Access and quality of rural healthcare: Ethiopian Millennium Rural Initiative

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Abstract

Objective. More than half the world’s population lives in rural areas; however, we have limited evidence about how to strengthen rural healthcare services. We sought to determine the impact of a systems-based approach to improving rural care, the Ethiopian Millennium Rural Initiative, on key healthcare services indicators.

Design. We conducted an 18-month longitudinal mixed methods study of the 10 primary healthcare units (PHCUs) serving ~400 000 people, using monthly indicator tracking and focus groups.

Setting. Rural Ethiopia.

Participants. Ten PHCUs and 140 focus group participants.

Intervention. The Ethiopian Millennium Rural Initiative.

Main Outcome Measures. Antenatal care coverage, skilled birth attendant rates, HIV testing in antenatal care, HIV testing in the health center or at health posts overall, outpatient volume at the health center. Qualitative data assessed community members’ perceptions of healthcare services.

Results. We found significant increases (P-values of <0.05) in antenatal care coverage, skilled birth attendant rates, HIV testing in antenatal care and HIV testing at health centers and health post levels. Outpatient visit rates also improved, but the change was not significant. Focus group data suggested that communities recognized substantial improvements but also voiced continued unmet needs.

Conclusions. A systems-based approach to strengthening rural healthcare units is feasible, although complex, particularly in rural settings. The combined use of quantitative and qualitative data is needed to provide a comprehensive view of impact. Future research is needed to understand the determinants of variation in improvement across health centers and regions.

Keywords: rural health services, HIV, AIDS, prenatal care, community health workers, Ethiopia

Introduction

Nearly half the population in the globe lives in rural communities [1] where healthcare services are typically less available and of poorer quality than in semi-urban and urban settings [2]. The rural–urban disparity is apparent in high-income [3] and middle-income [4, 5] countries; however, this discrepancy is most pressing in low-income countries, particularly in sub-Saharan Africa, where more than 60% of the population lives in rural areas [6], with long travel distances to healthcare facilities [7–9]. Consequently, any effort to strengthen health systems must incorporate a strategy to improve both the access to and the quality of healthcare services in rural areas.

Previous research in sub-Saharan Africa has identified several interventions shown to be effective in specific areas of rural healthcare, including enhanced access to antiretroviral treatment [10–12], antenatal care [13], infant care [14, 15], tuberculosis detection and treatment [16], and malaria prevention and treatment [17–19]. However, previous studies have not examined the effectiveness of systems-based approaches in which primary care is extended to rural areas and supported by supply chain, human resource management, monitoring and finance reform efforts.

Accordingly, we sought to determine the impact of a systems-based approach to improving rural care, the Ethiopian Millennium Rural Initiative (EMRI), on key healthcare services indicators; we hypothesized that there would be...
significant improvement in these key indicators. The EMRI, which was designed to strengthen primary healthcare units (PHCUs) in Ethiopia in an 18-month period, provided an ideal opportunity to examine the impact of a health systems strengthening intervention in one of the lowest-income countries in the world and among extremely rural populations. Understanding the impact of EMRI can provide insights for other countries in which elevating rural health-care services is a priority.

Methods

Setting

Ethiopia is a country of ~80 million people, and is ranked 177 out of 182 on the Human Development Index of the United Nations [20]. In 2007, the country spent ~3.8% of its gross domestic product on health [21]. With <1 physician and 2 nurses per 10,000 population [22], the country is far below WHO recommendations for the number of health professionals necessary to achieve key health indicators [23]. Despite task-shifting initiatives [24], HIV testing remains limited, and key maternal and child health indicators, such as use of antenatal care and skilled birth attendant rates, remain low across the country [21]. Rural healthcare has been noted as a particular problem in Ethiopia, which had fewer than 700 health centers in 2007 [25]. Although the country has undertaken an enormous expansion of health extension workers and health centers, currently, fewer than half of the rural residents of Ethiopia live within walking distance of a healthcare facility [26].

Intervention

The EMRI, a centerpiece of the country’s overall health sector development efforts, is a systems-based initiative to develop a successful model of rural primary healthcare that is scalable across the country. By systems-based, we mean healthcare improvement efforts that target all patients rather than those with specific diseases and that can be standardized and replicated across the country over time. Implemented by the Ethiopian Federal Ministry of Health (FMOH) with support from the Clinton Health Access Initiative (CHAI), EMRI employs a systems-based approach to strengthen health centers with the goal of increasing access to, and quality of services available in, rural settings.

The elements of the EMRI model include: (i) improving the infrastructure of health centers (i.e. water, electricity, physical infrastructure and equipment), (ii) improvement in the supply chain (e.g. transport of specimens and results follow-up), (iii) human resource capacity building through health worker training and on-site clinical mentoring, (iv) developing a system to improve referrals between health posts and health centers and (v) community education and mobilization. Additionally, the EMRI features new services, including HIV testing at the health posts and establishment of prevention of mother-to-child transmission (PMTCT) of HIV programs at health centers. The EMRI is consistent with the overall strategy of Ethiopia in the Health Extension Program (HEP), particularly in its focus on staff training for health posts and community mobilization; however, EMRI additionally includes focused efforts to improve health center infrastructure, supply chain and referral systems, to provide on-site clinical mentoring at health centers, and to extend HIV testing to the health posts.

Study design and sample

We conducted a longitudinal mixed methods study of the 10 PHCUs where EMRI had been in place for 18 months, each of which served a catchment area of ~40,000 people. The 10 PHCUs were selected in two regions (Oromia and Amhara regions) by the FMOH as priorities for improvement. Each PHCU included 1 health center, 5 health posts (each with 2 health extension workers) and an average of 200 volunteer community health workers. We collected quantitative data on health services utilization of the 10 PHCUs monthly for 18 months. We also conducted focus groups, as they are appropriate for topics that involve social norms, and are useful in revealing the diversity and consensus of opinions regarding a given issue [27]. We conducted two waves of focus groups: the first within 3 months of the initiation of EMRI, and the second completed 1 year later in the same catchment areas, until we reached theoretical saturation, i.e. until no new concepts occurred with successive focus groups [28]. This occurred after 14 focus groups (1 male and 1 female in each of 7 PHCU areas) in the first wave and 14 groups in the second wave, with a total of 28 focus groups. Participants were diverse with regard to residence within their catchment area, occupations and age (minimum of 16 years). Nearly all participants had some experience with the health center; only three participants reported that they had not visited the health center but had received visits from health extension workers at their homes. We stratified groups by gender to encourage open discussions about potentially sensitive health-related issues. Because this paper focused on perceptions of changes in access and quality of services since the inception of EMRI, the present analysis includes data from the 12-month follow-up focus groups, which were composed of 10 people each, or a total of 140 participants.

Data collection

Quantitative data on a set of five indicators (Table 1) were collected monthly by PHCU staff and corroborated through on-site checking of data reports by the research team every 6 months. Indicators, most of which were also required as part of the country’s Health Management Information System (HMIS), measured utilization of antenatal care, use of skilled birth attendants, HIV testing in antenatal care, HIV testing in the population aged 15–40 years at both the health center level and the health post level, and general outpatient visits. Data were recorded monthly on paper forms by PHCU staff, entered into Microsoft Excel by EMRI Regional Managers,
and reviewed for accuracy and completeness quarterly by our research team.

The focus group discussion guide (Appendix) used open-ended questions [29] to foster discussion of community perspectives on the availability and quality of services at the health center and health post, the degree to which these services met community needs, and changes in health delivery in the PHCU over time. Each focus group lasted ~1 h. Focus groups were coordinated by researchers from Addis Ababa University who spoke Amharic and Oromiffa and were experienced in facilitating focus groups. All sessions were audio-taped after researchers obtained participant consent. Audiotapes were transcribed in Amharic or Oromiffa as appropriate and then translated into English, producing 374 pages of transcripts for the present analysis. All research procedures were approved by the Institutional Review Board at the Yale School of Medicine and the Ethiopian FMOH.

Data analysis

Table 1 Time trends for key indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>β^a</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antenatal care coverage—Number of pregnant women attending their first antenatal care visit by number of predicted pregnancies in catchment area per month</td>
<td>41.4</td>
<td>0.002</td>
</tr>
<tr>
<td>Skilled birth attendant coverage—Number of deliveries by skilled birth attendants by number of predicted pregnancies in catchment area per month</td>
<td>2.6</td>
<td>0.015</td>
</tr>
<tr>
<td>Antenatal care HIV testing coverage—Number of pregnant women receiving HIV testing and counseling during their first ANC visit by number of first ANC visits per month</td>
<td>26.1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Health post and health center HIV testing coverage—Number of persons receiving HIV testing and counseling at a HP or HC by catchment area population ages 15–49 per month</td>
<td>2.7</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Outpatient visit rate—Number of outpatient visits by catchment area population per month</td>
<td>0.4</td>
<td>0.279</td>
</tr>
</tbody>
</table>

^aβ-values were calculated using dependent variables expressed as annualized percentage points.

HIV testing at the health post level began 10 months into the intervention, in July 2009.

For analysis of the qualitative data, we employed the constant comparison method [30–32] to determine key themes from the focus groups. Two members of the research team (R.A., T.R.W) conducted a line-by-line review of transcripts and developed codes inductively [31, 33]. Throughout the coding process, we constantly compared the content with previously coded data to ensure consistent assignment of codes. This iterative process of refining codes and describing properties of each [34] continued until no new concepts emerged and the final coding structure was established. Using a refined final version of the code structure, the team independently coded all focus group transcripts [35]. In order to ensure scientific rigor, we consistently used the focus group discussion guide, standardized coding and data analysis of focus group transcripts, and created an audit trail to document analytic decisions [32, 36, 37]. We report themes that are pertinent to the quantitative time trend data. We used ATLAS.ti (Version 5.0.67; Scientific Software Development GmbH, Berlin, Germany) to facilitate data coding, organization and retrieval.

Results

Study samples

The sample of PHCUs (n = 10) included 4 facilities in Amhara and 6 facilities in Oromia region of Ethiopia, and served more than 402 000 people with an average of 13 employees. Participants in the 14 focus groups used for this analysis (n = 140) ranged in age from 16 to 78, with an average age of 37 years (Table 2). The majority of participants were married in both the male (84%) and female (73%) focus groups.

Time trends in key indicators

Significant improvement (P-values of <0.05) over time was apparent in four of the five indicators (Table 1) including antenatal care visits and use of skilled birth attendants (Fig. 1), HIV testing in antenatal care (Fig. 2) and overall HIV testing (including testing performed at the health center and testing performed at the health posts) (Fig. 3). The estimated proportion of pregnant women in the catchment area that received antenatal visits increased from about 40–100%. In addition, by the end of the study period, about 85% of women who received antenatal care also were tested for HIV.
Overall, HIV testing increased nearly 4-fold, to cover 5% of the 15–49-year-old population in the catchment areas, and use of skilled birth attendants nearly doubled, although it remained limited at only 10% of expected deliveries in the catchment area. In data not shown, the significant increase in HIV testing rates occurred at different levels of facilities in the different regions. In Oromia, the significant increase was at the health post level, while in Amhara the significant increase took place at the health center level. For the remaining indicator (outpatient visits), improvement was apparent at individual PHCUs but was not statistically significant overall (Fig. 4).

**Community member experiences**

Focus group discussions revealed diverse views regarding the accessibility and quality of services, ranging from highly positive observations of substantial improvements in some services, to continued unmet needs and expectations for other services, such as those available at more urban facilities.

**Recognition of improved services**

Participants noted improvements in availability of antenatal care at the health centers, longer hours of operation and availability of skilled birth attendants at the health centers, and increased receipt of HIV testing as part of antenatal care and for the general adult population. They noted increased accessibility facilitated by health extension workers and health posts.
Antenatal care and use of skilled birth attendants. Focus group participants noted substantial improvement in antenatal care, as was also evident from the quantitative data. Improvements included better understanding of the antenatal period in pregnancy, access to regular check-ups and qualified health workers to perform antenatal care visits. One man from Amhara described changes in women’s understanding of how to prepare for childbirth:

Previously, pregnant women did not know when they were to deliver. But now they are getting a very good check-up. There is started five or six months before. Pregnant women used to refuse to go to the health workers. Now the health workers teach the people and pregnant women rush to get the [antenatal] services.

(Male, Amhara region, HC #1)

A woman from Oromia described how health promoters had changed women’s views about the importance of both antenatal and post-natal care available at the health centers.

Previously, pregnant mothers did not often come to this health center. But, after the health promoters got this training, they began to mobilize women in our area to seek health services provided by the health center by explaining to them that it is beneficial for both mothers and children. As a result, mothers are now increasingly getting antenatal and post-natal health care services from the health center. There is very good service in the health center.

(Female, Oromia region, HC #2)

Participants also noted increased availability of staff and medicines at the health centers to facilitate child birth in the health centers, suggesting that these changes reduced the need to travel long distances to a hospital to give birth. For instance, one woman in Oromia said:

To give birth before, I was referred to Black Lion Hospital. But now since the health care professionals started working 24 hr anyone who seeks service can get the required services easily. The situation is much improved. Due to the expansion of the service time availability, recently two women gave birth at this health center peacefully. Through observing each other, the community members will also start to come to the center more often.

(Female, Oromia region, HC #2).

HIV testing of pregnant women and overall. Both women and men commented on the increased availability and acceptance of HIV testing. Several participants referenced what one male participant said was ‘awareness creation and community mobilization through home visits [by community health promoters] to initiate people to take HIV tests’ (Male, Oromia region, HC #9). Recurrent observations about HIV testing of pregnant women were consistent with the quantitatively significant increases in HIV testing in antenatal care visits. One female from Amhara said,

A pregnant woman undertakes voluntary counseling and testing (VCT) for HIV/AIDS along with her husband. The couples are obliged to treat health conditions that might be transmitted to their child. I undertook VCT and they told me my husband had to follow suit.

(Female, Amhara region, HC #1).

Participants described acceptance of HIV testing as routine, especially among younger people, regardless of pregnancy status. Illustrating this perspective, one woman in Amhara noted:

The young have a good knowledge about HIV/AIDS and they come to get tested without anybody telling them to do so. Many young people are coming to the health center and testing. This is a big change.

(Female, Amhara region, HC #3)

Health posts and health extension workers. Many participants expressed major challenges due to the long distance and difficult terrain between their homes and the health centers. The strengthening of health posts, staffed with health extension workers, and contracting with community health workers through the EMRI was noted by several participants, particularly in terms of the availability of HIV testing at health posts. In Oromia, one participant said, ‘the health education provided by the health post and health extension workers should not be underestimated’ (Male, Oromia, HC #9), and participants described effective educational efforts undertaken in public squares, in churches and in social gatherings. One man from Amhara stated:

HIV/AIDS diagnosis was only available in the health center before, but now it is brought down to the neighborhood level on the health posts. And health workers were trained for this purpose. At [this] health post, many people got tested.

(Male, Amhara region, HC #1)

Participants observed that health extension workers were effective in tracking pregnant women who were HIV positive so as to ensure that they were supported with proper treatment to reduce likelihood of vertical transmission of HIV. One man in Amhara commented,
The health [extension] workers follow [women] when they are pregnant, and there are HIV positive mothers who gave birth. I don’t know how they follow the mothers. I don’t know the secret, but they take care of them.

(Male, Amhara region, HC #1)

Overall, participants described a gradual process of the community, increasing their acceptance of health extension workers, as reflected in this comment from an Amhara woman:

There is a farmer who comes to my tea house to have tea whenever she comes to [town]. She explained to me that at first she was totally against the health post workers and was not even willing to let them in her house. But eventually, she started to appreciate and be grateful for what the health extension workers have done to change her family and her life style. The health extension workers in the health station were at first were disliked by the community, now however they are highly appreciated and liked after what they do is seen.

(Female, Amhara region, HC #1)

Unmet needs and expectations

Despite participants’ views of improved availability of many services, they still reported substantial unmet needs and expectations. These unmet needs related to perceptions of inadequate diagnostic equipment at the health centers, quality of skilled birth attendants at the health centers, and level of staff and equipment at the health posts.

Access to services. Rural community members described that services remained difficult to access due to the distance to the health center or hospital and limited quality and comprehensiveness of services at some health centers, particularly compared with more urban or semi-urban health centers, as this man from Amhara observed:

... the health center doesn't have complete equipment to make the diagnosis. It is still backward. Compared with the HCs in the other woredas [districts], the [name] HC still lacks indispensable equipments to offer satisfying service.

(Male, Amhara region, HC #3)

Quality of childbirth services. Several participants voiced unmet expectations about childbirth services at the health centers. These participants suggested that, although new skilled birth attendants were available at health centers, there was skepticism regarding the quality of care they provided. A man from Oromia stated:

The expectant mothers from distant [towns] do not come to the health center for delivery service... they do not feel confident in the professionals’ skill and capacity of giving delivery service. Usually, as there are no adequate materials in the health center, it is mostly seen that women are given referrals to other health institutions, and this situation jeopardizes the life of the women...

(Male, Oromia region, HC #9).

Furthermore, some participants reflected that even with greater numbers of better trained staff and more equipment, the health centers were limited in their capacity to address more complex birthing needs, reducing the likelihood that women would use the health centers for childbirth. A woman in Amhara stated:

The health center provides delivery services day and night. It has the equipment and the qualified staff to do so. But there is a lack of beds for pregnant women who need to stay overnight and get medical help. Plus the center does not undertake medical operations due to lack of high expertise.

(Female, Amhara region, HC #1)

Additionally, participants expressed concerns about the quality of general outpatient care at the health center, as a man in Amhara explained,

Nobody comes to the health center to make check-ups. Even when people get flus or colds, they would rather treat them with traditional medicines as they think that they won't get solution at the health center.

(Male, Amhara region, HC #3)

Staffing and equipment at health posts. Participants indicated that their communities would benefit if their health posts had the same level of staff and equipment as the health centers, and if their health centers were able to offer surgery and other advanced treatments available in urban hospitals. The desire for such changes was driven primarily by long distances and limited transportation. A man in a particularly remote community in Oromia suggested that the health posts be enhanced to the level of health centers, saying,

The fundamental problem we are facing...is lack of equivalent service we need at the kebele [neighborhood] level. With the difficulty of transportation accessibility, we need to get the medicines and diagnosis for simple diseases at our vicinity.

(Male, Oromia region, HC #9)

Discussion

We found significant improvements in several targeted indicators in the EMRI program, after 18 months of operation. These included antenatal care coverage, use of skilled birth attendants, HIV testing in antenatal care and HIV testing overall. Focus group data indicated that increased use of these services was fostered in part by the expansion of health extension workers and volunteer community health workers, who were successful in educating and encouraging people in rural settings to use health center and health post services. The strategy of using community health workers for health education and linkages to services has been successful in other low-income settings [38, 39] and remains a core element of Ethiopia’s health system strengthening efforts. According to our findings, this strategy is likely to be successful in improving service use in some areas.

Despite these positive improvements, people’s experiences of the health centers and health posts as described in focus
groups were mixed, underscoring the importance of integrating quantitative and qualitative measures of impact. Perceptions of longer hours of operation, more qualified staff, and increased supplies and medications were apparent; however, many participants expressed disappointment in the level of services offered, comparing the strengthened health center to hospitals and health centers in more urban settings. Participants repeatedly noted the need for more qualified staff and greater equipment, particularly for performing surgical procedures for complicated childbirth. With the increased focus on the millennium development goal concerning maternal mortality [40, 41], rural initiatives such as EMRI may be important to begin the process of antenatal care; however, greater investment in complicated childbirth services will be critical.

Our findings should be interpreted in light of several limitations. First, we were unable to have a comparison group against which to examine progress over time; this is because other rural health centers did not routinely report data on HMIS indicators, as that system had not been widely implemented at the time of our study. Ethiopia has increased awareness of the need for HIV testing through many health education efforts throughout the country in recent years, and some of the improvement in HIV testing in the EMRI PHCU's could be due to these broader efforts; however, since non-EMRI rural health centers are still developing the staffing and systems needed to provide routine care, it is unlikely that they fully explain the observed improvements. Second, given the limited information technology in rural Ethiopia, data were gathered on paper and then entered into a computer centrally in Addis Ababa, which may have resulted in some errors. Nevertheless, we minimized the likelihood of such errors through the use of a consistent data capture form with detailed definitions of each input, and corroboration of data every 6 months by our research team using original registers to cross-check data. Finally, we conducted the study in a single country with an intervention that was broadly supported by the Ministry of Health; results may differ in other settings or where such political and instrumental support was not available.

The study describes overall improvement in several key areas using a systems-based approach to strengthening primary healthcare units; however, regional differences were apparent in how PHCU's accomplished their improvements. For instance, the expansion of HIV testing to the health post level was particularly important in one region. Additionally, we found variation in improvements even across health centers, with some demonstrating more substantial improvements in various indicators than others. Such variation underscores the complexity of predicting change and potential expansion of individual models of care, such as EMRI. Future research to identify the various elements of successful change, including, but not limited to, facility and governmental leadership, community engagement and economic resources, would be helpful in anticipating the potential effects of such interventions as they may be scaled up in alternative settings.

Funding

This research was funded through a grant from the Children's Investment Foundation Fund.

Appendix: Focus group discussion guide

1. Please tell us about the healthcare services you can get at the health center
   - Antenatal care?
   - Delivery Services?
   - Prevention of Mother to Child Transmission of HIV/AIDS services?
   - HIV/AIDS diagnosis?
   - HIV/AIDS treatment?
   - Malaria diagnosis and treatment?
   - Tuberculosis diagnosis and treatment?

2. Do the services currently offered by the health center meet the needs of the community?
   - If yes, how so?
   - How can the services that are available be made better?
   - What services not currently available would be the most valuable to have?
   - What keeps you from getting the services you need?
   - What do you think would help take care of those problems?

3. Please tell us about how often you use the services provided by the health center
   - How much do the services cost, and how do they get paid for?
   - We want to hear about the healthcare professionals at the health center. Can you tell us about how they work?
   - How can the healthcare professionals better serve you?

4. In general, please tell me what you have liked about your healthcare services and what you have not liked (please consider all kinds of services including health center and hospital care)
   - Are there any other ways that the health center can make the healthcare in your community better?

5. Please tell us about the healthcare services you can get at the health post?
   - Do the services currently offered by the health post meet the needs of the community?
   - Please tell us about how often you use the services provided by the health post
   - In general, are there any ways that the health post can make the healthcare in your community better?

6. We would like to hear more about health extension workers. Can you tell us about the work that they do in your community?

7. We would like to hear more about community health promoters. Can you tell us about the work that they do in your community?

8. Have there been any changes in the last 6 months that have made a difference for you and the community?

9. We are trying to understand how you feel about the healthcare services in your community. Is there anything else we should have asked that would help us understand this better?
References


