

The Nairobi Urban Health and Demographic Surveillance System: Bringing community voice and evidence to urban health in slum communities



The photo on the left shows Korogocho, Public Space Network, 2020
On the right, the photo shows Korogocho people's park, Nairobi News, 2019

"The Korogocho Peoples Park (KPP) was created by young people previously involved in crime with help from others. The park provides a green and safe space along Nairobi river where we the community works, learns, plays and progresses together."

Resident of Korogocho, 2023

Key messages

- The Nairobi Urban Health and Demographic Surveillance System (NUHDSS) was the first African urban health and demographic site surveillance (HDSS) based in a slum. It seeks to address the health and social needs of urban slum dwellers.
- NUHDSS has generated the information and evidence needed, to strengthen and inform action and change on healthy food systems and green spaces, promoting equity, poverty reduction and climate justice; facilitating the circular economy through reduced use, reuse, and recycling of waste.
- The NUHDSS data and nested studies were used to assess the impacts of interventions, to inform local and national policy-making and programmes to improve community health locally, in Kenya and in other African countries.
- As a tool for community voice and to support governance approaches and collective learning, the NUHDSS platform and process has strengthened the voice and involvement of residents of Viwandhani and Korogocho slums in their health and socioeconomic development bringing community voice in a 'whole of society' approach that recognizes and engages all stakeholders.

Context and challenges

Nairobi is the largest city, and capital of Kenya. The city has experienced high levels of population growth. The population increased almost 12-fold from an estimated 293 000 residents in 1960 to about 3.4 million in 2010 (Kenya National Bureau of Statistics, 2010). The 60-70% of Nairobi residents living in informal settlements and slums experience challenges in their living standards and livelihoods, with limited infrastructural improvements (APHRC, 2002, 2020; UN Habitat, 2008).

The NUHDSS was started by the Africa Population and Health Research Center (APHRC) in 2002. It is one of the first HDSS in Sub-Saharan Africa. Ethical clearance for the NUHDSS was granted at the inception by the Scientific and Ethics Review Unit of the Kenya Medical Research Institute and renewed annually.

NUHDSS was established in Korogocho and Viwandani informal settlements after a cross-sectional survey of slum settlements carried out by APHRC in 2000. That survey highlighted the need for a better and more disaggregated understanding of the socio-economic and health status of the urban slum residents, than available from national surveys.

The survey revealed that people residing in these informal settlements had some of the worst health and socioeconomic outcomes in Kenya (APHRC, 2020). They lacked basic rights and services, including healthy food, clean water, sanitation, health care, education and employment opportunities. With limited local authority presence they faced insecurity, limited land tenure, insufficient or non-existent waste management systems and infrastructure, adding to their food and income insecurity, risk of disease outbreaks, and flooding. These challenges have been further aggravated by climate change (APHRC, 2002, 2020).

The NUHDSS was thus set up to collect information regularly on demographic occurrences such as deaths, births and migrations, health outcomes such as vaccination, morbidity, nutrition, causes of death via verbal autopsy, and socioeconomic outcomes such as education, livelihoods, housing characteristics and marriage. Together with nested studies, the NUHDSS aimed to expose the long term consequences of living in urban informal settlements on socioeconomic and health outcomes, and to assess the impact of government, community and development agency interventions.



The photo on the left shows Peoples Park, Korogocho, Fola Olaleye, Much Ado About Cities, On the right, the photo shows Korogocho, Much Ado About Cities; 2021



The intention was for the platform and process to generate evidence to inform dialogue on and proposals for improved health and livelihoods, to increase access to healthy urban food, and improve waste management systems, especially in the Viwandhani and Korogocho slums. The platform aimed to make the findings available and disseminate them to residents of these two informal settlements, community researchers, planners, policy makers, development agencies, and other local, national and international stakeholders (APHRC, 2020; Amolo D.2023).

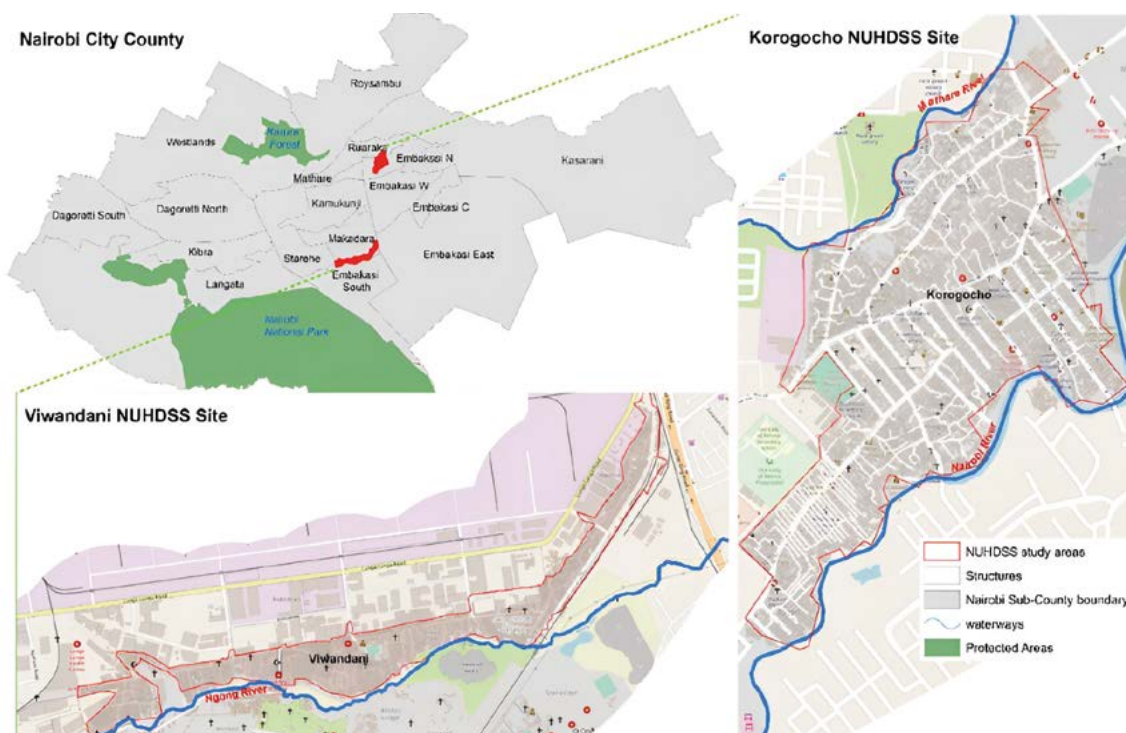
The actions and this involvement of stakeholders called for cross-sectoral co-ordination and action. An [EQUINET conceptual framework](#) outlines the urban responses for food, environments, green spaces and waste management systems as key entry points to foster innovation, collaboration, accountability, literacy and system-wide change to support healthy people, healthy ecosystems and an inclusive, productive, regenerative and circular urban economy (EQUINET, 2023). This case study was thus produced within a series of case studies in EQUINET in east and southern Africa to share practice and learning on integrated urban health systems.

Key areas of intervention and practice

The area covered by the demographic surveillance

Korogocho and Viwandani, the demographic surveillance areas, are the NUHDSS sites. Approximately 7kms apart, each site comprises neighboring villages within the two slums. They were selected by APHRC in consultation with Nairobi City Council and community members from the selected slums, taking into account the evidence from the survey. Having two sites meant that the differences and similarities between them could be assessed and discussed. For example, the survey found that Korogocho had poor health and socio-economic status, while Viwandani had a youthful, migrant and employed population.

Viwandhani was established on land left by the City Council as a river reserve on the banks of Ngong river, in 1973. The river is now heavily polluted by waste from the neighboring industries. The houses in the community are made of iron sheets and tin walls, built in rows, with an average of 6 rooms for rent in each structure. Viwandhani's population, about half of which is in the 20-39 year age group, actively seeks work in the neighboring industrial area. Only 5% of residents were born the site. (APHRC, 2020, UN Habitat 2008).



The area that comprises the NUHDSS. Map credit: Caroline Kabaria, APHRC



"Health issues generally but particularly in slum areas are way beyond just the health sector. . . . The programmatic and political response needs to be more nuanced."
Dr Ezeh, Former APHRC Executive Director

"There was some contamination...for close to a whole week, the pipes that bring water to this area of Korogocho were dirty because they leak when it rains. It was terrible, even the water smelled like sewage. Many people cannot buy other water and do not have kerosene to boil it. It causes sickness and many people have diarrhea."

Korogocho resident 2023

Korogocho, Anza Consortium, Nantonov
- iStock, 2022

Korogocho was created by quarry workers in the 1960/70s, and is the fourth largest informal settlement in Nairobi. The slum is approximately 12km from the Nairobi Central Business District and covers approximately 0.97km². It borders Nairobi's largest dumping site – Dandora. Houses in Korogocho are made of timber and mud walls, roofed with used tin cans and built in rows. There are more than 250 rooms for rent in each hectare of land, making it one of the most congested informal settlements in Nairobi with each rented room housing an average household of three persons. The population has resided there for many years (APHRC 2015, 2020, UN Habitat 2008).

The data collection process

In 2000 NUHDSS commenced as a pilot study by APHRC in consultation with Nairobi City Council and community representatives. All stakeholders were actively involved in the planning and implementation, including in determining the questions. The pilot was scaled up in August 2002 to cover two of Nairobi's largest informal settlements - Korogocho and Viwandhani, with each residential unit and household given a unique ID number (APHRC, 2020). Ethical clearance for NUHDSS was granted by the Kenya Medical Research Institute's Scientific and Ethics Review Unit (SERU-KEMRI) at the beginning of the project and renewed annually.

To build trust and active involvement of the community, local leaders and representatives were involved in planning and implementation. through regular planning meetings where all stakeholders were encouraged to contribute their views, needs, concerns and recommendations.

From July 2010 this process was formalized as the Community Advisory Committee (CAC). APHRC also recruited all supervisors and field interviewers from the local communities, providing employment and research capacities. Community involvement was also bolstered through annual community activities such as school upgrades and free health camps (APHRC, 2020, Amolo, 2023).

After the initial census in 2002, field Interviewers visited every dwelling, household, individual in the demographic surveillance areas every four months between 2003 to April 2017, to collect demographic and health information, including deaths and births, residential status and migration patterns. Households were defined as a group of people who ate from the same pot. From July 2017, this data was collected every 180 days.

To support data quality refresher trainings were provided before each survey, fieldworkers were closely supervised with spot checks and review of all questionnaires, with inconsistencies and errors addressed. The interviewers were trained and provided information to respondents on the process and protection of their individual confidentiality. They obtained informed consent before interviewing respondents. Any new residents were numbered and added to the master list. Every year, interviewers also captured information on livelihoods, housing, amenities and possessions; education level, marriage, employment status, vaccination coverage, pregnancy outcomes, wealth, nutrition, morbidity and health seeking behavior. From 2015, responding to challenges raised from field interviewers and community representatives on data collection, electronic data capture netbooks replaced paper-based data collection (APHRC, 2020).

For demographic information, pregnancy outcome questionnaires captured information on birth circumstances, antenatal care, fertility rates, fertility preferences and contraceptive use among women in the 15-49 age bracket. This explored their challenges, use and access of Reproductive Health/Family planning services. Deaths and the surrounding circumstances were captured in Events History/Status Update and Verbal Autopsy (VA) questionnaires were used. (APHRC, 2020).

The NUDHSS captured the population structure, finding for example that Viwandhani had a higher population of male residents within the 15-64 age group, whereas Korogocho had a larger population of children in the 0-4 age group; and that Korogocho had a more stable population, while Viwandani had more young people coming to Nairobi in search of jobs and other opportunities in the surrounding industries (APHRC, 2020).

Analysis of the data and dialogue on the findings

The NUDHSS was further cleaned, validated and processed electronically by APHRC, to address errors such as out-of-range or unexpected values, and to check and clean analytical files. Electronic data collection made analysis easier, allowing for real-time data quality checks, quality control, and review of evidence gathered (APHRC, 2020).

Analysis of data from NUHDSS indicated that almost 80% of the households in Viwandhani and Korogocho were food insecure, with both child and adult hunger present. Review of child data indicated that 60% of those in the 18-20 months age bracket were stunted and about 23% severely stunted, raising child nutrition as a priority. The highest mortality burden, found in children under five, was attributed to diarrhea and pneumonia. The latter was most prevalent during the rainy and chilly April to June season (APHRC, 2020).



"Korogocho is one of the darkest slums in Kenya, Daniel and Mutura have started teaching the children how to skate and it is bringing them hope and helping them to think of big things.

Resident of Korogocho, 2023

Korogocho Skating Kids, Korogocho, B
Mwangi, 2016



"I teach these ladies karate. You can see my punching bag here. We started training around the same time two elderly women were murdered. There came a well-wisher who was a foreigner and when he heard about the murders the wife volunteered to teach us some few karate moves. We chose to call the program Cucu Jikingo."

Beatrice, an older person living in Korogocho (Arise Consortium, 2023)

Arise Kenya Photovoice, Korogocho, Arise Consortium, 2023

The APHRC, Nairobi City Council and community leaders and representatives from Korogocho and Viwandhani discussed the findings during the regular community advisory committee meetings. The information was presented in different formats for different groups, interests, and levels of technical skills. The formats included reports, articles, research, graphics, radio programmes, education and communication materials and community radio. Through the community and stakeholder engagement there has been growing appreciation that good information results in better decisions, planning, implementation, and improved chances of success.

The information from NUHDSS has been used to actively engage the local communities in their own development by getting their input and amplifying their voices. It has brought community members together to help identify, discuss and prioritize challenges, to learn from each other, and to find and initiate potential solutions to improve their livelihoods in Viwandani and Korogocho. The communities have directly used the information to initiate activities to improve their health and wellbeing, such as those described in this brief.

APHRC, as part of its corporate social responsibility, has bolstered community engagement by organizing annual community activities such as school upgrades, building toilets, organizing school fees funding events for needy students, organizing events for youth to showcase their creativity and providing free health camps (APHRC, 2020; Amolo, 2023). In 2010, in partnership with Kenya Diabetes Management and Information Centre and the City Council of Nairobi, APHRC through the rapid results initiative established 10 clinics to improve and prioritize cardio-vascular disease management in its Primary Healthcare Facilities, some in the environs of Korogocho and Viwandani.

So far 6 clinics are still active, each catering for about 200 patients monthly, with all new diagnosed patients also being signed up to a local support group. Additionally, the patient support groups from Korogocho and Viwandani established community-based organizations to manage a revolving fund for drugs that gives community members access to CVD treatment and a months' worth of drugs (APHRC, 2020). In 2012, APHRC negotiated with a Partnership for Maternal, Newborn and Child Health to upgrade and equip 5 private not-for-profit clinics to cater for emergency obstetric care and to provide two ambulances for referrals in both Korogocho and Viwandani (APHRC, 2020).

The NUHDSS has been used by the government and development organizations to initiate interventions on healthy food systems, green spaces, waste management and living conditions that have the potential to reduce poverty. It has guided and informed projects, policy and programme formulation and implementation, and has been used to monitor their progress and assess their impact within Viwandani and Korogocho (APHRC, 2020, Amolo D. 2023). In 2005 Kenya's national maternal mortality ratio was estimated to be 560/ 100 000, while maternal mortality ratio for Korogocho and Viwandhani from January 2003 - December 2005 was found to be higher at 706 deaths per 100,000 live births (APHRC, 2020).

During the community advisory committee meetings, community representatives and leaders raised concerns about child mortality and maternal death as a key area for action and redress. Surveys and processes were jointly created to respond to this concern and collect the information needed to better understand and address it.

In 2005, based on this data, a voucher scheme was piloted by the Government of Kenya in Viwandhani and Korogocho to support uptake of family planning services, antenatal and postnatal care, safe deliveries and gender-based violence recovery services, with the scheme now planned for extension to other areas. In 2008, in partnership with UN HABITAT and the Italian Government, Kenya's Ministry of Local Government selected Korogocho to be one of the sites selected for a big slum-upgrading programme.

Mechanisms for dialogue, co-production and review

As earlier described, APHRC has ensured that there is active community representation, participation and engagement in the NUHDSS process. This has been achieved by making sure that community nominated leaders and representatives - including village elders and chiefs - are present and actively involved in all discussions and decisions made about the NUHDSS platform and process.

From July 2010 this convening of stakeholders was formalized as the Community Advisory Committee, that has met regularly to discuss NUHDSS implementation and findings. Its membership includes representatives from villages in the two sites, APHRC representatives and special interest groups including youth, women, media representatives, people living with disabilities, older persons, religious groups, educators, community health workers as well as the local administration. The committee has encouraged transparency through a full access to information/ disclosure policy, and accountability, through delegation, follow up and feedback. The Community Advisory Committee brought community voices, concerns, priorities and recommendations to the NUHDSS.

All information collected has been made freely available on the APHRC Microdata Portal for internal and external use, including through formal publications. APHRC is part of iSHARE, the INDEPTH network's Sharing and Accessing Repository initiative that allows for the NUHDSS data to be shared widely and freely across sites for use by policy makers and researchers across the region interested in evidence generation. Additionally, there is also a [web platform](#) developed by APHRC that allows online requests of meta data files from NUHDSS and other research projects (APHRC, 2020).

Outcomes and future plans

The NUHDSS platform has also created a foundation for specialized nested studies to make clearer the drivers of intra-urban and intra-slum populations health inequalities among the vulnerable including youth, women, children and the elderly. It has also enabled the monitoring and evaluation of the impact of programmes and interventions within the two informal settlements, by the community, government and other agencies (APHRC, 2020, Amolo D. 2023).

The stakeholders involved have also used the data to assess progress on the Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs) within Nairobi's informal settlements, including on: access to healthy urban food, poverty, waste management, sanitation, access to safe drinking water and healthy green spaces (APHRC, 2020). Information from the NUHDSS was used, for example, to draft a paper, 'Discourses of illegality and exclusion: When water access matters', that presented how residents of Viwandha and Korogocho dealt with water access challenges. This paper was used by the community members, the Nairobi City Council and development agencies as a source of information and guidance in their slum upgrading initiatives (APHRC, 2020).

The NUDHSS evidence has been used to improve services, such as the reproductive health and health service interventions noted earlier. NUDHSS evidence and its discussion was used to inform the implementation in the two slums of a government Alternative Provision to Basic Education project providing free primary education through non-formal schools.

While NUDHSS data suggests that the programme increased access to education in the informal settlements, there are still challenges such as poorly trained teachers, lack of access to safe and clean water, lack of toilets and waste disposal facilities, healthy meals, recreation facilities and a safe learning environment (APHRC, 2020). In the two settlements, NUDHSS evidence informed in 2015 a testing and counselling policy for minors under 18 years that did not require guardian or parental approval (APHRC, 2020), an impact evaluation of a 'DREAMS' initiative on prevention of HIV in adolescent girls and young women (APHRC, 2020), and a Human Milk Bank initiative in 2019 on infant feeding among the urban poor (APHRC, 2020).

The evidence and outcomes have also been shared internationally through scientific papers in peer-reviewed journals, and comprehensive reports feeding into urban policy dialogue, such as on the connections between migration and adult mortality. It has also been shared in EQUINET's urban health programme and in the Accelerating City Equity (ACE) Project of the International Society for Urban Health.

The NUDHSS has been in existence since 2002 and continues to be managed by the APHRC. After almost two decades of surveillance, APHRC is currently undertaking a deep and detailed review and reflection process of the NUHDSS to better understand, convey, and continue to enhance what the platform has achieved, its value-for-money, and utilization of its evidence, especially in improving the livelihoods, health and wellbeing of populations in informal settlements (APHRC, 2020, Amolo 2023).



Korogocho Before



Korogocho After

Streets of Korogocho; Nairobi, Kenya- Korogocho Slum Upgrading Program (KSUP) - The Street Upgrading Project. Global Design Cities Initiative., undated. KSUP was set up to address the challenges of bad drainage, poor access roads, inadequate street lighting, poor water services and poor waste management and sewage systems using integrated participatory planning processes as a method for resilient slum-upgrading



Photos left and right: Korogocho, Nairobi News, 2019

Areas for shared learning

Capacities, challenges and responses

The management of the NUHDSS platform and processes by APHRC and the role of the community advisory council bring multiple capacities and resources to the process. It has also helped to sustain the process over a long period and to build partnership with multiple agencies from the local council, government and international agencies. The platform itself has provided evidence to support advocacy on and lever resources for interventions in the two slum areas, integrating views and priorities of the local community with technical and other inputs.

There are challenges. Insecurity in the informal settlements has hindered the ability of the field team to reach some sites or residents who were unavailable during normal working hours. To respond to this, the team recruited local security who were trusted and well known by the community. It was difficult to monitor movement of residents who are highly mobile, within and between slums, affecting accuracy of information. The shift to an Electronic Data Capture tablet in 2015 made it easier to track these movements.

Some responders (less than 2%) became tired of the process due to the repetitive nature of the data collection and their inability to see personal benefits of the exercise, as the benefits were largely at community level. The team actively addressed this by building strong relationships with the community. They also recruited field interviewers from the local communities and ensured community involvement in planning and decisions through the leaders/representatives in the community advisory committee. Visible changes and annual events such as free medical camps and school upgrading helped to link respondents to the benefits of participation.

Features and learning for holistic, integrated approaches

The NUHDSS platform and processes align with several elements of the EQUINET conceptual framework for integrated approaches to urban health, as also shown in *Figure 1*. It has provided the information and evidence needed to create and implement interventions that produce healthy food systems and green spaces, that promote and protect equity and tackle poverty and support governance approaches and collective learning. On the latter, they have creating mechanisms and an enabling environment for community, council, government and technical stakeholders to actively participate, share, learn, discuss and collaborate on efforts to improve livelihoods.

Figure 1: A representation of the EQUINET conceptual framework and the areas covered by the NUHDSS

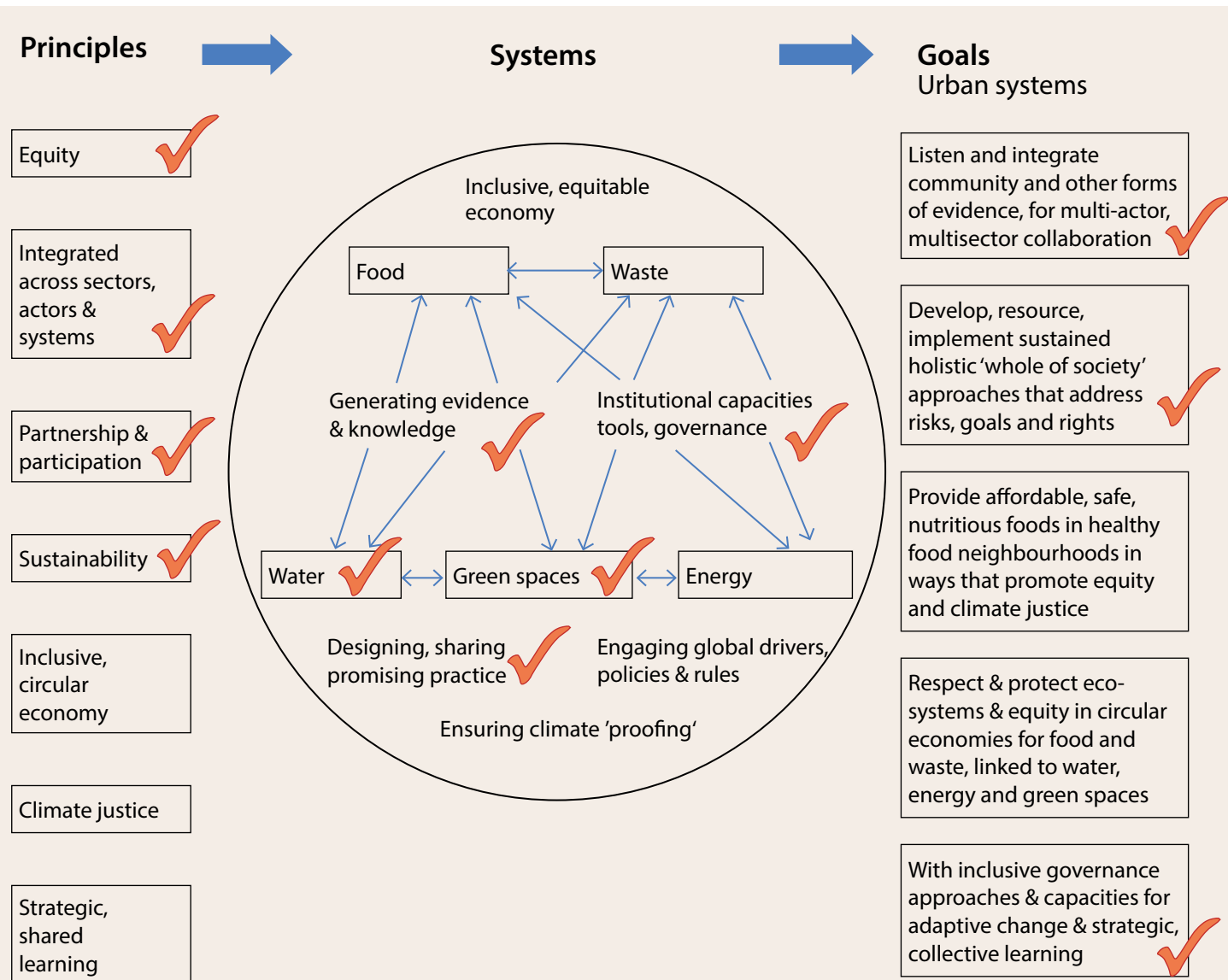


Figure source: EQUINET, 2023

The platform structure that is based on principles of equity, participation, accountability, transparency, information and progress creates an avenue for the community voice and message to be better heard, understood and equally considered. In particular, actively integrating community concerns and contributions into the process of data generation and use has allowed the community to actively engage in their own development, including in the promotion of service and social responses.

The system uses a 'whole of society' approach, involving the myriad of stakeholders and interests in addressing health and socioeconomic issues and outcomes in the informal settlements in Nairobi.

The initiative shows that relevant, well researched data is an invaluable resource. It is essential for effective planning and implementation of activities and for assessing the impact of those interventions, while enabling learning and improvement. The scale of deficits and demand for response calls for more than single surveys and for more than aggregate data.

The NUHDSS as a sustained initiative has facilitated the analysis of the long-term health and socio-economic conditions of those living in urban informal settlements and for the more sustained assessment of the impact of government, community and development agency interventions.

The platform and process is a resource for wider, sustained and disaggregated analysis of urban health interventions, with potential, as yet unused to show the links to circular economies and climate justice. It is a resource not only for the two local areas involved, but also for others in the region and internationally, given access to and dissemination of its evidence and reports.

The NUDHSS is a resource that clearly recognizes and seeks to address inequalities; and that actively engages, empowers and learns from and with the community, while bringing other stakeholders on board to support evidence-based policy and development interventions.



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