



REPUBLIC OF KENYA

Kenya Health Service Delivery Indicator Survey 2018 Report

May 2019

GHNDR and GEDDR



Report No:



Standard Disclaimer:

This volume is a product of the International Bank for Reconstruction and Development/ The World Bank and Government of Kenya. The findings, interpretations, and conclusions expressed in this paper do not necessarily reflect the views of the Executive Directors of The World Bank or the governments they represent. The World Bank does not guarantee the accuracy of the data included in this work. The boundaries, colors, denominations, and other information shown on any map in this work do not imply any judgment on the part of The World Bank and Government of Kenya concerning the legal status of any territory or the endorsement or acceptance of such boundaries.

Copyright Statement:

The material in this publication is copyrighted. Copying and/or transmitting portions or all of this work without permission may be a violation of applicable laws. The International Bank for Reconstruction and Development/ The World Bank encourages dissemination of its work and will normally grant permission to reproduce portions of the work promptly.

For permission to photocopy or reprint any part of this work, please send a request with complete information to the Copyright Clearance Center, Inc., 222 Rosewood Drive, Danvers, MA 01923, USA, telephone 978-750-8400, fax 978-750-4470, <http://www.copyright.com/> or to the Ministry of Health, Kenya, PO Box 48994 00100 Nairobi.

All other queries on rights and licenses, including subsidiary rights, should be addressed to the Office of the Publisher, The World Bank, 1818 H Street NW, Washington, DC 20433, USA, fax 202-522-2422, e-mail pubrights@worldbank.org.

TABLE OF CONTENTS

| | |
|---|------|
| Table of Contents..... | iv |
| List of Boxes..... | vi |
| List of Figures..... | vi |
| List of Tables..... | vi |
| ACRONYMS..... | viii |
| ACKNOWLEDGEMENTS..... | ix |
| EXECUTIVE SUMMARY | x |
| What service providers know? | x |
| What service providers do?..... | xi |
| What service providers have to work with? | xi |
| What does this mean for Kenya?..... | xi |
| Table 1: Kenya SDI At-A-Glance..... | xiii |
| Table 2. SDI Country Comparisons..... | xiv |
| I. INTRODUCTION..... | 15 |
| Organization of Health Sector in Kenya | 16 |
| II. METHODOLOGY AND IMPLEMENTATION..... | 19 |
| A. Implementation | 19 |
| B. SDI survey instruments..... | 19 |
| C. Sampling | 20 |
| III. RESULTS | 25 |
| D. Delivering Health Services | 25 |
| E. Caseload..... | 31 |
| F. Absence Rate..... | 33 |
| G. Diagnostic Accuracy..... | 38 |
| H. Adherence to Clinical Guidelines | 42 |
| I. Management of Maternal and Neonatal Complications | 46 |
| J. Drugs and Commodities Availability | 48 |
| K. Availability of Vaccines Related Equipment and Supplies..... | 50 |
| L. Equipment Availability..... | 55 |
| M. Infrastructure Availability..... | 59 |
| N. Waste Management..... | 62 |
| O. Governance in Health Service Delivery..... | 63 |

| | | |
|----------|---|-----|
| P. | Health Workforce Background..... | 66 |
| Q. | Family Planning Exit Interviews..... | 68 |
| R. | Poverty and health service delivery in Kenya..... | 73 |
| S. | Comparing Kenya to other SDI countries in the region | 74 |
| T. | Comparing both SDI Surveys in Kenya..... | 75 |
| V. | What Does This Mean For Kenya? | 77 |
| VI. | REFERENCES | 79 |
| VII. | ANNEXES | 81 |
| Annex A. | Sampling Strategy | 81 |
| U. | Sampling Frame for the 2018 Kenya SDI | 81 |
| V. | Sample Size and Sample allocation for the 2018 Kenya SDI..... | 84 |
| W. | Sampling Health Facilities and Health Workers..... | 84 |
| X. | Sampling Family Planning Clients for Exit Interviews | 85 |
| Annex B. | Definition of Indicators..... | 87 |
| Annex C. | Additional Results | 89 |
| Annex D. | County level results maps..... | 100 |
| Annex E. | Additional County Level Results | 107 |

List of Boxes

| | |
|---|----|
| Box 1: Why focus on service Delivery? | 15 |
| Box 2: The Service Delivery Indicators (SDI) Program..... | 18 |
| Box 3: Analytical underpinnings | 22 |

List of Figures

| | |
|--|----|
| Figure 1: Levels of service delivery in Kenya..... | 17 |
| Figure 3: Average number of health workers per facility by county | 27 |
| Figure 4: Availability of elements that comprise BEmONC and CEmONC | 30 |
| Figure 5: Outpatient caseload by county | 32 |
| Figure 6: Caseload by facility size | 33 |
| Figure 7: Absence rate by county..... | 35 |
| Figure 8: Reasons for absence by health worker cadre..... | 36 |
| Figure 9: Reasons for absence by location and sector | 37 |
| Figure 10: Diagnostic accuracy by county..... | 40 |
| Figure 11: Diagnostic accuracy and correct treatment by clinical case..... | 42 |
| Figure 12: Adherence to clinical guidelines by county | 44 |
| Figure 13: Management of maternal and neonatal complications by county | 47 |
| Figure 14: Availability of all priority drugs by county | 49 |
| Figure 15: Availability of individual vaccines by facility type | 52 |
| Figure 16: Availability of equipment and vaccines-related supplies by facility type..... | 53 |
| Figure 17: Equipment indicator by county..... | 56 |
| Figure 18: Infrastructure indicator by county..... | 60 |
| Figure 19: Sources of electricity by facility type..... | 61 |
| Figure 20: Means by which facilities communicate with their community | 64 |
| Figure 21: Means by which facilities communicate with their community on EMHS..... | 65 |
| Figure 22: Average age among various health workers | 66 |
| Figure 23: Gender distribution among various health workers | 67 |
| Figure 24: Education levels among various health workers | 67 |
| Figure 25: Key socio-economic features among FP clients..... | 68 |
| Figure 30: Poverty headcount against equipment availability..... | 73 |
| Figure 31: Map of health facilities visited by SDI in Kenya..... | 86 |
| Figure 32: Diagnostic accuracy by questions asked: Severe dehydration | 93 |
| Figure 33: Diagnostic accuracy by questions asked: Pneumonia | 93 |
| Figure 34: Diagnostic accuracy by questions asked: Diabetes Mellitus..... | 94 |
| Figure 35: Diagnostic accuracy by questions asked: Pulmonary Tuberculosis..... | 94 |
| Figure 36: Correct treatment actions: Post-partum Hemorrhage..... | 95 |
| Figure 37: Correct treatment actions: Neonatal Asphyxia | 95 |
| Figure 38: Availability of individual tracer drugs by type of facility..... | 98 |

List of Tables

| | |
|--|------|
| Table 1: Kenya SDI At-A-Glance..... | xiii |
| Table 2: SDI Country Comparisons..... | xiv |
| Table 3: SDI Health survey instrument description..... | 19 |

| | |
|---|----|
| Table 5: Survey Sample..... | 24 |
| Table 6. Sample for indicators of absence and competence | 24 |
| Table 7. Hours and days of service delivery..... | 25 |
| Table 8. Distribution of health cadres by ownership and location | 26 |
| Table 9: Facilities where women give birth | 28 |
| Table 10. Availability of basic and comprehensive emergency obstetric and neonatal care (full package) | 28 |
| Table 11. Availability of basic and comprehensive emergency obstetric and neonatal care (package without assisted vaginal delivery) | 29 |
| Table 12. Outpatient caseload..... | 31 |
| Table 13. Absence rate by cadre and facility type..... | 34 |
| Table 14. Diagnostic accuracy by cadre | 39 |
| Table 15. Number of cases correctly diagnosed..... | 41 |
| Table 16. Adherence to clinical guidelines by health provider type | 43 |
| Table 17: Availability of Standard Treatment Guidelines | 45 |
| Table 18. Management of maternal and neonatal complications by cadre..... | 46 |
| Table 19. Availability of priority drugs by facility type | 48 |
| Table 20: Availability of family planning commodities | 50 |
| Table 21: Availability of vaccines by facility type | 50 |
| Table 22: Availability of vaccines by facility type across counties | 51 |
| Table 23: Vaccines storage - Refrigerators with temperature between 2oC and 8oC..... | 53 |
| Table 24: Vaccines storage - Refrigerators with temperature between 2oC and 8oC (by county)..... | 54 |
| Table 25: Availability of basic equipment by facility type, ownership and location | 55 |
| Table 26: Availability of equipment items in the equipment indicator | 57 |
| Table 27: Communication equipment availability..... | 57 |
| Table 28: Access to various forms of communication..... | 58 |
| Table 29: Availability of ambulance services..... | 58 |
| Table 30: Availability of infrastructure by facility type..... | 59 |
| Table 31: Availability of specific types of infrastructure | 61 |
| Table 32: Total proportion of facilities carrying out safe health care waste disposal..... | 62 |
| Table 33: Facilities that had a work plan for the current fiscal year | 63 |
| Table 34: Receipt of financial management instruments by public providers | 63 |
| Table 35: Facilities that submitted a financial report for previous quarter | 64 |
| Table 36: Facilities that share financial information with community | 64 |
| Table 37: Facilities that share EMHS delivery information with community | 65 |
| Table 38: Facilities that received supervision visit..... | 65 |
| Table 39: Facilities with governing committees..... | 66 |
| Table 40: Kenya in comparison with other countries in health service delivery | 74 |
| Table 41: Comparisons between Kenya SDI Survey rounds..... | 76 |
| Table 42: Distribution of facilities by Type..... | 81 |
| Table 43: Distribution by Ownership..... | 83 |
| Table 44: Indicator definition and method of calculation | 87 |
| Table 45: Distribution of health personnel by facility type, ownership and location..... | 89 |
| Table 46: Distribution of health personnel by gender and mean age..... | 89 |
| Table 47: Average age of health personnel by county | 89 |
| Table 48: Determinants of Absenteeism: regression results | 91 |
| Table 49: Determinants of diagnostic accuracy: regression results | 92 |
| Table 50: Danger signs asked for sick child vignette by cadre type..... | 96 |
| Table 51: Drug availability for the full SDI list | 97 |
| Table 52: Drug availability for tracer drugs..... | 98 |

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 NCPD, and analytical inputs of the National Council for Population and Development (NCPD) staff including: Peter Nyakwara, Catherine Ndei, Francis Kundu, Daniel Fundi Mureithi, Samuel Lubanga, Bernard Kiprotich, and James Macharia. The Ministry of Health through Dr. Abel Nyakiongora and Dr. Peter Mbugua also assisted in providing policy interpretations of the findings, with Dr. Valeria Makori as the Project Coordinator.

The team appreciates the collaboration with the Council of Governors, who facilitated the link with the counties, Kenya National Bureau of Statistics (KNBS) who provided technical assistance in sampling of Health Facilities through John Kibet Bore. Appreciation is extended to, Senior Task Leaders who provided technical assistance to field teams, Supervisors for data collection and enumerators. We also acknowledge ICT support teams who helped in addressing ICT challenges during data collection. Gratitude also goes to Counties health personnel 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 (UNFFPA).

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 Comparisons⁴

| | 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.

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 respectively⁶ against a national policy target of 79 years. Poor health services affect

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.

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

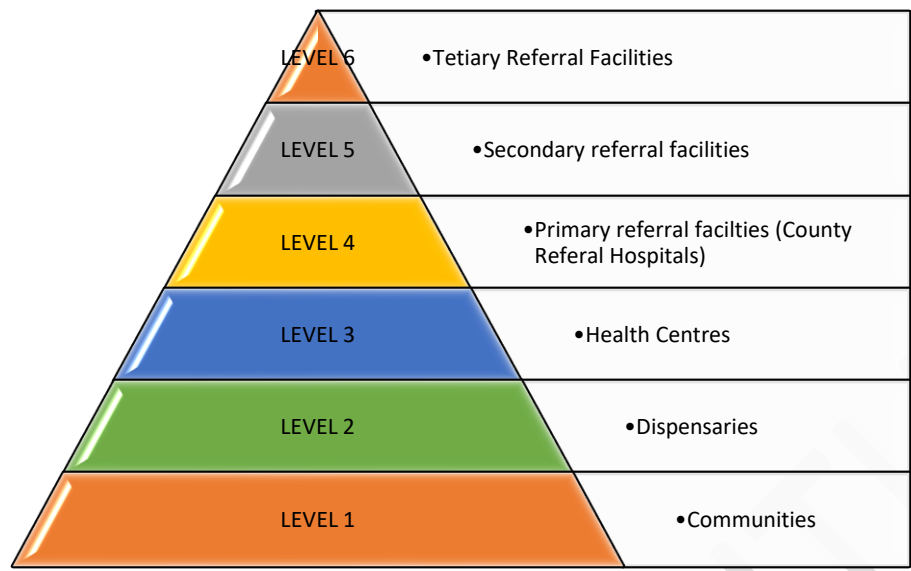
The Kenya Health Sector Strategic Plan (KHSSP II 2005-2010) introduced the Kenya essential package for health (KEPH), which is defined to have six levels of curative and preventative services as shown in Figure 1. Community health services ensure that the communities are involved in the health development 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 (QSIDS), 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 health 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.

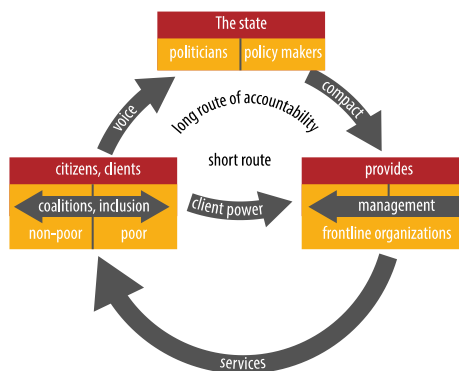
A multi-stage clustered sampling strategy is adopted. The first stage cluster selection is carried out independently within each stratum. The primary cluster considered is the county which is therefore the primary sampling unit (PSU). All 47 counties have been sampled. Health facilities were randomly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

CONFIDENTIAL

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

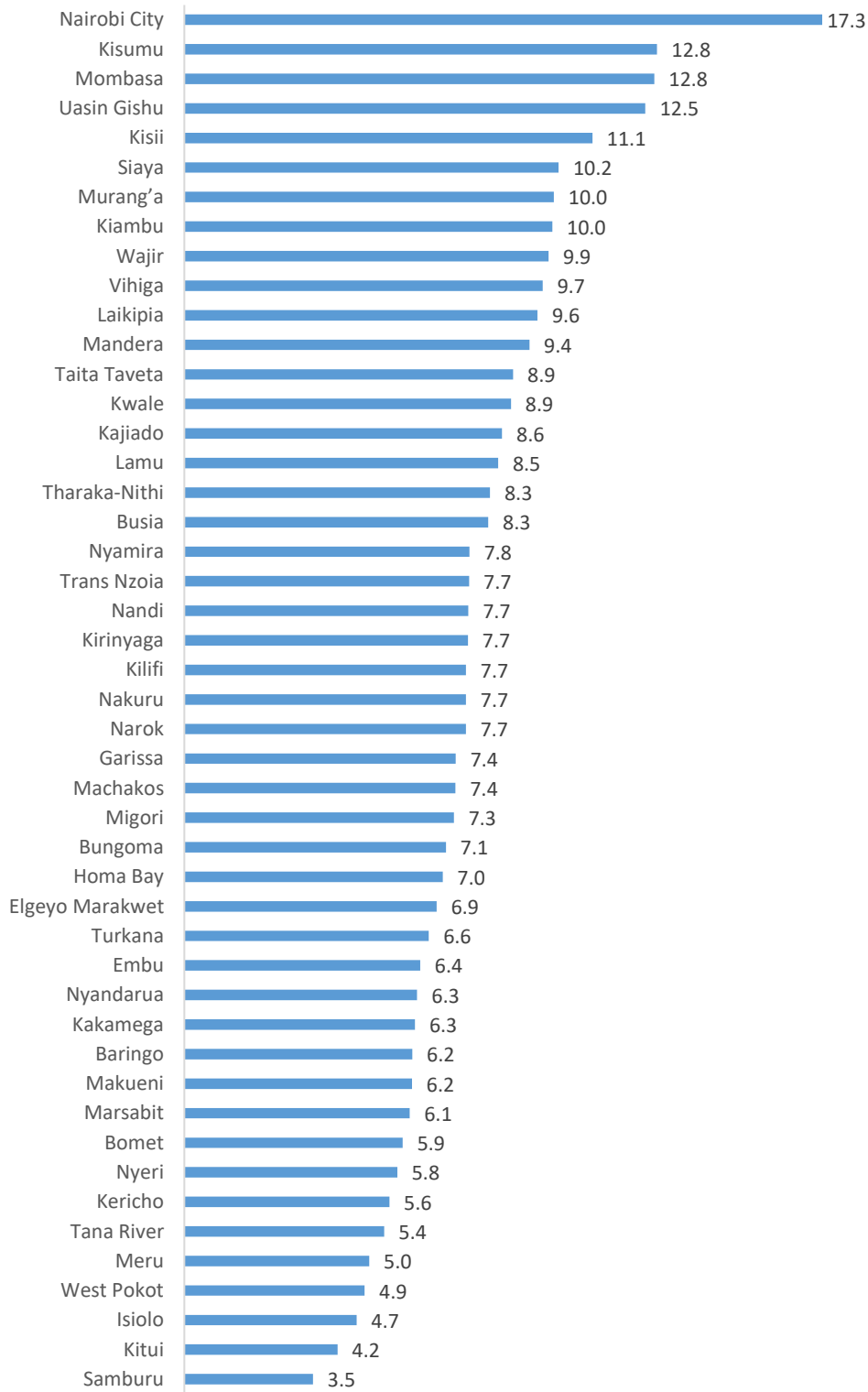
The average number of health workers per facility in Nairobi is 17.3 whereas the national estimate is around half of Nairobi (8.5). About 15 percent of all health workers are in Nairobi but close to two-fifths of the country's doctors (39.1 percent) serve in the capital which is home to only 10 percent 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 |

Source: Author's calculations using Kenya 2018 SDI data

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.

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 |

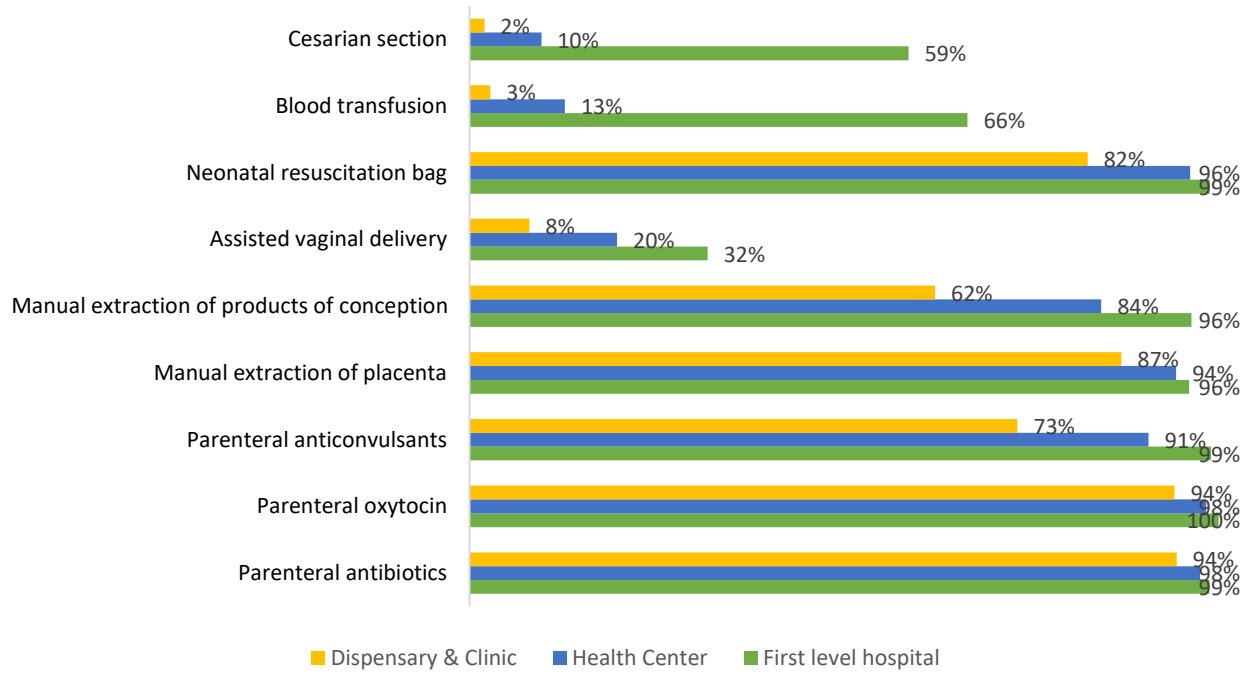
Source: Author's calculations using Kenya 2018 SDI data

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



CONFIDENTIAL

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.

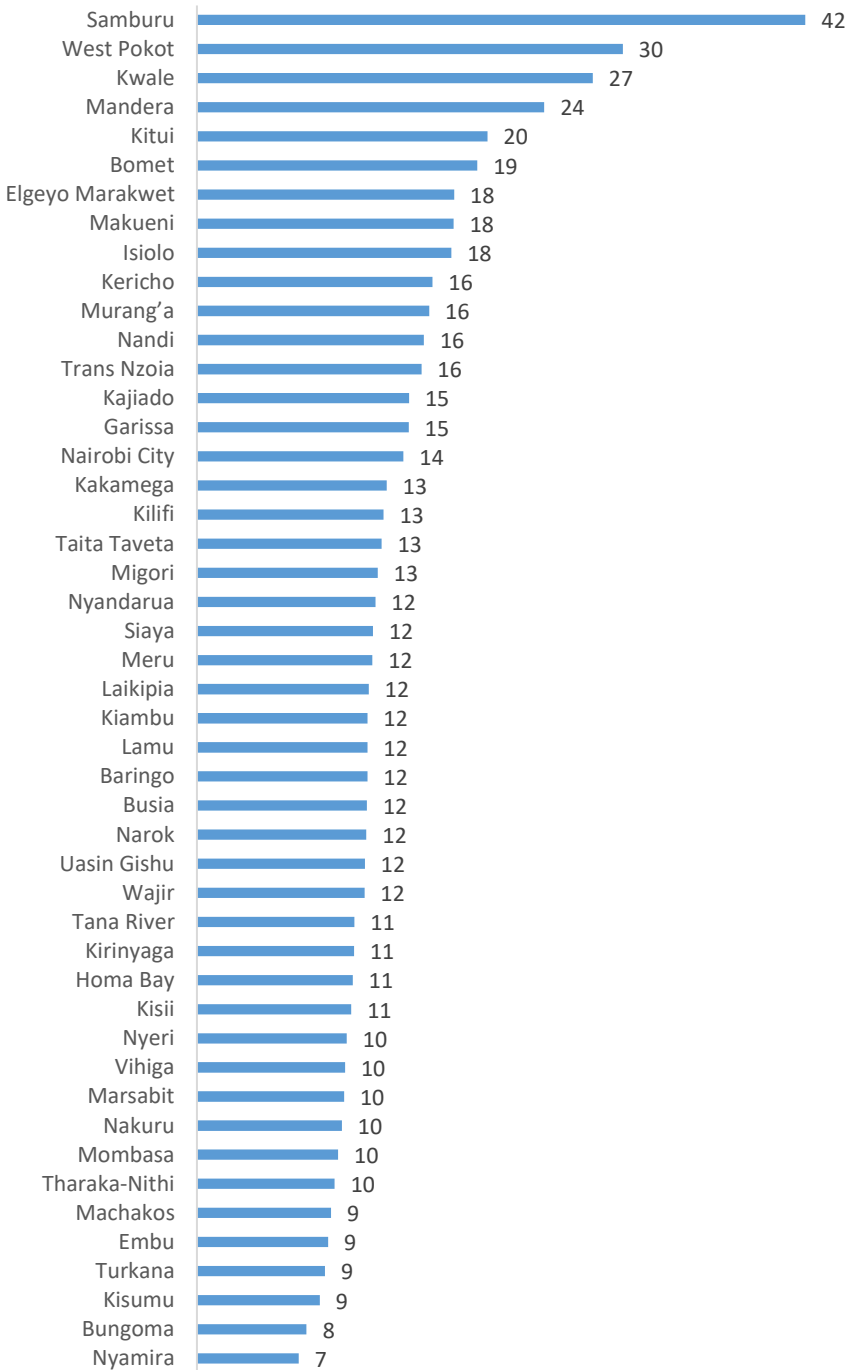
Table 12. Outpatient caseload

| 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

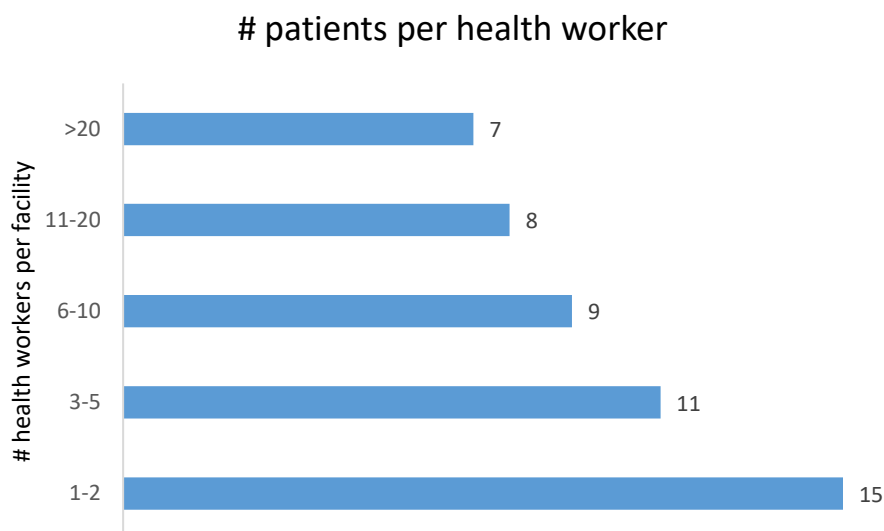


Source: Author's calculations using Kenya 2018 SDI data

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.

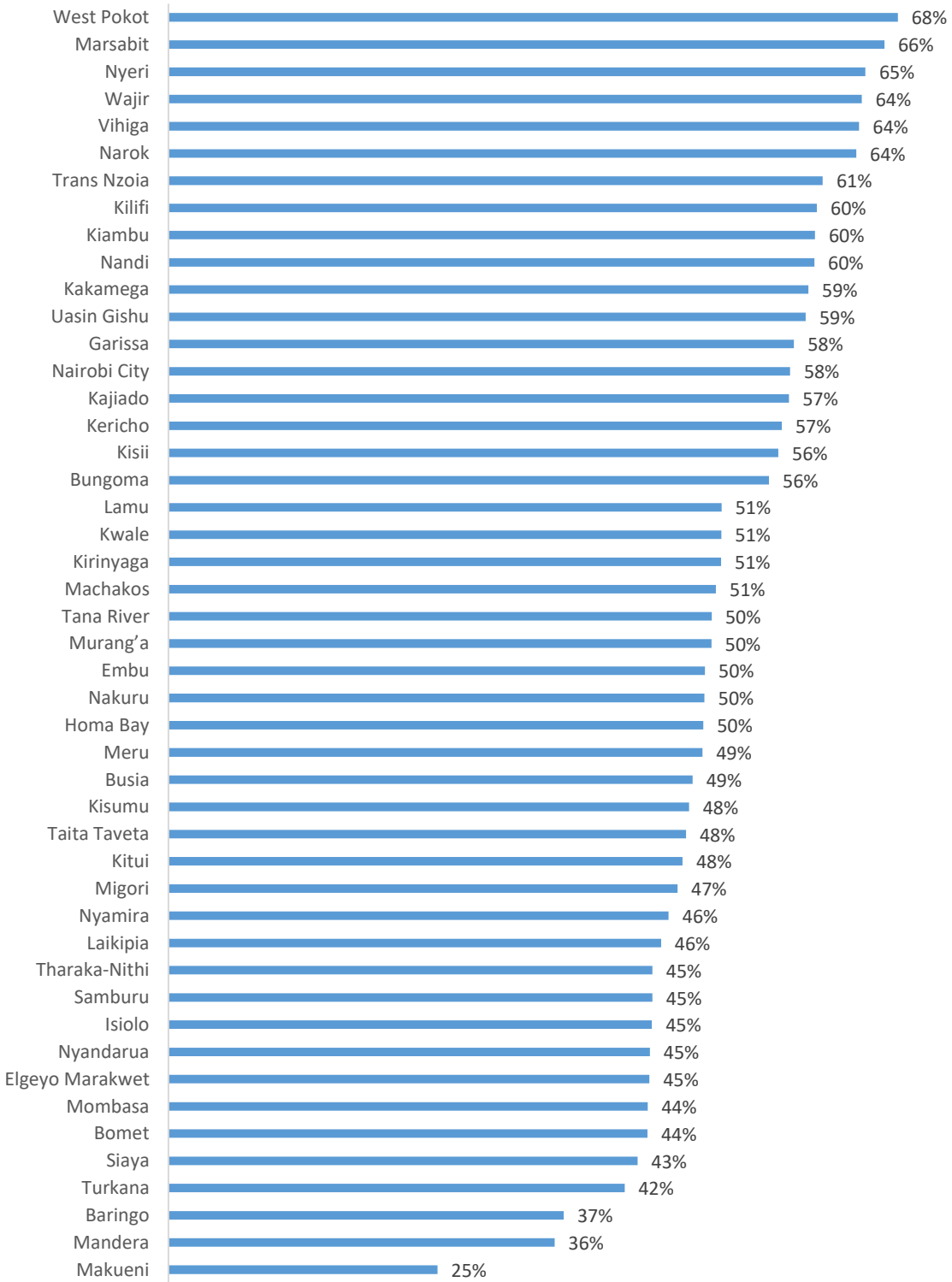
Table 13. Absence rate by cadre and facility type

| | 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



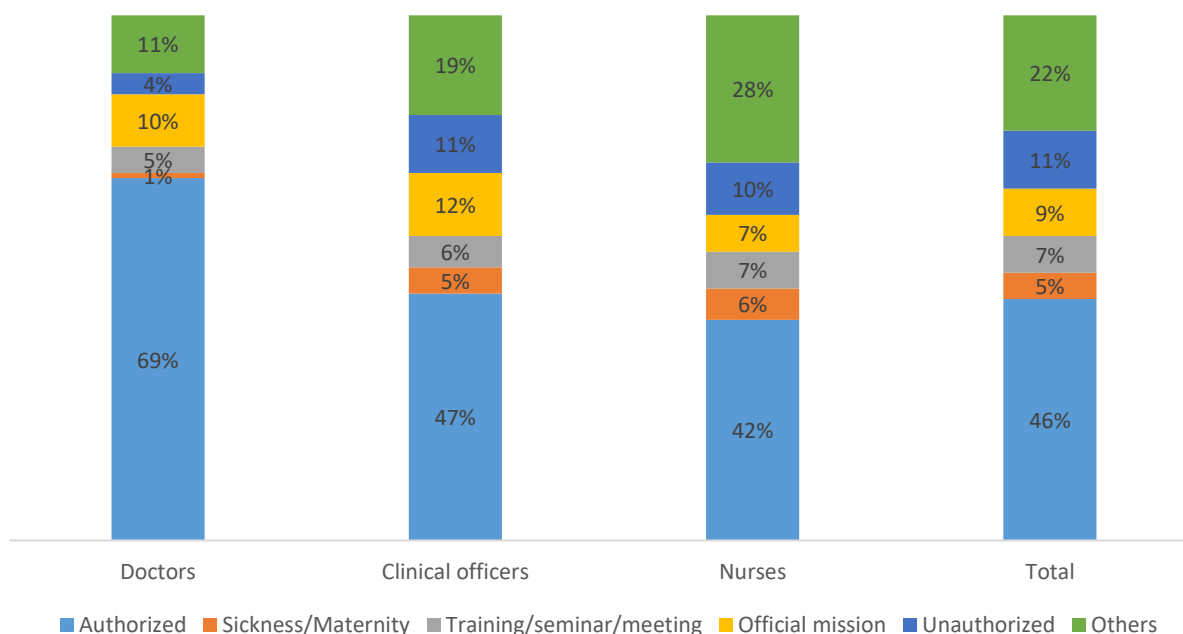
Source: Author's calculations using Kenya 2018 SDI data.

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).

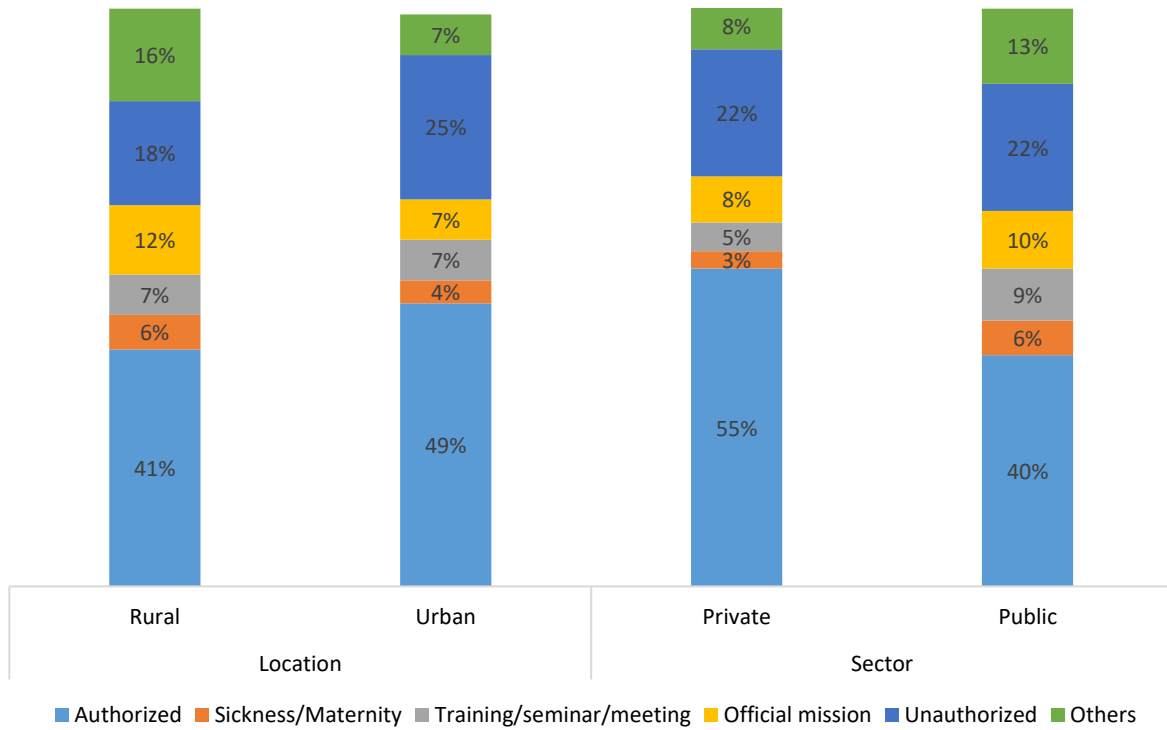
There is a clear need for better organization and management of HRH to improve the availability of staff for service delivery especially as it relates to authorized absenteeism.

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



CONFIDENTIAL

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 and 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 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 |

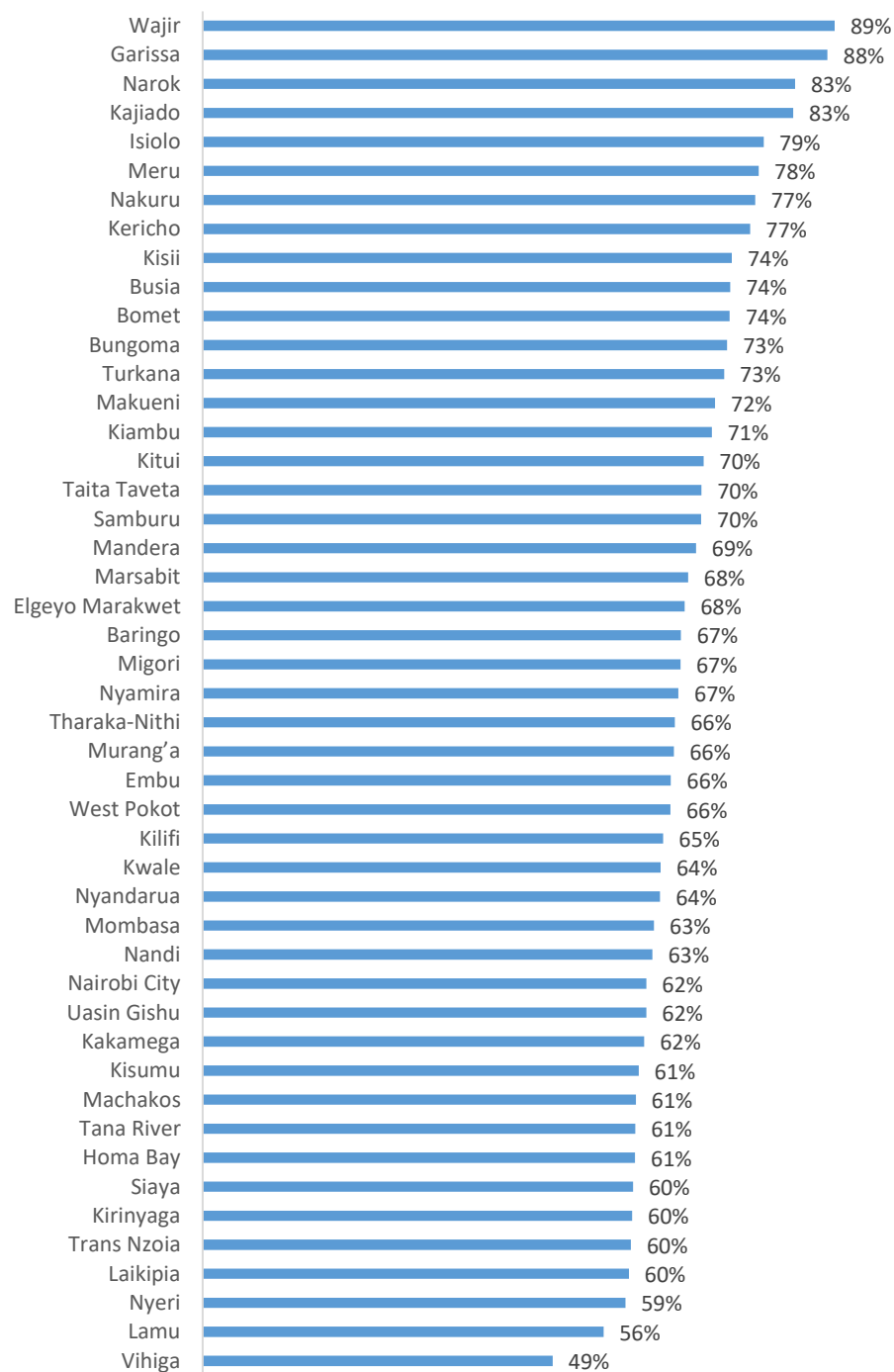
Source: Author's calculations using Kenya 2018 SDI data

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

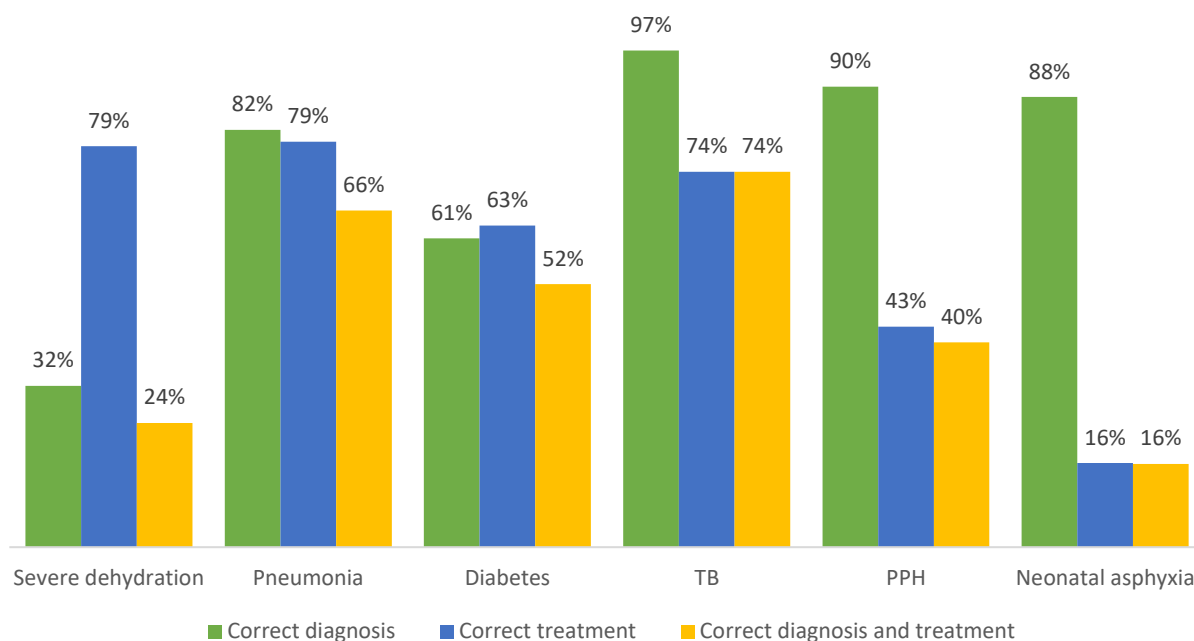
| # cases | All | Doctors | Clinical officers | Nurses |
|----------------|------|---------|-------------------|--------|
| 4 cases | 19.6 | 31.6 | 25.7 | 12.1 |
| 3 cases | 42.9 | 46.2 | 49.3 | 36.6 |
| 2 cases | 26.4 | 16.9 | 21.2 | 32.7 |
| 1 case | 9.8 | 4.4 | 3.5 | 16.5 |
| No case | 1.2 | 0.8 |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

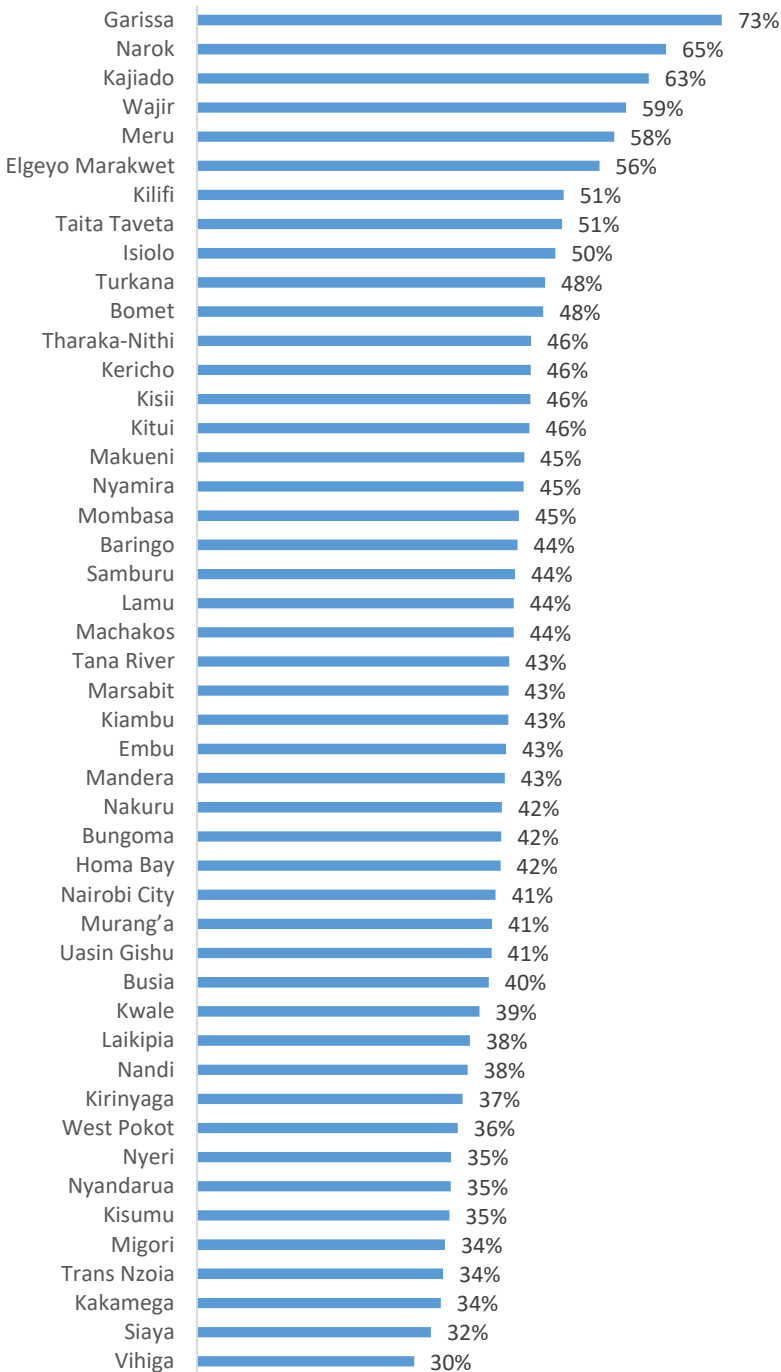
Kenyan health providers adhered to 43.5 percent of the clinical guidelines in the management of the four tracer conditions (Table 16). Urban providers were more adherent to the guidelines (46.2 percent of guidelines) than rural (41.8 percent). Doctors adhered to more of the clinical guidelines (51.5 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.

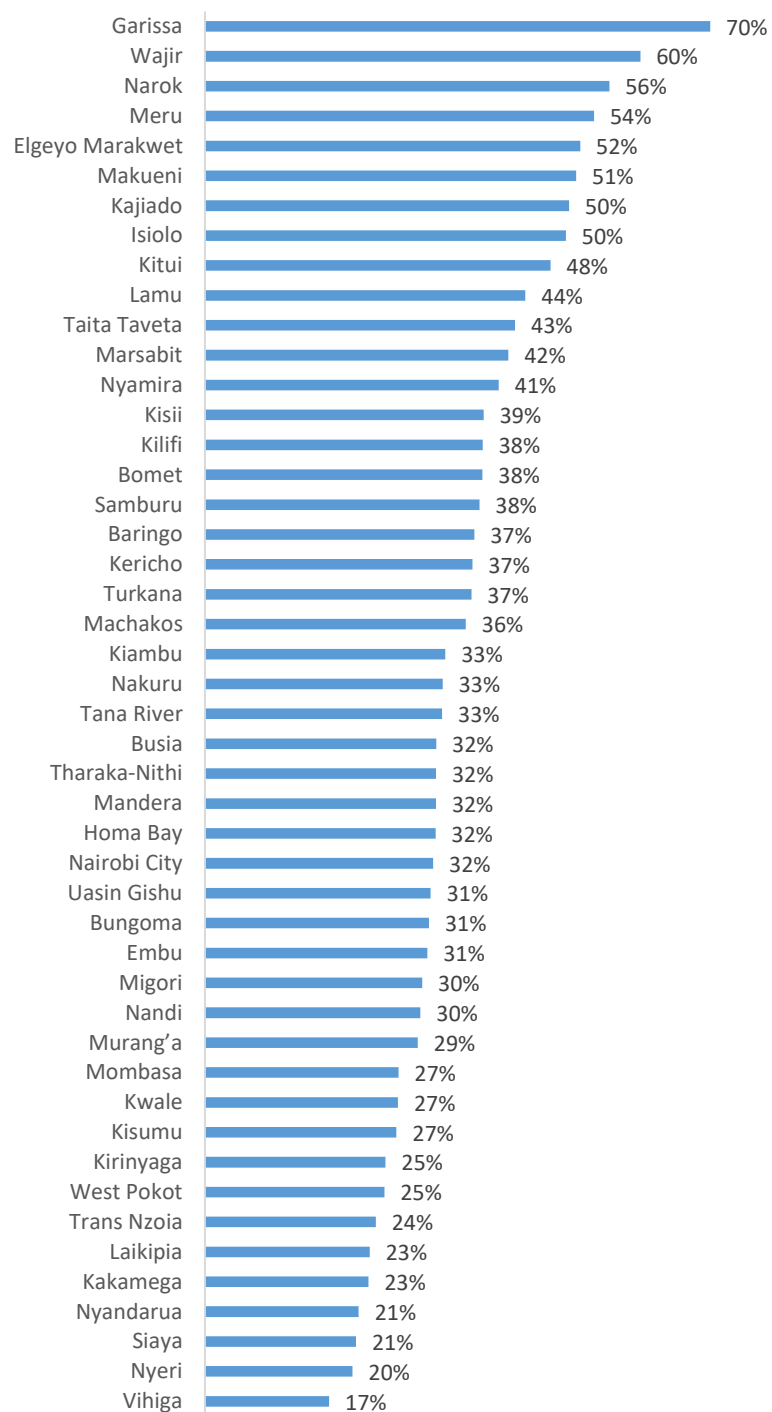
Overall, providers adhered to only 34.5 percent of the clinical guidelines for managing maternal and neonatal complications (Table 18). Doctors adhered to a marginally larger share of guidelines (41.5 percent of guidelines) compared to clinical officers (34.9 percent) and nurses (33.1 percent). There 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.

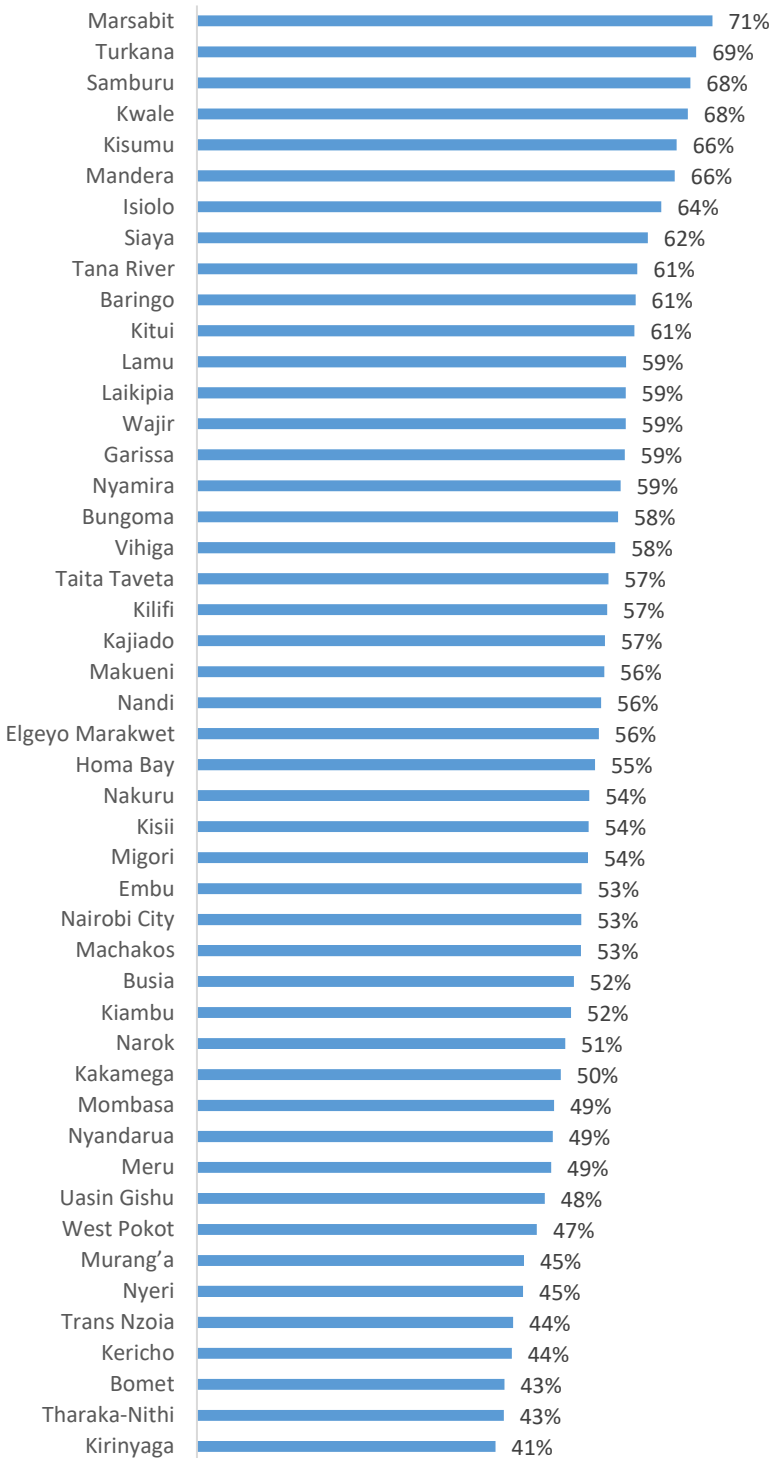
Table 19. Availability of priority drugs by facility type

| % 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).

Table 21: Availability of vaccines by facility type

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

| % 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

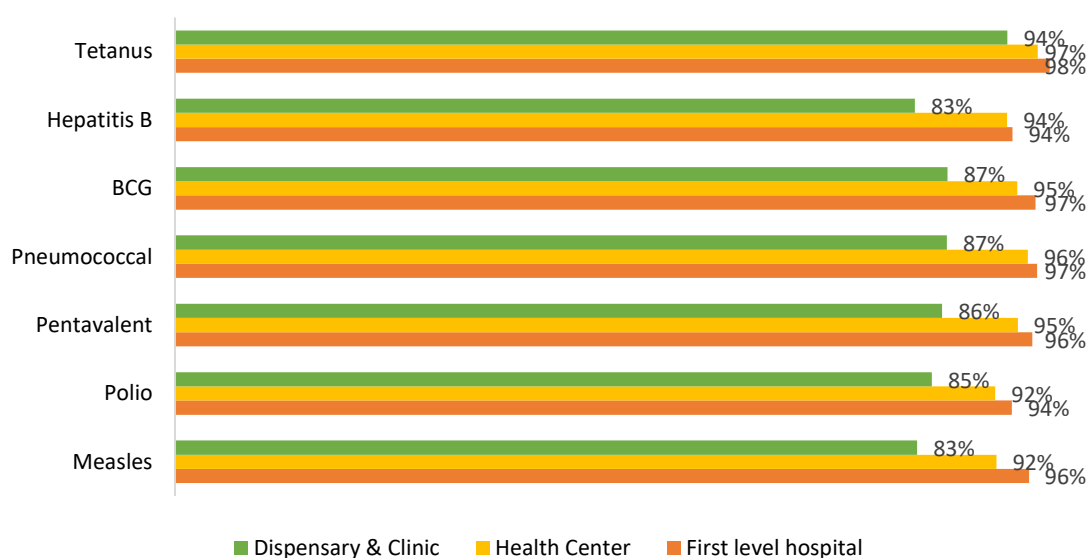
| % vaccines | Total | First level hospital | Health center | Dispensary and clinic |
|-----------------|-------|----------------------|---------------|-----------------------|
| Nyamira | 88.2 | 100.0 | 100.0 | 80.2 |
| Kisumu | 86.1 | 95.9 | 92.9 | 82.2 |
| Elgeyo Marakwet | 84.2 | 100.0 | 83.1 | 83.1 |
| 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

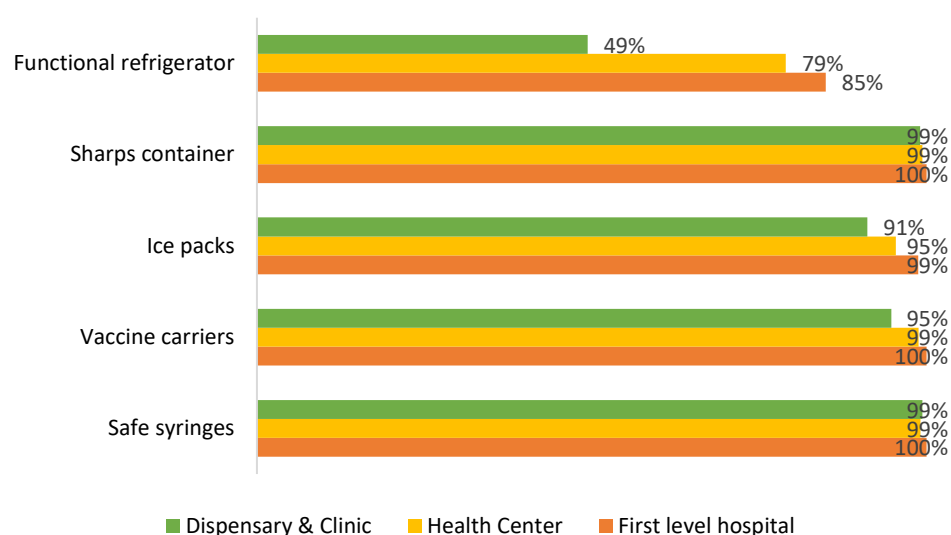


Note: sample includes only facilities that provide vaccination

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).

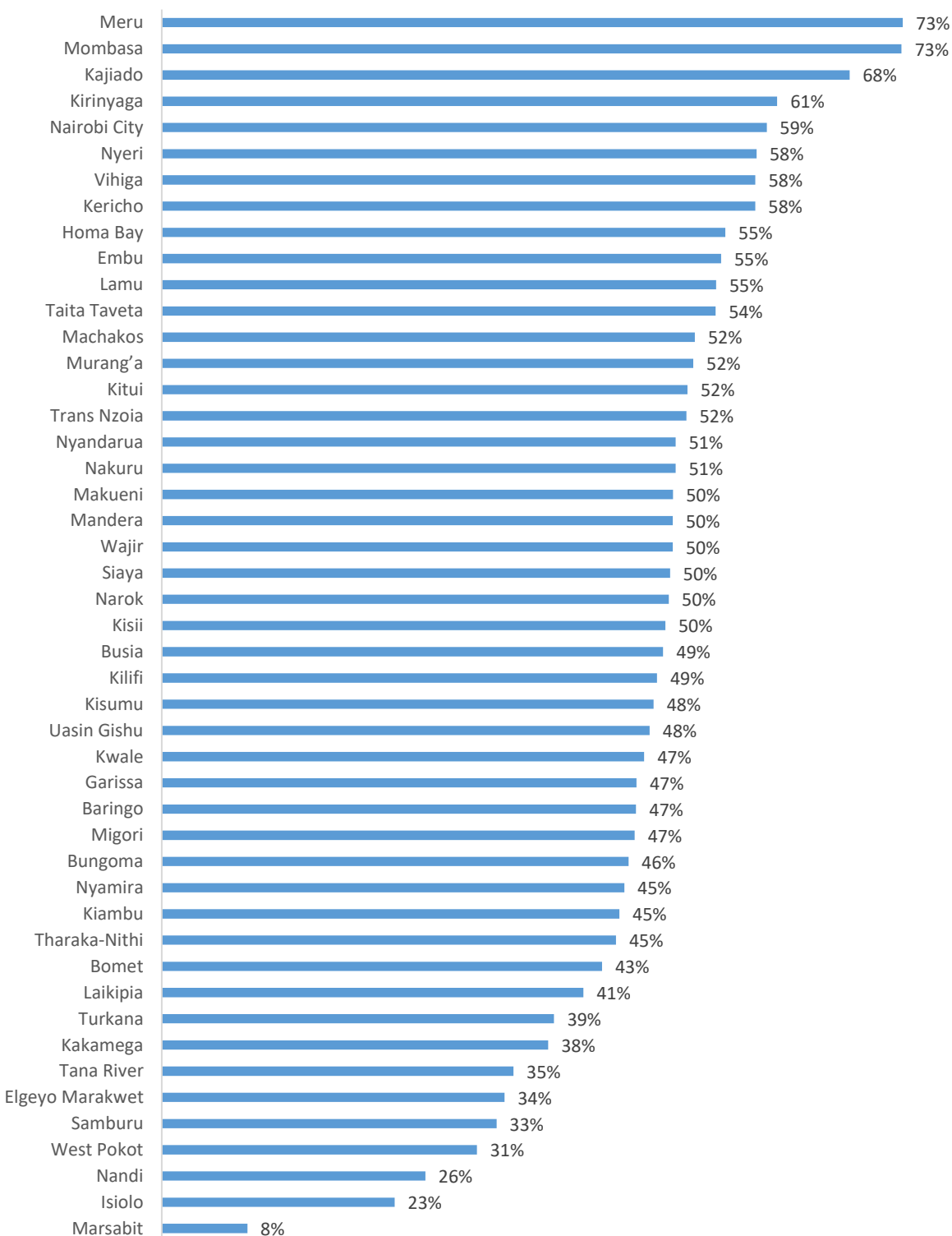
Table 25: Availability of basic equipment by facility type, ownership and location

| % 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 Phone¹ | 65.7 | 77.9 | 75.0 | 61.3 | 61.7 | 70.3 |
| Cellular Phone² | 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.

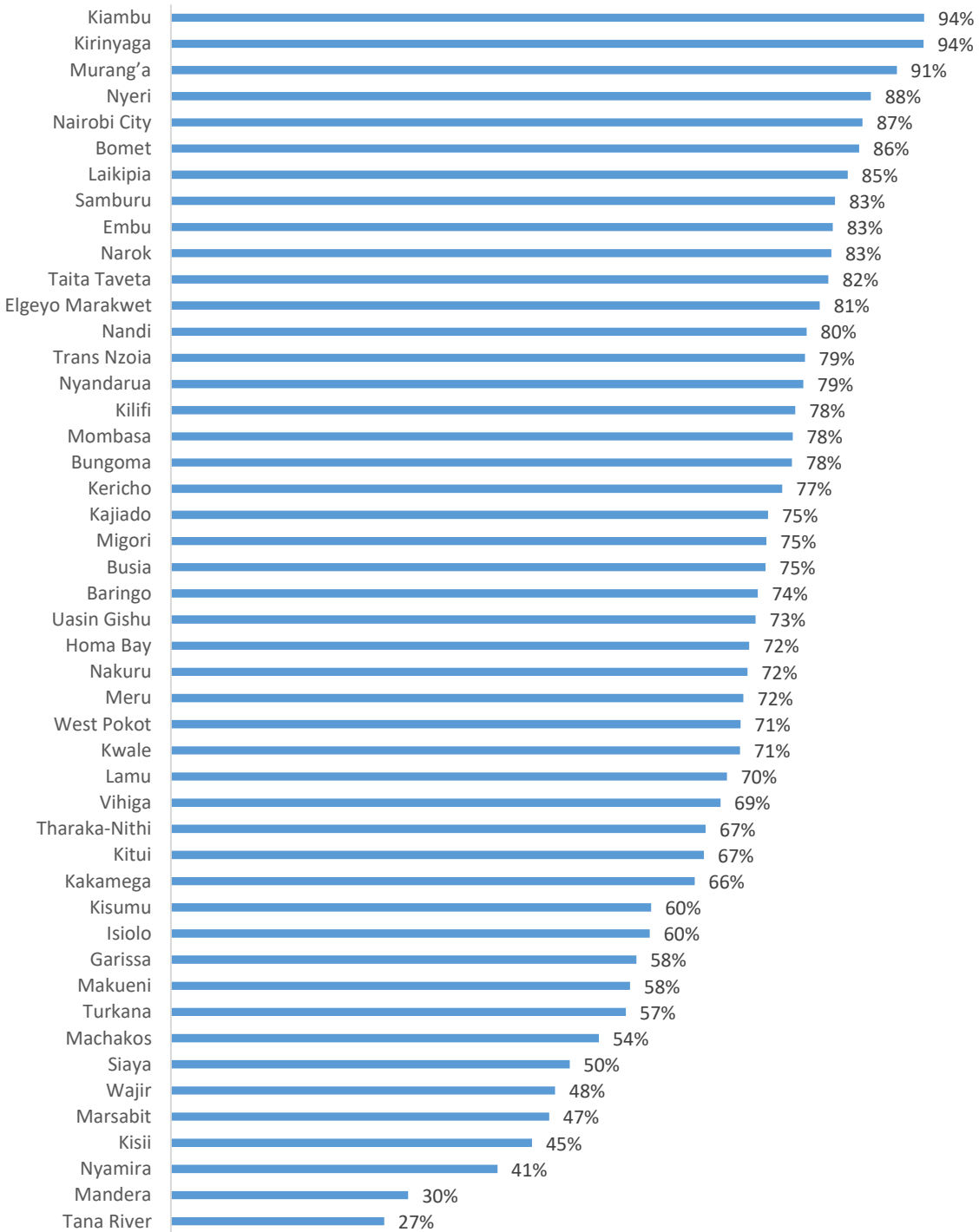
Table 30: Availability of infrastructure by facility type

| % 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.

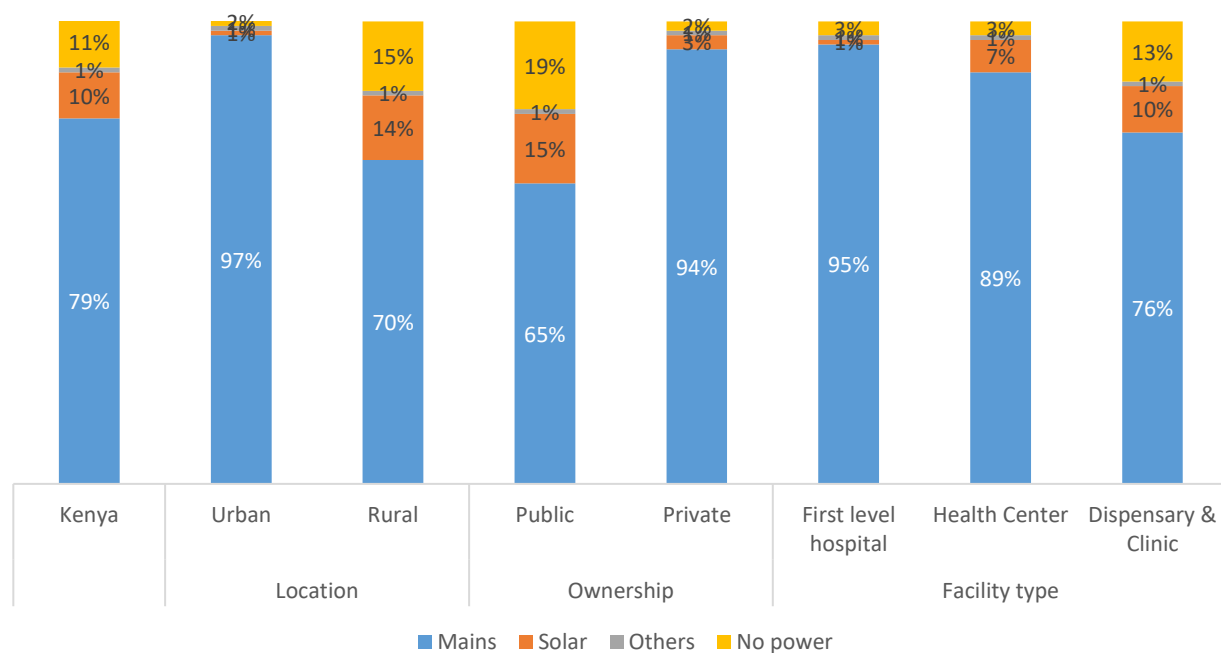
Table 31: Availability of specific types of infrastructure

| % 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 (Table 35). 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:

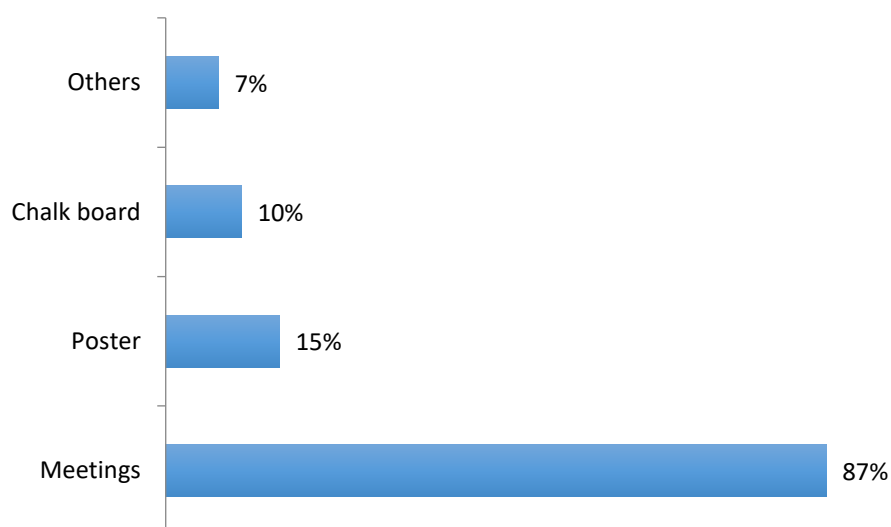
Over a half of the facilities (58.6 percent) shared the financial information with the community (Table 36). The difference was greatest between the rural (61.3 percent) and urban areas (36.3 percent).

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).

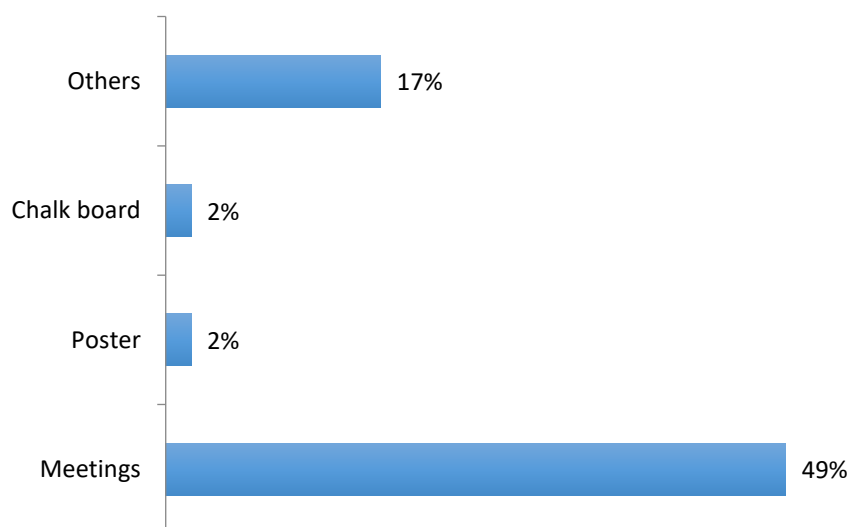
Table 37: Facilities that share EMHS delivery information with community

| % 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

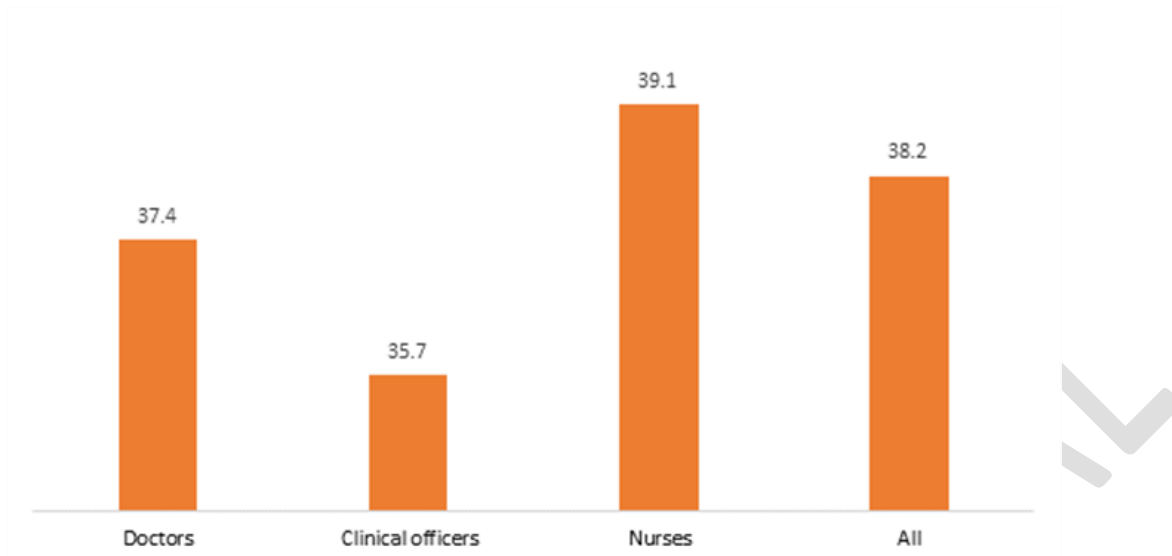
| % facilities | Kenya | Nairobi | Urban | Rural |
|---------------------------------|-------|---------|-------|-------|
| All | 93.9 | 89.5 | 76.3 | 96.1 |
| First level hospitals | 74.8 | 100.0 | 67.5 | 78.5 |
| Health Centers | 98.1 | 85.7 | 94.5 | 98.7 |
| Dispensaries and clinics | 94.4 | | 71.9 | 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

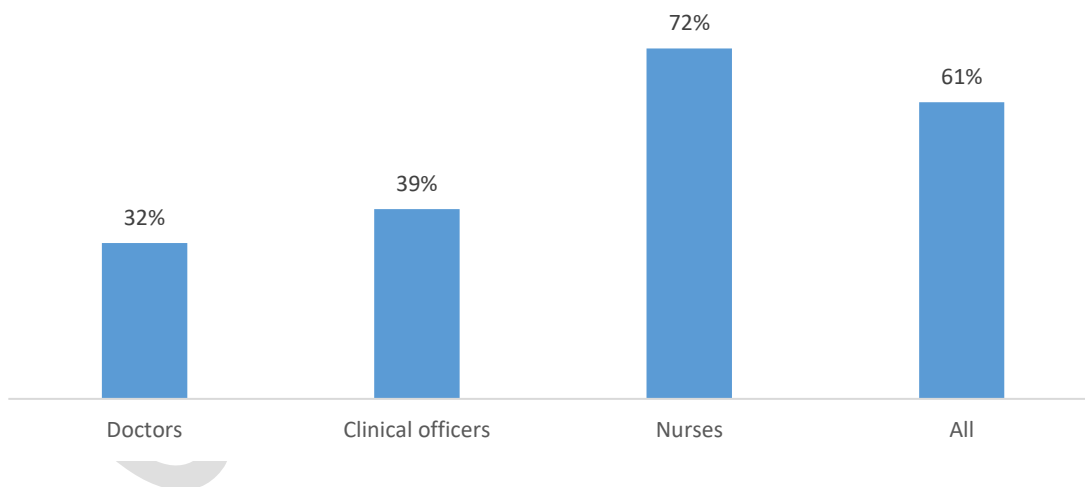
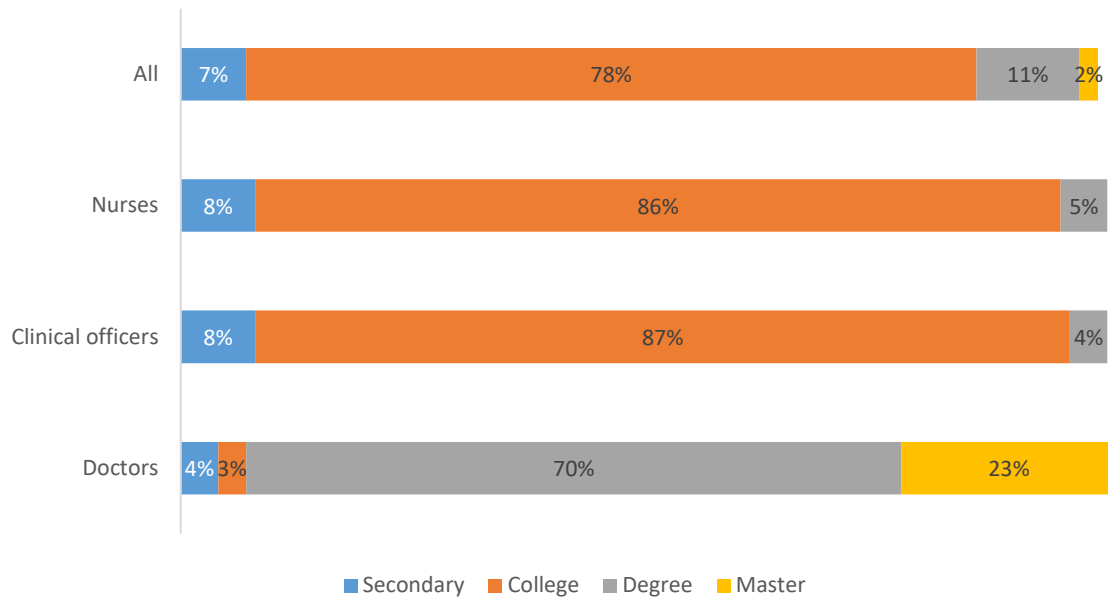


Figure 24 shows the education levels of health workers. Most health workers had education up to college level (78 percent). Half of nurse/midwives also had secondary education and 48 percent at college level. Among nurses and clinical officers, a great proportion (86 and 87 percent respectively) had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

Figure 24: Education levels among various health workers

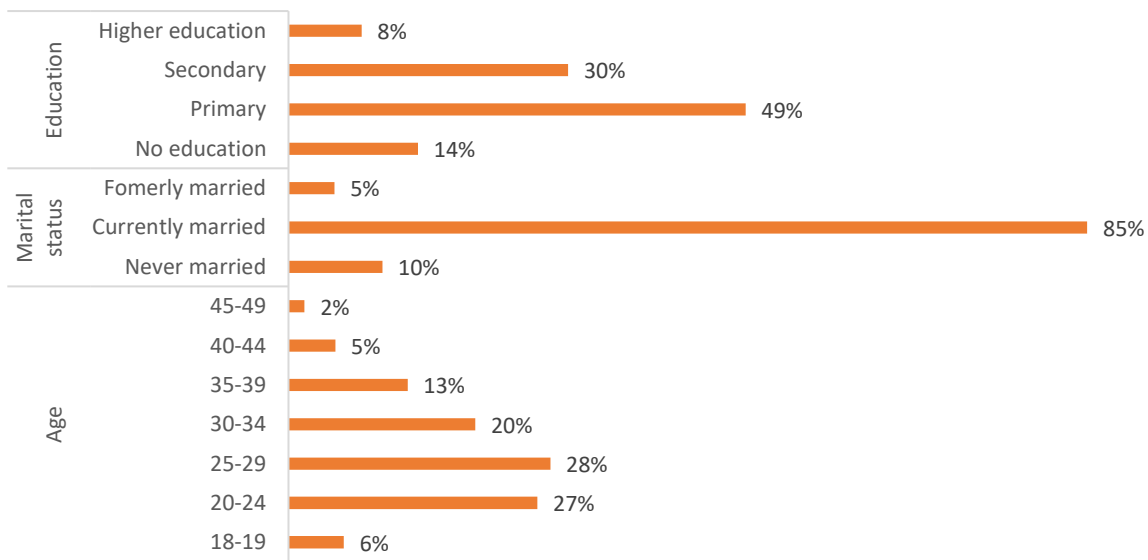


Q. Family Planning Exit Interviews

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 |
| Fourth | 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 Shillings (1 USD = 100.75 KSh²²)

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 |

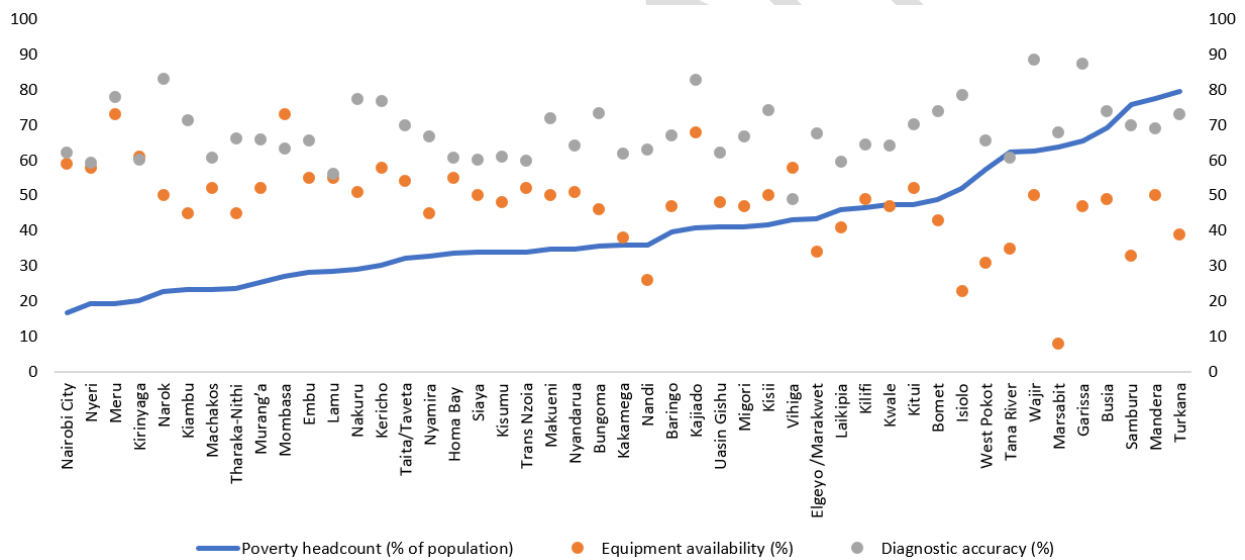
Source: Author's calculations using Kenya 2018 SDI data; costs are in Kenyan Schillings; sample includes only users that paid for services

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.

CONFIDENTIAL

VI. REFERENCES

- 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.
- Das, J., and J., Hammer, (2005). "Which Doctor? Combining Clinical cases and Item-Response to Measure Doctor Quality," *Journal of Development Economics*, 78:348–383.
- Das J, Hammer J, and Leonard K (2008). "The Quality of Medical Advice in Low-Income Countries". *Journal of Economic Perspectives*, 22(2):93–114.
- Kenya: WHO and UNICEF estimates of immunization coverage: 2017 revision. Retrieved November 2018, from http://www.who.int/immunization/monitoring_surveillance/data/ken.pdf.
- Kenya National Bureau of Statistics, Ministry of Health/Kenya, National AIDS Control Council/Kenya, Kenya Medical Research Institute, and National Council for Population and Development/Kenya. 2015. Kenya Demographic and Health Survey 2014. Rockville, MD, USA. Retrieved November 2018, from <http://dhsprogram.com/pubs/pdf/FR308/FR308.pdf>.
- Kenya National Bureau of Statistics (2018). Statistical Abstract 2018. Retrieved November 2018, from <https://www.knbs.or.ke/download/statistics-abstract-2018/>
- Kenya National Bureau of Statistics (2018). Kenya Integrated Household Budget Survey: Basic Report on Wellbeing. Retrieved November 2018, from <https://www.knbs.or.ke/download/basic-report-well-kenya-based-201516-kenya-integrated-household-budget-survey-kihbs/>.
- Kimathi, L (2017). "Challenges of the Devolved Health Sector in Kenya: Teething Problems or Systemic Contradictions?". *Africa Development*, XLII(1), 55-77.
- Mugo, P., Onsomu, E., Munga, B., Nafula, N., Mbithi, J., and Owino, E. (2018). "An Assessment of Healthcare Delivery in Kenya under the Devolved System." Kenya Institute for Public Policy Research And Analysis. Special Paper No. 19/2018.
- Republic of Kenya (2007). Kenya Vision 2030: A globally competitive and prosperous Kenya.
- Republic of Kenya (2010). Constitution of Kenya 2010. Retrieved November 2018, from <http://kenyalaw.org/lex/rest/db/kenyalaw/Kenya/The%20Constitution%20of%20Kenya/docs/ConstitutionofKenya%202010.pdf>.
- Republic of Kenya (2015). Kenya Health Workforce Report: The Status of Healthcare Professionals in Kenya, 2015. Retrieved November 2018, from https://www.taskforce.org/wp-content/uploads/2018/07/KHWF_2017Report_Fullreport_042317-MR-comments.pdf.
- Republic of Kenya (2016). Accelerating attainment of Health Goals: Kenya Health Sector Strategic and Investment Plan (KHSSP) 2013-2017. Retrieved November 2018, from <http://www.health.go.ke/wp-content/uploads/2016/03/KHSSP-BOOK.pdf>.
- World Bank (2014). World Development Report 2014: Risk and Opportunity—Managing Risk for Development. Retrieved November 2018, from <https://openknowledge.worldbank.org/handle/10986/16092>.
- Spence, M. Lewis, M. (2009). Health and Growth: Commission on Growth and Development. Commission on Growth and Development. World Bank.
- Swanson RC, Cattaneo A, Bradley E, Chunharas S, Atun R, et al. (2012). "Rethinking health systems strengthening: key systems thinking tools and strategies for transformational change". *Health Policy Plan*. 2012 Oct;27 Suppl 4: iv54-61.
- WHO (1999). Safe Management of Waste from Healthcare Activities. Retrieved November 2018, from https://www.who.int/water_sanitation_health/publications/wastemanag/en/.

WHO (2005). Better Health Care Waste Management. An integral component of health investment. Retrieved November 2018, WHO. http://www.who.int/water_sanitation_health/publications/better-health-care-waste-management/en/.

WHO (2011). Healthcare Waste Management Rapid Assessment Tool. Retrieved November 2018, from http://www.who.int/water_sanitation_health/medicalwaste/ratupd05.pdf.

CONFIDENTIAL

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

| County | Ownership | | | Proportion | |
|-----------------|-----------|---------|-------|------------|---------|
| | 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

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

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.

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

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

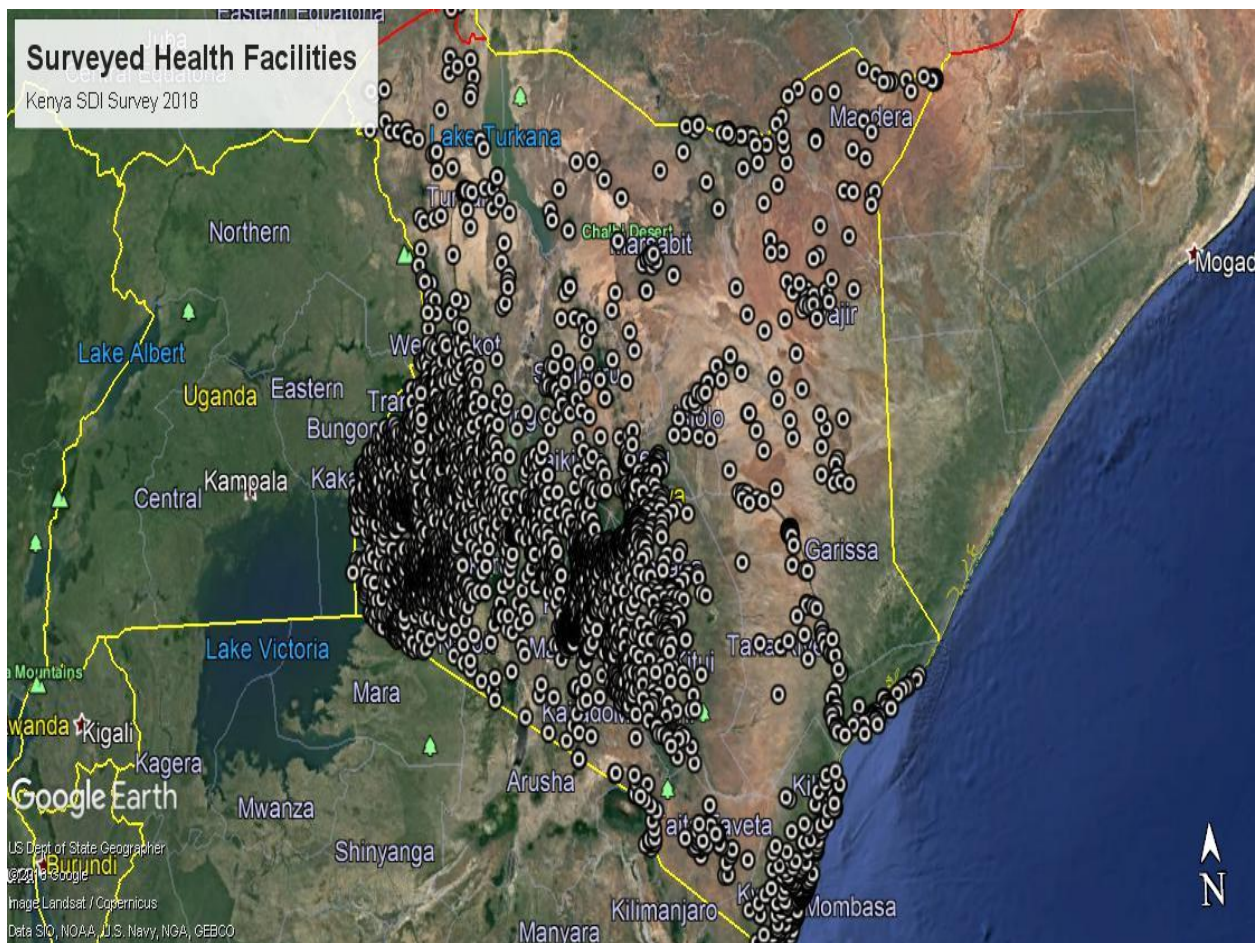
assessing knowledge. For absence, 10 health workers will be selected in the staff roster using a random numbers table and the whereabouts of those health workers is ascertained in a return surprise visit. For the assessment, however, only health workers who actually see patients i.e. provide a diagnostic 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. | <p>For each of the following four clinical cases: (i) acute diarrhea; (ii) pneumonia; (iii) diabetes mellitus; (iv) pulmonary tuberculosis.</p> <p>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.</p> <p>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.</p> <p>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).</p> |
| 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. | <p>For each of the following five clinical cases: (i) acute diarrhea; (ii) pneumonia; (iii) diabetes mellitus; (iv) pulmonary tuberculosis.</p> <p>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.</p> |

| Drug availability | |
|---|---|
| Share of basic drugs which at the time of the survey were available at the health facilities. | <p>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).</p> <p>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)</p> <p>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.</p> <p>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.</p> |
| Equipment availability | |
| Share of facilities with thermometer, stethoscope and weighing scale, refrigerator and sterilization equipment. | <p>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.</p> <p>Thermometer: Assign score of one if facility reports and enumerator observes facility has one or more functioning thermometers.</p> <p>Stethoscope: Assign score of one if facility reports and enumerator confirms facility has one or more functioning stethoscopes.</p> <p>Sphygmomanometer: Assign score of one if facility reports and enumerator confirms facility has one or more functioning sphygmomanometers.</p> <p>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.</p> <p>Refrigerator: Assign score of one if facility reports and enumerator confirms facility has one or more functioning refrigerator.</p> <p>Sterilization equipment: Assign score of one if facility reports and enumerator confirms facility has one or more functioning Sterilization device/equipment.</p> |
| Infrastructure availability | |
| Share of facilities with electricity, clean water and improved sanitation. | <p>Infrastructure aggregate: Assign score of one if facility reports and enumerator confirms facility has electricity and water and sanitation as defined.</p> <p>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.</p> <p>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.</p> <p>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).</p> |

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 Clinical officer (Specialist) | 7.2 | 18.1 | 13.6 | 3.2 | 2.1 | 10.2 | 5.1 | 2.7 | 11.3 |
| Clinical officer | 1.9 | 0.9 | 2.4 | 1.4 | 1.6 | 1.9 | 1.9 | 1.3 | 2.4 |
| Nurse (specialist) | 19.1 | 16.6 | 13.0 | 23.8 | 23.6 | 21.9 | 17.1 | 19.9 | 18.4 |
| BSc Nurse | 0.9 | 0.4 | 1.1 | 0.3 | 0.9 | 0.8 | 0.9 | 0.6 | 1.1 |
| KRCHN | 4.0 | 2.5 | 4.3 | 4.0 | 3.6 | 2.7 | 4.9 | 4.1 | 3.9 |
| KECHN | 52.0 | 47.2 | 50.4 | 54.3 | 52.4 | 47.8 | 55.0 | 55.9 | 48.5 |
| Total | 12.4 | 6.6 | 10.4 | 12.3 | 14.7 | 10.1 | 13.9 | 14.9 | 10.1 |
| | 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

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

| <i>Dependent variable: Diagnostic accuracy</i> | | | | | | | |
|---|----------|----------|----------|----------|----------|----------|----------|
| 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) |
| <i>Hospital is reference group</i> | | | | | | | |
| 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) |
| <i>Private sector is reference group</i> | | | | | | | |
| 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) |
| <i>Rural location is reference group</i> | | | | | | | |
| Urban | | | 0.01 | 0.01 | 0.01 | 0.01 | 0.03*** |
| | | | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| <i>Doctor is reference group</i> | | | | | | | |
| 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) |
| <i>Health Worker Characteristics</i> | | | | | | | |
| 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

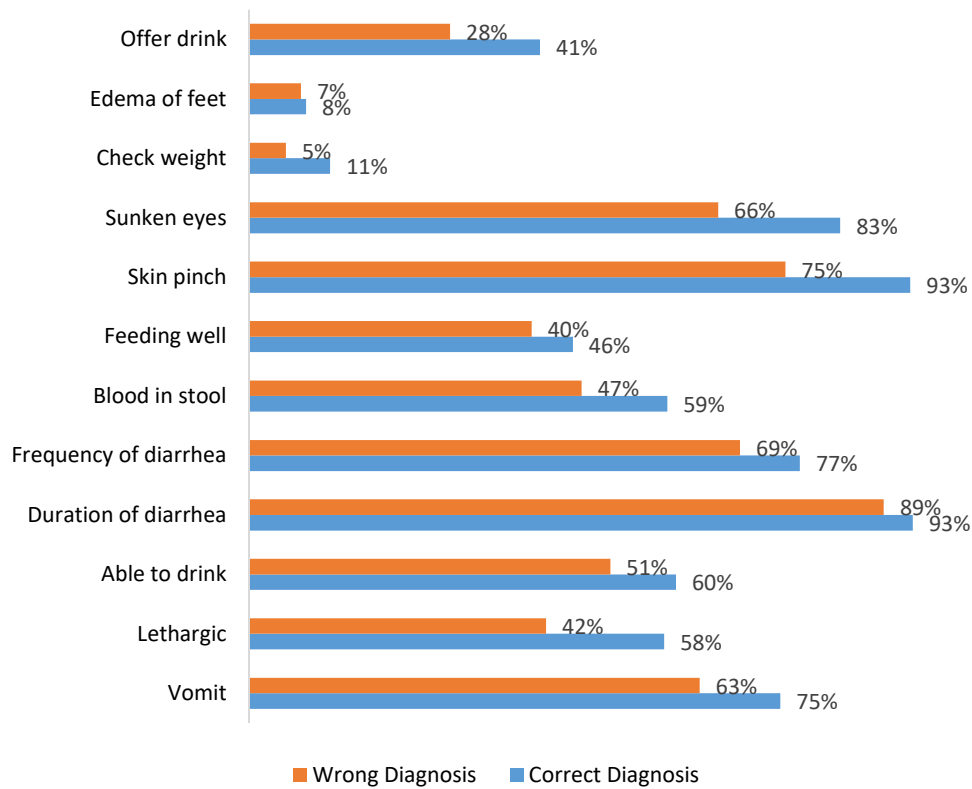


Figure 33: Diagnostic accuracy by questions asked: Pneumonia

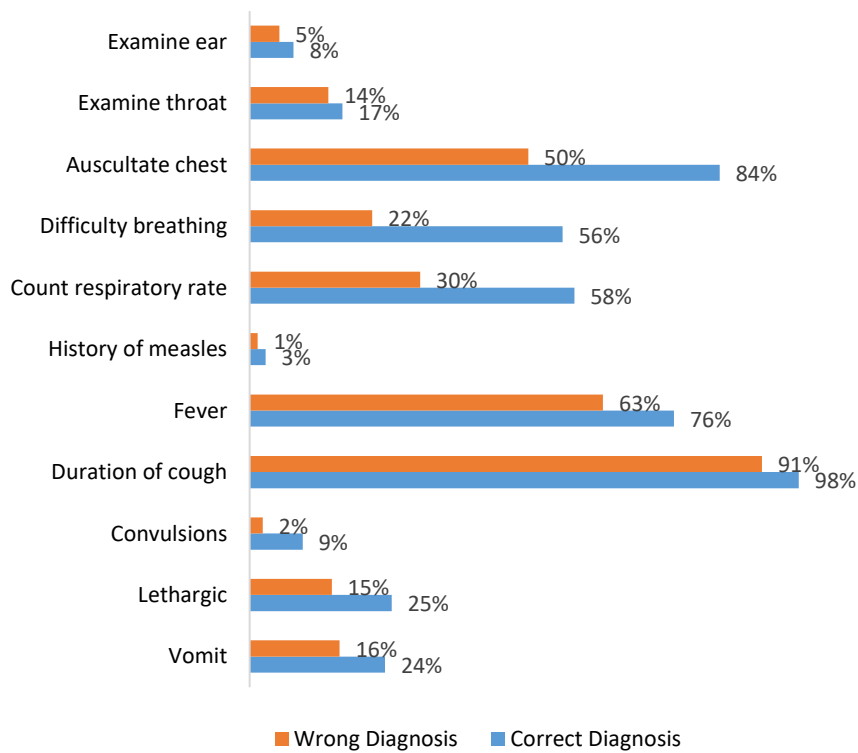


Figure 34: Diagnostic accuracy by questions asked: Diabetes Mellitus

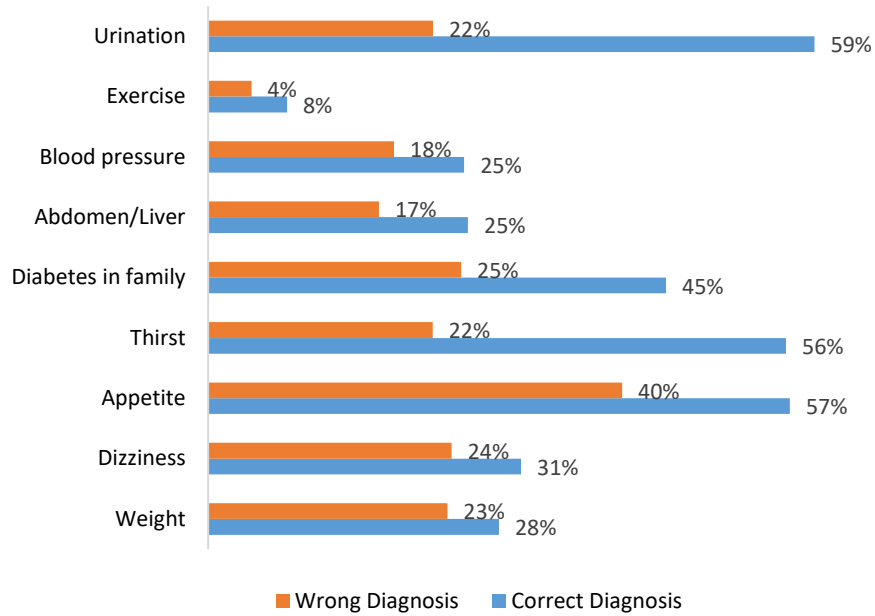


Figure 35: Diagnostic accuracy by questions asked: Pulmonary Tuberculosis

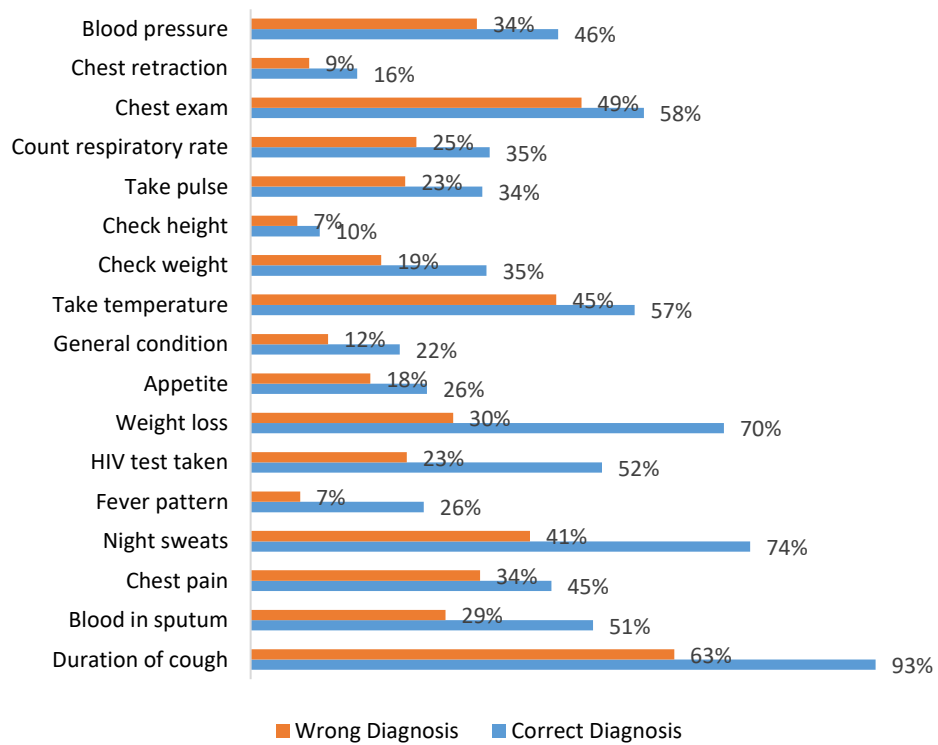


Figure 36: Correct treatment actions: Post-partum Hemorrhage

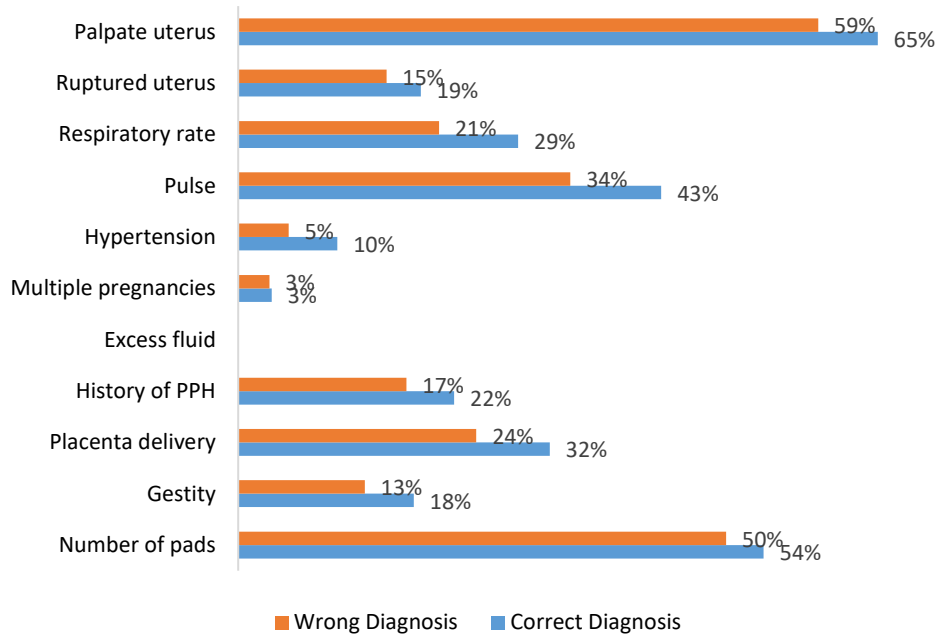


Figure 37: Correct treatment actions: Neonatal Asphyxia

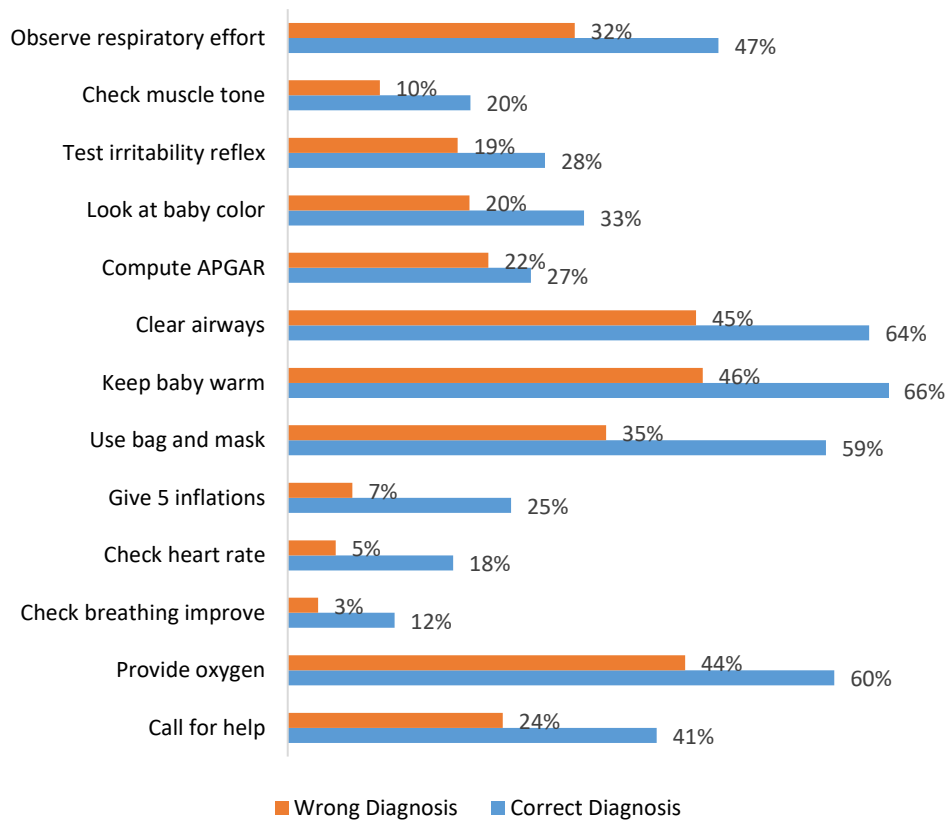


Table 50: Danger signs asked for sick child vignette by cadre type

| % 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 |

CONFIDENTIAL

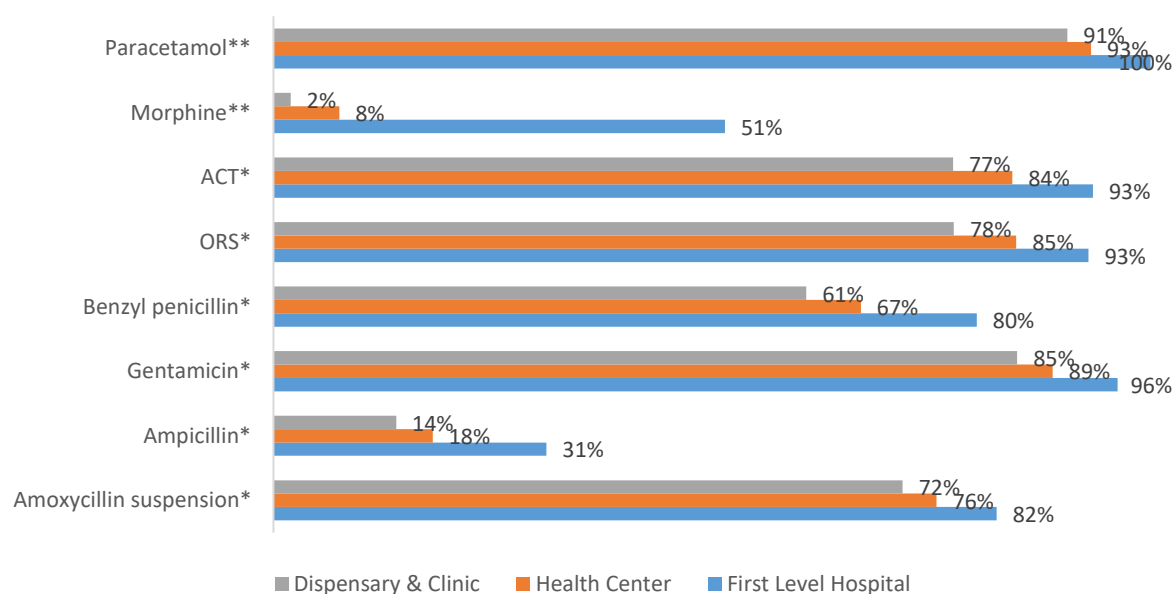
Table 51: Drug availability for the full SDI list

| % 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 ointment* | eye | 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 |

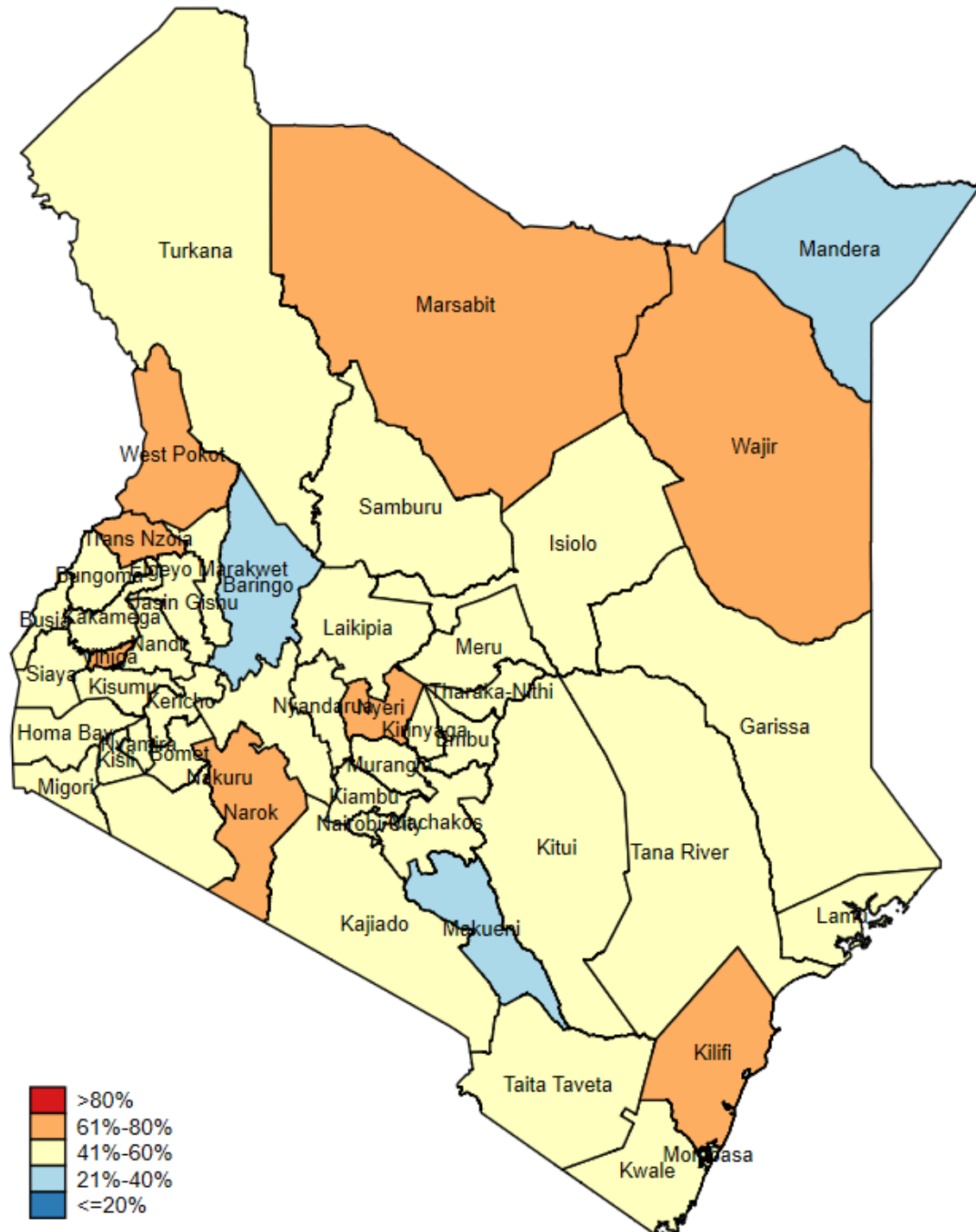
| | | | | | | |
|-------------------------------------|-----|------|------|------|-----|------|
| Health centers | 8.6 | 15.8 | 15.9 | 5.3 | 3.3 | 16.6 |
| Dispensaries and clinics | 3.1 | 9.5 | 4.6 | 17.2 | 1.4 | 4.8 |

CONFIDENTIAL

ANNEX D. County level results maps

Map 1: Absence Rate across Counties

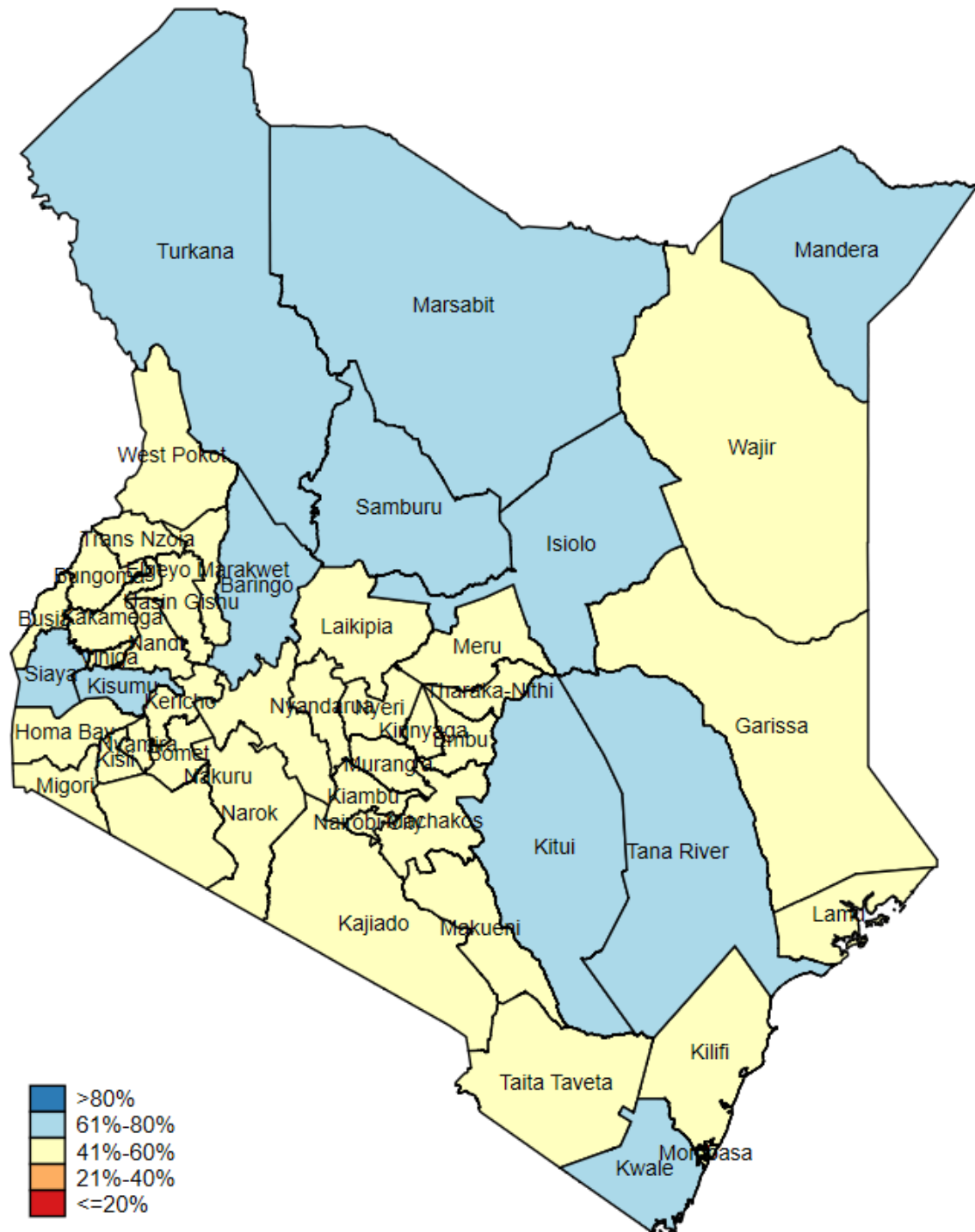
Absence rate by county



Source: Kenya Service Delivery Indicators Survey, 2018

Map 2: Availability of Priority Drugs across Counties

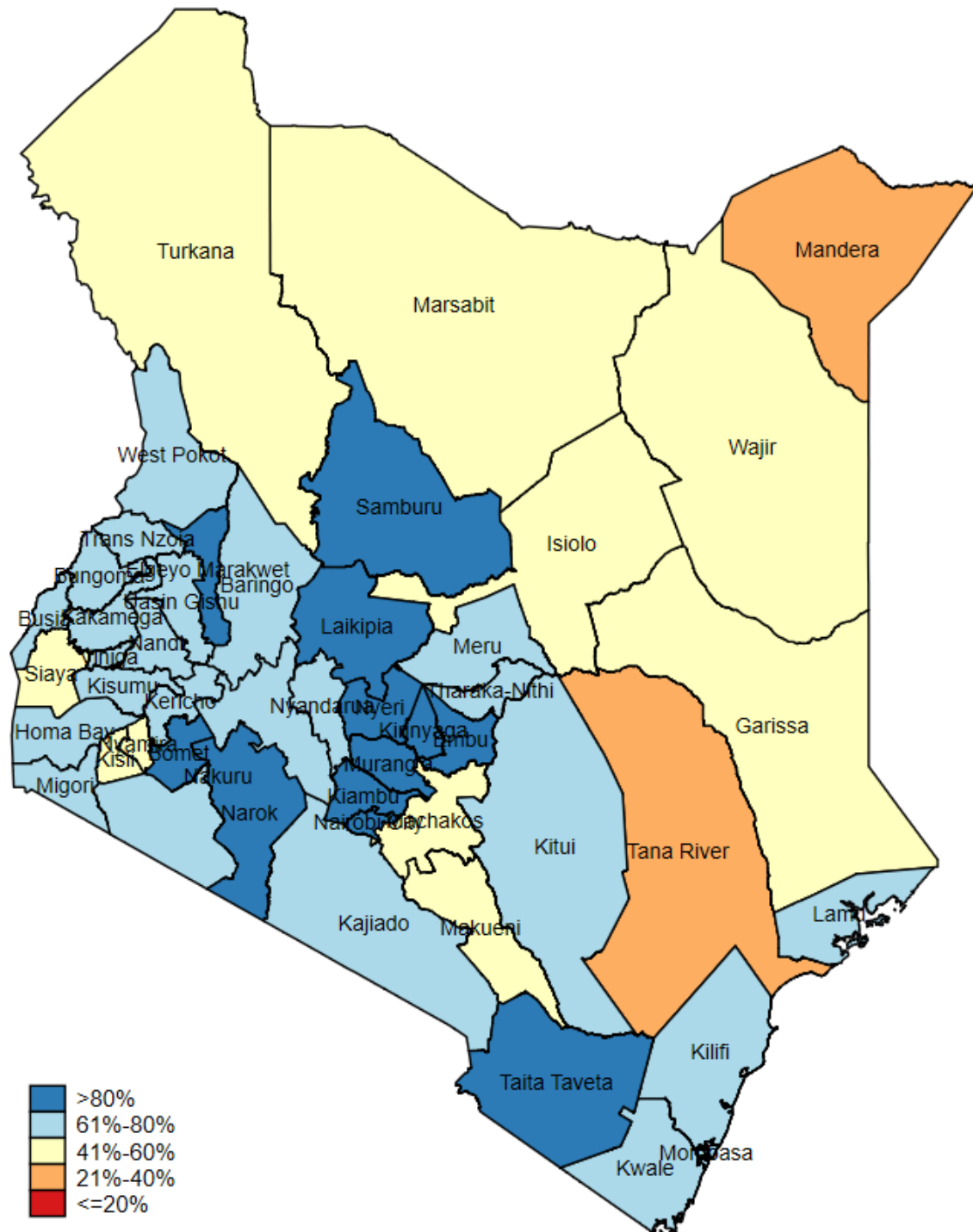
Priority drugs by county



Source: Kenya Service Delivery Indicators Survey, 2018

Map 4: Availability of Minimum Infrastructure across Counties

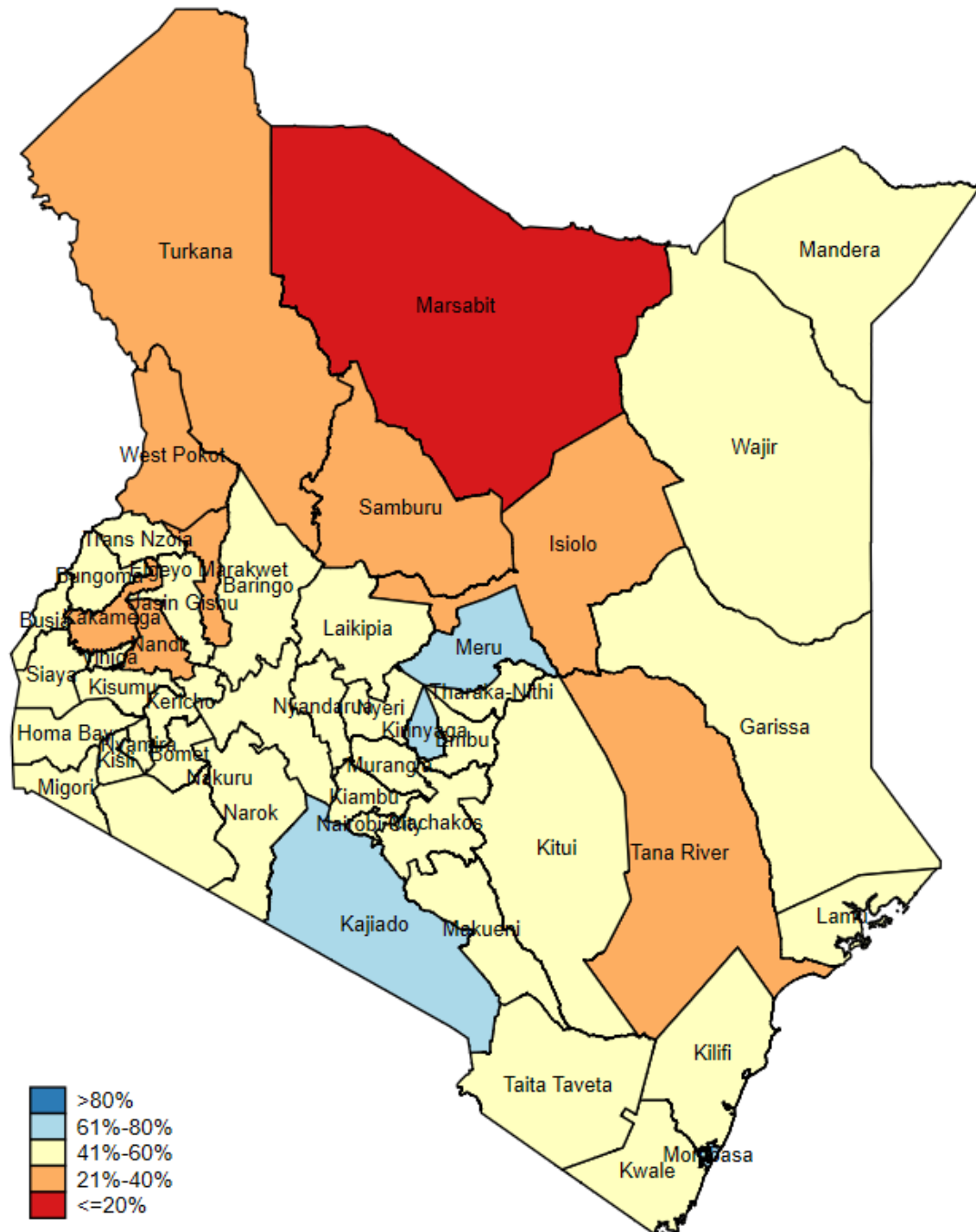
Minimum infrastructure by county



Source: Kenya Service Delivery Indicators Survey, 2018

Map 5: Share of Facilities with Minimum Equipment across Counties

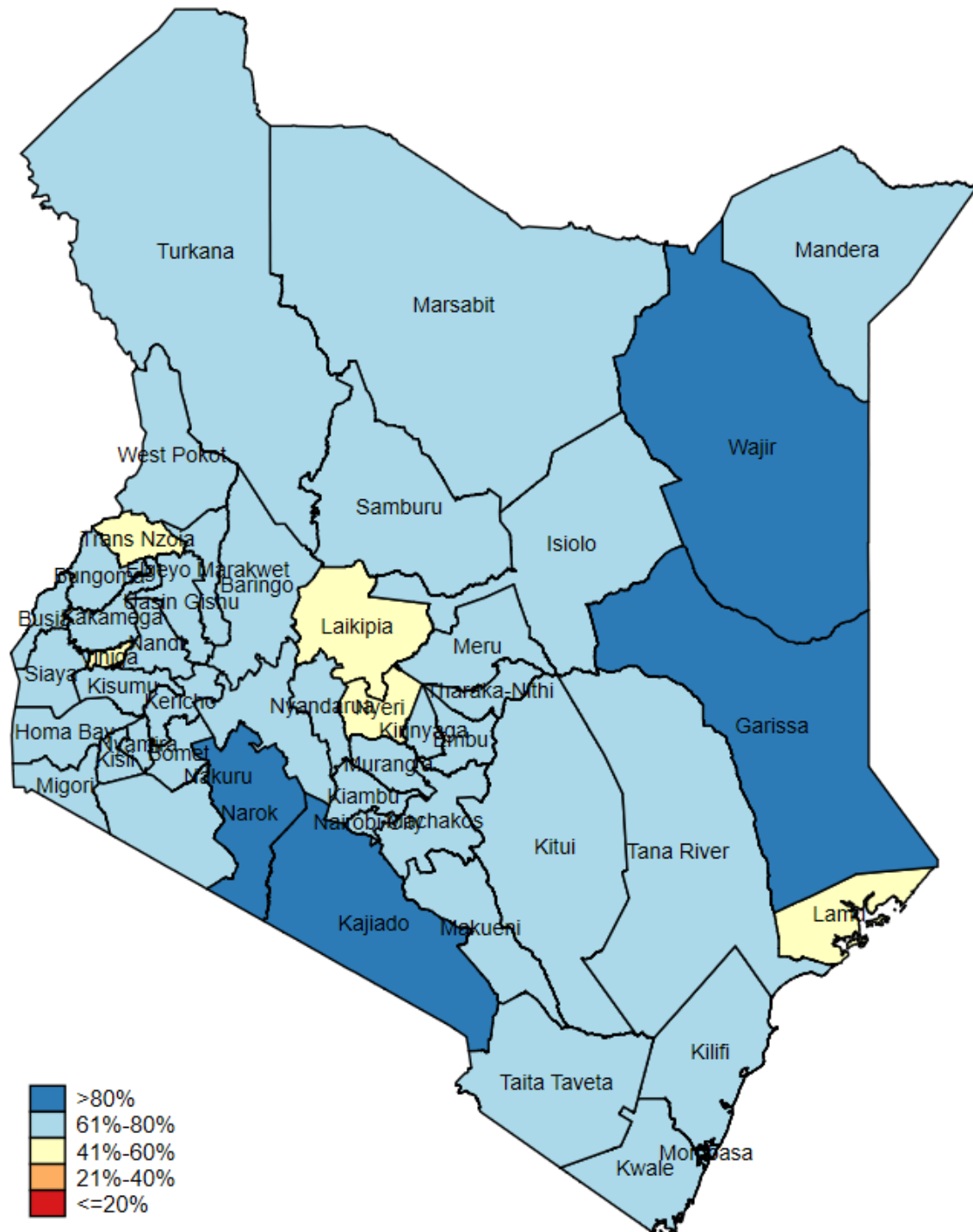
Minimum equipment by county



Source: Kenya Service Delivery Indicators Survey, 2018

Map 6: Average Diagnostic Accuracy of Common Conditions across Counties

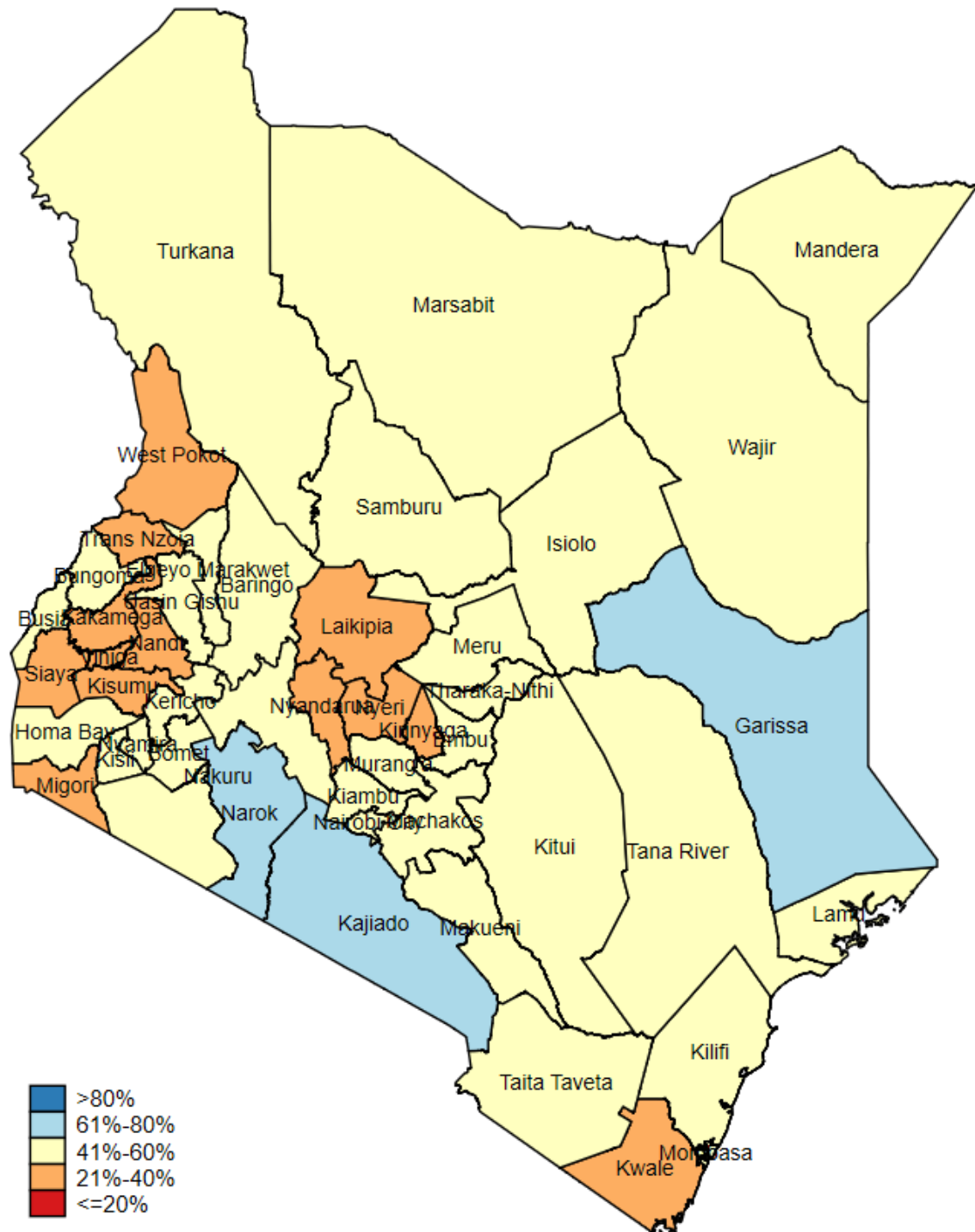
Diagnostic accuracy by county



Source: Kenya Service Delivery Indicators Survey, 2018

Map 7: Average Adherence to Clinical Guidelines across Counties

Adherence to clinical guidelines by county



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 2018²⁵.
- (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 years²⁶, 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 estimations²⁷.

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-profit²⁸ 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 randomly²⁹ 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-profit³⁰ 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 frame³¹
- 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 2012³². 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

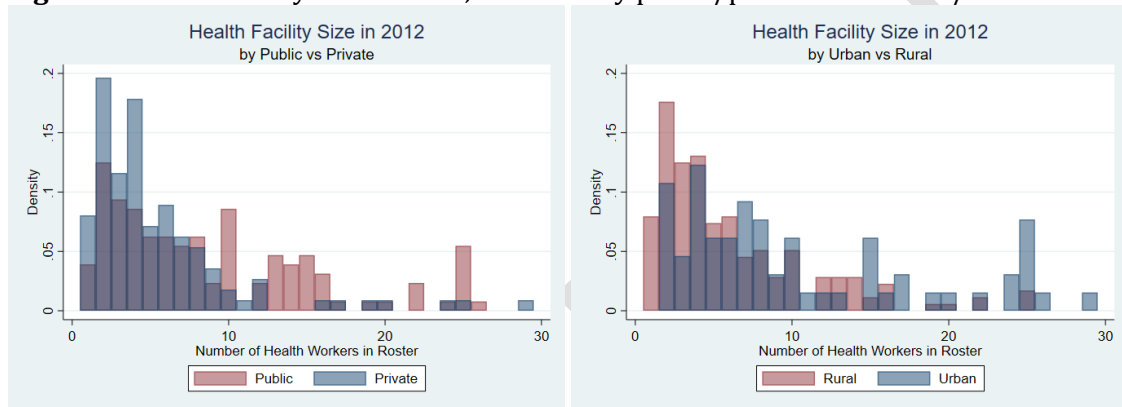
One of the main reasons for the differences in the above results has to do with the composition of the comparable samples, facility sizes, and the differential absenteeism rates across sub-categories. Moreover, the differential effect is greater in magnitude in 2012 because, as opposed to in 2018, the 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.

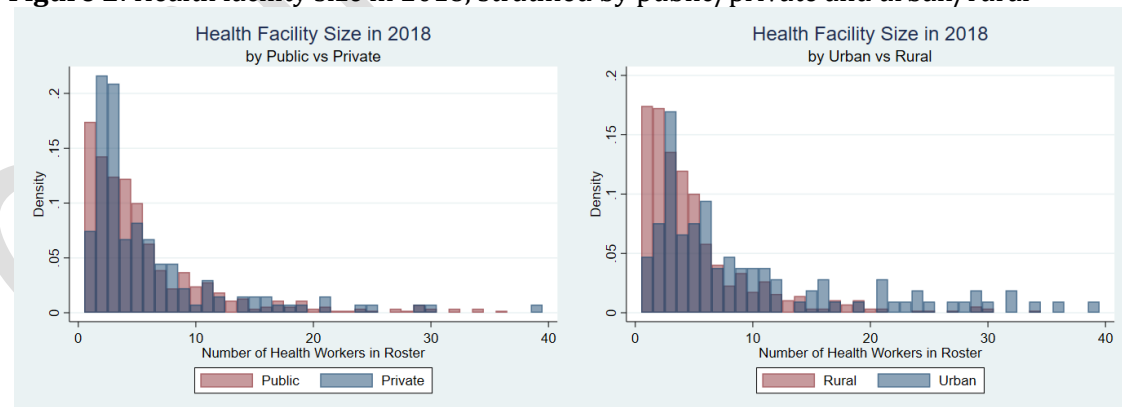
Likewise, rural facilities are smaller in size. Following the same logic, newly estimated individual-level weights are larger for workers in urban facilities. Again, (facility-level weighted) absenteeism is larger in urban settings by about 5 percentage points. Both of the above combined help to explain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

CONFIDENTIAL

ANNEX F: SUREVEY PERSONEL

| Steering Committee | |
|-------------------------------|--|
| Dr. Josephine Kibaru Mbae | National Council for population and Development (NCPD) |
| Peter Nyakwara | NCPD |
| Margaret Mwangi | NCPD |
| Taslim Wason | NCPD |
| Robert Okumu | NCPD |
| Dr. Patrick Amoth | Ministry of Health (MOH) |
| Dr. David Soti | MOH |
| Dr. Peter Cherutich | MOH |
| Dr. David Kariuki | MOH |
| Dr. Isabel Maina | MOH |
| Dr. Izaq Odongo | MOH |
| Hentry Gakio | Ministry of Planning |
| MacDonald Obudho | Kenya National Bureau of Statistics |
| Ezekiel Ngure | UNFPA |
| Dr Jane Chuma | World Bank |
| Technical Members | |
| Peter Nyakwara | NCPD |
| Catherine Ndei | NCPD |
| Francis Kundu | NCPD |
| James Macharia | NCPD |
| John Kibet Bore | KNBS |
| Samuel Ogola | KNBS |
| Dr. Valeria Makori | MOH |
| Dr. Agnes Nakato | MOH |
| Stephen Kaboro | MOH |
| Antony Francis Mveyange | World Bank |
| National Coordinators | |
| Catherine Ndei | NCPD |
| Francis Kundu | NCPD |
| James Macharia | NCPD |
| Dr. Valeria Makori | MOH |
| Dr. Agnes Nakato | MOH |
| Antony Francis Mveyange | World Bank |
| Senior Task Leaders | |
| Dr. Abel Nyakiongora | MOH |
| Dr. Peter Mbugua | MOH |
| Dr. Collins Tabu | MOH |
| Field Team Supervisors | |
| Ibrahim Wako | MOH |

| | |
|---------------------|------|
| Beatrice Achieng | MOH |
| Benard Oonga | MOH |
| Margaret Mwaita | NCPD |
| Halima Yusuf | MOH |
| Ken Lwaki | NCPD |
| Beatrice Okundi | NCPD |
| Jane Wanjaria | NCPD |
| Nzomo Mulatya | NCPD |
| Victoria Mutiso | NCPD |
| Nkatha Mutungi (Dr) | MOH |
| Enoch Obuolo | NCPD |
| Wambui Kung'u | NCPD |
| Sammy Tanui | NCPD |
| Andrew Mutuku (Dr) | PSRI |
| Fidelis Ndung'u | NCPD |
| Paul Malusi | MOH |
| Jacob Rotich | MOH |
| Elizabeth Washika | MOH |
| Janet Lunayo | NCPD |
| Tecla Kogo | MOH |
| Bernard Kiprotich | NCPD |
| Samuel Murage | MOH |
| Moses Ouma | NCPD |
| Dorcas Wandera | MOH |
| Josephine Marani | NCPD |
| Patrick Mutua | MOH |
| Andolo Miheso | MOH |
| Irene Muhunzu | NCPD |
| Patrick Omungo | NCPD |
| Rose Wakuloba | NCPD |
| Jedida Obure | MOH |
| Hambale Mohamed | MOH |
| Rukia Mahmoud | MOH |
| Hassan Ali Ibrahim | MOH |
| Hussein Buke Boru | MOH |
| Wilson Gitonga | MOH |
| Daniel Lesilele | MOH |
| Rahab Gichere | MOH |
| Robert Gesure | MOH |
| Dorcas Wandera | MOH |
| Brian Demesi | MOH |
| Florida Abuga | MOH |

| | |
|--------------------------|------|
| Dr Jonah Magare | MOH |
| Dr. Silas Agutu | MOH |
| Dr. Violet Adeke | MOH |
| Patrick Mutua | MOH |
| Lucy Kimondo | NCPD |
| Enumerators | |
| Catherine Jebet Bunei | MOH |
| Robinson Kipkulei | MOH |
| Alice Kirwa | MOH |
| Faith Khamali Gitira | MOH |
| Mellan Mwando Asinuli | MOH |
| Rudolf Aliuba Anjimbi | MOH |
| Kephine Knight Ogeu | MOH |
| Peter Maithulia | MOH |
| Elizabeth Naini | MOH |
| Phydy Wamwandu Baruka | MOH |
| George Barini | MOH |
| Maureen Ngure | MOH |
| Anne Kiragu | MOH |
| Catherine Wanjiru Ngacha | MOH |
| Joseph Macharia Wachira | MOH |
| Ekai David Logialan | MOH |
| Reuben Ewoi Akurusit | MOH |
| David Erukudi Lokaala | MOH |
| Aden Mohamud Rage | MOH |
| Sarah Aden | MOH |
| Farhia Ahmed Aden | MOH |
| Dennis Mose | MOH |
| Titus Kahindi | MOH |
| Roselyne Dzine Mwachunga | MOH |
| Flonera Muthoni Riungu | MOH |
| Diana Kanana Kinywa | MOH |
| Martin Munene Kinywa | MOH |
| Raphael Oduol | MOH |
| Arnolda Nyangombe | MOH |
| Ephy Abuto | MOH |
| Isaiah Tobiko | MOH |
| Paul Oramat Ndiema | MOH |
| Jacob Cheruiyot | MOH |
| Moses Lerais Lantoror | MOH |
| Hache Mohamed Boi | MOH |
| Talaso Chiri | MOH |

| | |
|----------------------------|-----|
| Abuga Orina Godfrey | MOH |
| Yussuf Adan Abdi | MOH |
| Hashim Mohamud Mohamed | MOH |
| Abdirahman Omar Hassan | MOH |
| Harrison Mariga | MOH |
| Omurwa Christopher Ondieki | MOH |
| Dominic Nyayiemi Orioki | MOH |
| Sabina Njeri Ndumbura | MOH |
| Ephantus Muriu | MOH |
| Stephen Mwangi Irungu | MOH |
| Thaddeus Kiptanui Kogo | MOH |
| Susan Jepkorir Biwott | MOH |
| Cynthia Kigen | MOH |
| Gloria Ikwere Ojuene | MOH |
| Lusaka Laurence | MOH |
| Dorcas Celia Atieli | MOH |
| Cynthia Sitat Masiarr | MOH |
| Sylvia Sein Koin | MOH |
| Anne Lanoi Letira | MOH |
| Andrew Cheruiyot | MOH |
| David Cheruiyot | MOH |
| John Kipkemoi Kiplagat | MOH |
| Emily Kotut | MOH |
| Beatrice Ng'eno | MOH |
| Antony Kiptarus Kemboi | MOH |
| Leonard Lusenaka | MOH |
| Patrick Wambani | MOH |
| Harun Namisi | MOH |
| David Pkemei Chumakemer | MOH |
| Joseph Korlem Lotukei | MOH |
| Joel Nguria | MOH |
| Ongoro Samwel Gregory | MOH |
| Omondi Violet Achieng | MOH |
| Edward Andrew Odhiambo | MOH |
| Rachel Ngoiri Njenga | MOH |
| Patric Kingori | MOH |
| Judy Wanja Nganga | MOH |
| Tahareni Swabir | MOH |
| Pricilla Ng'ang'a | MOH |
| Jeniffer Makena Mwongera | MOH |
| Bidala Nassoro Chuphi | MOH |
| Hanifa Mwarora | MOH |

| | |
|---------------------------|-----|
| Joseph Lutsangani | MOH |
| Dickens Otieno Ochieng | MOH |
| Irene Achieng Rapondi | MOH |
| Carolyne Adongo | MOH |
| Lucy Wanjiku Kahugu | MOH |
| Teresa Wanjiru Ndumia | MOH |
| Teresa Wanjiru Wanjiru | MOH |
| Wycliffe Asengi | MOH |
| Christabel Engefu Lidanya | MOH |
| Lydia Kiboi | MOH |
| Sylvia Kibeti | MOH |
| Athman Vae | MOH |
| Firdaus Abderehman Swaleh | MOH |
| Carolyne Wawira Njeru | MOH |
| Anne Nancy Muthoni Nyaga | MOH |
| Alice W Kinyanjui | MOH |
| Duncan Kipngeno | MOH |
| Kirui Cheruiyot Edward | MOH |
| Daisy Chepkoech | MOH |
| Kipkogei Sigei | MOH |
| Caroline Chelangat | MOH |
| Maggy Meki Kalondu | MOH |
| Francis Mundia Ruga | MOH |
| Cecilia Wanjiku Njoroge | MOH |
| John Mutei Mutua | MOH |
| Carolyn Nthenya Sammy | MOH |
| Faith Koki Ndeto | MOH |
| Abdinasir Mohamed Ibrahim | MOH |
| Mohamednur Maalim Abdi | MOH |
| James Musyoka | MOH |
| Alice Wambere Gitahi | MOH |
| Margaret Njoki Ndegwa | MOH |
| Loise Leseeto | MOH |
| Josen Lesooni | MOH |
| Elizabeth Habonaya | MOH |
| Ali Maro | MOH |
| Felix Kimathi Nyomoo | MOH |
| Jackline Mwebia | MOH |
| Charity Kendi ikiao | MOH |
| Farida Akinyi Oende | MOH |
| Lynnet Anyumba | MOH |
| Fredrick Ochieng Ouma | MOH |

| | |
|-------------------------|------|
| Naftaly Mwangi Macharia | MOH |
| Stephen Njenga Ndungu | MOH |
| Agnes Watare Muriithi | MOH |
| Hassan Guyo Gonosa | MOH |
| Franco Leni Lenapa | MOH |
| Stephen Kilonzo | MOH |
| Meshach Musyoka | MOH |
| Mercy Riungu | MOH |
| Elizabeth Muia | MOH |
| Oscar Musila Makite | MOH |
| Fredrick Odhiambo Oduar | MOH |
| Tabitha Sandra Akala | MOH |
| Benson Nderitu | MOH |
| Dan Omondi Otieno | MOH |
| Shem Nyarunda Kinara | MOH |
| ICT Support | |
| Abduba Godana | NCPD |
| Everlyne Waruru | NCPD |
| Humphery Kaburu | NCPD |
| Cosmas Boiyon | NCPD |
| Erastus Kivaya | NCPD |
| Mercy Osiri | NCPD |
| Danston Malava | NCPD |
| Ziporah Mutunga | NCPD |
| Monica Taka | NCPD |
| Jane Ndalo | NCPD |
| Mwaniki Frank | NCPD |
| Githinji Mugwe | NCPD |
| Beatrice Otindu | NCPD |