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# Understanding maternity care providers' use of data in Southern Tanzania

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## ABSTRACT

**Introduction** Health information management system data is collected for national planning and evaluation but is rarely used for healthcare improvements at subnational or facility-level in low-and-middle-income countries. Research suggests that perceived data quality and lack of feedback are contributing factors. We aimed to understand maternity care providers' perceptions of data and how they use it, with a view to co-design interventions to improve data quality and use.

**Methods** We based our research on constructivist grounded theory. We conducted 14 in-depth interviews, two focus group discussions with maternity care providers and 48 hours of observations in maternity wards to understand maternity providers' interaction with data in two rural hospitals in Southern Tanzania. Constant comparative data analysis was applied to develop initial and focused codes, subcategories and categories were continuously validated through peer and member checks.

**Results** Maternity care providers found routine health information data of little use to reconcile demands from managers, the community and their challenging working environment within their daily work. They thus added informal narrative documentation sources. They created alternative narratives through data of a maternity care where mothers and babies were safeguarded. The resulting documentation system, however, led to duplication and increased systemic complexity.

**Conclusions** Current health information systems may not meet all data demands of maternity care providers, or other healthcare workers. Policy makers and health information system specialists need to acknowledge different ways of data use beyond health service planning, with an emphasis on healthcare providers' data needs for clinical documentation.

## INTRODUCTION

Data on service provision from health facilities is considered vital for health system strengthening. This data, captured by Health Management Information Systems (HMIS), informs national and subnational health system performance monitoring including

## WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ Research into health service data and its use mainly focuses on performance and reliability of health management information systems, emphasising system-related and organisational determinants.
- ⇒ Little is known about data use at facility level, for example, by maternity care providers beyond quantitative health management information data and how different types of administrative and clinical data relate to each other and determine use.

## WHAT THIS STUDY ADDS

- ⇒ Maternity care providers felt alienated from the numeric nature of health management information system data because it neither fulfilled their need for clinical care, communication and service improvement nor for support and relationship building in a challenging working environment.
- ⇒ Health personnel added informal notes and registers to address their administrative and clinical data needs and appropriated existing data and documentation tools to create accounts of a social reality where they kept mothers and babies safe during labour despite workplace challenges.
- ⇒ Alienation of staff and complacency of immediate managers contributed to an organisational culture that lacked accountability for numeric data.

## HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ More research is needed to understand the complexity of official and informal documentation systems and data needs of maternity/healthcare providers to include their user perspectives.
- ⇒ Interventions to improve data quality and use may need to consider the multitude of clinical and administrative documentation forms and social data needs to avoid duplication and inefficiencies.
- ⇒ Data systems constitute an important part of health systems but depend on the functioning of other parts, such as supply or human resource management, that support an empowering working environment and a positive information use culture.

(1) monitoring and evaluation, (2) resource planning and (3) service management.<sup>1</sup> These purposes apply globally, although high-income countries mainly rely on electronic registries collecting individual patient data rather than aggregated facility data.<sup>2</sup> They also underscore the numeric nature of HMIS data.

In most low-income and-middle-income countries (LMICs) like Tanzania, the HMIS is organised around preprinted registers and forms filled by healthcare providers. Monthly summaries are later manually digitised into the District Health Information System (DHIS2).<sup>3 4</sup> Additional official forms of documentation are used at facility level (1) to support data generation for HMIS, for example, admission and discharge registers or (2) for decision making, for example, the partograph. Evidence related to the use of these documentation types is nonetheless scant.<sup>5 6</sup>

Studies frequently describe problems with HMIS data quality. Commonly cited findings are incorrect or incomplete recording in registers and a mismatch between registers, reporting forms and electronic DHIS2 data.<sup>7–10</sup> Studies suggest that these issues can be improved through increased supervision and feedback at facility level.<sup>11</sup> Underlying reasons for low data quality at healthcare provider level are, however, poorly understood.<sup>12</sup> Moreover, it has been suggested that data quality and data use are linked.<sup>13 14</sup> This is underscored by emerging evidence that health facility data are rarely used at district and facility level.<sup>15 16</sup> Apart from perceived low data quality, other factors explaining limited use were lack of (1) feedback, (2) accountability for data quality, (3) information-use culture<sup>17–20</sup> and the HMIS's unresponsiveness to shifting data demands and priorities.<sup>2</sup> The importance of an organisational culture emphasising data-informed decision making within health systems, coined as information-use culture or data-use culture is increasingly propagated to improve accountability and data use in LMIC.<sup>21 22</sup>

The problems described above raise concerns about the effectiveness of HMIS as the most suitable data collection system.<sup>2 23</sup> HMIS data collection processes and low data use may lead to a situation where clinical staff, such as maternity care providers (MCPs), perceive themselves as mere data producers, failing to use data for clinical care purposes.<sup>4 5</sup>

The aim of this study was to understand the processes and purposes involved in MCPs' use of data on healthcare provision in hospitals in Southern Tanzania.

## METHODS

We conducted this qualitative study with MCPs of two hospitals in Southern Tanzania between February and June 2021. The *Consolidated Criteria for Reporting Qualitative Studies* is used to report here.<sup>24</sup>

### Setting

In Tanzania, MCPs are responsible for HMIS documentation of maternity care using three preprinted registers

for (1) antenatal care, (2) labour and delivery and (3) postnatal care, daily tally sheets and monthly summary forms.<sup>25</sup> Since 2013, this data is subsequently digitised into DHIS2. HMIS documentation in the included district hospital was done accordingly. The regional hospital used an additional, locally developed electronic health information system collecting clinical and managerial information. Typically, healthcare providers receive infrequent training on HMIS mainly focusing on data entry and recurrent reallocation of staff contributes to attrition of knowledgeable staff.<sup>26</sup>

Management in included hospitals had repeatedly introduced supplementary documentation sources, for example, admission, referral and discharge registers (table 1). The partograph, recommended for labour monitoring by WHO, was introduced in 1994<sup>27</sup> and was subsequently integrated in preprinted clinical patient files. These documents supported completion of patients' antenatal care cards, HMIS tally sheets and summary forms. In 2015, the Tanzanian government had introduced an electronic hospital management information system with interfaces to existing digital systems like DHIS2<sup>28</sup> but this system was not functional in maternity wards during the time of data collection.

Our research was part of a larger study (*Action Leveraging Evidence to Reduce Perinatal Mortality and Morbidity in sub-Saharan Africa, ALERT*) to develop and evaluate an intervention to improve intrapartum care in four hospitals in Southern Tanzania.<sup>29</sup>

We included one district and one regional hospital from these four hospitals. The hospitals served a poor rural population living of subsistence farming.<sup>30</sup> District hospitals in Tanzania, with 100–175 beds, typically provide antenatal and postnatal care, routine labour and emergency obstetric care. Nurses and midwives at certificate or diploma level and non-physician clinicians or medical doctors work in maternity care. Regional hospitals have 176–450 beds and offer all the above with additional specialist care.<sup>31</sup> Like other hospitals in Tanzania, the included hospitals faced important human resource challenges with approximately half of the required nursing and clinical staff available.<sup>31</sup>

### Study design

We used a qualitative study design, based on constructivist grounded theory,<sup>32 33</sup> with (1) in-depth interviews (IDIs), (2) observations in maternity wards and (3) focus group discussions (FGDs) (figure 1).

### Sampling, recruitment, data collection and analysis

We report on sampling, data collection and analysis together in line with grounded theory.<sup>32 33</sup> Included hospitals were selected based on a heterogeneity assessment to ensure representation of hospitals in rural Tanzania.<sup>34</sup> A total of 14 IDIs and 48 hours of observations were conducted in February 2021. The two FGDs (11 participants), were conducted in June 2021. All MCPs working in maternity ward were eligible for IDIs

**Table 1** Main systems for collecting service provision data in maternity wards of included hospitals

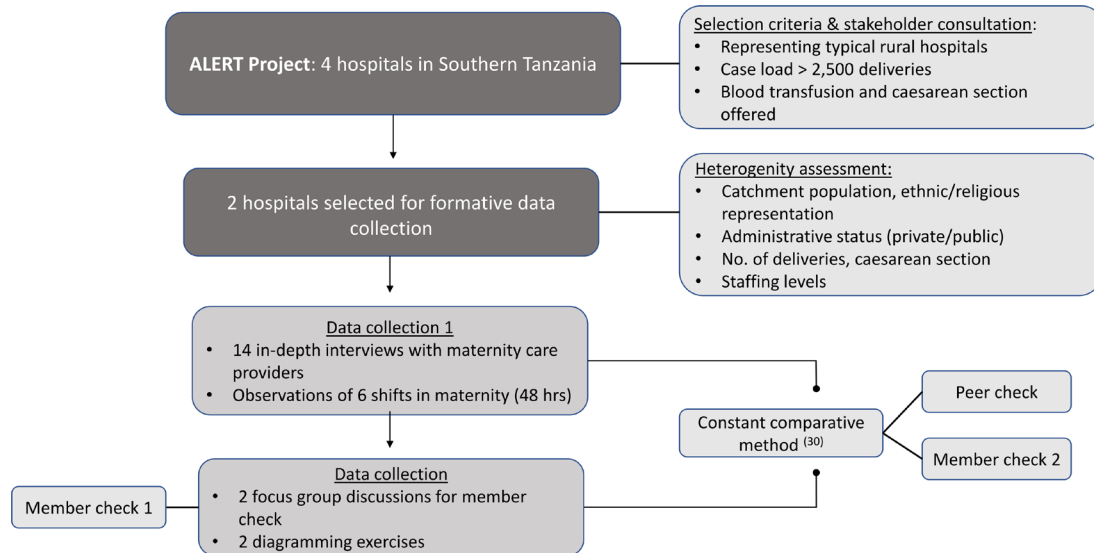
Name of system	Abbreviation	Components	Official purpose	Introduced by
Health Management Information System	HMIS	Printed registers, daily tally sheets, monthly report forms, DHIS2 software	Health system planning	Ministry of Health
Government of Tanzania Hospital Management Information System	GoTHOMIS	Electronic registry	Health system planning	President's Office - Regional Administration and Local Government
Antenatal Care Card	ANC card	Printed card handed out to client	Clinical documentation for decision-making	Ministry of Health
Electronic Information System (locally developed for one included hospital)	EIS	Electronic registry	Hospital management & planning, clinical management & decision making	Hospital management
Clinical patient file	–	Locally printed forms (admission, labour monitoring, delivery, postpartum care until discharge) Observation charts	Clinical documentation, support to HMIS documentation	Commissioned by Ministry of Health, Hospital management
Partograph	–	Form integrated in clinical patient file	Clinical labour monitoring, decision-making, number of completed partographs entered in monthly report form	Ministry of Health
Admission register	–	Hand-written register	Support to HMIS documentation	Hospital management
Discharge register	–	Hand-written register	Support to HMIS documentation	Hospital management
Informal documentation	–	Referral register Ward round register Maternal/newborn death register Shift report register Work plan register (district hospital) Theatre/Caesarean section register Equipment/supplies register (District hospital) Emergency drug register (Regional hospital) Loose paper notes	Various unofficial purposes	Nurse in charge of maternity together with maternity care providers

DHIS, District Health Information System.

and FGDs. We used theoretical sampling<sup>32</sup> to include a variety of cadres with experience in service documentation. Sampling for observations included all staff working in maternity wards at the time of observation (table 2). All but three IDI participants, not available on the day (one nurse-midwife, one medical doctor and one assistant medical officer) also took part in the FGD to allow for follow-up and in-depth questions based on a preliminary analysis of IDI transcripts.

MCPs received written and verbal information during initial encounters and could ask questions. IDIs, observations and FGDs were held at subsequent visits. We evaluated saturation continuously through simultaneous data collection and analysis to determine emergence of new information or topics.

Topic guides were grounded in previous research on HMIS data collection in Tanzania<sup>4</sup> and included topics like (1) data use and usefulness, (2) documentation



**Figure 1** Study design

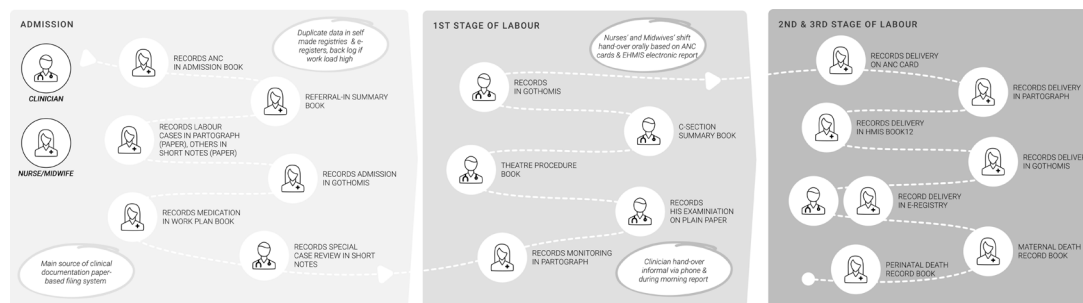
tools for different purposes and (3) views on data quality requirements, among others. They were developed in English, translated into Kiswahili and pretested. Topics for the FGDs were derived from continuous data analysis. We used diagramming adapted from user journey mapping<sup>35,36</sup> during FGDs to visualise MCPs’ data encounters<sup>37</sup> (figure 2). Observations included (1) which type of documentation was used, (2) how and at what time during maternity care and (3) how participants communicated about the information they had entered.

Observations took place at different times during daytime and night. IDIs and FGDs were held in separate hospital rooms with adequate audio-visual privacy. Interviews and FGDs were recorded and lasted 1–2 hours. Participants received refreshments and transport compensation from home.

Audios were transcribed verbatim in Kiswahili. Relevant quotes were translated into English. Observation notes and memos were taken in English. RU and FAA-B conducted initial coding on four transcripts in NVivo (NVivo V.12, QSR) for preliminary analysis. Parallel analysis during data collection was also guided by memo writing and daily debriefing with all data collectors. RU performed initial line-by-line coding and subsequent focused and theoretical coding<sup>32</sup> on the complete data set. Constant comparative analysis was used to explore differences between (1) individual transcripts, (2) data collection methods and (3) hospitals. Codes, categories and memos were continuously reflected for theory building through frequent peer check with FAA-B, HM-A, EM and ZJ. We conducted member checks during FGDs as part of the ALERT co-design process and at category

**Table 2** Demographic details of participants

Sex	Age group	Education	Occupation
Female	51–60	Diploma	Registered nurse-midwife
Female	51–60	Diploma	Registered nurse-midwife
Male	21–30	Diploma	Registered nurse-midwife
Male	31–40	Bachelor	Medical doctor
Female	21–30	Diploma	Registered nurse-midwife
Male	21–30	Diploma	Registered nurse-midwife
Female	51–60	Advanced diploma	Assistant medical officer
Male	51–60	Advanced diploma	Assistant medical officer
Male	21–30	Bachelor	Medical doctor
Male	31–40	Diploma	Registered nurse-midwife
Male	31–40	Diploma	Registered nurse-midwife
Female	51–60	Diploma	Registered nurse-midwife
Female	31–40	Certificate	Enrolled nurse-midwife
Male	21–30	Certificate	Enrolled nurse-midwife



**Figure 2** Example diagramming.

level (11 MCPs from four ALERT hospitals), to enhance trustworthiness.<sup>38 39</sup>

### Patient and public involvement

We did not involve patients or the public in this research due to the subject matter. They were not invited to contribute to design, analysis nor manuscript review.

### Reflexivity

The research team included early career researchers (RU and ZJ) and experienced researchers (FAA-B, EM, AP, CH and HM-A) from middle-income and high-income country institutions (see structured reflexivity statement in online supplemental appendix). RU, FAA-B, ZJ, AP and CH have medical backgrounds. HM-A and EM are medical anthropologist, social scientist. Three co-authors are male and four females.

FAA-B, RU and EM participated in data collection for IDIs and observational data with one social scientist and two nurses (all male) experienced in qualitative research. RU and ZJ collected FGD data. All had worked in the study area and speak fluent Kiswahili. The research team maintained an open conversation throughout data collection and analysis. All members have access to the data.

### RESULTS

We report results from IDIs and FGDs based on 4 categories and 12 subcategories, linking to one core category

(figure 3). Observations were used to triangulate what was said and are embedded where they illustrate or diverge from other findings.

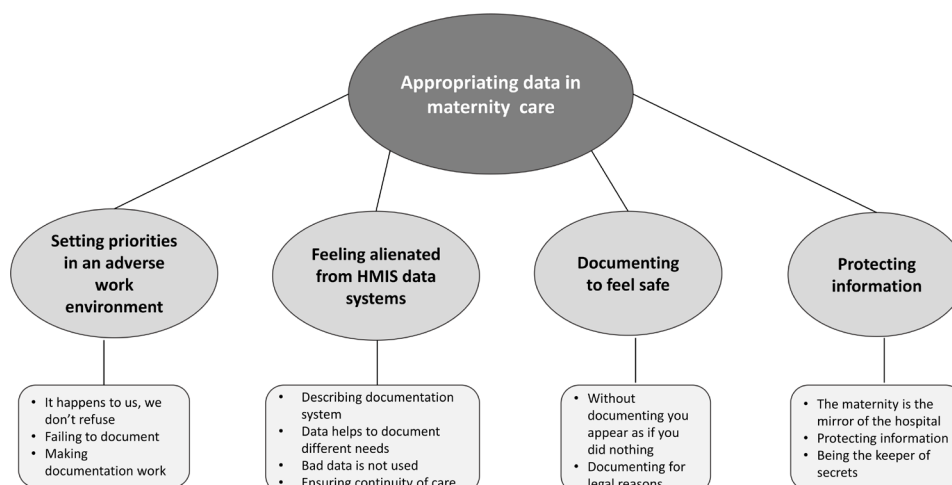
Our analysis resulted in a theoretical model that depicts how MCPs appropriate official HMIS data and informal data sources to preserve social relationships with various stakeholders of maternity care (figure 4).

### Category 1: Setting priorities in an adverse work environment

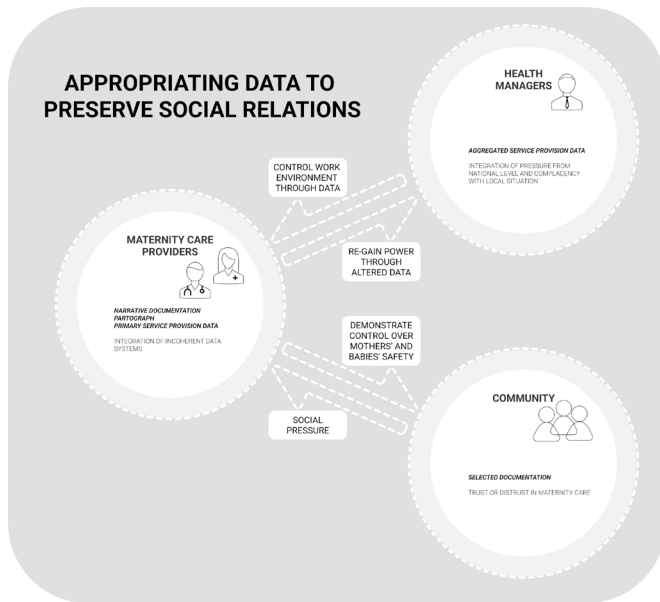
Participants described their difficult working environment and how this affected decision making regarding task prioritisation. Challenges included (1) low staffing levels, (2) high patient numbers and (3) occasionally, missing documentation tools, foremost hard copies of the partograph or antenatal care cards.

MCPs argued that they could not conduct documentation and care concurrently when number of clients and allocated tasks clashed: Participants explained that, with tools available and few patients, documentation was easy. In contrast, when managing emergencies or many patients, MCPs limited documentation to antenatal care cards only. Other documentation would then be done at shift end together which was also observed. This meant that information was frequently documented in retrospect. An important example of this dilemma was the documentation of fetal heart rate (FHR) during labour.

MCPs assigned a high theoretical value to the partograph during interviews, emphasising that they



**Figure 3** Core category, categories and subcategories. HMIS, Health Management Information Systems.



**Figure 4** Visual theory representation.

understood the importance of monitoring according to standards, and how they felt when they did not live up to this.

*30 minutes have passed I should quickly listen [to the fetal heart rate] again. And when I lose that time, I feel bad because it is not my intention to do so but the work is overwhelming.* (Interview Nurse-Midwife, female)

During observations however it was noted that FHR was measured infrequently, although partographs showed documentation of measurements every 30 min, but only one participant explained that FHR was only measured 4 hourly during maternal examination. This stands in contrast to the importance participants gave to the partograph as a professional tool, and at the same time shows the measures MCPs took to align professionalism with their work environment.

**Category 2: Feeling alienated from HMIS data**

Participants knew completing the HMIS was their task, although some would have preferred to employ data clerks for this. In addition, other documentation types were created to maintain reporting when HMIS registers were missing, or if electronic data collection systems failed. MCPs had also added separate registers to document deaths or for shift reporting. The same information was thus recorded in several documents since official registers still had to be completed once available. Apart from duplicate work this sometimes resulted in incongruent data between documentation sources.

*You must fill more than one register, even more than two... So, the time you spent on this is more than the care you provide.* (Interview Nurse-Midwife, male)

This quote illustrates how MCPs felt with regards to their primary tasks: Although they accepted that collecting data were part of their job, they preferred to

prioritise clinical work with the rationale that emergency cases or many women in labour had to be treated first.

MCP mentioned immediate usefulness as the main determinant of what constitutes good data.

*Good data is sustainable, meaning that you can collect this data then you go and use it, and it solves the problems that exist somewhere.* (Interview, Assistant Medical Officer, male)

This quote suggest reasons why MCPs may have shown little interest in collecting data they deemed not useful for their own purposes.

Participants described themselves as mere data producers, only receiving feedback when things went wrong. They reported not to use HMIS data in daily work.

*For now, I don't see anything [in terms of use]. We collect the information, we submit it, like there are 200 women who delivered normally, five had a Caesar [Caesarean Section]. That's it, you have already left it with the bosses, they have taken it and went with it.* (Interview, Nurse-Midwife, male)

The divide between MCPs' professional values and the need to collect data not perceived as useful, may have fostered a feeling of alienation leading to low accountability. Data accountability was rather seen as the outcome of an enabling environment created by management, thus outside MCP's responsibility. One Nurse-Midwife explained:

*My perspective concerning accountability is first we should have a friendly environment that will make everyone see themselves as the person responsible for completing the information.* (Interview Nurse-Midwife, male)

HMIS data was also perceived as a managerial means to control MCPs' performance or workload. Participants described using HMIS data to prove their hard work and, ultimately, to justify their employment in maternity.

*Yeah, you know, it is important to do [documentation] because without... you are perceived... as if on that day you haven't worked, you just sat there.* (Interview Nurse-Midwife, female)

This perception may have also contributed to reportedly low accountability and a drive to use HMIS coverage data in an unintended way, to make sure MCPs were seen as hard working and performing well despite the circumstances.

Participants described how other ways of documentation satisfied their immediate information need, for example, for communication about patient care, especially during shift hand-over. New informal documentation tools were often added either by the nurse-in-charge or MCPs to improve documentation after an incident, for example, a newborn death.

Most of these formats were informal narratives, and not necessarily reviewed by managers (table 1). They consisted of (1) paper notes, for example, from clinicians, who did not document on the partograph, (2) hand-written observation notes for shift hand-over, (3) little notebooks, for example, to document patient hand-over between theatre and maternity or (4) patient files



where cases were classified according to severity. A very important piece of added documentation in one hospital was a register to document medication and during observation midwives were seen reading it frequently or discussing it.

*...For those women with regular i.v. medication we have developed a work plan register that shows e.g., a mother receives powercef at this time, crystapen at that time ... You know, this really helps us not to forget to administer medication. So, this "that patient, I have forgotten", that doesn't occur.... (Interview Nurse-Midwife, female)*

This quote illustrates the type of information that was important to MCPs in their strategies to maintain control over their environment through developing processes to manage their workload, but also to be able to document that for example, a certain drug was out of stock. HMIS data could not serve this purpose due to its numeric format.

### Category 3: Documenting to feel safe

The partograph was portrayed as centrepiece of MCPs' documentation efforts to feel secure. Nurses talked about the importance of using the partograph and archiving it to access when mothers came back with a sick newborn. Partographs were kept together in piles in cupboards after they had been counted for the monthly HMIS report, but participants mused about the need to produce something in writing to reduce problems with the community they were so close to.

Apart from social risks of bad outcomes, like being blamed by the community, participants were also afraid of legal risks and written documentation seemed to help them cope with this.

*Yes, we all check [fetal heart rate], I count and write and the one who takes over from me also does that. So tomorrow, there is documentation showing that at 1:40 I have checked, and I have left [the patient] with you and from then on you have checked. And... [the document] will show what you did until that fresh stillbirth happened. And if the document doesn't exist, we will lock ourselves up [in jail]. (Interview Nurse-Midwife, female)*

Supervisors were aware of the challenges with partograph completion and complacent with data manipulation. They urged staff to fill incomplete partographs retrospectively, because the number of complete partographs was included in monthly reporting to higher level.

*...because the supervisor is here so if you don't fill, she will know and say: "look at that, here you haven't completed, complete this because if you don't, we will have a gap when we report [at the end of the month] and we will suffer. (Interview Nurse-Midwife, male)*

This quote depicts how MCPs also ensured their supervisors' safety from higher level reprimands through data manipulation. On the other hand, this exemplifies the pressure MCPs experienced to maintain relationships with supervisors who were health personnel and thus, their colleagues.

### Category 4: Protecting information

Participants argued that service provision data was hospital property and ensured that their documentation of provided care, or rather written scenarios of their perception of that care, were not shared with women and their companions.

*The mother cannot go [home] with the partograph since it is our property. There is a lot of confidential information written, so we keep them in our files which stay in a cupboard. (Interview Assistant Medical Officer, female)*

One reason cited by participants why women should not come close to the partograph, was that women could tear it apart during labour pain. This implies that labouring women were seen as out of their minds and may also allude to the perceived difficult working and documentation environment, MCPs found themselves in.

MCPs explained their role as keepers of secrets, their own and others', to preserve social integrity of the community to which they belonged.

*Hhmm, the most important is confidentiality because the people we serve, are the ones we are meeting in the streets. It is the community that surrounds us. So, the most important way to protect medical information is confidentiality. (Interview Assistant Medical Officer, female)*

Confidentiality was cited as one reason why companions should not enter maternity wards. On the other hand, we observed that companions were often asked to take clients' antenatal cards for registration even though it contained confidential information of the client, they might not be aware of, for example, a mother's HIV status. It was on MCPs to decide which information was confidential and which not.

### Core category: Appropriating data in maternity care

We identified MCPs' appropriation of data, to create a more desirable social narrative for themselves, their supervisors, and the community, as the core category for theory development (figure 4).

MCPs explained how (1) their own professional values, (2) their need for feeling safe during work and (3) the importance of maternity services for the community, often collided with their working environment and managerial pressure.

To make sense of these situations MCPs changed the meaning of health service data from the official health system perspective, that is, from the use by someone else, to a personal perception, where data provided them with a sense of control over (1) an environment that was perceived as adverse, (2) the community's opinion about maternity care and providers, and (3) managerial regulation of their work performance.

MCPs tried to uphold a positive image of their professional self and of the care provided, for their own sake and for the community, despite the challenges they were facing during their work. This is summarised by the quote below:

*We are a small number [of MCPs] but together we have decided that despite being so few we must document the things we do. It is important, because this is maternity, it is the mirror of the hospital.* (Interview Nurse-Midwife, female)

Altered FHR data, for example, could show that monitoring of fetal and maternal well-being was done according to standards and that ultimately good care was delivered.

Participants repeatedly emphasised the importance of documentation in general to underline their trustworthiness and to rebut managerial control. Altered HMIS data could also potentially conceal a situation, where more staff was available for fewer deliveries. During observation, we noted that indeed shifts were not always busy. Participants rarely mentioned these situations though, but rather described scenarios where either too many labouring women or women with serious complications met with too few staff.

Altered and appropriated partograph data assisted MCPs to feel safe when care went wrong, but other official data sources did not fulfil this need. Additional documentation sources were therefore created to ensure that communication and documentation supported MCPs in case problems with suboptimal care occurred. Immediate managers were complacent about alteration of partographs to meet their own requirements, thus facilitating data modification.

This complex situation of added documentation and appropriation of HMIS data for social purposes led to little accountability towards official data systems, their purposes and documentation in general.

Data could be altered or presented in a different way to safeguard social relationships, but it could also be withheld for the same purpose. MCPs and their managers closely lived within the community they provided care for, making them vulnerable in the context of their adverse working environment. Protecting their own documentation seemed thus important to reduce social disruption through breaches in confidentiality. On the other hand, MCPs had the power to choose whether to hold back or share their clients' sensitive health data, which may have contributed to their stand in the community.

## DISCUSSION

Our results suggest that MCPs integrated formal and informal service provision data to unite diverging influences from working environment, management, society and their professional perception into an alternative account of maternity care. HMIS data, the partograph and narrative documentation together embodied these different relationships (figure 4). This enabled MCPs to feel protected against litigation and disrupted social relationships. MCPs felt alienated from numeric HMIS data because it did not fulfil their own needs. Thus, they added handwritten records, and consequently, another layer of complexity to the already intricate HMIS. Healthcare managers were complacent with data modification

to meet their own data requirements. This led to low individual and systemic accountability towards quality and use of data.

### Core category: Appropriating data in maternity care

The concept of social dimensions of data and its use to construct realities of self, work performance or health has gained attention with increasing digitalisation of human life and interactions.<sup>40 41</sup> Lupton describes how a seemingly objective, quantifiable entity like personal data was used by lay people to make sense of their body and gain control over their health using self-tracking devices.<sup>42 43</sup> Research suggests that numeric data is not only embedded in social interactions but can also embody them. This notion has been applied to health service data regarding caesarean section in the United States and maternal mortality in Malawi.<sup>44 45</sup> Wendland depicts the apparent divide between seemingly neutral numeric indicators and how this evidence is contextually shaped. Other authors report, how numeric data is modified by healthcare providers to counteract pressure from health management in Burkina Faso, Ethiopia and Tanzania.<sup>5 6 46</sup> Our participants illustrated how they changed use and purpose of data (appropriation) by adapting HMIS data and creating narrative documentation, to construct a seemingly more trustworthy reality, with perceived control over (1) work environment, (2) managers' and (3) public reactions to their performance. Previous research by our group from Southern Tanzania also described MCPs' accounts on how data in official HMIS registers was altered to satisfy official requirements.<sup>4</sup>

Estifanos *et al* take a health system focus and emphasise on managerial pressure as a main driver for data modification in Ethiopia,<sup>46</sup> but we argue, that healthcare data is part of a more complex social, organisational and individual concept of power, alienation, accountability and social integrity (figure 4).

### Category 1: Setting priorities in an adverse work environment

Our findings depict how a challenging work environment shaped MCPs' appropriation of data to align professional, health system and societal priorities. Others have also described the environment of maternity care and documentation in Tanzania as *volatile*,<sup>47</sup> *complex*,<sup>6</sup> often constrained by a lack of human resources and commodities.<sup>48</sup>

Some authors imply that organisational culture may inform MCPs' view of their tasks. Research on the use of HMIS data including our own, suggests that MCPs need role models and support to develop a data perception led by accountability.<sup>4 8 22</sup> In line with our findings, MCPs in Burkina Faso and Ethiopia reported managerial complacency with data modification.<sup>5 46</sup> These experiences are likely to shape an organisational culture where data is used to safeguard social relationships as a coping mechanism within a complex environment.

### Category 2: Feeling alienated from HMIS data systems

Most research on health data focusses on official HMIS registers only.<sup>49 50</sup> Much less attention has been given to MCPs' efforts to increase use of data for clinical care, through added documentation: Strong describes how MCPs in Tanzania interacted with numeric data for hospital and health system purposes, where MCPs entered information into a *panacea* of notebooks and registers increasing documentation load.<sup>6</sup> Our results support this finding but add a new perspective by illustrating how MCPs used added documentation to fit their own data needs.

We describe how MCPs felt alienated from the official data: They could not use it and only received negative feedback on their efforts. This data was perceived as useless and consequently accountability was low. Other research from similar settings supports these findings: Numeric data was seen as owned by the management<sup>5 46</sup> and, similarly to our results, its completeness was valued over correctness.<sup>12</sup> MCPs saw themselves as data producers, feeling disempowered as data users.<sup>4</sup> Our participants described actual use of their narrative data while participants from our previous research reported that data which could be useful to them was missing from HMIS.<sup>4</sup>

This finding introduces the question how applicable numeric service provision data is to quality improvement at health facility level. The main purpose of HMIS is to generate coverage data for planning and performance monitoring,<sup>2 51</sup> thus focusing on the managerial part of healthcare. These systems developed over centuries and with an almost organic growth rather than design, user perspectives, like our participants' views, were often neglected previously.<sup>52</sup> In our study, MCPs and managers added other narrative dimensions to the official system, to tie incoherent purposes for different users. This process resulted in making the documentation system even more complex.

### Category 3: Documenting to feel safe

Our participants reported how they used documentation to feel safe in a work environment where good birthing outcomes were not guaranteed. These reports are in line with other research from similar settings where MCPs used altered partographs to protect themselves against managerial reprimands or legal consequences in cases of maternal deaths.<sup>5 6</sup>

WHO has promoted the partograph for labour monitoring since long, although effects on maternal and fetal outcomes were not ascertained.<sup>53</sup> MCPs in our study worked in an environment that often prevented them from meeting official standards, but they still stated that the partograph was their most important document. This claim enabled them to uphold a core professional value of maternity care: To make sure mothers and babies are safe, despite different realities in their maternities. Participants argued that the 'maternity ward was the mirror of the hospital', that is, hospital performance was judged by

their work. Our participants used altered partographs to create a new narrative of a maternity care where standards were followed, although on paper.<sup>54</sup> MCPs reasoned that this information should be kept well because they had to demonstrate that a child had been doing well under their care, when mothers brought back a sick newborn. These reflections may be interpreted as their attempt to feel safe in this aspect, despite the reality, that it was quite difficult if not impossible, to retrieve an individual partograph after discharge.

### Category 4: Protecting information

Participants described the importance of confidentiality for their acceptance within the community. They explained that confidentiality issues may prevent clients from coming to the maternity and other research suggests that fear of disclosure may deter HIV-positive women from accessing services.<sup>55</sup> We hypothesise that MCPs' power on decisions on whose and which data was shared, may have added to their social standing.

Our results add new insights to the literature on health information systems and data use: How data and documentation may reflect the provider–client relationship. In rural, remote areas such as our research setting, MCPs usually live within the small communities they serve, with reciprocal interdependencies. The balance between integration into a rural community and rejection may be delicate.<sup>56</sup> This may explain our participants' need to protect social integrity, and to include their clients in the creation of an alternative narrative of maternity care (figure 4).

### Methodological considerations

We used observation of MCPs' interaction with documentation sources to triangulate findings from other methods. FGDs served as member check. We consider this the main strengths of our study. Diagramming helped participants to reflect on the different types of produced data and to describe their complex system of documentation to the researchers. Some of the data collectors were known to participants including the European first author. This may have led to social desirability bias. We used triangulation and frequent member/peer check to mitigate this potential bias.

We included only health personnel in this study to gain deeper insights into their everyday data practices since they generate the primary data. Managers' perspectives are important and will be captured in a separate research study.

Only 4 out of 18 participants were clinicians (2 medical doctors and 2 assistant medical officers). This reflects the professional distribution in included maternities.

### CONCLUSIONS

Health data is not neutral, and users assign different meanings to it. Policy makers need to see health information systems as one component of the wider health system where other parts, such as staff and supply availability,

should be improved to positively influence MCPs' realities which may then affect data quality and use.

Current health information systems may not reflect MCPs', or other healthcare staffs', data needs. These systems have not been designed, but have rather evolved over time and relevant narrative parts for clinical uses are missing. They should be re-designed with an 'all-data-view' in mind, taking all users on board, including MCPs and their clinically oriented narrative data.

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primary data such as transcripts reflect views of maternity care providers from two healthcare facilities in Southern Tanzania, with a very small population of maternity care providers. Making the full data set publicly available could potentially breach the privacy that participants were promised upon request for participation. Also, our ethics approvals were granted based on the anonymity of the individuals consenting to participate. Due to these conditions, the authors are unable to avail the full transcripts. Excerpts of specific segments of the text will be reviewed for any potentially identifying details and made available to fellow researchers or reviewers who complete a data sharing agreement and abide by strict confidentiality protocols. In line with the information given to the participants and restrictions set by the ethics committees above, access to the full transcripts is only available to the involved researchers. Data requests may be sent to the corresponding author, RU, via regine.unkels@ki.se.

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