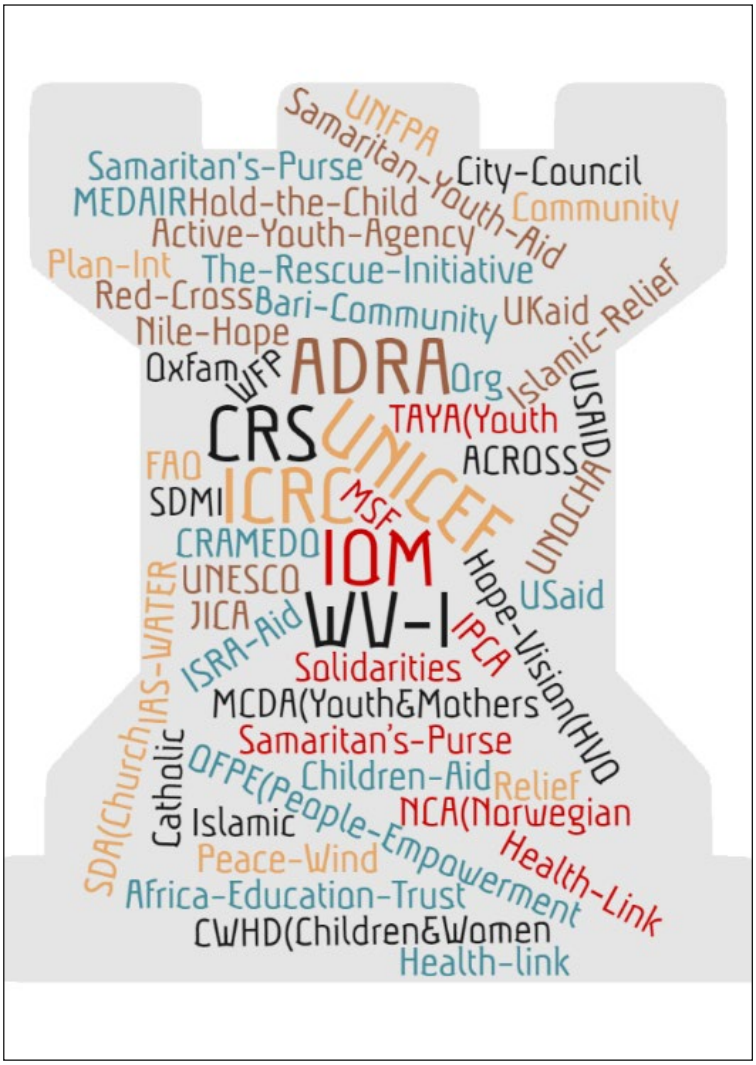
3.3.6. Organization and stakeholders

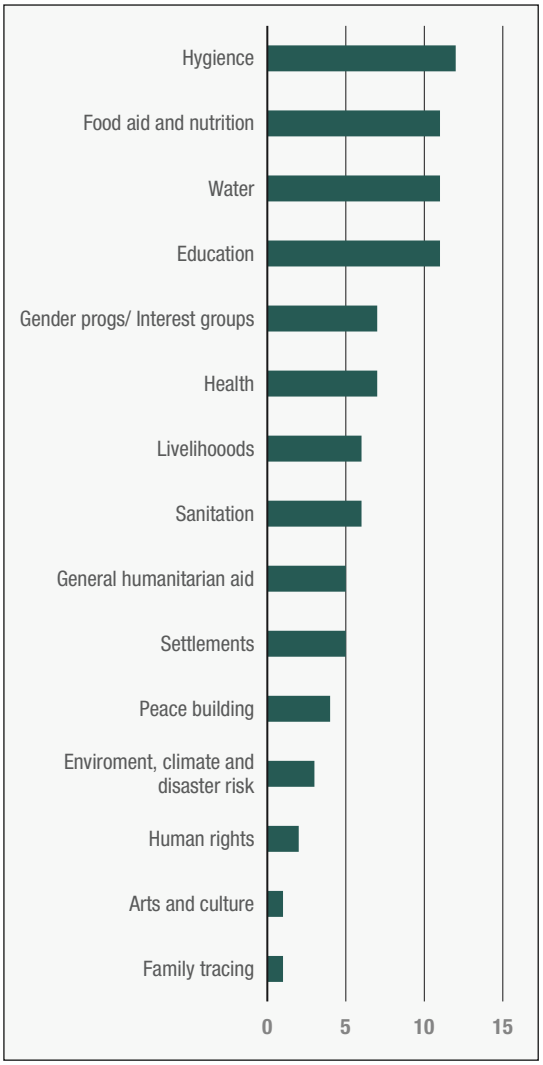
The survey mapped 42 civil society organizations which are involved in service provision within the municipality. While most organizations provide multiple services (across sectors), majority of them are involved in WASH, education, and programs related to children, youth and gender (see full list in Annex 1).

Analysis has revealed that despite there being numerous organizations providing services to the city residents, there are still huge gaps in service provision for essential areas/sectors. From this viewpoint, additional efforts by stakeholders are required to bridge the gaps in service provision, especially involving of essential services, including WASH components.

There are also notable overlaps in service provision where organizations with similar goals serve similar areas, amplifying spatial inequalities. Accordingly, this survey has revealed the need for stakeholder's coordination and partnership: coordination for the purposes of directing efforts to underserved and more deserving locations, and directing new partners and actors into neglected sectors; and partnership to create synergies among agencies offering similar service as well as expanding service to spatially disadvantaged areas.

Figure 3.41 and 3.42: Organizations providing services in the city, and their sectors of operations

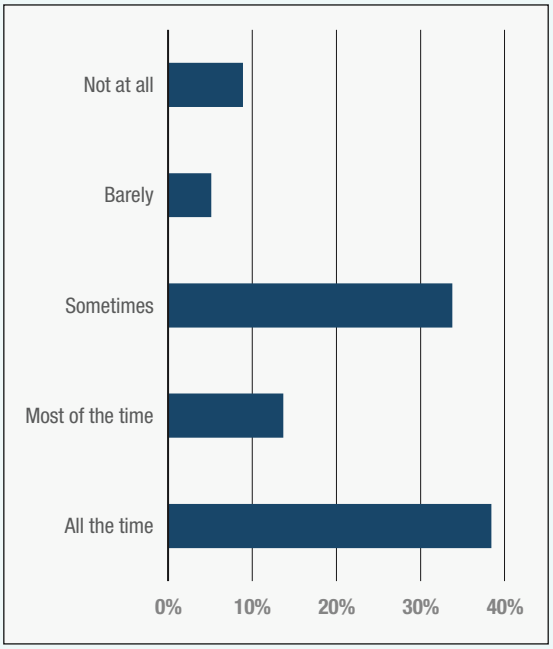


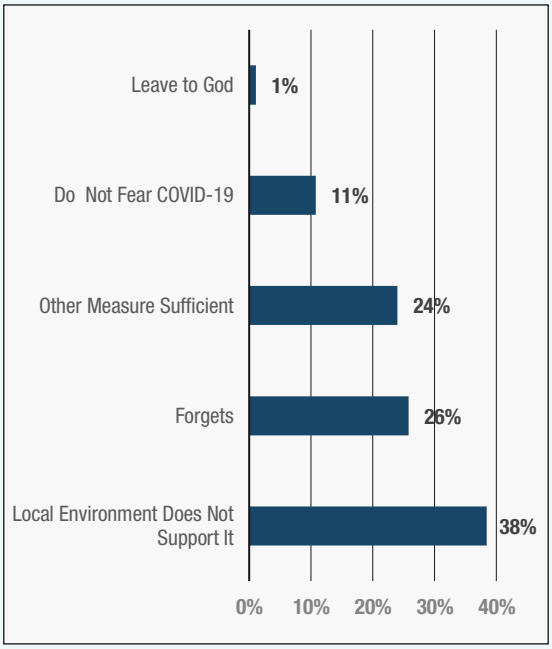


Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021

Box 2 **Community Response to Covid-19 Measures**

The survey, through facilities' users' interviews, sought to establish the views of the community on social distancing as a Covid-19 spread mitigation measure. Data shows that only 12% of the interviewed facility users (4,646) do not practice any form of social distancing, the rest embracing it to different degrees. Those that did not practice it all the time cited different reasons for it (Figures below).





Data Source: UN-Habitat Urban Indicators Database based on Field Survey, 2021

Out of those who do not practice social distancing, the main reasons identified included lack of fear of Covid-19, forgetfulness, and living environments which did not provide much option for social distancing e.g. congested settlement areas, congestion in public transport, market areas and other activity nodes. These findings are in the backdrop of prevailing COVID-19 mitigation measures set by the government of South Sudan in February 2021, some of which included mandatory wearing of facemasks, closure of all businesses and gatherings which attract crowds such as night clubs, parties, religious gatherings, and strategies encouraging working-from-home among others. These findings point to a need for enhanced public sensitization on the importance of observing the set Covid-19 measures; as well as a long term need for settlement re-configuration to improve on the space standards across the urban area.

PART 4 JUBA URBAN FORM/STRUCTURE AND COVID-19 VULNERABILITIES

4.1 Overview

The form and structure of any urban area significantly determines its functionality, how populations interact with the city and each other, the level of connectivity and interaction between different parts of the city, and shapes a city's prospects for prosperity and/or ability to respond to urban challenges and pandemics such as COVID-19. For example, an urban area that is well planned, and where adequate allocations are made to all land uses is likely to be more functional than one where planning considerations are not made. Equally, well planned neighbourhoods – with allocations for adequate land to streets, clear layout for basic infrastructure systems and open spaces (among others) are likely to offer opportunities for a higher quality of life than informal developments where such provisions are missing.

Within the context of COVID-19, whose spread-prevention is associated with among other things the ability to maintain social distancing and observe basic hygiene, understanding urban form and structure has proven to be an important factor in the overall estimation of urban risks. Urban form and structure can be analyzed through different approaches, but the core of most methods is a set of geophysical attributes such as the built-up area density, building sizes and shape, street-block sizes as well as measures of compactness. These, when compounded with socio-demographic data provide a good indicator of COVID-19 related risks as documented in previous studies throughout 2020 (see Bereitschaft and Scheller, 2020; Hanzl, 2020; Lak, Asl and Maher, 2020; Sharifi and Khavarian-Garmsi, 2020; Swapan et al, 2020; Jabareen and Eizenberg, 2021; Rice, 2020; Lall and Wahba, 2020)

As part of its COVID-19 response and data processes in 2020, UN-Habitat developed a simple model to map COVID-19 risks and vulnerabilities. This approach, which uses a mix of geophysical, socio-demographic and infrastructural and service data as inputs can be applied at multiple levels and scales to determine risks, with higher accuracy associated with high resolution data. Working in collaboration with the South Africa National Space Agency (SANSA), UN-Habitat has also developed a multi-step model which can be applied to characterize a settlement typology – and which can predict the presence and severity of slums and informal settlements at the city scale. The two models, which rely on similar data inputs were customized for analysis of Juba's settlement pattern at the street block level, as well as the city's COVID-19 vulnerabilities at the grid level.

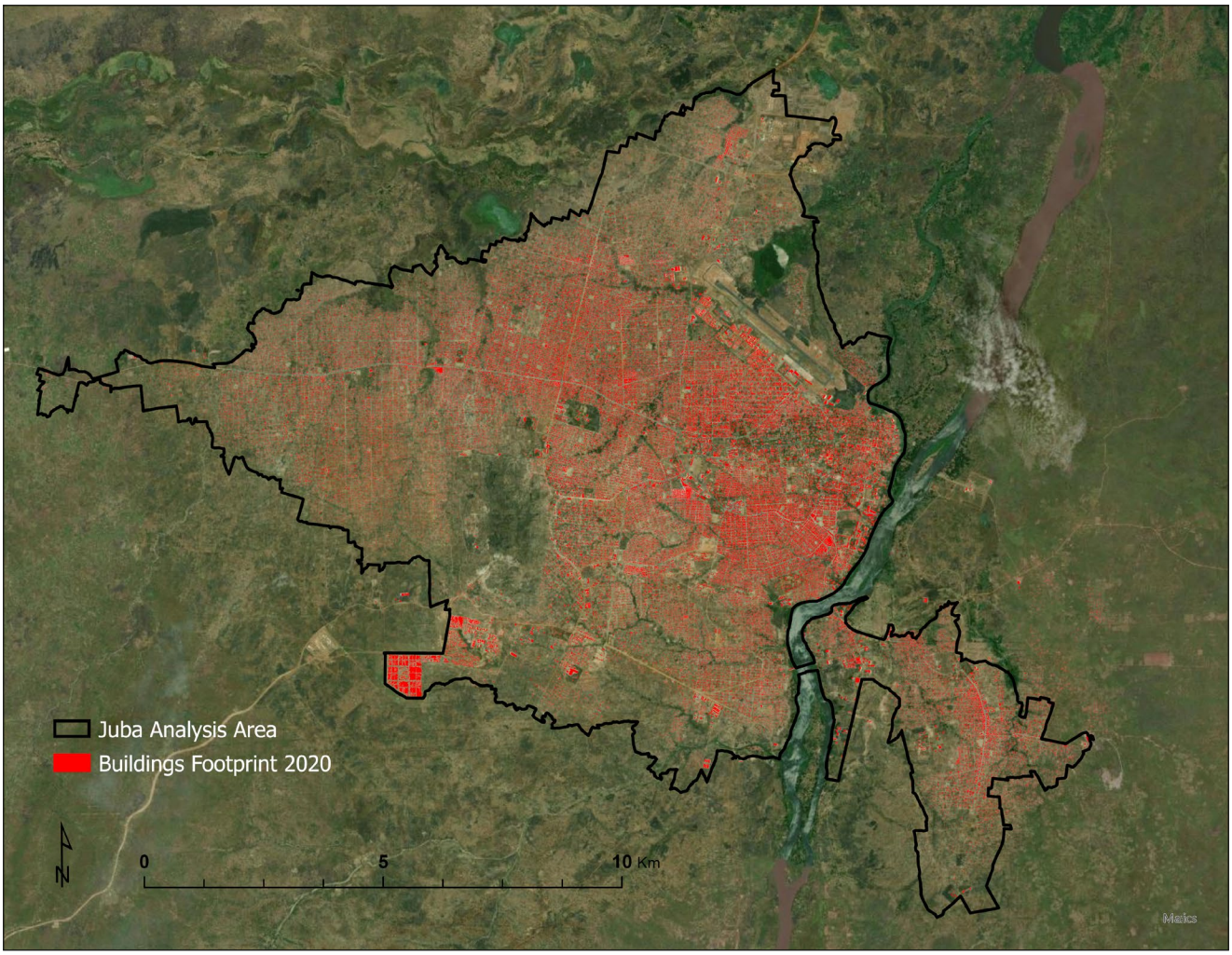
This section presents the results from application of both models in the larger Juba area.

4.2 Urban Form and Vulnerability Assessment Analysis Scope

This study aimed to produce multiple layers of data that is not only useful for the COVID-19 response, but also for long term planning interventions in Juba. The generation of data that is fit for purpose in both contexts demands a broad appreciation of the urban structure for the larger Juba area, as opposed to just the Juba municipality. Studies by UN-Habitat in more than 1,000 cities globally established that most cities outgrow their administrative boundaries, and recommended that analysis of urbanization trends, risks and opportunities should consider the interconnectedness and functionality of the area with an "urban character/ that meets basic density or population thresholds" as opposed to just the municipal boundaries.

While it would have been ideal to use the official boundaries for the Juba metropolitan area (which extends beyond the municipality) for the analysis the urban form and COVID-19 vulnerability, these boundaries were not available at the time of data compilation. To define the analysis scope thus, we made an assumption that areas that are connected to downtown Juba, and where the built-up area density per square kilometer was greater than 25% were functionally part of Juba municipality. We then used blocks defined from the street network to create a hard-edge boundary around these built-up areas. Figure 4.1 presents the defined analysis scope, which measures 141km^2.

Figure 4.1: Analysis scope for Juba's urban form and COVID-19 risk vulnerability



Source: UN-Habitat Urban Indicators Database, 2021; Background Image Credits: Maxar Technologies / Esri
Disclaimer: The boundaries and names shown, and the designations used on this map do not imply official endorsement or acceptance by UN-Habitat.

Within the defined analysis scope shown in Figure 4.1, we analyzed Juba's historical urbanization trends, its 2020 settlement pattern and COVID-19 risks. The analysis of Juba's historical urbanization trends considered two epochs – 2000 to 2010 and 2010 to 2020. 2010 was chosen as the median year to analyze overall urbanization trends during the 10 years leading to South Sudan's independence, and the 10 years within which independence was attained[14], and after which Juba became the South Sudan's capital. For both epochs, we considered two indicators of the urbanization process – the rate of land consumption rate (spatial urbanization) and the population growth rate, which constitute the global Sustainable Development Goal (SDG) indicator 11.3.1 - land consumption rate to population growth rate.

The actual computation of the land consumption rate followed the global indicator 11.3.1 metadata, which uses built up area change over time as a proxy for measuring the rate of spatial urbanization. For each analysis year, extraction of built-up areas from Landsat and Sentinel imagery was implemented using the Random Forest Classifier in Google Earth Engine (GEE) and post classification cleaning implemented in ArcGIS pro and QGIS. Limitations to access of disaggregated population data, as well as inconsistencies in existing gridded population datasets[15] made it impossible to calculate the population growth rate at the same spatial scope defined in figure 4.1, in which case we adopted the historical population growth rates published through the World Urbanization Prospects (UNDESA, 2018).

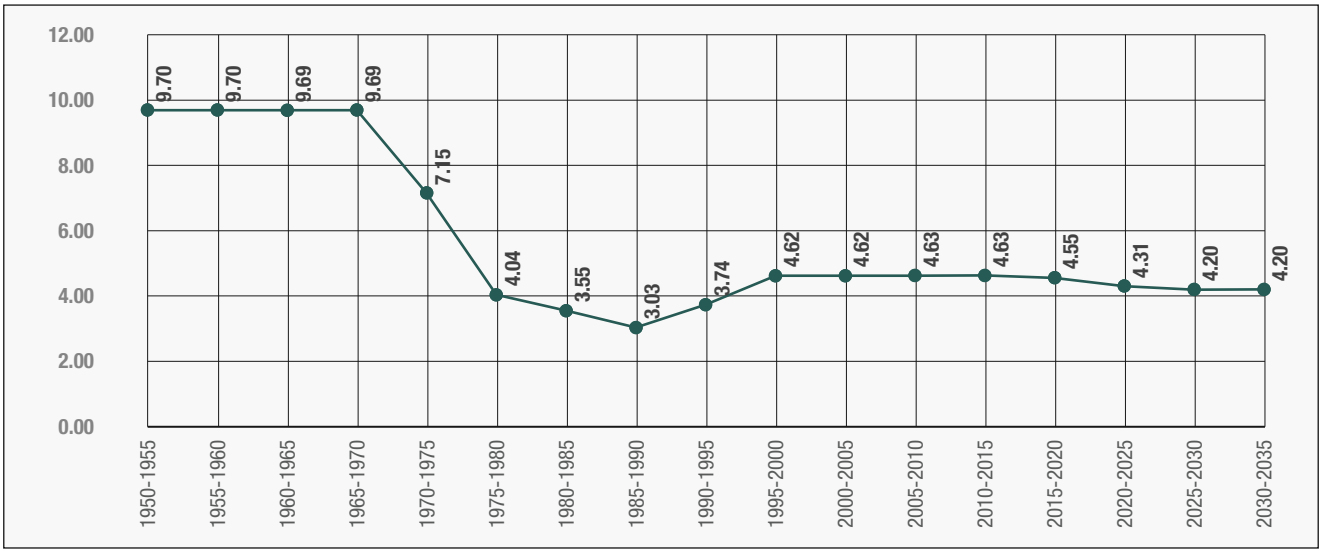
14. South Sudan gained independence on 9th July 2011, with Juba as its capital.

15. We compared the three most commonly used gridded population datasets – WorldPop , GHS-POP and GPWv4 and against the South Sudan Bureau of Statistics population estimates for Juba, as well as estimates by UNDESA (World Urbanization Prospects, 2018) and noted very high variances.

4.3 Juba's urbanization trends

According to the UN estimates, in the 20 years between 1950 and 1970, Juba's urban agglomeration (greater Juba) urbanized at rates exceeding 9%, before a steady decline from 1970 which could be closely associated the turbulent peace situation since early 1960s. Between 1990 and 1995, Juba's urbanization rate averaged only 3.03, before a gradual increase that peaked at 4.63% during the 2005 – 2015 period (Figure 4.2).

Figure 4.2: Average annual rate of urban population change in Juba (1950 – 2035) (Per cent)

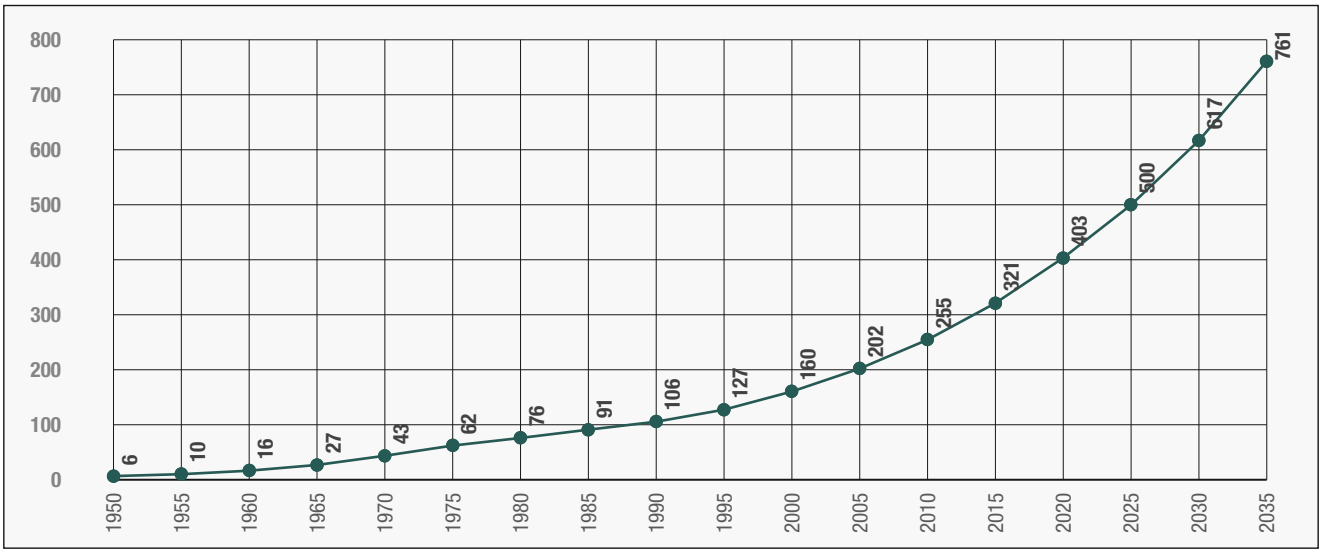


Data Source: UNDESA, 2018

Despite the fluctuating urbanization rates and many years of conflict, Juba has been on overall an upward population growth trajectory, with the urban agglomeration's population increasing from only 6,249 people in 1950 to an estimated 403,215 persons in 2020. Between 2000 and 2020, Juba's population grew 2.5 times, from 160,463 people to 403,215 people (Figure 4.3) (UNDESA, 2018). In 2020, Juba accounts for 15% of South Sudan's total urban population (UNDESA, 2018).

With an estimated average population growth rate of 4.2% between 2020 and 2035, Juba's 2020 population is likely to increase by 89% by 2035 (UNDESA, 2018), demanding for more basic services and orderly urban development.

Figure 4.3: Total population in Juba urban agglomeration 1950 – 2035 (Thousands)

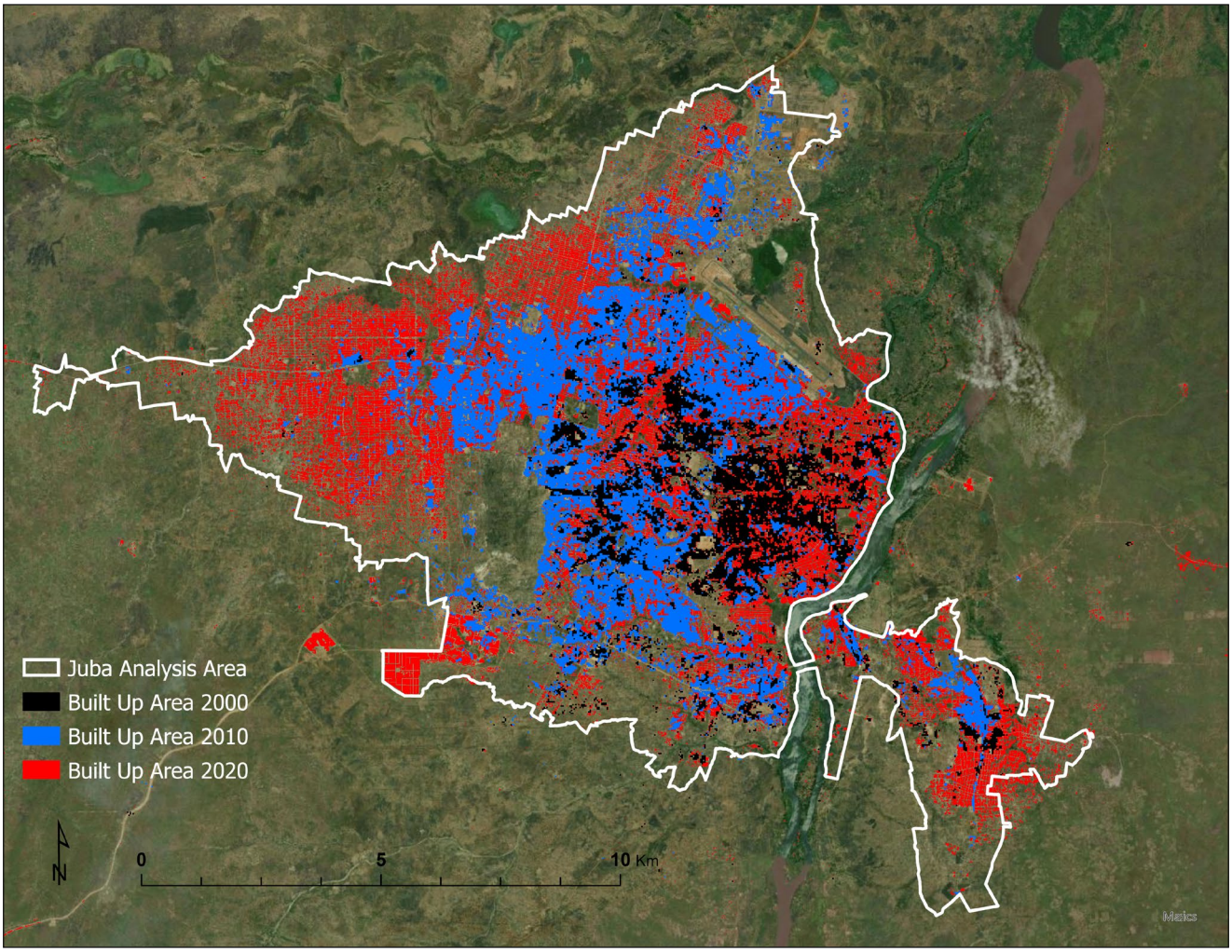


Data Source: UNDESA, 2018

Juba's population increase over time has translated into two unique phenomena: a) a rapid rate of spatial expansion, characterized by land cover conversion from non-built to built-up areas, and b) a shifting urban form and structure, whose main characteristic is redevelopment.

Based on land cover mapping data produced for the years 2000, 2010 and 2020 in the analysis area, the built-up area[16] in Juba almost tripled between 2000 and 2010 (from 11.71km^2 to 33.13km^2), and further increased by 75% (to 58.02km^2) between 2010 and 2020. This translated to an annual land consumption rate[17] of 18.3% during the 2000 – 2010 period, which declined to 7.5% during the 2010 – 2020 period. Figure 4.4 illustrates Juba's spatial urbanization trends during the period 2000, 2010 and 2020. While the spatial scope for the population and land consumption rate estimates for Juba may not be similar, the computations indicate a higher rate of land consumption than that of the population growth, which is consistent with UN-Habitat's findings in other cities around the world.

Figure 4.4: Spatial urbanization in Juba (2000 – 2020)

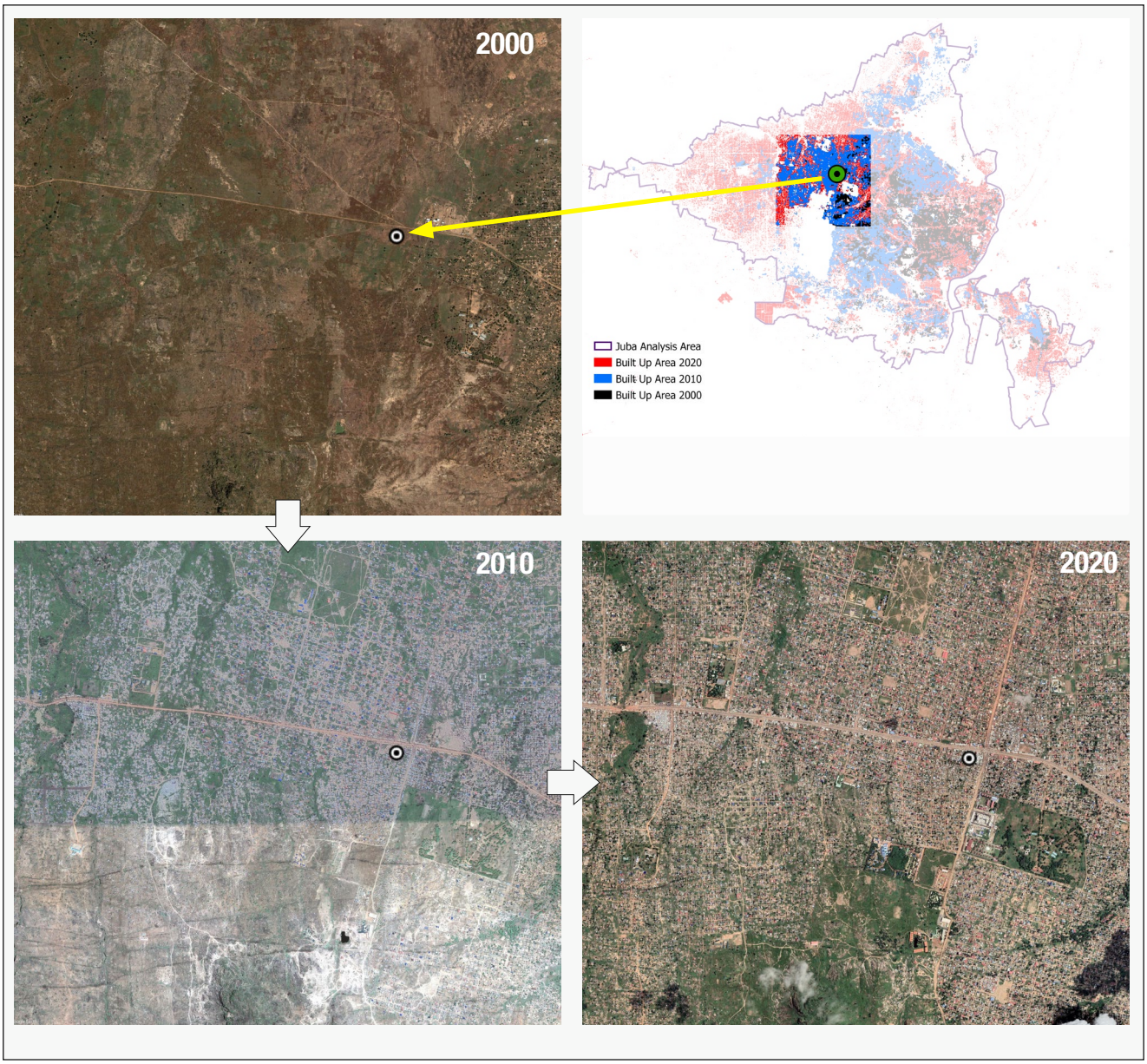


Source: UN-Habitat Urban Indicators Database, 2021 based on analysis from Landsat and Sentinel Imagery; Background Image Credits: Maxar Technologies / Esri
Disclaimer: The boundaries and names shown, and the designations used on this map do not imply official endorsement or acceptance by UN-Habitat.

Juba's spatial urbanization during the 2000 – 2020 period happened in 2 major ways; urban extensions and infills. The former resulted in overall expansion of the urban area while the latter resulted in increased urban densities as shown in figures 4.5 and 4.6 respectively.

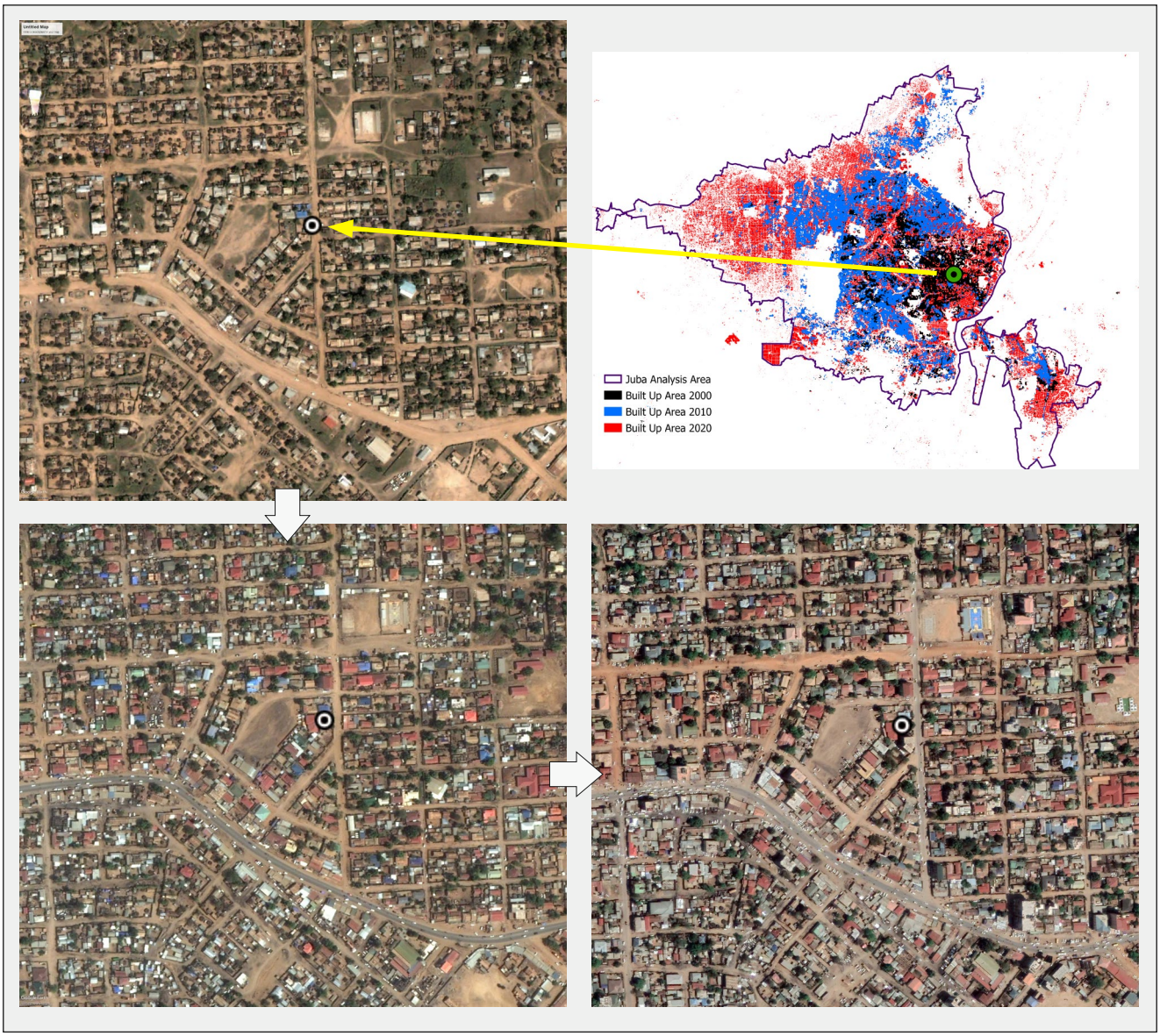
16. Built up area in this context largely refers to areas occupied by buildings. In Juba, buildings include both traditional housing (tukuls) and modern housing typologies
17. Land consumption rate is here defined as the annual rate of change from non-built to built-up areas, and is calculated using the formula (Vpast – Vpresent/ Vpresent)/ t

Figure 4.5: Juba's extensions resulting in outwards growth of urban agglomeration



Source: UN-Habitat Urban Indicators Database, 2021; Google Earth, 2021.

Figure 4.6: Juba's infill developments resulting in increased densities



Sources: UN-Habitat Urban Indicators Database, 2021; Google Earth, 2021.

Juba's overall expansion and densification is accompanied by very unique temporal changes to the built-up areas, with three main characteristics evident;

a) **"De-development"** – where previously built-up areas convert to non-built up status (these areas later convert back to built up areas with different development typology).

Area developed in Aug 2010 © Google Earth

Developments removed in Nov 2011 © Google Earth

Area still undeveloped in Dec 2020 © Google Earth

b) **Modernization** – where traditional housing and villages (characteristic of mud-walled tukuls with grass-thatched roofs) become converted to modern housing typologies

2003: Traditional Tukuls most dominant developments © Google Earth

2011: Some Tukuls replaced by modern house typologies © Google Earth

2020: Modern housing most dominant developments © Google Earth

b) **Urban form transformation** – which includes the conversion from organic to gridded urban form.

2009: Organic developments dominant © Google Earth

2020: Gridded urban form most dominant © Google Earth

Each of these built-up area changes can be explained by a mix of factors, which range from changes in land ownership structures to fluctuations in peace in South Sudan. Articulating the unique phenomena of de-development in Juba, Martin and Mosel note that;

> *"…….Forced displacement and return have been a key characteristic of the development of Juba town. ……..*
>
> *During the war people tended to move closer to the centre of town. Since the Comprehensive Peace Agreement, there has been movement both inside and outside of the city, as well as circular displacement around the outskirts, for example from Northern Bari or Rajaf payam to Gondokoro island. Most of those moving outwards are poor, landless people who have lost access to land due to demolitions, the return of the owners of the land they were staying on or due to increasingly unaffordable rent and housing prices. These include many long-term residents who came to Juba in the 1970s, who have had to vacate the plots they had been occupying during the war and now need to apply for land like any other newly arrived returnee. People owning land, or who are able to obtain land through money, connections or force, are moving inwards towards the well-serviced centre of the town, as are large numbers of international aid workers and foreign businesspeople. Most areas of Juba are now inhabited by a mix of different tribes, encompassing residents and returnees as well as other migrants. The old IDP camps have been dismantled and their populations have integrated within the town. "Martin and Mosel, 2011.*

The observed trends in both population and land consumption rates indicate that Juba will continue to grow into the future. How this growth happens, and the resultant opportunities and challenges will be directly related to the urban planning and development actions and strategies formulated today in response to the existing, as well as the anticipated future urbanization trends.

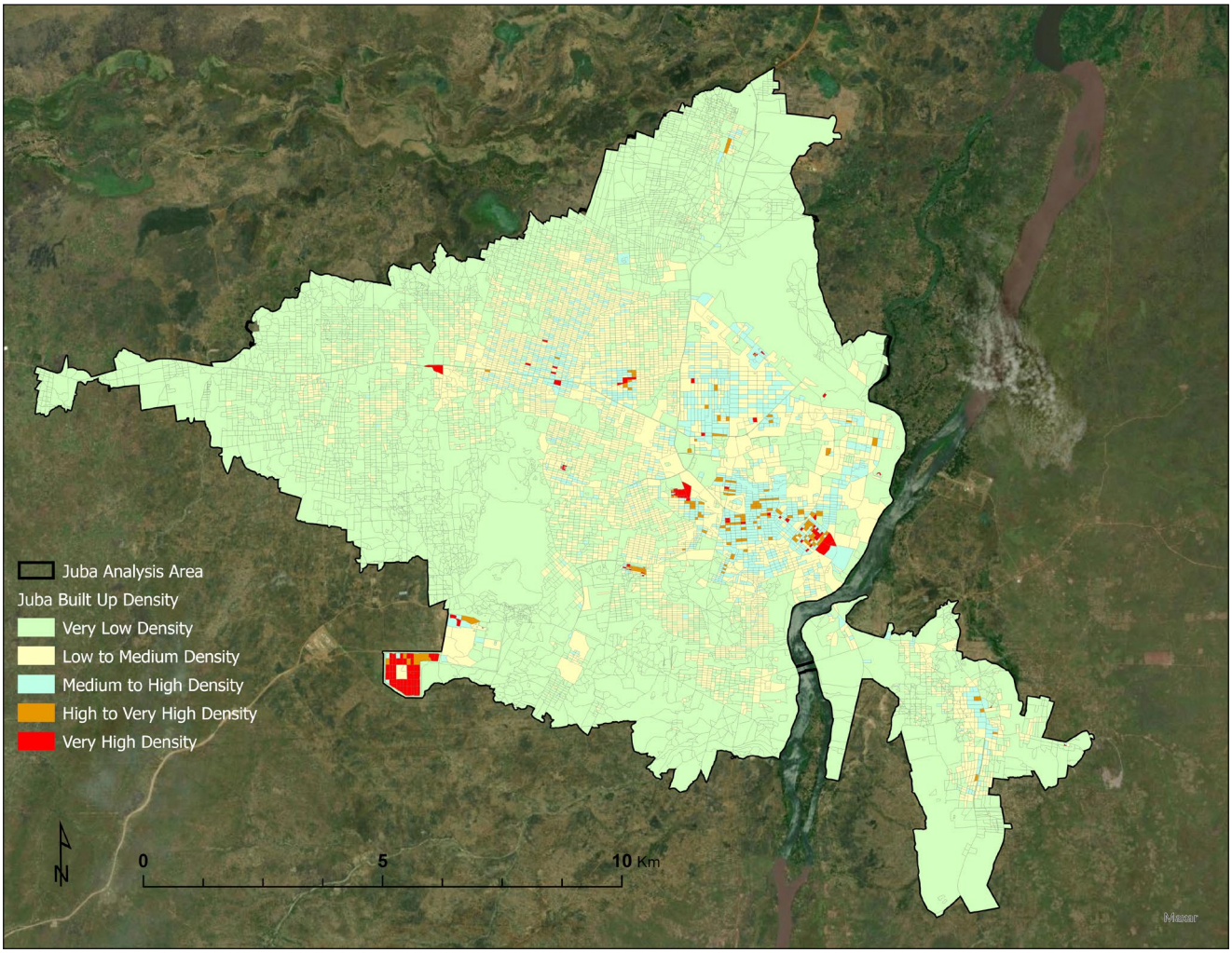
Juba, South Sudan © Tom McShane/ Flickr

4.4 Juba's urban structure

To understand Juba's urban structure, we calculated the percentage built up density at the street block level using individual building footprints generated from very high resolution imagery. We then analyzed the organization of buildings within each block and calculated a compactness score for each block to determine the overall urban structure in the urban area. From this analysis, four major findings emerged:

1. Juba's urban structure is characteristic of higher built-up area densities in the eastern part of the city and along the Gudele road that traverses from east to west of the urban area. Densities decline gradually as you move away from the areas surrounding the downtown area. In addition, the built-up densities also decline as the distance increases from the major roads. Overall, higher built-up densities are observed in areas that have been experiencing urban infills, while lower densities are observed in newly growing (expansion) areas.

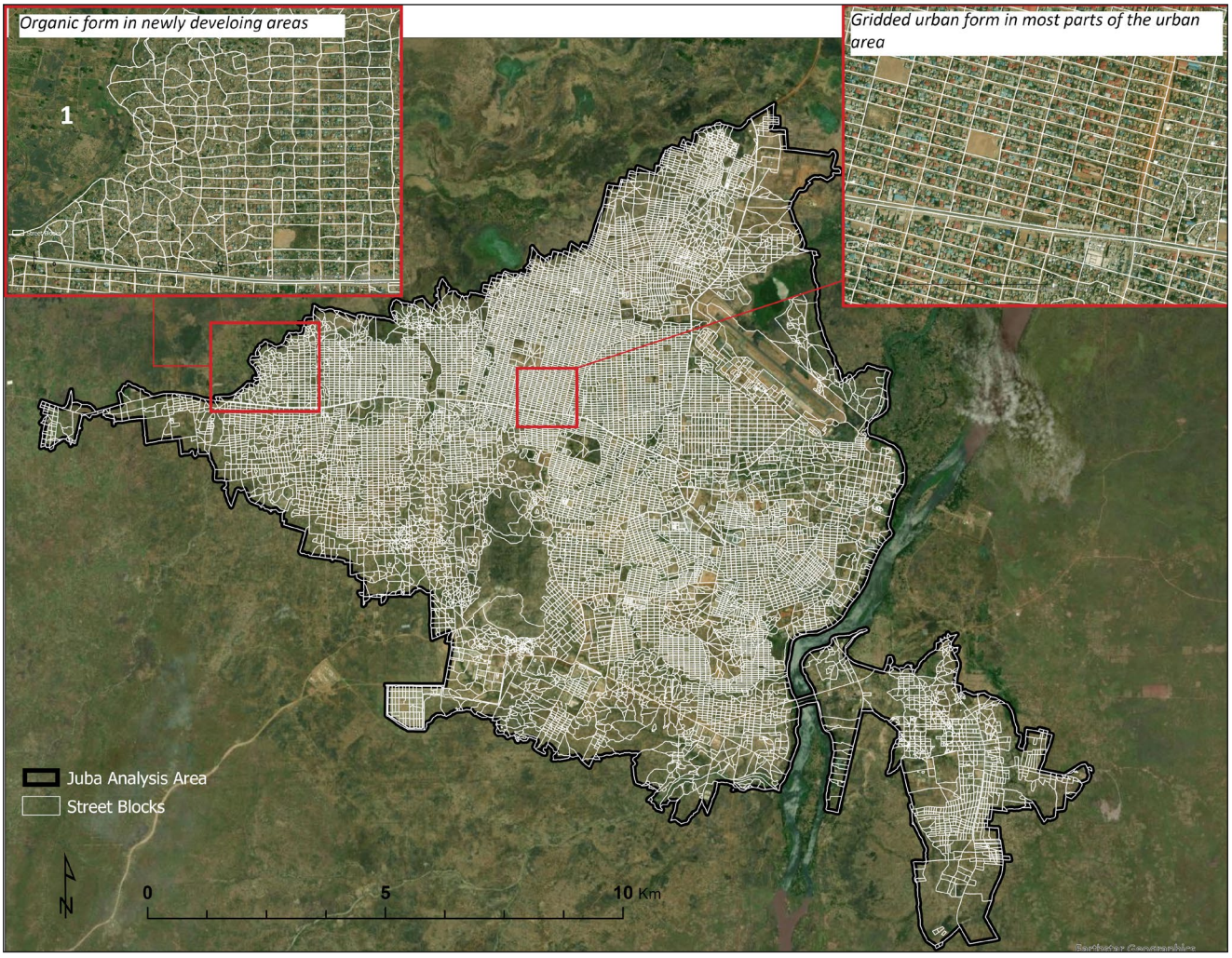
Figure 4.7: Built up area density per block in Juba



Source: UN-Habitat Urban Indicators Database, 2021; Background Image Credits: Maxar/Esri
Disclaimer: The boundaries and names shown, and the designations used on this map do not imply official endorsement or acceptance by UN-Habitat.

2. Juba's exhibits both gridded and organic urban form. The gridded form, which is characteristic of streets running parallel to each other to form rectangular blocks is the most dominant form in Juba. Organic form, which is characteristic of meandering streets which join to form irregular blocks is mostly common in the newly developing areas (expansion areas), although some patches of inorganic form are also evident within the gridded central parts of Juba. Equally, in the newly growing areas, a mix of organic and gridded urban form is also evident (Figure 4.8).

Figure 4.8: Juba depicts largely gridded urban form, with organic form in the newly expanding areas



Source: UN-Habitat Urban Indicators Database, 2021; Background Image Credits: Maxar/Esri
Disclaimer: The boundaries and names shown, and the designations used on this map do not imply official endorsement or acceptance by UN-Habitat.

3. The average block size in the analysis area measures about 9,627 m², which is less than half of the standard block in Manhattan, New York, whose area averages 21,920m² (80*274m). However, there are significant variations in the block sizes between the areas with gridded and organic urban forms – with the former depicting smaller block sizes than the latter (Figure 4.9).

Figure 4.9: Variations in block sizes in Juba

Source: UN-Habitat Urban Indicators Database, 2021
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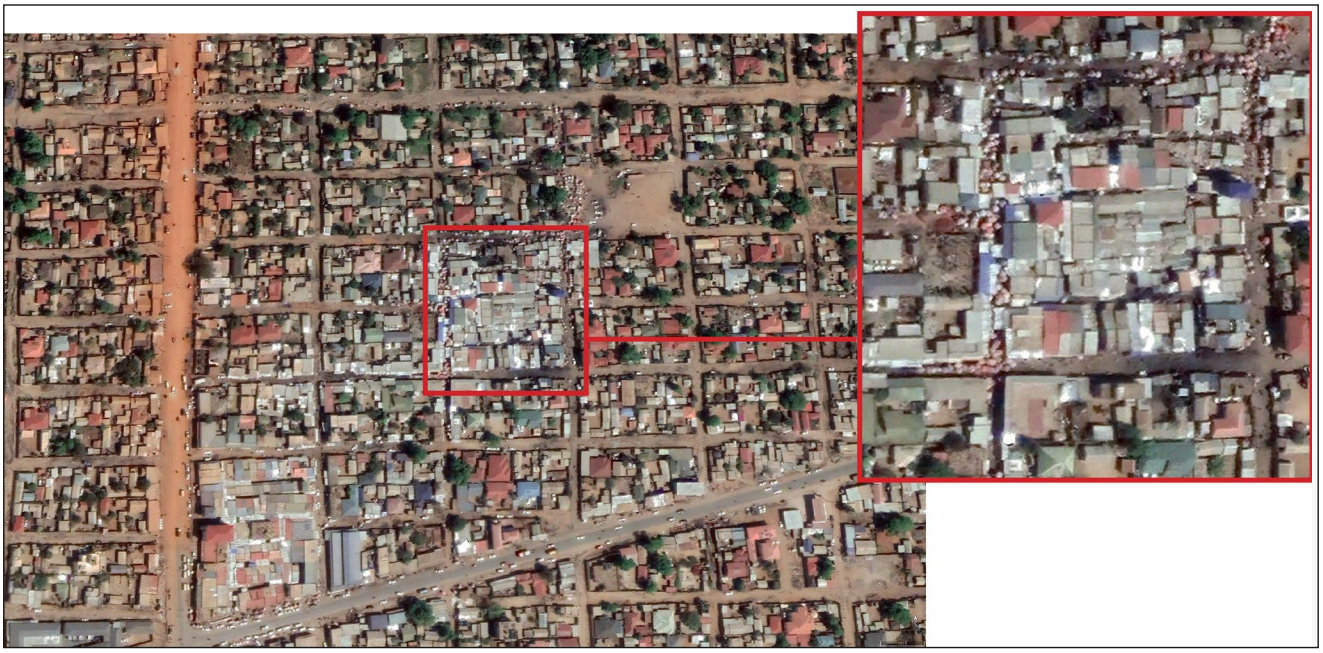
4. Despite the seemingly well-structured and organized streets and blocks for most of Juba's urban area, developments within each block are not orderly. Within majority of the blocks in the analysis area, buildings are packed together with limited intra-building spacing, while in others inorganic developments are evident, collectively forming an intra-block urban form that resembles planned informality (Figure 4.10). This could be indicative of proactive and reactive efforts to plan the urban area, and an absence of/or failure to enforce building regulations with provisions on building setbacks and plot coverage.

Figure 4.10: Congestion within street blocks



Intra-block developments in Juba depict congestion and lack of order and some blocks depict morphological characteristics that resemble slum. Source: Google Earth, 2020

Juba's urban structure presents both very unique opportunities as well as challenges for the urban area and its populations. Despite the roads being largely untarmacked, the structured street network and clear blocks present opportunities for infrastructure layout and offer movement options for residents – which would ideally make it easy to access basic services where such are provided within proximal distances. Except for a few areas, the smaller block sizes also make it easy to provide services to populations, and even respond to disasters such as fires in the event such occur. On the other hand, the unorderly developments within each block present major congestion challenges, and would also make it difficult to lay out infrastructure to individual buildings. Defining and enforcing standards on building set-backs and plot coverage, as well as a larger Juba zoning and development plan would help steer juba towards orderly growth. This should however be accompanied by clear land regularization, which has been previously noted as having an impact on the urban form and functionality of the settlement.

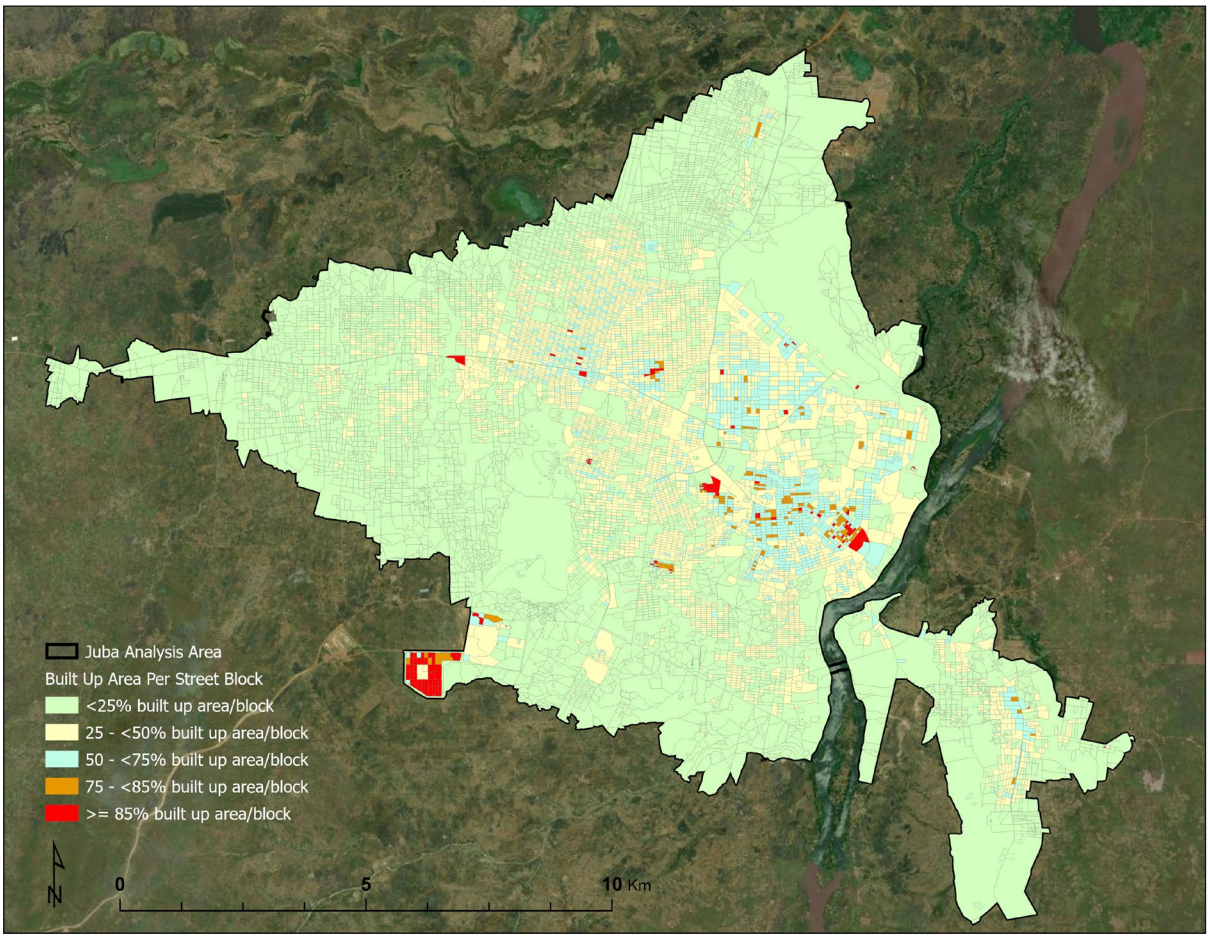
4.5 COVID-19 vulnerability levels in Juba

To understand Juba's vulnerability to COVID-19, we assessed risks at 100*100 equal sized grids using the likely levels of interaction between populations. The levels of interaction in our model considered only the settlement densities and the location of high interaction zones such as markets. As noted previously, the lack of high-resolution population data that could be reliably disaggregated to grids, as well as unreliability of existing disaggregated datasets made it impossible to assess risks based on the population component. Equally, other important inputs to UN-Habitat's COVID-19 risk model which could not be implemented due to lack of data include age-based vulnerabilities, co-morbidities (pre-existing conditions), access to basic sanitation services (particularly water and handwashing), transmission rates and health system indicators.

Since no major lockdowns were implemented within Juba, other than banning of social gatherings, we assumed that other than social distancing, usual non-gathering interactions continued to prevail in the urban area, and that areas such as markets still attract high populations concentrations and thus enhance risks. We also integrated into the model the settlement structure implemented at the block level, from which we identified potential slums and informal settlements, which we categorized as high-risk zones.

Based on our analysis, about 92% of the Juba analysis area is categorized as medium to high covid-19 risk zones, 6% are high to very high-risk zones and 2% are very high to severe risk areas (Figure 4.12). It should however be noted that the observed high level of developments within each street block could translate into higher levels of interaction and less space availability per person, and in turn higher COVID-19 risks. While disaggregated data to estimate the share of populations within each risk category is missing, majority of the urban area's population are expected to be living in the densely developed areas around Juba, Munuki and Kator Payams where covid-19 risks are categorized as being high to extreme. In turn, this means majority of Juba's population is at high risk of covid 19 in the absence of/non observation of preventive measures.

Figure 4.12: COVID-19 risk vulnerabilities by 100*100m grid in Juba



Source: UN-Habitat Urban Indicators Database, 2021; Background Image Credits: Maxar/Esri
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PART 5 SUMMARY OF FINDINGS AND RECOMMENDATIONS

From the survey, the following are key observations and recommendations:

1. Juba faces acute data limitations which requires more concerted efforts among partners to address. While the current study maps out the major settlement patterns as well as the available facilities within the city – which gives good baseline data, continuous update of the information is needed.

2. While Juba seems to have clear provisions for street networks which present opportunities for basic infrastructure layout, the city depicts a high level of intra-block informality, in which space standards are barely considered. This could be a challenge associated to lack of an elaborate city spatial plan and/or limitations in zoning regulations enforcement. Significant efforts are needed to address both, which can be achieved through long term and continuous support from different actors in the development sector.

3. Juba has notable gaps in the provision of adequate housing to residents, particularly on housing materials. Programs on improvement of existing housing fabric as well as provision of future housing demands – taking population dynamics into consideration – are required.

4. Piped water is unreliable, and most families depend on water from vendors and water tankers; while the whole city requires interventions on water supply systems, more affected area should be prioritized, and they include Munuki central, East of Hai Tarawa and Buluk and Alta Bara B.

5. The city relies heavily on pit latrines, which are associated with poor hygiene in urban areas; additionally, more than one third of sanitation facilities lack handwashing facilities. Citywide interventions on sanitation improvement is required, prioritizing Alta B and C, Hai Tarawa and Gudele 1.

6. With only about a quarter of the city able to access handwashing facilities outside their homes, and the number of new handwashing stations reducing over time, there is need for renewed efforts in promoting handwashing. Priority areas for this include along the major roads of Malakia, Gudele, and Airport, particularly at bus stops and busy activity nodes.

7. While schools are generally within reach of settlement locations, a few elementary facilities are required at Hai Malakal, Hai Jabel and Gudele. A desired intervention on education facilities involves improving their access to service, including water and solid waste management amenities.

8. Human settlements' densities are high at the city core, and while only a third of the population lack access to open spaces within 400 metres from their homes, available spaces are poorly equipped and managed. Poorer access is noted at Buluk, Alta Bara B and north east of Thongpiny

9. There are notable spatial inequalities in access to community halls, and new facilities are required in some areas, including Hai Tarawa, Mia Saba, and Alta Bara. Support programs to improve access to services for hall across the city are required.

10. The role of the private sector in the provision of services – education, health, WASH etc – is very prominent. It is likely that the heavy involvement of private actors widens the services affordability gaps, a hypothesis that requires detailed investigation. This survey recommends a detailed investigation into on the impacts of service provider to the quality and affordability of services.

11. There are numerous service providers/stakeholders working in the city, yet there are gaps and overlaps in service provision. The survey has established that even though organization have general awareness of other actors offering services in the city, a stakeholders' coordination framework is required to maximize synergies.

Annexes

Annex I : Mapped organizations, their engagements and areas of operations.

	Name of organization	Programs	Location of operation
1	Juba City Council	Numerous – WASH, Education, Health	All parts of the city
2	International Organization for Migration	Providing settlement Support	Jebel/Manga ten
3	The International Committee of the Red Cross (ICRC)	Sensitizing on COVID 19	The whole of Juba
4	The Food and Agriculture Organization (FAO)	Improvement of agricultural productivity	Terekerka
5	Health Link South Sudan	Support heath sector	Lologo and Munuki
6	South Sudan. Catholic Relief Services	Support to IDPS	Jebel
7	Islamic Relief Org	Education to IDPS	Gureii and Gudele
8	Children and women hope development	Covid 19 Awareness, Hand washing facilities	Magatens , Lemom Gaba and Jebel yesua
9	ACROSS South Sudan	Inventory of displaced persons, Peace, education	Buluk
10	The United Nations Children's Fund (UNICEF)	Child protection, education, water and sanitation	All parts of the city
11	United Nations Educational, Scientific and Cultural Organization	Building Peace in the minds of men and women	South west of UNMISS Tongping, others
12	Médecins Sans Frontières (MSF)	Treating patients suffering from wide array & illness and health needs.	Hai Malakia and others
13	Samaritan's Purse	Emergency food and water	Hai Cinema & others
14	World Vision international	The needs of most vulnerable children ,gender quality	Hai Cinema
15	Hope Vision organization (HVO)	Education and resilience for vulnerable people	JCC Compound Buluk ,Hai Toura & others
16	The United Nations Office for the Coordination of Humanitarian Affairs (OCHA)	Support authorities and other organizations on issues that hamper relief delivery	
17	CRA	Women empowerment	Lun
18	World Food Programs	Distribution of food	Goroma & others
19	Initiative for Peace Communication Association	Public health, Peace and Democracy	Juba Hospital
20	Peace Winds Japan (PWJ)	Socio-economic recovery – water and sanitation, hygiene, Education	
21	Plan International	Education, children and youth rights, participation and disaster reduction	All of Juba
22	OXFAM	Humanitarian assistance including clean water, hygiene facilities, food, fuel and income support	All regions of Juba
23	Adventist Development & Relief Agency	Health, Education, Livelihoods	Hai Kwait & others
24	Hold the Child	Stateless by identification	All within juba city
25	Solidarities International	Wash in Health facilities , school and community	Rajaf, Luri, Nyar Kenyi and Munuki
26	Bari community (B.C)	Food Aid cultural and social activities	Magallar , Godokoro,luri /Lodu, Lobonok, Rrajaf Bungu Ganji
27	Trust Action youth Association (TAYA)	Wash and food security, livelihood , women empowerment and GBV	Gurie , Luri
28	Mother and Children Development Aid	Wash and protection	Gurie, Kuda and Kapuri
29	OPEN (Organization for people empowerment and need's)	Integrated COVID-19 respond	Lemom Gaba, Gumbo, Rajaf, jopppa and northern Bari

	Name of organization	Programs	Location of operation
30	UNFPA	Health, capacity development for health care	All of Juba
31	The Rescue Initiative (TRI) South Sudan	Health & Nutrition, Education, Water, Hygiene & Sanitation, Food Security & Livelihoods and Conflict Resolution & Peace Building	All parts of the city
32	AET (African Educational Trust)	Teachers training	Juba Kit Rajaf
33	SDMI (Society of Daughters of Mary Immaculate and Collaborators	Food security and livelihood, education in emergency, women and youth empowerment program , Relief and Rehabilitation, Peace building and COVID-19 responds	POC 1&3, Magantens camp, Gurie, Joppa, Joppari, Lemon Gaba, Kopuri Luri , Munuki, Bori, Jebel Ladu, and Mmori
34	Children Aid	Health project and Health protection	Bibor, Buma and Nimule
35	Samaritan mission Aid	Hand washing facilities , empowering women to the leadership , borhold and making of liquid soap	Juba , Nimule Liria and Libonok
36	AYA (Active Youth Agency)	Wash project, hand washing facilities	Kopuri, Lemon Gaba and Joppa
37	Isra Aid	GBV, Awareness on COVID-19 protection	All part of Juba
38	Munuki Youth Association	WASH	Munuki
39	Norwegian Church Aid/ACT Alliance	Gender-Based Violence; Climate Resilient Water, Sanitation and Hygiene; Peacebulding; Community Based Teachers Training; and Inclusion of people with disabilities	All of Juba
40	Nile Hope	WASH	All of Juba
41	IAS Water Project	WASH	All of Juba
42	UKaid	Humanitarian aid	All of Juba

Annex II : Team leaders and Supervisors

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