A COST-BENEFIT ANALYSIS OF MANUAL, SEMI-AUTOMATED AND MOBILE-BASED FULLY AUTOMATED COMMUNITY HEALTH MANAGEMENT INFORMATION SYSTEMS IN MAKUENI COUNTY, KENYA

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BACKGROUND

- Effective and efficient Health Management Information Systems (HMIS) are vital for timely evidence based decision making on health development. This contributes to achievement of the Kenya Vision 2030
- HMIS at community level is majorly managed through manual systems, often experiencing erratic, incomplete reporting, and hence inefficient transmission of data to the National District Health Information System (DHIS) for use in decision making
- Concurrently, there is rapid growth in m-health technology, hence the need to ascertain which methods of HMIS are most beneficial.
- In 2014, Amref Health Africa carried out cost-benefit analysis of three alternative community-based health management information systems (CBHMIS): manual, semi-automated, and mobile fully automated system linked to the National (DHIS) test site
- Each alternative was implemented in separate Community Health Units, in Makueni County, Kenya
- The main objective of this study was to identify the best alternative approach of managing community-level health information systems, for evidence-based health policy decision-making.

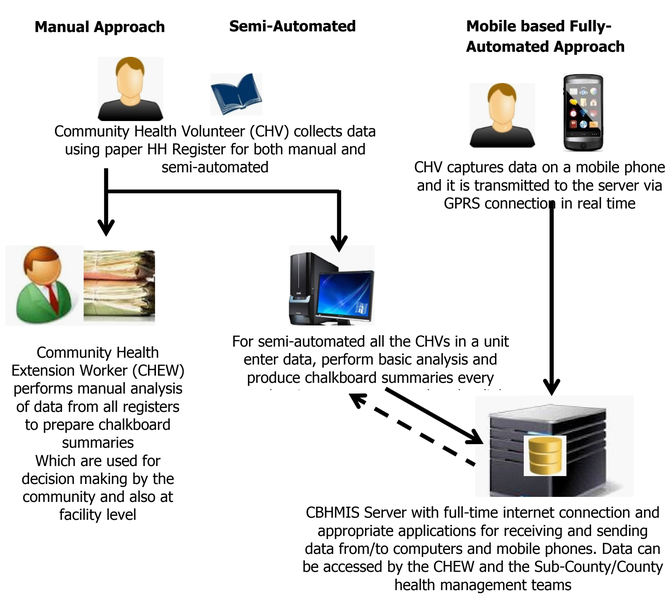

Figure 1: Diagrammatic illustration of the three CBHMIS approaches

METHODS

- **Study population:** Users of the community based health management information system in 3 sampled Community Units: Community Health Volunteers (CHVs), Community Health Extension Workers (CHEWs), Sub County Health Management Team (SCHMT) members and project staff.
- **Sampling:**
  - » Random sampling – 1 CU for manual and 1 for semi-automated CBHMIS.
  - » Purposive sampling - 1 CU utilising fully automated CBHMIS (M-JALI).
- **Design:** An ingredients approach - determined costs of operations of each alternative, benefits gained and lost (level of effort) in using each alternative. The levels of effort multiplied by the equivalent estimated monthly wage earnings for each category of personnel or item. Cost-benefit ratios computed. One year's data analysed and projected to up-to five years.
- **Data Collection:** Quantitative data on costs of operations and qualitative and cost of benefits gained & lost.

RESULTS

Costs and Benefits (Level of Effort and Monetary Level of Effort)

Table 1: Costs, Level of Effort and Monetary Level of Effort

CBHMIS Alternatives	Costs and Benefits Analysed		
	Costs (Per CU – One Year)	Level of Effort (Person Months per CU – One Year)	Monetary Value of Level of Effort – (Per CU - One Year)
Fully automated	Kshs. 1.6 million	96.6	Kshs. 223,875
Semi-automated	Ksh. 0.8 million	205	Kshs. 589,421
Manual	Kshs. 0.5 million	208	Kshs. 673,421

Comparison of Costs and Benefits

- To obtain the cost-benefit ratio of the three CBHMIS alternatives, the incremental benefits and costs were estimated. The absolute differences (gains) between the manual system and fully-automated systems were calculated on the one hand, and the semi-automated and the fully-automated on the other.

Table 2:Comparison of Benefits and Costs of each CBHMIS alternative

	Manual	Semi	Fully Linked
Total Money Value of Efforts	673,421	589,421	222,656
Total Costs	513,509	759,748	1,615,343
Incr. benefits	449,546	365,546	450,765
Incremental Cost	1,481,934	1,235,696	1,101,834
BCR	0.30	0.30	0.41

Five Year Projection - Incremental Costs and Benefits

- Projection of costs and benefits for four more years in addition to the initial actual one year was done.
- By the end of the five years, the cumulative incremental benefits due to the migration from the manual system to the linked fully automated system will be about Kshs. 2.3 million.
- The corresponding amount for the move from the semi-automated to the fully automated system will be slightly lower, at about Kshs. 1.9 million.

Table 3: Incremental Costs and Benefits for a Five-Year Period

	Manual	Semi	Fully Automated Linked
Incr. Benefits	1,828,983	2,290,956	2,297,167
Incremental Cost	1,889,764	2,705,639	2,003,617
BCR	0.85	0.79	1.15

CONCLUSION

- Moving from the manual to the fully-automated system brings about the biggest incremental benefits when implemented for more than one year, with a benefit-cost ratio of 1.15 – for every Ksh. invested in the linked fully automated system, benefits worth Ksh. 0.15 are gained. This is thus cost-effective.
- Migration from the manual to the fully-automated system is however also associated with the greatest cost hence low benefit-cost ratios if implemented in just one year. With the lowering of costs in subsequent years, there is potential for cost-benefit measures to improve.
- Within Kenya, the emphasis on m-health in several health policies and planning documents such as the HMIS Strategic plan, Kenya's National E-health Strategy 2011-2017 (GoK, 2011) attests to the importance of mobile-phone based information for health-decision making.
- The results of this study point to several benefits of using the fully automated CBHMIS system at the levels of the community, the County, and the nation.

For a Community Unit:

1. An improvement in time management that comes with the implementation of the fully automated CBHMIS (mobile based) has direct positive effects on volunteerism, women's ability to participate in the labour force, and make necessary health referrals.
2. Just like the CHVs, the community extension health workers (CHEWs) work partially at the community, as they attend to other crucial work at the health facilities as well. Freeing up time through the use of the fully automated system would increase the benefits to the patients served at the health facilities.

For Donors, Counties and the Country:

1. Utilising the linked fully automated system has a benefit-cost ratio of 1.15 – for every Ksh. invested in the linked fully automated system, benefits worth Ksh. 0.15 are gained. This is thus cost-effective.
2. Less level of effort in using fully automated system means that data is transmitted in a more timely way, hence less errors. This leads to better decision making at County and National level on health aspects.

RECOMMENDATION

The government and stakeholders including other development agencies should scale up the fully automated CBHMIS in Community Units, to achieve economies of scale in managing the system. The application software for the automated CBHMIS should also be developed into a tool for technical assistance to other institutions implementing the community health strategy.