REPUBLIC OF KENYA

Kenya Health Service Delivery Indicator Survey 2018 Report

May 2019

Report No: 2


UIMA WA IVETI
NA SYANA
COUNTY: KITUI.
DISTRICT: MWINGI CENTRAL.
DIVISION: WAITA. LOCATION: ENDUI.
SUB-LOCATION: KATITIKA. TOTAL VILLAGES: 27.
NAME OF CU: ENZIU COMMUNITY UNIT. NUMBER OF CHWs
Funded by:
EUROPEAN UNION
wda
wikivuvwa development action
IMPLEMENTED BY:
MINISTRY OF HEALTH
AMREF
ENZIU COMMUNITY CHWIS CHALKBOARD
INDICATOR
J F M A M J J A S O N D
No. of households
Total Population
Total women 15-49years
Total children 0-6months
Total children under 1year
Total children under 5years
Adolescent and youth girls 13-24years
Adolescent and youth boys 13-24years
Total Population of elderly-60+years
No. of households not treating water
No of households not using ITNs
No of household without functional latrines
Total Pregnant women
No. of Pregnant Women Who have attended atleast 4+ ANC visits
No. of Pregnant women referral
No. of Pregnancies under 18years
No. of deliveries by unskilled attendants
No. of births
No. of children not fully Immunized
No. of immunization defaulters traced
INDICATOR
J F M A M J J A S O N D
No. of children not de-wormed
No. of children-6months not exclusively breastfed
No. of SEVERE Malnutrition cases referred
No. of Moderate Malnutrition cases referred
No. of fever cases Managed
No. of diarrhoea cases Managed
No. of injuries and wounds managed
Total No. of cases referred
No. of People who do not know their HIV status
No. of elderly persons who had routine check ups
No. of dialogue days
No. of community action days
No. of Meetings with CHCs
No of deaths
<1year
1-5years
Maternal
Other deaths
Total deaths
No. of households without Potable food
Male
Female

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ACRONYMS

AERC	African Economic Research Consortium
AfDB	African Development Bank
BEmONC	Basic Emergency Obstetric and Neonatal Care
CEmONC	Comprehensive Emergency Obstetric and Neonatal Care
CHMT	County Health Management Team
CoK	Constitution of Kenya
CWIQ	Core Welfare Indicators Questionnaire
DTP	Diphtheria-Pertussis-Tetanus
FP	Family Planning
Hep-B	Hepatitis B
HFA	Health Facility Assessment
Hib	Haemophilus influenzae type b
HW	Health Workers
IMCI	Integrated Management of Childhood Illnesses
IMNCI	Integrated Management of Newborn and Childhood Illnesses
IUD	Intra-uterine Devices
KEHP	Kenya Essential Health Package
KEML	Kenya Essential Medicine List
KHSSP	Kenya Health Sector Strategic Plan
KIHBS	Kenya Integrated Household Budget Survey
KNBS	Kenya National Bureau of Statistics
LSMS	Living Standard Measurement Survey
MoH	Ministry of Health
NCPD	National Council for Population and Development
NHIF	National Hospital Insurance Fund
PCS	Patient Case Simulation
PETS	Public Expenditure Tracking Survey
QSDS	Quantitative Service Delivery Survey
SAS	Staff Absence Survey
SDI	Service Delivery Indicators
STG	Standard Treatment Guidelines
UNICEF	United Nations Children's Fund
WMS	Welfare Monitoring Survey
WHO	World Health Organization

ACKNOWLEDGEMENTS

This Kenya Health SDI report has been prepared in consultation with the Government of Kenya under the leadership of Ministry of Health (MOH) with technical guidance of Waly Wane (SDI Program Manager and co-TTL), Jane Chuma (Senior Health Economist and TTL for Kenya Health portfolio and SDI report co-TTL), Paolo Belli (Program Leader AFCE2), Antony Francis Mveyange (Consultant), Ivo Njosa (ICT Consultant). The authors of the report are Ashis Kumar Das (Consultant) and Miriam W Oiro Omollo (Consultant).

The team also benefited from the leadership of Dr. Josephine Kibaru Mbae, Director General, National Council for Population Development (NCPD), and analytical inputs of NCPD staff including Peter Nyakwara, Catherine Ndei, Francis Kundu, Daniel Fundi Mureithi, Samuel Lubanga, Benard Kiprotich, and James Macharia. The Ministry of Health (MoH), through Dr. Abel Nyakiogora and Dr. Peter Mbugua also contributed to the analysis and provided policy interpretations of the findings, with Dr. Valeria Makory as the Project Coordinator.

The team appreciates the collaboration with the Council of Governors, who facilitated the link with the counties, the Kenya National Bureau of Statistics (KNBS) for the technical assistance in the sampling of health facilities through John Kibet Bore. Appreciation is also extended to Senior Task leaders from the MoH and NCPD, who provided technical assistance to field teams, team supervisors and enumerators. We also acknowledge ICT support teams who helped in addressing ICT challenges during data collection. Gratitude also goes to the health personnel from all 47 counties, who responded to the interviews.

The team is grateful for the insights of several peer reviewers, including Ian Forde (Senior Health Specialist), Jeremy Veillard (Senior Health Specialist), and Laura Di Giorgio (Economist/Young Professional), and Felipe Jaramillo (Country Director for Kenya, Rwanda and Eritrea), provided overall guidance.

The team thanks the SDI management team Roberta Gatti (Chief Economist HD VP), Ciro Avitabile (Senior Economist) and Magnus Lindelow (Practice Manager, GHN01) for their support.

The views expressed in this publication are those of the authors. The findings, interpretations and conclusion expressed herein do not necessarily reflect the views of the World Bank Group, its Board of Directors or the countries they represent.

Finally, the team gratefully acknowledges the financial support from the World Bank, and William and Flora Hewlett Foundation, and the United Nations Population Fund (UNFPA).

EXECUTIVE SUMMARY

The Service Delivery Indicators (SDI) provides a set of key indicators that benchmark service delivery performance in the health and education sectors in Sub-Saharan Africa. The overarching objective of the SDI is to ascertain the quality of service delivery in basic health services and primary education. This would in turn enable governments and service providers alike to identify gaps and bottlenecks, as well as track progress over time, and across countries. The broad availability, high public awareness, and a persistent focus on the indicators that SDI provide, will help mobilize policymakers, citizens, service providers, donors and other stakeholders to take the necessary steps to improve the quality of service delivery, and thereby improve development outcomes.

The SDI Health survey team visited a sample of 3,094 health facilities across Kenya between March and July 2018. The 2018 Kenya SDI is the largest to date. The sample was composed of 1,781 public facilities and 1,313 private facilities. The survey team observed 13,026 workers for absenteeism and assessed 4,430 health workers for competence using patient case simulation. The data collected are representative of the 47 counties, of facility location i.e. urban/rural areas, facility ownership i.e. public/private, and level of facility i.e. first level hospital/health center/dispensary and clinic. The health workers were broken down into three categories: (i) doctors (specialist and general medical doctors), (ii) clinical officers, and (iii) nurses.

This report presents the results from the implementation of the second SDI survey in the health sector in Kenya. A unique feature of the SDI surveys is that it examines the production of health services at the frontline from the perspective of beneficiaries accessing services. The production of health services requires three dimensions of service delivery: (i) the availability of key inputs such as drugs, equipment and infrastructure; (ii) providers who are skilled; and (iii) providers who exert the necessary effort in applying their knowledge and skills. Successful service delivery requires that all these elements be present in the same facility at the same time. While many data sources provide information on the average availability of these elements across the health sector, the SDI surveys allow for the assessment of how these elements come together to produce quality health services in the same facility simultaneously.

What service providers know?

- Health providers in Kenya could correctly diagnose about two-thirds (67.5 percent) of the four tracer conditions.[1]
- Diagnostic accuracy rate varied across case conditions, ranging from 97 percent accuracy for pulmonary tuberculosis to 32 percent for severe dehydration.
- Doctors and clinical officers correctly diagnosed about three-fourths (75.9 and 74.1 percent respectively) of all the tracer conditions. Nurses correctly diagnosed only 60.1 percent.
- Higher level facilities (first level hospitals) correctly diagnosed more of the tracer conditions with a score of 75.7 percent. This was followed by health centers (68.3 percent) and dispensaries (64.3 percent).
- Adherence to clinical guidelines in the management of the four tracer conditions was at 43.5 percent. The lowest was in dispensaries and clinics (41.2 percent), followed by health centers (43.6 percent) and hospitals (49.7 percent).

[1] Tracer conditions include two child conditions (i) severe dehydration caused by diarrhea, and (ii) pneumonia, and two adult conditions (i) pulmonary tuberculosis and (ii) diabetes mellitus (type II) the first a communicable disease and the second a chronic condition. A third child condition malaria with anemia, which was done in the 2012 Kenya SDI and is included in all SDIs has been omitted.

- Doctors adhered to more of the clinical guidelines (51.5 percent) followed by clinical officers (47.6 percent) and nurses (38.4 percent).

What service providers do?

- Outpatient caseload was high with the average health worker seeing on average 13.3 patients per day.
- Public facilities had a higher daily caseload at 17.5 patients per provider per day than private (8.4).
- Absence rate was 52.8 percent during an unannounced visit with public sector absenteeism at 56.7 percent compared to 47.5 percent in the private sector.
- Doctors had the highest absenteeism rate of 60.7 percent followed by nurses (54.5 percent) and clinical officers (49.5 percent).

What service providers have to work with?

- 54.1 percent of priority drugs were available in Kenyan facilities. Rural facilities had a slightly higher availability of priority drugs (55.3 percent) compared to urban facilities (51.6 percent).
- Priority drugs for mothers were less available than drugs for children with average scores of 34.6 percent and 62.3 percent respectively.
- About 70 percent of health facilities provide immunization services, 62.5 percent stock vaccines, of which 89.1 percent have a refrigerator in working condition. 62.3 percent of all vaccines were available in those health facilities.
- Half (50.9 percent) of health facilities in Kenya met the minimum medical equipment requirements. First level hospitals were typically better endowed in equipment (78.7 percent), followed by health centers (66.8 percent), and then dispensaries and clinics (46.1 percent). The county of Meru had the best score (73 percent) and Marsabit scored lowest at 8 percent.
- 74.6 percent of health facilities had at least one of the three forms of communication equipment (phone, radio or computer). Cell phones paid by the facility were the most widely available piece of equipment, followed by computers and personal cell phones. There was a large gap in the availability of computers in rural and urban facilities. Only 31.7 percent of rural facilities had computers compared to 66.4 percent of urban facilities.
- 72.9 percent of the health facilities had access to all three types of basic infrastructure such as toilets, clean water and access to electricity. There were large differences between urban (83.7 percent) and rural (67.8 percent) as well as private (82.1 percent) and public (64.9 percent) facilities. Kiambu county scored highest (94 percent) and Tana River scored lowest (27 percent) on the availability of all three types of infrastructure.

What does this mean for Kenya?

Kenya's progress in achieving key maternal, infant, and child health targets has been slow as set out in key national policy documents. For Kenya to make rapid progress towards Universal Health Coverage, a health system needs to have skilled human resources, minimum inputs such as drugs, commodities and infrastructure, financing, leadership and governance, and health information systems. Comparing with the previous round of SDI Survey, it would seem that almost all indicators show a decline except infrastructure. While the reasons for decline need to be investigated further using additional research, and at least some of the difference may be driven by methodological

improvements between the two survey rounds, recent evidence suggests that devolution of health sector to counties could be a possible reason.[2-3] After the devolution, there was a concerted effort by the county governments on improving the facility infrastructure. This is substantiated by the increase in the infrastructure indicator in this survey.

Availability of skilled human resources for health (HRH) remains a major bottleneck to improving quality of care. In addition to increasing the volume of health workers to address the shortage of providers, improvements in management, supervision and training are critical to ensure quality health service delivery by a skilled HRH base. The survey found that provider knowledge and abilities are very low to deliver quality services. Training (both pre- and in-service) needs to be better focused with the main objective of capacitating health workers to accurately diagnose and treat the main causes of illness as well as to have the skills to refer complicated cases up to higher levels of care. There should also be a concerted emphasis on adhering to the national guidelines as far as managing critical health conditions is concerned.

High staff absenteeism is a barrier to achieving health goals. Apart from having the requisite number of skilled staff in place, the staff should be available in the facilities to provide services. During the unannounced visit, more than half of clinical staff were absent. In fact, most of these absences were approved. The county governments should ensure establishing systems for tracking staff availability during facility operation hours to reduce absenteeism. Secondly, rational approval of staff leaves can be undertaken by the facility heads or county health managers so as not to interfere with efficient service delivery.

Inputs are important and the lack of medical equipment, drugs and vaccines in facilities are concerning. Basic equipment as mandated by the Government, is not available at half of health facilities. This is alarming given the fact that most of the population accesses care at a public primary health facility. Only about half of the essential drugs are available. Drug availability, particularly for mothers is quite poor. Similarly, only less than two-thirds of the necessary vaccines are available.

Equitable access to quality health services remains a key challenge. While there has been some progress in Kenya's health sector, more can be done to improve service delivery. Like many countries, Kenya faces an inequitable geographic distribution of service quality. Competent health workers and infrastructure availability are better in urban areas.

Client satisfaction is high, but clients still pay for family planning services. A fifth of the family planning clients report of paying for services that are supposed to be provided free of cost including public facilities. Strong advocacy and verification measures have to be taken by the counties to ensure that clients specifically from lower socio-economic profiles are not deterred by costs of services.

[2] Kimathi, L. (2017).
[3] Mugo et al. (2018).

Table 1: Kenya SDI At-A-Glance

	Kenya	Public	Private	Urban	Rural	First level hospital	Health center	Dispensary and clinic
Caseload (per provider per day)	13.3	17.5	8.4	10.5	14.6	11.3	12.4	13.6
Absence from facility (% providers)	52.8	56.7	47.5	55.7	49.7	60.4	52.1	44.5
Diagnostic accuracy (% clinical cases)	67.5	68.5	65.9	70.2	65.9	75.7	68.3	64.3
Adherence to clinical guidelines (% clinical cases)	43.5	46.2	41.8	43.6	43.2	49.7	43.6	41.2
Management of maternal and neonatal complications (% clinical cases)	34.5	36.0	32.0	35.3	34.0	40.3	35.0	32.3
Drug availability (% drugs)	54.1	55.5	52.6	51.6	55.3	75.8	59.6	51.7
Equipment availability (% facilities)	50.9	42.4	60.6	61.7	45.8	78.7	66.8	46.1
Infrastructure Availability (% facilities)	72.9	64.9	82.1	83.7	67.8	89.5	82.2	70.1

Table 2. SDI Country Comparisons[4]

	Countries' average	Kenya (2018)	Sierra Leone (2018)	Madagascar (2016)	Mozambique (2015)	Niger (2015)	Tanzania (2014)	Nigeria (2013)	Togo (2013)	Uganda (2013)	Kenya (2012)
Caseload (per provider per day)	7.9	13.3	10.0	5.2	17.4	9.8	7.3	5.2	5.2	6.0	9.0
Absence from facility (% providers)	29.1	52.8	31.2	27.4	23.9	33.1	14.3	31.7	37.6	46.7	27.5
Diagnostic accuracy (% clinical cases)	48	67.5	44.5	30	58.3	31.5	60.2	39.6	48.5	58.1	72.2
Adherence to clinical guidelines (% clinical guidelines)	33.8	43.5	30.2	31	37.4	17.5	43.8	31.9	35.6	41.4	43.7
Management of maternal and neonatal complications (% clinical guidelines)	22.7	34.5	31.2	21.9	29.9	12	30.4	19.8	26	19.3	44.6
Drug availability (% drugs)	53.2	54.1	56.0	48	42.7	50.4	60.3	49.2	49.2	47.2	67.2
Equipment availability (% facilities)	58.5	50.9	56.2	62	79.5	35.9	83.5	21.7	92.6	21.9	76.5
Infrastructure availability (% facilities)	37.6	72.9	47.7	28.4	34	13.3	50	23.8	39.2	63.5	56.9

Note: There are some methodological sampling differences for SDI surveys prior to 2013 that might make simple comparisons less straightforward (see Annex E for more details)

[4] https://www.sdindicators.org/

I. INTRODUCTION

The Government of Kenya (GoK) is committed to achieving universal health coverage (UHC) by 2022. UHC is a situation where all people receive quality services when needed (promotive, preventive, curative and rehabilitative health services), without being exposed to financial hardship. The Constitution of Kenya (2010) provides the foundation and legal framework for UHC since it ensures a rights-based approach to health services delivery in the country. It stipulates that every Kenyan has a right to the highest standard of attainable health and that no person shall be denied emergency medical services.

Box 1: Why focus on Service Delivery?

Health service delivery—unlike other services such as water and sanitation or housing in which service delivery models are technology or infrastructure intensive—is fundamentally different. Specifically, health service delivery has human resource intensive service delivery models. SDI therefore focuses on frontline service delivery and provider behavior because of the unique aspects of service delivery in the sector:

- The labor intensive and transaction intensive nature of the health sector's service delivery model.
- The highly discretionary nature of work effort determining whether a nurse presents for work 24/7, often in tough working conditions.
- Nurses and doctors are intrinsically motivated, but that institutional incentives attenuate or undermine this motivation.
- The asymmetry of information—between policymakers and providers, as well as between communities and providers—is particularly acute in the health sector.
- A second order result of how planning takes place is the dominance of the "WHAT" rather than the "HOW" of service delivery.

The Constitution further delineates the functions of the National and County Governments in the provision of health services to the nation. Kenya's economic blue print "Kenya Vision 2030: A globally competitive and Prosperous Kenya", equally reinforces this constitutional requirement since it seeks to improve the livelihoods of Kenyans through the provision of an efficient and high-quality health care system with best standard. The management of the health care system and funds are devolved to the county level and there is a deliberate shift from curative to preventive health care.[5] Kenya's Health Policy 2013-2030 in response to the Constitution of Kenya and Kenya Vision 2030 formulates policies, principles and orientations that facilitate the development of comprehensive health investments, plans, and service provision within the devolved healthcare system.

Despite this progress in ensuring that health system is devolved in order to ensure equity in distribution of health services and interventions, the health outcomes are yet to converge to meet the set policy targets, for example, the country has a life expectancy at birth of males and females of 64 and 69 years respectively[6] against a national policy target of 79 years. Poor health services affect

[5] Kenya Vision 2030: A globally competitive and prosperous Kenya.
[6] https://www.who.int/countries/ken/en/

economic growth as well as the ability of households to increase their incomes. Insufficient access to contraception, along with lower levels of female education, job opportunities, and empowerment, results in high fertility, which leads to a vicious cycle, as it strains public service delivery, constrains women's time and empowerment, and limits the resources available to invest in individual children. Labor lost to poor health lowers farm productivity, particularly in labor-intensive agricultural activities. Health shocks also limit households' ability to save and invest, including in income-generating assets. In addition, Kenya has extremely high out-of-pocket expenditures. This burden falls disproportionately on the poor, as out-of-pocket health payments are regressive, and the poor are more likely to forgo health care.

The SDI provides information on service delivery and provider behavior, which lays a foundation for monitoring capacity of the health system to provide quality services to Kenyans under the UHC. The foundation for delivering on health and healthcare goals depends on whether service delivery fundamentals are in place: Are health providers knowledgeable and skilled? Are they present at work? Are basic inputs available such as equipment and drugs?

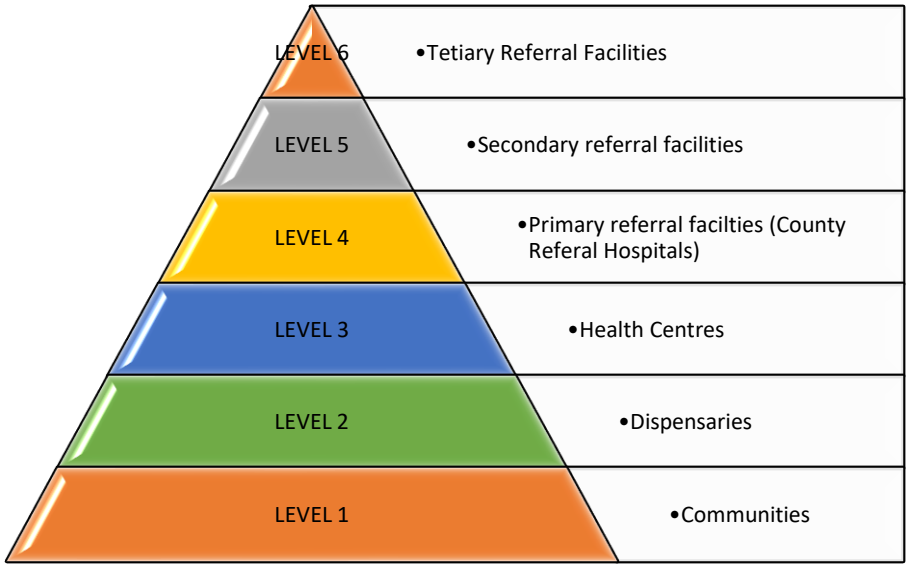
The SDI survey is essentially a return to the basics by shining light on these fundamentals. Service delivery literature points towards the importance of functional health facilities, and more generally, the quality of service delivery.[7] Nurses and doctors are an invaluable resource in determining the quality of health services. The literature has not always drawn links between systems investments and the performance of providers, arguably the ultimate test of the effectiveness of investments in systems.[8] The literature is, however, clear that conditional on providers being appropriately skilled and exerting the necessary effort, increased resource flows for health can have beneficial health and education outcomes.[9]

Organization of Health Sector in Kenya

The Kenya Health Sector Strategic Plan (KHSSP II 2005-2010) introduced the Kenya essential package for health (KEPH), which is defined to have six levels of curative and preventative services as shown in Figure 1. Community health services ensure that the communities are involved in the health development issues. Primary care services are made up of dispensaries, health centers and nursing homes both public and private facilities. The primary referral services include county referral hospitals, while level five and six facilities are secondary and national referral hospitals respectively. Health care promotion and prevention services are delivered from level 1 to 3 facilities; levels 4 to 6 provide both preventive and curative services.

7 Spence and Lewis (2009).
8 Swanson et al. (2012).
9 Spence and Lewis (2009).

Figure 1: Levels of service delivery in Kenya



Source: KHSSP 2013-2017

The health sector in Kenya is one of the devolved functions according to fourth schedule of the Constitution of Kenya 2010. The National government is responsible for enacting health policies and managing the National referral health facilities. It is also responsible for building the capacity and providing technical assistance to counties. County governments are accountable for: (a) county health facilities and pharmacies; (b) ambulance services; (c) promotion of primary health care; (d) licensing and control of undertakings that sell food to the public; (e) veterinary services (excluding regulation of the Profession); (f) cemeteries, funeral parlors and crematoria; and (g) refuse removal, refuse dumps and solid waste disposal. The delineation of the roles of the National and County Government in the health sector therefore makes it possible to determine who is responsible for devising policy recommendations and taking action to remedy issues found by the study. It is of note that SDI covered facilities in levels 2 to 4.

On health financing, the National Government through the National Treasury disburses funds through the Division of Revenue Bill (DORB) to each county. The County Governments receive funds from the National Government in the form of: equitable share, conditional grants and grant from development partners. The counties then develop their own annual budgets and appropriations bills using the laid down procedures. It is from the annual budgets that counties finance the health sectors. County Governments also generate own source revenue (OSR) as stipulated by Article 209(3) of the Constitution of Kenya (2010), which allows counties to impose property tax, entertainment taxes and any other tax authorized by an Act of Parliament. The Public Finance Management (PFM) Act 2012 provides the guidelines for management of county revenues.

Box 2: The Service Delivery Indicators (SDI) Program

A significant share of public health spending should contribute to good health outcomes. Understanding what takes place at these frontline service provision centers is the starting point in establishing where the relationship between public expenditure and outcomes is weak within the service delivery chain. Knowing whether spending is translating into inputs that health providers have to work with (e.g. basic equipment in health facilities), or how much work effort is exerted by health providers (e.g. how likely are they to come to work), and their competency would reveal the weak links in the service delivery chain. Reliable and complete information on these measures is lacking, in general.

To date, there is no robust, standardized set of indicators to measure the quality of services as experienced by the citizen in Africa. Existing indicators tend to be fragmented and focus either on final outcomes or inputs, rather than on the underlying systems that help generate the outcomes or make use of the inputs. In fact, no set of indicators is available for measuring constraints associated with service delivery and the behavior of frontline providers, both of which have a direct impact on the quality of services that citizens are able to access. Without consistent and accurate information on the quality of services, it is difficult for citizens or politicians (the principal) to assess how service providers (the agent) are performing and to take corrective action.

The SDI provides a set of metrics to benchmark the performance of health clinics in Africa. The indicators can be used to track progress within and across countries over time, and aim to enhance active monitoring of service delivery to increase public accountability and good governance. Ultimately, the goal of this effort is to help policymakers, citizens, service providers, donors, and other stakeholders enhance the quality of services and improve development outcomes.

The perspective adopted by the indicators is that of citizens accessing a service. The indicators can thus be viewed as a service delivery report card on health care. However, instead of using citizens' perceptions to assess performance, the indicators assemble objective and quantitative information from a survey of frontline service delivery units, using modules from the Public Expenditure Tracking Survey (PETS), Quantitative Service Delivery Survey (QSDS), and Staff Absence Survey (SAS).

The literature points to the importance of the functioning of health facilities and more generally, the quality of service delivery. The service delivery literature however is clear that, conditional on providers being appropriately skilled and exerting the necessary effort, increased resource flows for health can indeed have beneficial education outcomes.

The SDI initiative is a partnership of the World Bank, the African Economic Research Consortium (AERC), and the African Development Bank to develop and institutionalize the collection of a set of indicators that would gauge the quality of service delivery within and across countries and over time. The ultimate goal is to sharply increase accountability for service delivery across Africa, by offering important advocacy tools for citizens, governments, and donors alike; to work toward the end goal of achieving rapid improvements in the responsiveness and effectiveness of service delivery.

More information on the SDI survey instruments and data, and more generally on the SDI initiative can be found at: www.SDIndicators.org and www.worldbank.org/sdi, or by contacting sdi@worldbank.org.

II. METHODOLOGY AND IMPLEMENTATION

A. Implementation

The SDI survey interviewed 3,094 heath facilities across Kenya between March 2018 and July 2018. A total of 13,026 workers were observed for absenteeism, 4,430 health workers were assessed with clinical cases and 3,171 family planning clients were interviewed for their satisfaction on services. There were 161 first level hospitals, 484 health centers and 2,449 dispensaries and clinics. Within the sample, there were 1,781 public facilities and 1,313 private facilities across Kenya. Further, there were 2,274 rural and 820 urban facilities. The data collected are also representative of the counties, urban and rural areas strata.

B. SDI survey instruments

SDI uses a set of instruments to collect data and compute indicators. The instrument consists of 4 modules each of which captures specific information and is directed to the person(s) in the facility who is best informed and able to provide the relevant information. In Kenya, an additional module to assess the family planning clients' satisfaction and cost of services was included.

Table 3: SDI Health survey instrument description

Module of Instrument	Module Title	Main respondent	Description
Module 1	Facility information	Head of facility	Information about the facility's: functioning, infrastructure, equipment, materials, supplies, and tracer drugs.
Module 2A and 2B	Health Worker Roster	2A: Head of facility 2B: Selected medical staff	2A: Administered to head of facility to obtain a list of all health workers. 2B: Administered to randomly selected health workers to measure absence rates and to collect information about worker characteristics.
Module 3	Clinical knowledge assessment	Medical staff	Administered to medical personnel who regularly treat patients to evaluate their competency in the diagnosis and treatment of routine pathologies. Done using vignettes.
Module 4	Facility finances and governance	Head of facility and accountant (where relevant)	Collection of information about revenues, expenditures, management, governance, and drug provision for the facility.
Module 5	Family planning (FP) client exit	FP Client	Client satisfaction with FP services. Costs incurred in accessing the FP services.

Module 1 captures general information about the facility such as the availability of equipment or infrastructure. The module is also the vehicle to check for the availability of commodities, check whether the cold chain is in place and working, among others. An important aspect to note is that the information collected is verified by the enumerator. For instance, the infant scale must be seen and tested, a specific drug must be seen and the expiration date verified. On the cold chain the team does not rely on the temperature shown on the fridge instead they carry their own thermometer to measure the fridge temperature. Module 4 on the facility's financing, management, and governance follows the same principles.

To measure absence, the SDI uses an internationally accepted protocol of an unannounced second visit. During the first visit, which is announced, the team records the full staff roster for the health workers and the number of non-health workers in the facility. From the roster a maximum of 10 people are randomly sampled for follow up. Three days or more later the team visits the facility again but this time they come unannounced. The team then ascertains the whereabouts of the 10 people which were selected earlier. The team does not rely on the report of the head of facility or any other staff instead each person in the list of 10 must be seen in the facility to record them as present. The current activity of each staff is also documented.

Module 3 provides the information on provider's knowledge which is measured through Patient Case Simulations (PCS, also called "vignettes"). With this methodology, one of the surveyors acts as a case study patient with some specific symptoms. The clinician who is informed of the simulation is asked to proceed as if the enumerator is a real patient, while another enumerator acts as an observer. High quality performance in outpatient consultations entails at least the following: (i) to systematically arrive at a correct diagnosis (or preliminary diagnosis); (ii) to provide an appropriate treatment (or referral); and (iii) to reveal important information to the patient about which actions to take (e.g., how to take the medicine, what to do if the patient does not get better, etc.). The methodology presents several advantages: (a) all clinicians are presented with the same case study patients, thus making it easier to compare performance across clinicians; (b) the method is quick to implement and does not require waiting for patients with particular conditions; (c) it is not intrusive and eschews ethical issues that arise with real patients. The method also has its drawbacks. The most important one is that the situation is a not a real one and that this may bias the results.[10]

C. Sampling

The overall objective of the SDI is to produce accurate and representative indicators at the national, urban and rural levels. Indicators are representative at the county level for this Kenya health SDI and

[10] Comparisons of Patient Case Simulations with Direct Observation of real patients in low income contexts have revealed that performance scores typically are higher with Patient Case Simulations, but that the correlation between the two measures is substantial (e.g., Das, Hammer, and Leonard, 2008). Some authors have interpreted the score of Patient Case Simulations as a measure of competence or ability rather than actual performance (Das and Hammer, 2005, Leonard et al., 2007). There is reason to believe that Patient Case Simulations measure a blend of competence and actual performance, and that the blend depends on the actual design and framing of the tool. The Patient Case Simulations used in SDI were framed to resemble actual performance as closely as possible. Nevertheless, one should be aware of a potential upward bias of the *absolute* performance levels. As a measure of *relative* performance, though, Patient Case Simulations have considerable merit.

for all 47 counties. The main units of analysis are health facilities as well as health workers. The SDI also aims to produce accurate information on providers at varying levels in the pyramid i.e. hospital, health center and dispensaries as well as cadre (doctors, clinical officers and nurses), ownership (public versus private) and location status (urban versus rural).

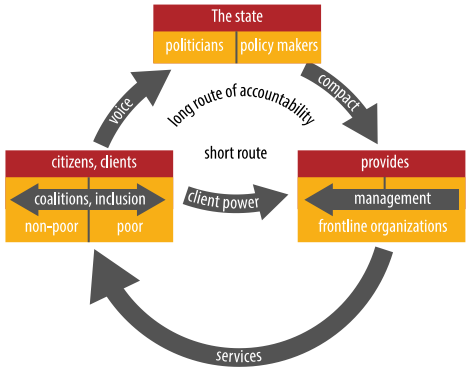
The sampling for Kenya SDI was undertaken by Kenya National Bureau of Statistics (KNBS). The sampling frame used for the Kenya health SDI was the list of health facilities from the Master Health Facility List. The original sample frame contained 9,654 health facilities.

A multi-stage clustered sampling strategy is adopted. The first stage cluster selection is carried out independently within each stratum. The primary cluster considered is the county which is therefore the primary sampling unit (PSU). All 47 counties have been sampled. Health facilities were randomly drawn with equal probability within the level of care. At the third stage, health workers were selected.

Box 3: Analytical underpinnings

Service delivery outcomes are determined by the relationships of accountability between policymakers, service providers and citizens.[a] Human development outcomes are the result of the interaction between various actors in the multi-step service delivery system, and depend on the characteristics and behavior of individuals and households. The delivery of quality healthcare is contingent foremost on what happens in health facilities, where a combination of several basic elements have to be present in order for quality services to be accessible and produced at the frontline. This in turn depends on the overall service delivery system, and these institutions and governance structures provide incentives for the service providers to perform. (see Figure 2)

Figure 2: Relationships of accountability: citizens, services providers and policymakers



***Source*: a. World Development Report, 2004.**

Service Delivery Production Function

Consider a service delivery production function, f, which maps physical inputs, x, the effort put in by the service provider, e, as well as his/her type (or knowledge), θ, to deliver quality services into individual level outcomes, *y*. The effort variable, *e,* could be thought of as multidimensional and, thus, include effort (broadly defined) of other actors in the service delivery system. We can think of this type as the characteristic (knowledge) of the individuals who are selected for a specific task. Of course, as noted above, outcomes of this production process are not just affected by the service delivery unit, but also by the actions and behaviors of households, which we denote by ε. We can therefore write: $y = f(x,e,\theta) + \varepsilon$

To assess the quality of services provided, one should ideally measure $f(x,e,\theta)$. Of course, it is notoriously difficult to measure all the arguments that enter the production, and would involve a huge data collection effort. A more feasible approach is, therefore, to focus instead on proxies of the arguments which, to a first-order approximation, have the largest effects.

Indicator Categories and the Selection Criteria

There are a host of data sets available in health. To a large extent, these data sets measure inputs and outcomes/outputs in the service delivery process.

Box 3. Analytical Underpinnings (cont'd)

The proposed choice of indicators takes its starting point from the recent literature on the economics of service delivery. Overall, this literature stresses the importance of provider behavior and competence in the delivery of health services (as opposed to water and sanitation services and housing that rely on very different service delivery models). Conditional on service providers exerting effort, there is also some evidence that the provision of physical resources and infrastructure has important effects on the quality of service delivery.

The somewhat weak relationship between resources and outcomes documented in the literature has been associated with deficiencies in the incentive structure of health systems. Indeed, most service delivery systems in developing countries present frontline providers with a set of incentives that negate the impact of pure resource-based policies. Therefore, while resources alone appear to have a limited impact on the quality of education and health in developing countries, it is possible inputs are complementary to changes in incentives, so coupling improvements in both may have large and significant impacts (Hanushek, 2006). While budgets have not kept up with the expansion in access in recent times, simply increasing the level of resources might not address the quality deficit in education and health without also taking providers' incentives into account.

SDI proposes three sets of indicators: (i) provider effort; (ii) competence of service providers and (iii) availability of key infrastructure and inputs at the frontline service provider level. Providing countries with detailed and comparable data on these important dimensions of service delivery is one of the main innovations of the Service Delivery Indicators. Additional considerations in the selection of indicators are (i) quantitative (to avoid problems of perception biases that limit both cross-country and longitudinal comparisons), (ii) ordinal in nature (to allow within and cross-country comparisons); (iii) robust (in the sense that the methodology used to construct the indicators can be verified and replicated); (iv) actionable; and (v) cost effective to collect.

Table 4: Health SDI Indicators

Provider Effort
Absence rate
Caseload per provider
Provider Competence
Diagnostic accuracy
Adherence to clinical guidelines
Management of maternal and neonatal complications
Availability of Inputs
Drug availability
Medical equipment availability
Infrastructure availability

Notes: a. The indicators listed here are not the only metrics collected in SDI surveys. For example, below are some example of management and governance data included the instrument. Examples: Roles and Responsibilities in Facilities, Government Supervision, Time Use, Leadership, People Management Practices, User Fees, Financial (cash) support to facilities by source, Community Involvement etc.

Table 5: Survey Sample

	Total	Share of total sample (Unweighted, %)	Share of total population (Weighted, %)
Facilities	3,094	100	100
First level hospitals	161	5.2	5.1
Health centers	484	15.6	15.4
Dispensaries and clinics	2,449	79.2	79.5
Ownership			
Public	1,781	57.6	53.1
Private	1,313	42.4	46.9
Location			
Nairobi	96	3.1	7.4
Urban	820	26.5	32.4
Rural	2,274	73.5	67.6
Healthcare workers	13,026	100	100
Doctors	319	2.5	11.8
Clinical officers	2,008	15.4	14.3
Nurses	6,054	46.5	43.9
Others	4,645	35.6	30.0

Table 6. Sample for indicators of absence and competence

Cadre	Absence rate[a]			Competence indicators[b]		
	Total	Percent[c] (%)	Percent[d] (%)	Total	Percent[c] (%)	Percent[d] (%)
Doctors	319	2.5	11.8	193	4.4	7.3
Clinical officers	2,008	15.4	14.3	1,599	36.0	44.5
Nurses	6,054	46.5	43.9	2,638	59.6	48.2
Others	4,645	35.6	30.0	-	-	-
Total	13,026	100	100	4,430	100	100

Source: Author's calculations using Kenya 2018 SDI data

Notes:

a. Absence rate is calculated using all health workers (i.e. whether clinician or not, e.g. pharmacist, laboratory technician).

b. The competence indicators (e.g. diagnostic accuracy, adherence to clinical guidelines and management of maternal and neonatal complications) are measured using only those health workers who interact with patients or users). Note also that the provider must be present during the first visit to be interviewed for competence.

c. Unweighted share i.e. share of the sample

d. Weighted share i.e. share of population (all facilities in the country or all health workers)

III. RESULTS

D. Delivering Health Services

The number of days health facilities offer services and the number of hours per day they operate are amongst the most basic indicators for measuring health service delivery. In Kenya, health facilities are open on average 6 days per week (Table 7). Urban (6.4 days) and private (6.4 days) facilities operate for significantly more number of days in a week than rural (5.8 days) and public (5.6 days) facilities respectively. The number of hours facilities are open for outpatient consultations is critical in understanding accessibility to health services. On average, facilities are open for 12.9 hours per day. Similar to the number of days, private (14.1 hours) and urban (14.9 hours) facilities remain open for significantly longer hours than public (11.8 hours) and rural (12 hours) facilities respectively.

Table 7. Hours and days of service delivery

	Kenya	Nairobi	Urban	Rural	Percent difference (%)	Public	Private	Percent difference (%)
Number of days per week facility was open (days)								
All facilities	6.0	6.4	6.4	5.8	-11.6***	5.6	6.4	-14.3***
First level hospitals	7.0	6.7	7.0	7.0	.	7.0	7.0	.
Health centers	6.6	7.0	6.8	6.5	-4.7***	6.4	6.7	-4.5***
Dispensaries and clinics	5.8	6.7	6.3	5.5	-13.4***	5.3	6.3	-19.1***
Hours outpatient consultations offered per day (hours)								
All facilities	12.9	15.7	14.9	12.0	-24.2***	11.8	14.1	-19.5***
First level hospitals	23.4	19.6	23.4	23.4	.	23.4	23.4	
Health centers	18.7	24.0	20.0	18.1	-10.5***	17.6	20.3	-15.3***
Dispensaries and clinics	11.1	19.6	13.0	10.2	-27.5***	9.6	12.7	-32.3***

Source: Author's calculations using Kenya 2018 SDI data
Note: Level of significance: *** p<0.01, ** p<0.05, * p<0.1. The percent difference is between public and private; urban and rural facilities.

Kenya's health workers are distributed inequitably with a majority of the high-skilled workers concentrated in urban areas, while the rural areas remain seriously underserved. Table 8 shows the distribution of health workers by ownership and location. Facilities on average were staffed 8.5 health workers.[11] Urban facilities have almost over twice more staff (13.7 providers) compared to rural facilities (6 providers). On average, public facilities are slightly larger (9.1) of private facilities (7.7) in terms of number of staff.

Nairobi has 32 percent of all the country's doctors with about 10 percent population, whereas Nyanza with 14 percent population has only 9 percent of doctors.[12] Overall, Kenya which has 13.8 skilled

[11] Administrative or other support personnel are not included.
[12] Kenya Health Workforce Report: The Status of Healthcare Professionals in Kenya, 2015

healthcare workers per 10,000 inhabitants is far below the WHO recommended minimum of 44.5 per 10,000 to meet the SDGs by 2030.

Approximately 90 percent of health personnel are either nurses (69.1 percent) or clinical officers (21 percent), and more than half of the health workers (58.1 percent) work in the public sector. Table 8 below shows that a disproportionate number of doctors (83.9 percent) work in urban areas whereas the majority of the population (64 percent) and 40 percent of the poor, live in rural areas.[13] Less than half of (47.3 percent) the country's health workforce and less than a fifth of all doctors (16.1 percent) serve the rural population. This distribution between urban and rural population is likely to reinforce service delivery and income inequalities.

Table 8. Distribution of health cadres by ownership and location

	Kenya	Nairobi	Public	Private	Urban	Rural
All health staff (#)	8.5	17.3	9.1	7.7	13.7	6.0
Doctors (%)	9.9	39.1	37.4	62.6	83.9	16.1
Clinical officers (%)	21.0	12.4	52.5	47.5	52.1	47.9
Nurses (%)	69.1	12.2	62.8	37.2	48.4	51.6
Total	100	14.9	58.1	41.9	52.7	47.3

Source: Author's calculations using Kenya 2018 SDI data

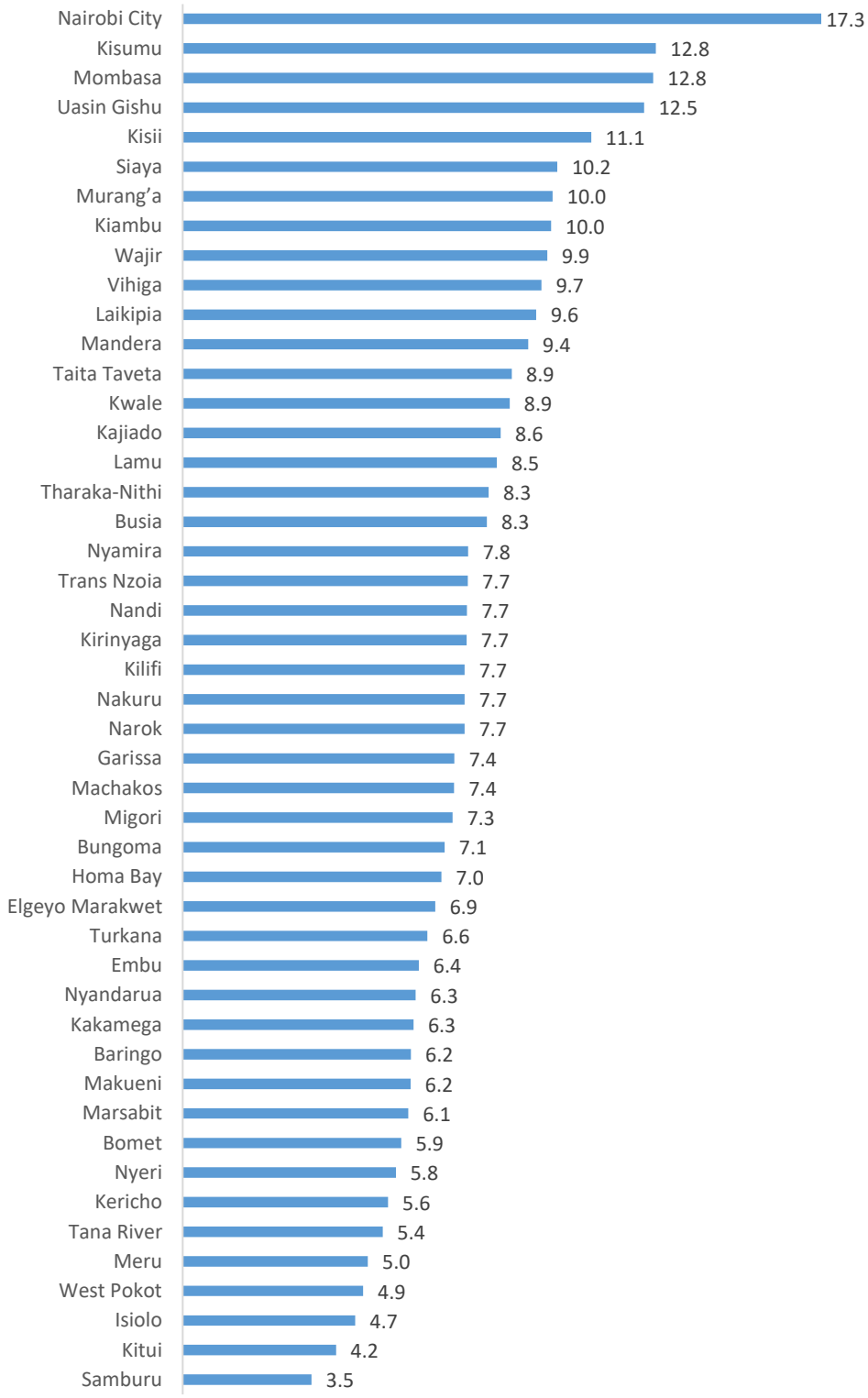
The average number of health workers per facility in Nairobi is 17.3 whereas the national estimate is around half of Nairobi (8.5). About 15 percent of all health workers are in Nairobi but close to two-fifths of the country's doctors (39.1 percent) serve in the capital which is home to only 10 percent of the population with 4.5 percent of the country's poor population.[14] It is also worth noting the Kenya health private sector is quite large as 41.9 percent of health workers provide services in private facilities. A large majority of Kenyan doctors (62.6 percent) serve in the private sector.

Figure 3 shows the average health worker number per facility by county. Urbanized counties such as Nairobi (17.3), Kisumu (12.8) and Mombasa (12.8) possess the maximum number of health workers per facility. On the lower end, there are counties such as Samburu (3.5), Kitui (4.2), and Isiolo (4.7) with health workers much lower than the national average. As it can be seen from Table A5 in the Appendix, the health worker numbers are largely driven by the hospitals in urban areas with very high averages. For instance, the average number of health workers in the hospitals in Nairobi City and Mombasa are 188 and 137 respectively, whereas Samburu (27) and Kitui (24) have relatively low numbers for hospitals.

[13] Kenya Integrated Household Budget Survey (2017)

[14] Source: Calculations from Kenya Statistical abstract 2018 (KNBS) "Basic report on wellbeing in Kenya"

Figure 3: Average number of health workers per facility by county



Source: Author's calculations using Kenya 2018 SDI data

In high-fertility rate countries such as Kenya, the provision of accessible and quality obstetric care (basic and comprehensive) is critical for the health system. However, access to quality health services for women is very limited in Kenya leading to many complications during and after childbirth. This is clearly evidenced by Kenya's high maternal mortality ratio, estimated at 362 per 100,000 live births as of the latest population-based survey in 2014.[15]

Only a half of facilities (50 percent) conduct deliveries (**Table 9**). Almost all first level hospitals (97.3 percent) reported to be providing birth services, whereas 88.2 percent health centers and only 39.5 percent dispensaries and clinics conducted deliveries. A higher proportion of rural and public facilities reported to conducting births than their counterparts.

Table 9: Facilities where women give birth

% facilities	Kenya	Nairobi	Urban	Rural	Public	Private
All	50.0	34.4	31.3	59.0	65.1	32.9
First level hospitals	97.3	78.9	96.8	97.8	99.0	94.9
Health centers	88.2	100.0	77.9	92.9	93.2	80.8
Dispensaries and clinics	39.5	78.9	15.9	50.5	56.3	21.9
# Facilities	3,094	96	820	2274	1781	1313

Source: Author's calculations using Kenya 2018 SDI data

Most health facilities do not have the capacity to offer Basic Emergency Obstetric and Neonatal Care (BEmONC) as shown in
Table **10** below. When considered the full BEmONC package of services, only 10.7 percent of all facilities in Kenya can provide basic emergency obstetric care services. Higher proportion of urban facilities (17.1 percent) provide BEmONC services than rural facilities (9.1 percent). Less than a fifth of hospitals (18.7 percent) offer full Comprehensive Emergency Obstetric and Neonatal Care (CEmONC) coverage.

Table 10. Availability of basic and comprehensive emergency obstetric and neonatal care (full package)

% facilities	Kenya	Nairobi	Urban	Rural	Public	Private
Share of facilities offering full basic emergency obstetric care (%)						
All facilities	10.7	9.0	17.1	9.1	11.1	10.0
First level hospitals	29.4	20.0	26.5	32.2	30.5	27.8
Health centers	17.4	0.0	22.5	15.4	20.0	12.7
Dispensaries and clinics	4.9	20.0	6.3	4.7	5.2	4.1
Share of facilities offering full comprehensive emergency obstetric care (%)						
All facilities	3.06	2.98	10.75	1.10	1.45	6.67
First level hospitals	18.7	0.0	24.6	13.2	14.1	25.3

15 Kenya National Bureau of Statistics and ICF International. 2015. Kenya Demographic and Health Survey 2014. Nairobi, Kenya and Rockville, Maryland, USA: KNBS and ICF International.

Source: Author's calculations using Kenya 2018 SDI data

If the package excludes assisted vaginal delivery (table 11), then the share of facilities providing BEmONC services nationally comes up to 53.8 percent (90.1 percent of hospitals, 71.9 percent health centers and 40.2 percent dispensaries and clinics). Similarly, more than half of hospitals (54.1 percent) offer Comprehensive Emergency Obstetric and Neonatal Care (CEmONC) coverage.

Table 11. Availability of basic and comprehensive emergency obstetric and neonatal care (package without assisted vaginal delivery)

% facilities	**Kenya**	**Nairobi**	**Urban**	**Rural**	**Public**	**Private**
Share of facilities offering full basic emergency obstetric and neonatal care (%)						
All facilities	53.8	68.7	73.2	48.9	50.5	61.1
First level hospitals	90.1	73.3	93.8	86.6	94.3	83.9
Health centers	71.9	66.7	74.3	70.9	72.6	70.6
Dispensaries and clinics	40.2	73.3	59.8	37.4	36.6	50.0
Share of facilities offering full comprehensive emergency obstetric and neonatal care (%)						
All facilities	8.9	23.9	32.3	2.9	4.0	19.7
First level hospitals	54.1	66.7	79.6	30.3	41.2	73.2

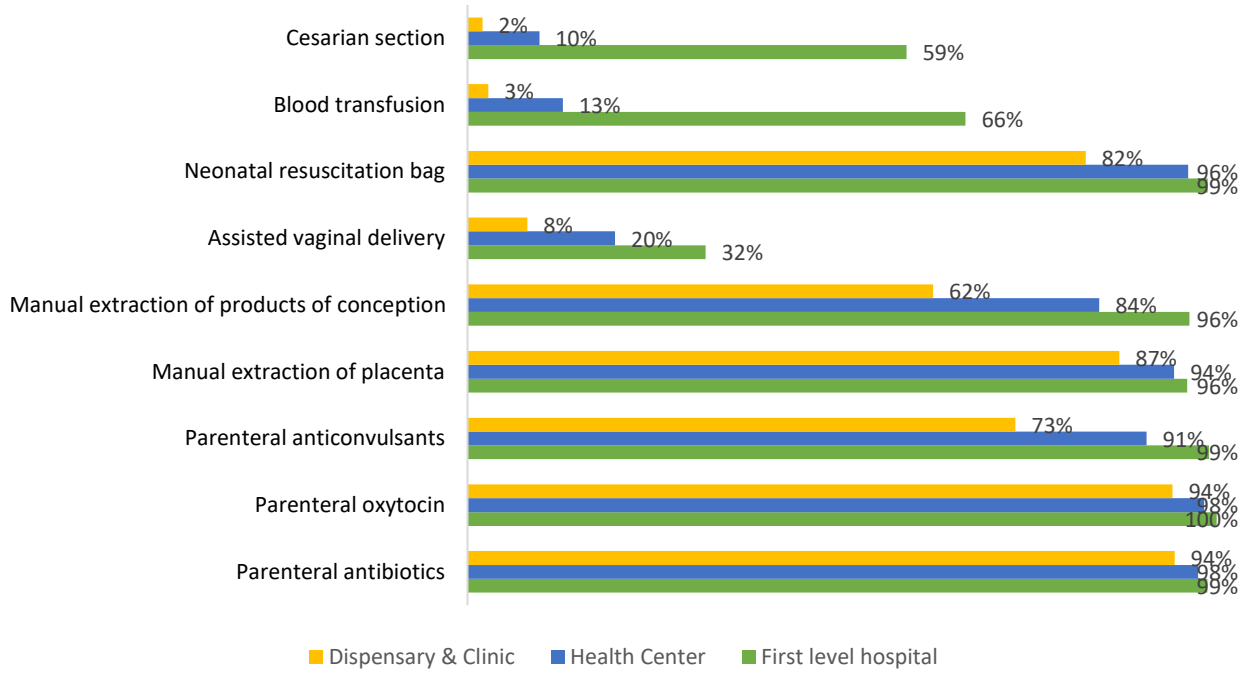
Source: Author's calculations using Kenya 2018 SDI data

Out of all seven signal functions for BEmONC, a greater share of all facilities had the provision of parenteral oxytocin, anticonvulsant and antibiotic, neonatal resuscitation bag, manual extraction of placenta and retained products of conception. However, only 8 percent of dispensaries, 20 percent of health centers and a third of hospitals (32 percent) had the provision of assisted vaginal delivery. This particular signal function thus brings down the BEmONC values to around 10 percent (**Table 11**) for the whole country even though facilities have higher scores for all other signal functions. Assisted vaginal delivery is an important signal function that can save the lives of both the newborn and the mother. However, studies in Africa show lower rates of assisted vaginal delivery due to lack of skills and supplies.[16] There is a strong case to be made for improving the availability of assisted vaginal delivery for the health sector to upgrade its BEmONC indicator and most importantly dealing with high maternal mortality ratio.

It is important that the facilities have the right equipment and training to support safe deliveries in primary health facilities. Figure 4 shows the components of BEmONC and CEmONC packages. Around two-thirds of the first level hospitals had the provision for caesarian section and blood transfusion.

[16] Ameh C, Msuya S, Hofman J, Raven J, Mathai M, et al. (2012) Status of Emergency Obstetric Care in Six Developing Countries Five Years before the MDG Targets for Maternal and Newborn Health. PLoS ONE 7(12): e49938. doi:10.1371/journal.pone.0049938

Figure 4: Availability of elements that comprise BEmONC and CEmONC



E. Caseload

Methodological Note

The caseload indicator is defined as the number of outpatient visits (recorded in outpatient records) in the three months prior to the survey, divided by the number of days the facility was open during the 3-month period and the number of health workers who conduct patient consultations (i.e. paramedical health staff such as laboratory technicians or pharmacists assistants are excluded from the denominator). In hospitals, the caseload indicator was measured using outpatient consultation records; only providers doing outpatient consultations were included in the denominator. The term caseload rather than workload is used to acknowledge the fact that the full workload of a health provider includes work that is not captured in the numerator, notably administrative work and other non-clinical activities. From the perspective of a patient or a parent coming to a health facility, caseload—while not the only measure of workload—is arguably a critically important measure.

Caseload is usually of concern because a shortage of health workers may cause caseload to rise and potentially compromise service quality. Overall, the average caseload in Kenya is at 13.3 outpatients per provider per day (Table 12). Public facilities had twice daily caseload (17.5 patients per provider per day) than private (8.4). Rural facilities on an average had four more patients a day than the urban facilities. While in the public sector lower level facilities had higher caseloads, the situation was reverse in private facilities.

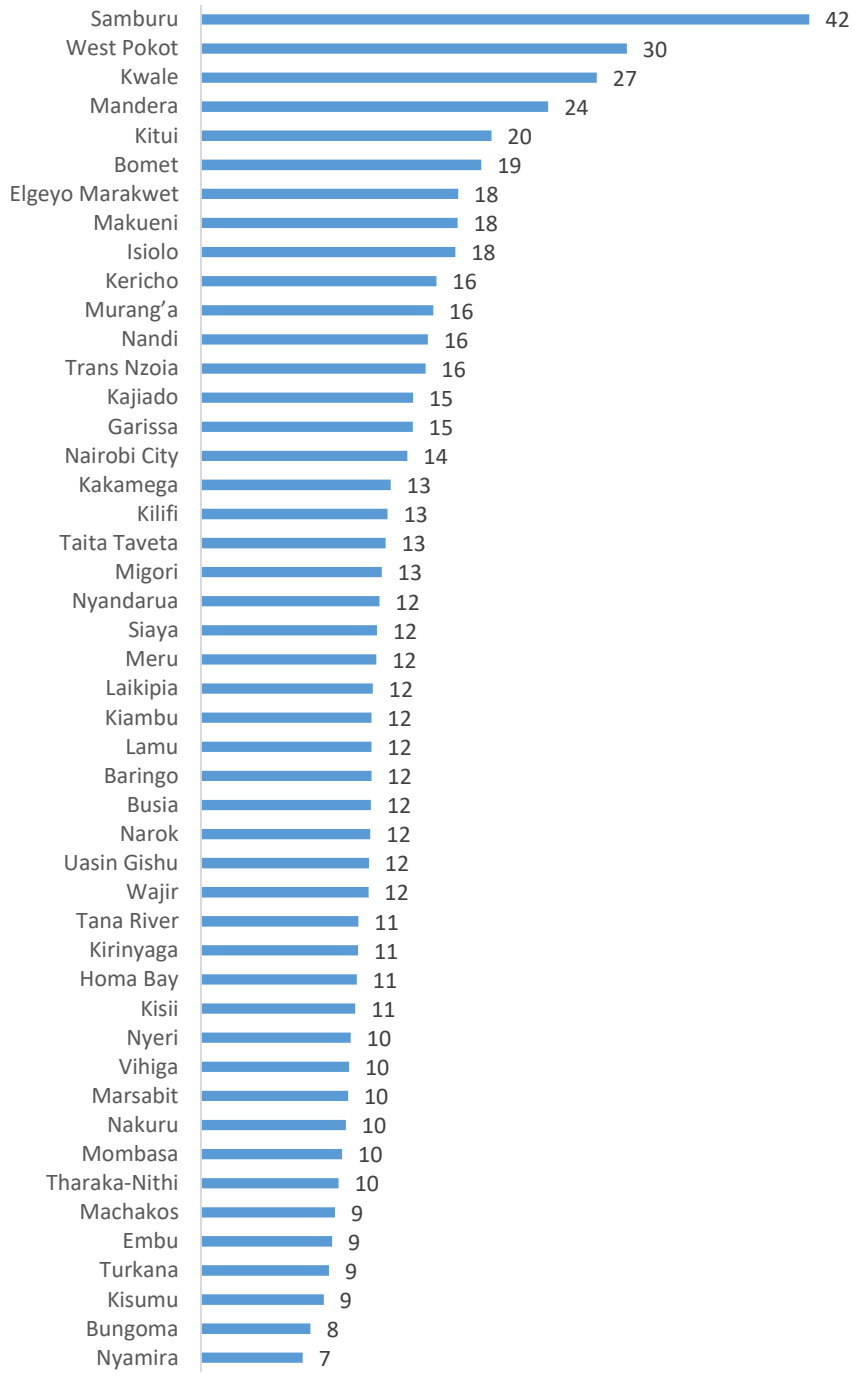
Table 12. Outpatient caseload

Outpatient visits per provider per day	Kenya	Nairobi	Urban	Rural	Public	Private
All facilities	13.3	13.9	10.5	14.6	17.5	8.4
First level hospitals	11.3	11.2	14.0	8.6	8.8	14.8
Health centers	12.4	15.6	11.2	13.0	15.2	8.2
Dispensaries and clinics	13.6	11.2	10.1	15.1	18.7	8.1

Source: Author's calculations using Kenya 2018 SDI data

As shown in figure 5, Samburu county had the highest outpatient caseload (42), whereas Nyamira had only 7 outpatients per day per provider.

Figure 5: Outpatient caseload by county

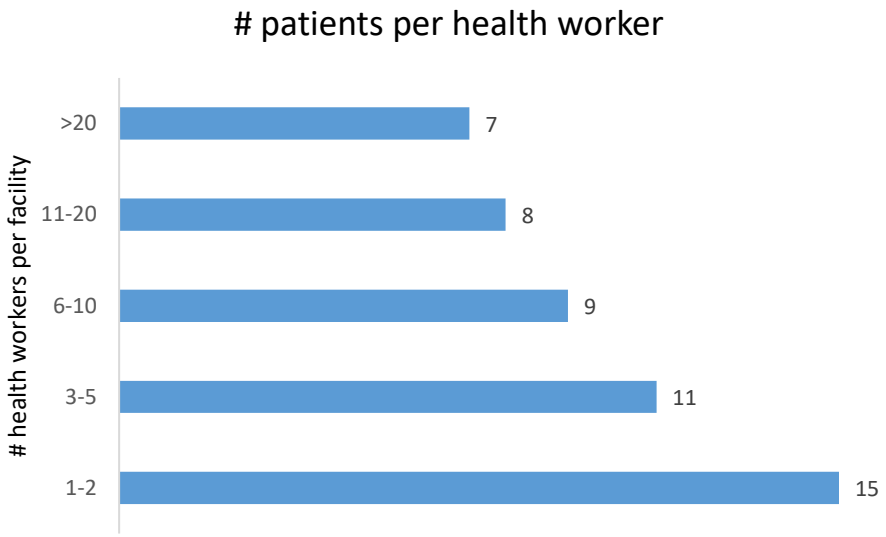


Source: Author's calculations using Kenya 2018 SDI data

Figure 6 shows that large health facilities (above 20 staff) have very low caseload levels with fewer than 7 patients per provider per day. Small-sized facilities (1 to 2 staff), comprising mostly of dispensaries and clinics had the highest caseload (15 outpatients per day). These findings have

implications on how health workers could be reallocated and be better utilized in primary health facilities with higher caseload.

Figure 6: Caseload by facility size



F. Absence Rate

Methodological Note

The average rate of absence at a facility is measured by assessing the presence of at most ten randomly selected health staff at a facility during an unannounced visit. Only workers who are supposed to be on duty are considered in the denominator. Thus, workers on call and off duty were excluded from the analysis. The approach of using unannounced visits is regarded best practice in the service delivery literature. Health workers doing fieldwork were counted as present.

The absence rate in Kenya's health sector is 52.8 percent during an unannounced visit (Table 13). The absence rate was slightly higher in Nairobi where 57.6 percent of health providers were absent. Among various levels of health facilities, hospitals (60.4 percent) had the highest absenteeism whereas dispensaries and clinics had the lowest (44.5 percent).

Doctors had the highest absenteeism rate of 60.7 percent, followed by nurses (54.5 percent) and clinical officers (49.5 percent). Doctors are more likely to be absent, as confirmed in a multivariate analysis (Annex C; Table 58). Table 13 shows that urban health providers are generally more likely to be absent than their rural counterparts except for dispensaries and clinics. Health workers from public facilities (56.7 percent) had higher absenteeism than private (47.5 percent). The regression results further show that older providers have higher absence rates.

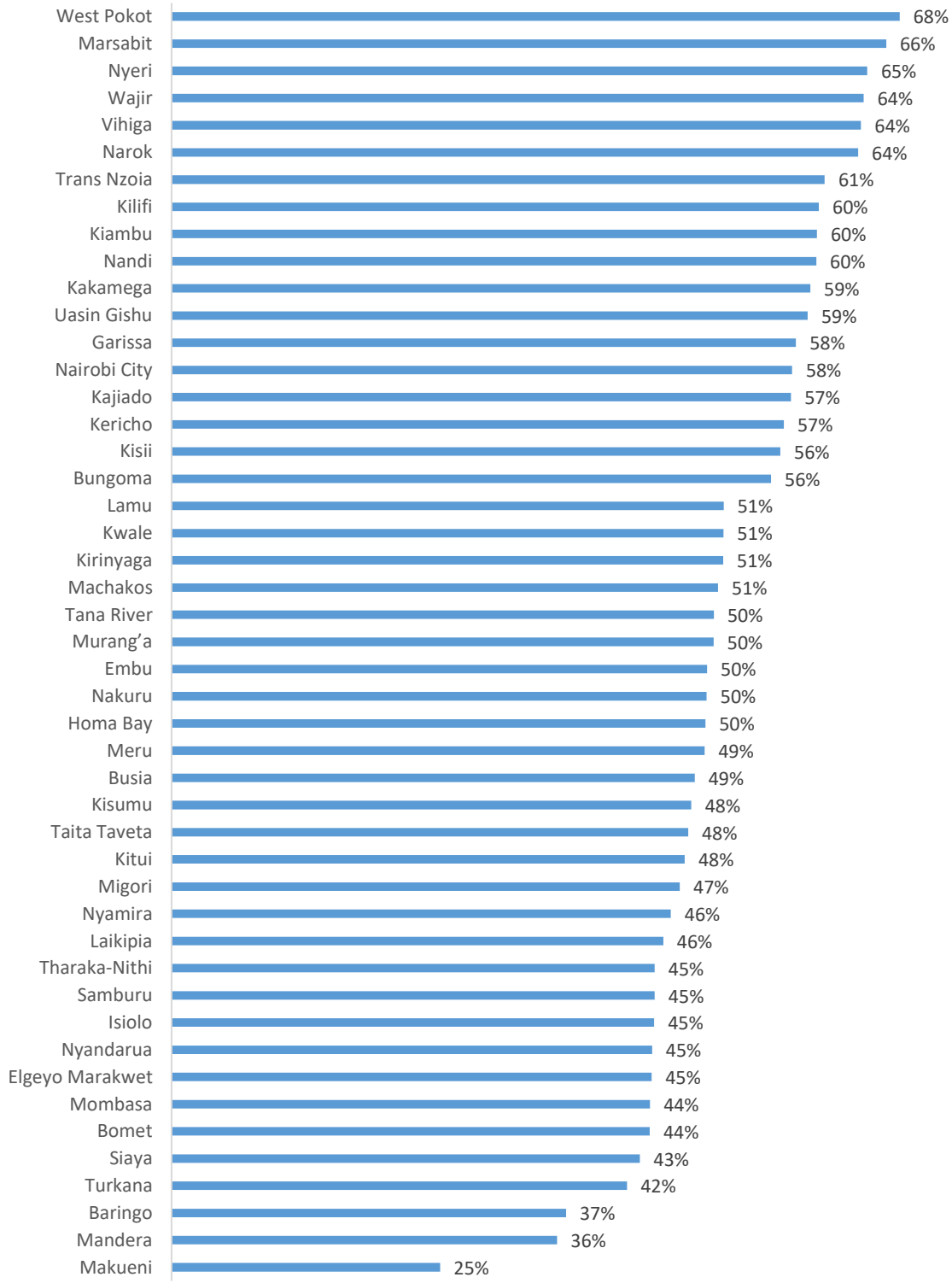
Table 13. Absence rate by cadre and facility type

	Kenya	Nairobi	Urban	Rural	Public	Private
All facilities	52.8	57.6	55.7	49.7	56.7	47.5
			Facility type			
First level hospitals	60.4	61.8	62.3	55.8	64.0	55.6
Health centers	52.1	58.9	56.1	50.1	55.0	46.4
Dispensaries and clinics	44.5	50.0	42.2	46.1	48.8	39.7
			Cadre			
Doctors	60.7	55.6	60.4	64.1	72.0	56.4
Clinical officers	49.5	49.4	50.3	48.8	55.3	42.6
Nurses	54.5	59.6	56.0	53.1	58.6	46.9

Source: Author's calculations using Kenya 2018 SDI data.

Among the counties, absenteeism rates were the highest in West Pokot with 68 percent (See Figure 7) and lowest in Makueni (25 percent). Among doctors, Kilifi, Lamu, Murang'a, Embu, Homa Bay, and Turkana had all doctors absent. West Pokot had the highest absenteeism among clinical officers (78.4 percent) and Wajir among nurses (80.7 percent).

Figure 7. Absence rate by county



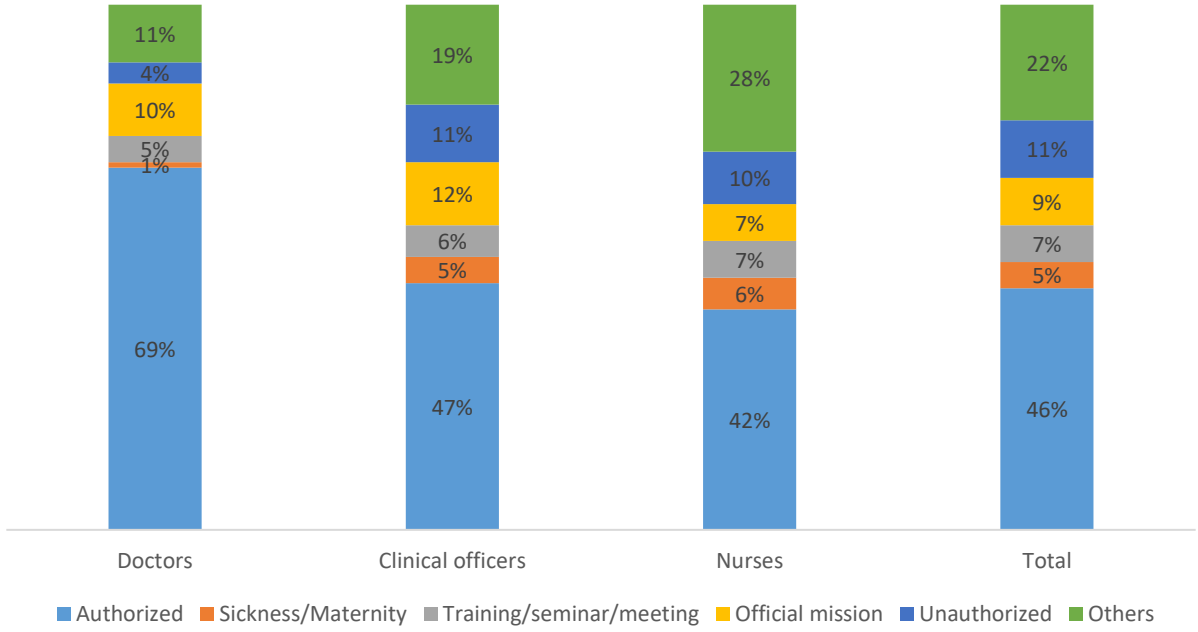
Source: Author's calculations using Kenya 2018 SDI data.

In any workplace setting, absence may be authorized or unauthorized. From a consumer's perspective, however, these providers are not available to deliver services at the health facility—whether authorized or not. Overall (Figure 8), less than half of the absences were authorized (46 percent) followed by other category (22 percent), while 11 percent were unauthorized. Nine percent health workers were on official mission, 7 percent were on training and 5 percent were on medical leave. This other category could not be classified within any of the existing categories.

Most absences among doctors were work authorized absence (69 percent) followed by other category (11 percent) and official mission (10 percent). The majority of clinical officers were on authorized absence (47 percent) followed by other category (19 percent) and official mission (12 percent). Most common reasons for nurses were authorized absence (42 percent), other category (28 percent) and unauthorized absence (10 percent).

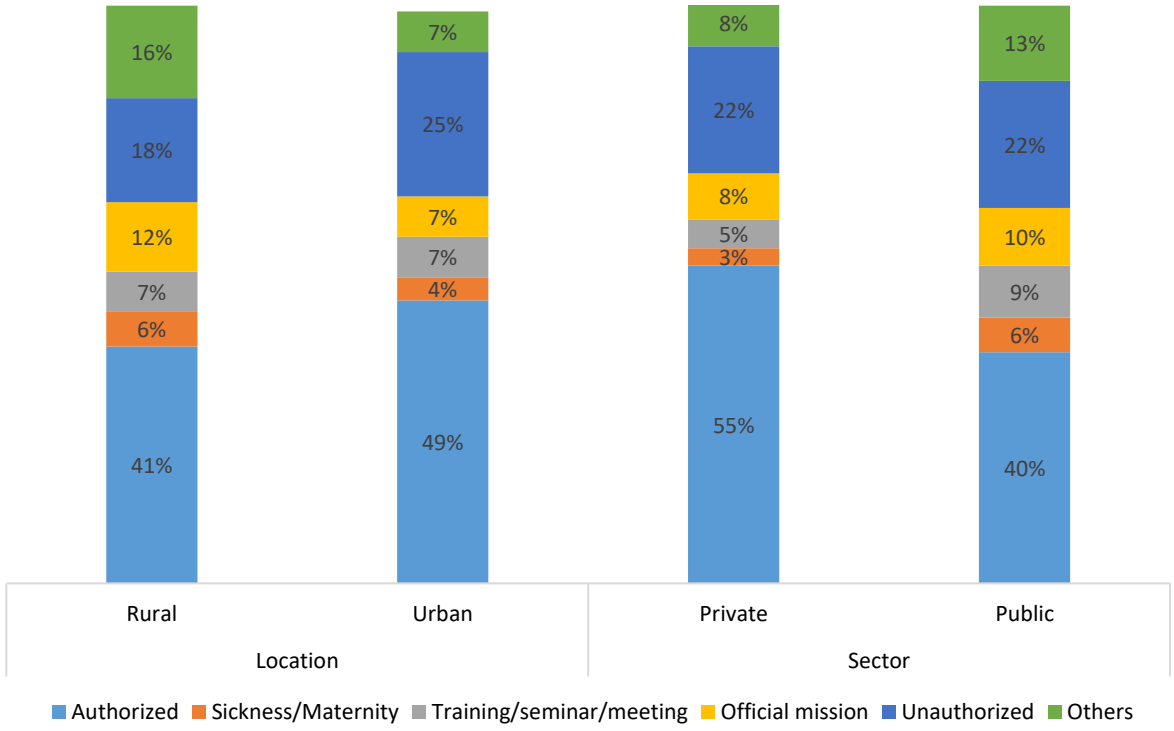
There is a clear need for better organization and management of HRH to improve the availability of staff for service delivery especially as it relates to authorized absenteeism.

Figure 8: Reasons for absence by health worker cadre



Comparing across locations (Figure 9), urban areas had a higher share of authorized absence (49 percent) than rural (41 percent). Unauthorized absence was higher in urban areas (25 percent versus 18 percent in rural). Private sector had relatively higher authorized absence (55 percent) than public sector (40 percent).

Figure 9: Reasons for absence by location and sector



G. Diagnostic Accuracy

Methodological Note

The choice of tracer conditions was guided by the burden of disease among children and adults, and whether the condition is amenable to use with a simulation tool, i.e., the condition has a presentation of symptoms that makes it suitable for assessing provider ability to reach correct diagnosis with the simulation tool. Two of the conditions were childhood conditions (severe dehydration and pneumonia), and two conditions were adult conditions (pulmonary tuberculosis and type I diabetes). Two other conditions were included: post-partum hemorrhage and neonatal asphyxia. The former is the most common cause of maternal death during birth, and neonatal asphyxia is the most common cause of neonatal death during birth. The successful diagnosis and management of these six conditions can avert a large share of child an adult morbidity and mortality.

These indicators were measured using the patient case simulation methodology, also called clinical cases. Clinical cases are a widely used teaching method used primarily to measure clinicians (or trainee clinicians) knowledge and clinical reasoning. A vignette can be designed to measure knowledge about a specific diagnosis or clinical situation at the same time gaining insight as to the skills in performing the tasks necessary to diagnose and care for a patient. According to this methodology, one of the fieldworkers acts as a case study patient and he/she presents to the clinician specific symptoms from a carefully constructed script while another acts as an enumerator. The clinician, who is informed of the case simulation, is asked to proceed as if the fieldworker is a real patient. For each facility, the case simulations are presented to up to ten randomly selected health workers who conduct outpatient consultations. If there are fewer than ten health workers who provide clinical care, all the providers are interviewed.

There are two other commonly used methods to measure provider knowledge and ability, and each has pros and cons. The most important drawback in the patient case simulations is that the situation is a not a real one and that this may bias the results. The direction of this potential bias makes this issue less of a concern—the literature suggests that the direction of the bias is likely to be upward, suggesting that our estimates can be regarded as upper bound estimates of true clinical ability. The patient case simulation approach offers key advantages given the scope and scale of the Service Delivery Indicators methodology: (i) a relatively simple ethical approval process is required given that no patients are observed; (ii) there is standardization of the case mix and the severity of the conditions presented to the clinician; and (iii) the choice of tracer conditions is not constrained by the fact that a dummy patient cannot mimic some symptoms.

The SDI survey assessed provider ability and knowledge using two process quality indicators (the adherence to clinical guidelines in four tracer conditions, and the management of two maternal and newborn complications), and an outcome quality indicator (diagnostic accuracy in four tracer conditions).

Results from the SDI survey reveal that provider ability and knowledge is low. Providers only correctly diagnosed two-thirds (67.5 percent) of the tracer conditions (Table 14).[17] Accuracy was higher for urban (70.2 percent) than rural (65.9 percent). Doctors correctly diagnosed slightly more of the tracer conditions (75.9 percent) than clinical officers (74.1 percent), whereas nurses could diagnose only 60.1 percent of conditions. Similarly, higher level facilities correctly diagnosed (hospitals – 75.7 percent) more of the tracer conditions than lower levels (health centers – 68.3 percent and dispensaries – 64.3 percent).

Table 14. Diagnostic accuracy by cadre

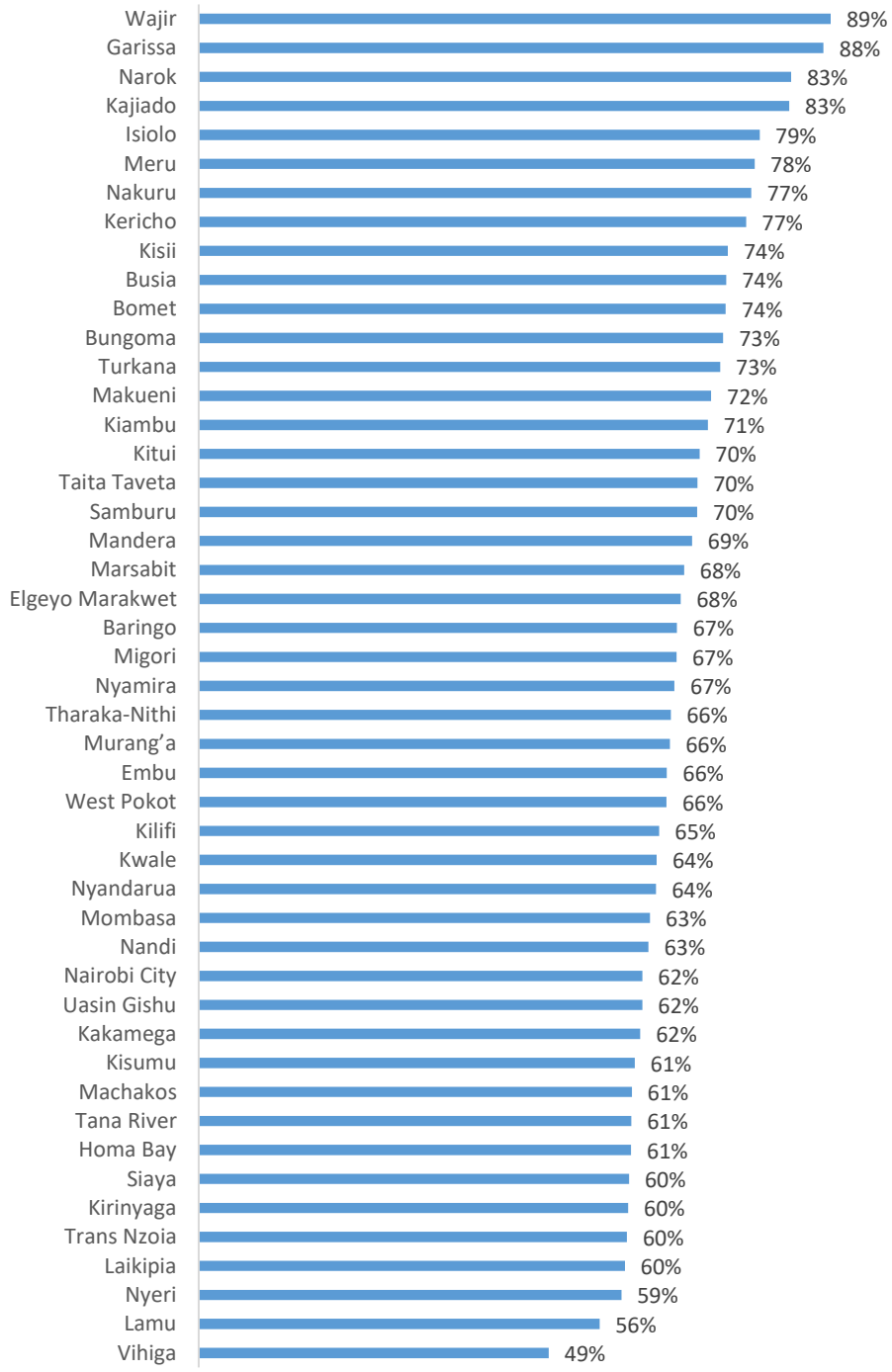
% clinical cases	Kenya	Nairobi	Urban	Rural	Public	Private
All	67.5	62.2	70.2	65.9	68.5	65.9
			Cadre			
Doctors	75.9	58.9	74.5	79.3	83.1	68.5
Clinical officers	74.1	68.9	74.0	74.3	76.5	71.3
Nurses	60.1	44.6	57.7	60.6	61.2	57.3
			Facilities			
First level hospitals	75.7	62.0	77.8	72.7	77.9	70.0
Health centers	68.3	64.0	68.5	68.2	68.1	68.6
Dispensaries and clinics	64.3	61.7	66.1	63.3	64.3	64.2

Source: Author's calculations using Kenya 2018 SDI data

As shown in Figure 10, providers from Wajir could correctly diagnose 89 percent of the tracer conditions with Vihiga being the lowest with less than half (49 percent) conditions diagnosed correctly.

[17] Figures 29-34 in Appendix C show the history taking and examination questions asked.

Figure 10 . Diagnostic accuracy by county



Source: Author's calculations using Kenya 2018 SDI data.

Table 15 shows that only a fifth of the health providers (19.6 percent) correctly diagnosed all four tracer conditions. Close to a half ((42.9 percent), could diagnose three of the four cases.

Table 15. Number of cases correctly diagnosed

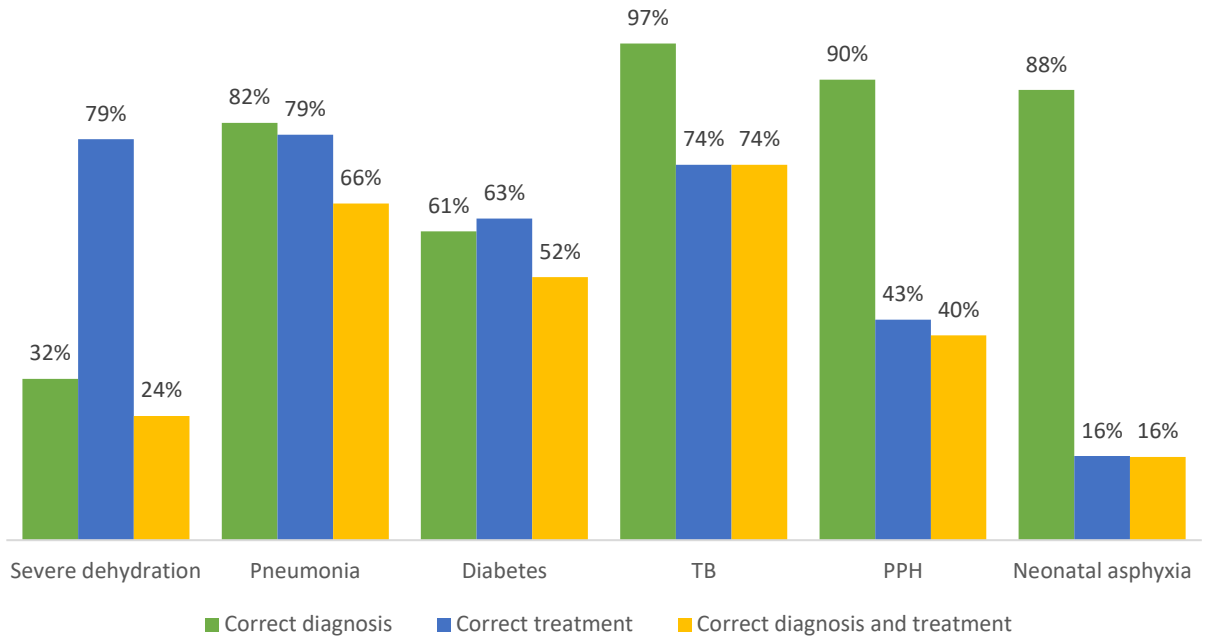
# cases	All	Doctors	Clinical officers	Nurses
4 cases	19.6	31.6	25.7	12.1
3 cases	42.9	46.2	49.3	36.6
2 cases	26.4	16.9	21.2	32.7
1 case	9.8	4.4	3.5	16.5
No case	1.2	0.8	0.4	2.1

Source: Author's calculations using Kenya 2018 SDI data

Diagnostic accuracy rate varied across case conditions, ranging from 90 percent accuracy for pulmonary tuberculosis to 32 percent for severe dehydration (see Figure 11).

An accurate diagnosis, however, is unfortunately not a guarantee for providing the correct treatment. There were substantially large discrepancies between diagnosis and treatment across the board revealing a critical disconnect in provider knowledge and follow-up. Among severe dehydration and diabetes conditions, interestingly more providers offered correct treatment actions even though they had lower diagnostic accuracy. With postpartum hemorrhage and neonatal asphyxia, even though a high proportion got the diagnosis correct, only a very few provided the correct treatment. While 88 percent of health providers got the diagnosis of neonatal asphyxia correct, only 16 percent got the correct treatment. The results of the other conditions equally show a knowledge gap in clinical diagnosis as well as patient management.

Figure 11: Diagnostic accuracy and correct treatment by clinical case



H. Adherence to Clinical Guidelines

Methodological Note

The assessment of process quality is based on two indicators: (i) clinicians' adherence to clinical guidelines in four tracer conditions and (ii) clinicians' management of maternal and neonatal complications. The former indicator is an unweighted average of the share of relevant history taking questions, and the share of relevant examinations performed for the four tracer conditions. The set of questions is restricted to core or important questions as expressed in the Integrated Management of Childhood Illnesses (IMCI).

The second process quality indicator is clinicians' ability to manage maternal and neonatal complications, i.e. post-partum hemorrhage and neonatal asphyxia. This indicator reflects the unweighted share of relevant treatment actions proposed by the clinician. The set of questions is restricted to core or important questions as expressed in the Integrated Management of Childhood Illnesses (IMCI) Guidelines for the tracer conditions.

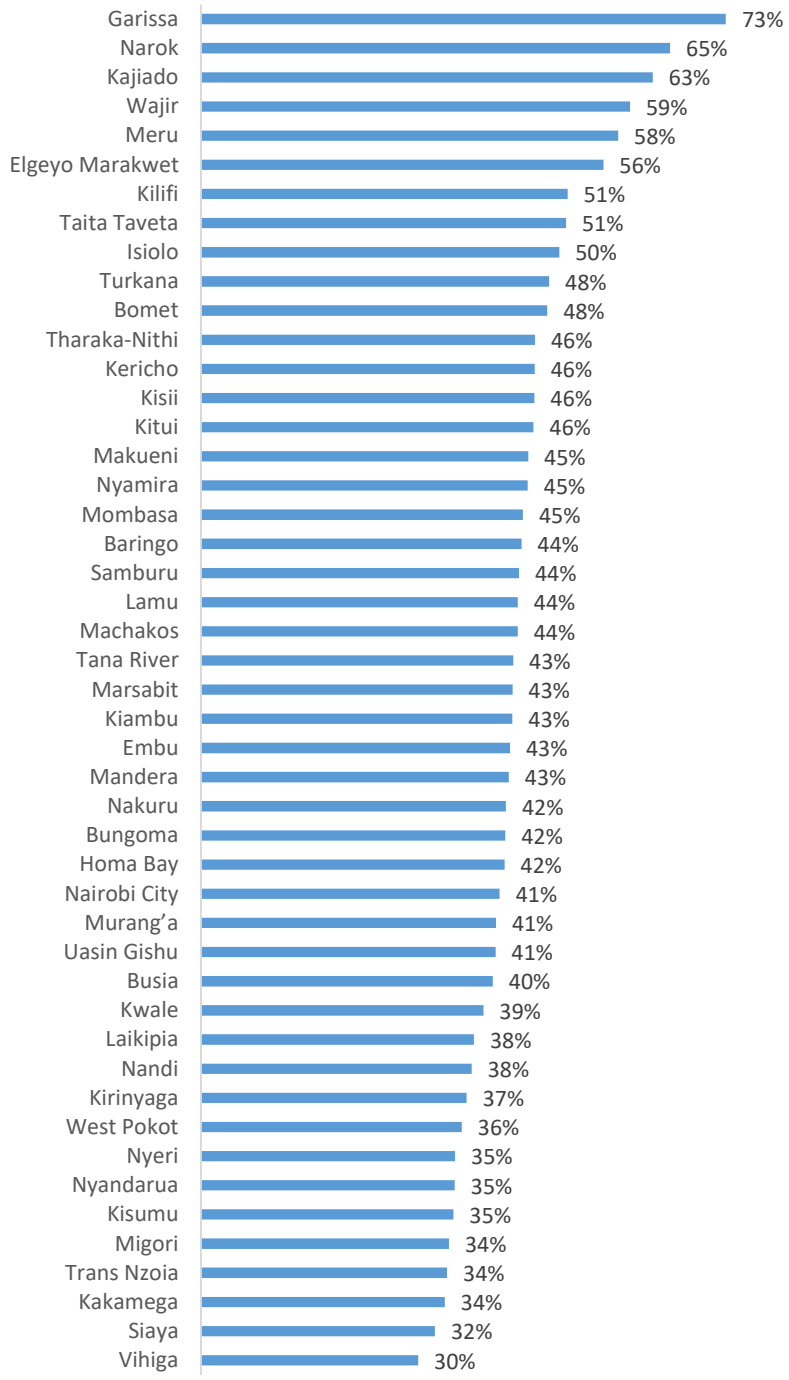
Kenyan health providers adhered to 43.5 percent of the clinical guidelines in the management of the four tracer conditions (Table 16). Urban providers were more adherent to the guidelines (46.2 percent of guidelines) than rural (41.8 percent). Doctors adhered to more of the clinical guidelines (51.5 percent) followed by clinical officers (47.6 percent) and nurses (38.4 percent). Adherence to clinical guidelines was lowest in dispensaries and clinics (41.2 percent) followed by health centers (43.6 percent) and hospitals (49.7 percent). For the most part, clinical guidelines are not followed in primary care health facilities, which is usually the first point of entry for most beneficiaries.

Table 16. Adherence to clinical guidelines by health provider type

% clinical cases	Kenya	Nairobi	Urban	Rural	Public	Private
All	43.5	41.4	46.2	41.8	43.6	43.2
			Cadre			
Doctors	51.5	45.8	51.4	51.7	54.1	48.9
Clinical officers	47.6	43.3	48.1	47.1	48.8	46.2
Nurses	38.4	34.1	38.0	38.5	38.8	37.4
			Facilities			
First level hospitals	49.7	40.8	52.0	46.3	51.2	45.6
Health centers	43.6	41.3	44.4	43.3	42.9	45.3
Dispensaries and clinics	41.2	41.5	43.3	40.2	40.5	42.1

Source: Author's calculations using Kenya 2018 SDI data

Figure 12 . Adherence to clinical guidelines by county



Source: Author's calculations using Kenya 2018 SDI data.

It must be noted that several clinicians gave partial treatment for certain conditions. For example, the simulation presenting pneumonia also presented the "patient" with a high temperature. While 79 percent treated pneumonia only, 72 percent providers got the full treatment of pneumonia and fever. Clearly, there is a knowledge gap on treatment for co-existing conditions. This is also against the

backdrop of availability of drugs in stock (See Annex C Table 61). At the time of the study, Paracetamol was available in a majority of facilities (91.4 percent).

The challenge of partial treatment is real and has both short and long-term effects. For the case of fever, if the child is not tepid-sponged, their fever could reach higher levels and the child could easily have a febrile convulsion, which may cause aspiration of food or fluids, biting of the tongue, among others. If the convulsion is not well understood, it could also lead to further mismanagement of the condition.

The survey assessed the availability of Standard Treatment Guidelines (STG) in facilities. As shown in Table 17, less than half (42.8 percent) of the facilities had IMNCI guidelines on the premises. The availability of guidelines for non-communicable diseases was very low across the board.

Overall, guidelines were more likely to be available in the hospitals than health centers or dispensaries. With the exception of IMNCI and cervical cancer, private facilities were more likely to have the guidelines available when compared with public facilities. Similarly, except for IMNCI, urban facilities were more likely to have the guidelines available.

Table 17: Availability of Standard Treatment Guidelines

% facilities	Kenya	Nairobi	Urban	Rural	Public	Private	First level hospitals	Health centers	Dispensaries and clinics
IMNCI	42.8	46.7	40.1	44.1	48.8	36.0	62.1	50.5	40.0
Cardiovascular diseases	6.9	7.7	10.4	5.2	4.8	9.2	23.2	10.5	5.1
Respiratory diseases	6.2	7.2	10.0	4.3	5.0	7.4	20.1	9.6	4.6
Cervical cancer	10.5	15.4	13.6	9.0	11.4	9.4	31.3	15.5	8.1
Surgical care	1.9	1.0	3.8	1.0	1.1	2.7	9.0	2.9	1.2
Waste management	19.6	28.2	25.0	17.0	18.3	21.0	45.3	27.4	16.4

Source: Author's calculations using Kenya 2018 SDI data

I. Management of Maternal and Neonatal Complications

The second process quality indicator is clinicians' ability to manage maternal and neonatal complications. This indicator reflects the unweighted share of relevant treatment actions proposed by the clinician. The set of questions is restricted to core or important questions as expressed in the Integrated Management of Childhood Illnesses (IMCI) and the Standard Treatment Guidelines.

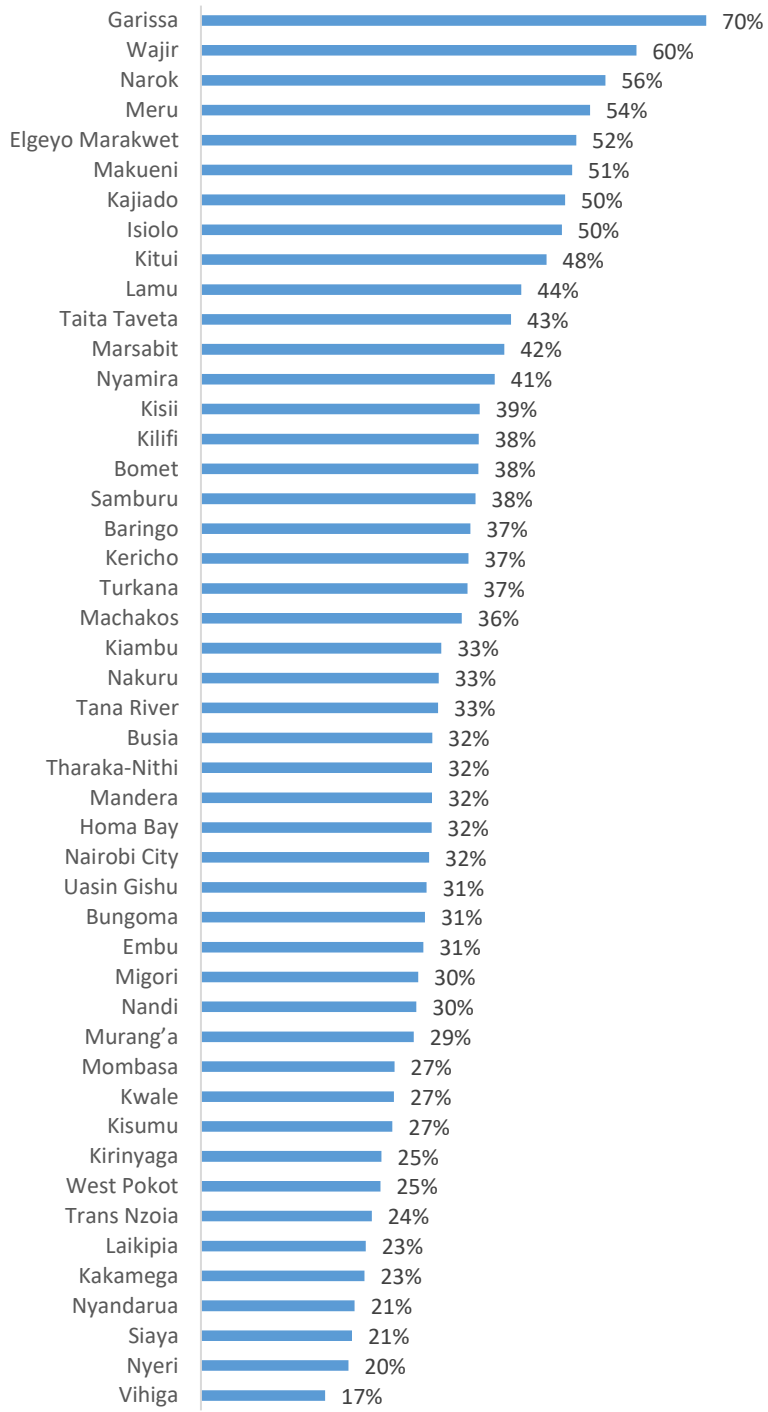
Overall, providers adhered to only 34.5 percent of the clinical guidelines for managing maternal and neonatal complications (Table 18). Doctors adhered to a marginally larger share of guidelines (41.5 percent of guidelines) compared to clinical officers (34.9 percent) and nurses (33.1 percent). There was very little variation across facilities in managing maternal and neonatal complications. First level hospitals had a higher adherence (40.3 percent) than health centers (35 percent) and dispensaries (32.3 percent).

Table 18. Management of maternal and neonatal complications by cadre

% clinical cases	Kenya	Nairobi	Urban	Rural	Public	Private
All	34.5	31.6	35.3	34.0	36.0	32.0
		Cadre				
Doctors	41.5	32.9	42.0	40.2	47.4	35.6
Clinical officers	34.9	32.7	35.4	34.3	36.0	33.5
Nurses	33.1	28.1	30.9	33.6	34.8	28.8
		Facilities				
First level hospitals	40.3	27.1	41.9	38.2	42.8	34.0
Health centers	35.0	32.2	35.1	34.9	34.4	36.2
Dispensaries and clinics	32.3	32.3	31.4	32.7	33.8	30.4

Source: Author's calculations using Kenya 2018 SDI data

Figure 13: Management of maternal and neonatal complications by county



Source: Author's calculations using Kenya 2018 SDI data.

J. Drugs and Commodities Availability

Methodological Note

This indicator is defined as the number of drugs of which a facility has one or more available, as a proportion of all the drugs on the list. The drugs have to be unexpired and have to be observed by the enumerator. The drug list contains tracer medicines for children and mothers identified by the World Health Organization (WHO) following a global consultation on facility-based surveys. The list of drugs has been adjusted to the level of facility as mentioned in the 2016 Kenya Essential Medicines List (KEML).

On average, 54.1 percent of priority drugs were available in Kenyan facilities (Table 19). Rural facilities had higher availability of priority drugs (55.3 percent) compared to urban facilities (51.6 percent). Public facilities had marginally higher availability of all priority drugs. Priority drugs for mothers and children were available with average scores of 34.6 percent and 62.3 percent respectively. Although over half (58.3 percent) of the tracer drugs surveyed were available in Kenya only 4.9 percent of facilities had all tracer drugs available. Among various levels, hospitals had a higher proportion of drugs availability.

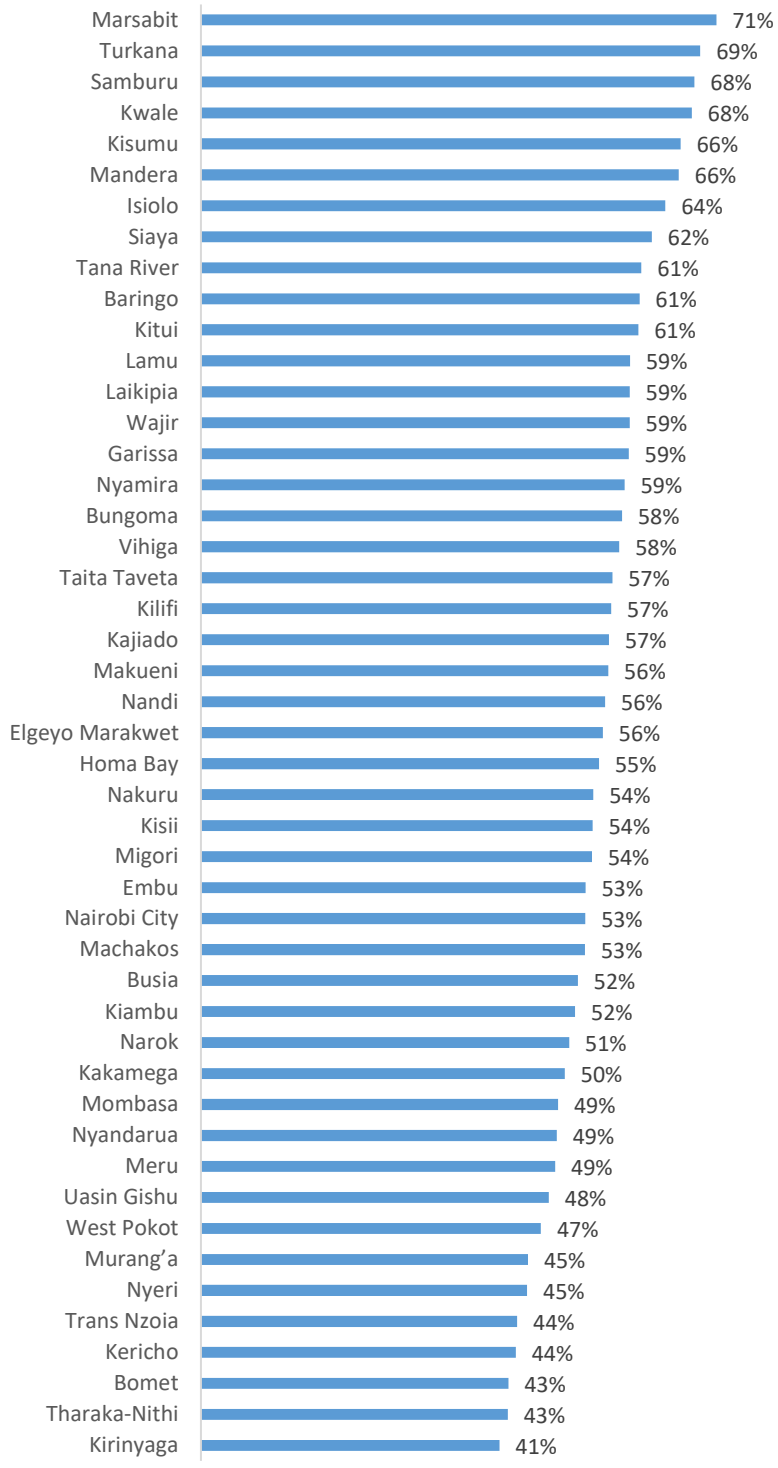
Table 19. Availability of priority drugs by facility type

% drugs	Kenya	Nairobi	Urban	Rural	Public	Private	First Level hospital	Health center	Dispensary and clinic
All priority drugs	54.1	53.2	51.6	55.3	55.5	52.6	75.8	59.6	51.7
Priority drugs for Mothers	34.6	27.5	24.8	39.3	42.6	25.6	77.6	58.0	27.3
Priority drugs for children	62.3	58.8	56.2	65.3	67.4	56.7	70.0	73.8	59.6
All tracer drugs	58.3	60.3	57.1	58.9	57.7	59.0	81.8	71.1	54.3
Have all tracers (% facility)	4.9	11.8	7.9	3.4	2.5	7.5	21.4	8.6	3.1

Looking across the counties (Figure 14), Marsabit (71 percent) had the highest availability with Kirinyaga being the lowest (41 percent).[18] The detailed availability of drugs are given in the appendix (table 61).

[18] World Health Organization (WHO) guidelines stated that priority drugs are for adults and children. For SDI, tracer drugs are those considered markers of drug availability according to the SARAM 2013. SDI looked at 8 out of the 11 drugs for first level hospitals, 8 for health centers and 6 for dispensaries and clinics.

Figure 14: Availability of all priority drugs by county



Source: Author's calculations using Kenya 2018 SDI data

Family planning commodities

Out of all facilities, 88.7 percent reported to be providing family planning (FP) services. Table 20 shows the availability of family planning supplies in facilities that do provide specific FP services. Male condoms were available in 92.4 percent of facilities whereas female condoms in 72.1 percent. Proportionately more rural and public facilities had the availability of male condoms. Oral contraceptives were available in 86.6 percent of all facilities and 93.6 percent facilities had injectables. Emergency contraceptives were available in 72.3 percent of facilities. A major share of facilities had IUD (91.1 percent) and implants (95.4 percent). More urban facilities had the availability of all contraceptives except male condoms.

Table 20: Availability of family planning commodities

% facilities	Kenya	Urban	Rural	Public	Private	First level hospitals	Health centers	Dispensaries and clinics	# facilities
Male condoms	92.4	89.1	93.8	96.1	86.8	94.7	96.1	91.6	2398
Female condoms	72.1	76.7	70.3	72.4	71.7	64.9	74.4	72.2	733
Oral contraceptives	86.6	89.5	85.3	86.4	86.8	90.1	86.6	86.3	2209
Injectables	93.6	94.5	93.2	92.8	94.7	92.1	90.8	94.3	2538
Emergency contraceptives	72.3	74.5	71.3	69.6	76.1	73.9	66.7	73.2	1211
IUD	91.1	93	90.2	90.9	91.6	93.9	93.9	90.1	1704
Implants	95.4	96.5	94.9	95.4	95.3	98.6	95.3	95.1	2366

Source: Author's calculations using Kenya 2018 SDI data

K. Availability of Vaccines Related Equipment and Supplies

Data from UNICEF and WHO in 2017 indicates immunization coverage is 89 percent for BCG, 82 percent for DTP3-HepB-Hib, 81 percent for polio3, and 89 percent for the measles vaccine.[19] In fact, the rates have declined by around 10 percentage points for all these vaccines compared to 2012 values.

A majority of health facilities (70.3 percent) reported providing vaccination service. However, only 89 percent of the facilities that offer immunization service store the vaccines in their premises. It is not clear where the other 11 percent that do vaccinate children store their vaccines and it was not possible to assess the conditions under which their vaccines are stored. Table 21 shows that 62.3 percent of all vaccines were available in Kenyan facilities. Rural facilities (70.5 percent) had higher availability than urban (45.2 percent) and public (81.4 percent) higher than private ones (40.7 percent). Hospitals (91 percent) and health centers (85 percent) had higher availability than dispensaries and clinics (56 percent).

[19] Kenya: WHO and UNICEF estimates of immunization coverage: 2017 revision. http://www.who.int/immunization/monitoring_surveillance/data/ken.pdf

Table 21: Availability of vaccines by facility type

% vaccines	Kenya	Nairobi	Urban	Rural	Public	Private
All	62.3	64.1	45.2	70.5	81.4	40.7
First level hospitals	91.0	84.2	90.6	91.4	98.3	80.8
Health centers	85.0	100.0	71.7	91.0	94.2	71.1
Dispensaries and clinics	56.0	84.2	35.7	65.4	77.2	33.7
# Facilities	3094	96	820	2274	1781	1313

Nyamira county had the maximum vaccines availability (88.2 percent), while Mombasa was the lowest with only 34.5 percent of vaccines available (Table 22).

Table 22: Availability of vaccines by facility type across counties

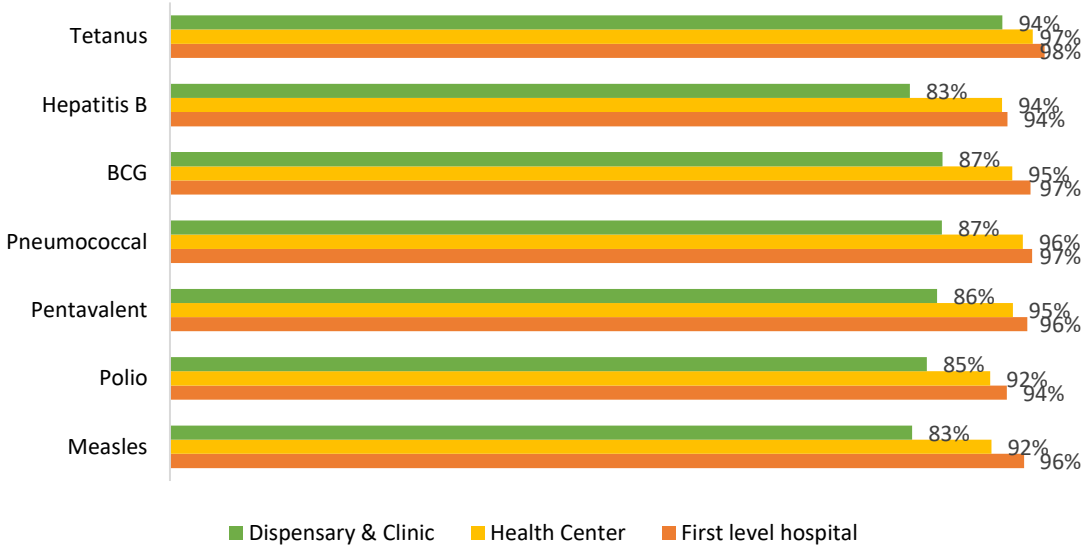
% vaccines	Total	First level hospital	Health center	Dispensary and clinic
Nyamira	88.2	100.0	100.0	80.2
Kisumu	86.1	95.9	92.9	82.2
Elgeyo Marakwet	84.2	100.0	83.1	83.1
Isiolo	82.5	100.0	66.7	84.7
Wajir	81.8	100.0	97.6	73.2
Bomet	78.6	78.6	77.8	78.7
Siaya	78.4	75.0	100.0	70.5
Nandi	77.6	100.0	74.3	77.2
Kisii	77.1	98.4	80.6	71.8
Turkana	75.6	71.4	94.6	73.0
Marsabit	74.5	100.0	82.9	71.0
Homa Bay	73.4	100.0	82.4	68.6
Narok	73.4	95.2	75.2	71.4
Bungoma	72.1	100.0	85.7	67.7
Vihiga	72.0	66.7	92.9	63.1
Mandera	69.4	89.3	87.3	56.7
Uasin Gishu	68.4	96.4	98.4	61.8
Baringo	68.3	100.0	98.4	63.0
Kakamega	67.1	100.0	71.4	63.3
Tana River	66.4	100.0	100.0	62.2
Migori	66.2	75.0	90.5	60.3
Samburu	66.1	100.0	95.2	62.2
Taita Taveta	65.5	67.9	74.3	62.7
Nakuru	65.0	100.0	91.7	57.6
West Pokot	64.6	92.9	100.0	61.4
Nairobi City	64.1	100.0	84.2	56.8
Makueni	63.6	100.0	78.6	60.2
Kajiado	63.3	100.0	97.1	56.3
Laikipia	63.3	75.0	80.0	60.4
Busia	63.3	100.0	78.6	57.1
Kericho	63.0	80.0	71.4	60.5
Murang'a	62.6	100.0	100.0	56.7
Kwale	62.2	100.0	81.6	58.5
Trans Nzoia	59.8	100.0	100.0	52.0
Lamu	59.7	100.0	100.0	50.8
Kitui	58.9	78.6	79.0	53.0
Kilifi	57.2	90.5	71.4	54.2

Machakos	56.9	100.0	82.1	52.4
Embu	55.7	100.0	71.4	51.7
Nyandarua	55.6	100.0	98.6	45.7
Garissa	54.8	80.0	54.5	51.9
Kiambu	50.8	80.0	62.3	47.0
Tharaka-Nithi	45.0	95.2	78.6	36.5
Kirinyaga	41.0	66.7	88.3	30.8
Nyeri	37.9	66.7	95.2	29.6
Meru	37.8	100.0	88.9	28.0
Mombasa	34.5	71.4	96.4	24.4

Source: Author's calculations using Kenya 2018 SDI data

Considering only facilities that provide vaccination (n=2247), individual vaccines were usually available in around 85 percent of the facilities (Figure 15). Dispensaries and clinics had a lower availability of vaccines.

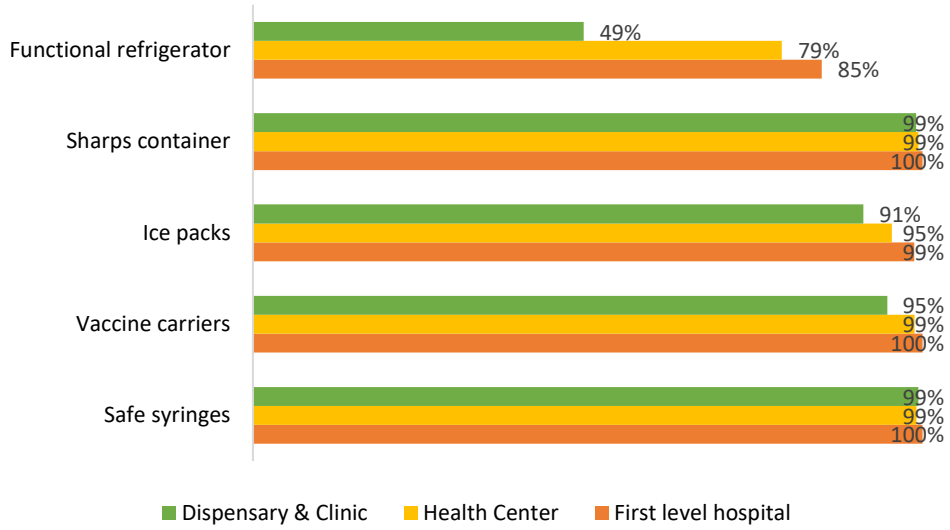
Figure 15: Availability of individual vaccines by facility type



Note: sample includes only facilities that provide vaccination
Source: Author's calculations using Kenya 2018 SDI data

There was near universal availability of all necessary material and equipment for vaccination such as ice packs, vaccines carriers, sharps containers, and safe syringes (**Figure 16**) except for refrigerators. Only around a half of the dispensaries and clinics (49 percent) had a functional refrigerator, whereas it was 79 percent and 85 percent for health centers and first level hospitals respectively.

Figure 16: Availability of equipment and vaccines-related supplies by facility type



Note: sample includes only facilities that provide vaccination
Source: Author's calculations using Kenya 2018 SDI data

Vaccine storage conditions

Methodological Note
The main indicator to assess vaccines storage conditions is the temperature of the refrigerators. In order to independently and consistently measure fridges' temperature, each team was provided with a thermometer. The enumerator asked the permission to put the thermometer in the refrigerator where vaccines are stored during the time of the survey. At the end of the survey, after anywhere between 3 to 6 hours, the enumerator returned to note the temperature.

Vaccines need optimal storage conditions in order to maintain their potency and it is thus important to evaluate the storage conditions of vaccines across the country. A high proportion (90.1 percent) of refrigerators with vaccines had a temperature within the recommended 2 to 8 degrees Celsius (Table 23). While more first level hospitals (94.9 percent) were likely to adhere to the recommended temperature range, only 88.4 percent of the dispensaries and clinics did so.

Table 23: Vaccines storage - Refrigerators with temperature between 2°C and 8°C

% facilities	Kenya	Nairobi	Urban	Rural	Public	Private
All	90.1	96.1	92.9	89.2	90.4	89.3
First level hospitals	94.9	93.8	96.4	93.5	95.0	94.8
Health centers	93.7	100.0	93.0	94.0	94.5	91.9
Dispensaries and clinics	88.4	93.8	91.8	87.6	88.7	87.5
# Facilities	1,828	50	313	1,515	1,388	440

Note: sample includes only facilities that provide vaccination
Source: Author's calculations using Kenya 2018 SDI data

Among the counties, three had all facilities (Tharaka-Nithi, Nyeri and Samburu) with within-range temperatures for their refrigerators (see **Table 24**). Enumerators were also asked to check for any signs of temperature monitoring in the facility, and they found it to be 90.5 percent for the total sample.

Table 24: Vaccines storage - Refrigerators with temperature between 2°C and 8°C (by county)

% facilities	Total	First level hospital	Health center	Dispensary and clinic	# Facilities
Tharaka-Nithi	100.0	100.0	100.0	100.0	24
Nyeri	100.0	100.0	100.0	100.0	34
Samburu	100.0	100.0	100.0	100.0	33
Elgeyo Marakwet	97.9	100.0	100.0	97.1	48
Kakamega	97.9	100.0	100.0	97.1	48
Kwale	97.5	100.0	100.0	96.9	40
Baringo	97.5	100.0	100.0	96.7	39
Nyandarua	97.2	100.0	100.0	95.8	36
Meru	96.7	100.0	100.0	94.4	30
Isiolo	96.6	100.0	100.0	95.7	29
Nairobi City	96.1	100.0	93.8	96.9	50
Vihiga	96.0	100.0	100.0	90.0	25
Kisii	95.9	100.0	100.0	93.3	50
Mandera	94.9	100.0	93.8	94.7	39
Siaya	94.1	100.0	93.8	93.8	51
Kiambu	93.5	100.0	71.4	97.1	46
Taita Taveta	93.5	66.7	100.0	95.5	34
Kirinyaga	93.2	100.0	90.0	94.4	30
Nandi	92.8	100.0	100.0	92.0	56
Embu	91.8	100.0	100.0	89.7	37
Mombasa	91.4	100.0	85.7	92.3	23
Kisumu	91.2	100.0	92.9	88.9	57
Nyamira	91.0	100.0	94.4	87.0	45
Makueni	91.0	100.0	100.0	88.6	44
Kilifi	90.7	100.0	100.0	88.9	43
Garissa	90.3	100.0	83.3	90.5	31
Kajiado	90.1	100.0	100.0	85.7	41
Murang'a	89.7	100.0	85.7	89.5	49
Homa Bay	89.6	100.0	85.7	90.0	49
Machakos	87.9	100.0	85.7	87.9	41
Narok	86.9	100.0	100.0	80.6	46
Trans Nzoia	86.3	0.0	100.0	88.0	33
Kitui	85.3	66.7	91.7	84.4	47
Laikipia	84.7	100.0	100.0	80.8	33
Uasin Gishu	84.4	75.0	100.0	81.8	45
Nakuru	84.2	100.0	88.9	79.2	37
Busia	84.1	66.7	100.0	82.6	32
Kericho	83.7	66.7	100.0	83.3	31
Bungoma	82.9	100.0	80.0	80.8	35
Wajir	82.9	80.0	100.0	75.0	41
Tana River	80.9	100.0	100.0	77.3	26
Lamu	80.0	100.0	75.0	78.6	20
Migori	80.0	100.0	100.0	71.0	45
Marsabit	77.5	50.0	85.7	76.9	35
West Pokot	74.6	100.0	66.7	73.5	39
Bomet	71.1	100.0	60.0	70.8	31
Turkana	68.1	100.0	87.5	61.5	50

Note: sample includes only facilities that provide vaccination; Source: Author's calculations using Kenya 2018 SDI data

L. Equipment Availability

Methodological Note
The equipment indicator focuses on the availability (observed by the enumerator in functional state) of minimum equipment expected at a facility. The pieces of equipment expected in all facilities are: weighing scale (adult, child or infant), stethoscope, sphygmomanometer and thermometer; and additionally, refrigerator and sterilization equipment at health center and hospital levels.

The survey found that half (50.9 percent) of health facilities in Kenya met the minimum medical equipment requirements (Table 25). Private facilities had better availability of equipment (60.6 percent) compared to public facilities (42.4 percent); and urban facilities (61.7 percent) than their rural counterparts (45.8 percent). Dispensaries and clinics had the lowest level of basic equipment available (46.1 percent) than health centers (66.8 percent) and first level hospitals (78.7 percent).

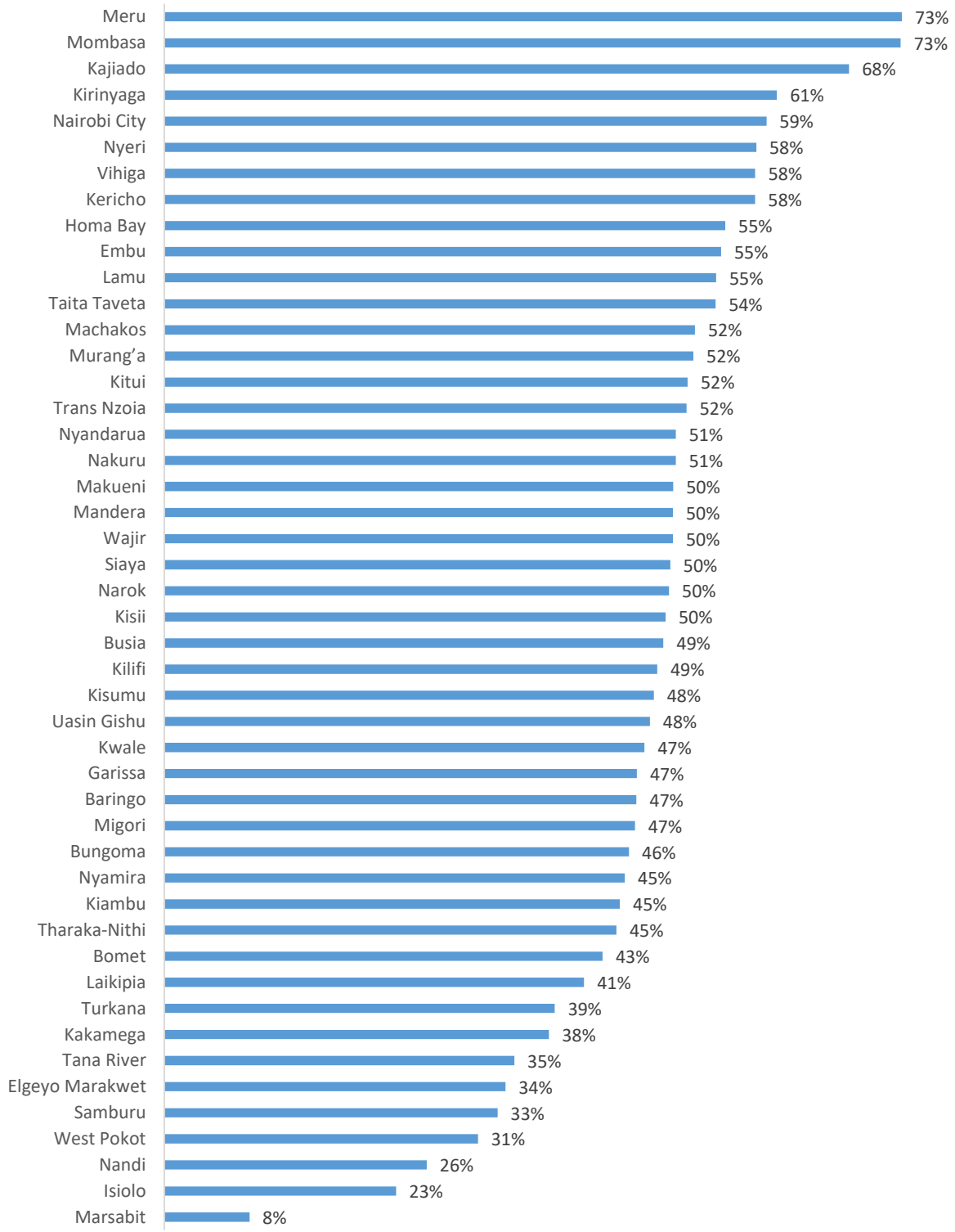
Table 25: Availability of basic equipment by facility type, ownership and location

% facilities	Kenya	Nairobi	Urban	Rural	Public	Private
All	50.9	59.5	61.7	45.8	42.4	60.6
First level hospitals	78.7	66.7	78.5	78.9	90.3	62.3
Health centers	66.8	68.4	57.9	70.8	76.9	51.6
Dispensaries and clinics	46.1	56.8	60.8	39.3	31.0	62.0
# Facilities	3094	96	820	2274	1781	1313

Source: Author's calculations using Kenya 2018 SDI data

Figure 17 shows availability of minimum equipment by county. Meru had the maximum share of facilities (73 percent), while only 8 percent of facilities in Marsabit had availability of minimum equipment.

Figure 17: Equipment indicator by county



Source: Author's calculations using Kenya 2018 SDI data
Figures are percentage of facilities with all minimum equipment available and functional
Minimum equipment: weighing scale (adult, child or infant), stethoscope, sphygmomanometer and thermometer; and additionally refrigerator and sterilization equipment at health center and hospital levels

Table 26 shows the availability of specific types of medical equipment in Kenyan facilities. Most facilities had a scale, a stethoscope, a sphygmomanometer and a thermometer. Over two-thirds of facilities had sterilization equipment (66.6 percent). However, only over a half of facilities (55.8 percent) had a refrigerator.

Table 26: Availability of equipment items in the equipment indicator

% facilities	Kenya	Nairobi	Urban	Rural	Public	Private	First level hospitals	Health centers	Dispensaries and clinics
Any scale	95.1	99.0	93.3	95.9	96.9	93.0	98.0	99.0	94.1
Thermometer	92.8	99.0	97.1	90.7	89.8	96.1	97.9	97.2	91.6
Stethoscope	95.4	99.0	97.2	94.6	93.8	97.2	98.8	98.6	94.6
Sphygmomanometer	92.3	92.8	93.8	91.7	90.4	94.6	97.6	95.9	91.3
Sterilization	66.6	84.6	74.7	62.7	62.1	71.6	94.8	88.1	60.6
Refrigerator	55.8	50.3	37.6	64.5	77.0	31.8	84.9	79.0	49.4

Source: Author's calculations using Kenya 2018 SDI data

Communications equipment

Table 27 shows the availability of communications equipment (radio, phone, computer) in Kenyan health facilities. The study found that around three-fourths (74.6 percent) of health facilities had at least one of the three forms of communication equipment.[20] Urban and private facilities were more likely to have any communication equipment.

Table 27: Communication equipment availability

% facilities	Kenya	Nairobi	Urban	Rural	Public	Private
All	74.6	92.8	86.2	69.0	69.8	80.0
First level hospitals	98.8	100.0	100.0	97.6	97.9	100.0
Health centers	88.4	94.7	93.4	86.1	86.3	91.6
Dispensaries and clinics	70.4	91.9	83.5	64.3	64.0	77.1
# Facilities	3094	96	820	2274	1781	1313

Source: Author's calculations using Kenya 2018 SDI data

The availability of specific types of communication equipment was also assessed (Table 28). cell phones paid by the facility were the most widely available piece of equipment, followed by computers and personal cell phones. There was a large gap in the availability of computers in rural and urban facilities. Only 31.7 percent of rural facilities had computers compared to 66.4 percent of urban facilities. Access to internet, however, was more limited with only a fourth (25.9 percent) of the facilities with that capacity. Public facilities were less likely to have access to internet (15.5 percent) than their private counterparts (37.5 percent), and rural (15.9 percent) less than the urban ones (46.5 percent).

[20] Note that phone cellular phones, the indicator only accepts cell phone which belongs to the facility itself or a personal cell phone but the facility supports the cost of its calls. Cell phones which belong to a staff of the facility, paid for by the staff of the facility but used also by the facility are not included in computing the indicator.

Table 28: Access to various forms of communication

% facilities	Kenya	Nairobi	Urban	Rural	Public	Private
Communication	74.6	92.8	86.2	69.0	69.8	80.0
Communication+	90.5	97.9	96.5	87.7	87.4	94.1
Land line	6.8	22.1	15.9	2.4	3.1	11.0
Cellular Phone[1]	65.7	77.9	75.0	61.3	61.7	70.3
Cellular Phone[2]	33.9	23.1	27.8	36.8	36.7	30.7
Computer	42.9	79.5	66.4	31.7	33.0	54.2
Shortwave Radio	1.0	3.6	1.9	0.6	0.2	2.0
Internet	25.9	53.9	46.5	15.9	15.5	37.5

Source: Author's calculations using Kenya 2018 SDI data
Communication + is an aggregate including cellular phone (see footnote #24).
Note: 1 - cell phone costs are paid for by the facility. 2 - Personal cell phone and costs are paid for by staff

Ambulance services

An effective referral system requires the availability of ambulance services. This need not be ownership of a dedicated emergency vehicle, but rather the facility having access to an emergency vehicle. Table 29 shows that ownership of an ambulance is very low (10.1 percent). However, 81.9 percent of health facilities had access to a vehicle to transport their patients. Rural facilities were more likely to have access (83.2 percent) than the urban ones (79.3 percent), whereas public facilities (87.3 percent) were more likely than the private counterparts (75.9 percent).

Table 29: Availability of ambulance services

% facilities	Kenya	Nairobi	Urban	Rural	Public	Private	First level hospitals	Health centers	Dispensaries and clinics
Own ambulance	10.1	18.0	13.0	8.7	10.5	9.7	67.5	22.8	3.9
Access to ambulance	70.7	79.5	59.8	75.9	84.8	54.7	95.1	86.1	66.1
Access to a vehicle not ambulance	81.9	90.8	79.3	83.2	87.3	75.9	96.4	92.7	78.9

M. Infrastructure Availability

Methodological Note

The infrastructure indicator captures the availability of three inputs: water, sanitation and electricity. The indicator is an unweighted average of these three components. Eligible sources are:
Electricity sources-electric power grid, a fuel operated generator, a battery-operated generator or a solar powered system as their main source of electricity.
Water sources-piped into the facility, piped onto facility grounds or comes from a public tap/standpipe, tube well/borehole, a protected dug well, a protected spring, bottled water or a tanker truck.
Sanitation sources-functioning flush toilets or Ventilated and Improved (VIP) latrines, or covered pit latrine (with slab).

Less than three-fourths (72.9 percent) of the health facilities had access to all three types of basic infrastructure (Table 30). About two-thirds of the rural facilities (67.8 percent) had the basic infrastructure compared to their urban counterparts (83.7 percent). There was also a large difference between the private sector (82.1 percent) and the public sector (64.9 percent). The infrastructure indicator steadily improved with the level of the facility, from 70.1 percent in dispensaries and clinics to 82.2 percent in health centers and 89.5 percent in first level hospitals.

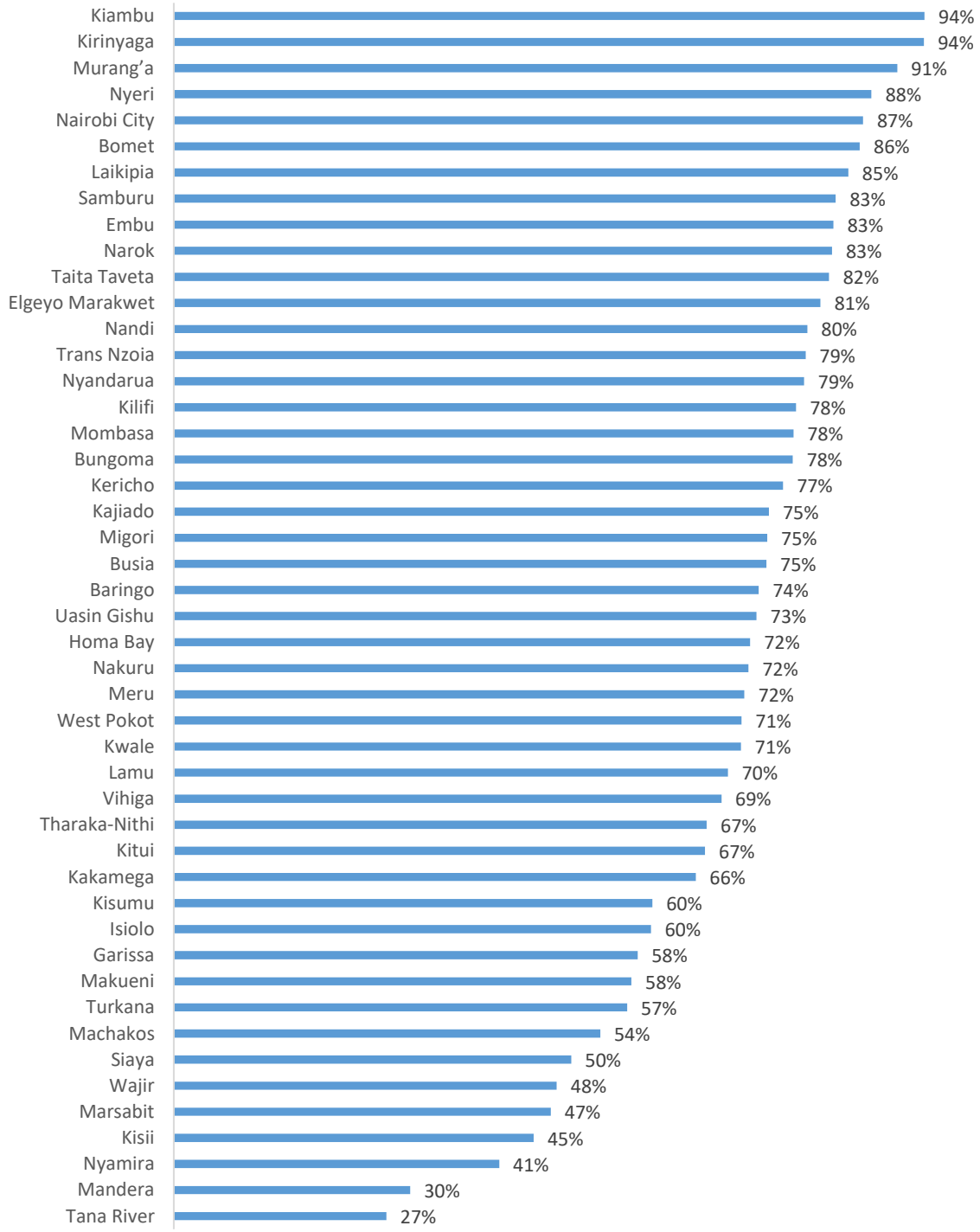
Table 30: Availability of infrastructure by facility type

% facilities	Kenya	Nairobi	Urban	Rural	Public	Private
All	72.9	86.7	83.7	67.8	64.9	82.1
First level hospitals	89.5	100.0	89.7	89.2	86.6	93.4
Health centers	82.2	94.7	85.1	81.0	79.0	87.2
Dispensaries and clinics	70.1	83.8	82.8	64.2	60.1	80.6
# Facilities	3094	96	820	2274	1781	1313

Source: Author's calculations using Kenya 2018 SDI data

Figure 18 shows availability of infrastructure by county. Kiambu and Kirinyaga had the maximum share of facilities (94 percent) with minimum infrastructure, while Tana River had the lowest (27 percent).

Figure 18: Infrastructure indicator by county



Source: Author's calculations using Kenya 2018 SDI data
Figures are percentage of facilities that have minimum infrastructure (electricity, clean water and improved toilet)

Table 31 shows the availability of specific types of infrastructure in Kenyan health facilities. When considered alone, 88.6 percent had access to clean water, 91 percent to toilets and 89.2 percent had access to electricity. The public-private and urban-rural gaps for electricity and toilets were large.

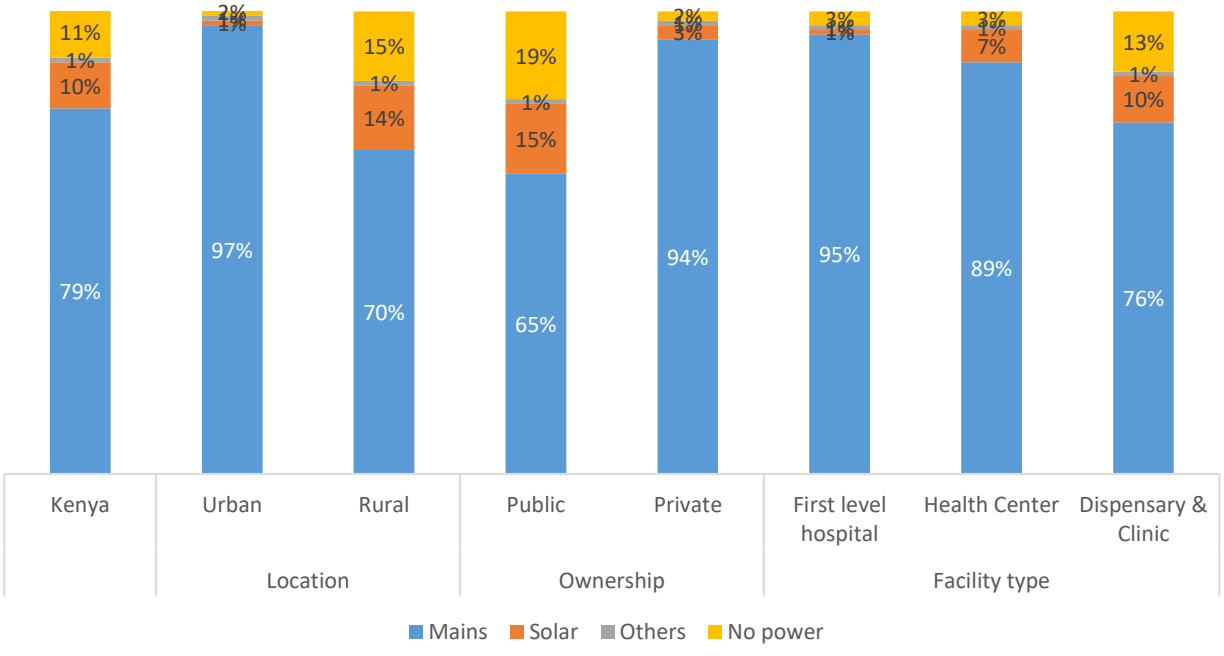
Table 31: Availability of specific types of infrastructure

% facilities	Kenya	Nairobi	Urban	Rural	Public	Private	First level hospitals	Health centers	Dispensaries and clinics
Infrastructure Indicator	72.9	86.7	83.7	67.8	64.9	82.1	89.5	82.2	70.1
Clean water	88.6	91.8	88.9	88.5	88.0	89.3	94.3	91.0	87.8
Toilet	91.0	94.9	95.5	88.9	88.8	93.5	96.2	93.1	90.3
Electricity	89.2	97.9	97.9	85.0	81.4	98.0	97.0	97.3	87.1

Source: Author's calculations using Kenya 2018 SDI data

As shown in **Figure 19**, national electric grid constitutes the major source of electricity in the facilities (79 percent). The proportion increases further in urban (97 percent) and private (94 percent) facilities to near universal levels. However, still over a tenth of the facilities rely on solar (10 percent) for power. Over the period of three months, most of the facilities (70.3 percent) had at least two hours of interruptions in power.

Figure 19: Sources of electricity by facility type



N. Waste Management

Health care waste is a product of health care activities and a potential source of infection if not disposed properly. In order to protect the public health from hazardous waste either directly or through vectors, health care waste must be destroyed or isolated from people, animals and disease vectors. This serves to avoid the recycling of pathogens in the community (WHO, 2005, p. 15). Using questionnaire and observation methods, the survey narrowed its scope to assessment of final disposal of medical waste and sharps, presence of guidelines and history of training in health care waste management.

Acceptable waste disposal.[21]

Most facilities (71.1 percent) carried out safe health care waste disposal (Table 32). However, only 19.6 percent of facilities were observed to have guidelines on health care waste management and 31 percent had training. Of these, 12 percent had both the guidelines and history of training.

Table 32: Total proportion of facilities carrying out safe health care waste disposal

% facilities	Kenya	Nairobi	Urban	Rural	Public	Private
All	71.1	92.8	83.3	65.3	63.5	79.8
First level hospitals	79.8	89.5	81.8	78.0	78.0	82.4
Health centers	76.1	100.0	80.5	74.2	72.3	81.8
Dispensaries and clinics	69.6	89.5	84.0	63.0	60.5	79.3
# Facilities	3094	96	820	2274	1781	1313

Source: Author's calculations using Kenya 2018 SDI data

[21] Protected ground/pit/incineration. These include incinerator burning, protected dumping and covered storage for off-site disposal. The actual safety of the method is debatable even if though it is accepted. The pits may have access to the water table and therefore potentially unsafe (WHO, 2005, p. 17). Burning of waste using a 1-chamber brick incinerator still have the risk of hazardous gases especially as their temperatures are not high enough to achieve complete combustion. Open burning, dumping on flat/unprotected ground are considered environmentally unacceptable and are discouraged (WHO, 2005, p. 41) (WHO, 1999, p. 120).

O. Governance in Health Service Delivery

Governance in Finance

The SDI survey also looked at financial planning, financial management instruments and reporting. As the management policies differ by facility ownership, this section restricts the analysis only to publicly owned facilities. The survey found that only 45.1 percent of facilities in Kenya had a work plan for the current fiscal year (Table 33). Relatively more urban facilities had work plans compared to their rural counterparts. Nairobi County public facilities had a higher percentage of reporting (56.9 percent) compared to the national average.

Table 33: Facilities that had a work plan for the current fiscal year

% Facilities	Kenya (All Public)	Nairobi	Urban	Rural
All	45.1	56.9	50.9	44.4
First level hospitals	57.0	80.0	63.3	53.8
Health Centers	53.1	57.1	47.2	54.1
Dispensaries and clinics	42.3	0.0	48.6	41.8
# Facilities	1,766	19	149	1,617

Source: Author's calculations using Kenya 2018 SDI data

Documentation of funds disbursed and expended is crucial to financial accountability and planning, especially in the public sector. This is usually done through financial management instruments. However, only 14.1 percent of public facilities had receipt books, 47.6 percent payment vouchers, and 42.0 percent cashbooks to manage their finances. (see Table 34 below). Urban facilities had more access to financial management instruments than their counterparts. First level hospitals had more access than lower level facilities.

Table 34: Receipt of financial management instruments by public providers

% Facilities	Kenya (All Public)	Nairobi	Urban	Rural	First level hospitals	Health centres	Dispensaries and clinics
Receipt books	14.1	5.3	22.1	13.1	62.4	15.4	10.2
Payment vouchers	47.6	5.3	33.6	49.3	68.4	52.5	45.0
Cash books	42.0	15.8	33.1	43.1	62.0	48.0	39.1
Other	11.6	21.1	10.6	11.7	18.5	17.5	9.8
# Facilities	1,766	19	149	1,617	102	307	1357

Source: Author's calculations using Kenya 2018 SDI data

More than two-thirds (65.2 percent) of the facilities could show that they submitted their financial report for the previous quarter. More rural facilities were compliant than urban facilities.

Table 35: Facilities that submitted a financial report for previous quarter

% Facilities	Kenya (All Public)	Nairobi	Urban	Rural
All	65.2	21.1	50.1	67.1
First level hospitals	85.7	40.0	86.9	85.1
Health centres	76.1	14.3	65.4	77.9
Dispensaries and clinics	61.2	0.0	33.0	63.8
# Facilities	1148	4	83	1065

Accountability and information sharing with the community

Over a half of the facilities (58.6 percent) shared the financial information with the community (Table 36). The difference was greatest between the rural (61.3 percent) and urban areas (36.3 percent).

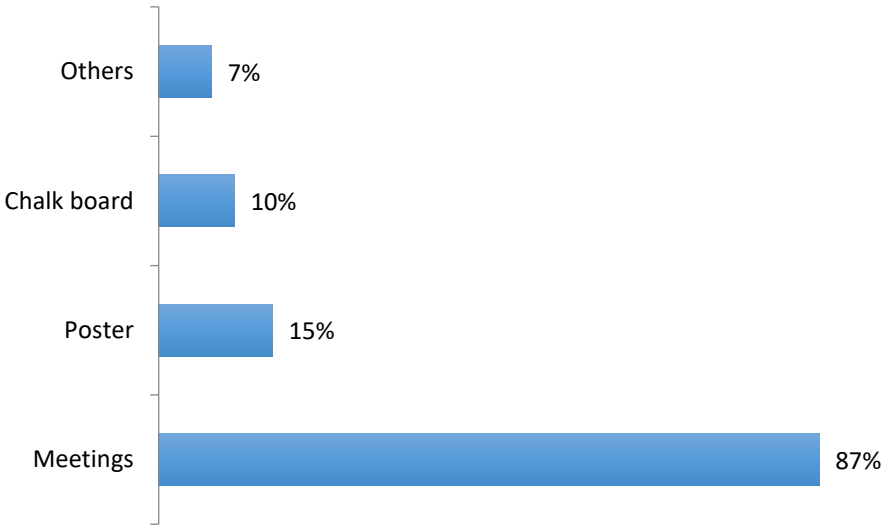
Table 36: Facilities that share financial information with community

% Facilities	Kenya (All Public)	Nairobi	Urban	Rural
All	58.6	42.1	36.3	61.3
First level hospitals	38.2	40.0	22.6	46.2
Health centres	60.2	42.9	53.7	61.3
Dispensaries and clinics	59.8	0.0	33.7	62.1
# Facilities	1766	19	149	1617

Source: Author's calculations using Kenya 2018 SDI data

87 percent communicated financial information through meetings (Figure 20), whereas 15 percent did so through posters and 10 percent via chalkboards.

Figure 20: Means by which facilities communicate with their community



Similar to financial information, more than half of public facilities (56.6 percent) shared the information about essential medicines and health supplies (EMHS) (Table 37). It is important to note that fewer urban facilities (32.6 percent) display EMHS information than rural (59.5 percent).

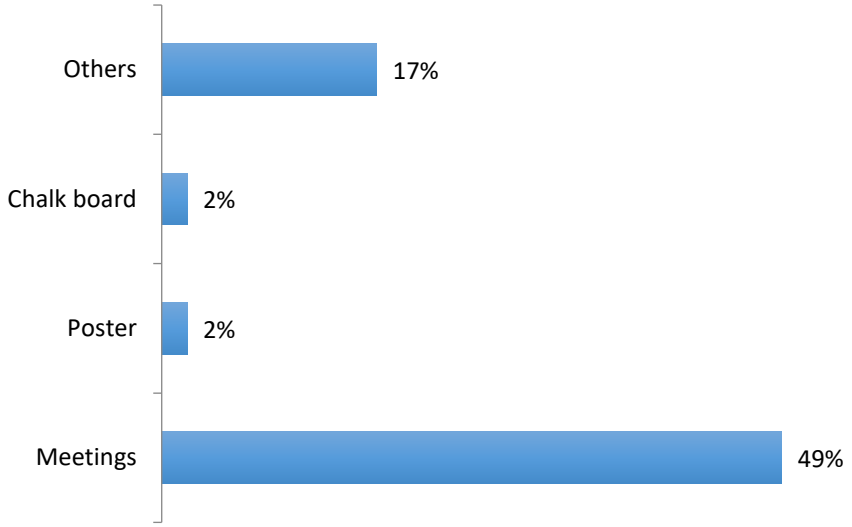
Table 37: Facilities that share EMHS delivery information with community

% Facilities	Kenya (All Public)	Nairobi	Urban	Rural
All	56.6	42.1	32.6	59.5
First level hospitals	29.6	80.0	19.3	34.9
Health centers	62.0	28.6	53.2	63.5
Dispensaries and clinics	57.4	0.0	28.5	60.0
# Facilities	**1766**	**19**	**149**	**1617**

Source: Author's calculations using Kenya 2018 SDI data

Figure 21 shows that 27 percent of the facilities shared information of essential medicines through meetings and 10 percent using other means.

Figure 21: Means by which facilities communicate with their community on EMHS



Source: Author's calculations using 2018 Kenya SDI data

Supervision

Technical supervision is a key factor in human resource appraisal and an important part of accountability for both the provider and the supervising body. This survey addressed supervision by the county health management teams (CHMT). More than two-thirds of facilities (78.1 percent) received a supervision visit from the CHMT during the previous year (Table 38). Supervision was highest in health center (94.5 percent), followed by first level hospitals (91.3 percent) and dispensaries (90.4 percent). It is interesting to note that rural facilities had higher supervision (91.9 percent) rates than urban facilities (86.0 percent).

Table 38: Facilities that received supervision visit during the previous year

% Facilities	Kenya (All Public)	Nairobi	Urban	Rural
All	91.3	94.7	86.0	91.9
First level hospitals	93.0	100.0	94.2	92.4
Health centers	94.5	92.9	93.5	94.7
Dispensaries and clinics	90.4		80.6	91.3
# Facilities	1766	19	149	1617

Source: Author's calculations using Kenya 2018 SDI data

Presence and Activity of Health Facility Governing Committees

More than two-thirds of facilities (93.9 percent) reported that they had a health facility management committee (Table 39). More rural facilities had the committees than urban facilities respectively. Of these facilities, 93.0 percent met quarterly and 4.6 percent monthly. The facilities that showed evidence of minutes of meeting were 86.5 percent.

Table 39: Facilities with governing committees

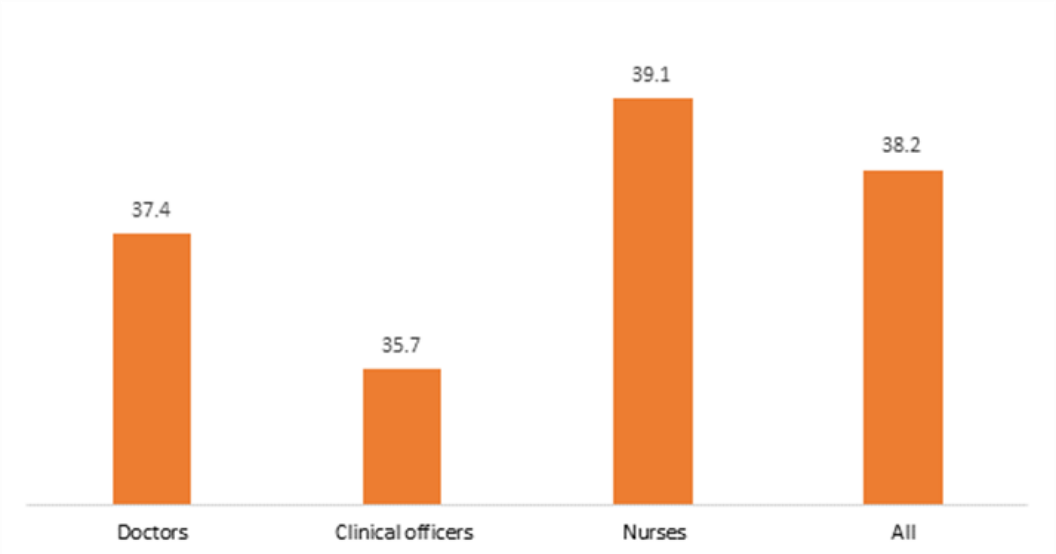
% facilities	Kenya	Nairobi	Urban	Rural
All	93.9	89.5	76.3	96.1
First level hospitals	74.8	100.0	67.5	78.5
Health Centers	98.1	85.7	94.5	98.7
Dispensaries and clinics	94.4		71.9	96.4
# Facilities	1766	19	149	1617

Source: Author's calculations using Kenya 2018 SDI data

P. Health Workforce Background

Average age of the health workforce was 38.2 years (Figure 22). Nurses had the highest average age (39.1 years) followed by doctors (37.4 years) and clinical officers (35.7 years).

Figure 22: Average age among various health workers



Majority of the workforce in the sample (Figure 23) were females (61 percent) most likely driven by the nurse category. As one would expect, proportion of females was higher among nurse (72 percent), while males dominated among doctors (68 percent) and clinical officers (61 percent) categories.

Figure 23: Share of female health workers

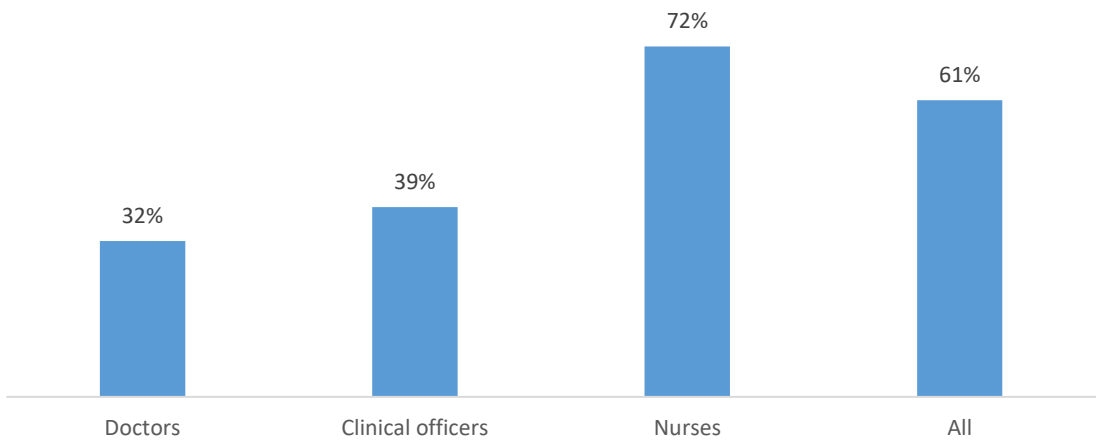
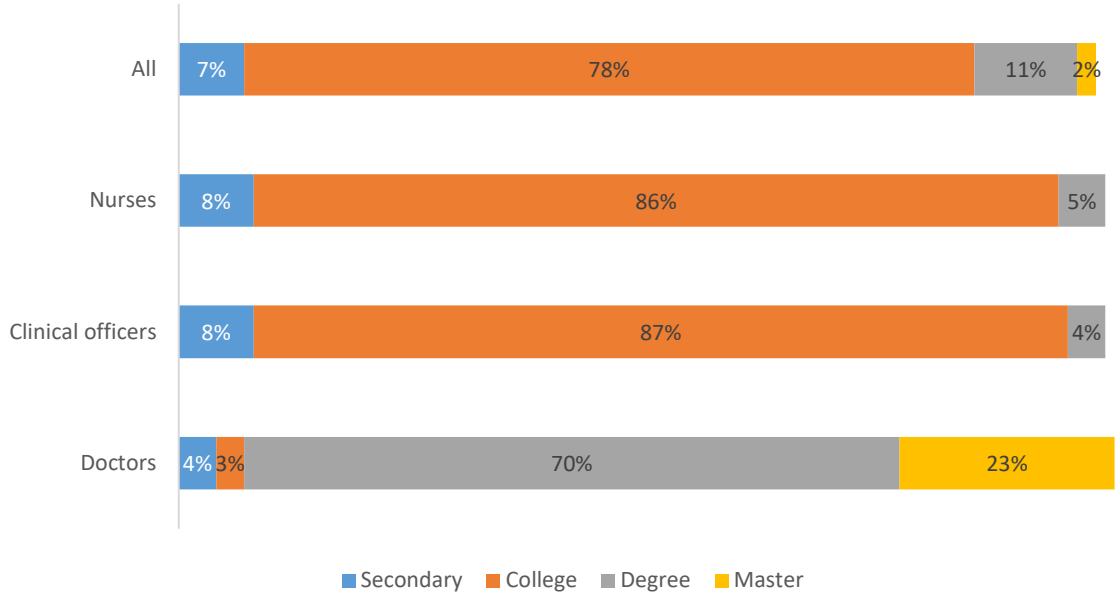


Figure 24 shows the education levels of health workers. Most health workers had education up to college level (78 percent). Half of nurse/midwives also had secondary education and 48 percent at college level. Among nurses and clinical officers, a great proportion (86 and 87 percent respectively) had college level education and most doctors had obtained a degree (70 percent).

Figure 24: Education levels among various health workers

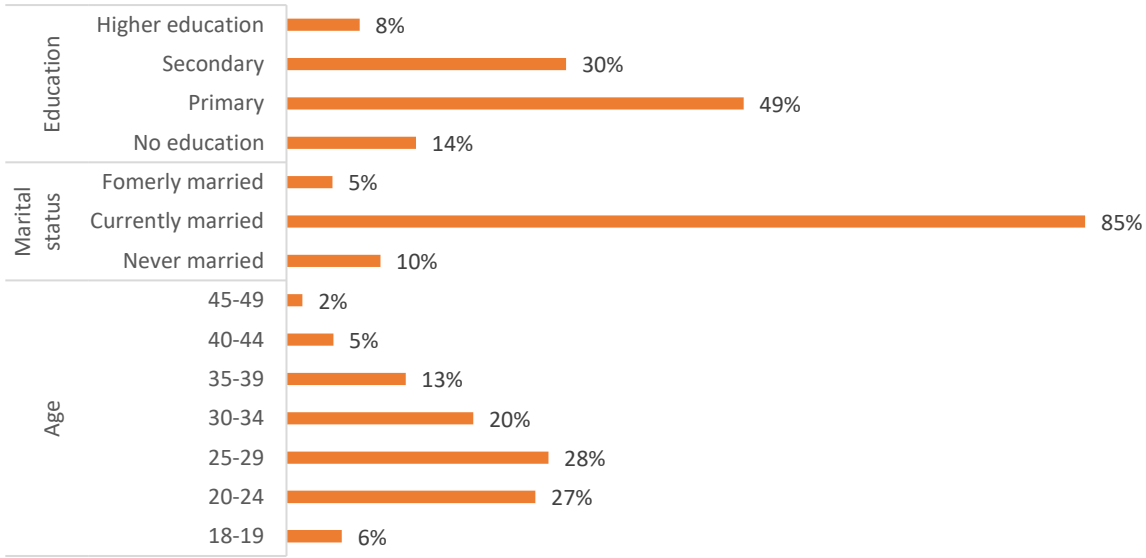


Q. Family Planning Exit Interviews

Sample Characteristics

A total of 3168 clients were assessed for their satisfaction on family planning services and the cost they paid for services. Almost all of the clients were females (99 percent) with majority between 20 and 29 years of age (55 percent). Figure 25 shows that 85 percent of them were married and about a half had primary level of education (49 percent).

Figure 25: Key socio-economic features among FP clients



Source: Author's calculations using Kenya 2018 SDI data

Client Satisfaction

Satisfaction among clients was assessed under eight dimensions – waiting time, consultation time, privacy, staff courtesy and respect, staff attitude, freedom of choice on a method, facility cleanliness and receipt of services. As shown in **Table 26** , a high proportion of clients (> 95 percent) were satisfied with various dimensions of service quality except waiting time (78.9 percent). However, the margin of differences between various socio-economic groups was not large.

Table 26: Satisfaction among FP clients by client characteristics

% satisfied	Waiting time	Consultation time	Privacy	Staff courtesy & respect	Staff attitude	Freedom of choice	Facility cleanliness	Services received
Age								
18-19	79.9	98.1	95.1	100.0	100.0	96.5	95.5	96.8
20-24	78.5	96.4	93.8	99.4	99.4	95.9	96.6	98.3
25-29	80.7	97.7	95.7	99.2	99.2	96.3	96.0	98.7
30-34	77.9	96.9	94.6	99.0	99.0	95.6	96.7	98.8
35-39	76.9	96.8	94.8	99.5	99.5	95.3	96.4	98.9
40-44	80.2	99.5	97.4	100.0	100.0	96.6	98.1	100.0
45-49	74.4	100.0	98.5	100.0	100.0	100.0	96.4	100.0
50+	76.2	100.0	100.0	100.0	100.0	81.6	100.0	93.8
Gender								
Male	89.0	100.0	90.6	100.0	100.0	100.0	98.1	100.0
Female	78.7	97.2	95.0	99.3	99.3	95.9	96.4	98.6
Marital status								
Never married	79.0	96.5	95.0	98.5	98.5	96.4	96.0	95.9
Currently married	79.4	97.4	95.2	99.4	99.4	95.9	96.4	99.0
Formerly married	69.3	96.0	90.7	99.5	99.5	95.7	98.3	97.8
Education								
No education	77.3	95.3	92.7	97.9	97.9	97.0	95.1	99.2
Primary	77.9	97.3	95.1	99.5	99.5	95.3	96.4	98.5
Secondary	80.0	97.9	96.2	99.6	99.6	96.2	97.0	98.2
Higher education	82.7	97.5	93.3	99.3	99.3	97.0	96.9	99.6
Wealth Quintile								
Lowest	76.2	96.9	93.4	99.5	99.5	95.8	95.9	98.5
Second	80.4	97.5	94.3	99.1	99.1	95.9	97.2	99.1
Middle	76.7	97.4	95.8	99.3	99.3	96.7	96.1	98.8
Forth	81.4	96.9	94.8	99.3	99.3	96.0	96.1	98.6
Highest	79.7	97.6	96.5	99.5	99.5	95.5	96.9	98.0
Total	78.9	97.3	95.0	99.3	99.3	96.0	96.4	98.6

Source: Author's calculations using Kenya 2018 SDI data

Table 27 presents the satisfaction by facility characteristics. Reported satisfaction was slightly higher among clients visiting rural and private facilities. Clients receiving services from dispensaries and clinics reported the highest level of satisfaction than higher level facilities.

Table 27: Satisfaction among FP clients by facility characteristics

% satisfied	Waiting time	Consultation time	Privacy	Staff courtesy & respect	Staff attitude	Freedom of choice	Facility cleanliness	Services received
Location								
Rural	79.4	97.3	95.9	99.5	99.5	96.1	96.4	98.7
Urban	77.1	97.0	91.9	98.7	98.7	95.6	96.7	98.3
Ownership								
Private	86.3	98.5	94.2	99.5	99.5	97.9	96.7	98.7
Public	77.2	97.0	95.2	99.3	99.3	95.5	96.4	98.6
Facility Type								
First level hospital	74.4	96.8	92.9	99.6	99.6	92.8	94.3	98.3
Health center	78.7	96.7	95.8	98.8	98.8	95.5	95.7	98.3
Dispensary & Clinic	79.7	97.6	95.1	99.5	99.5	96.7	97.1	98.8
Nairobi	77.9	98.9	91.2	100.0	100.0	96.7	95.6	98.9
Total	78.9	97.3	95.0	99.3	99.3	96.0	96.4	98.6

Source: Author's calculations using Kenya 2018 SDI data

Cost of FP Services

The survey assessed if the clients paid for FP services at the facilities (**Table 28**). Even though the FP services were supposed to be free, about a fifth of the clients interviewed (22.2 percent) had to pay for services at the facilities. On an average, the clients paid 305.3 KSh in total. The clients reported to have paid the maximum for receiving contraceptives from a provider (195.4 KSh on average). Clients did also pay for other services such as registration card (19.9 KSh), diagnostics (11.4 KSh), contraceptive from a pharmacy (11.4 KSh), consultation (21.6 KSh), transport (40 KSh) and other (5.6 KSh). Clients who were highly educated, older (40 to 44 years), never married, and from the highest wealth quintile spent the most than their counterparts.

Table 28: Cost for FP services by client characteristics

Client Characteristics	Paid for FP Services	Card	Diagnostics	Contraceptive from provider	Contraceptive from pharmacy	Consultation	Other	Transport	Total
Age									
18-19	11.0%	11.8	4.9	85.6	0.0	2.7	3.8	28.6	137.4
20-24	21.9%	13.0	4.2	136.4	7.1	18.2	3.0	35.7	217.7
25-29	22.0%	9.1	9.3	148.3	3.3	21.4	4.7	41.6	237.7
30-34	25.4%	10.3	21.1	185.0	22.7	25.3	12.5	43.4	320.3
35-39	23.9%	12.7	19.9	363.4	23.7	15.6	1.0	41.0	477.3
40-44	19.9%	189.6	0.0	476.0	0.0	56.5	8.2	48.4	778.8
45-49	26.4%	19.3	0.0	84.1	8.9	7.2	0.0	45.8	165.4
50+	9.6%	0.0	0.0	100.0	0.0	0.0	0.0	34.4	134.4
Gender									
Male	4.3%	0.0	0.0	27.5	22.5	0.0	0.0	14.9	64.9
Female	22.4%	20.0	11.4	195.8	11.3	21.6	5.6	40.4	306.1
Marital status									
Never married	25.7%	9.4	1.3	223.5	34.1	45.4	0.9	45.5	360.1
Currently married	21.5%	22.3	11.5	196.5	6.6	18.4	6.7	39.7	301.7
Formerly married	27.3%	7.4	28.3	127.8	32.6	20.2	0.0	34.5	250.8
Education									
No education	24.0%	6.6	2.3	62.0	3.1	0.0	9.5	31.6	115.1
Primary	16.7%	32.1	8.8	144.4	4.6	15.3	3.9	34.2	243.3
Secondary	24.5%	12.4	11.3	108.6	9.3	9.0	4.3	38.0	192.8
Higher education	42.5%	20.5	25.4	606.4	38.0	80.6	8.6	93.6	873.3
Wealth Quintiles									
Lowest	16.1%	12.6	16.5	83.6	3.6	19.7	9.3	30.0	175.3
Second	20.4%	6.2	3.8	104.6	5.1	5.8	1.1	31.2	157.8
Middle	24.0%	12.7	9.7	209.1	3.7	29.5	11.3	36.9	312.8
Forth	24.1%	14.1	5.0	142.3	1.5	15.8	4.6	43.8	227.1
Highest	26.2%	47.5	21.8	370.8	37.5	33.1	2.5	58.5	571.7
Total	22.2%	19.9	11.4	195.4	11.4	21.6	5.6	40.0	305.3

Source: Author's calculations using Kenya 2018 SDI data; costs are in Kenyan Schillings (1 USD = 100.75 KSh[22])

[22] Source: Central Bank of Kenya (https://www.centralbank.go.ke/rates/forex-exchange-rates/ Accessed Nov 20, 2018)

More proportion of client visiting urban, private and hospitals paid for FP services than their counterparts (Table 29). Total amount paid was higher among urban, private and health centers clients. In fact, clients in Nairobi paid KSh 697.6 on average.

Table 29: Cost for FP services by facility characteristics

Facility Characteristics	Paid for FP Services	Card	Diagnostics	Contraceptive from provider	Contraceptive from pharmacy	Consultation	Other	Average transport cost	Total
Location									
Rural	15.2%	9.02	4.69	75.89	3.07	5.87	6.10	34.05	138.70
Urban	46.6%	32.37	19.00	332.12	20.87	39.55	5.07	61.00	509.98
Ownership									
Private	70.1%	25.53	16.27	284.41	11.09	33.66	5.87	58.69	435.52
Public	11.1%	11.68	4.17	64.94	11.79	3.88	5.26	35.71	137.43
Facility Type									
First level hospital	34.3%	22.90	4.38	121.48	27.28	7.43	10.59	76.86	270.92
Health center	17.9%	7.72	15.59	440.61	8.07	55.71	2.47	46.74	576.91
Dispensary & Clinic	21.6%	22.74	12.08	142.51	7.84	15.32	5.15	30.98	236.62
Nairobi	31.5%	94.72	3.51	498.23	0.00	73.67	0.00	27.47	697.60
Total	22.2%	19.9	11.4	195.4	11.4	21.6	5.6	40.0	305.3

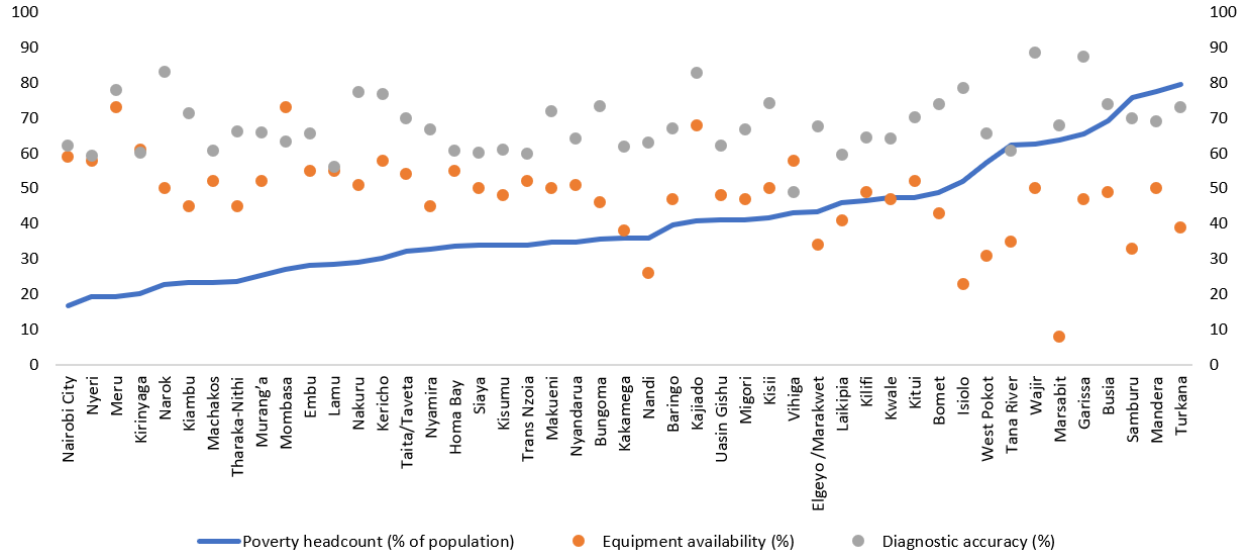
Source: Author's calculations using Kenya 2018 SDI data; costs are in Kenyan Schillings; sample includes only users that paid for services

R. Poverty and health service delivery in Kenya

Figure 30 below shows select key service delivery indicators by county against the county level poverty headcount. More than a third (36.1 percent) of the national population are poor as per the estimates from the 2015 Kenya Integrated Household Budget Survey (KIHBS). Twenty-four counties have lower poverty than the national average.

As it can be seen with equipment availability, there is no particular trend with poverty headcount. For instance, Nairobi City with only 16.7 percent poverty headcount had 45.1 percent of equipment available. On the other hand, Turkana with the highest poverty headcount (79.4 percent) had 61.6 percent of equipment available. Some counties with a higher poverty headcount had lower equipment availability, whereas counties with lower poverty headcount had higher availability as well. The situation was similar with diagnostic accuracy with no clear trend between poverty headcount and accuracy of diagnosis.

Figure 30: Poverty headcount against equipment availability and diagnostic accuracy



IV. COMPARATIVE SDI

After the SDI pilot in Senegal and Tanzania was carried out in 2010, the SDI was revised and rolled out in a number of countries such as Kenya (2012), Uganda (2013), Nigeria, Togo, and Mozambique (2015), Madagascar and Niger (2016). This second SDI in Kenya has a great deal of overlap with the first round in terms of content and implementation methodology. However, there are some methodological sampling differences for SDI surveys prior to 2013 that might make simple comparisons less straightforward (see Annex E for more details).

S. Comparing Kenya to other SDI countries in the region

SDI has been carried out in Senegal (2010), Kenya (2012), Nigeria, Togo, and Uganda in 2013, twice in Tanzania: in 2010 and 2014, Nigeria and Mozambique (2014), Niger and Madagascar (2016). The instruments used (except in Senegal and Tanzania 2010) are fully comparable as well as the survey implementation methodology. The results for the three recent SDI surveys in the region (Madagascar, 2016; Mozambique, 2015 and Tanzania, 2014) are therefore fully comparable.

Table 40 shows how Kenya compared to other countries for a few select indicators. Kenya performed higher than the average on all indicators (caseload, diagnostic accuracy, adherence to clinical guidelines, management of maternal and neonatal complications, availability of drugs and infrastructure) except for equipment availability and absenteeism. Absenteeism was not only higher than the regional average, it was in fact the highest among all SDI countries so far.

Table 40: Kenya in comparison with other countries in health service delivery

	Countries' average	Kenya (2018)	Madagascar (2016)	Mozambique (2015)	Tanzania (2014)
Caseload (per provider per day)	10.0	13.3	5.2	17.4	7.3
Absence from facility (% providers)	21.9	52.8	27.4	23.9	14.3
Diagnostic accuracy (% clinical cases)	49.5	67.5	30.0	58.3	60.2
Adherence to clinical guidelines (% clinical guidelines)	37.4	43.5	31.0	37.4	43.8
Management of maternal and neonatal complications (% clinical guidelines)	27.4	34.5	21.9	29.9	30.4
Drug availability (% drugs)	50.3	54.1	48.0	42.7	60.3
Equipment availability (% facilities)	75.0	50.9	62.0	79.5	83.5
Infrastructure Availability (% facilities)	37.5	72.9	28.4	34.0	50

T. Comparing both SDI Surveys in Kenya

As mentioned before, an SDI survey was carried out in Kenya in 2012. There are some important differences between the 2012 and 2018 survey rounds which may influence observed differences in results. Specifically, the 2018 sample is much more comprehensive: more than 10 times as many facilities and almost 9 times as many providers were surveyed in 2018 compared to 2012. The 2012 survey was conducted in 15 counties and is representative only at the national level, while the 2018 round took place in 47 counties and is representative at national- and county-levels. Unlike the 2018 survey, the 2012 survey did not include for-profit private facilities. Annex E provides additional details on the differences between the two survey rounds.

Given the interest in comparing findings from 2012 to those from 2018, Table 41 presents results for key indicators from both the 2012 and 2018 surveys. To enhance comparability of the results displayed in this table, the sample is restricted so that the analysis is only conducted in those counties that were surveyed during both the 2012 and the 2018 surveys, and excluding for-profit private facilities. It is worthwhile to note that both rounds of surveys utilized the same instruments. However, methodological improvements and differences in the nature of the samples (described above) means that there are differences in the way sampling weights are applied in calculations using data from the two surveys. Because of this, it is possible that differences observed between the 2012 and 2018 values, particularly for indicators that use provider-level disaggregated data, may be attributable to differences in weighting schemes rather than to true underlying changes. A detailed description of the similarities and differences between the two survey rounds is presented in Annex E together with some important considerations for interpreting these differences across years. It is with these caveats that a comparison of the two sets of results are presented below.

Comparing the 2018 values with those from the earlier SDI (2012), Kenya appears to have had an increase in caseload, absence rate and availability of infrastructure indicators. Absence rate appears to have increased by 15.6 percentage points between the 2012 and 2018 survey rounds. However, correction for the different sampling techniques and weights used in the two surveys renders a very different interpretation (see Annex E for more details). There also seems to have been a decline in diagnostic accuracy, management of maternal and neonatal complications, adherence to clinical guidelines, and availability of drugs and equipment. However, these changes may be subject to the same weighting sensitivities as absenteeism. Most changes between 2012 and 2018 were statistically significant. However, as described above, while the differences may be statistically significant, it is not possible to rule out that some of these differences are driven by improvements in the sampling methodologies used.

Table 41: Comparisons between Kenya SDI Survey rounds

	Kenya 2012	Kenya 2018	Unconditional Mean Difference [a]	Conditional Mean Difference [b]
	Mean [SE]	Mean [SE]		
Caseload (per provider per day)	6.785 [0.723]	17.146 [0.724]	10.361***	10.226*** [0.916]
Absence from facility [c] (% providers)	0.289 [0.044]	0.445 [0.015]	0.156***	0.158*** [0.046]
Diagnostic accuracy [d] (% clinical cases)	0.825 [0.033]	0.650 [0.009]	-0.175***	-0.152*** [0.033]
Adherence to clinical guidelines [d] (% clinical guidelines)	0.414 [0.023]	0.405 [0.005]	-0.010	-0.022 [0.018]
Management of maternal and neonatal complications [d] (% clinical guidelines)	0.380 [0.025]	0.331 [0.008]	-0.049*	-0.036 [0.023]
Drug availability (% drugs)	0.730 [0.020]	0.561 [0.006]	-0.169***	-0.167*** [0.018]
Equipment availability (% facilities)	0.637 [0.074]	0.576 [0.018]	-0.061	-0.050 [0.077]
Infrastructure availability (% facilities)	0.506 [0.076]	0.674 [0.018]	0.168***	0.162** [0.072]

Utilizes sample from the counties surveyed in both survey rounds and errors clustered at the facility-level; a - absolute differences between 2018 and 2012 in percentage points except caseload; b – difference is the coefficient on a year dummy of the regression of the outcome variables on the year dummy controlling for a rural/urban, public/private, and facility-level fixed-effects; c – absence rate analysis excludes for-profit private facilities; d – the conditional mean estimates for these variables are obtained from the same specification as other indicators but additionally controlling for infrastructure, equipment and drugs availability; *** p<0.01, ** p<0.05, * p<0.1

V. WHAT DOES THIS MEAN FOR KENYA?

Kenya's progress in achieving key maternal, infant, and child health targets has been slow as set out in key national policy documents. For Kenya to make rapid progress towards Universal Health Coverage, a health system needs to have skilled human resources, minimum inputs such as drugs, commodities and infrastructure, financing, leadership and governance, and health information systems.

Comparing with the previous round of SDI Survey, it would seem that almost all indicators show a decline except infrastructure. While the reasons for decline need to be investigated further using additional research, and at least some of the difference may be driven by methodological improvements between the two survey rounds, recent evidence suggests that devolution of health sector to counties could be a possible reason.[23-24] After the devolution, there was a concerted effort by the county governments on improving the facility infrastructure. This is substantiated by the increase in the infrastructure indicator in this survey.

Availability of skilled human resources for health (HRH) remains a major bottleneck to improving quality of care. In addition to increasing the volume of health workers to address the shortage of providers, improvements in management, supervision and training are critical to ensure quality health service delivery by a skilled HRH base. The survey found that provider knowledge and abilities are very low to deliver quality services. Training needs to be better focused with the main objective of capacitating health workers to accurately diagnose and treat the main causes of illness as well as to have the skills to refer complicated cases up to higher levels of care. There should also be a concerted emphasis on adhering to the national guidelines as far as managing critical health conditions is concerned.

High staff absenteeism is a barrier to achieving health goals. Apart from having the requisite number of skilled staff in place, the staff should be available in the facilities to provide services. During the unannounced visit, more than half of clinical staff were absent. In fact, most of these absences were approved. The Government should ensure establishing systems for tracking staff availability during facility operation hours to reduce absenteeism. Secondly, rational approval of staff leaves can be undertaken by the facility heads or county health managers so as not to interfere with efficient service delivery.

Inputs are important and the lack of medical equipment, drugs and vaccines in facilities are concerning. Basic equipment as mandated by the Government, is not available at half of health facilities. This is alarming given the fact that most of the population accesses care at a public primary health facility. Only about half of the essential drugs are available. Drug availability, particularly for mothers is quite poor. Similarly, only less than two-thirds of the necessary vaccines are available.

Equitable access to quality health services remains a key challenge. While there has been some progress in Kenya's health sector, more can be done to improve service delivery. Like many countries, Kenya faces an inequitable geographic distribution of service quality. Competent health workers and infrastructure availability are better in urban areas.

Client satisfaction is high, but clients still pay for family planning services. A fifth of the family planning clients report of paying for services that are supposed to be provided free of cost including

[23] Kimathi, L. (2017).
[24] Mugo et al. (2018).

public facilities. Strong advocacy and verification measures should be taken by the counties to ensure that clients specifically from lower socio-economic profiles are not deterred by costs of services.

The combination of people's knowledge, skills and health constitute human capital. It enables individuals to reach their full potential as productive members of the society and contribute to the national economic growth. A healthy child can have better learning abilities at school and is more likely to grow up as a productive adult.

Countries in sub-Saharan Africa have seen major reductions in children mortality between 1990 and 2015. However, the burden is still high and are mostly due to avoidable causes such as respiratory infections, malaria and diarrhea. As we see from the SDI survey results in Kenya, there are wide disparities even within countries. Apart from strengthening the existing healthcare systems (e.g. ensuring availability of inputs and continuous capacity development of healthcare providers), there should be additional attention to introducing reforms and innovate modalities for delivering services using current advances in technology and in decentralized settings.

A better human capital is linked with optimal delivery of services, at the least with education and health sectors. Through tracking the service delivery, SDI surveys provide metrics to measuring progress towards a higher human capital – both at a national as well as regional levels.

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VII. ANNEXES

ANNEX A. SAMPLING STRATEGY

The overall objective of the SDI is to produce accurate and representative indicators at the national, urban and rural levels. In some countries, like Kenya, it may be required that the indicators be representative at a sub-national level e.g. region or county. The main units of analysis are facilities as well as health workers. The SDI also aims to produce accurate information on providers at varying levels in the pyramid i.e. hospital, health center and clinics; as well as ownership status e.g. public versus private and location (urban and rural).

It is important to note here that the sampling strategy for the SDI in Kenya was done by the Kenya National Bureau of Statistics (KNBS). The list of facilities to include was sent to NCPD (the firm responsible for the data collection) by KNBS.

U. Sampling Frame for the 2018 Kenya SDI

Administratively, Kenya's health system is divided into 47 counties. In each county, the health sector is and managed by a County Health Management Team (CHMT). The Sampling Frame used is a list of health facilities provided by the MoH. The list contains a total of 9,654 facilities, with geographic identifications of County, constituency, sub-county and ward; as well as ownership status such as Public or Private. In addition to the list, facility type such as dispensaries, clinics, health centers, and hospitals; with their location in either Rural or Urban was provided by the nation's statistical agency - KNBS.

Table 42 and 43 below show the distribution of facilities by type and ownership respectively.

Table 42: Distribution of facilities by Type

County	Dispensary/Clinic	Health Center	First Level Hospital	Tertiary Hospital	Total
Mombasa	214	24	14	2	254
Kwale	123	14	4	0	141
Kilifi	223	22	10	0	255
Tana River	53	8	2	0	63
Lamu	41	6	3	0	50
Taita Taveta	72	18	10	0	100
Garissa	110	31	13	1	155
Wajir	62	24	10	0	96
Mandera	61	33	8	0	102
Marsabit	70	20	3	1	94
Isiolo	41	8	3	0	52
Meru	396	39	23	1	459
Tharaka Nithi	111	17	6	0	134
Embu	162	16	7	1	186
Kitui	256	58	14	0	328
Machakos	270	36	11	1	318

Makueni	257	38	9	0	304
Nyandarua	122	24	4	0	150
Nyeri	266	31	9	1	307
Kirinyaga	168	30	7	0	205
Muranga	214	18	11	0	243
Kiambu	399	58	29	1	487
Turkana	142	19	8	0	169
West Pokot	111	7	5	0	123
Samburu	64	5	3	0	72
Trans Nzoia	132	16	8	0	156
Uasin Gishu	151	30	11	1	193
Elgeyo Marakwet	93	22	8	0	123
Nandi	167	15	5	0	187
Baringo	180	25	4	0	209
Laikipia	93	14	8	0	115
Nakuru	343	58	25	1	427
Narok	117	35	7	0	159
Kajiado	235	33	12	0	280
Kericho	159	20	15	0	194
Bomet	110	18	5	1	134
Kakamega	191	66	13	1	271
Vihiga	60	25	6	0	91
Bungoma	169	29	12	0	210
Busia	92	20	7	0	119
Siaya	136	49	11	0	196
Kisumu	151	47	21	1	220
Homa Bay	197	59	15	0	271
Migori	169	36	12	0	217
Kisii	113	37	22	1	173
Nyamira	85	45	8	0	138
Nairobi	549	134	33	8	724
Grand Total	**7,700**	**1,437**	**494**	**23**	**9,654**

Source: NCPD sampling report

Table 43: Distribution by Ownership

	Ownership			Proportion	
County	**Public**	**Private**	**Total**	**Public**	**Private**
Mombasa	53	201	254	21%	79%
Kwale	101	40	141	72%	28%
Kilifi	110	145	255	43%	57%
Tana River	45	18	63	71%	29%
Lamu	35	15	50	70%	30%
Taita Taveta	63	37	100	63%	37%
Garissa	81	74	155	52%	48%
Wajir	94	2	96	98%	2%
Mandera	62	40	102	61%	39%
Marsabit	65	29	94	69%	31%
Isiolo	36	16	52	69%	31%
Meru	146	313	459	32%	68%
Tharaka Nithi	72	62	134	54%	46%
Embu	93	93	186	50%	50%
Kitui	232	96	328	71%	29%
Machakos	164	154	318	52%	48%
Makueni	210	94	304	69%	31%
Nyandarua	72	78	150	48%	52%
Nyeri	118	189	307	38%	62%
Kirinyaga	63	142	205	31%	69%
Muranga	129	114	243	53%	47%
Kiambu	109	378	487	22%	78%
Turkana	108	61	169	64%	36%
West Pokot	90	33	123	73%	27%
Samburu	46	26	72	64%	36%
Trans Nzoia	73	83	156	47%	53%
Uasin Gishu	120	73	193	62%	38%
Elgeyo Marakwet	108	15	123	88%	12%
Nandi	118	69	187	63%	37%
Baringo	176	33	209	84%	16%
Laikipia	73	42	115	63%	37%
Nakuru	164	263	427	38%	62%
Narok	106	53	159	67%	33%
Kajiado	92	188	280	33%	67%
Kericho	134	60	194	69%	31%
Bomet	110	24	134	82%	18%
Kakamega	160	111	271	59%	41%
Vihiga	49	42	91	54%	46%
Bungoma	131	79	210	62%	38%
Busia	76	43	119	64%	36%
Siaya	137	59	196	70%	30%
Kisumu	127	93	220	58%	42%
Homa Bay	170	101	271	63%	37%
Migori	131	86	217	60%	40%
Kisii	117	56	173	68%	32%
Nyamira	87	51	138	63%	37%
Nairobi	147	577	724	20%	80%
Grand Total	**5,003**	**4,651**	**9,654**	52%	48%

Source: NCPD sampling report

In total, there are 52 percent of the facilities that are Public and 42 percent Private.

V. Sample Size and Sample allocation for the 2018 Kenya SDI

$$n = \frac{3.84 f}{V^2} \frac{q}{p}$$

p = the anticipated proportion of facilities with the attribute of interest,
q = 1- p
f = the so-called design effect (deff),
V2 = relative variance, (square of the relative error),
3.84 = is the square of the normal deviate (1.96) needed to provide an estimate at the 95 percent level of confidence.

For 2018 SDI HFA, the following were used:
p=0.5, q=0.5, f=1, v=0.18 equally for each county.

Since the survey is conducted in a small sample of health facilities with the total target health facilities size N known, a finite health facility correction was further used to reduce the above calculated initial sample size to get the final sample size n* at county level.

$$\boxed{n^* = \frac{n}{1 + n/N}}$$

The resulting sample was later distributed proportionately across the strata (level of care) at county level.

Note that deff (f) is set at 1 because survey used stratified random sampling methodology. The facilities were sampled at strata (level of care by county) level systematically. The facilities were sorted by residence and geographic characteristics before sampling.

W. Sampling Health Facilities and Health Workers

The next stage is the selection of health staff for interviews. Prior to canvassing in the selected facility, a listing of health workers, detailing categories of staff will be provided. This list will serve as the sampling frame for the selection of health staff to be interviewed. Within each health facility, up to 10 health workers will be selected. There are 2 different procedures for measuring absenteeism or assessing knowledge. For absence, 10 health workers will be selected in the staff roster using a random numbers table and the whereabouts of those health workers is ascertained in a return surprise visit. For the assessment, however, only health workers who actually see patients i.e. provide a diagnostic and treatment are eligible. These procedures imply that facilities across strata

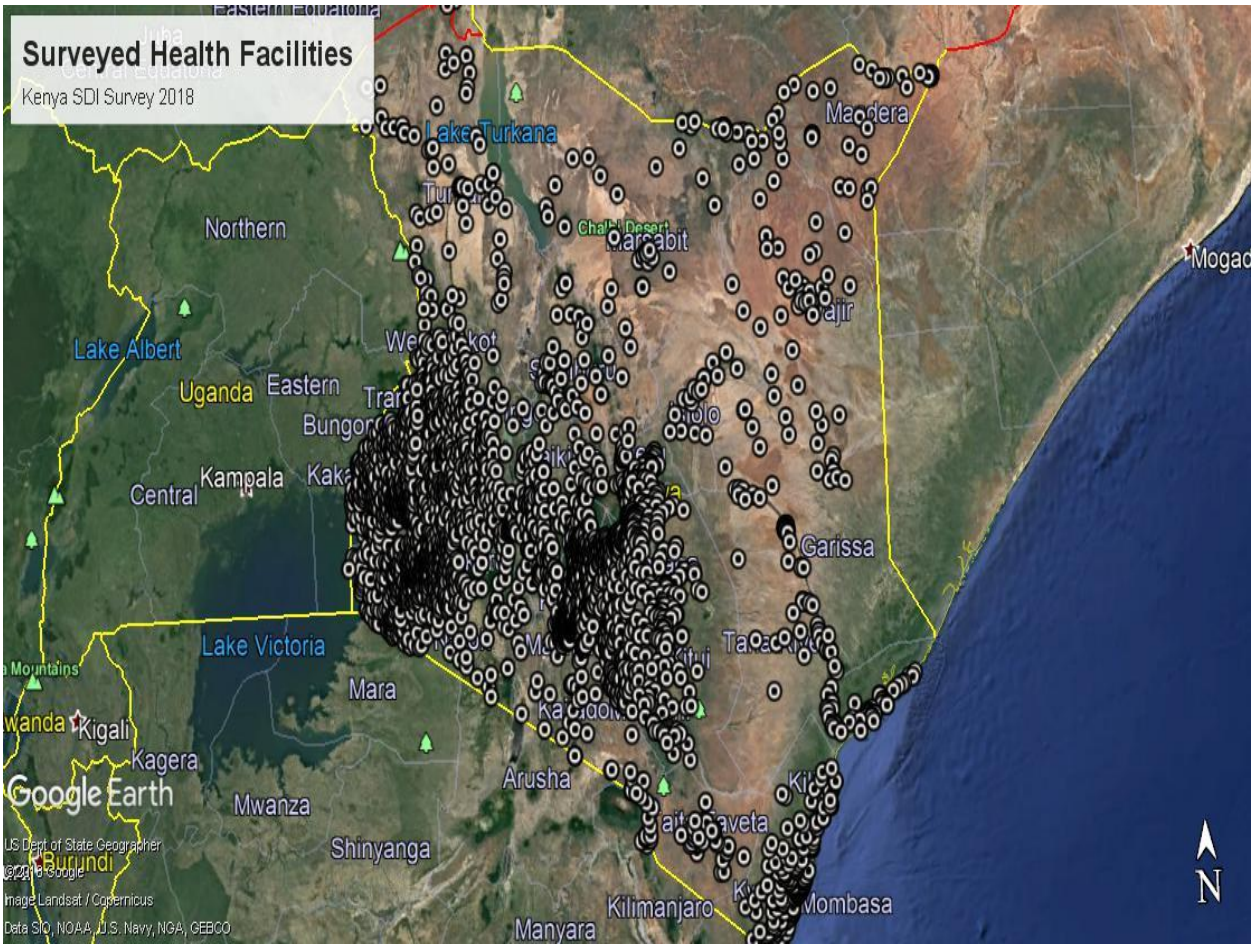
as well as health workers across strata and within facility do not all have the same probability of selection. It is therefore necessary to compute weights for reporting the survey results. Thus, separate weights were computed for the facility, absenteeism and competence samples. Facility weight is utilized while analyzing facility level indicators such as infrastructure, availability of equipment and drugs; absenteeism weight for calculating absenteeism and competence weight for clinical knowledge, adherence to guidelines and diagnostic accuracy.

X. Sampling Family Planning Clients for Exit Interviews

In health facilities providing family planning services, clients accessing these services were sampled for exit interviews. In dispensaries, clinics, and health centers up to a maximum of 3 clients per facility were sampled for interview while in first level hospitals a maximum of 5 clients were sampled. The sampling process was as follows;

a. The average number of family planning clients visiting a facility on a typical day is first determined.
b. Using the average number of FP clients, the sampling interval is determined by dividing the number by 3 (dispensaries, clinics, health centers) or 5 (first level hospitals).
c. From the first 3 (dispensaries, clinics, health centers) or 5 (first level hospitals) FP clients, the first interviewee is randomly selected, and the subsequent interviewees are selected by adding the sampling interval to the serial number of the previous client.
d. Where the average number of clients seen by a facility on a typical day is less than 6 (dispensaries, clinics, health centers) or 10 (first level hospitals) then the first 3 (dispensaries, clinics, health centers) or 5 (first level hospitals) were interviewed.

Figure 31: Map of health facilities visited by SDI in Kenya



ANNEX B. DEFINITION OF INDICATORS

Table 44: Indicator definition and method of calculation

Caseload per health provider	
Number of outpatient visits per clinician per day.	The number of outpatient visits recorded in outpatient records in the three months prior to the survey, divided by the number of days the facility was open during the three-month period and the number of health professionals who conduct patient consultations (i.e. excluding cadre-types such as public health nurses and out-reach workers).
Absence rate	
Share of a maximum of 10 randomly selected providers absent from the facility during an unannounced visit.	Number of health professionals that are not off duty and who are absent from the facility on an unannounced visit as a share of ten randomly sampled workers. Health professionals doing fieldwork (mainly community and public health professionals) were counted as present.
Adherence to clinical guidelines	
Unweighted average of the share of relevant history taking questions, the share of relevant examinations performed.	For each of the following four clinical cases: (i) acute diarrhea; (ii) pneumonia; (iii) diabetes mellitus; (iv) pulmonary tuberculosis. History Taking Questions: Assign a score of one if a relevant history taking question is asked. The number of relevant history taking questions asked by the clinician during consultation is expressed as a percentage of the total number of relevant history questions included in the questionnaire. Relevant Examination Questions: Assign a score of one if a relevant examination question is asked. The number of relevant examination taking questions asked by the clinician during consultation is expressed as a percentage of the total number of relevant examination questions included in the questionnaire. For each clinical case: Unweighted average of the: relevant history questions asked, and the percentage of physical examination questions asked. The history and examination questions considered are based on the Kenya Standard National Guidelines and the guidelines for Integrated Management of Childhood Illnesses (IMCI).
Management of maternal and neonatal complications	
Share of relevant treatment actions proposed by the clinician.	For each of the following two clinical cases: (i) post-partum hemorrhage; and (ii) neonatal asphyxia. Assign a score of one if a relevant action is proposed. The number of relevant treatment actions proposed by the clinician during consultation is expressed as a percentage of the total number of relevant treatment actions included in the questionnaire.
Diagnostic accuracy	
Average share of correct diagnoses provided in the four clinical cases.	For each of the following five clinical cases: (i) acute diarrhea; (ii) pneumonia; (iii) diabetes mellitus; (iv) pulmonary tuberculosis. For each clinical case, assign a score of one as correct diagnosis for each clinical case if diagnosis is mentioned. Sum the total number of correct diagnoses identified. Divide by the total number of clinical case. Where multiple diagnoses were provided by the clinician, the diagnosis is coded as correct as long as it is mentioned, irrespective of what other alternative diagnoses were given.

Drug availability	
Share of basic drugs which at the time of the survey were available at the health facilities.	Priority medicines for mothers: Assign score of one if facility reports and enumerator confirms/observes the facility has the drug available and non-expired on the day of visit for the following medicines: Oxytocin (injectable), misoprostol (cap/tab), sodium chloride (saline solution) (injectable solution), azithromycin (cap/tab or oral liquid), calcium gluconate (injectable), cefixime (cap/tab), magnesium sulfate (injectable), benzathine benzylpenicillin powder (for injection), ampicillin powder (for injection), betamethasone or dexamethasone (injectable), gentamicin (injectable) nifedipine (cap/tab), metronidazole (injectable), medroxyprogesterone acetate (Depo-Provera) (injectable), iron supplements (cap/tab) and folic acid supplements (cap/tab). Priority medicines for children: Assign score of one if facility reports and enumerator confirms after observing that the facility has the drug available and non-expired on the day of visit for the following medicines: Amoxicillin (syrup/suspension), oral rehydration salts (ORS sachets), zinc (tablets), ceftriaxone (powder for injection), artemisinin combination therapy (ACT), artesunate (rectal or injectable), benzylpenicillin (powder for injection), vitamin A (capsules) We take out of analysis of the child tracer medicines two medicines (Gentamicin and ampicillin powder) that are included in the mother and in the child tracer medicine list to avoid double counting. The aggregate is adjusted by facility type to accommodate the fact that not all drugs (injectables) are expected to be at the lowest level facility, CSB1, where health workers are not expected to offer injections.
Equipment availability	
Share of facilities with thermometer, stethoscope and weighing scale, refrigerator and sterilization equipment.	Medical Equipment aggregate: Assign score of one if enumerator confirms the facility has one or more functioning of each of the following: thermometers, stethoscopes, sphygmomanometers and a weighing scale (adult or child or infant weighing scale) as defined below. Health centers and first level hospitals are expected to include two additional pieces of equipment: a refrigerator and sterilization device/equipment. Thermometer: Assign score of one if facility reports and enumerator observes facility has one or more functioning thermometers. Stethoscope: Assign score of one if facility reports and enumerator confirms facility has one or more functioning stethoscopes. Sphygmomanometer: Assign score of one if facility reports and enumerator confirms facility has one or more functioning sphygmomanometers. Weighing Scale: Assign score of one if facility reports and enumerator confirms facility has one or more functioning Adult, or Child or Infant weighing scale. Refrigerator: Assign score of one if facility reports and enumerator confirms facility has one or more functioning refrigerator. Sterilization equipment: Assign score of one if facility reports and enumerator confirms facility has one or more functioning Sterilization device/equipment.
Infrastructure availability	
Share of facilities with electricity, clean water and improved sanitation.	Infrastructure aggregate: Assign score of one if facility reports and enumerator confirms facility has electricity and water and sanitation as defined. Electricity: Assign score of one if facility reports having the electric power grid, a fuel operated generator, a battery-operated generator or a solar powered system as their main source of electricity. Water: Assign score of one if facility reports their main source of water is piped into the facility, piped onto facility grounds or comes from a public tap/standpipe, tubewell/borehole, a protected dug well, a protected spring, bottled water or a tanker truck. Sanitation: Assign score of one if facility reports and enumerator confirms facility has one or more functioning flush toilets or VIP latrines, or covered pit latrine (with slab).

ANNEX C. ADDITIONAL RESULTS

Table 45: Distribution of health personnel by facility type, ownership and location

	Kenya	Nairobi	First level hospitals	Health centers	Dispensary and clinics	Private	Public	Rural	Urban
Physician/ Medical Doctor	2.6	7.7	4.9	0.7	1.1	4.5	1.2	0.6	4.4
Medical officer	7.2	18.1	13.6	3.2	2.1	10.2	5.1	2.7	11.3
Clinical officer (Specialist)	1.9	0.9	2.4	1.4	1.6	1.9	1.9	1.3	2.4
Clinical officer	19.1	16.6	13.0	23.8	23.6	21.9	17.1	19.9	18.4
Nurse (specialist)	0.9	0.4	1.1	0.3	0.9	0.8	0.9	0.6	1.1
BSc Nurse	4.0	2.5	4.3	4.0	3.6	2.7	4.9	4.1	3.9
KRCHN	52.0	47.2	50.4	54.3	52.4	47.8	55.0	55.9	48.5
KECHN	12.4	6.6	10.4	12.3	14.7	10.1	13.9	14.9	10.1
Total	100	100	100	100	100	100	100	100	100

Table 46: Share of female health workers and mean age

	Female (%)	Mean age (All)	Mean age (Male)	Mean age (Female)
Physician/Medical Doctor	28.9	43.0	45.2	37.7
Medical officer	32.7	35.3	36.5	32.8
Clinical officer (Specialist)	27.1	45.2	46.9	40.9
Clinical officer	40.2	34.7	35.3	33.9
Nurse (specialist)	62.3	44.0	45.6	43.1
BSc Nurse	69.9	38.8	37.7	39.3
KRCHN	71.4	37.0	35.6	37.5
KECHN	74.0	47.6	47.5	47.7
Total	60.9	37.5	45.2	37.7

Table 47: Average age of health personnel by county

County	Mean age	Standard error	95% confidence interval	
			Lower	Upper
Kwale	61.7	6.1	49.8	73.7
Mombasa	48.5	2.9	42.8	54.3
Marsabit	44.8	3.7	37.5	52.0
Taita Taveta	41.8	3.7	34.7	49.0
Nyeri	41.1	1.5	38.1	44.1
Migori	40.2	3.3	33.8	46.7
Elgeyo Marakwet	39.7	1.2	37.3	42.1
Kitui	39.6	1.5	36.7	42.5
Laikipia	39.5	1.7	36.1	42.9
Kericho	39.4	1.1	37.3	41.5
Baringo	39.2	0.9	37.5	41.0
Meru	39.1	1.8	35.5	42.7
West Pokot	38.7	2.9	33.0	44.3
Nyandarua	38.4	1.8	34.8	41.9
Kiambu	38.4	0.9	36.6	40.1
Embu	38.2	0.9	36.5	39.9
Nakuru	38.1	1.7	34.8	41.5
Makueni	37.9	0.9	36.2	39.7

Murang'a	37.9	1.8	34.4	41.4
Kilifi	37.6	1.2	35.2	39.9
Lamu	37.1	1.2	34.8	39.4
Trans Nzoia	37.0	1.3	34.4	39.5
Vihiga	36.8	0.8	35.3	38.3
Tharaka-Nithi	36.8	0.6	35.6	37.9
Kakamega	36.7	0.7	35.3	38.1
Kisii	36.6	0.7	35.2	38.1
Tana River	36.5	1.5	33.6	39.5
Narok	36.5	1.4	33.9	39.2
Bungoma	36.5	0.6	35.3	37.7
Nairobi City	36.3	1.5	33.4	39.1
Samburu	36.2	0.6	35.0	37.4
Kirinyaga	36.0	0.8	34.5	37.6
Nandi	36.0	1.1	33.9	38.1
Busia	35.9	0.7	34.5	37.3
Nyamira	35.6	0.6	34.3	36.8
Homa Bay	35.4	0.8	33.7	37.1
Kisumu	35.3	0.8	33.7	36.9
Bomet	34.6	0.6	33.4	35.9
Uasin Gishu	34.5	1.4	31.8	37.2
Isiolo	34.1	0.9	32.2	35.9
Kajiado	33.3	1.3	30.8	35.8
Siaya	32.4	0.5	31.5	33.3
Garissa	32.4	0.4	31.5	33.2
Machakos	32.4	1.1	30.2	34.6
Mandera	32.2	0.6	31.0	33.5
Turkana	31.2	0.3	30.6	31.7
Wajir	30.4	0.4	29.6	31.2

Table 48: Determinants of Absenteeism: regression results

	Dependent variable: Absence rate					
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)#
Private sector is reference group						
Public					0.08***	0.09***
					(0.01)	(0.01)
Rural is reference group						
Urban					-0.02	-0.01
					(0.02)	(0.02)
Hospital is reference group						
Health center				0.02	0.01	0.01
				(0.03)	(0.03)	(0.03)
Health post				-0.00	0.00	-0.01
				(0.03)	(0.03)	(0.03)
Facility with 1-2 health workers is reference group						
Size 3 to 5 HWs			0.04***	0.04**	0.04***	0.03*
			(0.02)	(0.02)	(0.02)	(0.02)
Size 6 to 10 HWs			0.07***	0.06***	0.06***	0.05***
			(0.02)	(0.02)	(0.02)	(0.02)
Size 11 to 20 HWs			0.16***	0.14***	0.14***	0.13***
			(0.02)	(0.02)	(0.02)	(0.02)
Size 20+ HWs			0.20***	0.20***	0.20***	0.18***
			(0.02)	(0.03)	(0.03)	(0.03)
Doctor is reference group						
Clinical officers		-0.15***	-0.11***	-0.11***	-0.13***	-0.13***
		(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Nurses		-0.12***	-0.06*	-0.06*	-0.10***	-0.10***
		(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Health Worker Characteristics						
Female provider	0.01	0.03**	0.01	0.01	0.01	-0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Age of provider	0.001***	0.001**	0.001***	0.001***	0.001***	0.001***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Constant	0.38***	0.56***	0.41***	0.42***	0.40***	0.42***
	(0.02)	(0.04)	(0.04)	(0.05)	(0.05)	(0.07)
Observations	11,726	7,391	7,364	7,360	7,360	7,360
R-squared	0.00	0.00	0.02	0.02	0.03	0.05

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; # includes county dummies (not shown in the table)

Table 49: Determinants of diagnostic accuracy: regression results

	Dependent variable: Diagnostic accuracy						
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)#
Process quality						0.64***	0.64***
						(0.02)	(0.03)
Minimum equipment					-0.00	-0.01	-0.00
					(0.01)	(0.01)	(0.01)
Infrastructure					0.03***	0.02***	0.02**
					(0.01)	(0.01)	(0.01)
Communication					-0.02**	-0.00	0.01
					(0.01)	(0.01)	(0.01)
Ambulance access					-0.01	0.01	0.01
					(0.01)	(0.01)	(0.01)
Drug availability					0.04*	0.02	0.02
					(0.02)	(0.02)	(0.02)
Hospital is reference group							
Health center	-0.06***	-0.06***	-0.01	-0.01	-0.01	0.00	0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)
Health post	-0.11***	-0.11***	-0.03	-0.03	-0.02	-0.00	0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Private sector is reference group							
Public		-0.00	0.04***	0.04***	0.05***	0.03***	0.03***
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Rural location is reference group							
Urban			0.01	0.01	0.01	0.01	0.03***
			(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Doctor is reference group							
Clinical officers			-0.00	-0.01	-0.00	0.01	0.02
			(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Nurse			-0.14***	-0.13***	-0.13***	-0.06***	-0.06***
			(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Health Worker Characteristics							
Female provider				-0.02***	-0.02***	-0.01*	-0.01
				(0.01)	(0.01)	(0.01)	(0.01)
Age of provider				-0.00**	-0.00*	-0.00	-0.00
				(0.00)	(0.00)	(0.00)	(0.00)
Constant	0.75***	0.75***	0.73***	0.76***	0.73***	0.38***	0.28***
	(0.02)	(0.02)	(0.02)	(0.03)	(0.04)	(0.03)	(0.05)
Observations	4,427	4,427	4,427	4,427	4,427	4,427	4,427
R-squared	0.02	0.02	0.08	0.09	0.09	0.24	0.28

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; # includes county dummies (not shown in the table)

Figure 32: Diagnostic accuracy by questions asked: Severe dehydration

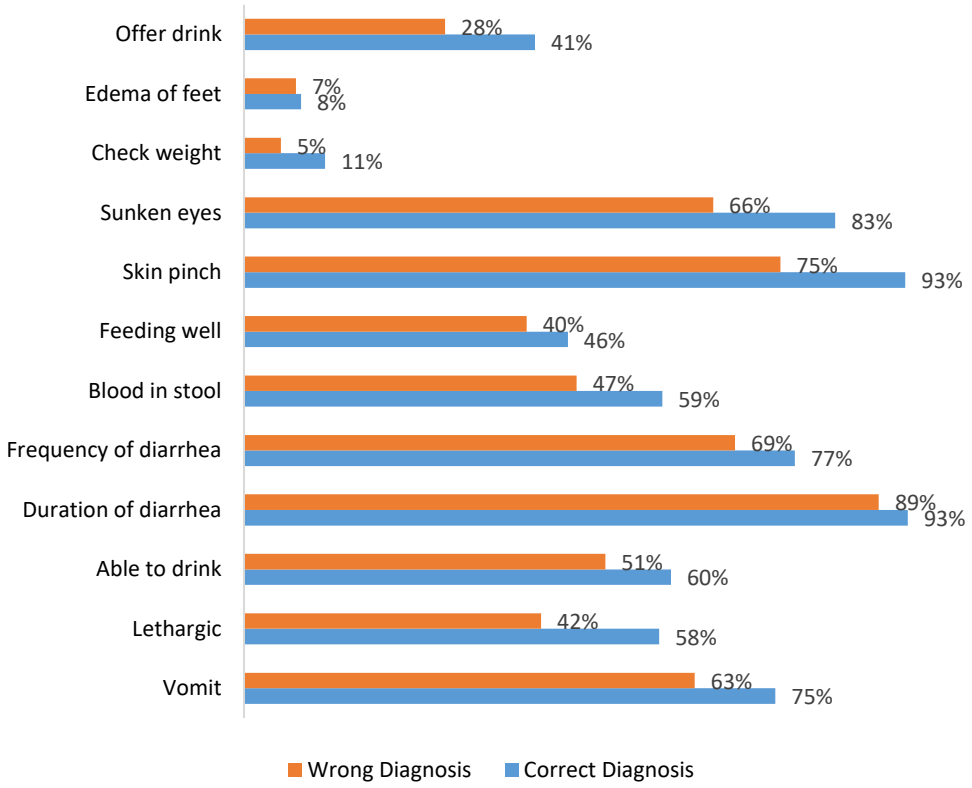


Figure 33: Diagnostic accuracy by questions asked: Pneumonia

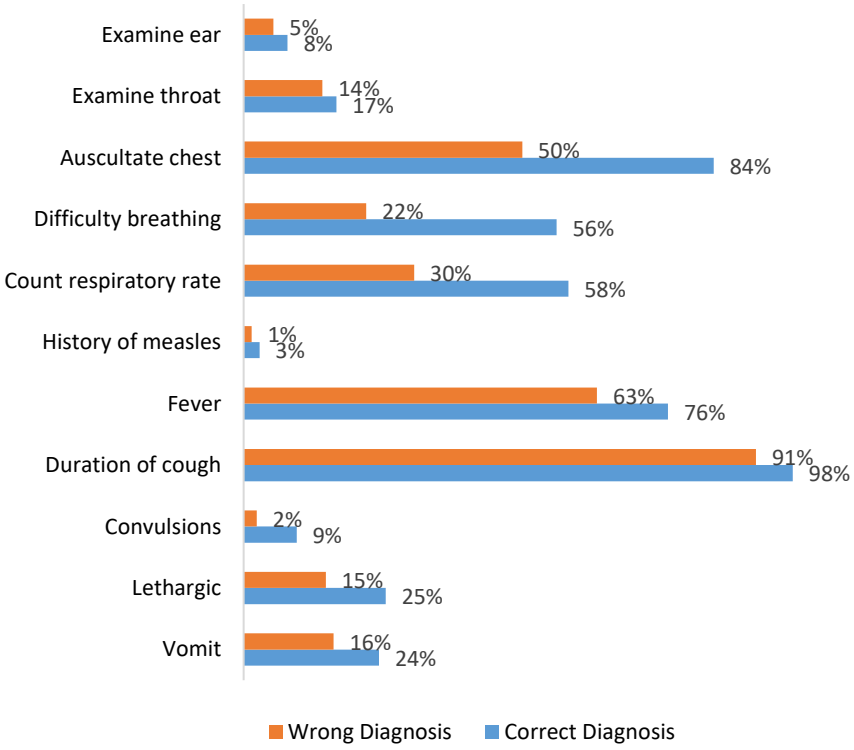


Figure 34: Diagnostic accuracy by questions asked: Diabetes Mellitus

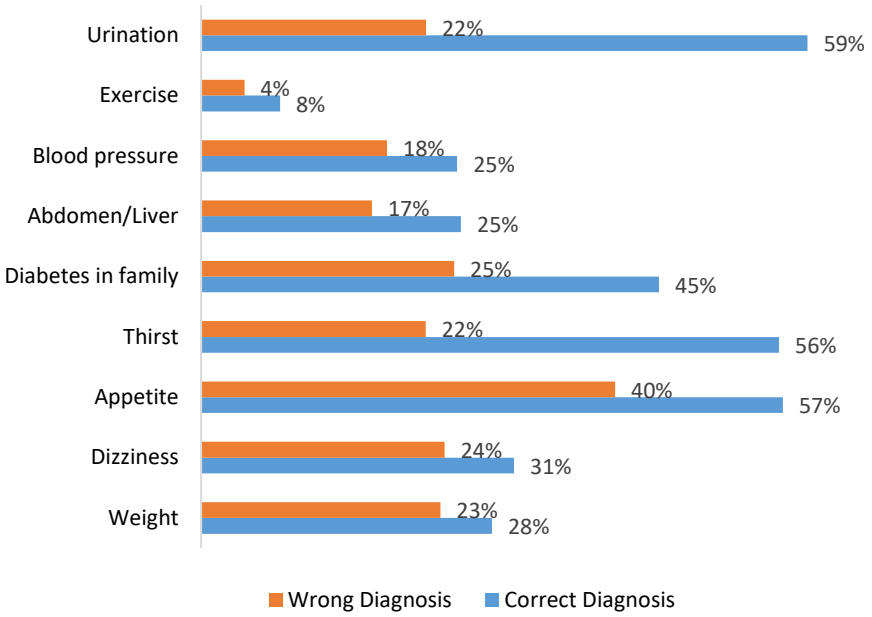


Figure 35: Diagnostic accuracy by questions asked: Pulmonary Tuberculosis

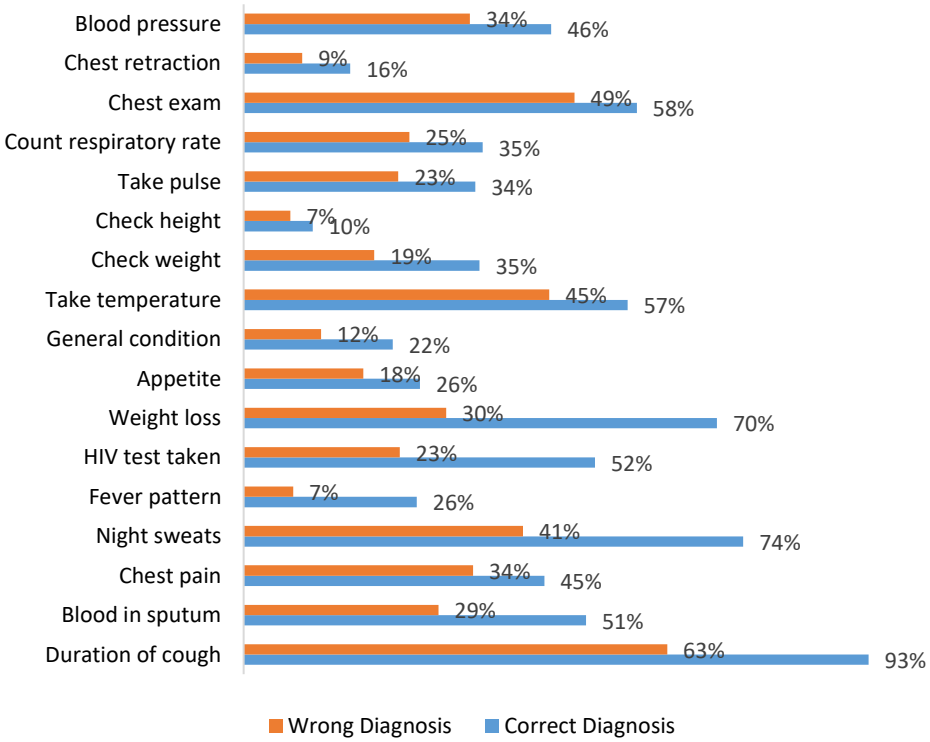


Figure 36: Correct treatment actions: Post-partum Hemorrhage

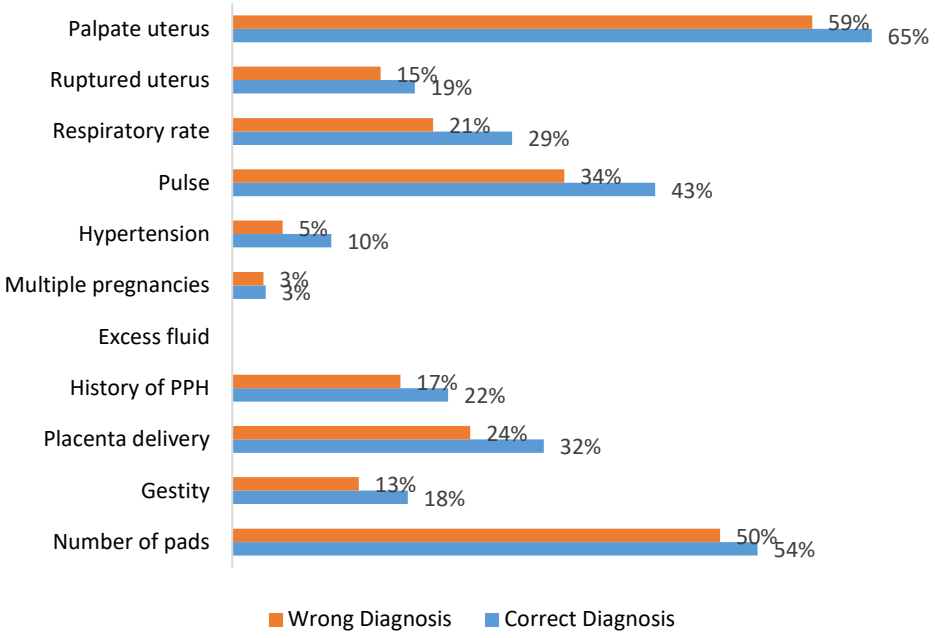


Figure 37: Correct treatment actions: Neonatal Asphyxia

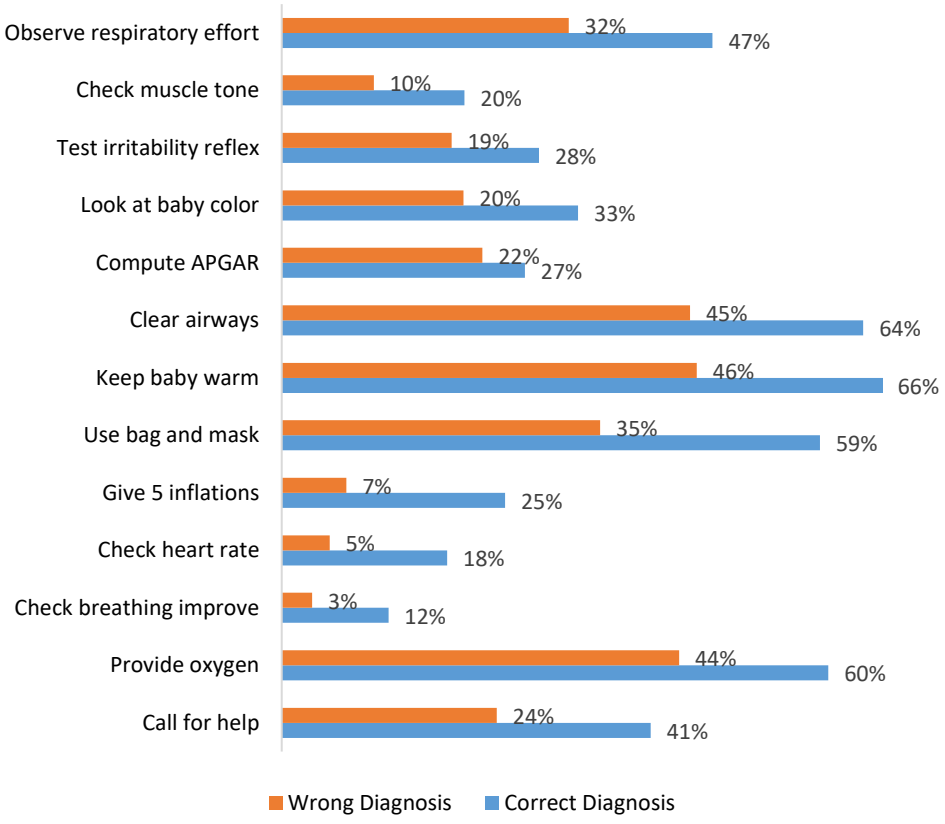


Table 50: Danger signs asked for sick child vignette by cadre type

% Cadre	Pneumonia			Severe dehydration		
	Vomit	Convulsion	Lethargic	Vomit	Lethargic	Drink
Doctors	33.9	17.0	29.2	75.7	60.7	58.8
Clinical officers	25.8	10.0	29.2	77.8	56.6	55.0
Nurses	17.9	5.0	16.9	55.6	36.2	51.8
Total	22.6	8.1	23.3	67.0	47.1	53.8

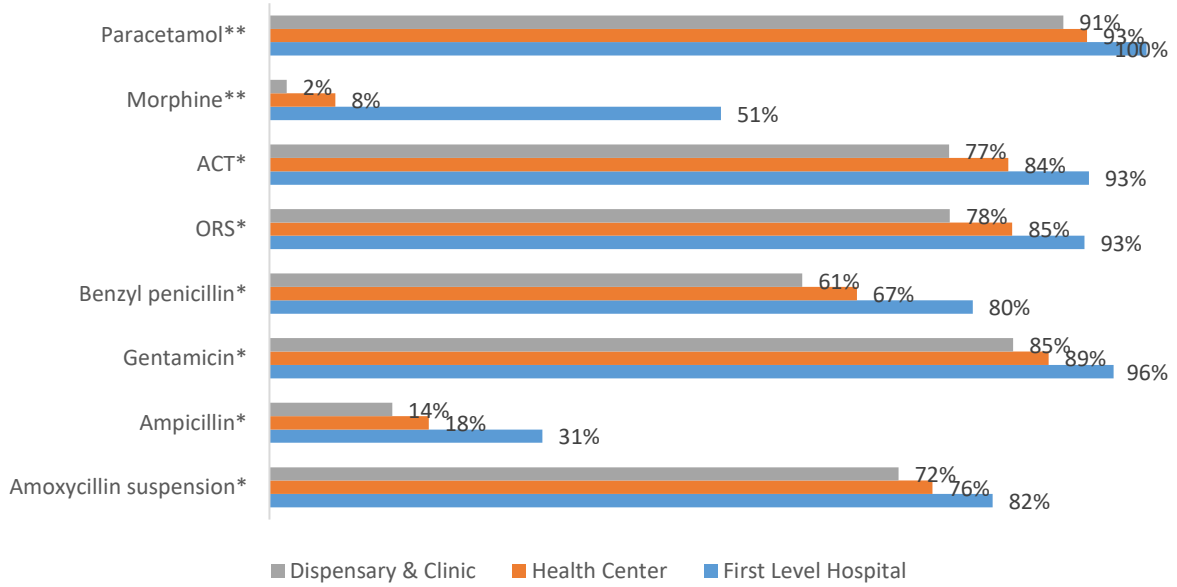
Table 51: Drug availability for the full SDI list

% facilities	Kenya	Nairobi	Urban	Rural	Public	Private	First Level Hospital	Health Center	Dispensary & Clinic
Core Medications									
Amoxicillin tab*	84.1	81.5	84.1	84.1	80.6	88.1	97.1	83.6	83.4
Coamoxiclav**	46.4	61.0	64.1	38.0	32.5	62.2	81.8	52.2	43.0
Ciprofloxacin**	75.3	82.6	81.6	72.3	68.2	83.4	89.3	76.4	74.2
Amitriptyline**	33.7	50.8	49.1	26.4	19.7	49.6	73.9	43.0	29.3
Amlodipine***	24.2	39.0	40.6	16.3	14.5	35.2	65.0	31.3	20.2
Atenolol**	36.6	54.9	47.7	31.2	28.1	46.1	88.2	51.3	30.4
Dexamethasone**	40.6	43.6	48.9	36.6	33.7	48.3	91.4	56.8	34.1
Diazepam*	52.4	73.3	63.7	46.9	40.6	65.6	80.2	67.4	47.6
Enalapril*	50.3	58.0	57.9	46.6	42.7	58.8	95.2	64.0	44.7
Furosemide**	67.1	81.5	73.6	64.0	59.0	76.3	98.2	81.2	62.3
Hydrochlorothiazide**	60.6	61.0	63.7	59.1	53.5	68.7	94.8	71.0	56.4
Hydrocortisone*	83.2	81.5	83.9	82.9	80.6	86.1	94.0	88.8	81.4
Insulin**	24.7	43.6	40.5	17.2	15.5	35.3	91.0	40.5	17.4
Metformin**	52.3	55.9	59.8	48.7	43.6	62.1	96.6	67.9	46.4
Prednisolone**	71.0	72.3	77.1	68.1	61.3	82.0	88.8	71.7	69.7
Salbutamol*	39.7	44.1	46.5	36.4	34.9	45.2	74.8	45.5	36.3
Aspirin*	51.6	53.3	50.9	52.0	55.1	47.7	81.2	62.4	47.7
Fluconazole**	44.0	65.6	65.3	33.8	27.9	62.2	75.0	56.0	39.7
Nystatin*	69.1	55.4	63.8	71.7	71.8	66.1	85.6	78.4	66.3
Clotrimazole*	80.4	74.4	78.1	81.5	79.5	81.5	89.6	79.7	79.9
Griseofulvin**	66.3	58.0	63.9	67.5	67.4	65.1	95.5	72.7	63.2
Ibuprofen**	77.6	77.4	81.7	75.7	70.8	85.3	92.0	78.2	76.6
Tramadol**	30.1	42.6	52.7	19.3	10.5	52.3	75.9	33.0	26.6
Morphine**	5.4	4.6	10.2	3.0	3.5	7.5	51.5	7.5	2.0
Isoniazid Rifampicin** (Fixed-dose combination)	40.0	32.3	25.9	46.7	57.9	19.7	79.2	65.6	32.5
Isoniazid Rifampicin Pyrazinamide** (Fixed-dose combination)	24.6	21.0	17.4	28.0	36.1	11.5	65.7	50.1	17.0
Isoniazid Rifampicin Pyrazinamide Ethambutol** (Fixed-dose combination)	42.2	32.3	26.5	49.7	61.6	20.3	81.3	69.3	34.4
Essential Medications for mothers									
Oxytocin**	90.0	100.0	95.9	88.5	89.0	92.3	97.0	97.2	85.7
Calcium Gluconate**	29.2	36.9	47.3	24.6	25.4	37.6	64.9	31.8	22.3
Magnesium sulphate**	61.3	52.3	65.8	60.2	64.3	54.6	84.8	67.8	54.7
Sodium Chloride**	91.0	96.9	96.3	89.7	89.9	93.6	95.6	93.8	89.1
Misoprostol**	23.0	72.3	62.3	13.0	11.1	49.3	69.5	27.2	13.6
Ampicillin*	16.9	50.8	33.7	12.6	9.8	32.5	31.1	18.2	14.0
Gentamicin*	87.1	96.9	94.3	85.2	84.6	92.6	96.2	88.8	84.8
Metronidazole*	88.5	93.8	96.7	86.5	85.7	94.9	95.9	89.3	87.0
Azithromycin/Erythromycin**	63.9	75.4	81.1	59.5	56.0	81.5	83.7	65.9	59.8
Cefixime**	72.7	87.7	90.8	68.1	65.1	89.6	95.9	75.6	67.7
Benzathine benzyl penicillin*	83.6	90.8	92.5	81.4	80.1	91.5	93.7	89.0	79.7
Betamethasone/Dexamethasone**	50.7	60.0	72.6	45.1	43.6	66.4	91.6	60.7	39.7
Nifedipine**	51.2	72.3	79.5	44.0	39.1	78.0	80.7	55.4	44.6
Methyldopa**	47.9	69.2	71.3	42.0	41.8	61.6	86.4	60.8	36.1
Hydralazine**	38.1	58.5	61.5	32.1	32.1	51.2	78.1	47.5	27.5
Iron supplements*	84.4	76.4	73.8	89.5	92.6	75.1	95.5	93.1	82.0
Sulfadoxine/pyrimethamine**	24.4	7.2	21.8	25.7	25.6	23.2	36.7	28.5	22.9
Essential Medications for children									

Paracetamol**	91.4	87.7	91.3	91.4	89.1	94.0	100.0	93.2	90.5
Morphine**	5.4	4.6	10.2	3.0	3.5	7.5	51.5	7.5	2.0
Amoxicillin*	72.9	75.4	76.6	71.1	64.7	82.1	82.4	75.6	71.7
Cotrimoxazole*	85.0	80.5	78.5	88.1	88.3	81.3	98.7	90.3	83.1
Benzylpenicillin*	62.7	77.4	70.3	59.1	51.9	74.9	80.2	67.0	60.7
Oral Rehydration Solution*	79.4	79.5	76.1	81.1	81.5	77.1	92.9	84.7	77.6
Vitamin A*	94.6	91.5	94.7	94.5	95.6	92.3	98.3	96.9	93.6
ACT or ALU*	79.3	76.4	75.5	81.2	82.6	75.6	93.4	84.2	77.5
Artesunate**	45.0	38.5	39.2	47.8	53.0	36.0	78.5	60.7	39.8
Albendazole*	86.8	84.6	82.9	88.6	89.9	83.2	98.1	90.0	85.4
Mebendazole**	27.3	42.6	39.5	21.5	13.6	42.9	45.0	28.3	26.0
Chlorhexidine*	25.0	22.1	21.1	26.9	30.0	19.3	57.9	43.6	19.3
Tetracycline eye ointment*	65.7	61.0	64.1	66.5	62.3	69.6	91.4	71.0	63.0

Note: Should be carried by * Dispensary/clinic and above, ** Health centers and above, *** First level hospitals according to KEML 2016

Figure 38: Availability of individual tracer drugs by type of facility



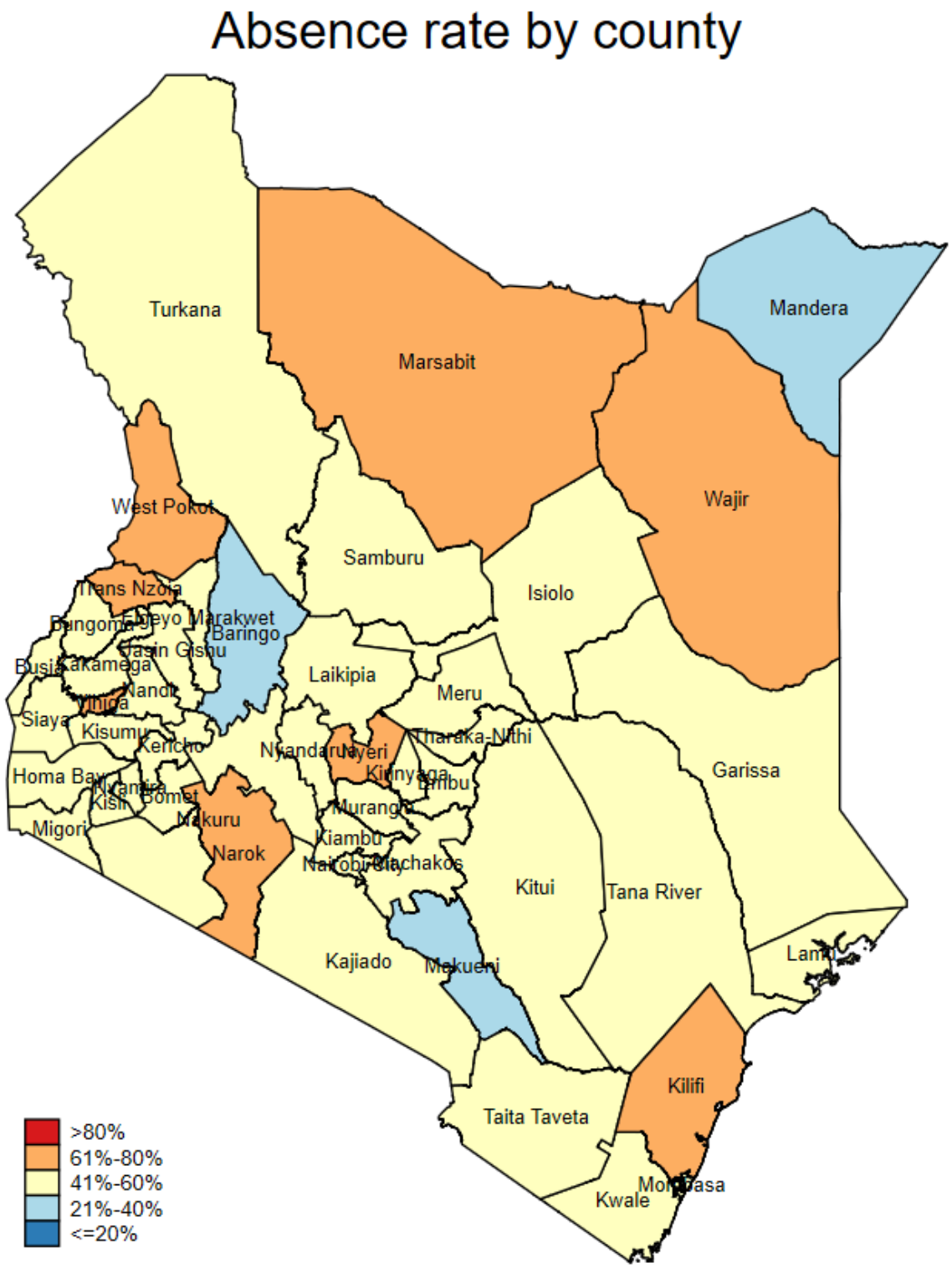
Note: Should be carried by * Dispensary/clinic and above, ** Health centers and above, *** First level hospitals according to KEML 2016

Table 52: Drug availability for tracer drugs

% facilities	Kenya	Nairobi	Urban	Rural	Public	Private
All	4.9	11.8	7.9	3.4	2.5	7.5
First level hospitals	21.4	33.3	25.9	17.2	15.3	30.1
Health centers	8.6	15.8	15.9	5.3	3.3	16.6
Dispensaries and clinics	3.1	9.5	4.6	17.2	1.4	4.8

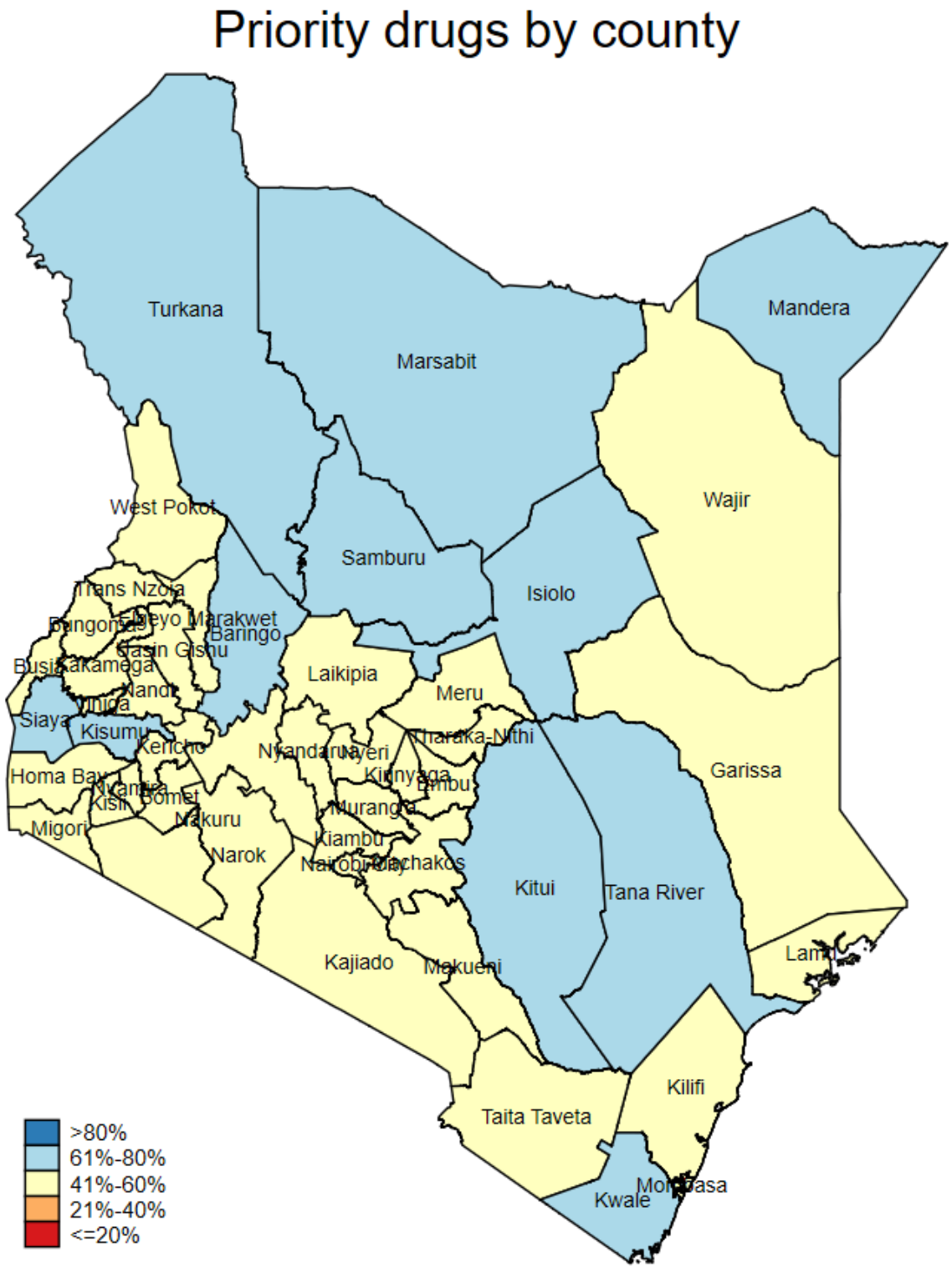
ANNEX D. County level results maps

Map 1: Absence Rate across Counties



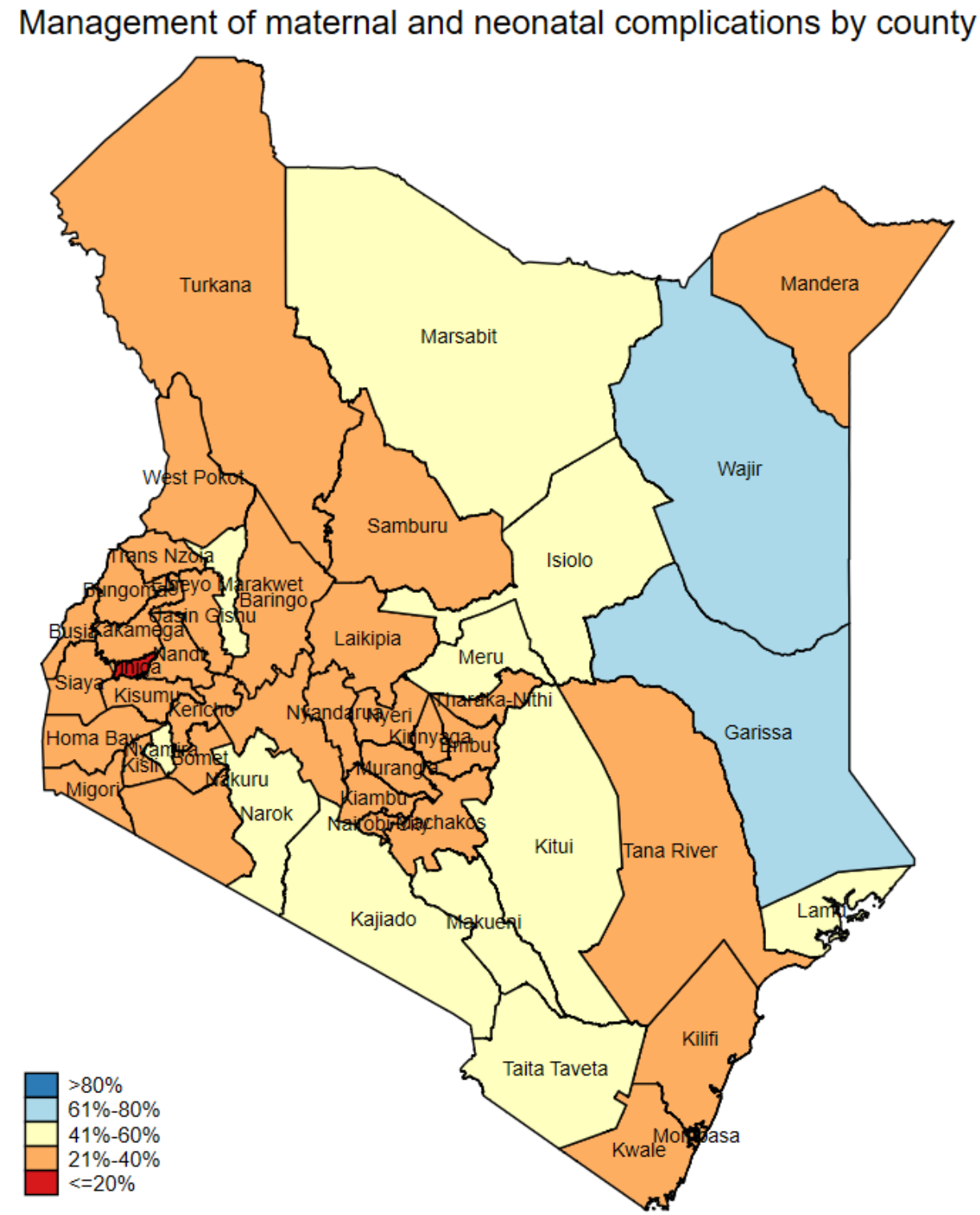
Source: Kenya Service Delivery Indicators Survey, 2018

Map 2: Availability of Priority Drugs across Counties



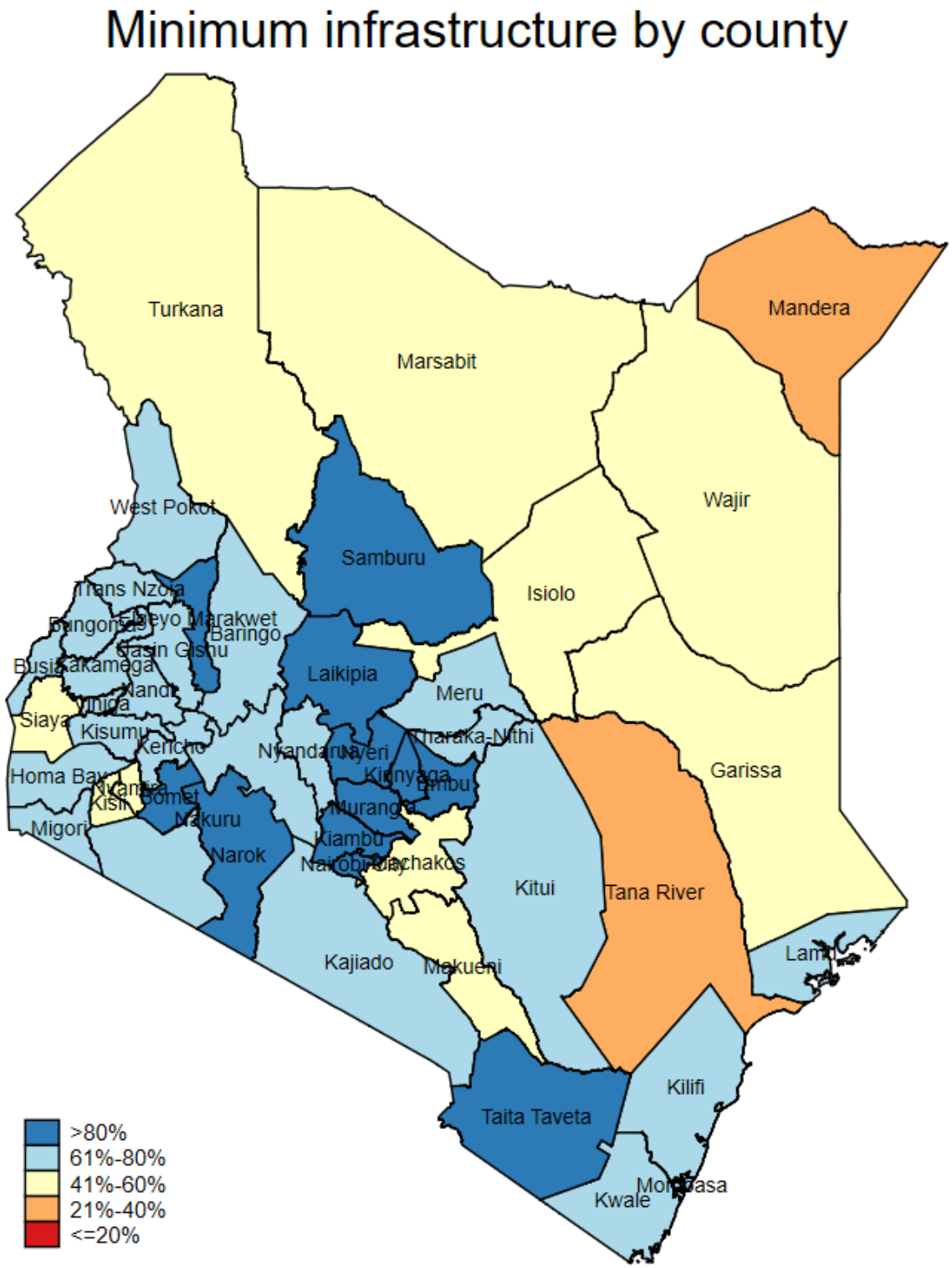
Source: Kenya Service Delivery Indicators Survey, 2018

Map 3: Capacity to Manage Maternal and Neonatal Complications across Counties



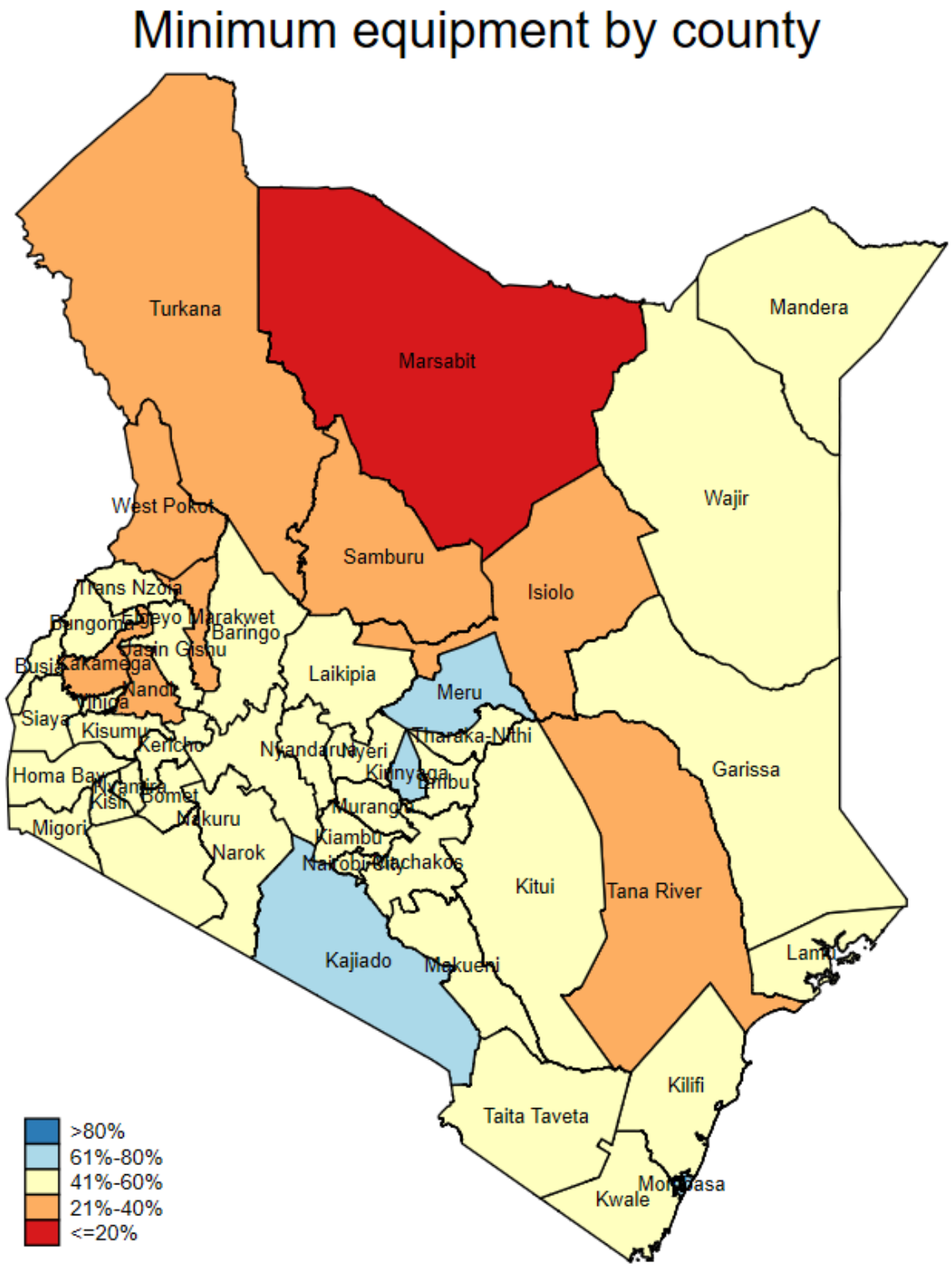
Source: Kenya Service Delivery Indicators Survey, 2018

Map 4: Availability of Minimum Infrastructure across Counties



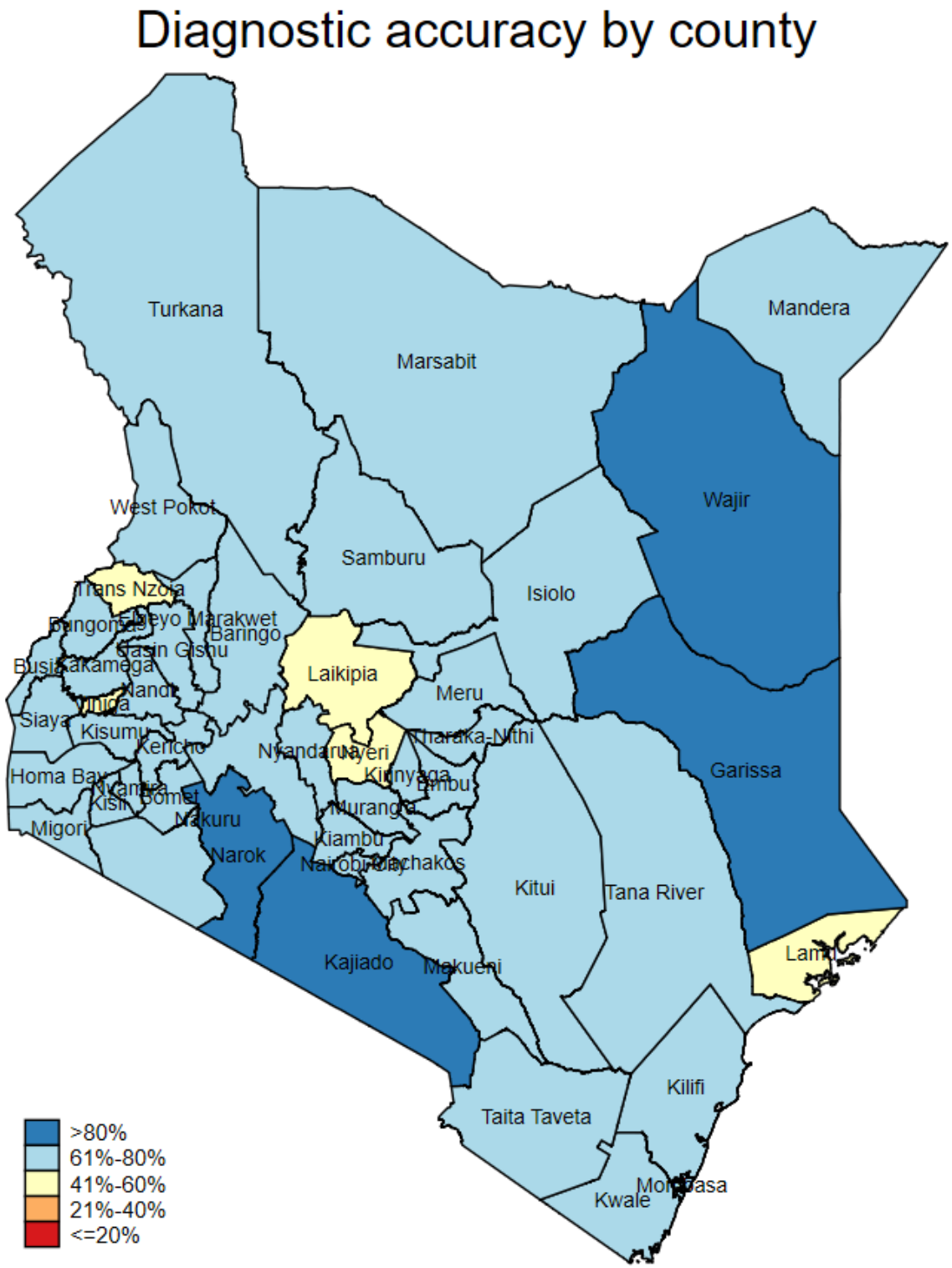
Source: Kenya Service Delivery Indicators Survey, 2018

Map 5: Share of Facilities with Minimum Equipment across Counties



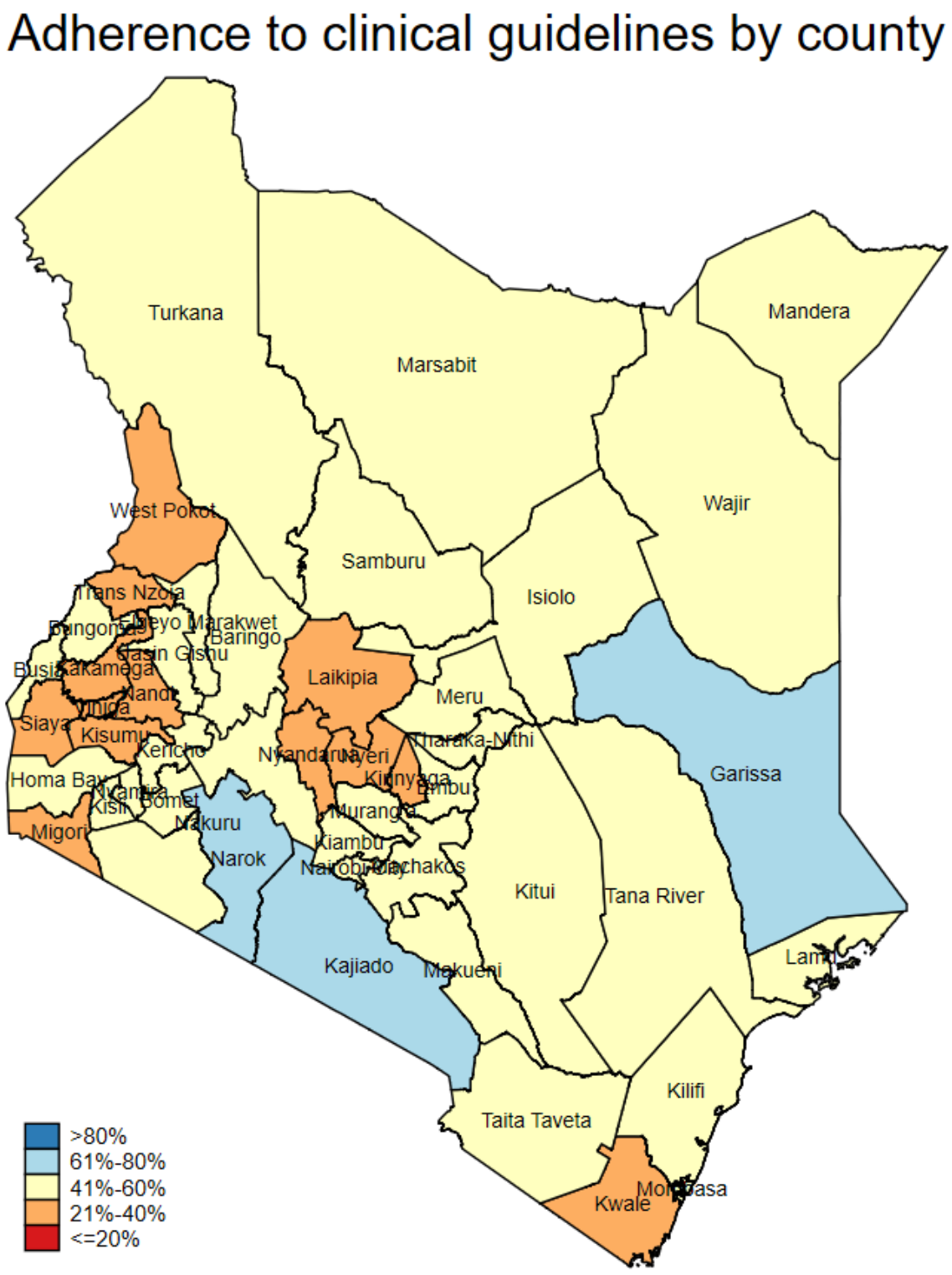
Source: Kenya Service Delivery Indicators Survey, 2018

Map 6: Average Diagnostic Accuracy of Common Conditions across Counties



Source: Kenya Service Delivery Indicators Survey, 2018

Map 7: Average Adherence to Clinical Guidelines across Counties



Source: Kenya Service Delivery Indicators Survey, 2018

ANNEX E. Additional County Level Results

Table A1. Facilities with basic emergency obstetric and neonatal care package (excludes assisted vaginal delivery)

County	Total	First level hospital	Health Center	Dispensary and Clinic
Samburu	100.0	100.0	100.0	100.0
Embu	93.1	100.0	83.3	100.0
Tharaka-Nithi	91.4	100.0	100.0	50.0
Bomet	88.4	100.0	100.0	71.4
Garissa	81.5	100.0	85.7	73.3
Trans Nzoia	78.8	100.0	100.0	66.7
Wajir	78.6	80.0	83.3	76.0
Mandera	77.9	100.0	80.0	70.6
Nakuru	76.8	100.0	90.0	54.5
Kisumu	76.3	100.0	100.0	61.3
Marsabit	74.1	100.0	90.0	67.7
Nairobi City	68.7	66.7	73.3	64.3
Meru	66.2	50.0	75.0	66.7
Kakamega	62.7	100.0	68.8	55.9
Nyandarua	62.1	100.0	100.0	40.0
Mombasa	61.7	75.0	75.0	50.0
Kiambu	60.5	100.0	40.0	60.0
Nyamira	60.4	100.0	76.2	45.2
Nyeri	60.3	100.0	42.9	75.0
Baringo	59.7	100.0	71.4	50.0
Siaya	58.1	100.0	72.2	45.5
Elgeyo Marakwet	55.7	100.0	90.9	26.3
Kisii	53.2	88.9	84.6	32.4
Busia	52.0	100.0	62.5	42.3
Bungoma	49.2	100.0	80.0	37.2
Laikipia	48.3	100.0	100.0	35.5
Kilifi	48.1	100.0	66.7	41.5
Kericho	46.9	100.0	20.0	40.0
Kwale	46.8	100.0	85.7	38.1
Kitui	45.1	75.0	71.4	26.9
Kajiado	44.7	100.0	100.0	20.0
Kirinyaga	44.3	66.7	54.5	16.7
Taita Taveta	43.0	100.0	33.3	37.5
Makueni	42.5	100.0	88.9	28.2
Isiolo	42.2	100.0	50.0	30.8
West Pokot	41.5	100.0	66.7	35.9
Vihiga	41.4	100.0	76.9	10.5
Turkana	41.3	100.0	87.5	27.5
Murang'a	39.4	100.0	25.0	22.2
Migori	38.2	50.0	50.0	33.3
Nandi	36.9	100.0	40.0	22.2
Uasin Gishu	36.2	100.0	50.0	24.0
Lamu	34.7	100.0	33.3	27.8
Machakos	33.7	50.0	33.3	32.1
Narok	33.1	100.0	76.9	11.4
Homa Bay	28.2	100.0	40.0	16.7
Tana River	23.1	100.0	100.0	14.3

Table A2. Vaccines storage - Refrigerators with temperature between 2oC and 8oC

County	Total	First level hospital	Health Center	Dispensary and Clinic
Mombasa	91.4	100.0	85.7	92.3
Kwale	97.5	100.0	100.0	96.9
Kilifi	90.7	100.0	100.0	88.9
Tana River	80.9	100.0	100.0	77.3
Lamu	80.0	100.0	75.0	78.6
Taita Taveta	93.5	66.7	100.0	95.5
Garissa	90.3	100.0	83.3	90.5
Wajir	82.9	80.0	100.0	75.0
Mandera	94.9	100.0	93.8	94.7
Marsabit	77.5	50.0	85.7	76.9
Isiolo	96.6	100.0	100.0	95.7
Meru	96.7	100.0	100.0	94.4
Tharaka-Nithi	100.0	100.0	100.0	100.0
Embu	91.8	100.0	100.0	89.7
Kitui	85.3	66.7	91.7	84.4
Machakos	87.9	100.0	85.7	87.9
Makueni	91.0	100.0	100.0	88.6
Nyandarua	97.2	100.0	100.0	95.8
Nyeri	100.0	100.0	100.0	100.0
Kirinyaga	93.2	100.0	90.0	94.4
Murang'a	89.7	100.0	85.7	89.5
Kiambu	93.5	100.0	71.4	97.1
Turkana	68.1	100.0	87.5	61.5
West Pokot	74.6	100.0	66.7	73.5
Samburu	100.0	100.0	100.0	100.0
Trans Nzoia	86.3	0.0	100.0	88.0
Uasin Gishu	84.4	75.0	100.0	81.8
Elgeyo Marakwet	97.9	100.0	100.0	97.1
Nandi	92.8	100.0	100.0	92.0
Baringo	97.5	100.0	100.0	96.7
Laikipia	84.7	100.0	100.0	80.8
Nakuru	84.2	100.0	88.9	79.2
Narok	86.9	100.0	100.0	80.6
Kajiado	90.1	100.0	100.0	85.7
Kericho	83.7	66.7	100.0	83.3
Bomet	71.1	100.0	60.0	70.8
Kakamega	97.9	100.0	100.0	97.1
Vihiga	96.0	100.0	100.0	90.0
Bungoma	82.9	100.0	80.0	80.8
Busia	84.1	66.7	100.0	82.6
Siaya	94.1	100.0	93.8	93.8
Kisumu	91.2	100.0	92.9	88.9
Homa Bay	89.6	100.0	85.7	90.0
Migori	80.0	100.0	100.0	71.0
Kisii	95.9	100.0	100.0	93.3
Nyamira	91.0	100.0	94.4	87.0
Nairobi City	96.1	100.0	93.8	96.9

Table A3. Availability of equipment

County	Total	First level hospital	Health Center	Dispensary and Clinic
Meru	72.9	100.0	88.9	69.3
Mombasa	72.7	75.0	50.0	75.4
Kajiado	67.6	50.0	100.0	63.6
Kirinyaga	60.5	66.7	72.7	57.9
Nairobi City	59.5	66.7	68.4	56.8
Nyeri	58.5	66.7	100.0	52.9
Vihiga	58.4	66.7	64.3	54.8
Kericho	58.3	60.0	42.9	60.0
Homa Bay	55.4	100.0	52.9	52.7
Embu	55.0	100.0	71.4	50.9
Lamu	54.5	100.0	75.0	48.1
Taita Taveta	54.5	75.0	90.0	41.7
Machakos	52.4	50.0	75.0	50.0
Murang'a	52.3	100.0	85.7	46.3
Kitui	51.7	75.0	73.3	45.2
Trans Nzoia	51.6	50.0	85.7	47.2
Nyandarua	50.5	100.0	100.0	39.2
Nakuru	50.5	100.0	41.7	48.5
Makueni	50.3	100.0	70.0	45.7
Mandera	50.2	100.0	61.1	37.5
Wajir	50.2	100.0	83.3	30.3
Siaya	50.0	75.0	72.2	39.6
Narok	49.9	100.0	66.7	41.3
Kisii	49.5	100.0	71.4	32.6
Busia	49.3	66.7	30.0	52.2
Kilifi	48.7	33.3	71.4	47.1
Kisumu	48.3	85.7	81.3	31.1
Uasin Gishu	48.0	100.0	88.9	37.9
Kwale	47.4	100.0	71.4	42.6
Garissa	46.7	60.0	45.5	45.5
Baringo	46.6	100.0	44.4	45.8
Migori	46.5	25.0	83.3	40.0
Bungoma	45.9	75.0	30.0	46.6
Nyamira	45.5	100.0	57.1	33.3
Kiambu	45.0	60.0	54.5	42.5
Tharaka-Nithi	44.7	66.7	87.5	36.2
Bomet	43.3	100.0	44.4	40.4
Laikipia	41.5	50.0	80.0	36.4
Turkana	38.6	100.0	75.0	29.6
Kakamega	38.0	75.0	52.6	30.2
Tana River	34.6	100.0	100.0	26.5
Elgeyo Marakwet	33.7	100.0	54.5	22.7
Samburu	32.9	100.0	100.0	24.3
West Pokot	31.0	100.0	66.7	25.9
Nandi	25.9	100.0	80.0	19.4
Isiolo	22.9	100.0	66.7	7.4
Marsabit	8.4	0.0	0.0	11.1

Table A4. Outpatient caseload

Outpatient visits per provider per day	Total	First level hospital	Health center	Dispensary and clinic
Samburu	42.2	33.6	15.2	44.8
West Pokot	29.5	18.6	9.0	31.2
Kwale	27.4	55.2	28.5	26.4
Kitui	20.1	13.3	24.4	19.4
Bomet	19.4	13.8	22.6	19.1
Mandera	18.1	5.6	19.5	19.0
Elgeyo Marakwet	17.8	6.6	12.2	20.2
Makueni	17.8	9.9	14.0	18.6
Isiolo	17.6	3.4	8.4	20.4
Kericho	16.3	4.0	14.8	17.7
Murang'a	16.1	14.8	17.5	16.0
Nandi	15.7	20.7	7.3	16.3
Trans Nzoia	15.6	6.4	12.9	16.2
Kajiado	14.7	9.4	29.5	12.7
Garissa	14.7	6.8	12.8	16.2
Nairobi City	13.9	15.6	11.2	14.4
Kakamega	13.2	5.4	11.3	14.3
Kilifi	12.9	8.1	14.0	13.0
Taita Taveta	12.8	7.6	16.2	12.6
Migori	12.5	2.8	9.8	13.8
Nyandarua	12.4	9.8	11.8	12.6
Siaya	12.2	7.7	7.2	14.4
Meru	12.1	16.6	11.1	12.0
Laikipia	11.9	9.8	5.1	12.9
Kiambu	11.8	14.4	19.8	10.4
Lamu	11.8	1.0	7.2	13.3
Baringo	11.8	0.7	12.1	12.0
Busia	11.8	9.5	7.3	12.9
Narok	11.7	4.9	11.0	12.4
Uasin Gishu	11.6	6.7	12.9	11.8
Wajir	11.6	5.8	10.8	12.7
Tana River	10.9	4.1	7.5	11.4
Kirinyaga	10.9	8.0	8.6	11.5
Homa Bay	10.8	10.1	8.3	11.6
Kisii	10.7	4.9	12.7	11.2
Nyeri	10.4	29.3	10.8	9.7
Vihiga	10.3	22.7	6.2	10.8
Marsabit	10.2	3.2	9.7	10.6
Nakuru	10.0	18.5	10.7	9.3
Mombasa	9.8	9.3	6.8	10.2
Tharaka-Nithi	9.5	8.8	13.7	8.9
Machakos	9.3	4.3	11.0	9.3
Embu	9.1	7.7	4.4	9.8
Turkana	8.9	12.8	5.9	9.1
Kisumu	8.5	6.6	7.3	9.2
Bungoma	7.6	25.5	5.5	6.7
Nyamira	7.1	4.2	10.0	5.6

Table A5. Average health workers per facility

# workers	Total	First level hospital	Health center	Dispensary and clinic
Nairobi City	17	188	13	8
Kisumu	13	46	15	8
Mombasa	13	137	7	5
Uasin Gishu	13	65	22	7
Kisii	11	47	12	4
Siaya	10	38	16	6
Murang'a	10	109	18	4
Kiambu	10	98	12	3
Wajir	10	65	5	3
Vihiga	10	52	15	3
Laikipia	10	82	11	3
Mandera	9	69	6	3
Taita Taveta	9	46	7	4
Kwale	9	145	16	3
Kajiado	9	69	21	4
Lamu	9	83	12	3
Tharaka-Nithi	8	89	13	3
Busia	8	37	15	5
Nyamira	8	58	7	4
Trans Nzoia	8	47	22	3
Nandi	8	118	14	4
Kirinyaga	8	68	16	3
Kilifi	8	90	8	4
Nakuru	8	60	12	3
Narok	8	88	9	2
Garissa	7	31	6	5
Machakos	7	79	14	4
Migori	7	22	17	4
Bungoma	7	41	13	4
Homa Bay	7	36	8	4
Elgeyo Marakwet	7	57	8	2
Turkana	7	40	14	4
Embu	6	64	15	3
Nyandarua	6	111	11	2
Kakamega	6	24	10	4
Baringo	6	158	10	2
Makueni	6	80	17	2
Marsabit	6	66	5	4
Bomet	6	28	16	3
Nyeri	6	93	11	2
Kericho	6	40	7	2
Tana River	5	43	17	3
Meru	5	31	9	3
West Pokot	5	49	9	3
Isiolo	5	20	6	3
Kitui	4	24	7	2
Samburu	4	27	6	2

Table A6. Absence rate by cadre and facility type

County	Total	First level hospital	Health Center	Dispensary and Clinic	Doctors	Clinical officers	Nurses
West Pokot	67.6	84.7	78.9	50.5	0.0	78.4	63.5
Marsabit	66.3	100.0	50.0	55.0	.	63.4	70.9
Nyeri	64.6	77.1	62.1	45.3	74.1	63.9	56.1
Wajir	64.2	76.1	39.6	34.5	95.9	36.2	80.7
Vihiga	64.0	68.4	66.1	51.8	45.6	67.7	70.0
Narok	63.7	77.9	47.5	49.3	0.0	66.8	77.4
Trans Nzoia	60.6	74.5	54.9	53.4	29.0	44.1	66.7
Kilifi	60.1	71.8	41.8	51.3	100.0	46.5	56.9
Kiambu	59.9	64.4	57.6	49.3	59.0	57.9	67.1
Nandi	59.8	77.0	61.7	50.3	0.0	62.8	64.8
Kakamega	59.3	78.4	57.3	50.9	62.2	56.8	61.2
Uasin Gishu	59.0	80.0	67.0	40.2	66.3	69.0	50.6
Garissa	57.9	71.4	48.7	50.1	26.3	56.4	60.8
Nairobi City	57.6	61.8	58.9	50.0	55.6	49.3	59.8
Kajiado	57.5	67.0	67.3	39.7	74.0	43.9	62.0
Kericho	56.8	73.1	48.2	41.5	40.9	68.3	58.9
Kisii	56.5	60.5	54.8	48.6	64.8	64.1	59.3
Bungoma	55.6	62.7	52.3	50.7	21.4	53.5	58.0
Lamu	51.2	52.7	58.5	41.1	100.0	71.5	49.6
Kwale	51.2	55.7	55.5	45.2	93.1	46.5	41.7
Kirinyaga	51.2	40.3	67.8	45.1	96.1	52.3	50.4
Machakos	50.7	60.0	56.6	41.5	90.7	33.5	55.5
Tana River	50.3	33.3	64.3	54.2	.	45.3	48.4
Murang'a	50.3	58.2	44.6	43.5	100.0	35.5	33.3
Embu	49.7	49.8	59.6	45.5	100.0	34.0	50.2
Nakuru	49.7	66.4	31.6	35.2	69.3	41.7	59.4
Homa Bay	49.5	62.4	48.0	41.7	100.0	63.2	55.8
Meru	49.5	52.6	46.5	48.6	22.2	34.6	51.3
Busia	48.5	23.4	64.2	49.5	56.5	42.2	54.9
Kisumu	48.2	59.6	46.6	41.7	84.2	33.7	59.2
Taita Taveta	47.9	58.4	45.0	38.5	75.2	45.4	47.5
Kitui	47.6	57.1	45.6	44.8	68.8	41.3	48.4
Migori	47.2	60.8	51.8	38.8	83.6	44.2	59.2
Nyamira	46.3	44.8	49.9	44.5	42.2	56.4	41.1
Laikipia	45.6	49.8	62.3	38.6	58.9	44.2	51.0
Tharaka-Nithi	44.8	40.2	53.7	47.4	.	70.9	34.7
Samburu	44.8	62.0	46.7	36.8	.	52.2	51.3
Isiolo	44.8	56.5	45.3	39.3	23.2	49.6	41.0
Nyandarua	44.6	36.8	55.7	51.9	.	30.8	42.0
Elgeyo Marakwet	44.6	40.7	47.8	50.5	90.0	70.6	42.5
Mombasa	44.4	53.9	24.0	33.8	13.8	59.5	37.4
Bomet	44.4	63.1	33.1	46.3	73.2	33.4	49.1
Siaya	43.5	50.0	45.7	38.2	54.2	38.6	51.3
Turkana	42.3	34.5	42.3	47.1	100.0	40.2	38.8
Baringo	36.6	50.0	39.4	20.3	50.7	60.8	29.0
Mandera	35.8	41.8	23.5	28.9	23.5	24.2	46.4
Makueni	24.9	7.8	43.3	25.2	25.2	13.6	25.8

Table A7. Diagnostic accuracy

% health workers	Severe dehydration	Pneumonia	Diabetes	TB	PPH	Neonatal asphyxia
Mombasa	37.8	70.0	47.9	97.3	92.4	88.1
Kwale	34.4	75.1	49.1	98.0	80.8	85.5
Kilifi	24.8	89.4	43.9	100.0	91.8	83.0
Tana River	45.4	78.2	25.6	93.2	90.1	82.6
Lamu	23.8	100.0	81.2	100.0	92.4	100.0
Taita Taveta	36.6	74.3	68.5	100.0	91.8	88.7
Garissa	78.6	98.2	75.1	98.2	91.5	94.7
Wajir	78.4	91.5	84.3	100.0	98.0	94.8
Mandera	19.3	95.7	63.6	97.9	97.9	97.2
Marsabit	26.0	87.5	58.5	100.0	95.8	97.1
Isiolo	43.2	84.9	86.4	100.0	92.4	92.4
Meru	31.7	97.2	83.3	99.4	92.1	90.4
Tharaka-Nithi	37.4	66.7	68.4	92.1	97.6	85.2
Embu	33.1	71.0	67.7	92.0	73.1	84.3
Kitui	15.7	85.3	83.3	96.4	80.7	95.3
Machakos	22.7	80.6	45.0	94.4	84.2	88.0
Makueni	10.1	87.2	91.5	98.4	92.0	97.3
Nyandarua	25.6	75.4	58.7	96.5	97.4	84.8
Nyeri	12.6	71.9	56.8	96.8	89.2	85.4
Kirinyaga	13.8	69.5	60.3	97.0	92.1	88.8
Murang'a	22.9	74.9	67.4	98.8	89.5	83.3
Kiambu	36.1	84.2	68.8	96.2	96.2	73.8
Turkana	52.5	88.4	51.3	100.0	96.5	87.7
West Pokot	32.5	83.1	49.2	97.4	84.6	89.2
Samburu	47.1	85.3	51.6	95.5	80.9	98.3
Trans Nzoia	31.6	77.4	49.2	94.2	91.6	85.5
Uasin Gishu	29.3	81.7	41.3	97.5	82.4	89.0
Elgeyo Marakwet	29.4	82.2	58.5	100.0	93.9	98.4
Nandi	31.1	88.3	34.5	98.1	88.5	79.7
Baringo	15.2	90.5	63.7	98.7	98.7	86.7
Laikipia	8.7	79.5	52.0	98.7	95.4	90.1
Nakuru	39.2	87.6	83.2	99.6	89.2	92.0
Narok	55.0	95.1	81.9	100.0	87.7	99.3
Kajiado	62.6	94.2	77.3	96.9	89.0	99.0
Kericho	40.8	89.7	77.6	98.7	91.8	94.2
Bomet	46.3	87.9	61.1	100.0	82.1	81.9
Kakamega	30.4	74.6	49.1	95.9	87.0	78.4
Vihiga	22.1	64.9	27.4	87.3	86.0	84.0
Bungoma	20.2	96.2	80.6	96.9	93.8	96.0
Busia	23.6	91.7	83.9	99.0	91.7	96.0
Siaya	25.7	69.3	51.0	95.2	94.1	96.7
Kisumu	27.5	73.2	43.6	100.0	97.6	92.4
Homa Bay	26.0	81.6	35.6	99.1	94.0	89.7
Migori	29.6	82.5	58.2	97.4	89.7	90.9
Kisii	47.4	84.9	66.0	98.1	81.6	97.3
Nyamira	29.9	73.8	66.2	96.9	75.9	88.0
Nairobi City	34.2	73.6	47.3	95.5	90.5	78.6

Table A8. Treatment accuracy

% health workers	Severe dehydration	Pneumonia	Diabetes	TB	PPH	Neonatal asphyxia
Mombasa	70.5	54.3	50.6	63.6	14.7	4.8
Kwale	81.6	68.2	54.4	88.4	22.3	16.5
Kilifi	86.7	77.0	62.1	72.9	28.4	28.7
Tana River	87.0	68.6	49.1	86.4	47.8	0.0
Lamu	65.8	69.7	65.2	69.0	32.3	35.3
Taita Taveta	89.5	95.1	82.8	75.0	52.6	26.9
Garissa	85.3	87.5	75.5	43.0	64.4	61.7
Wajir	89.1	98.0	95.7	92.8	83.5	57.9
Mandera	90.0	91.4	61.5	55.6	13.5	1.1
Marsabit	77.9	89.6	74.3	91.7	37.2	20.3
Isiolo	83.4	97.0	93.9	45.4	77.3	43.9
Meru	72.7	89.5	96.3	40.4	57.4	33.9
Tharaka-Nithi	83.5	77.3	56.8	58.7	32.0	29.8
Embu	71.5	61.2	62.2	60.3	27.9	25.5
Kitui	77.9	76.1	80.9	83.9	67.3	44.0
Machakos	89.4	69.1	56.2	62.1	31.3	12.8
Makueni	83.8	98.4	85.6	84.7	70.6	63.7
Nyandarua	76.8	89.7	60.2	74.7	33.3	0.0
Nyeri	65.8	67.2	44.1	65.8	30.4	0.5
Kirinyaga	70.1	68.2	55.9	85.2	33.0	4.8
Murang'a	81.9	72.9	66.0	76.5	42.7	1.8
Kiambu	84.5	77.6	67.2	61.8	55.6	2.3
Turkana	89.1	74.6	62.9	94.1	53.6	8.7
West Pokot	67.3	90.1	55.6	51.2	39.4	7.4
Samburu	71.7	80.5	42.4	73.4	36.3	40.5
Trans Nzoia	68.1	76.2	41.1	75.9	37.1	15.4
Uasin Gishu	66.7	81.2	49.7	76.5	48.2	8.5
Elgeyo Marakwet	91.8	100.0	53.1	94.4	66.0	29.9
Nandi	75.6	93.9	42.3	69.4	44.8	2.2
Baringo	92.4	96.2	65.9	98.7	72.8	17.7
Laikipia	75.6	84.0	51.3	87.0	15.8	2.5
Nakuru	79.7	81.8	77.1	78.8	51.6	11.3
Narok	89.4	76.9	74.9	68.0	64.5	45.6
Kajiado	83.1	76.1	94.3	68.0	45.0	38.6
Kericho	81.9	86.4	58.6	82.6	58.5	12.5
Bomet	85.7	93.6	55.3	85.4	61.4	8.5
Kakamega	71.0	66.2	40.9	66.2	36.3	2.8
Vihiga	69.4	51.8	27.4	47.1	24.8	4.1
Bungoma	83.7	84.6	67.6	87.1	45.7	1.9
Busia	83.4	84.9	75.9	90.8	41.5	6.1
Siaya	84.7	81.3	46.1	81.7	30.7	8.0
Kisumu	74.1	82.5	36.7	89.3	49.2	8.7
Homa Bay	82.9	88.3	55.5	92.7	58.9	3.2
Migori	67.5	81.3	62.6	89.2	51.7	6.7
Kisii	52.5	79.6	61.2	67.5	31.2	41.1
Nyamira	80.1	74.9	66.2	73.3	49.5	36.8
Nairobi City	79.6	78.4	71.9	63.5	24.1	9.3

Table A9. Management of maternal and neonatal complications

% health workers	PPH	Neonatal asphyxia	Both
Mombasa	26.9	26.8	26.8
Kwale	25.5	28.0	26.7
Kilifi	34.6	42.3	38.5
Tana River	40.0	25.8	32.9
Lamu	37.7	51.1	44.4
Taita Taveta	45.4	40.6	43.0
Garissa	65.7	74.3	70.0
Wajir	60.3	60.4	60.3
Mandera	29.8	34.2	32.0
Marsabit	33.4	50.6	42.0
Isiolo	54.1	45.9	50.0
Meru	55.8	52.0	53.9
Tharaka-Nithi	32.0	32.1	32.0
Embu	29.3	32.4	30.8
Kitui	50.0	45.7	47.9
Machakos	35.3	37.0	36.2
Makueni	51.5	51.4	51.4
Nyandarua	25.6	17.0	21.3
Nyeri	25.6	15.3	20.4
Kirinyaga	27.4	22.6	25.0
Murang'a	33.0	26.0	29.5
Kiambu	40.3	26.3	33.3
Turkana	42.9	30.9	36.9
West Pokot	28.8	20.9	24.9
Samburu	34.1	42.0	38.0
Trans Nzoia	27.1	20.2	23.7
Uasin Gishu	32.1	30.4	31.3
Elgeyo Marakwet	55.4	48.6	52.0
Nandi	32.7	27.0	29.9
Baringo	48.2	26.4	37.3
Laikipia	22.4	23.2	22.8
Nakuru	38.4	27.5	32.9
Narok	55.2	56.9	56.0
Kajiado	46.0	54.9	50.5
Kericho	40.1	34.0	37.1
Bomet	44.5	32.4	38.5
Kakamega	27.3	18.0	22.6
Vihiga	20.0	14.5	17.2
Bungoma	33.5	28.6	31.1
Busia	31.8	32.3	32.1
Siaya	23.3	18.6	20.9
Kisumu	29.9	23.1	26.5
Homa Bay	40.5	23.4	32.0
Migori	35.1	25.0	30.1
Kisii	34.0	43.2	38.6
Nyamira	40.8	40.6	40.7
Nairobi City	32.3	30.9	31.6

Table A10. Adherence to clinical guidelines

% health workers	History and examination	Important history and examination
Mombasa	33.5	44.6
Kwale	27.4	39.2
Kilifi	38.5	50.8
Tana River	30.2	43.3
Lamu	34.1	43.9
Taita Taveta	38.1	50.6
Garissa	65.8	72.7
Wajir	47.6	59.4
Mandera	32.7	42.7
Marsabit	30.3	43.2
Isiolo	36.5	49.6
Meru	47.8	57.8
Tharaka-Nithi	32.7	46.3
Embu	30.4	42.8
Kitui	35.8	46.1
Machakos	30.2	43.9
Makueni	32.2	45.3
Nyandarua	23.4	35.2
Nyeri	22.8	35.2
Kirinyaga	25.7	36.8
Murang'a	28.5	40.9
Kiambu	31.5	43.2
Turkana	36.3	48.2
West Pokot	24.7	36.1
Samburu	31.2	44.1
Trans Nzoia	25.2	34.1
Uasin Gishu	30.3	40.8
Elgeyo Marakwet	47.5	55.8
Nandi	27.3	37.5
Baringo	34.0	44.4
Laikipia	25.1	37.8
Nakuru	29.1	42.3
Narok	54.2	65.0
Kajiado	50.1	62.6
Kericho	31.4	46.2
Bomet	35.1	48.0
Kakamega	23.3	33.8
Vihiga	20.0	30.1
Bungoma	29.8	42.2
Busia	29.5	40.4
Siaya	21.5	32.4
Kisumu	24.1	35.0
Homa Bay	33.2	42.1
Migori	25.4	34.4
Kisii	34.5	46.2
Nyamira	34.1	45.3
Nairobi City	30.4	41.4

Table A11. Facilities that received resources from any source

% facilities	Total	First level hospital	Health center	Dispensary and clinic
Mombasa	14.3	25.0	12.5	13.8
Kwale	63.8	100.0	85.7	59.6
Kilifi	43.6	66.7	57.1	41.2
Tana River	80.2	100.0	50.0	82.4
Lamu	39.4	50.0	75.0	33.3
Taita Taveta	70.7	100.0	80.0	63.9
Garissa	24.2	40.0	20.0	23.3
Wajir	72.1	100.0	66.7	69.7
Mandera	26.0	50.0	16.7	28.1
Marsabit	53.7	100.0	50.0	52.8
Isiolo	20.0	0.0	16.7	22.2
Meru	29.8	75.0	33.3	26.7
Tharaka-Nithi	37.5	100.0	87.5	25.5
Embu	54.3	100.0	57.1	51.9
Kitui	55.6	50.0	66.7	53.2
Machakos	66.6	100.0	87.5	62.9
Makueni	57.5	100.0	70.0	54.3
Nyandarua	52.1	100.0	100.0	41.2
Nyeri	51.1	66.7	100.0	44.3
Kirinyaga	36.4	66.7	72.7	28.1
Murang'a	47.4	50.0	71.4	44.8
Kiambu	19.3	60.0	45.5	12.3
Turkana	58.5	100.0	87.5	51.9
West Pokot	60.6	100.0	100.0	56.6
Samburu	30.8	50.0	33.3	29.7
Trans Nzoia	27.9	50.0	71.4	20.8
Uasin Gishu	70.6	75.0	100.0	66.1
Elgeyo Marakwet	79.8	25.0	63.6	88.6
Nandi	20.2	50.0	60.0	16.1
Baringo	72.6	100.0	88.9	69.5
Laikipia	73.6	75.0	80.0	72.7
Nakuru	43.8	50.0	83.3	35.9
Narok	46.8	66.7	40.0	47.8
Kajiado	33.8	25.0	30.0	34.9
Kericho	61.4	60.0	66.7	61.0
Bomet	84.5	100.0	66.7	87.2
Kakamega	66.0	100.0	75.0	60.4
Vihiga	48.0	66.7	50.0	45.2
Bungoma	48.6	50.0	60.0	46.6
Busia	45.4	0.0	40.0	50.0
Siaya	58.5	100.0	61.1	54.2
Kisumu	66.2	57.1	75.0	64.4
Homa Bay	63.3	100.0	70.6	58.2
Migori	62.0	75.0	75.0	58.2
Kisii	69.3	66.7	71.4	69.0
Nyamira	57.0	100.0	61.9	50.0
Nairobi City	17.1	33.3	26.3	13.7

Table A12. Facilities that had a work plan for the current fiscal year

% facilities	Total	First level hospital	Health center	Dispensary and clinic
Mombasa	11.7	25.0	0.0	12.3
Kwale	41.0	50.0	57.1	38.5
Kilifi	19.2	33.3	0.0	20.6
Tana River	49.5	0.0	50.0	52.9
Lamu	3.0	0.0	25.0	0.0
Taita Taveta	7.8	0.0	20.0	5.6
Garissa	48.3	60.0	60.0	44.2
Wajir	4.0	0.0	8.3	3.0
Mandera	15.0	50.0	11.1	12.5
Marsabit	12.6	0.0	0.0	16.7
Isiolo	5.7	0.0	0.0	7.4
Meru	18.2	25.0	22.2	17.3
Tharaka-Nithi	36.0	66.7	62.5	29.8
Embu	42.0	66.7	57.1	38.9
Kitui	19.5	50.0	20.0	17.7
Machakos	24.7	0.0	62.5	21.4
Makueni	13.9	100.0	20.0	10.0
Nyandarua	26.6	100.0	70.0	15.7
Nyeri	26.5	66.7	77.8	18.6
Kirinyaga	13.9	33.3	45.5	7.0
Murang'a	14.0	25.0	14.3	13.4
Kiambu	18.1	40.0	27.3	15.1
Turkana	12.3	33.3	25.0	9.3
West Pokot	44.9	50.0	100.0	41.5
Samburu	57.2	50.0	66.7	56.8
Trans Nzoia	11.1	0.0	28.6	9.4
Uasin Gishu	39.7	0.0	50.0	41.1
Elgeyo Marakwet	45.9	0.0	45.5	50.0
Nandi	18.8	50.0	40.0	16.1
Baringo	6.3	100.0	11.1	3.4
Laikipia	49.2	25.0	80.0	47.7
Nakuru	30.5	75.0	41.7	25.0
Narok	9.3	33.3	6.7	8.7
Kajiado	15.5	25.0	10.0	15.9
Kericho	47.1	40.0	66.7	45.8
Bomet	43.3	100.0	55.6	38.3
Kakamega	35.2	50.0	37.5	33.3
Vihiga	41.8	66.7	64.3	29.0
Bungoma	47.2	25.0	60.0	46.6
Busia	30.5	33.3	20.0	32.6
Siaya	54.3	50.0	55.6	54.2
Kisumu	47.1	28.6	50.0	48.9
Homa Bay	50.6	60.0	47.1	50.9
Migori	59.1	75.0	58.3	58.2
Kisii	53.6	77.8	57.1	47.6
Nyamira	76.9	100.0	76.2	75.0
Nairobi City	21.8	0.0	36.8	19.2

Table A13. Facilities that received supervision visit

% facilities	Total	First level hospital	Health center	Dispensary and clinic
Mombasa	54.4	25.0	62.5	55.4
Kwale	70.4	100.0	100.0	65.4
Kilifi	74.3	33.3	71.4	76.5
Tana River	75.3	100.0	50.0	76.5
Lamu	81.8	100.0	75.0	81.5
Taita Taveta	92.2	100.0	100.0	88.9
Garissa	56.9	60.0	80.0	51.2
Wajir	96.0	100.0	100.0	93.9
Mandera	57.5	75.0	50.0	59.4
Marsabit	100.0	100.0	100.0	100.0
Isiolo	74.3	100.0	50.0	77.8
Meru	33.2	75.0	44.4	29.3
Tharaka-Nithi	88.1	66.7	100.0	87.2
Embu	84.2	100.0	100.0	81.5
Kitui	91.3	100.0	100.0	88.7
Machakos	83.9	100.0	87.5	82.9
Makueni	78.2	100.0	90.0	75.7
Nyandarua	92.0	100.0	100.0	90.2
Nyeri	55.8	100.0	66.7	52.9
Kirinyaga	39.5	33.3	54.5	36.8
Murang'a	87.1	100.0	100.0	85.1
Kiambu	88.8	100.0	90.9	87.7
Turkana	93.9	100.0	100.0	92.6
West Pokot	82.9	100.0	100.0	81.1
Samburu	95.2	100.0	100.0	94.6
Trans Nzoia	84.2	100.0	85.7	83.0
Uasin Gishu	72.1	100.0	87.5	67.9
Elgeyo Marakwet	98.4	75.0	100.0	100.0
Nandi	76.8	100.0	60.0	77.4
Baringo	95.7	100.0	100.0	94.9
Laikipia	73.9	25.0	80.0	77.3
Nakuru	82.7	100.0	91.7	79.7
Narok	93.7	100.0	93.3	93.5
Kajiado	67.7	50.0	80.0	66.7
Kericho	78.4	60.0	83.3	79.7
Bomet	89.7	100.0	88.9	89.4
Kakamega	82.3	100.0	93.8	77.1
Vihiga	81.0	0.0	92.9	83.9
Bungoma	63.9	50.0	80.0	62.1
Busia	71.4	100.0	60.0	71.7
Siaya	84.3	100.0	88.9	81.3
Kisumu	82.3	85.7	75.0	84.4
Homa Bay	92.1	100.0	88.2	92.7
Migori	85.9	75.0	83.3	87.3
Kisii	78.6	66.7	78.6	81.0
Nyamira	90.1	100.0	85.7	91.7
Nairobi City	86.5	100.0	94.7	83.6

Table A14. Facilities with governing committees

% facilities	Total	First level hospital	Health center	Dispensary and clinic
Mombasa	14.2	0.0	12.5	15.4
Kwale	72.2	50.0	85.7	71.2
Kilifi	47.4	33.3	71.4	45.6
Tana River	90.1	100.0	100.0	88.2
Lamu	72.7	100.0	75.0	70.4
Taita Taveta	63.2	25.0	90.0	61.1
Garissa	58.7	100.0	60.0	53.5
Wajir	91.9	80.0	100.0	90.9
Mandera	51.7	25.0	50.0	56.3
Marsabit	87.9	50.0	100.0	86.1
Isiolo	68.5	0.0	50.0	77.8
Meru	31.9	50.0	44.4	29.3
Tharaka-Nithi	49.9	66.7	75.0	44.7
Embu	62.2	100.0	71.4	59.3
Kitui	74.1	75.0	80.0	72.6
Machakos	64.8	50.0	87.5	62.9
Makueni	79.4	100.0	80.0	78.6
Nyandarua	47.3	100.0	100.0	35.3
Nyeri	44.2	0.0	88.9	40.0
Kirinyaga	40.6	66.7	81.8	31.6
Murang'a	70.3	100.0	100.0	65.7
Kiambu	34.9	60.0	54.5	30.1
Turkana	87.7	66.7	100.0	87.0
West Pokot	83.9	0.0	100.0	86.8
Samburu	71.6	50.0	66.7	73.0
Trans Nzoia	49.0	0.0	85.7	47.2
Uasin Gishu	76.4	50.0	87.5	76.8
Elgeyo Marakwet	93.3	50.0	90.9	97.7
Nandi	70.9	100.0	60.0	71.0
Baringo	92.8	100.0	88.9	93.2
Laikipia	60.6	25.0	80.0	61.4
Nakuru	55.2	75.0	83.3	48.4
Narok	82.8	100.0	73.3	84.8
Kajiado	43.0	25.0	60.0	41.3
Kericho	68.1	20.0	66.7	72.9
Bomet	89.7	100.0	77.8	91.5
Kakamega	80.8	100.0	93.8	75.0
Vihiga	62.5	66.7	92.9	48.4
Bungoma	75.0	100.0	70.0	74.1
Busia	71.1	66.7	60.0	73.9
Siaya	85.7	75.0	94.4	83.3
Kisumu	82.3	85.7	75.0	84.4
Homa Bay	88.2	100.0	88.2	87.3
Migori	71.8	75.0	66.7	72.7
Kisii	73.9	66.7	71.4	76.2
Nyamira	75.2	100.0	85.7	66.7
Nairobi City	49.7	66.7	57.9	46.6

Table A15. Client satisfaction

% clients	Waiting time	Consultation time	Privacy	Staff courtesy & respect	Staff attitude	Coercion	Facility cleanliness	Services received
Mombasa	79.9	97.9	76.0	97.9	97.9	93.6	97.9	97.9
Kwale	60.3	98.3	77.4	100.0	100.0	98.3	95.2	96.7
Kilifi	76.9	96.3	90.8	100.0	100.0	99.1	95.4	100.0
Tana River	88.3	100.0	94.2	100.0	100.0	97.1	97.1	100.0
Lamu	45.2	100.0	100.0	100.0	100.0	96.8	87.1	100.0
Taita Taveta	82.2	100.0	98.7	100.0	100.0	91.0	98.7	98.7
Garissa	54.4	75.6	93.9	100.0	100.0	90.8	87.8	100.0
Wajir	80.1	86.3	93.2	86.3	86.3	93.5	100.0	100.0
Mandera	88.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Marsabit	84.0	92.0	100.0	100.0	100.0	92.0	92.0	100.0
Isiolo	92.6	96.3	100.0	100.0	100.0	100.0	96.3	96.3
Meru	73.4	92.4	98.5	98.5	98.5	95.5	100.0	97.0
Tharaka-Nithi	80.4	100.0	100.0	100.0	100.0	100.0	98.3	98.3
Embu	78.0	99.3	99.3	98.5	98.5	97.2	98.7	97.9
Kitui	76.7	100.0	96.6	100.0	100.0	100.0	96.6	98.3
Machakos	85.2	98.0	89.2	100.0	100.0	98.0	91.2	100.0
Makueni	74.1	100.0	93.9	100.0	100.0	100.0	93.9	96.9
Nyandarua	63.6	100.0	97.2	100.0	100.0	86.0	97.2	97.2
Nyeri	76.9	97.6	100.0	98.8	98.8	97.6	98.8	98.8
Kirinyaga	81.8	100.0	97.4	100.0	100.0	96.1	98.7	100.0
Murang'a	81.5	100.0	100.0	100.0	100.0	97.9	98.2	100.0
Kiambu	69.7	92.5	92.4	94.1	94.1	95.4	98.5	98.4
Turkana	93.8	93.8	100.0	93.8	93.8	93.8	93.5	100.0
West Pokot	60.0	91.3	95.7	100.0	100.0	89.5	95.7	94.8
Samburu	75.0	100.0	100.0	100.0	100.0	95.0	100.0	100.0
Trans Nzoia	71.9	89.5	91.2	100.0	100.0	96.5	98.2	98.2
Uasin Gishu	86.2	96.9	95.4	100.0	100.0	77.0	98.4	92.3
Elgeyo Marakwet	84.1	97.7	93.1	100.0	100.0	95.4	89.7	100.0
Nandi	79.0	93.6	88.0	100.0	100.0	96.1	100.0	98.7
Baringo	94.8	100.0	94.8	100.0	100.0	100.0	100.0	100.0
Laikipia	74.5	97.4	94.2	100.0	100.0	100.0	97.4	100.0
Nakuru	90.3	95.2	100.0	100.0	100.0	100.0	100.0	100.0
Narok	72.2	100.0	100.0	100.0	100.0	95.4	100.0	100.0
Kajiado	91.6	95.8	100.0	100.0	100.0	95.8	95.8	100.0
Kericho	93.6	99.1	100.0	100.0	100.0	98.2	97.1	100.0
Bomet	98.7	99.3	99.3	100.0	100.0	98.0	99.4	99.3
Kakamega	69.9	98.2	91.3	100.0	100.0	87.8	91.1	96.5
Vihiga	75.5	100.0	92.6	97.6	97.6	80.6	95.2	97.6
Bungoma	73.1	100.0	96.8	99.2	99.2	85.2	97.5	100.0
Busia	72.6	96.6	94.9	99.4	99.4	97.7	94.9	97.1
Siaya	73.5	98.8	94.0	100.0	100.0	100.0	95.2	100.0
Kisumu	91.8	100.0	99.0	100.0	100.0	99.0	97.0	100.0
Homa Bay	76.1	95.6	91.5	98.5	98.5	98.5	91.1	96.2
Migori	81.0	89.8	91.1	100.0	100.0	95.0	96.2	96.2
Kisii	81.4	99.0	97.0	100.0	100.0	95.2	95.2	100.0
Nyamira	76.7	98.9	97.2	99.4	99.4	98.3	95.6	100.0
Nairobi City	77.9	98.9	91.2	100.0	100.0	96.7	95.6	98.9

ANNEX E. DIFFERENCES IN ABSENTEEISM RATES BETWEEN 2012 AND 2018

This annex explores more in depth the difference in raw absenteeism rates included in this report and those in the original 2012 report, which at a first glance seems to be 27 percentage points (27.5% vs 54.6%, respectively). However, there are several factors to consider when interpreting the estimates from each year, particularly differences in protocols, definitions and sampling, among others. These distinctions need to be taken into consideration when comparing the results across years. In this annex, we explore each of these elements in more detail to better understand the differences in absenteeism over this 6-year period.

The results detailed below suggest that, while we cannot rule out real changes in absenteeism between 2012 and 2018, the differences in context across years (reflected through different sampling decisions) make a comparison in absenteeism rates extremely complex to make. Thus, the reader should be very careful when making these comparisons and taking the numbers at face value.

1. Ruling out changes in protocols and definitions

We first checked whether there was a change in protocols and definitions of absenteeism between the two years studied. In both rounds, the protocol to collect data on absenteeism was the same:

(i) During a first announced visit to each health facility, a roster with all staff was collected from a senior administrator or health provider. This list contained up to 50 health workers in 2012 and up to 250 in 2018[25].
(ii) During a second unannounced visit, up to 10 health workers from the initially-collected list were randomly selected and their presence in the facility was recorded.
(iii) If not present, the reason for being absent for each selected health worker was recorded.

We also liaised with the Field Coordinators for the 2018 survey to assess whether the protocol was followed, or whether there were any notable deviations that might have resulted in higher estimated absenteeism rates. The Coordinators reported no major deviations during their supervision visits. In fact, they could corroborate that absenteeism seemed high during their monitoring visits.

After the data described above were collected, the absenteeism rate was calculated. In both years[26], the absenteeism rate was defined as the "share of a maximum of 10 randomly selected health staff absent from the facility during an unannounced visit". It is important to clarify that health professionals actively engaged in fieldwork at the time of the second visit (mainly community and public health professionals) were counted as present. Health workers in the roster collected during the first visit but classified as temporaries, transferred, terminated, deceased, retired, resigned, off-duty, on-call, or not scheduled to work at the time of the absenteeism check were all excluded from the estimations[27].

[25] This fact will limit the way in which we compare the results between both years (see Section 2).
[26] In 2012, the absence indicator was not estimated for hospitals because of the complex arrangements of off duty, interdepartmental shifts, etc. We correct for this when comparing the results between both years (see Section 3).
[27] Information is more precise and disaggregated in 2018.

All of the above was extremely similar in both years, allowing us to rule out that the difference in absenteeism rates was due to changes in protocols and definitions.

2. Sampling

We also studied sampling strategies in each year, which are described in detail below. Moreover, samples and weights were made as comparable as possible in order to understand the real differences in absenteeism. The results suggest that differences across years are extremely sensitive to the changes in sample methodologies.

A. Summary of methodology in 2012

In 2012, the SDI survey collected information from 294 health facilities and 1,859 health providers located in 15 Kenyan counties. The results are representative at the following levels:

- Nationally-representative based on geographical characteristics, population, rural/urban, poor/non-poor
- Representative of government and private non-for-profit[28] facilities
- Representative of services at the first, second and tertiary facility levels, which includes: dispensaries, health centers (including medical clinics), and district hospitals (including sub-district hospitals).

The procedure was as follows:

- Four county strata were created based on most recent available information from the national statistical authority: rural/urban and poor/non-poor.
- Within each stratum, counties were selected randomly[29] with probability proportional to population size within it.
- Within each county, geographical locations were selected randomly with probability proportional to population size within it.
- Within a geographical location, facilities were selected randomly from a sample frame that included public facilities (Ministries of Health) and private (non-profit) facilities, each at first, second and tertiary level of care.

B. Summary of methodology in 2018

In 2018, the SDI survey collected information from 3,094 health facilities and 16,010 health providers located in 47 counties. The results are representative at the following levels:

- National, urban and rural levels
- Indicators were representative at the county-level as well
- Government and private (both non-for-profit[30] and for-profit) facilities
- Representative of services at the first, second and tertiary facility levels, which includes: Dispensaries/clinics, health centers, and hospitals (including first- and tertiary-levels hospitals).

[28] This includes faith-based and NGOs facilities, notably excluding private for-profit facilities.
[29] Nairobi was pre-selected because as the capital it is exceptional. Similarly, Mombasa was pre-selected. After pre-selecting Nairobi and Mombasa, along with three other "case study" counties. the remaining ten counties were selected randomly with the exclusion of three counties of North Eastern province due to security concerns
[30] This includes faith-based and NGOs facilities.

The procedure was as follows:

- The sample frame included 9,631 facilities (both public/private and at 3 levels of care) in 47 counties.
- In each of the 47 counties, a target number of facilities was decided based on the overall/combined number of facilities available in the county as per the sampling frame[31]
- Once this target number of facilities per county was decided, it was distributed proportionally to the number of facilities across each of the strata generated by the permutation of ownership type (i.e. community/public/private non-profit/private for-profit) AND level of care (i.e. dispensary/clinic, health center, and first level hospital).

C. Comparing estimates from 2012 and 2018

I. Accounting for difference in samples

Samples in 2012 and 2018 were designed with different purposes in mind and to ensure representativeness at different levels. Thus, comparing any statistic one-to-one, without considering the context, is likely not correct. The following differences need to be taken into account for any comparison to be made:

i. Private for-profit health facilities were included in 2018 while only private not-for-profit were included in 2012.
ii. In 2012, the absence indicator was not estimated for hospitals because of the complex arrangements of off-duty, interdepartmental shifts, etc.
iii. Representativeness in 2012 is only at the national level, while in 2018 representativeness is at the national, county and rural/urban levels.
iv. Some counties were semi-randomly selected in 2012, while every county was surveyed in 2018.
v. Furthermore, three counties of North Eastern province were excluded in 2012 due to security concerns.

Taking the above into consideration, the first exercise that we perform is to create samples that could be compared across both years. In order to achieve this, the steps below are followed:

i. Private for-profit facilities were dropped in 2018
ii. The same counties surveyed in 2012 were kept in 2018
iii. Hospitals were dropped in 2018 from the absenteeism estimation
iv. There is an issue for estimating new unbiased individual-level weights for facilities with more than 50 health workers in the roster. Thus, for making comparisons at this level, we would need to restrict the samples to those facilities with less than 50 health workers on the roster.

II. Accounting for difference in weights

Once samples were restricted to be comparable, attention shifted to ensure the usage of the same type of weights in both years. In 2018, absenteeism was estimated using individual-level data with (correctly) adjusted weights for the probability of being one of the 10 staff

[31] Excluding tertiary hospitals. Also, note that population size and characteristics DID NOT enter into the sampling methodology as they did in 2012.

selected for absenteeism check. In contrast, in 2012, weights were only used at the facility-level.

There are two options to compare absenteeism using comparable sub-samples and methodologies between both years. The methods and their results are summarized below and the results are shown in Table 1.

i. Use data and weights at the facility-level (difference in absenteeism is 18.13 percentage points; 44.05% in 2018 vs 25.92% in 2012)
ii. Create individual-level weights in 2012. However, information on total number of health workers is missing for 2012[32]. We can count people in the roster but, for those with greater than 50 health workers (i.e. maximum recorded), this will bias the new individual-level weights. Nonetheless, we can still create the weights using the formula *Absenteeism Weight = Facility IPW * (1 / Probability of Selection for Absenteeism Check)* and restrict both 2012 and 2018 to facilities with less than 50 staff (difference in absenteeism is now 20.78 percentage points but in the opposite direction; 47.86% in 2018 vs 68.64% in 2012)

Table 1: Differences in Absenteeism Rates between 2012 and 2018

	2012	**2018**	**Difference**
Facility-level Weights	25.92%	44.05%	18.13%
Individual-level Weights	68.64%	47.86%	-20.78%

III. Exploring channels for different results

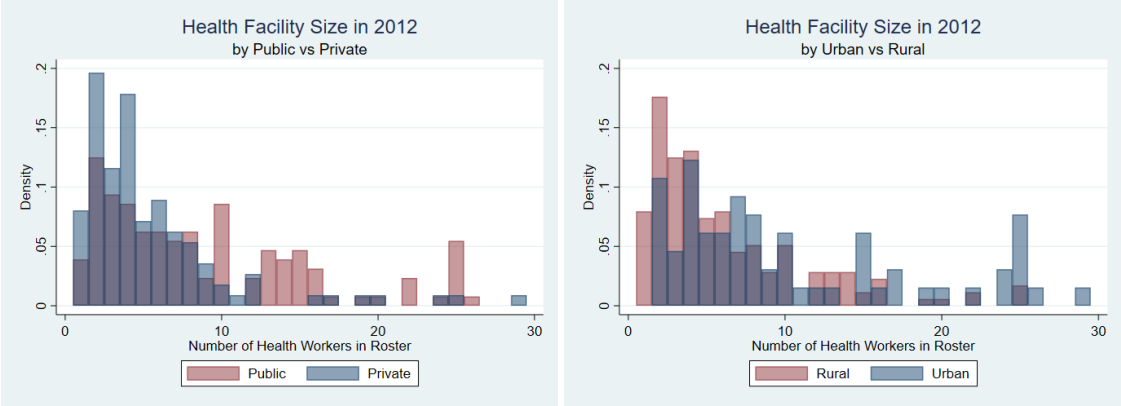
One of the main reasons for the differences in the above results has to do with the composition of the comparable samples, facility sizes, and the differential absenteeism rates across sub-categories. Moreover, the differential effect is greater in magnitude in 2012 because, as opposed to in 2018, the probability of selecting a particular county and geographical location was proportional to its population size. This means that the proportion of facilities with more than 10 workers would presumably be higher in 2012. In fact, the data corroborates this for the comparable sub-samples, with 20% of facilities having more than 10 workers in 2012 in contrast to only 10% in 2018.

In 2012, we also note that private health facilities have fewer health workers than public facilities (see Figure 1). More importantly, the distribution of private health facilities is located mostly below the cutoff point of 10 (maximum number of health workers selected for the absenteeism exercise). This means that the probability of any single health worker being selected is higher in private facilities and, therefore, the newly estimated individual-level weights will be larger for public health workers. Incidentally, the (facility-level weighted) absenteeism rate for the public sector is about 8 percentage points larger than that of the private sector.

[32] This is a separate question asked prior to filling out the roster and it is relevant because the roster had a limit number of health providers to be recorded. The question was actually asked as per the survey instrument, but the information was lost and never recovered.

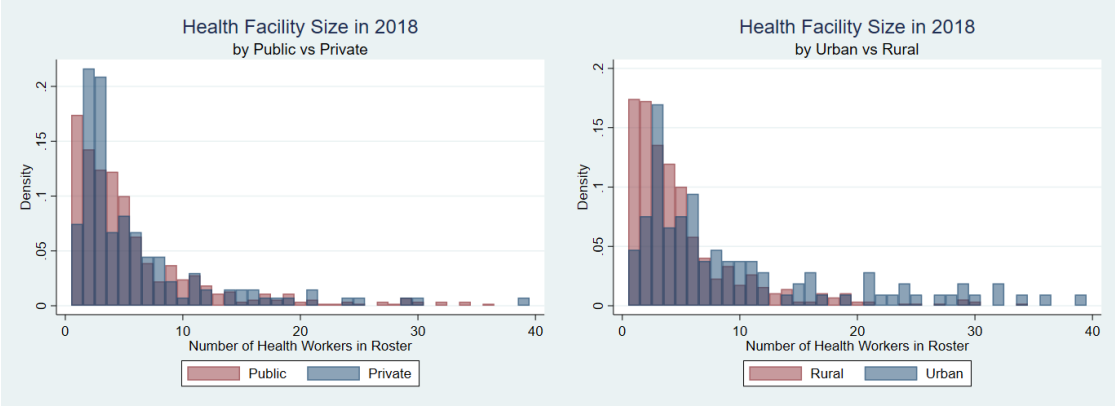
Likewise, rural facilities are smaller in size. Following the same logic, newly estimated individual-level weights are larger for workers in urban facilities. Again, (facility-level weighted) absenteeism is larger in urban settings by about 5 percentage points. Both of the above combined help to explain the very different rate of absenteeism estimated using different methodologies.

Figure 1: Health facility size in 2012, stratified by public/private and urban/rural



In contrast, in 2018, the distributions of the size of public and private health facilities are much more similar, particularly below 10 workers. The same is the case for urban and rural facilities, perhaps to a lesser extent. However, as noted before, the proportion of facilities with more than 10 workers is half of that in 2012, which makes the magnitudes of absenteeism more comparable when using weights at the individual and facility levels.

Figure 2: Health facility size in 2018, stratified by public/private and urban/rural



3. Summary of results

SDI surveys have evolved over time and have been adapted to time-specific circumstances and needs. There are many aspects to be taken into consideration when comparing statistics across time (even between two SDI surveys in the same country), in particular differences in protocols, definitions and

sampling. Once accounted for, the results might be very different from those obtained from more superficial comparisons.

The current Annex, with all its methodological caveats due to lack of perfect data and documentation, presents some of the main differences between the SDI surveys carried out in Kenya in 2012 and 2018. It also elaborates on some of the possible and likely sources of variation across years that might help explain the differences in absenteeism rates when restricting the sample to comparable sub-samples and using the same methodologies to account for different sampling strategies.

Some other tentative sources of variation, such as seasonality and correct classification of reasons for absenteeism, were studied but showed no explanatory insights. Thus, they are not included in this Annex. It is also worth pointing out that we do not attempt or are able to rule out a real change in absenteeism. Rather, we advise the reader on the changes in methodology across years and present some potential drivers for the difference in absenteeism rates. This Annex, its content and results are a good reminder of the complexity of the SDI surveys and the need to always account for methodological differences before comparing results across time and countries.

ANNEX F: SURVEY PERSONEL

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Cosmas Boiyon	NCPD
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