Reviewer's report

**Title:** In-depth assessment of the design and implementation of the National Health Information System at a district level hospital in Tanzania

**Version:** 2 **Date:** 22 July 2013

**Reviewer:** Anwer Aqil

Reviewer's report:

Thank you for sharing the paper for review and comments. The paper in its current form requires a lot of revision before being considered for publication. It neither identifies the added value for contribution to the state of the art in routine information system assessment/evaluation nor describes any innovative methodology in assessing the existing system. The reasons for publishing the paper need to articulate such as an exploratory HIS study from Tanzania given that scantily Tanzania HIS literature is scanty, application of Public sector managed HIS in a private hospital, etc. The detailed comments are grouped under general and specific comments for improving manuscript for publication.

General comments

1. The objectives of the paper need to be clarified. The authors need to be specific about their research questions. Is it a cross-sectional study to describe the strengths and weaknesses of MTUHA in one private hospital, while MTUHA mainly serves public health sector facilities? Is it study to assess strengths and weaknesses of MTHUA when applied in a hospital? Or is it a study of strengths and weaknesses of hospital based MTUHA, given MTUHA has separate and specific data collection tools and information use for hospital, and its reporting to and linkage with district health office?

2. Like any national HIS, I am assuming that MTUHA data collection tools and resulting indicators are based on national or lower level information needs. Therefore, role of the hospital in data collection, reporting and use is probably delineated in MTHUA manual. It is not clear whether authors were using MTHUA manual as gold standard to assess strengths and weaknesses of MTHUA application in a hospital or some others standard.

3. The paper would benefit if clear statements are made from the start what specific aspects of the information system in the hospital are part of the study and reviewed because stating assessing strengths and weakness of the system are too generic? This would also help in organizing and describing the results.

4. The abstract results section could be improved by specifically stating findings related to data quality indicators such as data accuracy, completeness and timeliness. Similarly, some statement about information use would be nice before describing the underlying reasons for weaknesses.

5. The paper would benefit by describing accountability mechanisms for MTUHA implementation within the private hospital and in relation to district health office to
develop recommendations.

6. Methodological issues – since the objectives and research questions were not clearly defined, it is difficult to assess whether the methods used are relevant.

a. The operational definition of design of MTUHA is limited to clarity to use data collection tools, consistency between tools, and applicability of information. HIS design also covers aspects like HIS performance [data quality (accuracy, completeness, and timeliness) and use of information], information flow and linkages among different levels, feedback, accountability processes, training, supervision, finances but authors did not specify where they did not included those HIS design aspects in the assessment. It is not clear what standards are used to specify MTUHA strengths and weaknesses? The authors would benefit from conducting HIS literature review to be familiar with latest developments in assessment of information system such as PRISM framework and its tools for creating operational definitions of various aspects of HIS.

b. There is no description of how knowledge and skills about MTUHA, data collection, analysis and processing, mathematical skills were assessed. This also caused problem in presenting results about them.

c. There is confusion in describing unit of analysis. A distinction needs to be made what MTUHA aspects specifically relate to hospital and what MTUHA aspects are common for all levels. Since all data was collected in the hospital and from the hospital staff, unit of analysis remained confined to hospital as well as their perceptions about MTUHA. District or higher level staff was not included to collect the data and thus unit of analysis does not change. Authors need to justify how findings from one private hospital could be generalizable to the whole MTUHA system, despite authors admitting that this district level private hospital is not comparable to public sector district hospital?

d. There is no clarity to distinguish how qualitative or quantitative methods were used and results presented separately. How sample size for interviewees, participant observations and records were calculated? Were they selected randomly or purposely? There is no description how sampling selection affected the results.

7. It is stated that the private hospital is obliged to contribute to MTHUA. However, nature of obligation is not clear whether a regulatory mechanism exist for both public and private health facilities to report through MTUHA? If private health sector is not part of the MTUHA and reporting is voluntary then how findings from a private hospital could be generalizable to public health sector managed MTUHA?

8. An outsider reading and editing would help creating better clarity, logical consistency and flow.

Specific Comments

9. Under introduction or background section, provide an overview of the MTUHA structure, functions, types of information collected, data collection and reporting forms, information flow and roles and responsibilities and what additional information are collected from hospital and if not, why not? How data is
transferred from primary registers to the reporting forms? How data quality is checked? What types of analyses are conducted at the hospital and by whom? This will also help clarify the confusion between describing aspects of MTUHA and associated assessment findings. For example, Table 1 describes the primary data books under results section. Since overview will take care of the description of primary data books, what would be interesting for reader, under results section, is to know what strengths and weakness are found after reviewing primary data books. Thus, confusion would be avoided between description of existing MTUHA and assessment results. If this advice is followed then Table 1-4 will become part of the description and redundant, while results section will present strengths and weaknesses findings about these data collection books and forms. Please highlight what is unique in MTHUA and comparable to international standards, if possible.

10. Figure 1 (section introduction, page 3, para 4) is informative but does not provide enough information about linkages and information flow between these levels. Similarly, it would be nice to know how many facilities reporting to wards, division and district and who has the supervisory responsibility. A revision of this figure with information flow and linkages and more information under narrative would help reader understand the system better. This figure could be subsumed under background section.

11. Section design of data collection books, page 10, para 2, the reader expected that findings will be described in relation to the MTUHA design criteria of clarity, consistency and applicability (page 5, para 3) rather than describing contents of data books. Table 1 is irrelevant and the narrative can be revised to show how criterion of applicability is used to show diagnostic list is irrelevant.

12. Correct use of data collection tools, page 10-13. There were neither references made to MTUHA manual nor were standards mentioned against which correct use was measured. Statements were made about knowledge of MTUHA such as lacking, moderate. A certain number of staff were interviewed and no reason was provided why results were not presented in descriptive statistics and why qualitative statements were preferred. Similarly, supporting evidence was not provided to make statements like “these problem appeared to be compounded by a lack of knowledge about data collection and processing. Mathematical skills were also reported to be low amongst some staff that calculating the indicators or creating summaries for each ward presented difficulties (page 11, para 3)”. This section could be improved by presenting frequency of incorrect use by types of data collection registers and reporting forms, and where incorrect use occurred. After identifying incorrect use, describe reasons for incorrect use, especially whether the MTUHA manual has clear instructions to use but instructions were not followed r because instruction were not available or were available but amenable to interpretation.

13. Usability of books for secondary reporting, page 13-14, the description of Table 2 is quite confusing and so is its relevance. There is a need to clarify the distinction between book 2 (probably data collection book) and book 10 (probably a reporting form to district or higher level). The point made is that hospital reporting data book 10 has 72 forms and out of which only 16 could be filled from
the primary hospital registers book 2. It is better to explain that restricting data reporting is MTUHA design flaw after describing the finding rather than giving that explanation in next paragraph, making the reader looking for the explanation. In addition, authors did not describe whether MTUHA manual provided any explanation for this restriction or silent on it? If there is no explanation given in the manual then the authors should have further probed this at higher level why such basic flaw was not seen during the design phase or after initial implementation and what actions have been taken to correct that, especially in the context of generalization these findings to overall MTUHA.

14. Table 3, page 14, as suggested earlier, it could be part of the background description and therefore, is redundant here. What is needed under results section is to describe whether forms are submitted on time, which is another indicator of data quality called timeliness. Unfortunately, that information is missing. Timeliness is usually calculated at district level but submission date at the facility could be used for calculating timeliness at the facility (hospital) level.

15. Table 4 is like Table 3 (page 14) and does not provide any useful information on the strengths or weakness of the indicators. There seems to be a misunderstanding between population based indicator and facility based indicators which needs clarification. HIS, as a general rule, collects facility service coverage data. Each facility has a catchment area and its estimated target population is used as denominator to calculate service coverage. MTHUA seems to be following the same standard practice where the district provides catchment area population for calculating the denominator. Despite using target catchment area population as denominator, the indicator remains a facility based service coverage indicator. Population based indicator is based on both numerator and denominator coming from household survey. Providing outdated catchment area population data from district or higher level is a technical and management issue and has nothing to do with facility or population based indicator, although it has implication for calculating or planning service coverage correctly as pointed out by authors on page 15.

16. Same comment applies for Table 5 as for Table 3 and 4.

17. Under HIS, completeness is generally defined as number of cells filled in the reporting form compared to all cells in the reporting form for a given month or number of facilities reporting to the district compared to all facilities in the district for a given month. Authors have not provided a definition of completeness as per MTHUA manual to be used. In addition, they have not specified what criteria they used to specify reporting form incomplete. How many entries were missing to be defined as incomplete form? How many forms supposed to be reported from the hospital level and how many were irrelevant for hospital reporting? Thus, Table 6 needs revision to be more informative.

18. Table 7 is about data inconsistency, usually termed as data accuracy, and measured as percentage of mistakes made in transferring data from primary registers to the reporting forms. Table 7 could be presented as a line chart showing that data accuracy varies over time and ranges from 29% to 234%, indicating that reported number are over reported than actual numbers. No explanation as given for this over-reporting. It would be good to mention this
finding in the abstract along with completeness data because it reflects the hospital MTHUA data quality.

19. There are some inconsistencies noted in Table 8 and its narrative. First, the RCH coverage is part of the MTUHA F004 as described in Table 4. However, the Table 8 does not specify that this information exist in MTUHA. Second, the narrative on Table 8 on page 18, para 4, states that information is available on 9 indicators in MTUHA while the total number is 12 under information available column in Table 8. If we add the RCH indicator in the column then the total would be 13. Thus, this number needs to be corrected and cell for RCH needs revision in Table 8.

20. Under discussion section, page 18, para 1, authors stated, “Our findings suggest that it is precisely this comprehensiveness that poses a problem for the data collection in MTUHA.” However, the paper never described what “comprehensiveness” entails and what is the alternative to “comprehensiveness” given their assessment? Criticizing comprehensiveness become more intriguing when authors raise issue of why HIV/AIDS data is not integrated and its implication (section data use, page 21, para 3).

21. Under discussion section, page 18, para 3, it is stated, “This would reinforce the impression that MTUHA is a living and relevant HIS that is constantly referred to.” It is not clear what “constantly referred to” mean. It seems like the authors probably wanted to say “continuously used and improved” keeping it logically consistent with words like “living and relevant”.

22. Under discussion section, page 18, para 4, the authors stated that maternity, RCH and HIV/AIDS wards had acceptable level of accuracy and completeness. However, they never described this “acceptable level” either in methods or in result section and how they measured that level, thus confusing the reader on the meaning of this conclusion.

23. Under discussion section, page 20, para 3, authors stated that some MTUHA indicators are questionable because they combined information from the hospital and outside of hospital such as, “sum of deliveries performed at the facilities or by birth attendant/total number of <1 years old per year.” This indicator is part of MDG 5 reduction in maternal mortality and described as “Proportion of births attended by skilled health personnel” which includes both house and facility deliveries assuming that a skill birth attendant or health professional is present at the time of delivery irrespective of the location. Therefore, before making this indicator questionable, authors should have clarified first whether hospital collect information on birth attendant on home deliveries. Second, the indicator asks for sum of deliveries making assumption that there are two sources of data. Thus, when hospital would report without having source for collecting delivery data from outside of hospital, it will only reflect hospital deliveries. Third, clarify the denominator of total live births in catchment population or a certain % of total expected deliveries in hospital because some will be delivered at home to assure correct calculation.

**Level of interest:** An article of limited interest
Quality of written English: Not suitable for publication unless extensively edited

Statistical review: Yes, and I have assessed the statistics in my report.

Declaration of competing interests:

I declare that I have no competing interests.