Using GPS and Google Earth to understand and use BIG Data in rural Tanzania to save lives

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Background

- GIS is a computer system for manipulating, and spatial data which has become widespread across public health research and implementation projects to analyze the geographic distribution of health outcomes, service provision, and population demographics.
- Geospatial mapping may be of particular use in low-resource settings to inform the targeting of high-needs communities.
- Mama na Mtoto (MnM), an ongoing Maternal, Newborn, and Child Health (MNCH) intervention in Tanzanian districts, recorded GPS coordinates at hamlet centers during their baseline (2016) household coverage survey.

Objectives

1) To create geospatial maps using QGIS software based on key indicator data from MnM's MNCH household survey.
2) To collect qualitative feedback from stakeholders and implementation team members in Mwanza, Tanzania regarding perceptions of map utility and potential of maps to inform future interventions.

Methods

- Six maps were created using Quantum GIS (QGIS) to visually display health outcomes by hamlet for the following indicators: antenatal care (ANC) attendance, postnatal care (PNC) attendance, health facility deliveries, under five-stunting, and under five underweight status.
- Feedback was sought from selected stakeholders regarding perceptions of the map content, features, and application

Results

QGIS Mapping:

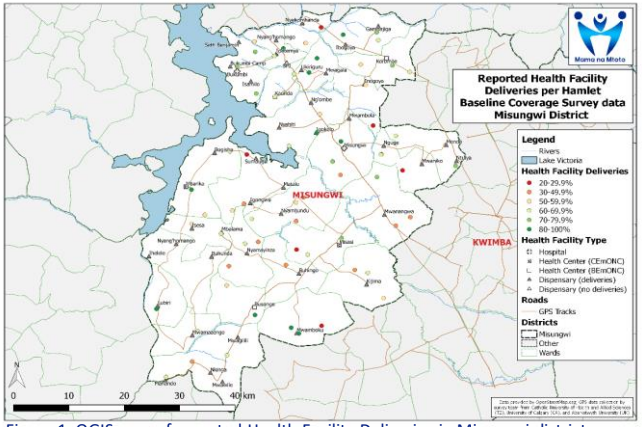

Figure 1. QGIS map of reported Health Facility Deliveries in Misungwi district, Tanzania. Symbology represents indicator coverage per hamlet (2016)

Stakeholder perceptions:

Ease of use, feasibility	• A visual presentation of indicator data is a welcome alternative to tabular datasets. • Intermediate colors in the legend spectrum are more difficult to differentiate (ie. orange, light green).
Interpretation of maps	• For certain indicators, hamlets with poorest outcomes seemed to be more concentrated in the southern half of the district. • For certain indicators, hamlets adjacent to the main road appeared to have better outcomes.
Future Directions	• Midline and end line data can be compared with baseline maps as a means of tracking progress across the district. • Team members were interested in receiving maps for more indicators, especially nutrition

Discussion

- Map creation for hamlet-level indicator visualization is relatively simple when datasets with appropriately geo-tagged data are readily available.
- Limited user experience visualizing or analyzing spatial data may necessitate a degree of orientation with certain map-reading skills to properly interpret the maps
- Local context was an asset for understanding hamlet outcomes in relation to geographic features.
- Practical cut-off values for point coloring are recommended
- Limitations to this study include:
  - QGIS maps do not account for relative hamlet size
  - Potential hesitancy to report negative feedback

Conclusion

- Geospatial analysis of health-interventions in low-resource setting holds great potential as a tool for understanding health outcomes in rural populations.
- Collaborative analysis with local teams can build data literacy regarding GIS tools, potentially providing new strategies to monitor population characteristics and evaluate project outcomes
- By tailoring intervention strategies to unique population characteristics, GIS is a means of applying precision medicine to population health.

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