Management of Health Care Facilities and Patient Attendance during Major Disruptions: Evidence from Kenya

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May 1, 2026

Abstract

This paper measures and analyzes management practices in the Kenyan health care sector, drawing on a nationally representative survey and linked administrative data. The paper adapts the World Management Survey to measure management quality in primary health care facilities and hospitals, surveying 429 primary health care facilities and 73 hospitals. Primary health care facilities are the primary point of contact for most patients, providing treatment for common infectious diseases and chronic conditions, as well as services related to maternal and child health. Management quality is low on average, and the distribution is highly compressed. The analysis uses administrative data to test the association between the management quality and performance of primary health care facilities, measured by outpatient attendance, during a period of disruption that included the COVID-19 pandemic and a public health workers' strike. Overall attendance fell during this period. Private facilities experienced a smaller decline than public facilities, consistent with substitution during the strike. Within the private sector, better-managed facilities showed greater resilience, driven primarily by operations management. These results underscore the role of management quality in strengthening facility-level resilience and the complementarity of public and private sectors in absorbing healthcare shocks.

Keywords: management practices; primary health care; outpatient attendance; shocks.

JEL Codes: I15, L32, M10

*Andrews: The World Bank. Dal-Ri: International Finance Corporation. Gatti: The World Bank, IZA, and CEPR. Lemos: The World Bank, CEP-LSE, and CEPR. Macis: Johns Hopkins University, IZA, and NBER. This study was approved by the Amref Africa Ethics and Review Committee (ESRC P778-2020) and the Johns Hopkins Homewood IRB (HIRB00010949). We acknowledge financial support from the Research Department at the World Bank (Research Support Budget). We are grateful to Raissa Ebner, Rifat Haider, and Juan Munoz for outstanding research assistance, to Elizabeth Naukusi Wangia for helpful comments, and for the partnership of the Kenya Ministry of Health, Council of Governors, and National Council for Population and Development.

1 Introduction

Low- and middle-income countries have made substantial progress in expanding access to essential health services in recent years. However, concerns persist that merely increasing access without addressing the quality of health care may not yield the desired improvement in health outcomes (Das et al. 2018). For example, estimates indicate that high-quality health systems could prevent 1 million newborn deaths and half of all maternal deaths annually in low- and middle-income countries (Kruk et al. 2018). A growing body of evidence indicates that many aspects of health care quality are influenced by management practices (McConnell et al. 2013, Bloom et al. 2015, Goetz et al. 2015, Dunsch et al. 2017, Macarayan et al. 2019, Bloom et al. 2020, Angelis et al. 2021, Muñoz and Otero 2025). Yet, data linking management to health care quality in low- and lower-middle-income countries, where quality tends to be lowest (John et al. 2004), is largely absent.

In this paper, we begin to bridge this knowledge gap by investigating management practices in health facilities in a lower-middle-income country, with a focus on essential public health services. We developed a survey instrument based on the World Management Survey (WMS) and applied it to a sample of 429 primary healthcare (PHC) facilities in Kenya, a country with important shortcomings in healthcare provision. PHC facilities typically serve as the main point of contact with the healthcare system, providing a broad range of essential services such as treatment of common infectious diseases, management of chronic conditions, basic emergency care, minor surgical procedures, as well as services related to maternal and child care (family planning, prenatal and postnatal care, well-child visits, immunizations, developmental screenings, nutrition counseling, and mental health support for mothers and children). The application of our survey instrument extends the WMS methodology (Bloom et al. 2020), which has thus far focused on hospitals, to PHC facilities in a lower-middle-income country context, contributing to a limited set of internationally

comparable measurements of management practices in this setting.[1] We also surveyed maternal and child health-related departments in 73 Kenyan hospitals, which allowed us to make comparisons with results from other countries, where hospital management data are also available.

Our first contribution is descriptive: we analyze the data on management practices and uncover three main findings. First, we find that management-practice quality scores in Kenyan PHC facilities are low on the WMS scale. On a scale between 1 ("worst practices") and 5 ("best practices"), the mean management score in Kenyan PHC facilities is 1.61, which places Kenya at the lower end of the distribution in the available cross-country benchmarks. These comparisons should be interpreted with care, given differences in facility types and services provided. Second, the distribution of management scores is characterized by high compression. The standard deviation of 0.17 is less than half of that observed in any other surveyed country. Third, our internationally comparable sample of hospitals indicates similarly low management scores (mean = 1.59 and SD = 0.14), thus indicating that the PHC facilities in our sample are not outliers in the Kenyan context.

Our second and main contribution is to combine our survey results with administrative data from the Kenyan Health Management Information System (HMIS) on quarterly outpatient attendance between 2018 and 2021, collected independently of our management survey, to explore the association between management practices and service provision during a time of significant disruptions, including the COVID-19 pandemic and a public healthcare workers' strike. Such disruptions negatively lead to adverse health outcomes by affecting access to essential care, including maternal and child health services. Antenatal care, for example, is provided by 99% of the public and 86% of the private PHC facilities in our sample. Besides, among outpatients for which gender information is available, 58% are women, thus indicating that disruptions are likely to particularly affect this group.

[1] To facilitate further research, we are making the survey instrument publicly available to other researchers. The survey is available on the WMS website: https://www.worldmanagementsurvey.org/.

Prior studies have shown that strikes in public health facilities in Kenya were associated with decreases in admissions in public facilities (Njuguna 2015, Irimu et al. 2018). More recently, a retrospective parent study found that Kenyan women who were pregnant during nationwide public health worker strikes in 2017 were less likely to receive maternal and child health services, experienced lower overall health care utilization, and faced delays in child immunization (Scanlon et al. 2021). Understanding whether management practices can effectively mitigate these adverse impacts is crucial for maintaining healthcare service delivery during crises.

Focusing on attendance as the key outcome variable is of first-order importance when studying the impact of disruptions and the potential mitigating role of good management practices in healthcare facilities. Disruptions, such as pandemics or strikes, often lead to significant decreases in healthcare service utilization, directly affecting the continuity and quality of care provided to patients. Attendance serves as a fundamental indicator of both access to and the functioning of healthcare services during such periods. By examining attendance, we can quantitatively measure the immediate effects of disruptions on healthcare delivery. Furthermore, analyzing how management practices influence attendance during disruptions can reveal whether effective management can serve as a buffer, maintaining or even improving service delivery when challenges arise. This focus is especially pertinent in contexts where ensuring continuous care is critical, such as in maternal and child health services, where lapses can lead to severe health outcomes. Thus, studying attendance helps us understand the resilience of healthcare systems and informs strategies to enhance management practices that support service continuity under adverse conditions.

Our results reveal differences between public and private facilities. All types of PHC facilities experienced a sharp shortfall in outpatient attendance during the initial phase of the COVID-19 pandemic. However, in private PHC facilities, we find that facilities with higher management scores were better able to recover and sustain patient volumes during

the quarters affected by COVID-19 and the public health workers' strike that took place between the last quarter of 2020 and the first quarter of 2021. After normalizing outpatient attendance by each facility's maximum observed attendance, we find that, relative to the quarter immediately before the disruptions, a one standard deviation increase in management scores is associated with up to 6.5 percent points higher normalized outpatient attendance in private facilities in the quarters affected by the disruptions. This association is primarily driven by better "operations management", whereas we do not find an equally important role for "people management". By contrast, in public PHC facilities we do not detect any correlation between management practices and outpatient attendance during these disruptions. Our data do not allow us to identify mechanisms, but the pattern is consistent with greater operational flexibility and managerial autonomy in private facilities—especially during disruptions.

Our findings underscore the need for improvements in management practices within the entire Kenyan health care system, a setting characterized by low-resource constraints.

Our results also highlight the resilience of well-managed private facilities in the face of a significant disruption in the provision of public healthcare services, suggesting that management practices are an important correlate of attendance resilience beyond ownership status, and pointing toward the complementarity of the two sectors.

2 The Kenyan Health Care Context

Since 2013, Kenya's healthcare sector has operated under a devolved system, with shared responsibilities between national and county governments. The Ministry of Health provides governance, policy oversight, and technical assistance to the 47 counties, which manage community, primary health care, and county referral facilities. Due to the devolution of health service delivery management, we expected to find heterogeneity in how facilities were managed across these counties.

Health services are delivered through a six-level hierarchy of health facility types, ranging from community health units that focus on preventive and promotive health services to hospitals offering increasingly specialized care for inpatients and outpatients. In 2018, the system included 5,003 public and 4,651 private facilities, which complement each other in delivering health care services (World Bank and Government of Kenya 2019).[2] Public facilities, owned and managed by the government, often provide free services, including maternal care following a reform in 2013 (Orangi et al. 2021). Therefore, a considerable portion of the Kenyan population, unable to afford private-sector health services, relies on public facilities (Kaguthi et al. 2020). While private facilities are subject to licensing by the appropriate regulatory bodies and their operation is overseen by the Ministry of Health, the quality-of-care standards are poorly defined, leading to fragmented standards being applied by the Ministry of Health and the regulatory agencies (Gatome-Munyua et al. 2015). Nonetheless, private facilities remain an essential source of care even in rural areas (Ngugi et al. 2017).

3 Data

This paper combines two independently collected data sources. First, we developed and implemented a new management survey instrument adapted for the Kenyan health care context. Second, we leverage administrative data provided by the Ministry of Health on monthly outpatient attendance at each health care facility. These two data sets are merged at the facility level, allowing us to explore the relationship between management practices and service delivery.

[2]The private sector includes not-for-profit and for-profit facilities. Not-for-profit facilities are owned by faith-based health services (FBHS), non-governmental organizations (NGOs), civil society organizations (CSOs), or other non-profit/public benefit organizations. For-profit facilities, in contrast, are owned by private individuals, organizations, or groups operating as profit-making enterprises (Ministry of Health, Kenya 2013).

The World Management Survey

The original WMS project pioneered the methodology of measuring management in manufacturing firms using an interview-based survey tool that evaluates a range of day-to-day management practices on a uniform scale (Bloom and Van Reenen 2007). Typically administered by phone using semi-structured interviewing techniques, the survey quantifies management in two broad domains: operations and people management. It assigns scores on a grid from 1, representing "worst practice", to 5, indicating "best practice". While the original survey instrument has been adapted for use in education (Bloom et al. 2015) and in health care, where its applications have been limited to hospitals in developed and developing countries (Tsai et al. 2015, Bloom et al. 2020), it has not been fielded in PHC facilities in any setting or in hospitals in Kenya.

In developing countries, where the distribution of management practices tends to have a low average and is more concentrated at the lower end of the WMS scoring system, the tool has also been modified to capture small differences in management practices that the standard measurement tool is unable to pick up. This version of the WMS, named Development WMS (D-WMS), allows for finer grading (i.e., half-point values) between scores 1 and 3 and expands the instrument to measure management practices under three criteria: existence, use, and monitoring (Lemos and Scur 2016). While the D-WMS was initially deployed in primary schools in India (Lemos et al. 2024), it had not yet been surveyed in the health care sector. Hence, to measure management practices among health care facilities in low- and middle-income country contexts, we adapted it to the health care setting, while ensuring comparability with surveys conducted elsewhere. Our adapted survey instrument thus includes dimensions meant to measure management aspects related to issues specific to health care facilities in Kenya and other low- and middle-income countries.

While the D-WMS questionnaire is the basis of our survey instrument, we also incorporated dimensions from a health care organization assessment tool developed by

SafeCare, an agency that specializes in health care quality standards and patient safety in low- and middle-income countries (Dunsch et al. 2017).[3]

Our survey instrument encompasses 15 dimensions, each evaluated through three questions and scored on a scale of 1 to 5. To form dimension-level scores, we calculate the simple average of the scores from the 3 questions within each dimension. Utilizing these scores for the 15 dimensions, we generate an overall facility-level score (determined by the simple average of all 15 dimensions) as well as two sub-indices: operations (including 11 dimensions) and people (including 4 dimensions), as indicated below.

- Layout of the Patient Pathway (*operations management*): Assesses how clearly patient flow is organized—from registration through discharge—and whether physical layout and signage minimize bottlenecks and waiting times.

- Standardization and Protocols (*operations management*): Evaluates the existence and consistent use of written clinical and administrative protocols (e.g., triage rules, treatment checklists) to ensure uniform quality of care.

- Patient and Clinical Records (*operations management*): Measures the accuracy, completeness, and retrievability of patient files—paper or electronic—and the extent to which records are used for clinical decision-making.

- Inventory Management (*operations management*): Examines systems for forecasting, ordering, storing, and tracking drugs, vaccines, and supplies to avoid stock-outs and wastage.

- Continuous Improvement (*operations management*): Captures whether the facility systematically identifies performance gaps, conducts root-cause analyses, and implements iterative changes.

[3]See Appendix B.1 for details on the selection of surveyed dimensions.

- Patient Complaints (*operations management*): Looks at mechanisms for collecting, reviewing, and acting on patient feedback or grievances to improve service quality and patient experience.

- Performance Tracking (*operations management*): Gauges the regular measurement of key indicators (e.g., wait times, service volumes, treatment outcomes) and the reliability of underlying data systems.

- Performance Review (*operations management*): Rates the frequency and rigor with which managers and staff discuss performance metrics, identify problems, and devise corrective actions.

- Balance of Goals (*operations management*): Assesses whether targets cover multiple priorities (quality, access, efficiency, and equity) rather than focusing narrowly on a single metric

- Interconnection of Goals (*operations management*): Evaluates the alignment of unit-level targets with facility-wide objectives and the cascading of goals across departments and cadres.

- Clarity and Comparability of Goals (*operations management*): Measures how well targets are defined, communicated, and benchmarked—internally or against external standards—to facilitate meaningful comparison.

- High-Performance Evaluation (*people management*): Assesses whether outstanding performers are systematically identified through objective criteria and given recognition, promotion, or other rewards.

- Removing Poor Performers (*people management*): Looks at processes for identifying underperformance, providing remediation, and, if necessary, reassigning or dismissing persistently low performers.

- Absence Management (*people management*): Captures practices for monitoring staff attendance, understanding root causes of absence, and implementing deterrents or support measures to ensure adequate staffing.

- Attracting Talent (*people management*): Evaluates efforts to recruit qualified clinical and non-clinical staff—e.g., outreach, employer branding, competitive compensation, and clear career pathways—to fill vacancies promptly.

We conducted the survey using the WMS tool in a sample of 429 PHC facilities, which is the main focus of our study. We also included 73 hospitals so as to allow for international comparisons. The sample for our survey was drawn from the World Bank's 2018 Kenyan Survey Delivery Indicators (SDI) initiative.[4] It was designed to be representative at the national level and to allow for comparisons between public and private facilities, as well as between hospitals and PHC facilities.[5] We also aimed to have a large enough sample to exploit the geographic variation in outcomes and management across Kenya's 47 counties. Data collection took place from March to June 2021, with support from the Ministry of Health (which coordinates the health care sector at the national level) and the Council of Governors (which coordinates it at the county level). The Ministry of Health provided guidance on the study tool adaptation and its implementation in Kenya's health care facilities. The Council of Governors facilitated access to the counties through the county directors for health, who assisted in establishing initial contact with managers from the selected facilities.[6]

[4]More information on the sample selection procedure for the Kenyan WMS and its relationship with the Kenyan SDI is available in the Appendix Subsection B.2.

[5]Probabilistic weights were constructed to expand our sample to the universe of health care facilities in Kenya. The weighted and unweighted distributions of management scores are similar, alleviating concerns that data collection frictions compromise the representativeness of our results.

[6]Appendix Subsection B.3 describes the data collection.

Administrative Facility-Level Data

Our main facility-level service delivery data comes from the HMIS maintained by the Ministry of Health. This data set covers all health care facilities in Kenya (both public and private), and regular reporting at the monthly level is mandatory. We focus on outpatient attendance. We restrict our analysis to the 418 PHC facilities (out of 429) in our management survey and reporting outpatient attendance data from January 2018 to December 2021.[7] Similar extractions from the Kenyan HMIS have been used in papers evaluating service delivery during the COVID-19 pandemic (such as Ahmed et al. 2022), attesting to the quality of the data.

4 Management Practices in Kenya

Figure 1 shows how Kenyan facilities compare with those in other countries, focusing on the management dimensions surveyed in all countries.[8] Our sample of surveyed hospitals is important for this comparison, as PHC facilities were not surveyed in other countries. We observe that in this internationally comparable measure of management practices, the average score in Kenya is 1.59 in hospitals and 1.61 in PHC facilities, placing Kenya at the lower end of the distribution across surveyed countries.[9] Across the set of countries where a

[7]The outpatient attendance data contain missing observations but no true zeros. In cleaning, reporting gaps of up to two months are linearly interpolated. Results are qualitatively similar without this step, although statistical significance is weaker. Values are treated as outliers when month-to-month deviations exceed ten times the mean facility-level deviation and are then winsorized to the 10th (if below the median) or 90th (if above the median) facility-level percentile.

[8]To ensure cross-country comparability while accommodating survey variations, we create a modified comparable score by implementing two adjustments. First, our D-WMS score (which permits half-point values between 1 and 3) is converted into usual WMS scores by rounding down the score for each dimension (e.g., if the Layout of the Patient Pathway score is 1.6, we round it down to 1). Second, since the surveyed dimensions are different across countries, in this analysis, we use only the dimensions included in all surveys (Layout of the Patient Pathway; Standardization and Protocols; Continuous Improvement; Performance Tracking; Performance Review; Balance of Goals; Interconnection of Goals; Clarity and Comparability of Goals; High-Performance Evaluation; Removing Poor Performers).

[9]The average score of 1.59 in hospitals and 1.61 in PHC facilities is 1.5 standard deviations below the mean of high-income countries. See Appendix Figure A.1.

comparable WMS-based measure is available, Kenya's scores are among the lowest, though comparisons should be interpreted with care given differences in facility types and services provided. The distribution of management scores in Kenya is also more compressed than in other countries. While the standard deviation is 0.17 (PHC facilities) and 0.14 (hospitals) in Kenya, all other countries exhibit a standard deviation above 0.2.[10]

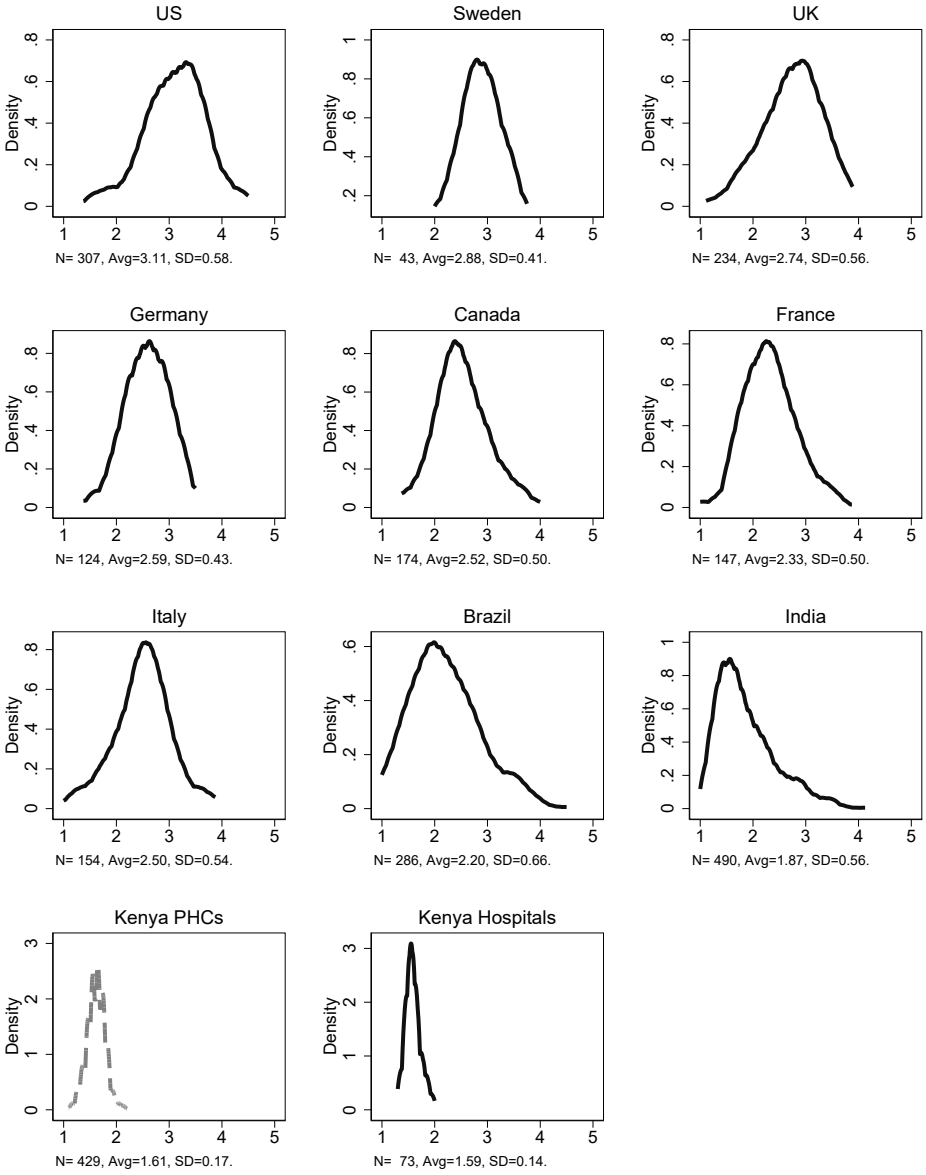
Focusing on PHC facilities, Table 1 presents the main findings of our data collection effort in more detail, including a comparison between public and private facilities. In summary, the D-WMS results indicate that management scores are low in Kenya, averaging at 2.03 in public and 1.98 in private PHC facilities. This trend is consistent across all 15 dimensions, without any component surpassing an average score of 2.6. Facilities adopt slightly better practices in operations management (2.12 and 2.03 in public and private facilities, respectively) than in people management (1.79 and 1.85).[11]

The bottom of Table 1 shows that both public and private PHC facilities included in our study deliver a broad array of primary-care services. Beyond routine outpatient consultations, they offer chronic-disease management, minor surgical procedures, laboratory and diagnostic services, family-planning counseling, child-vaccination and curative care, as well as the full continuum of maternal and newborn care. For example, outpatient consultations are available in every public and private PHC (100 percent each); non-communicable-disease management is offered by 91 percent of public and 82 percent of private facilities; minor surgical procedures by 82 percent and 93 percent, respectively; and laboratory/diagnostic services by 78 percent of public and 97 percent of private facilities. Maternal and child services are likewise common: antenatal care is provided in 99 percent of public PHC facilities and 86 percent of private PHC facilities, while postnatal care is

[10] Appendix Figure A.2 shows that Kenya conforms to the usual relationship observed between management scores and health outcomes. There is a negative correlation with maternal mortality and infant mortality and a positive one with life expectancy. Binned scatter plots where both management scores and health outcomes are residualized using a regression with GDP per capita as the independent variable also display a similar correlation.

[11] Appendix Figure A.3 shows the distribution of the management domains.

Figure 1: Distribution of Management Scores in the Health Care Sector



Note: Management scores on a scale of 1 to 5. Management scores are calculated with a comparable set of dimensions across surveys (Layout of the Patient Pathway; Standardization and Protocols; Continuous Improvement; Performance Tracking; Performance Review; Balance of Goals; Interconnection of Goals; Clarity and Comparability; High-Performance Evaluation; Removing Poor Performers). Facility-level management scores are a simple average of included dimensions.

Table 1: Management, Facility Characteristics, and Service Delivery in Kenya

	Public				Private			
	Mean	p10	p90	SD	Mean	p10	p90	SD
Overall Management Score	2.03	1.88	2.19	0.13	1.98	1.76	2.18	0.16
Operations Management Score	2.12	1.94	2.30	0.14	2.03	1.80	2.25	0.18
Layout of the Patient Pathway	2.23	1.83	2.50	0.28	2.23	1.83	2.67	0.30
Standardization and Protocals	2.16	2.00	2.33	0.22	2.10	1.83	2.33	0.26
Patient and Clinical Records	1.98	1.83	2.17	0.21	2.00	1.83	2.50	0.26
Inventory Management	2.45	2.17	2.67	0.21	2.44	2.17	2.83	0.30
Continuous Improvement	2.19	2.00	2.50	0.23	2.17	1.83	2.50	0.25
Patient Complaints	2.15	1.67	2.50	0.31	2.12	1.83	2.50	0.29
Performance Tracking	2.46	2.17	2.67	0.37	2.08	1.17	2.67	0.51
Performance Review	2.57	2.17	3.00	0.34	2.49	2.00	3.00	0.42
Balance of Goals	1.94	1.50	2.33	0.34	1.68	1.17	2.17	0.38
Interconnection of Goals	1.93	1.50	2.25	0.36	1.73	1.25	2.25	0.42
Clarity and Compatibility	1.29	1.17	1.67	0.27	1.26	1.17	1.50	0.27
People Management Score	1.79	1.54	2.04	0.21	1.85	1.62	2.08	0.19
High-Performance Evaluation	1.53	1.17	2.00	0.37	1.59	1.33	2.00	0.28
Removing Poor Performers	1.94	1.67	2.50	0.34	1.96	1.83	2.33	0.31
Absence Management	1.84	1.50	2.17	0.30	1.96	1.50	2.33	0.32
Attracting Talent	1.84	1.50	2.17	0.31	1.87	1.50	2.17	0.32
Service Provision								
Services: Outpatient	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Services: Antenatel Care	0.99	1.00	1.00	0.10	0.86	0.00	1.00	0.35
Services: Maternity	0.79	0.00	1.00	0.41	0.60	0.00	1.00	0.49
Services: Obstetrics and Neonatal Care	0.49	0.00	1.00	0.50	0.52	0.00	1.00	0.50
Services: Postnatal Care	0.94	1.00	1.00	0.25	0.79	0.00	1.00	0.41
Services: Children Vaccination	0.97	1.00	1.00	0.18	0.68	0.00	1.00	0.47
Services: Children Curative	0.92	1.00	1.00	0.26	0.80	0.00	1.00	0.40
Services: Non-Communicable Disease	0.91	1.00	1.00	0.28	0.82	0.00	1.00	0.39
Services: Minor Surgical	0.82	0.00	1.00	0.39	0.93	1.00	1.00	0.25
Services: Lab/Diagnostic	0.78	0.00	1.00	0.41	0.97	1.00	1.00	0.17
Services: Family Planning	0.99	1.00	1.00	0.08	0.94	1.00	1.00	0.24
Observations	293				136			

Note: PHC facilities only. Management scores on a scale of 1 to 5. Facility-level management scores are a simple average of all 15 dimensions. Operations and people management scores are a simple average of the dimensions that compose each of them. Management variables from the 2021 Kenya WMS. Service provision variables from the 2018 Kenyan SDI survey.

available in 94 percent and 79 percent, respectively. These figures underscore the central role of both public and private PHC facilities in providing essential health services and, therefore, the potential implications if service provision is disrupted.[12]

5 Management and Service Delivery

We leverage administrative data provided by the Ministry of Health on monthly outpatient attendance at each health care facility and merge it with our WMS data. We aim to assess how management practices affected service provision during the initial phase of the COVID-19 pandemic. Even though national guidelines were in place, the devolved health care system afforded facility managers the autonomy to implement distinct mitigation measures, which could have resulted in heterogeneous responses.

COVID-19 posed a significant health challenge in Kenya. Using data spanning a period identical to ours, Kiarie et al. (2022) identify four distinct COVID-19 pandemic periods in Kenya: a pre-pandemic phase before February 2020, a first pandemic phase from March 2020 to November 2020, a health workers' strike between December 2020 and January 2021, and a second pandemic period after February 2021. They report that the disruption in service provision during the health workers' strike was actually larger than any disruption during the rest of the COVID-19 pandemic. Ahmed et al. (2022) show similar findings, which we reproduce in Figure 2 using data from Kenyan PHC facilities in our sample. In this analysis, monthly total outpatient attendance is modeled following the interrupted time series specification below:

$$Attendance_{im} = \alpha_{c_m} + \beta \cdot T_m + \sum_{\tau=2020m3}^{2021m12} \gamma_\tau D_m^\tau + \varepsilon_{im} \tag{1}$$

In Equation 1, $Attendance_{im}$ is the normalized outpatient attendance for each facility i in

[12] Appendix Table A.1 presents additional facility-level characteristics.

month m.[13] α_{c_m} denotes calendar-month fixed effects. T_m captures a linear trend in monthly outpatient attendance, with $T_m = 0$ centered around month $m = 2018m1$. Finally, D_m^τ is an indicator equal to 1 if month $m = \tau$, and 0 otherwise, and the coefficients γ_τ capture month-specific deviations during the COVID-19 pandemic period relative to the trajectory predicted by the calendar-month fixed effects and the linear time trend.

In Figure 2, the solid black curve indicates observed attendance, while the solid red curves indicate predicted attendance according to the previous equation when the post-pandemic coefficients are set to 0 – that is, in a predicted scenario where attendance followed the previous years' trajectory. We find that the large reduction in outpatient attendance during the COVID-19 pandemic holds true for public (Panel A) and private (Panel B) PHC facilities. However, the disruption during the health workers' strike is only observed in public PHC facilities. In fact, disruption in private PHC facilities vanished during that time, suggesting their potential role in mitigating the strike-induced disruption. Some of the relative stability in private facilities during the strike may reflect patients substituting away from public facilities.

In order to understand whether these patterns correlate with management practices, we adopt an event study strategy centered around the COVID-19 shock in March 2020. We pool the facility-level monthly outpatient attendance data into quarters and estimate the following regression model for the period starting four quarters before the shock:

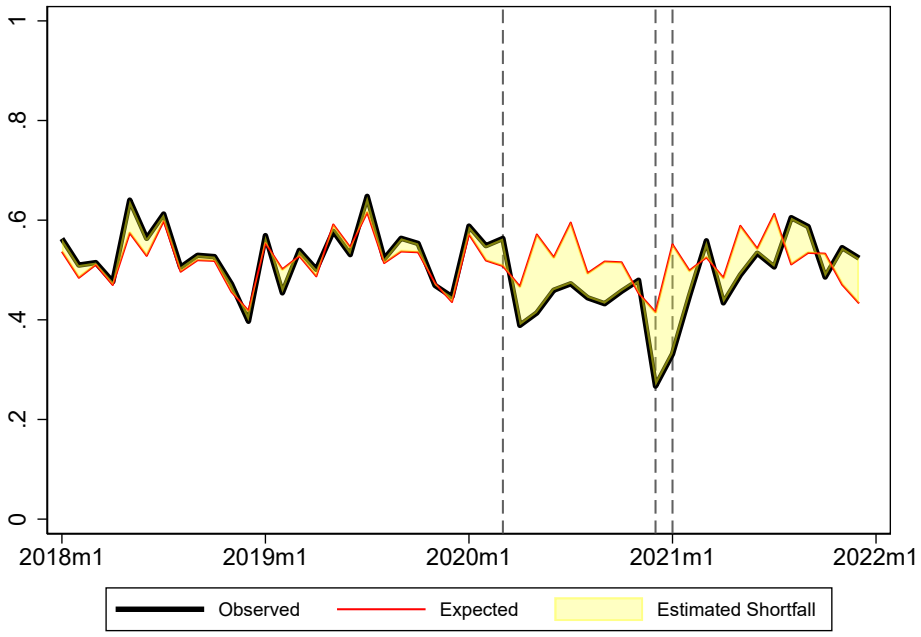
$$Attendance_{it} = \sum_{k \neq -1} \delta_k (ZMgmt_i \times D_{it}^k) + \alpha_i + \lambda_t + \varepsilon_{it} \tag{2}$$

In Equation 2, $Attendance_{it}$ is the normalized outpatient attendance for facility i in quarter t. $ZMgmt_i$ is our standardized management measure. D_{it}^k is an indicator equal to 1 if quarter t corresponds to relative quarter k, measured with respect to the reference period.

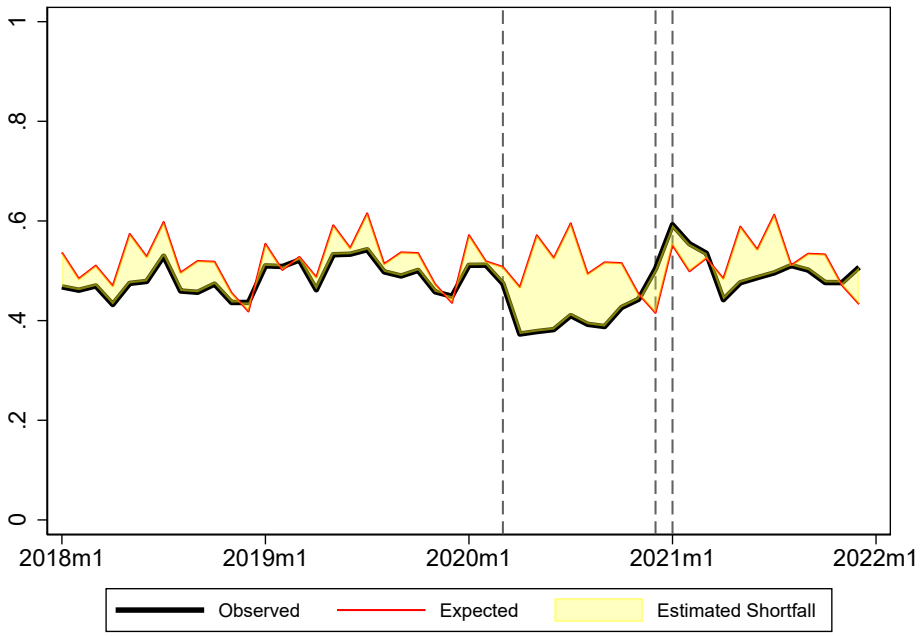
[13] The time series for each facility is normalized by the maximum reported attendance over our analysis period. A similar approach is adopted by Ahmed et al. (2022) on a national level.

Figure 2: Outpatient Attendance: Observed and Expected

(a) Public Facilities



(b) Private Facilities



Note: PHC facilities only. Monthly observed outpatient attendance: data from the Kenyan HMIS at the facility level and normalized by the maximum reported attendance in each facility between January 2018 and December 2021. Expected outpatient attendance and estimated shortfall estimated following the procedure in Ahmed et al. (2022). See text for details. Number of PHC facilities: Public = 248. Private = 82.

Hence, our coefficients of interest, δ_k, capture the correlation between management scores and outpatient attendance levels relative to a baseline period (in our case, $k = -1$, the last quarter of 2019). We also directly include facility and quarter fixed effects (α_i and λ_t, respectively), while standard errors are clustered at the facility level.

Figure 3 shows our main finding from this analysis.[14] We separately display the results for public PHC facilities (Panel A) and private PHC facilities (Panel B), given that they display different disruption trajectories during the period of our analysis. Panel A shows that there is no correlation between management practices and outpatient attendance after 2019q4 in public PHC facilities.

However, Panel B displays a more nuanced picture for private PHC facilities. In this case, there is a positive and statistically significant correlation between management scores and outpatient attendance after the beginning of the COVID-19 pandemic. This effect takes a few months to be fully realized, but the coefficients are positive and statistically significant for the period encompassing 2020q3 and 2021q1, which coincides with initial COVID-19 waves in Kenya and the health workers' strike between December 2020 and January 2021.[15] In particular, by 2021q1, we observe that a one standard deviation increase in management scores is associated with 6.5 percent points higher normalized outpatient attendance, relative to the period before the disruptions. Figure 4 also displays that the operations management dimension is more strongly correlated with outpatient attendance.[16] Taken together, our results highlight the resilience of well-managed private facilities (particularly of those with

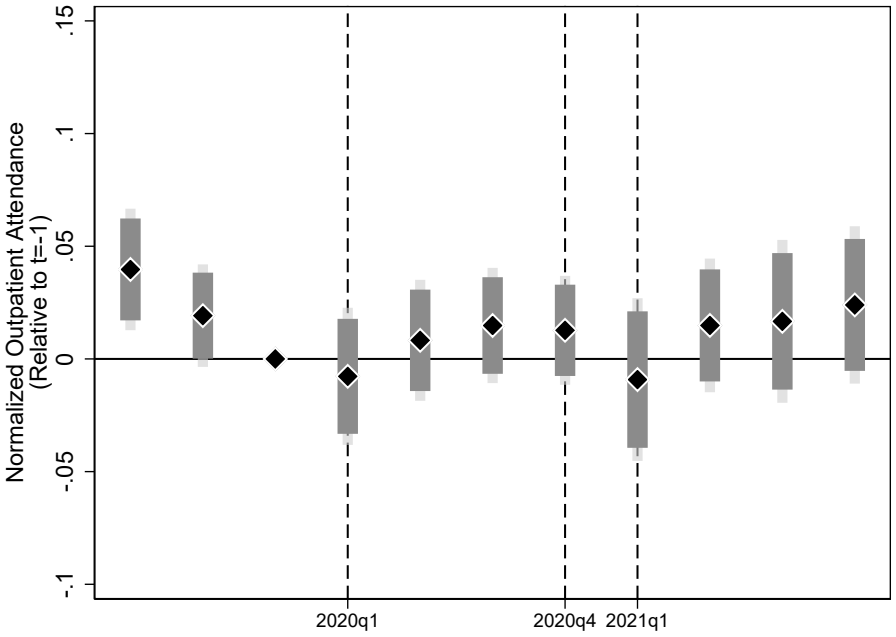
[14] See Appendix Table A.2 for the table with regression results.

[15] See Appendix Figure A.4 for the timeline of COVID-19 waves in Kenya.

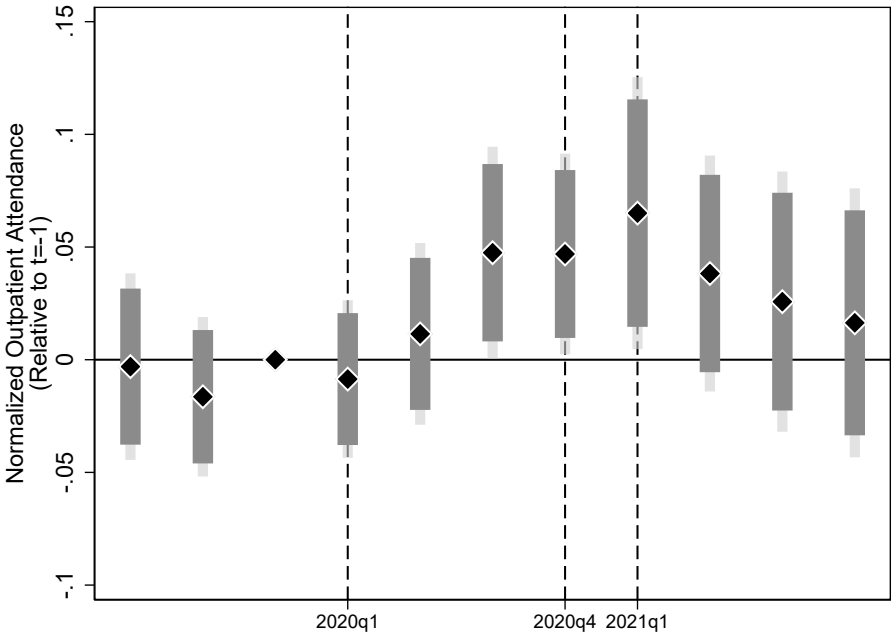
[16] Management scores were collected in March–June 2021, after the pandemic onset and the December 2020–January 2021 health workers' strike. We treat management as a facility-level characteristic, where scores reflect practices throughout the study period. To the extent that these shocks may have induced management turnover or affected managers personally, the measured scores could differ from pre-shock practices. We therefore implement two robustness checks. First, we restrict the sample to managers with at least two years of tenure at the same facility (75% of the original sample), which reduces the likelihood of endogenous management transitions. Second, we restrict the sample to managers who report no personal exposure to bereavement or serious illness in the prior year (72% of the original sample). Both robustness checks leave the estimates unchanged, consistent with our assumption.

Figure 3: Overall Management and Outpatient Attendance

(a) Public Facilities



(b) Private Facilities

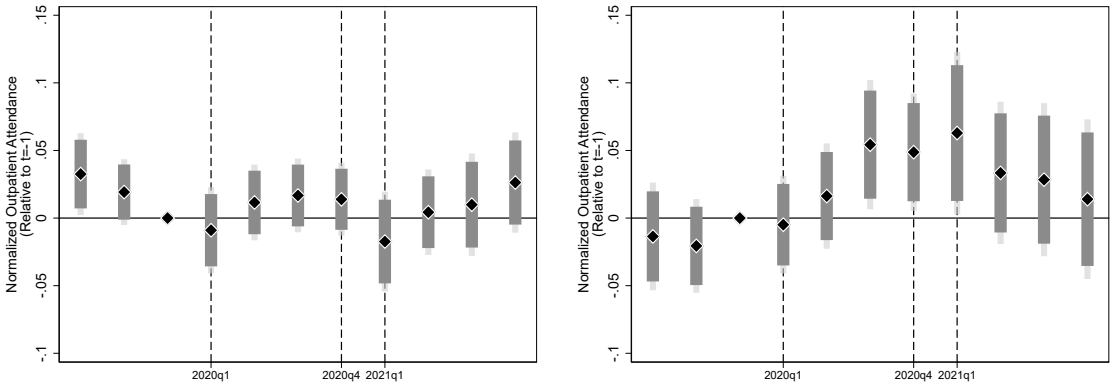


Note: PHC facilities only. Quarterly outpatient attendance: data from the Kenyan HMIS at the facility level and normalized by the maximum reported attendance in each facility between 2019q2 and 2021q4. Reported coefficients show the quarterly outpatient attendance levels interacted with management practices at Kenyan primary health facilities relative to period t=-1 (2019q4). Management practices are standardized with a mean of 0 and a standard deviation of 1. Regression includes facility and quarter fixed effects. Standard errors are clustered at the facility level. Number of facilities: Public = 260. Private = 91. The analysis is restricted to a shorter time period to alleviate data availability constraints and improve statistical power.

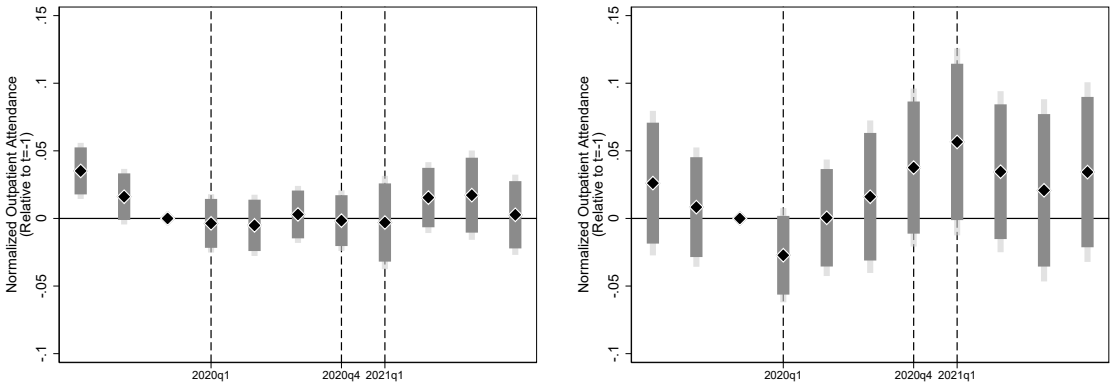
better practices in operations management) during a significant disruption in the provision of public health care services. This pattern is consistent with differences in operational flexibility and managerial autonomy that may allow some private facilities to adjust staffing, patient flow, and supply management more rapidly than public facilities during disruptions.

Figure 4: Management and Outpatient Attendance

(a) Operations Mgmt: Public PHC facilities (b) Operations Mgmt: Private PHC facilities



(c) People Mgmt: Public PHC facilities (d) People Mgmt: Private PHC facilities



Note: PHC facilities only. Quarterly outpatient attendance: data from the Kenyan HMIS at the facility level and normalized by the maximum reported attendance in each facility between 2019q2 and 2021q4. Reported coefficients show the quarterly outpatient attendance levels interacted with management practices at Kenyan primary health facilities relative to period t=-1 (2019q4). Management practices are standardized with a mean of 0 and a standard deviation of 1. Regression includes facility and quarter fixed effects. Standard errors are clustered at the facility level. Number of facilities: Public = 260. Private = 91. The analysis is restricted to a shorter time period to alleviate data availability constraints and improve statistical power.

6 Conclusion

In this study, we investigated management practices in primary health facilities in Kenya and explored their association with indicators of health care service delivery. To achieve this, we adapted the WMS to the Kenyan health care context, assessing 15 dimensions of management practices and surveying 429 health care facilities that are representative at the national level. We also included 73 hospitals in our survey, allowing benchmarking against existing surveys of hospitals in other countries. Importantly, our study extends the application of the WMS methodology to PHC facilities in a low-income country, contributing to a limited set of internationally comparable measurements (within the set of common dimensions) of management practices in this setting. The collection of management practices data across a diverse and extensive network of facilities in a lower-middle-income country setting fills a crucial knowledge gap and provides evidence relevant for both scholarly inquiry and policy formulation in health care management.

We also merged the management data with data on outpatient attendance provided by the Ministry of Health, enabling us to assess the association of management practices on health care service provision during a period that includes the initial phase of the COVID-19 pandemic and a public health workers' strike. While other studies have documented the adverse impacts of disruptions, notably strikes, on health care attendance in Kenya, none have yet considered the potentially moderating role of management practices as a buffer against these disruptions.

Our analysis revealed several critical findings. First, we found that management practices in Kenyan health care facilities, as measured by our adapted survey instrument, are generally low, and this trend is consistent across all dimensions of management we assessed. Second, overall management scores remained low across facilities, with a very compressed distribution. Finally, during the COVID-19 pandemic, we found that better-managed private facilities experienced less disruption in outpatient attendance, a result that is driven by

facilities with better practices in operations management. The data at our disposal do not allow us to identify mechanisms, but the pattern is consistent with differences in operational flexibility and managerial autonomy across ownership types, especially during disruptions.

Our study provides new insights into the state of management practices in Kenyan health care facilities and their relationship with service delivery. It highlights the need for improvements in management practices, especially in the context of low-resource settings, to enhance the quality of health care services and address health disparities. It also suggests a complementarity between the public and private sectors, highlighting the resilience of better-managed private facilities during disruption periods. In a mixed public–private system, disruptions in public facilities can induce substitution toward private providers, which may also contribute to the relative stability of private-sector attendance during strike periods. Our findings are in alignment with those reported by Njuguna (2018), which highlighted a contrasting response in public versus private health care facilities during the 2017 nurses' strike in Kenya. Specifically, Njuguna (2018) observed that while the proportion of fully immunized children significantly decreased in public facilities during the strike, there was a notable increase in the same proportion within private, faith-based facilities. Similarly, Scanlon et al. (2021) found that pregnant women were less likely to deliver in a health facility overall, but more likely to deliver in a private facility. This divergence underscores the resilience of private health care institutions in maintaining critical health services, such as child immunizations, even during periods of significant labor disruptions. Our contribution is to show that this resilience is not solely a public–private divide, but it is consistent with management practices being an important correlate of sustained service delivery during disruptions.

Future research could further investigate the specific dimensions of management that have the most significant impact on service delivery and explore strategies for implementing effective management practices in diverse health care settings. Additionally, future studies

could collect management scores for PHC facilities in other low-income countries and ideally build longitudinal data matched with administrative health outcomes to better understand whether management in PHC facilities is correlated with health outcomes. Future studies can also investigate what is behind the differences between public and private facilities; one possibility is that private-facility managers face stronger performance incentives, which could help explain why we observe these patterns in private but not public settings. These insights can inform policy decisions and initiatives aimed at strengthening health care systems and ultimately improving health outcomes in developing countries.

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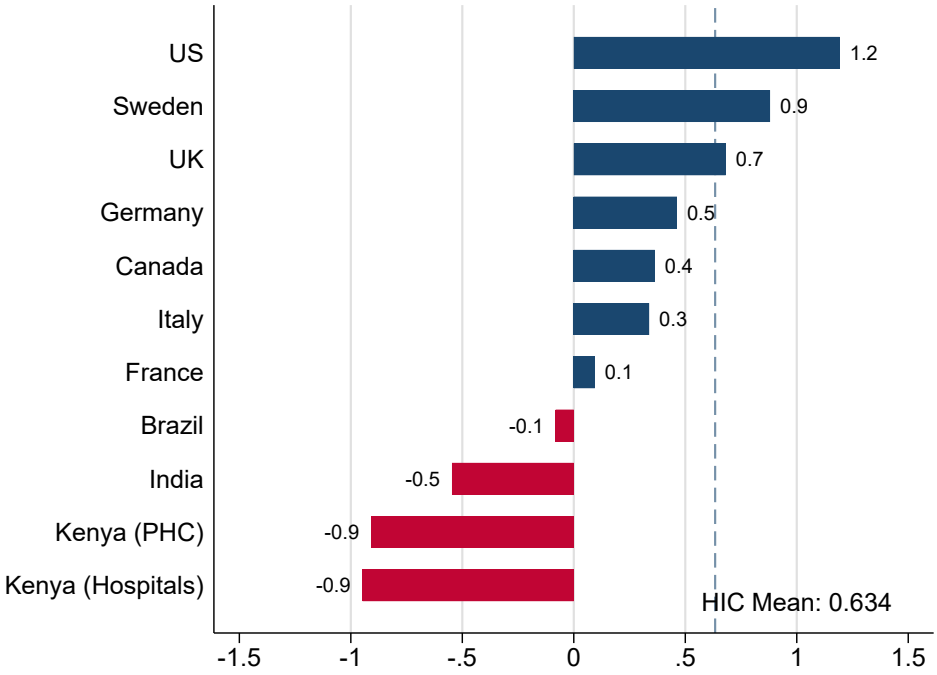
A Figures and Tables

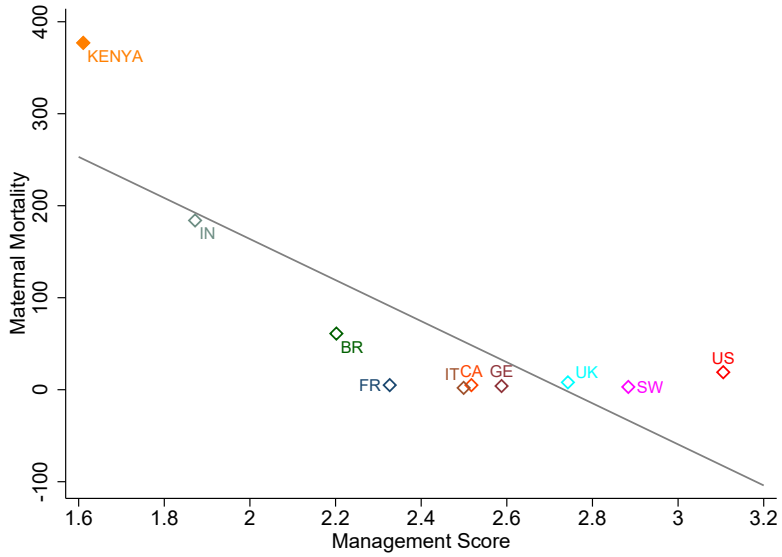
Figure A.1: Average Management Scores in the Health Care Sector



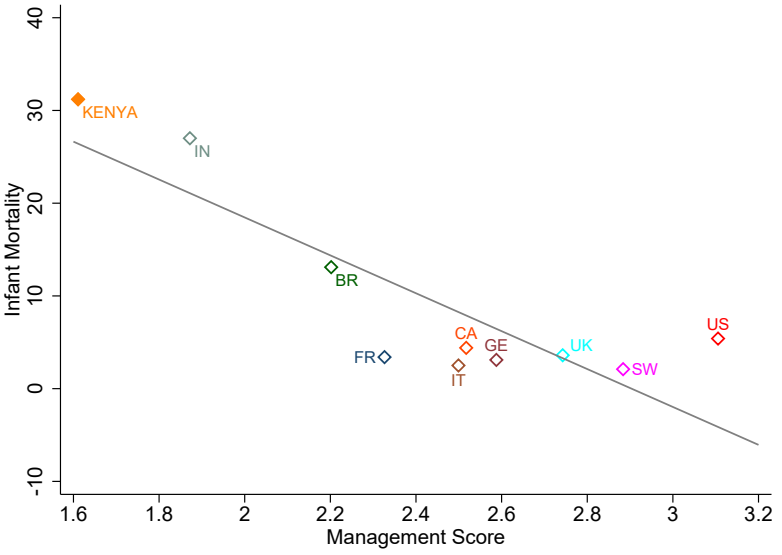
Note: Management scores are calculated with a **comparable set of dimensions** across surveys (Layout of the Patient Pathway; Standardization and Protocols; Continuous Improvement; Performance Tracking; Performance Review; Balance of Goals; Interconnection of Goals; Clarity and Comparability; High-Performance Evaluation; Removing Poor Performers). Facility-level management scores are a simple average of included dimensions and standardized using the global distribution.

Figure A.2: Health Outcomes and Management

(a) Maternal Mortality



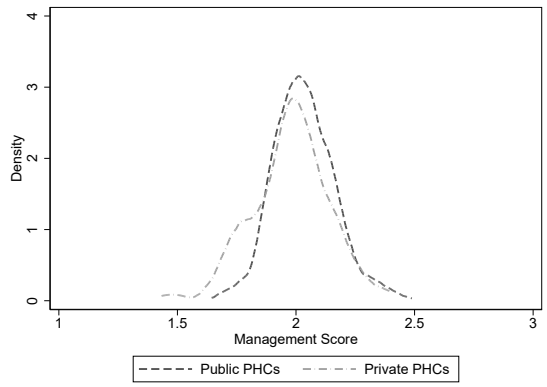
(b) Infant Mortality



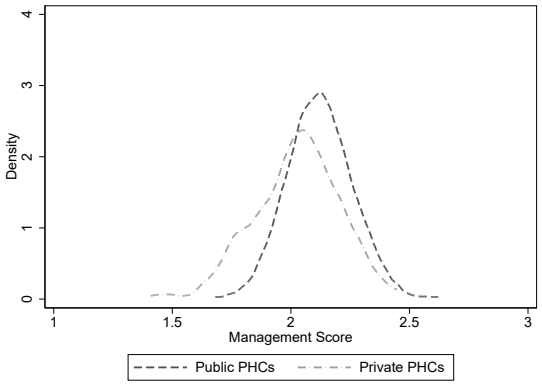
Note: Management scores on a scale of 1 to 5. Management scores are calculated with a **comparable set of dimensions** across surveys (Layout of the Patient Pathway; Standardization and Protocols; Continuous Improvement; Performance Tracking; Performance Review; Balance of Goals; Interconnection of Goals; Clarity and Comparability; High-Performance Evaluation; Removing Poor Performers). Facility-level management scores are a simple average of included dimensions. Data for maternal mortality (per 100,000 live births in 2014) and infant mortality (per 1,000 live births in 2020) from the World Bank Open Data. Number of observations: US = 307, Sweden = 43, UK = 234, Germany = 124, Canada = 174, Italy = 154, France = 147, Brazil = 286, India = 490, Kenya = 502.

Figure A.3: Management Scores: Distribution

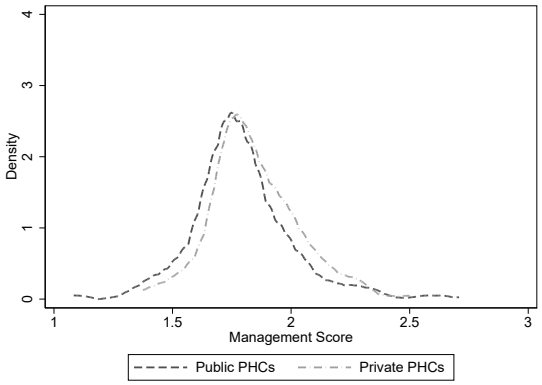
(a) Overall Management



(b) Operations Management



(c) People Management



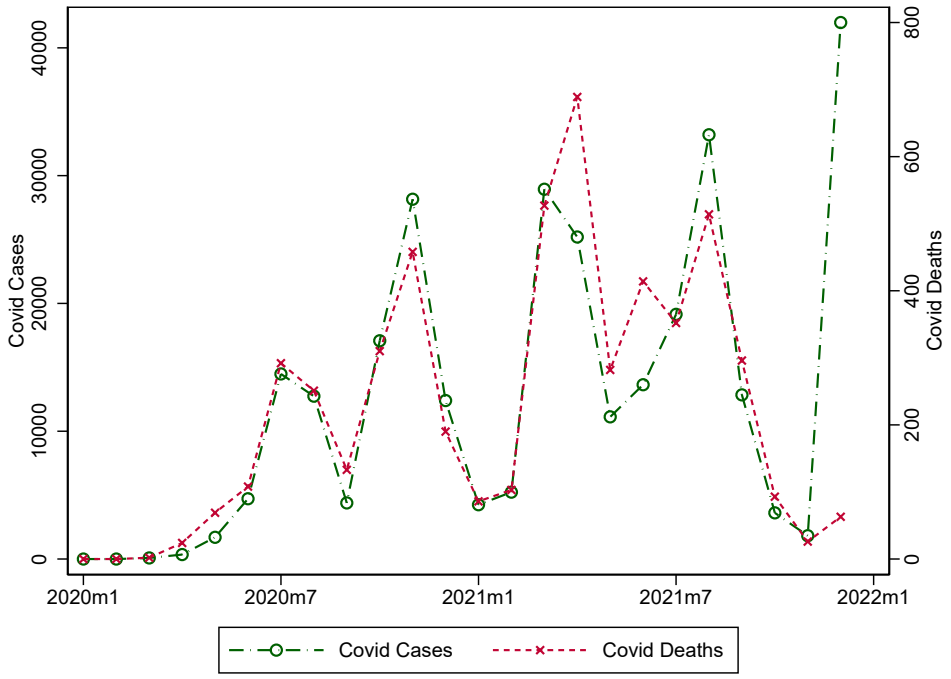
Note: Primary health care facilities (PHCs) only. Management scores from the 2021 WMS Kenya WMS.

Table A.1: Facility Characteristics and Service Provision

	Public				Private			
	Mean	p10	p90	SD	Mean	p10	p90	SD
Facility Characteristics								
Facility: Urban	0.11	0.00	1.00	0.31	0.61	0.00	1.00	0.49
Total Staff	13.04	5.00	23.00	13.84	19.07	5.00	37.00	22.72
Total Beds: Zero	0.24	0.00	1.00	0.43	0.13	0.00	1.00	0.34
Avail. Min. Medical Equipment	0.39	0.00	1.00	0.49	0.18	0.00	1.00	0.38
Manager: Age	38.83	30.00	51.00	8.80	44.92	28.00	62.00	12.97
Manager: Male	0.49	0.00	1.00	0.50	0.64	0.00	1.00	0.48
Manager: Degree/Masters	0.17	0.00	1.00	0.38	0.32	0.00	1.00	0.47
Manager: Years in Facility	4.35	1.33	9.17	3.22	8.82	1.58	21.42	7.80
Manager: Attended Training Program	0.40	0.00	1.00	0.49	0.64	0.00	1.00	0.48
Manager: Has Clinical Background	0.91	1.00	1.00	0.29	0.86	0.00	1.00	0.35
Service Delivery								
Avail.: Drugs for Mothers	0.45	0.00	0.75	0.33	0.37	0.00	1.00	0.41
Avail.: Drugs for Childen	0.65	0.43	0.86	0.19	0.67	0.43	0.86	0.21
Avail.: Vaccines	0.84	0.14	1.00	0.34	0.42	0.00	1.00	0.48
Clinical Vignettes: Diagnosis	-0.01	-0.54	0.64	0.49	-0.07	-0.68	0.64	0.54
Clinical Vignettes: Treatment	0.04	-0.58	0.58	0.48	-0.14	-0.79	0.56	0.52
Observations	293				136			

Note: Primary health care facilities (PHCs) only. "Clinical Vignettes: Diagnosis" and "Clinical Vignettes: Treatment" are summary indices based on six vignettes (covering diarrhea with severe dehydration, pneumonia, type 2 diabetes, pulmonary tuberculosis, postpartum hemorrhage, and neonatal asphyxia) and are constructed following Anderson (2008). Number of observations: Public = 293, Private = 136.

Figure A.4: Covid-19 Pandemic in Kenya



Note: Monthly number of Covid-19 cases and deaths provided by the Ministry of Health in Kenya. Original data at the province level and aggregated at the country level.

Table A.2: Management and Outpatient Attendance

	Outcome var: Normalized Outpatient Attendance					
	(1)	(2)	(3)	(4)	(5)	(6)
2019q2 $\times Mgmt$	0.040***	-0.003	0.033**	-0.014	0.035***	0.026
	(0.014)	(0.021)	(0.015)	(0.020)	(0.011)	(0.027)
2019q3 $\times Mgmt$	0.019*	-0.016	0.019	-0.021	0.016	0.008
	(0.012)	(0.018)	(0.012)	(0.017)	(0.010)	(0.022)
2019q4 $\times Mgmt$	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)
2020q1 $\times Mgmt$	-0.008	-0.009	-0.009	-0.005	-0.004	-0.027
	(0.015)	(0.018)	(0.016)	(0.018)	(0.011)	(0.018)
2020q2 $\times Mgmt$	0.008	0.011	0.012	0.016	-0.005	0.000
	(0.014)	(0.020)	(0.014)	(0.020)	(0.012)	(0.022)
2020q3 $\times Mgmt$	0.015	0.047**	0.017	0.054**	0.003	0.016
	(0.013)	(0.024)	(0.014)	(0.024)	(0.011)	(0.028)
2020q4 $\times Mgmt$	0.013	0.047**	0.014	0.049**	-0.002	0.038
	(0.012)	(0.022)	(0.014)	(0.022)	(0.011)	(0.029)
2021q1 $\times Mgmt$	-0.009	0.065**	-0.017	0.063**	-0.003	0.057
	(0.018)	(0.030)	(0.019)	(0.030)	(0.018)	(0.035)
2021q2 $\times Mgmt$	0.015	0.038	0.004	0.033	0.015	0.035
	(0.015)	(0.026)	(0.016)	(0.027)	(0.013)	(0.030)
2021q3 $\times Mgmt$	0.017	0.026	0.010	0.028	0.017	0.021
	(0.018)	(0.029)	(0.019)	(0.028)	(0.017)	(0.034)
2021q4 $\times Mgmt$	0.024	0.016	0.026	0.014	0.003	0.034
	(0.018)	(0.030)	(0.019)	(0.030)	(0.015)	(0.033)
Obs	2860	1001	2860	1001	2860	1001
R-Squared	0.392	0.375	0.392	0.378	0.392	0.366
Quarter FE	✓	✓	✓	✓	✓	✓
Facility FE	✓	✓	✓	✓	✓	✓
Sample	**Public**	**Private**	**Public**	**Private**	**Public**	**Private**
Mgmt Dimension	**Overall**	**Overall**	**Operations**	**Operations**	**People**	**People**

Note: Primary healthcare facilities (PHCs) only. Number of facilities: Public = 260. Private = 91. The analysis is restricted to a shorter time period to alleviate data availability constraints and improve statistical power. Quarterly outpatient attendance: data from the Kenyan HMIS at the facility level and normalized by the maximum reported attendance in each facility between 2019q2 and 2021q4. Reported coefficients show the quarterly outpatient attendance levels interacted with management practices at Kenyan primary health facilities relative to period t=-1 (2019q4). Management practices are standardized with a mean of 0 and a standard deviation of 1. Standard errors (clustered at the facility level) in parentheses. Significance stars: * p-value < .1; ** p-value < .05; *** p-value < .01.

B Additional Information on Methods and Data

B.1 Construction of the Kenya WMS Instrument

Table B.1 below presents our survey instrument. The complete instrument developed for this study is available on the World Management Survey website.[17] Our survey instrument is an adaptation of the Development World Management Survey (D-WMS) for hospitals. The D-WMS was designed by the Centre for Economic Performance at the London School of Economics to measure the management practices of hospitals. It consists of 20 modules. To inform our adaptation, we also referred to a health care organization assessment tool produced by SafeCare, an agency that specializes in health care quality standards and patient safety in low- and middle-income countries.[18] The agency developed a set of standards that assess the structures and processes that guide the delivery of health care services. The SafeCare standards are divided into 4 categories and 13 "service elements" related to various management aspects of health care facilities.[19]

To create the adapted D-WMS for Kenya, we proceeded as follows. First, we mapped the two instruments (D-WMS and SafeCare), identifying the areas of overlap. The following elements presented substantial overlap between D-WMS and SafeCare and were included in our survey instrument: Layout of Patient Pathway, Standardization and Protocols, Continuous Improvement, Performance Tracking, Performance Review, Balance of Goals, Interconnection of Goals, Clarity and Comparability, High-Performance Evaluation, Removing Poor Performers, and Attracting Talent. Next, we selected a set of relevant categories from the SafeCare standards and converted them into D-WMS questions. These modules are: Patient and Clinical Records (adapted from SafeCare's Management of

[17] Website: worldmanagementsurvey.org.

[18] SafeCare was created as part of a collaboration between the Joint Commission International based in the US, PharmAccess Foundation of the Netherlands, and the Council for Health Service Accreditation of Southern Africa established to "address issues of poor and limited health care delivered in developing countries."

[19] The SafeCare standards are accredited by the International Society for Quality in Health Care.

Information module), Inventory Management (adapted from elements from SafeCare's Management and Leadership and Facility Management Services modules), and Patient Complaints (adapted from SafeCare's Patient Rights module). Finally, we included a module on Absence Management to better understand potential correlates of high absence rates measured in the Kenya 2018 SDI health survey (described further in the next section). The problem of absence of clinical and non-clinical personnel in Kenya and other resource-constrained settings has been highlighted by recent research (see, for example, Tumlinson et al. 2019, Andrews et al. 2021, Andrews et al. 2021), and we decided to measure management practices associated with mitigating or dealing with this phenomenon. As a result of this process, we arrived at our adapted D-WMS for Kenyan health facilities. Our instrument includes a total of 15 modules, 11 of which are from the D-WMS, 3 are adapted from the SafeCare standards, and 1 was produced by this research team.

Table B.1: Health Care Management Instrument for this Study

1. Layout of the Patient Pathway	D-WMS and SafeCare
2. Standardization and Protocols	D-WMS and SafeCare
3. Patient and Clinical Records	SafeCare only
4. Inventory Management	SafeCare only
5. Continuous Improvement	D-WMS and SafeCare
6. Patient Complaints	SafeCare only
7. Performance Tracking	D-WMS and SafeCare
8. Performance Review	D-WMS and SafeCare
9. Balance of Goals	D-WMS and SafeCare
10. Interconnection of Goals	D-WMS and SafeCare
11. Clarity and Comparability	D-WMS and SafeCare
12. High-Performance Evaluation	D-WMS and SafeCare
13. Removing Poor Performers	D-WMS and SafeCare
14. Absence Management	New module
15. Attracting Talent	D-WMS and SafeCare

B.2 Sample Selection

The backbone of this data collection effort is the World Bank's Service Delivery Indicators (SDI) initiative. SDI surveys are nationally representative facility-based surveys of primary health care centers and primary schools designed to measure quality-of-service delivery. The first generation of SDI health surveys aimed to collect data on (i) provider knowledge, (ii) effort, and (iii) inputs at the providers' disposal. SDI health surveys have been conducted at least once in eleven different African countries,[20] and the survey program has since expanded to measure additional domains of quality of service delivery and collect data in countries in the South Asia, Eastern Europe/Central Asia, Middle East/North Africa, and Latin America/Caribbean regions.

In 2018, the World Bank, in partnership with the Ministry of Health of Kenya and the National Council for Population and Development, conducted its second health facility survey in Kenya, sampling 3,095 health facilities (of a total of 9,659 health facilities in the country), including 290 hospitals and 2,805 primary care facilities across the country. The Kenya SDI Survey was not only nationally representative (and representative of both urban and rural locations) but also representative at the county level. Data collection took place between March and July 2018.

The sample for our Kenya WMS was drawn from the 2018 Kenya SDI sample and was designed to be representative at the national level. It was also designed to allow for comparison between public and private facilities and between hospitals and lower-level facilities. Given our focus on primary health care facilities, the intended sample sizes were set at 100 for hospitals and 400 for primary health care facilities. These values were selected to give us meaningful variation in both management practices (typical WMS samples are of roughly 100-200 facilities), but also enough to exploit the geographic variation in both outcomes and management practices across Kenya's 47 counties. Below, we provide

[20] Guinea-Bissau, Kenya, Malawi, Mozambique, Niger, Nigeria, Senegal, Sierra Leone, Tanzania, Togo, and Uganda.

additional details on how the sample was drawn.

The initial sample of 500 total facilities for the D-WMS was drawn from a universe of 1,618 facilities, purposively selected out of the 9,659 facilities in the country based on the following criteria:

1. Being among the facilities visited by the Kenya SDI survey in 2018;
2. Having non-missing values for key SDI indicators (non-missing caseload, absence rate, diagnostic and treatment accuracy, management of maternal and neonatal complications, equipment, medicine, and infrastructure availability);
3. Delivering health services at facility Levels 2, 3, and 4;
4. Having at least 5 staff (since WMS questions on human resources management are not applicable to extremely small facilities);
5. Being either public or private for-profit (i.e., neither faith-based nor NGO- nor community-owned, so that an adequate sample was available to make comparisons between public and private facilities).

The universe was divided into 168 strata, defined as the combinations of 47 counties, two service levels (2 and 3 together versus 4), and two ownership statuses (public and private). A target sample of 500 facilities was allocated to these strata, striving to have in total:

1. 100 facilities of Level 4 (hospitals) and 400 facilities of levels 2 and 3 (PHCs);
2. 10 facilities in each county to mirror the SDI's county-level representativeness;
3. As many private facilities as possible (to allow for comparison with public facilities).

The target sample was then selected by simple random sampling within each stratum. In the strata where that was possible, a few additional reserve facilities were selected (also

by simple random sampling), with the intention of substituting target facilities that might not be contacted due to nonresponse. Only 187 reserve facilities were selected initially, but an additional 200 were added due to higher-than-expected nonresponse.

B.3 Data Collection

The study was implemented in partnership with the Ministry of Health (which coordinates at the national level) and the Council of Governors (which coordinates at the county level). The Ministry of Health provided overall guidance on the study tool adaptation and its implementation in the context of Kenya. The Council of Governors facilitated access to the counties through the county directors for health, who were tasked with sharing the consent forms and introductory letters with facility managers from selected facilities, requesting them to participate in the survey and informing them about the survey methodology.

In order to ensure smooth implementation, the phone numbers of facility managers from the selected facilities were validated before data collection began. This contact validation process was conducted by the survey firm between November and December 2020 with the support of the Council of Governors' county directors for health. This was conducted to confirm which facilities were still in operation and that the available facility contact information was correct. When phone numbers were not validated, the survey firm searched facility websites and online facility rosters and asked other contacts for updated facility manager contact information.

After the initial communication with the selected facilities, the survey firm scheduled the interviews, which involved calling all the sampled facilities and identifying a mutually agreeable time for the actual telephone interview. At this point, the survey firm also ensured the interviewee (health facility manager) met the respondent inclusion criteria:

1. For Level 2 and 3 facilities, the respondent was the facility manager (responsible for the day-to-day management of the facility).

2. For Level 4 facilities, the respondent was the in-charge of the maternal/child health (MCH) ward (usually a chief or head nurse). In line with global WMS methodology, the person in-charge of the MCH ward was selected as the respondent in these larger

facilities (rather than the facility manager). This was because the head of large facilities is typically not involved in the day-to-day inner workings of the management of service delivery (which is the subject of the WMS). The MCH ward was selected (as opposed to the head of another ward) because the types of services available and patients seen at MCH wards in larger facilities are likely most similar to those in the smaller (outpatient) facilities, and the Kenya SDI survey focused on measurement of MCH service availability.

3. Having been in the position at the sampled facility for at least one year (to ensure that the manager had sufficient experience at the facility to answer the interview questions).

Data collection commenced on March 8, 2021, and ended on June 22, 2021. On average, 10 interviews were done per day (the average completion rate was 2 interviews per enumerator per day at an average length of 95 minutes) over a period of four weeks, after which the number of interviews reduced significantly (as all the interviews that were easy to schedule were completed first). Data were collected by a team of 8 highly trained and experienced enumerators and 4 supervisors based in Nairobi.

To limit measurement error, enumerators were trained in the adapted D-WMS methodology to use open-ended, double-blind interviewing and to score practices based on what respondents reported actually happens in day-to-day management rather than on aspirational statements. Scores were assigned only after the interview using detailed notes and the scoring manual. Supervisors monitored protocol adherence during fieldwork, listened in to selected live interviews, reviewed and double-scored interviews using enumerator notes and/or recordings, discussed discrepancies with enumerators, and validated all scored questionnaires; ongoing feedback, daily meetings, and calibration exercises were also used to promote consistent scoring across interviewers. Enumerators underwent a refresher training after two weeks of data collection, and the team held weekly meetings to address any bottlenecks.

Implementation challenges included poor telephone network connectivity in some geographic areas, managers not picking up their phones when called (despite attempts at different times and on different days), and managers' unavailability to participate or to finish the interview due to competing demands on their time. Some private facilities requested extra information and were more hesitant to participate in the study.

Of the 887 on the contact list (sub-sample randomly drawn from the Service Delivery Indicators sample), 18 facilities were no longer in operation, 2 were misnamed duplicates of other facilities, and 38 had managers who had been in their role for less than a year. Of the remaining 829 potentially eligible facilities, 502 interviews were completed (60.6%). Of the 327 that did not participate, 18 respondents were contacted but declined because they were too busy (5.5% of non-participants), and the remaining 309 (94.5%) were unreachable by phone (the phone was never answered, the phone number was incorrect and it was not possible to find a functioning number, etc.).