BMJ Public Health

Exploring district implementation of national guidelines and maintenance of essential health services during the COVID-19 pandemic in Uganda

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To cite: Stein DT, Ssessanga A, Olaro C, *et al*. Exploring district implementation of national guidelines and maintenance of essential health services during the COVID-19 pandemic in Uganda. *BMJ Public Health* 2025;**3**:e001813. doi:10.1136/bmjph-2024-001813

► Additional supplemental material is published online only. To view, please visit the journal online (https://doi.org/10.1136/bmjph-2024-001813).

Received 7 August 2024
Accepted 19 March 2025

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ABSTRACT

Introduction The effectiveness of national policies in decentralised health systems depends on local-level implementation. This study examines whether variation in implementation of national guidelines across districts and health system functions explains differences in local health system performance in maintaining continuity of essential maternal health, family planning and child vaccination services during the COVID-19 pandemic in Uganda.

Methods We used routine health data and an interrupted time-series analysis to estimate district-specific relative declines in service outputs during COVID-19 compared with expected volumes if prepandemic trends continued for maternal health, family planning and child vaccination services. We randomly selected 57 districts across 15 regions and measured the implementation of national guidelines for maintaining essential health services through a web-based survey of district health teams. We generated 'implementation summary scores' by health system function and service category, representing the proportion of guidelines reported implemented by districts. We tested associations between implementation scores and performance.

Results On average, districts (n=42; 74% response rate) reported implementing 58% (95% CI 54–62) of guidelines across health system functions, ranging from 33% (24–41) for 'financing' and 43% (36–49) for 'service delivery' to 93% (89–96) for 'coordination and communication' and 88% (81–94) for 'monitoring'. Districts reported implementing 60% (53–68) of guidelines requiring national government action. District performance in maintaining child vaccination services was positively associated with vaccine-specific 'financing' and 'national government' implementation summary scores after controlling for geography and district characteristics.

Conclusion Variation in implementing national-level policy across districts indicates inefficiencies or inequities across geographies in Uganda in terms of ability and capacity to respond to emergencies. Local guideline implementation also varied across health system functions, with financing and service delivery-related guidelines having the lowest implementation scores. Future emergency responses should consider how to balance local adaptations with central support by identifying which health system functions districts can more easily manage and adjust independently.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ National health policy implementation in decentralised contexts depends on local actors' authority and capacity to translate decisions into action, or their ability to implement national policies with fidelity. Effective emergency response requires intergovernmental coordination between national and local governments responsible for health service delivery.

WHAT THIS STUDY ADDS

⇒ Our study highlights variations in how Ugandan districts implemented national COVID-19 guidelines for the continuity of essential services, pointing to possible inefficiencies and inequities. We found that health system functions like monitoring and communication were more consistently implemented, while local service delivery adaptations and financing-related guidelines posed greater challenges. Implementation of vaccine-specific financing guidelines and greater support from the national government was associated with better maintenance of child vaccination services.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Future emergency responses should consider how to balance local adaptations with central support by identifying which health system functions districts can more easily manage and adjust independently. Monitoring local implementation fidelity and addressing policy implementation variations may also enhance overall system performance. Further research should investigate the drivers of local-level variation in policy implementation and explore the most effective options for improving local health systems performance during emergencies in Uganda and other decentralised contexts.

BACKGROUND

Governance is an important determinant of health sector performance.[1] Advocates of decentralised or devolved health system

governance argue that more local control over resources, policy implementation and service delivery better aligns health systems with local needs.[2] There is mixed evidence, however, on whether decentralised health system governance, where decision-making powers and responsibilities such as planning, budgeting and financial management of health service delivery are transferred to subnational units, has positive or negative effects on health system performance.[3–5] One avenue through which decentralisation impacts health system performance is through the concept of 'decision space'.[6] Although the formal decision-making authority of subnational units in decentralised systems is defined by policy, how this authority is exercised can vary across local governments (LGs), wherein some may choose not to (or be unable to) take advantage of their devolved responsibilities.[7–9] Therefore, simply devolving authority to subnational units is not enough to improve the performance and responsiveness of local health systems. Subnational actors must also have the skills, resources and accountability to effectively use their decision-making authority. Otherwise, decentralisation risks exacerbating differences in resources and capacity across subnational units.

The COVID-19 pandemic disrupted the delivery of essential health services across the world. A hallmark of a resilient health system is the ability to maintain continuous, or quickly restore, delivery of essential health services during emergencies. Strategies to enhance health system resilience cut across issues of governance, financing and service delivery.[10] While emergency management is a federal responsibility in most decentralised countries, the actual delivery of healthcare services is still usually the responsibility of LG units.[11] This means that during an emergency like the COVID-19 pandemic, LGs have the power to tailor their response to local conditions. However, this devolved decision-making power also creates challenges of intergovernmental coordination and communication.[12] Effective implementation of a nationally coordinated emergency response in the health sector in decentralised systems thus crucially depends on the authority, capacity and willingness of subnational units to implement national policies and guidelines with fidelity.[13] There is a body of literature investigating the role of decentralisation in determining policy responses, and potentially health and economic outcomes, during the COVID-19 pandemic.[14–16] In many countries, policy responses were centralised during the early phases of the pandemic to address the need for national resources and a coordinated response, with many systems returning to decentralised authority over time.[14 17–22] Investigating the interplay of national policy guidance and local policy implementation is crucial for understanding effective emergency response in decentralised health systems.

In Uganda, health service delivery responsibility is devolved to subnational units. The ministry of health (MoH) oversees health policy and supervision, while LGs ensure access to quality health services through annual planning and management. During the COVID-19 pandemic, the MoH distributed guidelines for maintaining essential health services, but implementation of many adaptations was under the districts' control. Existing evidence documents the impact of COVID-19 on essential services like maternal health, family planning and immunisation at the national level in Uganda, and local-level adaptations were identified by stakeholders as crucial for maintaining the delivery of essential health services.[23–28] Performance in maintaining essential services, however, varied across regions and districts in Uganda, highlighting possible inefficiencies or inequities in the capacity to respond to the challenges of the pandemic and implement local health system adaptations.

This study explored the translation of national policy into local implementation during the COVID-19 pandemic in Uganda. We defined the formal decision-making authority of LG health officials using the MoH's guidelines for maintaining essential health services. We measured implementation fidelity (or the adherence to national policy) at the district level, assessed variations in guideline adherence across districts and health system functions, and estimated the associations between guideline implementation and local health system performance in maintaining maternal, family planning and child vaccination services during the pandemic's first year. This research aims to guide future emergency management in Uganda and other decentralised contexts. This research adds to the literature evaluating the implications of decentralised governance in the COVID-19 response by measuring and linking subnational implementation of national guidelines to local health system resilience using routine health data and original survey data. Uganda is an interesting case study to explore this question due to its extensive decentralised governance structure coupled with variations in LG decision space and capacity.

METHODS

Study context

Health systems governance

Decentralisation in Uganda began in 1986 and was formalised by the Local Government Act in 1997, transferring public service delivery responsibilities to district and city LGs.[29] The MoH oversees health policy and supervision, while LGs ensure access to quality health services through annual planning and management. LG responsibilities include medical and health services, maternity and child welfare, disease control, emergency referrals, sanitation, health education, water quality monitoring, private sector supervision and enforcement of health acts.[30]

In Uganda, district local government councils (LCVs) are led by technical (chief administrative officers or CAOs) and elected political (LCV chairpersons) officials. The district health committee governs the health sector politically, while the technical arm consists of district health teams (DHTs) and district health management

teams (DHMTs), including the District Health Officer (DHO). This technical arm reports to the CAO at the district level and to the MoH at the central level.[31]

During the COVID-19 pandemic, district task forces and district rapid response teams led the local response, guided by the National Task Force and MoH.[32] The MoH issued standard operating procedures for all sectors. Local council I at the village level managed tasks such as granting driving permissions to pregnant women and others during lockdowns. Non-emergency motor movement required approval from the resident district and city commissioner, the president's appointed representatives in districts and cities.[33]

Health financing

Districts receive funding from the central government via sector-specific conditional grants, unconditional grants and equalisation grants. In fiscal year (FY) 2019–2020, over 95% of district revenue came from central government transfers, with 81% from conditional grants.[34] While districts can raise revenue, it is negligible. Government of Uganda (GoU) funds tertiary healthcare facilities through a mix of direct payments and budget transfers to LGs. These health grants, allocated based on a formula, are split into wage, non-wage and development components for managing healthcare facilities, including district hospitals and health centres.[30 34] During the COVID-19 pandemic, an additional budget was allocated for interventions related to the pandemic response.[35] It is illegal to charge user fees in public facilities, except for private wings in public hospitals.[36]

Research question and conceptual framework

With this research, we aimed to answer the following question: is variation in district performance for maintaining essential maternal, family planning and child vaccination services associated with variation in district implementation of the MoH's guidelines for continuity of essential health services during the first year of the COVID-19 pandemic? In framing and answering this research question, we drew on several conceptual frameworks, including frameworks describing decentralisation's impacts on health system performance via local 'decision space',[4 6] health system resiliency and performance during emergencies[10 37] and health system building blocks[38] (figure 1). We divided the building block of 'health information systems' to include the functions of 'monitoring' and 'coordination and communication' and additionally expanded the 'essential medicines' category to include infrastructure and commodities. We considered the MoH's 'Guidelines for Continuity of Essential Health Services during the COVID-19 pandemic' to codify local health system (ie, district) *de jure* decision space and aimed to measure the *de facto* decision space via district implementation of these guidelines.[39] Some of the guideline components directly rely on national government and development partner inputs. These are assessed separately. For our performance outcome, we considered the relative change in service outputs during the first year of the pandemic as a measure of the local health system's ability to adapt to shocks and minimise disruptions to essential services during emergencies (described more below).

Study design, sample and measures

This study proceeded in three steps. First, we assessed local health system performance for maintaining essential service delivery during the first year of the COVID-19 pandemic. Second, we used original survey data to measure district implementation of national guidelines for maintaining essential health services. Lastly, we assessed associations between local health system performance and guideline implementation.

Local health system performance for maintaining essential services (outcome)

We used facility-level data from Uganda's Health Management Information System (HMIS) and an interrupted

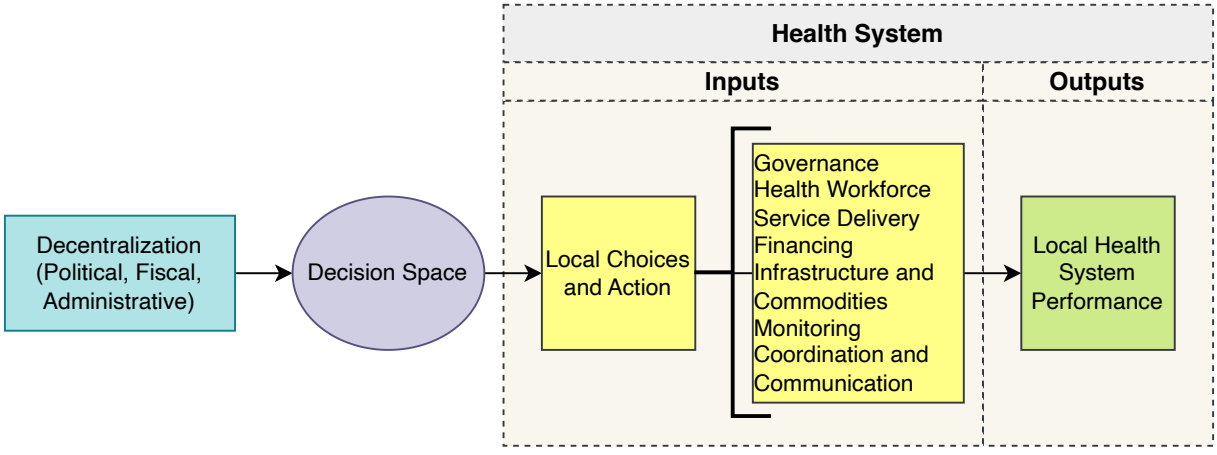

Figure 1 Stylised diagram linking decentralisation, decision space and health system inputs and outputs. *Note:* adapted from Dwicaksono and Fox[4] and Bossert.[6]

time series analysis to quantify the magnitude of the impact of COVID-19 on health service utilisation across maternal, family planning and child vaccination service indicators (approach summarised in online supplemental figure 1). We downloaded monthly service volume data from January 2018 to March 2021 for the 13 indicators in online supplemental table 1. We included facilities in the analysis for each indicator that submitted at least 10 HMIS monthly reports in the 12 months post-COVID-19 (ie, from March 2020 to March 2021), so that we did not include facilities that stopped reporting during the COVID-19 pandemic (this reduced the number of included facilities by 1%–2% depending on the indicator). We included public, private-for-profit and private-not-for-profit facilities at all levels (including national referral hospitals, regional referral hospitals, general hospitals, health centres II/III/IV and clinics).

Our outcome measure for the analysis was the relative change in service volume for maternal health, family planning and child vaccinations by district in Uganda, comparing observed levels of service delivery to predicted levels in the absence of the COVID-19 pandemic (derived from the analysis of HMIS data). The outcome performance measure was estimated for each indicator and district separately, and the average decline in service volume across indicators in each service group (ie, family planning, maternal health and vaccinations) for each district was used as the outcome for the multivariable linear regressions (described more in '*Statistical Analysis*' below).

We first used an interrupted time series linear regression to estimate whether there were any changes in the level of service outputs for each of the family planning, maternal, and child vaccination indicators in each month after the COVID-19 pandemic began in March 2020 through March 2021.[40 41] The regression model included month and district fixed effects. The model specification was as follows:

$$Y_{it} = \theta + \beta_1 Time + \beta_{2...14} Pandemic\ Month + \phi + \delta + \epsilon_{it}$$

Where Y_{it} is the number of people using or visits for a given health service in a given month-year t and district i; θ is a constant; time is a variable equal to 0 in January 2018 and increasing by one unit in each subsequent month to account for secular trends; $\beta_{2...14}$ are indicators for each post-COVID-19 month from March 2020 to March 2021; ϕ is a fixed effect for calendar month to account for seasonality; δ is a fixed effect for the district. Standard errors were clustered at the district level to control for any remaining within-district error correlation over time. The coefficients of interest are $\beta_{2...14}$, which represent the average change in the level of health service utilisation in each post-COVID-19 month compared with the same month in the absence of COVID-19.

After estimating the interrupted time series regression, we used the fitted regression model to predict a counterfactual level of health service outputs for each district in the absence of COVID-19 by extending the pre-COVID-19 monthly trends through to March 2021 (ie, setting $\beta_{2...14}$ equal to zero). We generated counterfactual levels of health service utilisation separately for each indicator and district. We compared the expected number of visits/outputs in the absence of COVID-19 to the actual observed number in each post-COVID-19 month to quantify the magnitude of the impact of COVID-19 on health service utilisation for each indicator and district. We then summarised the average relative change for each district across indicators in each indicator group (ie, family planning, maternal health and vaccinations), which is the 'performance outcome'.

District implementation of national guidelines (explanatory variable)

Surveying local health system officials was necessary to systematically measure the implementation of national guidelines across districts. To sample districts for the survey, we used the district-specific measure for the maintenance of essential health services derived from the analysis of HMIS data described above. We ranked districts by performance and categorised them into terciles of either low, medium or high performance in maintaining essential services. We sampled districts to survey using stratified random sampling and the performance terciles. We sampled two 'high' performing districts and two 'low' performing districts (using the performance terciles) in each of Uganda's 15 regions and Kampala to ensure regional representation and performance variation. When a low- or high-performing district was unavailable in a region, it was replaced with a 'medium' performing district (n=7 'medium' performing districts were included). The districts sampled (n=57) for the survey and their resilience ranking are in online supplemental table 2.

The survey was designed to be answered by the DHO and DHT members and asked questions organised by health system functions including governance, health workforce, service delivery, health financing, infrastructure and commodities, monitoring and coordination and communication. The survey questions were based on the guidelines published by the MoH in August 2021 called 'Guidelines for Maintaining Essential Health Service Delivery in the Context of COVID-19'.[39] The survey was fielded in July 2022 via a web-based platform (KoboToolbox). More than one individual could provide answers to the survey (with only one answer allowed per question for each district), and respondent(s) for each section were recorded in the web-based survey form. All survey respondents provided informed consent before participating in the survey. The survey was piloted in three districts (not included in the analysis) and feedback incorporated in the survey instrument prior to deploying to the full sample. The online supplemental appendix contains the district survey tool.

We used district survey responses for relevant questions to calculate an 'implementation summary score' by health system function, service group and overall.

Questions for which districts reported 'yes' were given a value of 1, and values were added up for a total score within each health system function for each district. The total score for each district was divided by the total possible points for that health system function to yield a value between 0 and 1 that represents the proportion of guidelines within that health system function that the district reported completing or implementing. In addition to summary scores by health system function, we calculated a total score across all health system functions for each district. We also calculated service-specific implementation summary scores that included questions that were specific to either family planning, maternal health or child vaccination services within and across the health system functions of service delivery, infrastructure and commodities and health financing (these were the functions with service-specific guideline questions). Additionally, we separated out guideline questions related directly to national government and development partner inputs and actions into a separate category of summary scores. The questions and responses used to calculate the various implementation summary scores can be found in online supplemental table 3. This index-like scoring method was modelled after the quality-of-care literature and similar work that summarise reported implementation of maternal health signal functions into quality indices.[42–45] This scoring method is also used in an analysis of subnational implementation fidelity of a national health programme in Nigeria.[46]

District-level covariates

We included several district-level covariates that may be associated with both our outcome (performance in maintenance of essential health services during COVID-19) and explanatory variable of interest (implementation of national guidelines). These included measures of district population size, per cent urban population, health budget allocation, overall health sector performance and COVID-19 test positivity rates during the first year of the pandemic. For population size, we included the average projected district population size in 2020 and 2021 from the Uganda Bureau of Statistics (UBOS).[47] We also used urban versus rural population size estimates (averaged over years 2020 and 2021) to construct a per cent urban variable for each district from UBOS.[48] For health budget allocation to districts, we used average district-level health budget allocation in FYs 2019–2020 and 2020–2021 from the Ministry of Finance, Planning, and Economic Development (MOFPED).[49] We also included a covariate for district-level performance in the health sector in 2019 from MOFPED's LG performance assessments.[50] Lastly, we included district-specific COVID-19 test positivity rates (calculated as the number of positive tests divided by the total number of tests) from March 2020 to March 2021 from the MoH's Central Public Health Laboratories COVID-19 Dashboard.[51]

Statistical analysis

We analysed the proportion of districts that reported implementing each guideline (scored as 1 for 'yes'; online supplemental table 3). We calculated average implementation scores across all districts by health system function, service type (where relevant) and region (Northern, Eastern, Western and Central). We also provided separate summaries for actions by the national government and development partners.

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To assess the relationship between guideline implementation and local health system performance during the first year of COVID-19 (March 2020–March 2021), we ran a series of linear regressions for each of the three service category performance outcomes (maternal health, family planning and child vaccination services). Each regression adjusted for district-level covariates including district population size, percent urban population, health budget allocation, health performance score and COVID-19 test positivity rate during the first year of the pandemic. We also incorporated region fixed effects to control for time-invariant differences across regions and used cluster-robust standard errors at the region level in all models. For each service category outcome, we explored associations with both overall and service-specific implementation summary scores, as well as implementation summary scores by health system function.

Patient and public involvement

Patients or the public were not involved in the design, conduct, reporting or dissemination plans of this study.

RESULTS

Survey sample

Out of the 57 sampled districts, 42 (74%) completed the survey. Across the 42 districts, 57 respondents contributed answers to the survey, with DHOs (n=19) being the most common respondent, followed by medical/nursing/clinical officers (n=9) and assistant DHOs (n=8). On average, 82% of respondents reported serving 2 years or more in their current position, and 89% reported serving 2 years or more in any position in the district (table 1).

District implementation of national-level guidelines

On average across districts, 58% of guidelines were reported implemented by districts in the first year of the COVID-19 pandemic (figure 2A). On average, the coordination and communication (mean=0.93) and monitoring (0.88) functions had the highest implementation summary scores, while financing (0.33) and service delivery (0.43) had the lowest average scores (figure 2A and online supplemental table 4). By service category, 40% of guidelines specific to family planning and maternal health service delivery, financing and infrastructure and commodities were reported implemented on average across districts, while 58% were reported implemented for vaccination-specific questions (figure 2B). Figure 2C presents total implementation summary scores

Table 1 Position characteristics of survey respondents from 42 districts

Position	Number of respondents	Number serving 2 years or more in position	Per cent serving 2 years or more in position	Number serving 2 years or more in the district (any position)	Per cent serving 2 years or more in the district (any position)
District health officer	19	14	74%	17	89%
Medical/nursing/clinical officer	9	7	78%	9	100%
Assistant district health officer	8	8	100%	7	88%
Other district officials (finance, human resources, etc)	6	4	67%	4	67%
Biostatistician	5	5	100%	5	100%
Senior health educator	3	3	100%	3	100%
District health inspector	2	1	50%	2	100%
District planner	2	2	100%	2	100%
Medical superintendent	2	2	100%	2	100%
Cold chain technician	1	1	100%	0	0%
Total or Average	**57**	**47**	**82%**	**51**	**89%**

42 districts completed the survey. A total of 57 individuals contributed responses to the survey across the 42 districts, as more than one respondent could contribute answers for each district. Only one answer was allowed per question per district. The bottom row in the table represents the total or average value for each column.

across districts. There is not much meaningful variation across regions in implementation summary scores (online supplemental figure 2 and table 5).

Below we summarise key questions by health system function. The proportion of districts reporting 'yes' for each guideline question can be found in online supplemental table 3.

Governance

Key questions in the governance function focused on the development of local guidelines, defining essential health services, participating in national coordination committees and the ability to prioritise the health sector during the pandemic. Almost all districts (95%) reported being aware of and using guidelines for maintaining essential services, and 69% reported having a District Task Force subcommittee on the continuity of essential health services that met at least biweekly. However, only 40% of districts reported defining core and essential health services which should continue in the district (and those that can be delayed).

Health workforce

Questions relating to the health workforce assessed modifications to workforce roles, compensation, training and support during the pandemic. A high percentage of districts implemented task-shifting (90%), provided training (93%), and implemented modifications to provider cadre responsibilities (79%). However, few districts (14%) identified retirees to return to work, and only 36% provided compensation or rehabilitation services for those infected with COVID-19 at work.

Service delivery

Questions on service delivery adaptations examined how districts ensured access to essential health services through transportation permits during lockdowns, community outreach and alternative service delivery models. While all districts provided travel permits to health workers, mothers and drivers during lockdowns, very few districts used web-based platforms for, for example, outpatient visits (7%).

For family planning services, a little over a third of districts provided community-based delivery of contraceptive injections (38%) or pills (40%), allowed for self-injection/self-administration of pills (33%), or conducted active outreach for family planning counselling or medicines. About half allowed for multimonth prescriptions of contraceptive pills (52%). Very few districts used web-based platforms for family planning counselling (7%) or task-shifted family planning counselling (26%) or medicines (31%) to community-based teams.

For maternal health services, less than half of districts allowed for multimonth prescriptions for iron supplementation (48%), provided community-based delivery of iron supplementation (40%) or Intermittent Preventive Treatment for malaria for pregnant women (40%), or conducted active outreach for antenatal care (40%). A small proportion of districts used web-based platforms for postnatal (10%) or antenatal care (10%) or

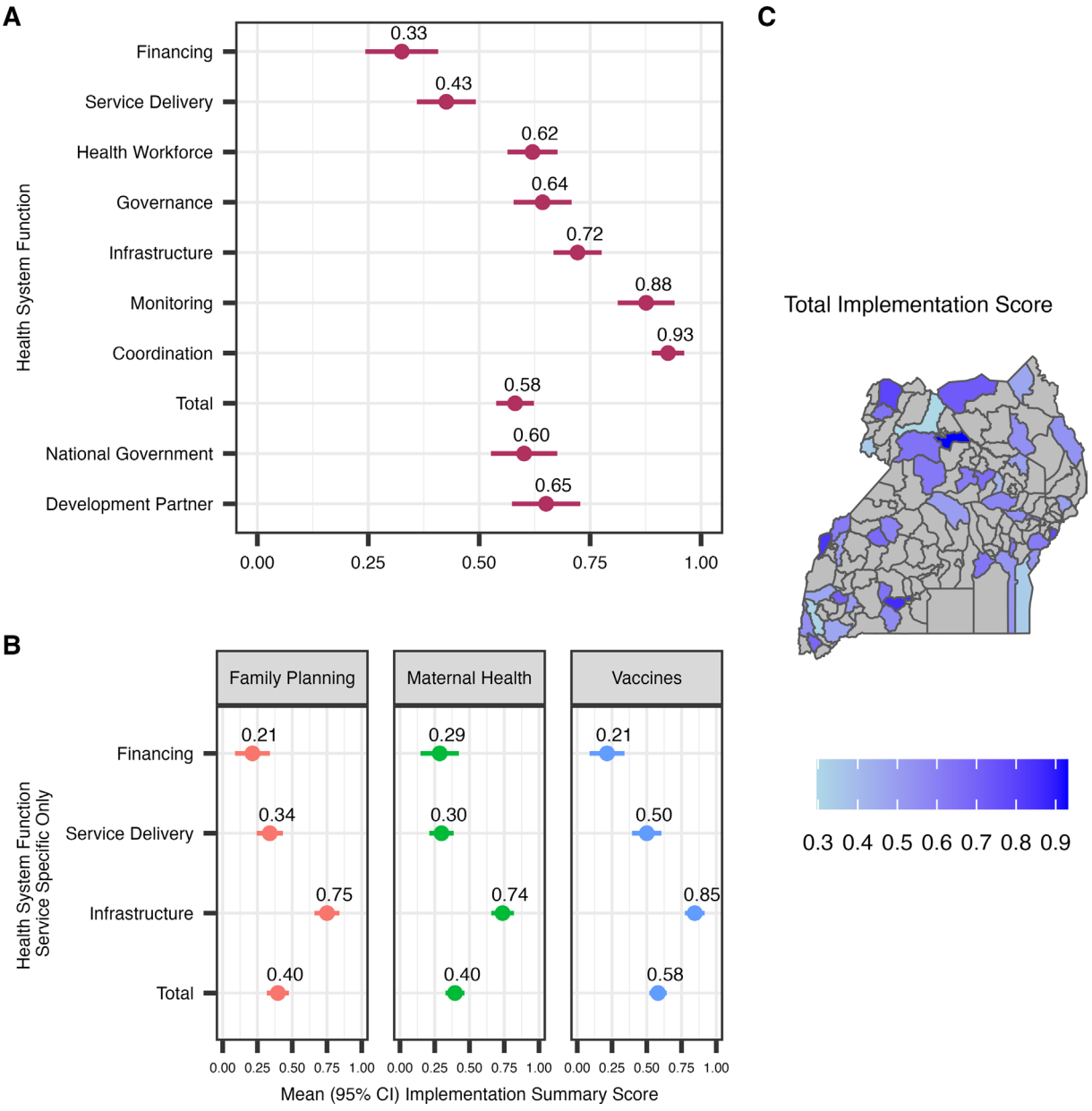

Figure 2 Distribution of guideline implementation summary scores by (A) health system function, (B) service category and (C) district (n=42). Points represent the mean value and lines represent the upper and lower bounds of the 95% confidence interval in (A) and (B).

task-shifted postnatal care (29%) and antenatal care (26%) to community-based teams.

For vaccination service delivery, most districts conducted active outreach for routine childhood vaccination (64%), and a little over a third task-shifted routine childhood immunisations to community-based teams (36%).

Financing

Financing questions were asked about district allocation of funds for the COVID-19 response, essential services, and support to private healthcare providers. A majority of districts (76%) allocated funds to facilities for referral and transport costs, while fewer districts allocated their own revenue to the COVID-19 response (24%) or for maintaining essential services (14%). For service-specific financing, 21% of districts reported submitting a budget for family planning services and child vaccination services, while 29% reported submitting a budget for maternal health services in their COVID-19-specific budget submission.

Infrastructure and commodities

Questions related to infrastructure and commodities focused on the availability and management of essential medicines and infrastructure such as cars, equipment and temporary facilities. Most districts reported mobilising and redistributing commodities that were overstocked in district stores (93%), and 55% of districts reported ordering higher levels of commodity or medicine stock

to ensure continued availability. Most districts reported monitoring commodity stock. About half of districts reported never experiencing stock-outs or being able to order or find additional stock of maternal health commodities when needed, 60% reported never experiencing stock-outs or always being able to order or find supplemental stock for family planning medicines, and almost three-quarters of districts reported never experiencing stock-outs or always being able to find supplemental stock of child vaccinations.

Monitoring

Monitoring questions asked about whether and how districts monitored ongoing delivery of essential services. Almost all districts reported monitoring essential service delivery (98%), with the most common monitoring tool being HMIS (95%) followed by communication with facilities and healthcare workers (83%).

Coordination and communication

Questions on coordination and communication covered how districts liaised with providers and communicated changes in service delivery to the public. All districts reported using traditional (ie, radio or ads) or social media for communication on adjustments to service delivery, while 81% of districts reported liaising with private sector providers to mobilise support for continued delivery of essential services.

National government

These questions focused on ascertaining support from the national government regarding training, staff and funding. Most districts (71%) reported receiving sufficient training from the national government to continue essential health service delivery, while 57% reported receiving budget allocation specifically for ensuring the continuity of essential services (compared with 88% reporting receiving funds specifically for the COVID-19 response). Only 24% of districts reported receiving additional staff from the government to increase health workforce capacity.

Development partner

These questions explored support from development partners for the COVID-19 response. A high percentage (88%) of districts reported receiving personnel or staff from development partners or non-governmental organizations to support the COVID-19 response in any way. Many districts reported receiving guidelines or protocols for the delivery of essential services from development partners or non-governmental organizations (69%), 76% reported receiving technical assistance to define essential services and 36% reported receiving funding from partners to maintain essential service delivery.

Performance in maintaining essential health services

On average, essential health service delivery reduced in the first three months of the pandemic (March–May 2020) for maternal health (−6.6% change in service delivery outputs compared to the expected volume without COVID-19), family planning (−18.2%) and child vaccination (−16.5%) services (table 2). Across the first year (March 2020 to March 2021), service delivery outputs rebounded for maternal health (4.1%) but remained below expected levels for first-dose child vaccinations (−17.0%) and family planning (−2.2%).

Results were similar in the sample of districts that completed the survey (n=42). Essential health service delivery reduced in the first three months of the pandemic (March–May 2020) for maternal health (−6.4% change in service delivery outputs compared to expected volume without COVID-19), family planning (−13.9%) and child vaccination (−17.6%) services. Across the first year (March 2020 to March 2021), service delivery outputs rebounded for maternal health (3.5%) but remained below expected levels for first-dose child vaccinations (−12.6%) and family planning (−3.6%). Average performance for the full survey sample (n=57) and survey non-respondents (n=15) can be found in online supplemental table 6).

Association of implementation summary scores with performance in maintaining essential health services

For child vaccination services, districts that reported submitting a budget for routine child immunisation in their COVID-19-specific budget submission had better performance in maintaining these services. An additional point on the vaccine-specific financing score (corresponding to moving from 0% to 100% of guidelines reported being implemented) was associated with 12.3 percentage points (1.9–22.7, p-value=0.02) better

Table 2 Mean relative difference (%) in observed service delivery outputs during COVID-19 from expected volume without COVID-19 by health indicator group

	First three months, national sample	First three months, survey respondents	Full year, national sample	Full year, survey respondents
Maternal health (%)	−6.6	−6.4	4.1	3.5
Family planning (%)	−18.5	−13.9	−2.2	−3.6
Vaccines (%)	−16.3	−17.6	−15.4	−17.0

The table presents relative differences in service delivery outputs across the first three months (March–May 2020) and first year (March 2020–March 2021) for the full national sample of districts (n=136) and survey respondent districts (n=42).

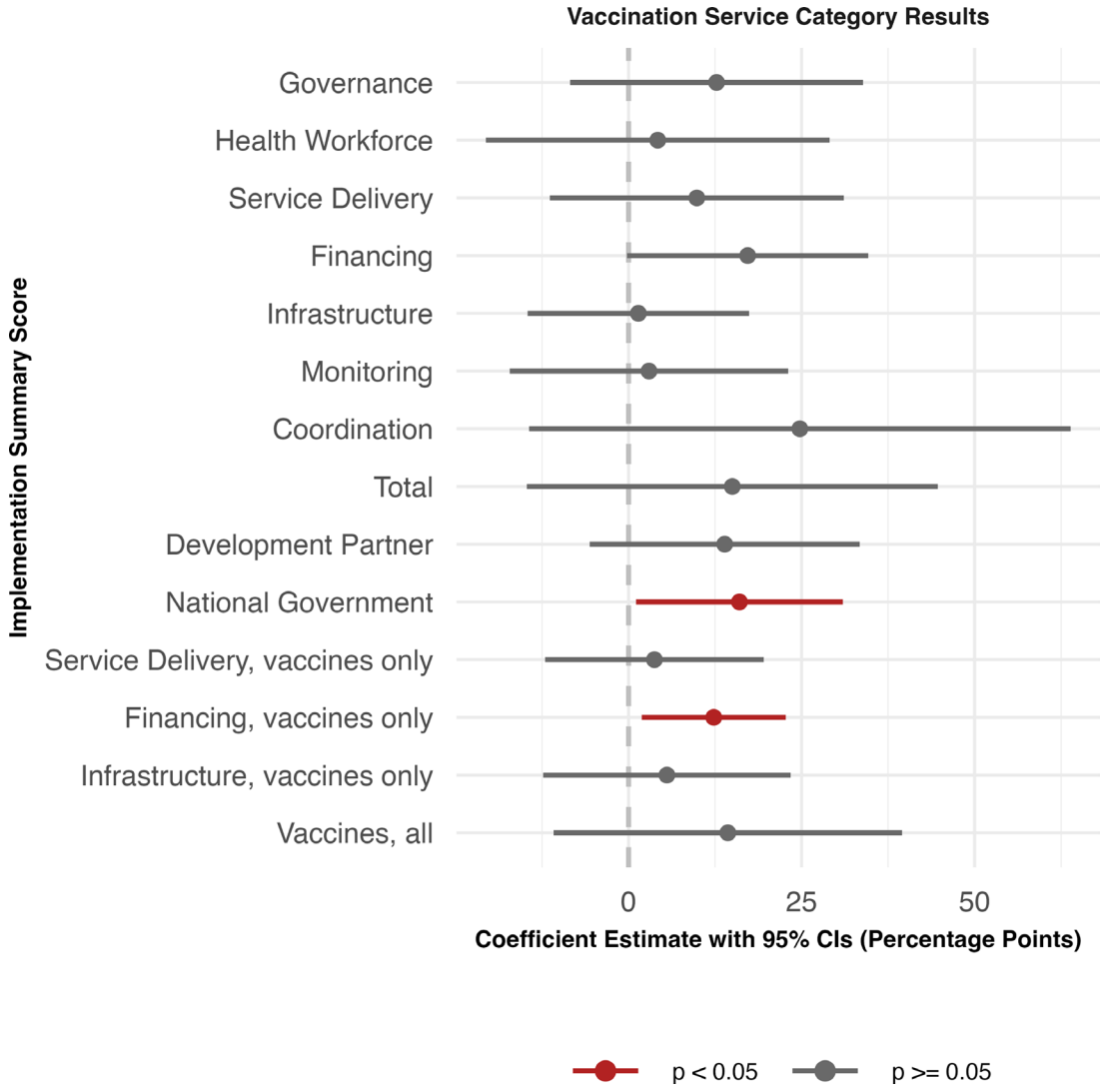

Figure 3 Associations between guideline implementation scores and maintenance of essential child vaccination services during the first year of the COVID-19 pandemic (March 2020–March 2021). *Note:* coefficient values are from a linear regression model of the relative difference in vaccination service outputs during the first year of the COVID-19 pandemic (March 2020–March 2021) compared with a no-pandemic counterfactual (dependent variable) on implementation summary scores for each district in the survey (explanatory variable). All models include an indicator for the 15 regions in Uganda and cluster-robust standard errors clustered at the region level. The model additionally controls for district population size, percent urban population, health budget allocation, health performance score (from Uganda's 2019 local government performance assessment) and COVID-19 test positivity rates for the first year of the pandemic. Point estimates and 95% confidence intervals (CIs) are shown in the figure. All regression results can be found in online supplemental table 7.

performance in maintaining essential vaccination services (figure 3).

Districts that reported receiving national government support—such as sufficient training, additional government healthcare workers and funding allocation for COVID-19 and essential health services—performed better in maintaining child vaccination services. An additional point on the national government summary score was associated with 16.0 percentage points (1.1–40.0, p-value=0.04) higher performance in maintaining essential vaccination services (figure 3). We did not find any significant associations for maternal health or family planning services. The regression results for each model can be found in the online supplemental table 7.

DISCUSSION

This study provides a comprehensive analysis of district implementation of national guidelines during the COVID-19 pandemic in Uganda. Our study highlights variations in implementing national-level guidelines across health system functions, suggesting potential inefficiencies and inequities in local capacity and resources to effectively respond to health system emergencies. This variation may exacerbate existing health disparities across geographies. The observed variation in district performance and implementation of national guidelines raises questions about the impact of administrative unit proliferation on lower levels of the health system.[52] In Uganda, the number of districts has increased significantly—from

39 districts in 1995 to 136 districts and cities in 2022 and 146 districts and cities in 2023. Increasing the number of districts and fragmenting existing government structures may have reduced intergovernmental bargaining power and capacity at lower levels, effectively recentralising power and impacting the ability to effectively implement guidelines during the COVID-19 pandemic.[52–54] Previous research in sub-Saharan Africa, including Uganda, found diminishing returns in terms of efficiency gains and public service provision quality due to administrative unit proliferation. Gains from resource redistribution to underserved areas may be eclipsed by additional administrative costs and losses of economies of scale as territorial boundaries fragment.[55]

Variation in district implementation of national guidelines may also be related to the de facto decision space, capacity and resources that local health system actors exercised before the COVID-19 pandemic. In Nigeria, districts that were better able to maintain primary care service delivery during COVID-19 reported fewer pre-existing health system challenges that constrained their response.[56] Across eight LMICs, reported challenges to maintain primary care services during COVID-19 were also found to be related to pre-existing health system challenges.[57] Previous research on the decision space of DHMTs in Uganda highlighted local variation in decision space, where some DHMTs used more decision space than allocated by law.[58] This research acknowledged that districts need more control over resources to implement local decisions effectively. Although districts control service delivery, the national government controls financing to the districts through conditional grants and must approve local budgets and plans.[59] The limited financial autonomy of districts and attempts to recentralise authority contribute to limited pre-COVID-19 levels of district decision space in Uganda.[31] Additionally, concerns about inadequate health sector financing overall persist. Although government expenditure on health in real terms is increasing, it remains low as a percentage of Gross Domestic Product (GDP), limiting resources available to districts for health service delivery even in non-emergency times.[60]

Variation across districts in implementing national guidelines may also relate to local leadership and political dynamics. In Uganda, relational power dynamics between district technical personnel and elected or appointed political leaders contribute to variation in local health system performance.[31 61 62] In Nigeria, states with governors who were committed to the health sector showed greater local implementation of a national health programme, and local leadership also proved key to maintaining primary healthcare services during COVID-19.[46 56] In our study, we did not measure specific aspects of each district's technical or political leadership, so we cannot assess how much of the variation in guideline implementation is due to leadership or local politics.

The variation in guideline implementation also points to the complexity of implementing guidelines at lower levels of the health system, especially in emergencies. Previous analysis highlighted the numerous guidelines in Uganda's healthcare sector, and the COVID-19 pandemic produced a surge in national guidelines for healthcare workers and local government units.[63] While awareness of guidelines in our study sample was high—95% of districts reported being aware of the MoH guidelines for maintaining essential services—limited funding and human resources may have hindered effective implementation. For example, despite high awareness, only 48% of districts reported having a DHT member on the national coordination committee for the continuity of essential health services, and 40% reported defining core and essential health services using national or locally contextualised lists. Still, the presence of guidelines for maintaining essential services during the pandemic were deemed essential for filling knowledge gaps of health workers in Uganda and globally.[26 64]

Certain health system functions, such as monitoring and communication, had higher implementation scores across all surveyed districts, possibly indicating areas that were easier to implement. Functions like monitoring and communication may be more adaptable during emergencies at the local level due to their relative flexibility and lower resource requirements compared with structural changes in service delivery that require national coordination or additional resources. In future emergencies, the MoH should consider which health system functions are more implementable at the local level and identify functions that require additional capacity building support or financing. It may be that certain emergency functions are more appropriately managed at the national level, as national governments may be better equipped to prepare, absorb and manage pandemic risks than LGs. The MoH should additionally monitor whether districts are able to implement the guidelines available to them, in addition to ongoing LG performance assessment conducted by MOFPED.

We found significant associations between district performance in maintaining essential child vaccination services and financing-related guidelines and inputs. For vaccine-specific financing, this included whether the district submitted a budget request for routine child immunisation services in their COVID-19-specific budget. We also found associations with national government-related scores, including support from the national government, such as receiving sufficient training to continue essential health service delivery, receipt of contract staff to increase health workforce capacity and receipt of allocations specifically for the COVID-19 response and ensuring continuity of essential services.

These findings emphasise the importance of health financing and the role of the central government in supporting subnational units in Uganda during health system emergencies. During the COVID-19 pandemic, Uganda allocated an additional US$31.0 million to support activities related to maintaining essential health services.[65] However, the MoH's COVID-19 Resurgence

Plan reported several gaps and challenges in response stewardship and coordination after the first year of the pandemic, including underfunding of districts, minimal linkage between central and district-level responses and ownership challenges across central and local levels that hampered response implementation.[65] Our study shows that districts that were better resourced and supported by the central government were better able to maintain essential child vaccination services.

We found associations between financing-related guidelines and the maintenance of essential child vaccinations but not with implementation summary scores for maternal health or family planning services. This lack of association could be due to residual confounding, low statistical power and potential measurement error. Unmeasured determinants like leadership and management, as well as demand-side factors, may play crucial roles in district responses and performance during emergencies but are not captured in our study. Vaccination service delivery may have been more sensitive to variation in guideline implementation compared with maternal health and family planning services, which cannot be as easily delayed or deferred.

This study has several limitations. First, it is possible that districts implemented adaptations to maintain essential service delivery in response to service disruptions and reductions, thus our analysis may be biased due to reverse causality. However, our analysis only assessed associations, so no causal interpretations should be made. Second, there may be concerns about the representativeness of the sampled districts due to stratified random sampling of high- and low-performing districts, but performance in maintaining essential services was similar between sampled and non-sampled districts (online supplemental table 6). Third, measurement error in exposure (guideline implementation) and outcome (performance in maintaining essential services) measures may bias findings. The survey was conducted digitally, and budget constraints prevented the validation of responses. The target respondents for the survey were district officials, and it is possible that facility- and patient-level data on actual activities and resources during the pandemic could provide a more precise understanding of district-level adaptations and on-the-ground reality. Answers to the survey may also have been different had a different district official completed the survey. In terms of outcome measurement, the set of 13 indicators for assessing the maintenance of essential services was selected based on consultation with the MoH's maternal and newborn health data officer; however, use of different indicators might produce different results. Although best practices were followed for cleaning HMIS data, service volume data quality might be insufficient. Relatedly, not all private health facilities regularly report into the HMIS system, so we are unable to fully assess whether demand for services shifted to the private-for-profit sector, as service volume for these facilities is less likely to be captured in HMIS (eg, about 50% of private-for-profit facilities report into HMIS compared with all government health facilities and almost all private-not-for-profit facilities). Fourth, it is also possible that our interrupted time series model was misspecified, such that our predicted service volumes in the absence of COVID-19 do not represent the true counterfactual. Fifth, our analysis may have limited power to detect effects given our relatively small sample size of districts included in the survey, but our analysis provides insights into potential effects. Finally, we did not adjust for multiple hypothesis testing in our regressions. As a result, some of the significant associations identified may be due to chance.

This study provides valuable insights into the variable implementation of national health policy across health system functions in Uganda's decentralised context during the COVID-19 pandemic. These findings highlight the necessity of closely monitoring district-level capacities and the execution of national policies, especially for health system functions that require structural changes, national intervention or additional funding.

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Acknowledgements We acknowledge funding from the Women and Public Policy Program (Harvard Kennedy School), the Michael Von Clemm Traveling Fellowship (Harvard T.H. Chan School of Public Health), and the Harvard Global Health Education and Learning Incubator. We are grateful for support and feedback from Michael Baganizi, Thomas Bossert, Sarah Byakika, Kevin Croke, Sue Goldie, Edith Kangabe, Steven Kikomeko, Paul Mbaka, Henry G. Mwebesa, Wilberforce Mugwanya, Jotham Musinguzi, Ian Nason, Sam Samwel Omwa, Gil Shapira, Christine Tashobya, Charles Zirarema, and members of the Ministry of Health Technical Working Group for Maternal and Neonatal Health. We would like to thank the 42 district planners and district officials who completed the survey. We would also like to thank the Ministry of Health for providing access to the electronic Health Management Information System data and approving the study. We thank Serena Zhao for research assistance.

Contributors DTS and CM conceptualised the study, and DTS acquired funding. DTS, AS, CM, FS and FEM designed the study tools, and DTS, AS and CM implemented the survey. DTS conducted data analysis and wrote the first draft. CO, JNS and BK supported the study implementation and provided input to the interpretation of study findings. All authors reviewed the manuscript and gave final approval for submission. DTS is the guarantor.

Funding Funders – Global Health Education and Learning Incubator (Harvard University) [Grant/Award Numbers: Not Applicable], Harvard Kennedy School Women and Public Policy Program [Grant/Award Numbers: Not Applicable], Michael Von Clemm Traveling Fellowship (Harvard T.H. Chan School of Public Health) [Grant/Award Numbers: Not Applicable] – had no role in the study design; collection, analysis, or interpretation of data; writing the report; or in the decision to submit the paper for publication.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants. This study was approved by the Makerere University College of Health Sciences, School of Public Health Research and Ethics Committee (SPH-2022-289) and the Uganda National Council for Science and Technology (SS1386ES). The Harvard T.H. Chan School of Public Health (Principal Investigator's Institution) deemed this research as exempt and not requiring IRB review. Approval was obtained from all local ethics committees. Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request.

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