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Ministry of Health

SPECIAL BULLETIN

19TH ANNUAL REVIEW MEETING 2017

IMPROVING THE PERFORMANCE OF THE HEALTH SYSTEM: A FOUNDATION FOR UNIVERSAL HEALTH COVERAGE

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FOREWORD

The Federal Ministry of Health, Policy and Planning Directorate (PPD) would like to extend its warm welcome to the participants of the 19th Annual Review Meeting (ARM) and readers of this year's special bulletin.

FMOH is currently on its second year of implementing the Health Sector Transformation Plan (HSTP) with four priority agendas: Transformation in equity and quality of health care, information revolution, Woreda transformation and the Caring, Respectful and Compassionate health work force. Monitoring and evaluation plays a vital role in assessing the status of HSTP implementation, identify successes and challenges and to inform program implementers and stakeholders towards the achievement of the ambitious health targets. As part of the M&E process, periodic participatory performance reviews and conducting operational researches and evaluations are vital. ARM is one of the M&E processes through which performances are reviewed and key successes and challenges are presented and discussed.

This Special Bulletin for this year's Annual Review Meeting is the sixth issue in a series that has been published for the last six years as part of the publications distributed in the ARM. In this year's special bulletin, four categories of articles are presented that includes: Best practices/lessons learned, new initiatives, program implementation progresses and research articles. The purpose of this special bulletin is to present best practices/lessons learned and new initiatives, to describe program achievements and progresses and to present research findings to policy makers, health managers, health workers and other stakeholders for evidence informed decision making.

I would like to thank all FMOH directorates, agencies and researchers for their efforts and contributions in these articles and look forward to having articles of high quality and impact for the years ahead. I am also grateful to the editorial board members, PPD staff, contributors and reviewers for the extraordinary efforts made to realize the publication of this special bulletin.

Desalegn Tegabu Zegeye (MD, MPH, MA)

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SECTION 1:

BEST PRACTICES, LESSONS LEARNED

ENSURING EQUITY THROGH PRIMARY HEALTH CARE: EXPERIENCE FROM URBAN PRIMARY HEALTH CARE REFORM PILOTING IN ADDIS ABABA

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INTRODUCTION

The urban population in Ethiopia is increasing rapidly. Currently more than 17 million people (nearly 19% of the total population) live in urban areas. The proportion of people living in urban areas is one of the lowest in the world, well below the sub-Saharan Africa average of 37%. But this will change soon, with projections that 30% of the country's people will reside in urban areas by 2028 (Central Statistical Agency (2013). Population Projection of Ethiopia for All Regions: at Woreda Level from 2014–2017. Federal Democratic Republic of Ethiopia and World Bank. Ethiopia Urbanization Review.)

If managed properly, urban population growth presents a huge opportunity for multiple sectors, but may also pose a demographic challenge as cities struggle to provide health care, jobs, infrastructure, services, and housing to rapidly increasing population. If sound policies, institutions, and investments are not created immediately, it will be difficult to respond to the growing need of the urban population.

Urban populations face a triple threat: infectious diseases like HIV, TB, pneumonia, and diarrhea; non-communicable diseases like asthma, heart disease, cancer, and diabetes; and violence and injuries, including traffic collisions. Due to such multifaceted challenges, a new approach to mitigate the complicated health problems of urban dwellers is needed. With this understanding, the Ethiopian government in collaboration with USAID funded Strengthening Ethiopia's Urban Health Program implemented by John Snow, Inc and Harvard T. H. CHAN School of Public Health piloted a reformed urban primary health care system in three health centers in Addis Ababa in 2014. The new primary health care model is based on lessons from middle income countries, particularly Cuba and Brazil. Experience from these countries is believed to apply to Ethiopia's context as Ethiopia aims to become middle-income country by the year 2035.

The key lesson from these countries are: have well-developed human resources with a mix of skills & adequate in numbers; family physicians/doctors and nurses providing team-based primary health care services; clinics & health workers located near or within the community; and services targeted to the specific need of the population through risk factor-based client segmentation or category

OBJECTIVES

- Describe the design and approach of the Urban Primary Health Care reform in Addis Ababa.
- Assess the challenges faced and documented successes in the implementation of the reform.
- Provide recommendations to be considered for future implementation.

METHODOLOGY

We reviewed the PHC reform implementation manual and tools, different administrative and field observation reports. We also reviewed findings from the expert appraisal of the primary health care (PHC) reform done in 2017 with special focus on three pilot sites: Yeka Woreda 02 (Entoto Health Center), Bole (Gerji HC) and Gulele (Selam HC).

FINDINGS AND DISCUSSIONS

The Urban PHC reform/FHT approach is one of the initiatives by FMOH in realizing equitable health service provision among the urban population. The FMOH launched the reform in 2015 at pilot level in three PHCUs of Addis Ababa city. This reform has three major agendas; service standardization, client categorization and introduction of team-based approach at the PHCUs. Each reform agenda and its contribution to ensure equity in provision of health services as discussed below.

a. Service standardization

In the context of Family Health Team (FHT) approach, the existing PHC service packages is fine-tuned with due emphasis to the balance of health promotion, disease prevention, and clinical services. In this respect, a continuum of health care services is provided to the community based on the health needs. The FHT approach allows the provision of selected clinical services at the community level. The facility-based services is continued to be provided and the community-based intervention follows the client categorization. Thus, availing comprehensive type of services at the different service delivery points (household, school, youth center, homeless spots and workplaces) is believed to improve the reach of the services to the neediest segment of the community. Through categorization and prioritizing of the households, the FHT can easily access target population with basic health services, which in turn helps ensure equity in the provision of basic health services.

b. Team based approach

The other pillar of the Urban PHC reform is a team-based approach. The main purpose of the team-based approach is to ensure that every household has an easy access to all spectrums of health care services ranging from primary to tertiary care services using the FHT as an entry point. The team covers health interventions at households, community at schools, youth centers, and streets for homeless people, workplace, and facility services for a designated catchment population. There are pooled services such as laboratory, pharmacy, delivery, and administrative services in a complimentary or synergistic manner with the FHT. Up to five teams are formed per health center for both facility based and outreach activities. Each team is composed of health officer/BSC nurse, diploma nurses, 4-5 health extension professionals and an environmental health professional. In the implementation of FHT approach, health center staffs are able to access the community who they are serving and help them tailor their services as per the need of their catchment population. Through this; the link between the community and that of the health center is improved.

Figure 1: FHT checking client's blood glucose level at household, Addis Ababa

c. Categorization of households

In reforming the primary health system in the urban context, the provision of services to the community follows clients' categorization. The category is based on epidemiologic factors and socioeconomic conditions of the households in a way that helps to reach the urban poor. In this categorization process, households with pregnant women and under five children who are at the same time economically deprived of get priority in receiving basic health services.

INCOME CATEGORY Client characteristic	(A) LOWEST	(B) MEDIUM	(C) HIGHEST
I: Pregnant women and children under the age of 5 years	Category IA	Category IB	Category IC
II: Adults with chronic problems and non-communicable disease	Category IIA	Category IIB	Category IIC
III: Others	Category IIIA	Category IIIB	Category IIIC

ACHIEVEMENTS

According a recent expert appraisal of the implementation of the reform at the three health center, the new model strengthened focus on family and community context bolstered by Ethiopia's Health Extension Program. The approach increased access to basic services for marginalized and vulnerable population groups. The team approach allowed provision of comprehensive care including previously neglected problems such as non-communicable disease, injuries, violence, and mental health. Programmatic efforts to ensure continuity of care starting at the community to the health center and tertiary levels of care through referrals are being strengthened, although there are challenges due to the lack of clear payment mechanism for patients to get paid services.

The reform introduced the practice of team work within the primary health care system and helped to draw health workers out of the health centers to work with community-based structures and members. For example, in one of the three pilot health centers (Gerji Health Center in Bole Sub-city) there are five family health teams, each with two sub-teams (one that goes into the community and the other that stays at the health center to provide services to the community members referred by the other team).

In addition to home visits, the family health team goes to schools and work places. On Mondays and Tues- days, the team provides services to children under-five and antenatal care for pregnant mothers. Services for chronic and non-communicable diseases cases are provided on Wednesdays. On Thursdays, the team goes to schools, youth centers, work places, and community centers. Fridays are reserved for weekly meetings.

CHALLENGES

Inadequacy of human resources to staff the family health team; disruption of regular activities during emergencies, lack of office space to reorganize outpatient clinics according to the family health team's arrangement; lack of sustained follow-up support from health offices; financial constraints (or absence of fee waiver system) for providing medications for indigent people identified during visits by team; transportation problems; lack of links to private sector; and weak referral network between the health center and hospitals are the main challenges reported from the pilot health centers. In particular, the lack of a mechanism to cover the cost of medicines for poor families creates mistrust and cynicism when the team members who visit a family that has sick person are unable to provide any medical support.

CONCLUSION AND RECOMMENDATION

In general terms, the reform exercise in Addis Ababa has shown that the FHT approach, if implemented as per the context of the cities in Ethiopia, would be appropriate in reaching out urban population, especially the poor and vulnerable with basic health services in equitable manner. From the reports and site visits in Addis Ababa, the FHT approach benefits in availing comprehensive health services especially at the community and household level. While scaling up, the following should be taken in to consideration.

- Design region and town/cities specific implementation approach by taking lessons from pilot sites.

- Revisit health center structures to deploy required work force both in number and in professional diversity.

- Roll out community based health information system and health insurance scheme to successfully implement the program.

- Revise baseline data collection and analysis system to make is easier.

- Advocate the reform at all levels including the community to generate adequate support.

THE EXPERIENCE OF TIGRAY REGION, ETHIOPIA ON IMPLEMENTING TOBACCO CONTROL LAW: PROGRESS REPORT AND POLICY RECOMMENDATIONS

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INTRODUCTION

The global burden of non-communicable diseases (NCDs) is increasing at an alarming rate, posing serious societal, economic, as well as political challenges. More than 80% of NCD mortality occurs in low and middle income countries (LMICs) where the health systems may lack adequate response capacity (1) to mitigate the double mortality burden brought about when Non communicable diseases (NCDs) become an increasing threat while deaths from infectious diseases remain highly prevalent. The primary NCDs (Cardiovascular disease CVD, diabetes, chronic respiratory diseases, and cancer) share common risk factors and it is a well-accepted fact that a comprehensive approach requires both effective and accessible delivery of health services as well as multi-sectorial actions aimed at decreasing the population-level risk factors especially those pertaining to lifestyle and behavior such as alcohol consumption, tobacco use, unhealthy diet, and lack of exercise(2) . The burden of NCD can be mitigated employing a small number of proven prevention measures that could stem the rise of the NCD epidemic. Global evidences indicate that there are potential affordable and potent prevention tools focused on five key areas: tobacco, alcohol, diet, exercise & nutrition. Together, programs targeting these areas could reduce the burden of NCDs by more than half, while costing only a tiny fraction of current health spending (3).

Evidence suggests that Ethiopia, one of the low-income countries found in Eastern Africa, is starting to face the double mortality burden, also known as the epidemiologic shift, especially in urban areas. The WHO 2014 Report on NCDs estimated that 30% of all deaths in Ethiopia are attributable to NCDs. A burial surveillance study conducted on all adult deaths in the Ethiopian capital Addis Ababa from 2006-2009 found that 51% of deaths were attributable to NCDs, 42% to communicable diseases, and 6% to injuries (4). Another study conducted in Kilte Awlaelo Demographic and Health Surveillance Site in Tigray Region, Ethiopia found that NCDs accounted for 34.8 % of all deaths in the study area (5). Because the Ethiopian health system has traditionally been oriented towards addressing communicable diseases, the approach to NCDs is not well integrated in the health system and there is a dearth of locally specific evidence on the prevalence of lifestyle and behavior related risk factors for NCDs. Despite this, Ethiopia has recognized the growing public health threat of NCDs and has started to adopt global commitments aimed at tackling them (6), such as the Framework Convention on Tobacco Control (FCTC) which was drawn by the World Health Assembly in 2003. There are variable degrees of commitment by signatory countries to ratify and fully implement the FCTC at ground level (7). Therefore, this commentary is meant to summarize the progress of FCTC implementation in Ethiopia thus far, with a specific focus on the experience of Tigray Regional State, northern Ethiopia, which has seven administrative zones and an estimated regional population size of 5,000,559 (8).

TOBACCO USE IN ETHIOPIA

Tobacco use is known to be an antecedent risk factor for a wide range of health problems including CVD, lung cancer, and chronic respiratory disease (9). WHO estimated 4.1% prevalence of tobacco use in Ethiopia in the year 2014, compared with 9.9% in Uganda and 13.1% in Kenya (6). The 2011 Ethiopian Demographic and Health Survey estimated 7% prevalence of tobacco use among Ethiopian adults, with wide regional variations (10), and a study conducted in Harar, Ethiopia found 12.2% prevalence of tobacco smoking, with sex, age, peer influence as positive predictors (11). A 2008 study on the epidemiology of CVD risk factors found that 68% of adults in urban areas of Ethiopia have one or more CVD risk factor, with 11% prevalence of daily smoking among men in Addis Ababa and 7% in Butajira while less than 1% of females in either population reporting smoking(12). Ethiopia signed the FCTC in 2004, and just recently ratified the convention in 2014.

STEPS FOLLOWED

Information dissemination and awareness creation

Prior to official ratification of the FCTC in 2014, Tigray Regional Health Bureau (TRHB) has already been undertaking various tobacco use prevention and control measures mainly focused at creating awareness among school children and students in higher education using information, education, and communication (IEC) strategies to discourage harmful habits such as cigarette smoking, alcohol consumption, and drug use (17).

In addition, the health development army (HDA), which has helped Ethiopia to achieve several maternal health goals (18)local assessments of the magnitude of maternal mortality are not often made, so the best available information for health planning may come from global estimates and not reflect local circumstances.\\n\\ nMETHODS: A community-based cross-sectional survey was designed to identify all live births together with all deaths among women aged 15-49 years retrospectively over a one-year period in six randomly selected districts of Tigray Region, northern Ethiopia. After birth and death identification, Health Extension Workers trained to use the WHO 2012 verbal autopsy (VA, has proven instrumental in rolling out political, civil, and health related messages, including the tobacco control IEC materials developed by the TRHB. These materials have been successfully distributed at community level thanks to the HDA, women's development groups (WDG), consisting of 25-30 women further organized into 1-to-5 networks based on their vicinity.

REGULATORY FRAMEWORK AND IMPLEMENTATION APPROACH

Following Ethiopia's ratification of FCTC in January 2014, several legal tools were developed both at national and regional levels. Tigray region's regulation on administration and control of food, medicine, and health care concurrently passed on January 2014 with number 83/2014 which had separate article that incorporates almost all sorts the FCTC components was the first legislation of its kind to come into force and brought success stories that are being scaled up to other parts of the country, banning tobacco smoking in public areas was notably recognized nationwide (20,21).

The Tigray Region administration regulation number 83/2014 had tried to incorporate the demand and supply reduction .The lessons on banning tobacco in public areas in Tigray has been witnessed by various local and international media out lets. More over the experience of Tigray was presented various national and regional meetings.

POLICY RECOMMENDATIONS TO STRENGTHEN TOBACCO CONTROL

Despite the lessons learned thus far, there remain some gaps in implementing the FCTC principles. The issue of comprehensive banning, increase in tobacco taxation, and creating viable economic alternatives to minors who sell and or buy tobacco, tobacco dependence cessation which were not exhaustively addressed in the regulation need to be on the top agenda of the Tigray region and Ethiopian government. Ethiopia need to learn on the achievements of few African countries who have experienced a gain by strictly implementing the FCTC including increase tobacco taxation (22).

COMPETING OF INTEREST

The authors declare that they have no competing of interest Ideas presented in this manuscript don't necessarily reflect the stand of the institution the authors are affiliated.

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IMPROVING SKILLED DELIVERY THROUGH WOMEN DEVELOPMENT ARMY AND HEALTH WORKERS: EXPERIENCES FROM SASIE TSAEDA AMBA DISTRICT, TIGRAY REGION, ETHIOPIA

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INTRODUCTION

Improving maternal and newborn health is one of the top priorities of the government of Ethiopia. The Federal Ministry of Health (FMOH) has been implementing different high impact interventions to improve maternal and newborn health. According to the Ethiopian Demographic and Health Survey (EDHS), remarkable improvements in maternal mortality from 2000 to 2016 has been achieved. The maternal mortality ratio plummeted from 871 maternal deaths per 100,000 live births in 2000 to 420 per 100,000 in 2016 (1). However, further efforts and commitment are required to achieve the target of reducing maternal mortality ratio (MMR) to 199/100,000 live births by 2020 [2]. Accordingly, creating "Home delivery free kebeles" is designed as one of the three indicators of woreda transformation and efforts are made to maximize key maternal health interventions that will lead to an increase in demand for services and increase access to obstetric care. Global experiences have shown that "…women's groups practicing participatory learning and action are cost-effective strategy to improve maternal and neonatal survival in low-resource settings" (3). In 2011, the government of Ethiopia introduced Women Development Army (WDA), a broad-based community engagement platform. After the introduction of this initiative, commendable changes have been achieved in improving the demands in maternal and newborn health services. This in turn helps to improve maternal health, and minimize maternal and neonatal mortality. In this article, the concerted efforts of WDA and health workers and its effect in increasing skilled delivery is discussed.

OBJECTIVE

To analyze the contribution of the Women's Development Army (WDA) and health workers to improve skilled delivery in Sasie Tsaeda Amba district, Tigray region of Ethiopia

METHODS

A case study was applied as a study design with the use of document analysis, interview and focus group discussions. Literature review was conducted on policy documents, strategic plans and initiatives including the Health Sector Transformation Plan, government reports and relevant studies that address maternal health and health service utilization, and the role of WDA in improving the health status of the community. Following the literature review, data gathering through interview and focus group discussion was carried out at Sasie Tsaeda Amba district, in Tigray Region. Sasie Tsaeda Amba was purposively selected among the twenty seven best performing districts that were awarded by the FMOH in 2016.

The study was conducted in Sasie Tsaeda Amba woreda. It is one of the districts in Tigray Region with a total population of 159, 637. In the Woreda, there are 6 health centers, 1 primary hospital and 26 health posts. In the woreda, there are 48 HEWs, 894 functional WDAs and 4,470 functional 1 to 5 networks.

Data was collected by 2 experts from FMOH and 1 expert from JSI/Finot project. Data was collected by a mix of data collection methods that includes document reviews, interviews with health workersand focus group discussions. Interviews with semi structured questionnaire was performed with head of the woreda Health Office, director of edaga-Hamus Health Center, health workers from the health center (n =7)and Health Extension workers. Focus group discussion was also conducted with 3 WDA groups; each group consisted of six to eight members. Notes taken during data collection were analyzed, and findings are organized in three themes and presented in the result section.

RESULTS

1. PEER TO PEER LEARNING

The one to five network members of the WDA in the visited villages meet weekly and discuss health and other development issues. WDA leaders also meet with HEWs every other week to discuss performance and share information. HEWs get relevant health information from the WDA leaders, and plan their visit to households based on the need. For instance, they visit pregnant women at their home and provide counseling and health services. Pregnant women and mothers who have children less than five years of age get the required advice and counseling from their team members and HEWs. Pregnant mothers get special support and counseling to attend their antenatal checkups and give birth at health institutions. The WDA leaders and women who have given birth at health centers mainly provide the counseling. WDA networks regularly do demand creations on maternal and neonatal health services and this is linked to services offered at health facilities through the health professionals.

Fig.1A: 1 to 5 network discussion   Fig.1B. Local Credit and saving association of WDA

2. CONSENSUS BUILDING DISCUSSIONS WITH PREGNANT MOTHERS

The Woreda health office has introduced a system called "consensus building discussion" that helped to increase institutional delivery. A health professional from Health Center, HEW and the WDA leader team up to meet pregnant mothers at their own homes at least three times during their pregnancies and identify preferred place of delivery. The team also discuss with other influential persons, such as husbands, mother-in-laws, elder sons/daughters, traditional birth attendants, on the risks of home delivery and the importance of institutional delivery to minimize maternal and neonatal deaths. After they reach to a consensus, the team and members of the family make an agreement and sign a form that shows the pregnant mother and her families agree to skilled birth attendance.

According to the interviewed HEWs and WDA leaders, some of the documented advantages of completing this consensus building form include: (i) it helps HEWs to monitor the performance of 1 to 5 network leaders, (ii) it helps to identify the challenges a pregnant mother may face from her husband or other influential persons. Thus, HEW and Health center staff may need to have further discussion and convince the family members or influential others (iii) the filled and signed form reminds pregnant mothers to be prepared for institutional delivery. This approach has greatly helped to increase facility delivery in Saise Tseada Amba district (4) (see figure 3 below).

Since the woreda health office aspires to create "home delivery free kebeles" through achieving 100% institutional delivery, it has also introduced an initiative called immediate home delivery reporting and auditing system. The completed forms, signed by HEWs and the Kebele administrator, are submitted to the nearest health center. Afterwards, the Woreda health office, together with health centers, assigns team of experts to audit the reasons that led the pregnant mother to deliver at home and suggest possible solutions. This initiative has ensured the sense of accountability among the HEWs and Kebele administrators.
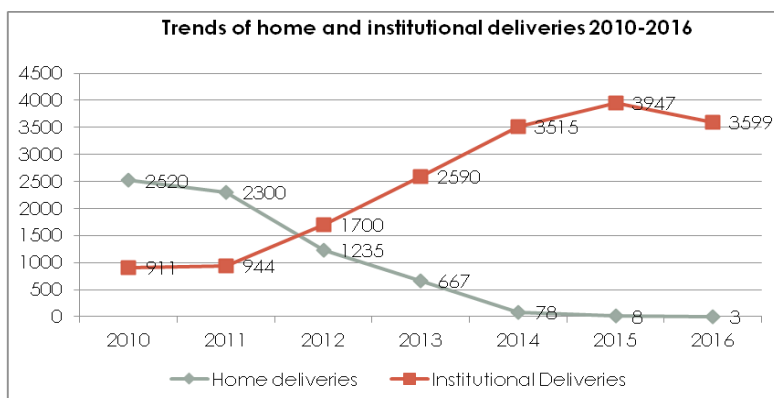
Figure 3: Trend of home and institutional deliveries in Saise Tseada Amba District, 2010-2016

The woreda has also implemented a monthly pregnant women conference initiative. The conference is usually facilitated by staff from health centers (health officers and midwifes) and HEWs. Agendas are designed based on the local challenges that include barriers for institutional delivery, harmful traditional practices, counseling on birth preparedness, personal hygiene, nutrition, and the likes. Sometimes religious leaders/influential individuals and husbands are invited to the conference. The interviewees mentioned that the woreda health office has a system of documenting and adapting best practices from other woredas.

3. USAGE OF LONGSTANDING COMMUNITY BASED INSTITUTIONS FOR HEALTH

In Ethiopia, there are historically constituted community-based indigenous institutions that promote collective practice and solution provision on a voluntary basis. Equb, a local saving and credit mechanism, is one of those longstanding institutions employed in different parts of Ethiopia. The WDA members were asked how equb helped them to strengthen their performance in undertaking the health activities. They mentioned that equb gathering gives them opportunity of saving money, as well as, a forum to discuss health and other social issues. A member of the WDA said, "Equb boosts our saving practice that help to have an amount of money, for instance, to cover the health cost; besides, it promotes our social bond which is very important for our solidarity to maintain our meetings and share experiences of best health practices".

Health center staff and HEWs in the kebele also shared this view. The HEW at Addis Zemen HP stated, "Equb has positively impacted on the functionality of the WDAs and 1 to 5 networks by developing the sense of unity and solidarity".

The focus group discussion participants also stressed that equb gives them opportunities to discuss their health issues regularly; including counseling of pregnant women and their husbands that in turn facilitates institutional delivery.

DISCUSSIONS

The WDA is designed to bring about transformational positive behavioral and attitude change, ensuring every household is reached, in addition to supporting the work of the HEWs. The WDA is designed to ensure the systematic organization of the communities, which is inclusive and encourages collaborative movement through active participatory learning and actions (2). This study indicated that the collective efforts of WDA, HEWs and health workers in Saise Tseda Amba district contributed to maximize institutional delivery over the last 6 years. Home delivery showed a sharp decline yearly while institutional delivery was increasing. Increase in institutional delivery can contribute to the reduction in maternal and neonatal death.

The findings revealed that the WDA in the district is vibrant and the health staff is committed to close follow up of pregnant women and their families to make health facilities as their choices to deliver their babies. The woreda health officers, as well as, the kebele administrators demonstrate leadership and commitment. From the findings, we can conclude that collective efforts minimize all the factors related to delay in accessing skilled delivery services (5). Therefore, the district is moving forward significantly and has paved the way for creating a "home delivery free kebele", which is one of the criteria for woreda transformation (6).

More importantly, they use locally generated information for action, including the data collection using the consensus building scheme and an immediate home delivery reporting and auditing system. This local use of information for action is a powerful tool in taking corrective action in time and strengthening the accountability mechanism.

The health workers and WDA are keen to use different innovations, as well as, the existing community-based institutions to create home delivery free kebeles. As mentioned by different researchers (7, 8), the starting point for any venture in a community context is the current practice of that community. This study showed that "Equb" was employed as a medium to discuss different health issues, including the importance of skilled birth attendance to minimize maternal and neonatal death. This also indicated that the existing community structure and practices of supporting each other helped to compliment the knowledge from scientific bases (7).

CONCLUSION

In conclusion, the Saise Tseada Amba woreda health office and health center staff and HEWs, in collaboration, with the WDA have greatly enhanced the rate of institutional delivery. Their method of operation including consensus building sessions with pregnant mothers, immediate home delivery reporting and auditing system and usage of the exiting community-based institutions as a health discussion forum can be scaled up to other districts and regions in Ethiopia and also to other developing countries with similar set up.

RECOMMENDATION

We recommend further studies to investigate the impact of increasing institutional delivery on improving maternal health, and decreasing maternal and neonatal death in the district. We also suggest that further studies in other best performing woredas and share best experiences in order to accelerate skilled birth delivery. Strengthening the functionality of WDA is recommended to improve utilization of maternal health services. On top of this, we recommend promoting a mother friendly health facility environment and improving the quality of maternal health services available in health facilities as suggested by other researchers (9).

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UPGRADING HEALTH CENTER TO CEMONC CENTER AS A WAY TO REDUCE SERVICE OVERLOAD FROM A REFERRAL HOSPITAL: THE CASE OF ST. PAUL HOSPITAL MILLENNIUM MEDICAL COLLEGE AND TWO HEALTH CENTERS IN ADDIS ABABA

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1. INTRODUCTION

St. Paul's Hospital was built in 1969 (was named St Paul General Specialized Hospital until 2008) by Emperor Haile Selassie in collaboration with the German Evangelical Church to serve as a center of medical care for underserved populations. The hospital is accessible to an estimated number of more than 5 million people under its catchment area. It currently has 421 hospital beds serving around 280,000 patients per annum. Approximately 75% of the patients have received medical services free of charge, and the rest are paying very nominal fees.

Obstetrics and gynaecology department is one of the oldest departments in the college which was started in July 2012. It provides comprehensive obstetric and gynaecologic services and training for both undergraduate and postgraduate medical students. Moreover it is deeply involved in research undertakings and multiple local and national advocacy activities.

Obstetrics and gynaecology department of St. Paul Hospital Millennium Medical College (SPHMMC) currently runs the busiest delivery unit in the country providing 900 deliveries per month with a cesarean section rate of 36 %. The rapidly increasing number of deliveries altogether with various complications requiring very close attention has overburdened the department's work which in turn is seriously undermining the quality of service and teaching activities. The department is now seeing much more critical patients than ever before. An average of up to 6-12 eclampsia/severe pre-eclampsia cases are seen per day from whom majority require ICU care. Moreover, the rapidly improving high risk pregnancy care unit has made significant progress since the start of maternal fetal medicine fellowship where many mothers would require termination by induction requiring a one-to-one care during delivery. It is also common to see an average of 2-6 women in labour ward on induction.

The fact is for a tertiary teaching hospital like SPHMMC to handle complicated cases, the preparation of the hospital to handle such enormous burden is far from ideal. Large number of normal deliveries are also taking the meager resources away from most critical patients that needs exact care and attention. As a result, the maternal mortality and morbidity and perinatal mortality and morbidity have become higher than expected at a tertiary level.

In SPHMMC, likewise in most hospitals in Addis Ababa, nearly 200-250 normal deliveries occur at emergency gynecology OPD (EGOPD) while all of them should have been expected to happen at lower levels such as health center. Moreover, most mothers arrive at facility at early stage of labor and are kept at the emergency GOPD because of lack of beds. Another reason that made mothers to be kept at emergency GOPD is lack of willingness of other hospitals to receive the referrals. Because of the aforementioned reasons, mothers stay wondering around hospital's corridors with no follow-ups that might expose mothers and fetus for serious heath outcomes.

Increasing work load at SPHMMC's labor & delivery unit is compromising quality of service and training provided at the department. Residents in particular are overburdened and exhausted which in turn leads to burn out and drop outs of the residents. In the contrary, many of the catchment health centers under SPHMMC are suffering from low delivery attendances. The lack of enough work with regard to delivery at the health center level has led to staff to be idle and demoralized thereby resulting in lack of experience and confidence.

The burden and demanding nature of maternity services at SPHMMC has also impact on every other routine activity of the department and the interactions the department should have with other service departments within the hospital. Moreover, the department's effort to introduce various advanced and sub-specialty services and trainings is also believed to be affected by the shift in focus to the dire needs in labor and delivery.

In order to tackle problems mentioned above, the department of obstetrics and gynecology of SPHMMC launched a pilot project to upgrade Kolfe and Felege-melse health centers, which are found in its catchment area, to a Comprehensive Emergency Obstetric and Neonatal care (CEMONC center).

2. METHODS AND PROCESSES RELATED TO THE IMPLEMENTATION

In order to capacitate the catchment health centers to a CEMONC, with the aim of minimizing unnecessary referrals and share the burden of SPHMMC, the following steps have been undergone:

2.1 BEmONC training: Standardized three weeks training in three rounds on BEmONC was provided to midwife mentors working at catchment health centers. A total of 60 health care providers have taken the training.

2.2 Emergency Obstetrics Drills training: To provide care for catastrophic maternal health problems, health care workers from health centers were given a five-day training of emergency obstetrics drill training focusing on the management of PPH and Eclampsia. Moreover, trainees were given an opportunity to practice on three to five similar cases at SPHMMC.

2.3 Upgrading Health Centers to CEmONC facility: Kolfe and Felege- Melse health centers were transformed to CEmONC facility by equipping them with the necessary medical supplies, residents and consultants Kolfe HC and medical supplies to Felege-Melse HC respectively.

2.4 Supply of drug and equipment: Availability of medical supplies required to provide BEmONC were assessed and were supplied to catchment health centers based on their needs.

2.5 Midwives exchange program: Exchange of midwives between catchment health centers (HCs) and SPHMMC was arranged. Thus midwives from health centers were attached to SPHMMC and midwives from SPHMMC were attached to the health centers for a month in several rounds to let them be exposed to different work set up. More importantly, the program believes that it has helped the health Centers' midwives to improve their confidence to manage cases and avoids unnecessary referrals.

2.6 Establishing hospital-health center networking system: A two way communication between catchment health centers and SPHMMC that includes referral and feedback referral is established. The system was aimed at benefiting SPHMMC in terms of efficient utilization of beds and link delivery cases from GYN OPD of SPHMMC to health centers for postnatal care follow up.

2.7 Review meeting and Supportive supervision: Regular monthly catchment health centers' review meetings were held to discuss challenges faced during referral, and share lessons, set action plan to bring better outcome.

3. RESULT OF THE IMPLEMENTATION

Having putting in to place the above mentioned approaches that aims to improve quality of maternal health and decreasing workloads at GYN Obs of SPHMMC, the following outcomes have been observed/reported:

- The number and types of "referred in" cases of laboring mothers has significantly increased.

- An average of 100-450 feed-back referrals were reported per month. Moreover, number of mothers receiving PNC (FP for example) at HCs has increased.

- The number of mothers who had delivered at the health centers in general has markedly increased. Particularly, Kolfe health center has reported a fivefold increase than before. Moreover, cesarean section (CS) at Kolfe health center has reached 50-100 per month.

- The lesson learned from this project was that effective two-way referrals among health facilities needs strong coordination and follow up by both referring facilities and receiving specialized facility.

4. CONCLUSION

- The hospital and HC network is used as a platform for knowledge and skill transfer and building the capacity of facilities; laboring mothers with complications obtain timely and quality care at HC level.

- Upgrading and operating a health center to a CEMONC is a feasible but it is a very challenging undertaking.

- Close affiliation of an upgraded center to a tertiary or training hospital such as SPHMMC is useful in improving the image and the morale of staff of health centers.

- Effective two-way referral system between hospital and HC with in defined catchment area ensures effective transfer of mothers, and it also strengthens task shifting.

- Through provision of timely care, it is possible to minimize obstetric complications and further life threatening situations that might leads to maternal and/or neonatal deaths.

- Feedback loop to track referrals helps to create continuum of care and determines if mother/patient received the necessary care component.

- Capacitating of health centers and establishing effective referral linkage has demonstrated in reduction of pressure on resources and work force in referral hospitals. It has also increased service accessibility for mothers at health center level without compromising quality of care.

5. RECOMMENDATION

- It is highly recommended if FMOH and AARHBs work together to scale up CEmONC referral linkage system to other hospitals and HCs. Moreover, it is also advisable to strengthen regular review meeting that would be held among coordinating health facilities.

- It is good if AARHB in collaboration with its health facilities plan together to equip health facilities with necessary materials and infrastructures with regard to CEmONC.

- It is of high priority, if referring and receiving health facilities are accountable with regard to improving referral and feedback mechanisms.

- Partners are advised to use this opportunity to build the capacity of health facilities.

- It is also recommended to routinely evaluate various areas of the program and highlight areas for improvement with regard to improving quality of quality of care.

EVIDENCE BASED CARE FOR REDUCING SURGICAL SITE INFECTION RATE: LESSONS FROM A QUALITY IMPROVEMENT PROJECT IN GHANDI MEMORIAL HOSPITAL

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ABSTRACT

BACKGROUND: Surgical site infection is a type of healthcare-associated infection in which a wound infection occurs after an invasive (surgical) procedure and affects up to one third of patients who have undergone a surgical procedure. In LMICs, the pooled incidence of SSI was 11.8 per 100 surgical procedures (range 1.2 to 23.6). Gandhi Memorial Hospital performs at least 2650 surgical procedures per annum with around 5% of SSI rate procedure developing a surgical site infection. This means that 133 women at this hospital who underwent surgery will have a surgical site infection annually. Hence the aim of this QI project was to reduce the level of surgical site infection from 4.8% to 3.5 % by the end of June 2007 and to 1% by the end of December 2007.

DESIGN AND STRATEGY: A quality improvement intervention was conducted from January 2007 E.C to December 2007 at Gandhi Memorial Hospital to reduce the rate of surgical site infections. The Root causes to the problem were identified and change ideas developed by the Quality Improvement Unit using the driver diagram.

The quality improvement interventions (change ideas) include the following:

- Development of a guideline on restricting the traffic of attendants and students entering into the surgical ward, following standard sterilization procedures in the surgical area, nursing care standards in post op patients.

- Performing culture and sensitivity tests of samples taken from SSI wounds to inform the first line antibiotics for the pre-op and post-op regimen.

- Provision of trainings on sterilization,

RESULTS: At the end of June 2007, the SSI rate was declined progressively from 4.8% to 2.1% below the target of 3.5%. From October 2007 to November 2007, the rate of SSI has declined from its baseline 3.1% to 2.3% after changing the protocol of postop antibiotic where the QI team expected a decline rate of SSI as a target to be 2.5%. At the end of December 2007, the SSI rate declined progressively from 2.3 % to 2.2 % which was below the target of 2.5%. The monthly SSI has declined progressively along the downward direction with. The decline of SSI has remained to be below the target. The monthly SSI has declined progressively along the downward direction with 5 data points as a trend of decline. The decline of SSI has remained to be below the baseline median from March 2007 to August 2007 (6 consecutive data points) that signals as a shift of median AND hence a new median was set as new median.

LESSON LEARNT: The majority of surgical site infections are preventable. In our experience the simple intervention such as restriction of the high unrestricted traffic flow to the inpatient and post-op inpatients and limiting the visiting hours of attendants had a significant effect on reducing post- operative wound infection rate. Culture and sensitivity testing also helped to determine the most appropriate prophylactic prescribing guidelines in the hospital. Training of nursing staff and those involved in sterilization procedures is also an important quality improvement initiative. Infection caused by microorganisms from an outside source following surgery became less common after the quality improvement initiative.

INTRODUCTION

Surgical site infection is a type of healthcare-associated infection in which a wound infection occurs after an invasive (surgical) procedure. Recent work by the World Health Organization (WHO) - *Clean Care is Safer Care* programme shows that surgical site infection (SSI) is the most and frequent type of surveyed of Health Care Associated Infections (HAI) in LMICs and affects up to one third of patients who have undergone a surgical procedure. In LMICs, the pooled incidence of SSI was 11.8 per 100 surgical procedures (range 1.2 to 23.6) (1).

Gandhi Memorial Hospital performs at least 2650 surgical procedures per annum with around **5%** of SSI rate procedure developing a surgical site infection. This means that 133 women at this hospital who underwent surgery will have a surgical site infection annually. This may range from a wound discharge which is self-limiting and resolves within 7–10 days of an operation to a life-threatening postoperative complication.

Infection at the site of surgery may be caused by poor infection prevention practices in the operating room or on the ward after completion of surgery. The surgical site infection rate is an indicator of the quality of medical care received by surgical patients and an indirect measure of infection prevention practices in the hospital (2).

Post-operative surgical infections cause significant morbidity for the patient, prolongs hospital stay and increases health care costs. The majority of surgical infections are preventable using a range of preoperative, intra-operative and post-operative interventions.

Several overlapping and complementary quality Improvement (QI) models exist, which all stem from the "Science of Improvement" that starts with an aim and develops tests towards improvement. In Ethiopia, Kaizen is thought of as the engine driving improvement, while the Model for Improvement can be seen as the "vehicle" that provides structure for improvement. At the heart of both methodologies are small rapid tests of change that lead to sustained improvement. The Model for Improvement is a framework for accelerating improvement. The model is based on three fundamental questions: (i) what are we trying to accomplish? (ii) How will we know that a change is an improvement? (iii) What changes can we make that will result in improvement? These questions are combined with the Plan-Do-Study-Act (PDSA) cycle to accelerate improvement (3).

AIM STATEMENT

The aim of this QI project was to reduce the level of surgical site infection from 4.8% to 3.5 % by the end of June 2007 and to 1% by the end of December 2007.

DESIGN AND STRATEGY

A quality improvement intervention was conducted from January 2007 E.C to Date December 2007 at Gandhi Memorial Hospital to reduce the rate of surgical site infections. The Root causes to the problem were identified and change ideas developed by the Quality Improvement Unit using the driver diagram that was depicted below.

The quality improvement interventions (change ideas) include the following:

- Development of a guideline to be used by service providers in the surgical area of the hospital. The guideline includes the following major points: restricting the traffic of attendants and students entering into the surgical ward, following standard sterilization procedures in the surgical area, nursing care standards in post op patients. Orientation was provided to the concerned staff and implementation of the guideline commenced.

- Performing **c**ulture and sensitivity tests of samples taken from SSI wounds to inform the first line anti-biotics for the pre-op and post-op regimen.

- Provision of trainings on sterilization, where by a standard on job training was provided for professionals working in the sterilization room on the appropriate procedures to follow to clean and sterilize surgical equipment Implementation of standard sterilizing techniques measures by replacing the traditionally assigned person with trained nurse.

RESULT

The quality improvement project was started in January 2007 EC at which time the first change idea which was regulating traffic flow was undertaken. The interventions were mainly reducing the number of patient attendants and visitors and limiting the visiting hour. The patient visiting hours was reduced from practically unlimited hours to 5 hours per day and the number of attendants was reduced to 1 attendant per patient. Fixed schedules were developed and adhered to for the clinical students to align the clinical attachments and patient care in a manageable manner.

Surgical site Infection rate before the implementation of the above-mentioned interventions was 4.8%. After the initiation of the interventions in January 2007 EC, the surgical site infection rate has declined progressively. A dramatic reduction in surgical site infection rate from baseline 4.8% to 2.4% was observed after 4 months with single intervention of restriction of visitors and reducing the number of attendants. A shift had been observed on August 2007 (six or more consecutive data points below the median), signaling that there was a significant change in the measure and implicating it was associated with a change idea. A new median and new target was set after the shift was observed.

- In September 2007 EC, a new target of reducing the surgical site infection rate to 1.0% was set, and subsequently additional quality improvement interventions were introduced that includes the culture and sensitivity testing of specimen samples taken from the wound sites of patients to guide antibiotic use starting on October; as well as the assignment of a properly trained personnel at the sterilizing unit.

- Surgical infection rate was reduced from 4.8% in January 2007 EC to 2.2% in December 2007 EC. This is a reduction by more than 50%, which is mainly due to the quality improvement interventions.

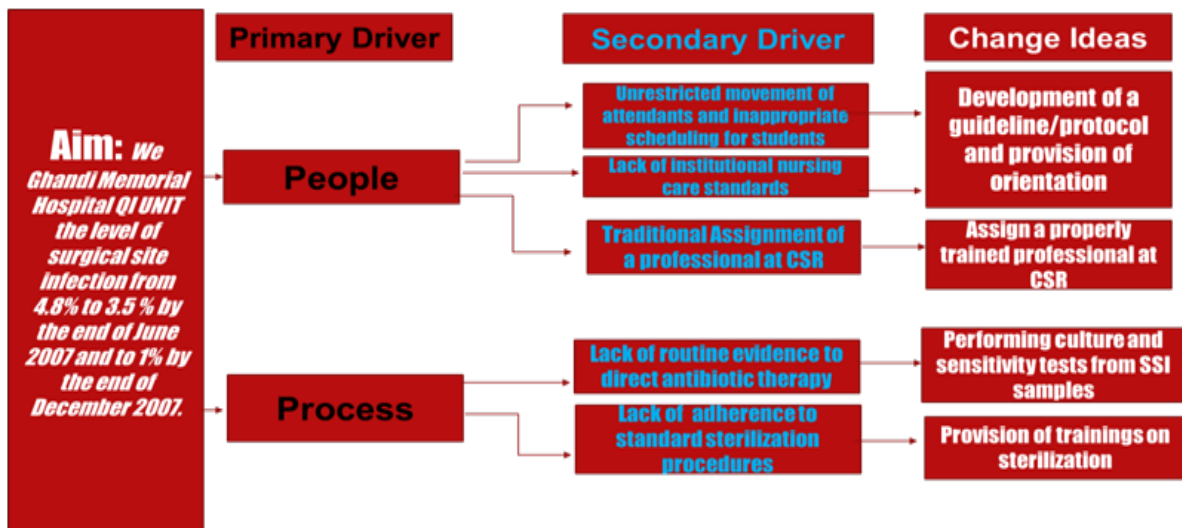
Figure 1: Quality improvement Driver Diagram

PDSA-1

PLAN: PDSA-1 was planned to be tested from January 2077 to June 2007 with intervention of restriction of free flow of attendants and students. Development of restriction of free flow of attendants and students identified as a nidus for the infection through developing protocol and orienting hospital staffs to t put into practice were

planned. The protocol for restricting of free flow of attending visitors and practical attaching nursing and medical students were developed and oriented to all staffs including the hospital gate guard. Beside the protocol of restriction in traffic flow attendants and students; the strict IPPS practice protocol were oriented inclusive of restricting and limiting the type of foods and drinks brought by attendants from out of the hospital to be monitored by the head and assigned nurses in the ward.

DO: The hospital gate was restricted by the watch guard except for 1 attendant whose ID being submitted to watch guard at the gate. The students followed the protocol and yet some of the students breach the rule during the admission of new clients to be clerked at night duty time. However, some of the attendants infrequently bypass the checkpoint and takes the food and drinks to the ward. Nevertheless, the restriction protocol has worked in limiting the free flow attendants and students to the ward.

STUDY: At the end of June 2007, the SSI rate was declined progressively from 4.8% to 2.1% below the target of 3.5%. The monthly SSI has declined progressively along the downward direction with 5 data points as a trend of decline. The decline of SSI has remained to be below the baseline median from March 2007 to August 2007 (6 consecutive data points) that signals as a shift of median AND hence a new median was set as new median.

ACT: After the reset of new median on August 2007 for the SSI rate at 2.05%, the SSI remains at 3.1% until the PDSA-2 was planned to be introduced on October 2007.

PDSA-2

PLAN: During change idea generation, the culture and sensitivity the organism predominant in the hospital were not known for long and the QI team decided to do culture and sensitivity for those clients who develop SSI. Hence the physician who operated the clients would order culture and sensitivity for those clients whose SSI were not be explained by underlying causes.

DO: As plan, the nurses had sent the sample taken from the infection site for culture and sensitivity for those clients with SSI by the senior. The predominant organism identified in those clients who developed SSI were S. Aureus as a common cause of hospital acquired infection. Hence protocol of post op antibiotic was changed from routine Ceftriaxone to Cloxacilline and Metronidazole.

STUDY: From October 2007 to November 2007, the rate of SSI has declined from its baseline 3.1% to 2.3% after changing the protocol of postop antibiotic where the QI team expected a decline rate of SSI as a target to be 2.5%.

ACT: Though the target for the reduction based on the regimen change has been achieved; a decision to investigate the IPPS practice brought the introduction and testing of the replacement of the traditional person in charge of CSR by trained nurse.

PDSA-3

PLAN: PDSA-3 was planned to be tested starting from November 2007. Inappropriate processing of surgical equipment at the Central Sterilization Room was one of the gaps identified. This was mainly due to the traditional random assignment of nurses at the central sterilization room. The change idea developed was to assign professionals who had received a standard training on infection prevention as well as on the appropriate procedures to follow to clean and sterilize surgical equipment.

DO: Trainings were provided to professionals, and these trained professionals were assigned to the central sterilization room and adhere to the standard protocols when sterilizing and cleaning equipment.

STUDY: At the end of December 2007, the SSI rate declined progressively from 2.3 % to 2.2 % which was below the target of 2.5%. The monthly SSI has declined progressively along the downward direction with. The decline of SSI has remained to be below the target.

ACT: Finally, the QI team agreed to monitor these successful interventions and the improvement in monthly bases for sustaining the improvement achieved.
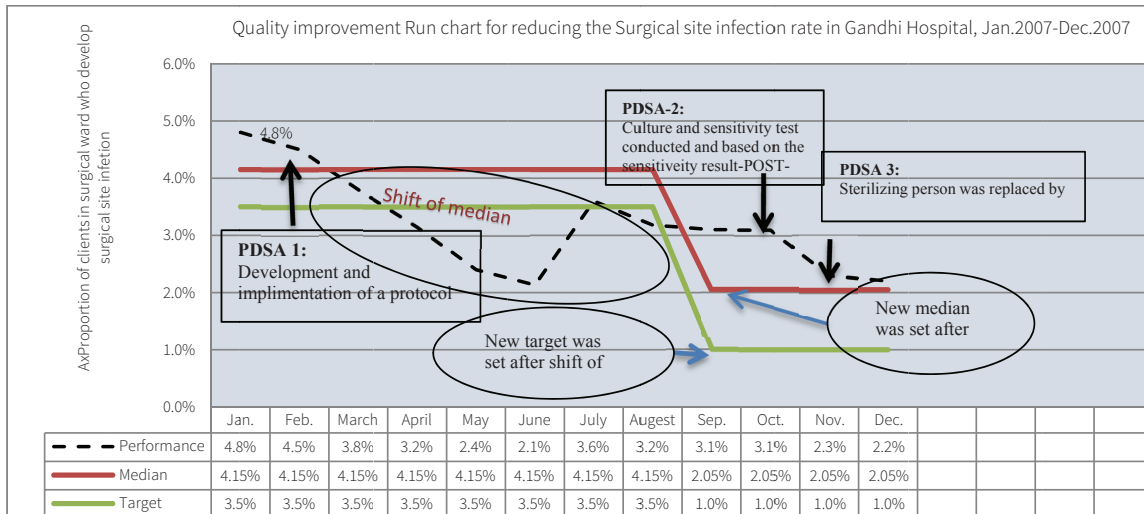
Figure 2: Quality improvement Run Chart

LESSONS LEARNT

The majority of surgical site infections are preventable. In our experience the simple intervention such as restriction of the high unrestricted traffic flow to the inpatient and post-op inpatients and limiting the visiting hours of attendants had a significant effect on reducing post- operative wound infection rate. Culture and sensitivity testing also helped to determine the most appropriate prophylactic prescribing guidelines in the hospital. Training of nursing staff and those involved in sterilization procedures is also an important quality improvement initiative. Infection caused by microorganisms from an outside source following surgery became less common after the quality improvement initiative. Therefore, in order to minimize SSIs at hospitals, we recommend development and implementation of a quality improvement initiative that includes protocols for health providers and trafficking guides for attendants and visitors.

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AUDITABLE PHARMACEUTICAL TRANSACTION AND SERVICES IMPLEMENTATION STATUS UPDATE, CHALLENGES AND LESSON LEARNED

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INTRODUCTION

This evaluation report presents implementation status of Auditable Pharmaceutical Transaction and Services (APTS), a package of proven interventions designed to improve quality of pharmaceutical service provisions at healthcare facilities. APTS has five essential elements (result areas): efficient budget utilization, reliable information generation, improved transparency and accountability, effective workload analysis and deployment, and improved customer satisfaction. To achieve those key result areas, listed above, health facilities are expected to implement the packaged interventions under each essential element. APTS legal framework was enacted at different times. At regional level, it was enacted in 2011 in Amahra, in 2012 in Dire Dawa, in 2014 in SNNPR, in 2015 in Tigray and Oromia, and in 2016 in other 4 emerging regions.

Currently, APTS is one of key pharmacy initiatives under implementation. Most of the regional health bureaus are trying their best to ensure its implementation in their respective regional health facilities. This status evaluation report presents implementation update, challenges and lessons learned from APTS implementing sites based on the five key APTS result areas,.

OBJECTIVE

The objective of this evaluation is to evaluate APTS implementation status using selected APTS result areas (efficient budget utilization, reliable information and customer satisfaction) as a reference for measurement.

The specific objectives of the evaluation include:

✓ Assess and prepare APTS implementation status update across different regions of the country

✓ Assess the major challenges encountered or anticipated during scale up of APTS implementation at health facilities levels.

✓ Identify lessons learnt for sharing to other disciplines or facilities.

METHODOLOGY

This implementation status survey was conducted using standardized implementation assessment tool in selected 28 APTS implementing health facilities across the country from August 8, 2017 to September 06, 2017. Reports of APTS performances indicators were regularly collected, analyzed, feedbacks generated; and disseminated through telephone, emails, physically during integrated supportive supervisions and review meetings. Both financial and service performances are regularly collected using standardized spreadsheet (MFRF and MSRF) developed for this purpose.

This evaluation report was generated from the cross sectional survey conducted and regular performance reports, baseline assessment findings, supportive supervision reports, and various feedbacks.

RESULT AND DISCUSSION

IMPLEMENTATION UPDATE

Up to September 2017, the number of APTS implementing sites from various regions of the country and the hospitals under the auspices of the federal government has reached 123. Among these sites, 46 facilities have started APTS this fiscal year.
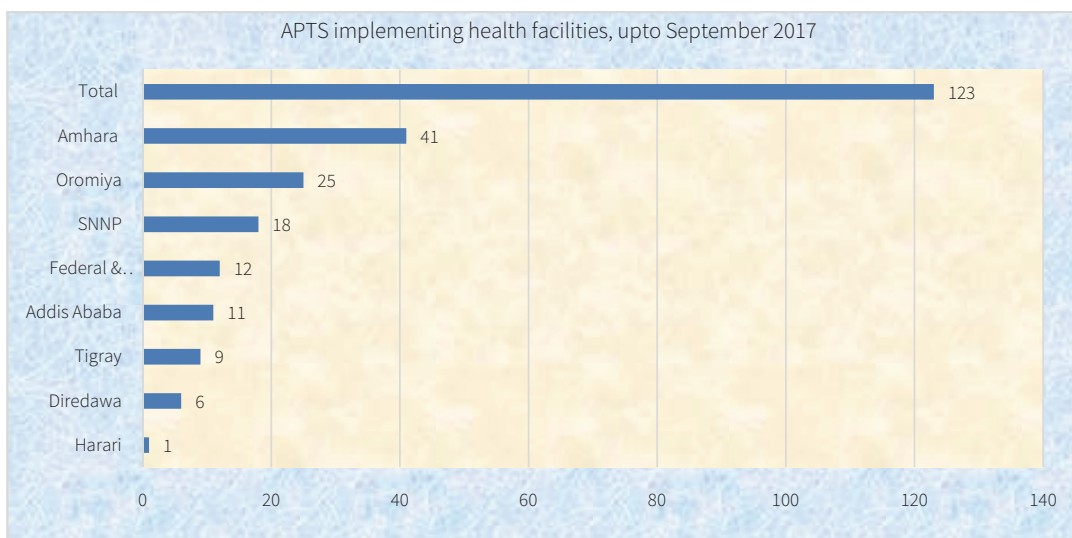
Figure 1: APTS implementing health facilities (hospitals and health centers) in Ethiopia, September 2017

During initiation of APTS in those health facilities, the following key activities were accomplished at federal, regional and health facility Levels.

- Popularization of enacted regulations in respective regions.

- Workload analysis and measurement of level of effort and facilitation of deployment activities including opening new position for pharmacy accountants.

- Workflow arrangement was done through renovation of dispensing counters, cashier's cubicles, shelves suitable for professionals and patients.

- Printing of financial tools (receiving and issuing vouchers, sales tickets, registers, summary formats)

- Provision of capacity building training and onsite mentoring for all pharmacy professionals, accountants, cashiers and auditors.

- Organizing experience sharing among APTS implementing sites.

- Special assistance was given to emerging regions (e.g. printing of vouchers with estimated expense of 2,195,008.20 ETB)

ESSENTIAL ELEMENTS (RESULT AREAS) OF APTS

APTS has five result areas: efficient budget utilization, transparent and accountable transactions, reliable information, workload analysis and human resource deployment, and improved customer satisfactions. The following results were summarized from the routinely collected reports, and cross sectional survey conducted by Federal ministry of health:

EFFICIENT BUDGET UTILIZATION

Through regular pharmaceutical stock status analysis and ABC-VEN reconciliation, APTS implementing facilities are expected to proactively determine stock movement status and take actions on over and under-stocked items which reduce expiry and stock out of pharmaceuticals. The following graph shows implementation status of this tool in selected hospital. As indicated in the graph, both Felege Hiwot and Debremarkos hospitals scored more than 90%. It means compared to the other hospitals, this two hospitals were efficiently utilizing their pharmaceutical budget.

Efficient Budget Utilization (N=32), Sept 2017

Hospitals	Percentage
Debremarkos Refereal hosp	94
Felegehiwot Specialized hosp	91
Black Lion hosp	88
St. Peter TB Specialized hosp	84
St.Paul Millenium College hosp	81
Bisidimo General hosp	75
DilChora hosp	75
Hiwot fana Spe hosp	72
Hawassa referral hosp	66
Shashemene referral hosp	63
Ras Desta Memorial hosp	56
Amanuel hosp	56
Aksum Referal hosp	56
Butajira General hosp	56
Dilla University Referral hosp	56
Zewuditu hosp	53
Finoteselam General hosp	50
Ayder Referral hosp	50
Gondar university hosp	47
Worabe referral hosp	38
Wolayta sodo referral hosp	38
Asella hosp	38
Mekele hosp	34
ALERT hosp	25
Jimma University hosp	25

Figure 2: Percentage of efficient budget utilization status, measured by 32 (Yes/No) checklist, as of September 2017.

The following key interventions were reported as measures taken as part of the efficient budget utilization effort:-

- Exchange of medicines with other medicines between nearby health facilities which is either in cash or in kind.

- Promotion about the use of medicines to prescribers

- Donation to facilities that do not have budget to pay or medicines to exchange

- Timely procurement initiation for understocked items.

EXPIRY OF MEDICINES

By effectively implementing the above interventions, trends of pharmaceutical expiry rate has come down with a negative slope heating HSDP or HSTG targets of Ethiopia (below 2%) in APTS implementing health facilities (Figure 3).

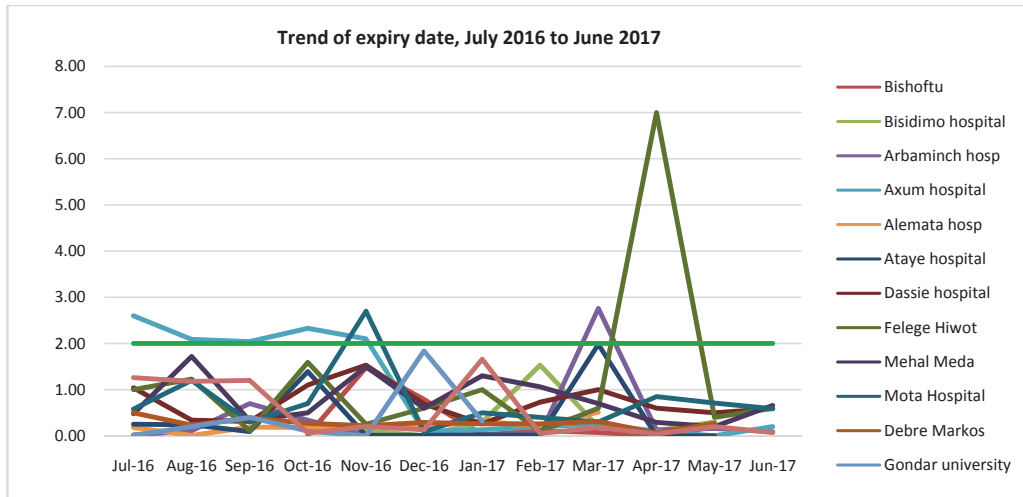Figure 3: Trend of pharmaceutical expiry rate and its comparison with a national target (<2%) in APTS implementing hospitals, from July 2016 to June 2017.

AFFORDABILITY

Affordability was calculated as the number of days the lowest paid unskilled government worker would have to work to pay for one treatment course for an acute condition (usually 7 days) or one month's treatment for a chronic condition. During the reporting period, the lowest paid Ethiopian government worker earned 960 ETB per month or 23 ETB (US$ 1.15) per day. Overall, a low-paid government worker would generally need more than one day's wages to purchase standard treatments in APTS implementing health facilities.
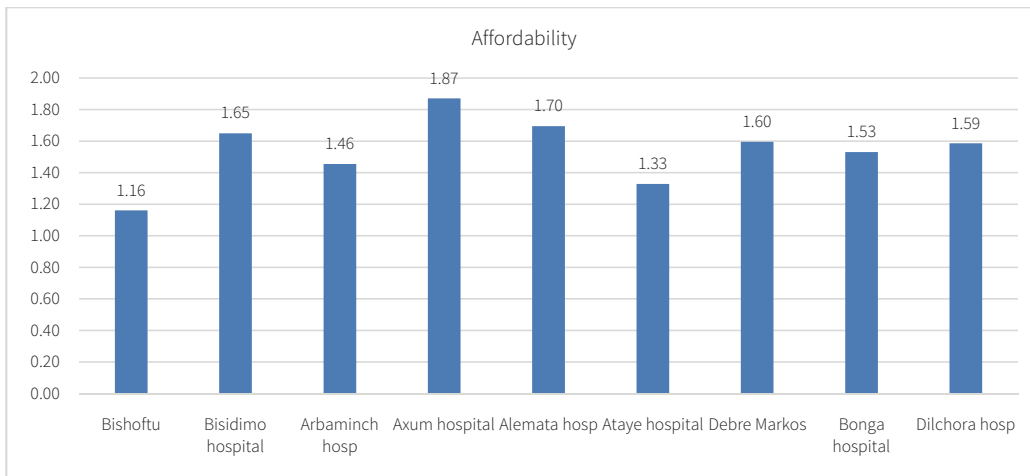
Figure 5: Days' wage to buy medicines: The number of days the lowest paid unskilled government worker would have to work to pay for one treatment course for an acute condition (usually 7 days) or one month's treatment for a chronic condition for selected hospitals Jul-2016 to June 2017.

RELIABLE INFORMATION

Reliable information generation and utilization is an important aspect of healthcare planning, management and decision making. In health facilities, ensuring uninterrupted pharmaceutical supply needs highly reliable information system. Utilization of poor quality data for quantification and forecast may expose the facilities either for stock out or wastage of pharmaceuticals. The following graph shows, reliable information generation status. Compared to others, five hospitals scored more than ninety percent (90%). It means these hospitals were producing more reliable information on pharmaceutical service rendered; product transacted and finance related information.

Reliable Information(N=53), September 2017
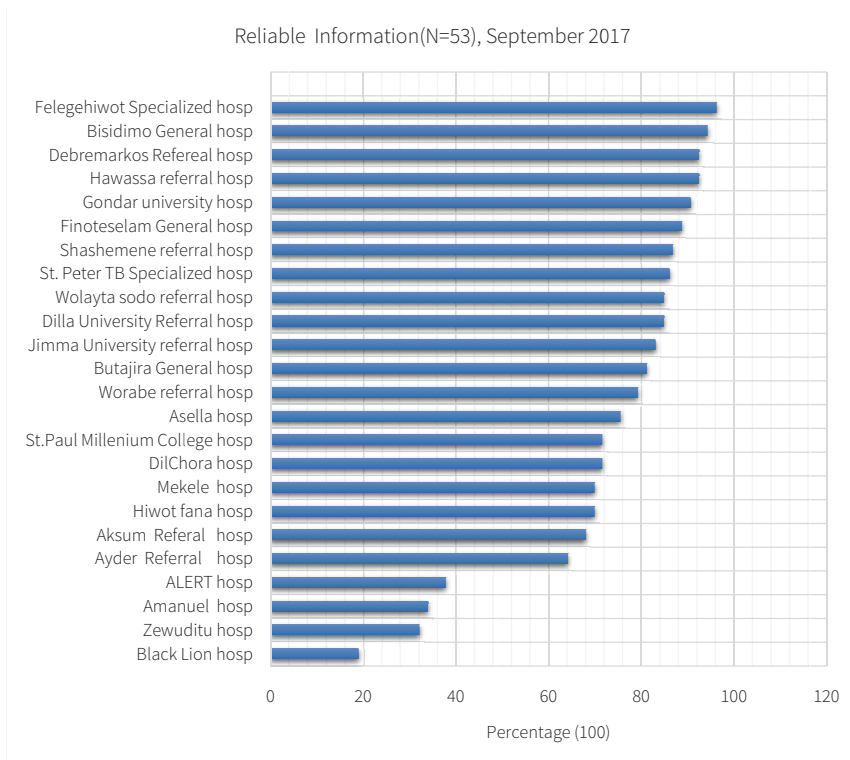
Figure 4: Percentage of reliable information generation, using detailed 53 (Yes/No) checklist, and its comparison among selected hospitals, as of sept 2017.

CUSTOMER SATISFACTION

Client satisfaction is measured by exit interview of clients from pharmacy department. Previous studies showed that workflow arrangement, improving availability of prescribed medicines and better counseling resulted in better of satisfaction. The following graph shows client satisfaction status in selected hospitals.

Customer satisfaction (N=11), september 2017
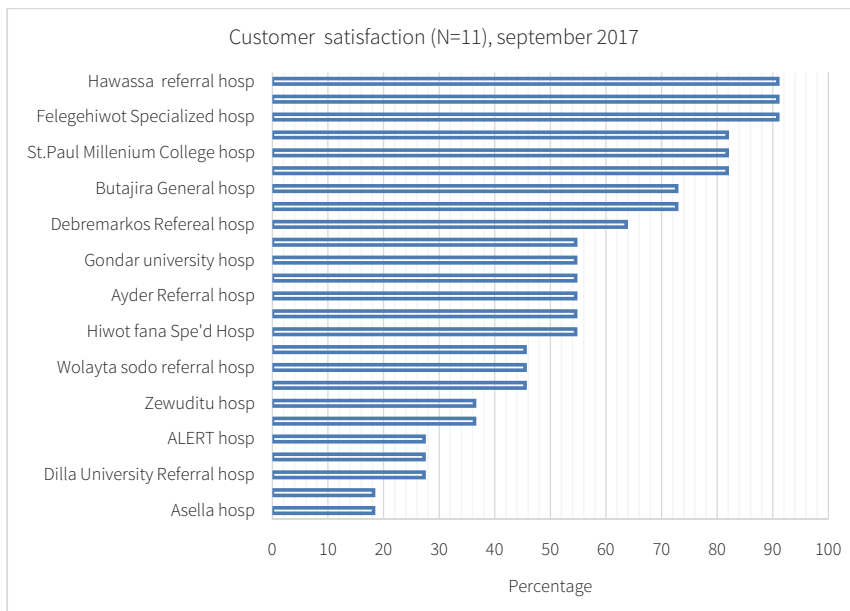
Figure 6: Customer satisfaction of pharmacy service provision, measured by exit interview of clients with or without medicines from outpatient pharmacy department, September 2017.

CHALLENGES

- Poor documentation of activities and irregular report generation and submission to respective regions.

- Slow implementation of APTS as compared to the set targets because of various reasons including slow renovation, limited capacity and the sky rocking price of new primary hospitals. There is slow APTS scale up at health center levels.

- Emerging regions didn't still start APTS.

- Delay of indemnity guideline endorsement

- Lack of Auditors and pharmacy accountants which may be due to salary scale versus high market demand.

- Lack of automation of APTS and pharmacy services or lack of use of cash register machine

- Few professional's resistance to the change due to various reasons including rent seeking behaviors and conflict of interest to their business

LESSONS LEARNED

- Collaboration of the FMOH with MOFED, General Audit, Ministry of Justice and partners has facilitated implementation of customer focused services using APTS.

- Teamwork among pharmacy professionals with Auditors, finance experts, human resource experts has resulted in improvement of customer satisfaction by providing organized and one stop-shopping service.

- Implementation of APTS without arrangement of workflow of pharmacy dispensaries didn't bring intended results such as patient satisfaction and reduction in expiry of medicines. Examples: A.A regional Hospitals

- The onsite training and simultaneous implementation of APTS was more effective than offsite training.

- Key medicines availability and expiry reduction were found to be improved compared to the baseline among the actively reporting APTS sites.

- Changing the attitude of professionals was found to be critical before changing pharmacy service delivery system

- Provision of training before hospitals are done with the prerequisites (renovations, man power deployment, printing of vouchers) to start APTS has led to failure.

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SECTION 2:

NEW INITIATIVES, SUMMARY OF STRATEGIES…

FAST TRACK ELIMINATION OF BLINDING TRACHOMA: THE ETHIOPIAN INITIATIVE TO CLEAR TT BACKLOG

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INTRODUCTION

Trachoma, a neglected tropical disease (NTD), is the world's leading infectious cause of blindness. It is caused by conjunctival infection with particular serovars of Chlamydia trachomatis. Infection is associated with inflammatory changes of the conjunctivae known as "active trachoma". Repeated episodes[1] of active trachoma can result in scarring of the eyelid, which in some individuals leads to trichiasis (in which one or more eyelashes are pulled inwards to touch the eye). Trichiasis is an extremely painful condition. It can be corrected by eyelid surgery, but left untreated may, in combination with other changes to the eye induced by trachoma, lead to corneal opacification, low vision and blindness.

World Health Organization (WHO) in its world health assembly WHA51 in 1998 declared to eliminate blinding trachoma as a public health problem by the year 2020. Trachoma can be eliminated as a public health problem by implementing a package of interventions – the "SAFE strategy" comprising: Surgery for trachomatous trichiasis; Antibiotics to clear ocular chlamydia trachomatis infection; and Facial cleanliness and Environmental improvement (particularly improved access to water and sanitation) to reduce C. trachomatis transmission[2]. The surgical intervention is provided to individuals with trichiasis, while A, F and E are delivered to entire districts in which prevalence of the active trachoma sign "trachomatous inflammation–follicular" (TF) is above 5%[3].

Ethiopia is part of the WHA51 declaration to eliminate blinding trachoma by 2020 and adopted SAFE strategy as a means to eliminate blinding trachoma as a public health problem.

Targets for the elimination of trachoma as a public health problem are:

1. A prevalence of trachomatous trichiasis (TT) "unknown to the health system"[4] of <0.2% in people aged ≥15 years (which approximates to <1 case per 1000 in individuals of all ages), and

2. A prevalence of TF[5] of <5% in children aged 1–9 years, in each formerly endemic district. In addition, there must be evidence that the health system can continue to identify and manage incident cases of TT[6].

THE BURDEN OF TRACHOMA IN ETHIOPIA

As side from small scale surveys in some woredas of the country; there were two major undertakings to understand the burden of trachoma. These large scale surveys were the National Blindness Survey in 2006[7] and the Global Trachoma mapping Project (GTMP) from 2012-2015[8,9,10,11,12]. The later was a survey specifically targeting to understand trachoma burden at district level in all rural districts of Ethiopia.

The second survey, GTMP is the most important survey for trachoma program, was funded by the UK government through its bilateral agency, DFID from 2012-2015. This project enabled the MOH to carry out district level population based surveys to estimate the prevalence of TF among children 1-9 years of age and prevalence of TT among 15 years of age and above in all rural districts of Ethiopia except Amhara regional state where the prevalence of the disease had been surveyed earlier. The prevalence of active trachoma ranged from 0.2% to73.4% and that of trachomatous trichiasis ranged from 0.2% to 12% with an average prevalence of 4%. This puts Ethiopia as top in the list of highly affected countries followed by Nigeria and Malawi by the number of people at risk of trachoma and by India and Nigeria by the number of estimated number of people affected by trichiasis[13]. The project has provided baseline data for most of rural woredas (with the exception of 20 districts) and allowed the program to conduct evidence-based comprehensive planning and progress monitoring.

Following the mapping of trachoma, the FMOH in collaboration with partners has re-examined the Ultimate Intervention Goal (UIG) to eliminate trachoma and developed national and regional Trachoma Action Plan to scale up SAFE intervention. The UIG for AFE intervention in 657 woredas with a TF prevalence ≥5% among children 1-9 years of age, an estimated population of more than 75 million require one or more years of annual mass drug administration (A), facial cleanliness (F) and environmental improvement (E) interventions. The UIG for surgery in the 665 woredas with a TT prevalence of ≥2 per 1000 among people above 15 years old is estimated to be 691,037 people who require surgery (S) to correct eyelid alleviate pain, suffering and ultimately prevent blindness.

FAST TRACK TT INITIATIVE

Trichiasis surgery is the main strategy for the population already affected with scaring of the conjunctiva and in turned eyelashes. The TT service in the country operated more than 800,000 individuals' with TT from 2003-2014. Despite this huge achievement the GTMP survey and impact assessment surveys in Amhara revealed that at the end of 2014 an estimated 691,037 individuals needs TT surgery to achieve the UIG.

Cognizant of this pressing need the Ministry of Health renewed commitment to reach the Ultimate Intervention Goal for surgery by launching Fast Track initiative to clear the TT backlog in 2015 within 2 year timeline. FMOH in collaboration with international and local development partners has developed a plan to boost the current efforts. A total of 44 million Birr was committed from the ministry of health for the training of sufficient number of TT surgeons. Similarly, donors and development partners pledged to match the challenge grant to avail TT kits, consumables and cover operational cost for undertaking TT surgeries.

The planning process of Fast Track Initiative is based on the evidences from different studies and program review meetings that the TT surgery service is overwhelmed by the low access of TT surgery services, lack of trained manpower and attrition, low productivity of TT surgeons, shortage of surgical kits and supplies, low surgical acceptability or low service utilization due to patient and provider related challenges and most importantly low program ownership at different level of the health system. Hence initiative mainly targeted to lessen and possibly to avoid the different barriers of TT service provision.

OBJECTIVE

- To reduce the prevalence of trachomatous trichiasis (TT) to <1 case per 1,000 population or <2% per 1,000 among people ≥15 years.

COMPONENTS/STRATEGIC ACTIVITIES/INTERVENTIONS/ACTIVITIES

- Training of middle level health care providers using the WHO Trichiasis surgery manual

- Increase TT Service access and use a combination of Static, Outreach and dedicated mobile team service

- Enhance local ownership and commitment of regional, zonal, district and kebele political leaders and health managers

- Strengthening Monitoring and Evaluation.

TARGET

- Provide TT surgery for 693,037 individuals by June 2017.

- To equip 826 health centers to provide TT surgery service in 665 woredas where TT prevalence is above the threshold

- To train 1,117 middle level health care providers for trichiasis surgery

This report mainly summarizes the work carried out by the Fast Track TT Initiative to clear TT backlog in 2 years time and scale up TT surgery services from January 2015 to June 2017 and provides an update on the progress of initiative to clear the trichiasis backlog. Moreover the report briefly summarizes work carried out to recognize the burden of trachoma and its findings.

RESULTS

COORDINATION

At National level FMOH NTD department with expert advice by National Trachoma Task Force Committee (NTTFC) and the different sub-committees were responsible for coordination planning, implementation monitoring and evaluation of the fast track initiative. With the support and guidance of the FMOH and NTTFC, regional, zonal and woreda task force were also established to lead the initiative. Consultative meetings, official launching by decision makers with advocacy workshops were also conducted in each region.

IMPLEMENTATION

The official launching of the Fast Track TT initiative was announced by the Honourable Minister on February 2015. The implementation was done in three phases.

1. The first phase targeted four zones with the highest TT burden within the four regions that carry 96.5% of the backlog. East Gojam zone in Amhara, Jimma zone in Oromia, Gurage zone in SNNP and Central zone in Tigray regions were selected. The purpose of the first phase is to test the plan, to learn implementation challenges and to identify success stories for the national scale up.

2. The second phase is scale up to the four regions highly affected by TT and was started on November/December 2015 with the overall purpose of expanding service to reach as many TT cases as possible and getting high impact achievement.

3. The third phase is to implement in the remaining four regions which carry the 3.5% of the TT burden and planned to be started September 2016.

Since the launch of Fast Track TT initiative in February 2015 until June 2017, the first two phases of the initiative were implemented. The implementation of third phase is not started yet as planned.

A total of 887 IECWS were trained and deployed, 656 Health centers provide TT surgery in static and outreach service and a total of 397,291 TT cases had received TT surgery, which accounts 57% of the total Ultimate Intervention Goal for surgery.
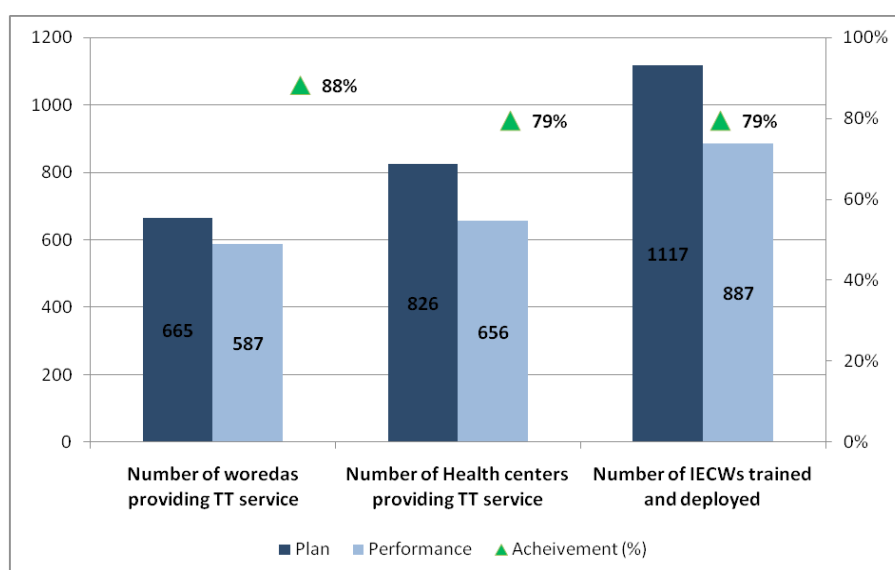

Figure 1 Fast Track TT Initiative plan vs. achievement

Table 1 Fast track TT Initiative Ultimate Intervention Goal for surgery and surgical output by region

Region	UIG at the end of 2014	2015 Surgery	2016 Surgery	2017 surgery	Total surgery	Remaining UIG	% remaining
Afar	1,707				0	1,707	100%
Amhara	336,314	76,953	111,687	53,798	242,438	93,876	28%
BG	2,586				0	2,586	100%
Gambella	4,834				0	4,834	100%
Oromia	171,094	12,838	34,176	23,342	70,356	100,738	59%
SNNP	124,454	21,001	26,864	12,809	60,674	63,780	51%
Somali	15,447				0	15,447	100%
Tigray	36,601	6,295	11,465	6,063	23,823	12,778	35%
Total	**693,037**	**117,087**	**184,192**	**96,012**	**397,291**	**295,746**	**43%**

Moreover a total of 32 districts (12 districts in Amhara, 3 in Oromia, 14 districts in SNNP and 3 in Tigray regional state) had achieved the surgical UIG. However impact assessment surveys need to be done to determine whether the prevalence of TT has lowered below the elimination target of less than 2 per 1000 among people 15 years and above.

MONITORING AND EVALUATION

District level surgical data were collected and analyzed in a weekly basis from static and outreach services. Regions and zones were also monitoring performance by getting the weekly woreda level data. Data was also analysed at different levels and used to improve performance by creating community awareness and increasing case finding of suspected TT cases to organize outreach services, to identify and solve challenges. Supportive supervision, quarterly, biannual and annual review meetings at every level were also part of the monitoring the performance of the initiative.

At national level monthly performance monitoring and analysis of regional achievement were done regularly, performance feedbacks and supervision were conducted when necessary. TT performance was agenda and reviews were made in many different form including annual review Joint Steering Committee, annual and bi-annual review meetings.

Moreover data and surgical quality monitoring were also conducted at critical point of time during implementation by regions, zones, woredas and implementing partners. The national trachoma task force has also produced a guideline and implementation framework for TT surgery service supportive supervision, outcome assessment and surgical audit. For this to work smoothly involving SECUs and forming catchment endemic woredas for regular support and quality checks is a priority agenda for the current fiscal year and the coming time.

DISCUSSION

Fast Track TT initiative has been instrumental in boosting the momentum obtained by the national scale up of SAFE intervention. Moreover the fast track TT initiative has shown marked improvement in commitment and ownership of the program by the health system and hence TT surgery intervention is now mainstreamed in the national health system rather than an activity for partners. This has been witnessed by the fact that number of surgeries done during the initiative in two and half years from January 2015-June 2017 is nearly 50% of the surgeries done in Eleven years from 2003-2014.

Fast track TT initiative has showed significant progress in surgical output annually/biannually. The phase two of the implementation in 2016 was a time of massive scale up to reach every TT endemic woreda in the four regions highly affected. The achievement is remarkable even at the Global level. WHO GET 2020 in its 2017 meeting reported close to 71% of the 2016 global output of trichiasis surgery was performed in Ethiopia[14].
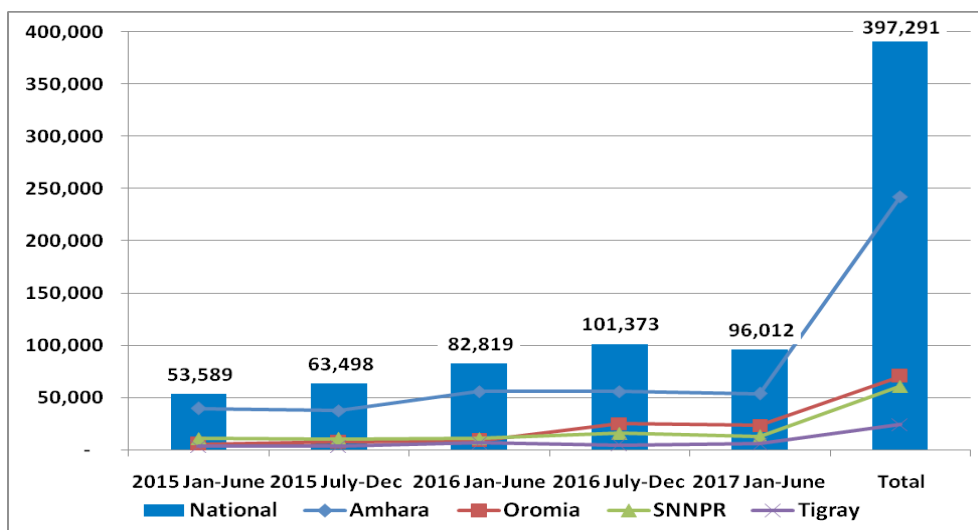
Figure 2: Fast Track TT initiative Surgical Output from January 2015 to June 2017 by region

However, as seen from above graph, a huge difference in performance is observed across regions and a similar contrasting performance has also been observed across zones as well across woredas to the extent even within the same region. This has a massive contribution to the high backlog still remaining to be cleared.

The fast track initiative has been short of achieving the target dates. Therefore, still there are 78 woredas needing access to TT service, 170 health centers should provide TT surgery in static and outreach service and 230 mid-level health care providers should be trained and deployed to provide the service and estimated 295,746 TT cases should get urgent surgery services to reach the Ultimate Intervention Goal (UIG) for surgery.

The main contributing factor for the still huge backlog is the marked difference in leadership and commitment of health managers and decision makers across regions, zones and woredas in the four regions where the initiative has been scaled up and the delayed implementation of the initiative in remaining low burden regions planned for the third phase.

Lessons learnt from best performing regions, zones and woredas such as from the 32 woredas which has cleared the estimated backlog were; elimination of trachoma as a public health problem in general and specifically clearing of TT backlog is attainable in short period of time by strong commitment and strong leadership role of the government to scale up TT surgery services, increasing surgeon's productivity and dedicating TT surgeons to TT surgery services also played important role. Expansion of TT surgery services through training of mid-level health workers and the application of combined service delivery approaches and especially use of outreach (which accounted 80% of TT surgeries performed) contributed to the huge achievements in a relatively short period of time. Training of HEWs in TT case identification; their involvement in social mobilization and in organizing outreach services are instrumental in increasing community awareness and TT service utilization.

CONCLUSION AND RECOMMENDATION

The launch of this ambitious Fast Track Initiative to address the surgical component is a clear witness of the country's commitment to eliminate blinding trachoma by the year 2020. Despite disparity in performance, the initiative is showing that huge number of surgeries can be done preventing blindness even though the achievement is far from the target. This requires strong commitment at federal, regional and district level in utilizing this opportunity to eliminate blinding trachoma. Strengthening monitoring and evaluation is critical for the program. Moreover implementation of the initiative in the regions where the initiative is not started yet should urgently start implementation.

Hence it is very important to take the lesson from high performing regions, zones and woredas to achieve the target. The major contributing factors to excellent achievement is involvement and good leadership of decision makers across different levels, regular performance review and monitoring, participation of HEWS in TT case identification and community awareness raising activity and organizing outreach service, good support and TT cases mobilization during outreach service.

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THE ETHIOPIA DATA USE PARTNERSHIP: SUPPORT TO THE INFORMATION REVOLUTION ROADMAP

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INTRODUCTION

The Ethiopia Data Use Partnership (DUP) is a five year collaborative endeavor between the Ethiopian Federal Ministry of Health (FMOH) and a consortium of development partners. It was formed to support the implementation of the Information Revolution Roadmap. Funded by the Bill & Melinda Gates Foundation and the Doris Duke Charity Foundation, the DUP is led by the Federal Ministry of Health (FMOH) and assembles a data use consortium, which includes JSI, Regenstrief Institute, the GoBee Group, and the University of Gondar, as well as other partners such USAID and the Global Fund.

OBJECTIVE

The DUP, similar to the Information Revolution Roadmap, aims to improve the collection and use of high-quality routine information in Ethiopia's health sector, leading to better quality, efficiency, and availability of primary health and nutrition services at all levels of the health system.

As a partnership, it aspires to and holds itself accountable for facilitating a transformation of health information system (HIS) structure and culture that results in greater and more effective use of data for improving health system and health program performance, and ultimately for improving the health status of the Ethiopian people.

THE DUP PRINCIPLES

The DUP is grounded in a participatory, user centered approach and follows the four guiding principles:

1. Country ownership & accountability for the National HIS to ensure sustainability—the DUP will play a supportive role to FMOH efforts

2. Inclusive and collaborative engagement with a range of cross-sector stakeholders inside the FMOH and among the development partners and other non-health players in the country

3. Deliberate investment to a pervasive information culture that promotes active data use at each layer of the health system

4. Innovation & strategic change, stemming from human centered design (HCD) and systems thinking that builds on current investments and encourages learning from local and global experiences

STRATEGIC APPROACHES

The FMOH recently launched the Information Revolution Roadmap, a strategy that fundamentally shifts current approaches to data collection and information management. It also champions a data culture where stakeholders at all levels of the health system, actively use data for decision-making.

Committed to the FMOH's vision of delivering quality healthcare throughout the country, the DUP supports the national implementation of the Information Revolution Roadmap over the next five years (2017 – 2021). This comprehensive initiative will include organizational strengthening, selective system design, accelerated system expansion, individual capacity building, and cultural change activities, stressing country leadership, ownership, and strong coordination among diverse stakeholders.

Underpinning this approach is the intent to create a culture of data use at all levels of the Ethiopian health system, from community to woreda, all the way up to the FMOH. At least four major data use improvement strategies are proposed: (1) application of Human-Centered Design (HCD) methods and Data Use Innovation Labs; (2) development of digitalized HIS, including eHealth architecture, interoperability and visualization, and access to data; (3) capacity building through working with local universities; and (3) development of governance for the Information Revolution.

Particularly the application of HCD methods and Data Use innovation Labs are promising and innovative strategies. Creating a culture of data use is a behavioral change intervention, both at the individual and organizational level. HCD is a collaborative problem-solving approach that provides broadly applicable methods of developing an in-depth understanding of human behavior. It involves the process of understanding the "how" and the "why" of a problem. HCD has been used increasingly in the private sector for product and technology development as an approach to better understand the user needs and involve them early on in the design of solutions. This approach can be adopted not only to create products and technologies but also to develop systems, programs, and services that are most needed by the users and that are most appropriate in the given context to maximize impact and outcomes.

Innovation labs have been used in the private sector as a mechanism to introduce and accelerate innovation in the context of manufacturing, financial services, etc. In recent years, interest and experimentation has grown in the creation of social innovation labs to help address complex social and social system problems with creativity and to catalyze positive change. A Social Innovation Lab strategically brings people together at a time when persistent problems, disruptive changes or a crisis demand that stakeholders come together to make new sense of the situation.

Therefore, the HCD methods and Data Use Innovation Labs, as organizational behavioral interventions, could be applied in establishing a culture of information. These two approaches will help us to improve our understanding of the complexity surrounding data use behaviors and the barriers to improved data use. These approaches will also enable us to define locally-generated solutions for improving data use focusing on a range of HIS structures, components, processes and behavioral incentives. We will also build FMOH capacity to use HCD and manage innovations labs as part of the ministry's internal strategy for introducing innovative ways to address information system and data culture problems.

THE DUP ACTIVITIES

The planned project activities follow the Information Revolution's framework that includes two pillars of cultural transformation and HIS digitalization, an overarching HIS governance, and the connected woreda concept.

PILLAR 1: CULTIVATING AN INFORMATION CULTURE

One of the primary foci of DUP is promoting a culture of data use. Empowering stakeholders at every level to not only collect high quality data, but to also consistently apply the information in decision-making and problem solving will positively impact Ethiopia's health system and health outcomes. Pillar 1 activities involve facilitating individual capacity building in coordination with local universities, as well as organizational strengthening of performance review teams through user centered innovation labs and based on the Connected Woreda concept.

PILLAR 2: DIGITALIZATION AND SCALE UP OF PRIORITY HIS

The DUP will establish foundational components and capacities in eHealth architecture, including establishing a data warehouse and continuing the work on the master facility registry and the national health data dictionary. Pillar two activities are critical in making data accessible to stakeholders by setting data standards for eHealth solutions and promoting interoperability between the country's different health information systems.

HIS GOVERNANCE

The HIS governance needs to be designed to help establish, monitor and evaluate HIS activities that are essential to achieve the goals of the information revolution. HIS governance activities will support the inclusion of decisions around strategy, standards, guidelines, capacity building as well as HIS policies and procedures.

THE CONNECTED WOREDA CONCEPT

The DUP will support the FMOH in operationalizing the Information Revolution through the connected woreda concept. The Connected Woreda Program upgrades promising woredas with the necessary infrastructure, capacity, and data use practices to serve as an information hub and space for data driven decision-making at both the community and the different health system levels. DUP will work closely with local universities and the Capacity Building and Mentoring Program (CBMP) to build on comprehensive capacity at woreda level.

CONCLUSION

The Data Use Partnership is a new initiative led by the FMOH and currently funded by the Bill & Melinda Gates Foundation and the Doris Duke Charity Foundation to implement the Information Revolution Roadmap. In addition to the DUP consortium, the FMOH invites other donors and implementing partners to join DUP. As such, DUP can become an engagement platform for donors and implementing partners in support of an integrated HIS in Ethiopia.

HEPATITIS B VACCINATION OF HEALTH WORKERS IN ETHIOPIA: PROGRAMMATIC AND POLICY IMPLICATIONS

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BACKGROUND

Hepatitis, an inflammation of the liver, can be caused by genetic diseases, medications, alcohol and hepatitis viruses (A, B, C, D and E). Chronic hepatitis, cirrhosis and hepatocellular carcinoma are usually results of Hepatitis B and C infection. It is estimated that one third of the world's population (about 2 billion people) have been infected with Hepatitis B at some point in their lives[1]. And, over 257 million people are chronically infected with HBV globally by the year 2015 (2). Besides, viral hepatitis caused 1.34 million deaths in 2015 and about 780,000 are due to HBV (3). Globally, over 37.5% of deaths due to cirrhosis and hepatocellular carcinoma are attributable to chronic HBV infection (4).

Chronic HBV infection is estimated to be highly prevalent in Ethiopia. WHO categorizes Ethiopia as one of the 28 countries with high burden of chronic hepatitis. A recent meta-analysis of HBV chronic infection showed a national HBV prevalence of 7.3% (5).

HBV is a parenteral virus, whose transmission is usually by contact with blood or other body fluids (i.e. semen and vaginal fluid) of an infected person. The main transmission route includes sexual contact, transfusion of infected blood and blood products, sharing of contaminated needles, other sharps, and tooth brushes, vertical transmission and close muco-cutaneous contacts. On the other hand HBV is a vaccine preventable disease.

Throughout the world, millions of healthcare professionals work in health institutions and it is estimated that 600,000 to 800,000 cut and puncture injuries occur among them every year (6). In which case, hepatitis B virus (HBV) is the greatest threat of infection for healthcare workers (HCW). The risk of contracting hepatitis B by healthcare personnel is four times greater than that of the general adult population.

The discovery of HBV vaccine and the results obtained from its introduction constitute a landmark of great importance for medical practice. Besides providing immunity against HBV infection, these vaccines indirectly protect against chronic liver disease and hepatocellular carcinoma.

In the broader context, the Sustainable Development Goal sets a 2030 global target of elimination of viral hepatitis as a public health problem. Universal precaution of infection prevention remained the general guiding principle of infection prevention in health care settings. Vaccination of health workers who are at an increased risk of acquiring and/or transmitting the virus due to the high risk of direct contact to blood and body fluids is another strategy recommended. To this end, the WHO's Global Health Sector Strategy (GHSS) on Viral Hepatitis outlined provision of hepatitis B vaccine to health workers as one of the five strategic initiatives in elimination of viral hepatitis as a public health problem by the year 2030. Likewise, the Ethiopian national hepatitis strategy underscores the importance of provision of Hepatitis B vaccine to individuals identified as high-risk; among such listed are health workers.

In cognizant to the aforementioned strategies, the Federal Ministry of Health (FMOH) envisioned provision of hepatitis B vaccine to health workers in the public sectors as one of its major commitments in governance and leadership. Therefore, the Ministry by allocating the necessary resources took the initiative of HBV vaccination of health workers practicing within the public healthcare facilities as one of its public accomplishments. By doing so, it makes Ethiopia one of the few and leading countries in Africa that fulfills its political commitment on the bases of achieving one of the strategic directions in the prevention of hepatitis through mandatory vaccination of health workers.

GOAL AND OBJECTIVES

Goal: The main objective is to prevent chronic hepatitis B virus infection and its serious consequences, including liver cirrhosis and hepatocellular cancer (HCC) and contribute for the reduction of HBV prevalence towards elimination of hepatitis as a public health problem.

SPECIFIC OBJECTIVES

- To provide HBV vaccine to all category A healthcare workers practicing in public health facilities

- To prevent accusation and transmission of HBV infection by healthcare workers

- To ensure the high level political commitment and strengthen effective leadership and governance in the national response of hepatitis prevention and control

APPROACHES AND ELIGIBILITY FOR HBV VACCINATION

In countries like Ethiopia, health resources are limited, whereas priorities are many. As such, deciding who must and who shouldn't receive the vaccine among health workers does have many implications. Thus, the Ministry took stringent criteria to make such decisions from the outset by adopting a standard definition of health workers who are at highest risk to HBV infection to themselves and transmission of infection to others. World Health Report 2006 defines healthcare workers as: all people engaged in actions whose primary intent is to enhance health irrespective of their duty station (health institutions or not). In general, all health workers practicing within healthcare institutions are recognized as at increased risk of exposure and transmission of Hepatitis B infection compared to the general population. The FMOH understands the challenge and wants to vaccinate all at-risk healthcare workers. Therefore, the Ministry adopts a thorough strategy for effective implementation of this particular task.

To this end, the first step was demarcation of health workers who are at the highest risk of HBV infection or transmission based on internationally accepted norm and standard. Under this guiding principle, health workers fall into three categories (A to C) by level of risk exposure to blood and infectious body fluids from "A" high risk to "C" low risk (7). Among these, categories standard recommendations advised provision of mandatory HBV vaccines to those only under category 'A'. These groups of healthcare workers are defined, as those who have direct contact with blood or body fluids and are at the highest risk to infection and transmission of HBV infection. Based on this criterion, the task force with in the Ministry agreed and decided to provide vaccine for health workers that fall under category "A" alone.

TARGET POPULATION AND ELIGIBILITY FOR HBV VACCINATION

The target populations are all health workers that fall under category A. Thus, in Ethiopia, as per the above definition and consensus reached by the task force, the following two groups of health workers have been identified as category A healthcare workers that are targeted for HBV vaccination.

Group 1: The first group consists of HCWs who are permanent employees of public health facilities (health posts (HP), health centers (HC) and hospitals) who are currently providing health services. The list includes:

- Cleaners, healthcare waste handlers, laundry personals

- Medical doctors (generalist and all specialties)

- Health officers

- Anesthesia staff

- Nurses (of all category)

- Midwives

- Laboratory technicians and technologists

- Clinical pharmacy technicians and pharmacists

- Health extension workers

- Ambulance workers

- Optometrists

- Blood bank staff (with direct contact with blood including cleaners and waste handlers but excluding administrative staff)

- Federal and regional lab personals (with direct contact with blood including cleaners and waste handlers but excluding administrative staff)

- Others: Such as patient porter, biomedical engineer/technician, x- ray technicians, ward runners, sanitarian/environmental health officer, admission & discharge workers and social worker

Group 2: The second group of health workers comprises of students of health science colleges within the public health teaching institutions whose job will be falling under the above list of category A on their graduation as well as the teaching and support staff in these institutions.

Based on the above criteria, an estimated number of 498,000 health workforces are eligible for HBV mandatory vaccination in Ethiopia. Accordingly, the FMOH procured a three dose vaccine that is sufficient enough to vaccinate these target health workers.

STANDARD RECOMMENDATION FOR VACCINATION OF HEALTH WORKERS

Screening of healthcare workers before vaccination with HBV is not obligatory (8, 9). As such, screening of HCW prior to vaccination was not a prerequisite during this exercise in Ethiopia. However, counseling of HCWs before vaccination was highly recommended so as to identify prior risk of HBV infection and to avert false reassurance secondary to vaccination. As a result, we adopted a strategy of an informed-based consent self-screening and opt-in vaccination strategy based on their risk perception. Accordingly, the vaccine is provided to all health workers who opts-in taking it with or without screening.

PLANNING AND QUALITY ASSURANCE

The FMOH followed multistage planning and quality assurance techniques. The Ministry established a technical taskforce led by the Disease Prevention and Control Directorate (DPCD) and Non-communicable diseases (NCDs) case team. Members of the technical taskforce were from the EPI team, Pharmaceutical and Medical Equipment Directorate (PMED), Addis Ababa University and St. Paul Millennium Medical College. The technical taskforce was responsible in planning, quantification, training, implementation and monitoring of the vaccination campaign.

The data source for the total number of HBV vaccination eligible health workers was from two sources: The first source is from the HR data that was compiled by the Human Resource for Health (HRH) directorate. The second source is data collected from all regions that requested Regional health Bureaus to submit their HR data based on a checklist that was sent to them. The two data sources were triangulated in a planning workshop held for two days in the presence of all regional EPI and HRH focal persons. The final agreed upon regional HRH data were compiled and submitted to PFSA for distribution of HBV vaccine. Similarly, the technical taskforce provided two days training to regional EPI and HRH focal persons. Vaccination job aids, registration and reporting tools were developed and distributed at the time of the training. Regions were strongly advised to cascade the training and vaccination tools along their structural administrative hierarchy.

This initiative has been started in 2015; begin with development of concept note and on progress till date. In December 2016, the vaccine was procured and imported into Ethiopia. Subsequently, the first and second dose

of the vaccine was distributed in June/July, 2017 where eligible health workers received their first dose starting August/September, 2017 as per the regional context.

BUDGET AND FINANCING

The Federal Ministry of Health procured and imported HBV vaccine that is sufficient enough to vaccinate nearly 498,000 healthcare workers. In procurement terms an HBV vaccine, adult vial of 10 doses of total quantity 166,000 of each at a price of $ 3.00 was procured. As such a total of about $ 498,000 or approximately birr 11,289,660 (at the exchange rate of 22.67) was spent. The Ministry raised and allocated all the budget required, demonstrating its high level political commitment and governance-leadership on hepatitis.

CONCLUSION

Primarily, this is an initiative commenced by the FMOH in fulfillment of its national and global commitment in governance and leadership towards the elimination of viral hepatitis as a public health problem by 2030. Accordingly, nearly 498,000 health workers including health facility waste handlers and health science students who will be joining the future health workforce are presumed receiving HBV vaccine by the end of 2017. This made Ethiopia one of the few leading African countries accomplishing the global strategic direction of vaccinating healthcare workers for HBV. By the immediate objective of avoiding exposure to HBV infection and/ or transmission of infection the strategy is aimed to contribute for the overall elimination of hepatitis.

Besides, the Federal Ministry of Health undertook robust measures in addressing viral hepatitis. As such, developing National Hepatitis Strategic Plan and diagnosis and treatment guideline was given a top priority which is a fundamental step for a systematic and coordinated response in the prevention and control of viral hepatitis. Therefore, on top of vaccination of health workers, the Ministry is working to create and increase access for screening, diagnosis and treatment of hepatitis B and C chronic infections. Likewise, the Ministry is working in evidence generation in the form of research that included the EDHS and NCD steps based sero prevalence surveys for HBV and HCV.

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RESTRUCTURING EFMHACA: TUNING-UP THE AUTHORITY FOR A BETTER HEALTH PRODUCT REGULATION AND HEALTH OUTCOMES

Ethiopian Food, Medicine and Health Care Administration Control Authority

INTRODUCTION

The Federal Ministry of Health (MOH) is mandated by law to ensure implementation of national medical products, food, and healthcare regulatory functions. To execute this responsibility, it has restructured federal level regulation and decentralized most health regulatory functions to regional state governments in 2002 E.C. As a result, the Ethiopian Food, Medicine and Healthcare Administration and Control Authority (EFMHACA) was established to carry out federal level regulatory functions. Before the 2002 E.C. Business Process Reengineering work, regulation had relatively been given inadequate political will and resources. With the eventual establishment of EFMHACA and decentralization of certain regulatory functions, however, regulation in the health sector has been considered as a major pillar alongside with the traditional public health functions - expansion of health service and healthcare financing. Also, the fragmented health regulatory activities at the federal level along with previously unregulated products and services were mandated to be carried out by EFMHACA. Hence, the Health Products and Service Regulation Business Process Reengineering work and its implementing laws brought encouraging advances to protect and improve the health of Ethiopians.

However, the extensiveness of regulatory functions and inadequacy of the legal framework that the authority administers were identified as some of the major challenges by customers, public-wings, stakeholders, the employee of the Authority, and regional health regulators. According to the Food, Medicine and Healthcare Administration and Control Proclamation 661/2002, EFMHACA has the power and responsibility to regulate almost anything within the domain of public health including food, medicine, medical devices, traditional medicine, complementary and alternative medicines, cosmetics, tobacco, health professional, health institutions, environmental health, communicable diseases and other public health-related issues. In fact, these activities were too broad to handle by a single administrative agency effectively and efficiently.

METHODS

At the backdrop of this, with assistance from the U.K. Department for International Development (DFID), the FMOH commissioned a team of subject matter experts in 2008 E.C. to study the extent of the problem and recommend organizational and governance options. In addition, an internal study was also conducted by the Authority.

RESULTS

According to findings of the study, the Authority's current structure, legal frameworks and operation could not go along with the country's economic and social developments and EFMHACA will be rigorously challenged to regulate the sector effectively. Moreover, it underlines that, should the Authority continue with its current form and shape, it will not be able to adequately support Ethiopia's plan in expanding the pharmaceutical industry and manufacturing sector. Based on this study and regulatory options recommended by the team of experts, the FMOH's Executive Committee along with higher officials of Regional Health Bureaus decided to restructure EFMHACA to focus on health and health-related products and re-establish the Authority with the power to regulate food, medicine, medical device, cosmetics, and tobacco among others.

In addition, the internal study conducted by the Authority revealed that, customers, public-wings, stakeholders, employees of the Authority, and regional health regulators identified that the proclamation contains various definitions which are either unclear or not in compliance with the technical definition of products or services regulated by the Authority. The proclamation is also found to be both under-inclusive and over-inclusive of matters covered by the law. It is under-inclusive in the sense that a proclamation should cover several other regulatory matters substantively and with respect to enforcement measures under its penalty and administrative measure chapter. Also, it is over-inclusive because certain regulatory matters are carried out by other federal government office and administered per other laws issued by the House of Peoples' Representative.

DISCUSSION, CONCLUSION AND RECOMMENDATION

A draft proclamation on health and health-related products was prepared by EFMHACA to correct shortcomings identified by the Authority's national legislative assessment study on the proclamation. This bill's entire focuses is on health and health-related products and introduces definition and other provision harmonized with laws of both developing and developed countries having best practices, WHO and African Union model laws issued on food, medicine, and medical device, and WHO treaty issued on control of tobacco products and adopted by the Ethiopian parliament. The draft law has been reviewed and agreed to by FMOH Executive Committee and is in order to be sent to the country's next law making process.

Finally, when the restructuring comes into effect, EFMHACA will be reestablished with a Council of Ministers Regulation and hoped to be a specific expert agency with better capability to install a targeted regulatory system to achieve its objectives. Regulation of health and related products separate from health care regulation –health professionals, health facilities, and other public health functions- is common in many countries including in Ghana, Tanzania, Nigeria, Kenya; Thailand, Indonesia, China, South Korea, U.S.A., Australia, and Canada.

IMPROVING DATA QUALITY AND INFORMATION USE THROUGH THE ADOPTION OF DHIS 2 AS A NATIONAL ELECTRONIC HEALTH MANAGEMENT INFORMATION SYSTEM (EHMIS)

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1. BACKGROUND

The Federal Democratic Republic of Ethiopia, Ministry of Health (FMoH) implemented the Electronic Health Management Information System (eHMIS) since 2010 with the objective of capturing, processing and presenting health data based on the national core indicators embarked to measure the provision of health services, and ultimately improve the health conditions of the population. Since then, the health sector has shown significant improvement in utilizing the routine health information for evidence based planning and decision making. Furthermore, eHMIS created awareness and demand for quality information among health workers, managers, and partners.

Despite significant progress made towards scaling up the eHMIS applications to all health facilities in the country, various assessments and supportive supervisions identified major gaps in required infrastructure, skilled manpower, data quality, and information use. On top of this, the use of two distinct eHMIS applications in different regions posed a significant problem at the national level and lead to fragmented technical support, duplication of effort in maintaining the systems, and inefficient allocation of resources. As a step forward, FMoH decided to standardize the eHMIS applications throughout the country in a view of alleviating the limitations of the current systems and strengthening ownership. With one system throughout the country, FMoH aspires to mobilize resources and strengthen the technical support required to improve data quality and information use. For this reason, in 2015, a group of experts from Policy Planning and Health Information Technology directorates (PPD and HITD), with the support of external experts, customized and pilot-tested the District Health Information Software (DHIS 2) as a proof of concept. The pilot-testing results[1] indicated that DHIS 2 has the potential to be customized to Ethiopia context and serve as a national eHMIS.

DHIS 2 is open source, free, and highly configurable software that is developed by Health Information Systems Program (HISP) with the support from University of Oslo. The system has a data collection, aggregation, management, analysis, and data visualization components tested and adapted in more than 30 low and middle income countries, and proved to be robust in areas where there are infrastructural constraints.

To coordinate, facilitate and technically support the overall transition effort, the FMoH management in April 2017 established a Steering Committee (SC), Core Customization Team (CCT), and Technical Working Group (TWG). The SC, comprised of donor groups and chaired by the state-minister, oversees the planning and implementation of DHIS 2 and mobilizes the required resources to carry out the transition activities. The CCT, comprised of HITD, PPD, DUP and other external experts, is responsible for customizing DHIS 2 based on the requirements set out by the [indicator revision] TWG, and set up the pilot-testing and scaling up plans.

At the time of writing this article, the CCT/TWG has completed the basic customization and the system has been tested by a User Acceptance Test (UAT) team. External experts have also worked on the code-level customization mainly on the data entry module, data validation, the Ethiopian calendar, data analysis features, and server installation and configuration. The CCT has trained the Master TOT trainers from HITD and PPD as well as HMIS focal persons from pilot implementing health centers, Woreda Health Offices (WoHOs), and Regional Health Bureaus (RHBs). This article, therefore, describes the processes followed in the customization of DHIS 2, and shows the strategies and approaches adopted to deploy the system, train end-users, and also the post-implementation activities - including maintenance and support, monitoring and evaluation, and establishing

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[1] https://drive.google.com/drive/u/0/folders/0B-F-9TuRxACqck9iX0dCREdodXc

help desks. The post-rollout activities also include establishing DHIS 2 academies in collaboration with the local universities and implementing partners so as to ensure the sustainability in the capacity building, and ultimately ownership of the system.

2. STRATEGIES AND APPROACHES

2.1. SUMMARY OF THE DHIS 2 CUSTOMIZATION

The DHIS 2 customization started on April 2017 by the CCT that comprises FMoH/HITD, DUP and external experts. The team started its work by drafting a work plan, and revising the previously customized DHIS 2 and pilot-tested in Oromia, SNNP, Gambela and Addis Abeba as a proof of concept. Later in the customization process, the indicator revision TWG from PPD joined the CCT to work on identifying and prioritizing the system requirements for DHIS 2. The customization process is classified as user-side (basic) and code-level (advanced) customizations. The CCT/TWG completed the user-side customization while the external experts handled the code-level customization, and server installation and configurations.

The CCT, closely working with the TWG, defined the metadata based on the revised indicators and reworked on the data entry forms. For the organization units, since the currently available MFR data is not up-to-date, the team decided to use the facility list from the existing eHMIS applications for testing purposes until the MFR is ready. Based on this, the CCT exported the facility list from the existing eHMIS applications, and curated the data including the parent-child hierarchy. The MFR TWG has organized a regional data curation and consultative workshop with the aim of engaging RHBs and zonal health departments (ZHDs) to review and update their health facility list. The updated list is imported into MFR which will serve as one common repository for DHIS 2 and other eHealth applications – one key component for interoperable eHealth systems.

The other major activity that the CCT/TWG, with the help of the external experts, has worked on is the data entry forms. After working through the available options, the team decided to use custom forms with sections and include validation rules. The validation rules will follow strict rules while the sections group common data elements into same category making the data entry process handy. On top of this, the external experts also worked on customizing the default DHIS 2 calendar to Ethiopian calendar that in many ways affect the data entry, analysis and report generation features of the system.

At the time of writing, the basic and code-level customizations, and server installation and configuration are completed and pilot-testing is in progress.

2.2. LEADERSHIP AND GOVERNANCE STRUCTURE

Switching from the existing eHMIS applications to DHIS 2 requires time and other resources, and has to happen in a manner that does not disrupt the current system users. Therefore, establishing various task forces that will support in planning, allocating resources, coordinating, and monitoring the whole transition process is crucial.

The DHIS 2 implementation task forces include the Steering Committee, Core Customization Team (CCT)/ Technical Working Group (TWG), National Implementation Team (NIT), Regional Implementation Team (RIT), and Zonal Implementation Team (ZIT)/Woreda Implementation Team (WIT). The SC, through the PPD and HITD directors, establishes the NIT that will oversee the different implementation activities, and appoint a chairperson and co-chairperson from PPD and HITD directorates. This team comprises PPD, HITD, and other directorates in the ministry, and partners that can support the implementation. The NIT will establish the RITs composed of M&E and IT staffs, FMoH representative, and implementing partners. The RITs in turn will establish similar teams at zonal or woreda (for those regions that do not have zones) level. Figure 1 depicts the team organization and reporting structures.

2.3. FIELD-TESTING THE APPLICATION

After the customization, the application needs to pass through exhaustive tests before the nationwide implementation. Testing the application will help identify bugs, missed requirements and new features to be incorporated. It will also open doors to improve the system further, and help customize the training and implementation modalities. The core customization team along with external DHIS 2 experts has conducted

the system and unit tests, and organized a user acceptance test (UAT) at the national level. Test cases were prepared, UAT conducted and, based on the findings the CCT fixed the errors and made appropriate revisions on the application.
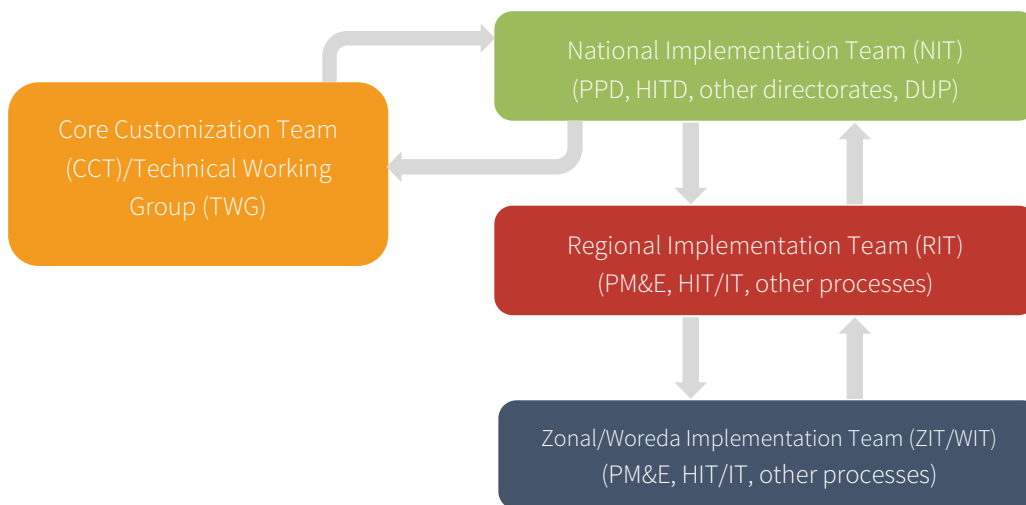

Figure 1: DHIS 2 implementation governance structure

According to the official DHIS 2 website[2], 16 countries have implemented DHIS 2 as a national electronic HMIS (Health Management Information System) and many of these are the sub-Saharan African countries. The experiences of these countries demonstrate that they have pilot-tested the software before the national level scale-up. Uganda, for instance, adopted DHIS 2 at the national level in 2011 piloting it in 4 districts before scaling it up to the 112 districts in 2012[3]. In Kenya, DHIS 2 was pilot-tested from January-April in 2011 before the nation-wide implementation[4]. Rwanda achieved the country wide roll out of DHIS 2 in four years; two years for preparation and two for the roll out, and referred as an "absolute record time."[5]

The experiences of these countries show that a diligent preparation is one of the key elements behind the success stories of DHIS 2 implementation. Considering this into account, the CCT recommended DHIS 2 to be pilot-tested before the nation-wide scale up. Health facilities and administrative health units that can represent the urban, rural, and pastoralist settings, as well as those that were used for the previous DHIS 2 pilot-testing, were trained and are testing the application. Accordingly, one woreda/sub city from Addis Abeba, Oromia, Afar, and SNNP regions, and all health centers under the selected woreda/sub city are serving as pilot-test sites. The NIT will prepare evaluation criteria, evaluate the pilot-test, and report back to the CCT the bugs and other outstanding issues to be dealt with.

2.4. SCALING UP APPROACH

After the field-testing, the customization team will fix the bugs, add essential features required, and release a new version before the nation-wide scale-up. The nation-wide scale up will be guided by the training, system deployment, maintenance and support, and monitoring and evaluation approaches.

The scale-up will have two phases: Phase 1 (November and December 2017) and Phase 2 (January 2017 to February 2018). Phase 1, covers the DHIS 2 implementation at regions, zones, woredas, hospitals, and health centers that have Internet connectivity. Subsequently, Phase 2 of the implementation will include deploying the system at offline health centers, migrating legacy data, establishing helpdesks at all levels, and putting in place a regular monitoring and evaluation mechanisms.

At the end of Phase 2, preparation to establish local DHIS 2 academies will commence. To this end, the NIT, CCT/TWG, external experts and local universities will team up to assess the current situation and develop a

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[2]https://www.dhis2.org/inaction
[3] https://bmcmedinformdecismak.biomedcentral.com/articles/10.1186/1472-6947-14-40
[4]http://www.who.int/woman_child_accountability/ierg/reports/11_Nielsen_HISP.pdf
[5]https://docs.dhis2.org/master/en/user-stories/html/user_story_rwandaHMIS.html

detailed plan including the required resources, timeline, and the governance structure. Establishing local DHIS 2 academies will ensure the sustainability of the capacity, and strengthen the ownership of the system.

2.4.1 Training approach

The DHIS 2 training follows an adult learning methodology supported by user manuals, Standard Operating Procedures (SOPs), and guidelines. The customization team, together with external experts, will train the NIT that will conduct the Master TOT at the national level to RITs. The regional teams will, then, conduct a TOT to zones, woredas, and hospitals so that they can cascade the (basic) training to health centers.

2.4.2 System deployment approach

In the first iteration of the DHIS 2 implementation, health facilities and administrative health units with Internet connection will connect to the central server (instance) of DHIS 2 to enter, aggregate, and analyze data. As the system experiences continuous modification until it becomes stable with all possible bugs fixed and expected features added, having one national instance is the ultimate solution ensuring system upgrades whenever needed. To withstand the security and load balancing issues, in addition to the production server, a replication server is configured to synchronize data in an automated manner. Moreover, a backup server, perhaps at national data center, will be installed and configured to regularly take backup of the production database. Later on, servers can be added as needed so as to keep the production and replication servers' load balanced.
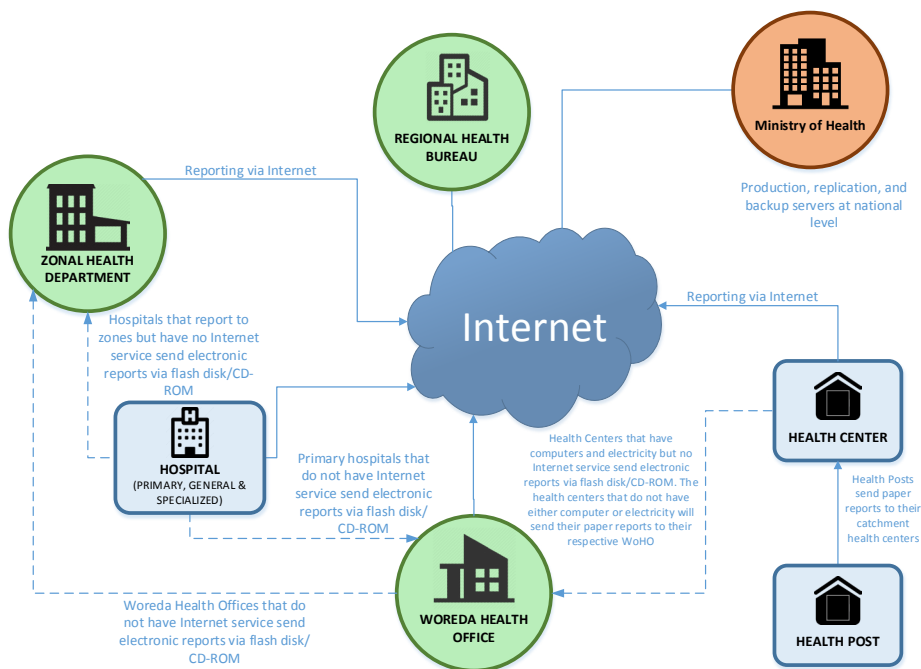
Figure 2: DHIS 2 data flow

Depending on the availability of the Internet, zones, woredas, and health facilities will directly connect to the national server or will have their own offline instances. The offline version will remain a viable option for woredas and health facilities with intermittent or no Internet connection. After data entry, offline sites will export and send their data to the upper level in the reporting hierarchy via USB sticks (flash disks) or CD /DVD for the data to be uploaded (imported) to the national server. Nevertheless, health centers with no computer or electricity will keep sending hard copy reports to their respective woredas for the woreda HMIS focal person to enter their data on DHIS 2.

In the long run, however, regions will have their own servers whereby administrative health units and health facilities under them connect to manage and access data. The regional servers will remain synchronized with the national server either by using the DHIS 2 data synchronization option or through an interoperability mediator such as OpenHIM. This option, nevertheless, requires due emphasis on maintaining the security of the regional servers, updating the DHIS 2 instances whenever there is a change at national level, and keeping the servers synchronized.

To ensure data quality, the CCT along with the indicator revision TWG have put in place loose and strict validation rules in DHIS 2 and introduced rules to maintain the quality of the data to capture. Users can validate the consistency of their data against the validation rules during and after the data entry. It is also important to realize that the technical team will prepare SOPs and other relevant guidelines to support the timeliness, completeness and quality of the data at all levels of the health system.

The replication and backup servers at the national level will ascertain data security and availability especially in the event of a disaster. Specifically, the replication server will balance the load of the production server and ensures the system availability while the backup server regularly maintains the database backup. In addition, the national server will use a Linux operating system and external experts will put in place the necessary security mechanisms so as to withstand external network attacks and data theft through the Internet.

2.5. DATA MIGRATION APPROACH

In Phase 2 of the implementation, the CCT/TWG will focus on migrating the legacy data to DHIS 2. This will allow end-users to aggregate and analyze data based on the old and new indicators.

Moreover, the legacy systems would be archived at FMoH as well as regional levels for future reference and to later test the consistency of the migrated data. Figure 3 shows the data migration steps and processes.
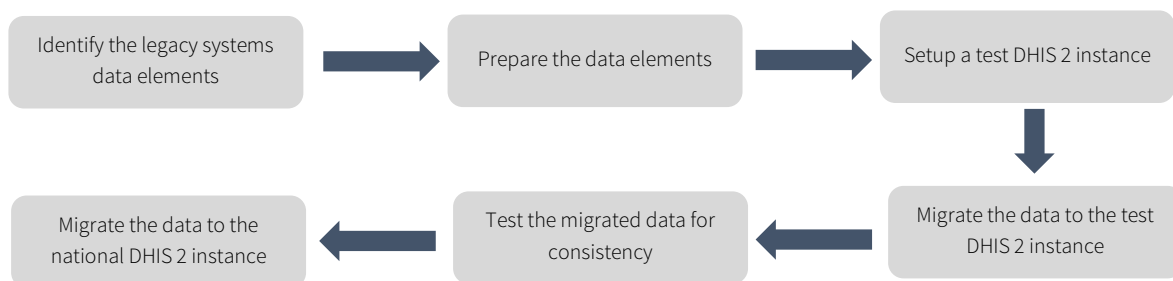

Figure 3: Data migration processes

2.6. POST-ROLL OUT ACTIVITIES

2.6.1 Integration and interoperability

The Information Revolution document states that its National Health Information Enterprise Architecture or eHealth Architecture (eHA) defines the conceptual relationships between the health information systems (HIS). Since HMIS is one of the major components of the Health Information System (HIS), the integration of DHIS 2 with other existing and upcoming eHealth systems will greatly impact the overall HIS. The integration of Master Facility Registry (MFR), National Health Data Dictionary (NHDD), and Electronic Community Health Information System (eCHIS) with DHIS 2 will facilitate data exchange and triangulation. It will also keep data consistency, accuracy, and reliability. In the bigger context, the integration would happen through the eHA interoperability layer but until that is ready, the DHIS 2 data synchronization or a separate interoperability mediator will be considered as an integration options.

2.6.2 Monitoring and evaluation (M&E)

It is advantageous to monitor and evaluate the roll out process at early stages in terms of cost-effectiveness and to amend and improve the system. It also open doors for the implementation teams to learn the effective approaches to conduct training, deploy the system, and provide maintenance and support. M&E activities are considered in the Phase 2 of the implementation whereby the implementation teams will conduct the M&E, formulate and review the findings. To further strengthen the implementation and sustainability of the system, conducting a regular supportive supervision is also beneficial.

2.6.3 Maintenance and support

Despite the efforts at FMoH and RHBs to coordinate the technical support required for eHealth applications, computer networking, and hardware maintenance activities, currently, there are no structured, better coordinated and efficient technical support mechanisms put in place in the middle and lower levels of the health system hierarchy. As a result, a health facility may stop sending its HMIS reports simply due to a malfunctioning computer that would be easily and timely fixed by trained woreda/zone personnel with limited resources. This problem necessitates the need to establish a help desk system that is efficient, cost-effective and ensures sustainability of the technical IT support at all levels of the health system.

The help desk structure will extend from FMoH to health facilities in the health system structure and focuses on providing a technical support to eHealth systems (not only to DHIS 2) and IT infrastructures. It will follow a tiered (hierarchical) approach and will have four layers ranging from basic (level 1) to advanced (level 4) technical support levels without the need for additional staffing, especially at woreda and zone levels. Rather, 2-3 HIT/ IT and/or M&E staffs from woreda and zone levels, and 5-10 IT staffs from regions and FMoH will be trained and provided the essential software/hardware components, and appropriate SOPs, guidelines, manuals and a knowledge-base system required for the technical support.

2.7. REQUIRED RESOURCES

The cost breakdown for the DHIS 2 implementation includes material procurement, training, offline system deployment, maintenance and support, and monitoring and evaluation. The NIT will work with regions to map out the offline and online administrative health units and health facilities along with their computer demands. Detailed list of the required resources along with the cost breakdown is stated in the DHIS 2 rollout plan.

3.CONCLUSION

Customizing and implementing DHIS 2 in such a big country like Ethiopia requires a thoughtful planning and execution. The FMoH is committed more than ever to make sure that the implementation of DHIS 2 draw lessons from previously implemented eHMIS systems, meets the expected goals, and planned activities are executed meticulously. To this end, both HITD and PPD, and other directorates will work together to efficiently mobilize the required resources by engaging the development and implementing partners, and most importantly the end-users from health facility to regions, and FMoH levels.

FMoH believes that DHIS 2 is one of the priority initiatives to improve data timeliness, completeness, quality, and ultimately information use. Furthermore, due attention is given towards building the capacity of FMoH staffs and others in the health system hierarchy so as to enable them to manage the customized application and further improve it - ensuring the sustainability of the system.

BRIEF OVERVIEW OF THE NATIONAL ADOLESCENT AND YOUTH HEALTH STRATEGY

Maternal and Child Health Directorate, FMOH, Addis Ababa, Ethiopia

The World Health Organization (WHO) classifies persons in the age range of 10-19 years as Adolescents and those 15-24 years as youth. While the adolescent classification is mostly universal, different continents or nations adopt different age ranges for youth. The definition of youth is also influenced by the constant changes in demographic, economic, and socio cultural circumstances. In the African Youth Charter, youth are people 15 to 35 years. The National Youth Policy of Ethiopia adopts the age of 15-29 years for youth.

The demographic dynamics within this group associated with its socio-economic values have attracted growing attention to the health of adolescents and youth in Ethiopia. Ethiopia's first Adolescent and Youth Reproductive Health (AYRH) Strategy was developed in 2006 through which a number of initiatives have been undertaken over the last decade. The government has made concerted efforts as part of the first Growth and Transformation Plan (GTP-1) to respond to the needs of adolescents and youth by providing opportunities for skill and economic development. There have been improvements in the policy and legal framework for adolescent and youth health and development, in the incidence and prevalence of HIV and STIs, and in the knowledge and attitudes towards AYSRH.

However, besides limitation in scope, the 2006 AYSRH strategy was also challenged by lack of multisectoral collaboration, low stakeholder and youth involvement, inadequate resources, and persistent social and cultural barriers to AYSRH. As a result, limitations still exist and adolescents and youth continue to face particular challenges to their health and development. Thus, the need for a comprehensive adolescent and youth health responsive strategy is imperative.
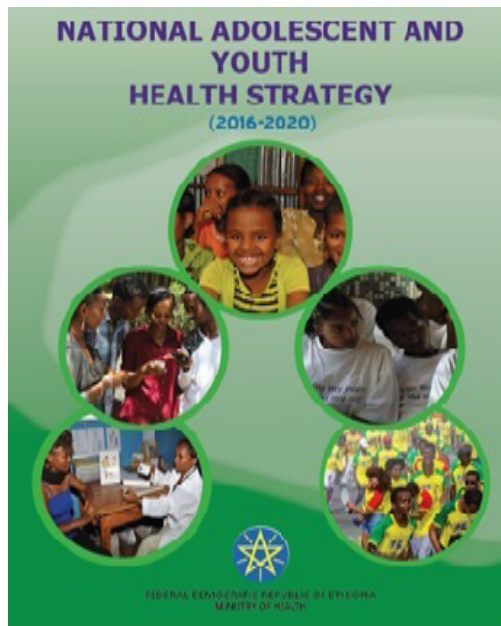
The preparation of the new strategy was informed by far reaching situational analysis of the trends in the mortality, morbidity, and the health system response to adolescent and youth health and development in Ethiopia. The analysis found that the health and development of adolescents in Ethiopia are determined by broad ranging health and health related behavioral conditions as SRH and HIV remain the main concern. Hence, the strategy is the first of its kind that goes beyond SRH, HIV, and addresses such target conditions as nutrition, mental health, substance use, noncommunicable diseases, intentional and unintentional injuries, various forms of violence, and risks and vulnerabilities associated with disability, identified by the situational analysis.

The strategic framework is built on a set of key guiding principles. It aims to contribute to the improvement of the health of adolescents and youth through the development and strengthening of an integrated health sector response and the implementation of effective health promotion, prevention, and care programs. It employs six minimum health goals to be achieved by 2020:

- Reducing mortality and morbidity by 50%

- Reducing suicide rate by 50%

- Reducing mortality from road traffic accident by 25%

- Reducing pregnancy related deaths by 50%

- Reducing HIV incidence by 75% and,

- Reducing adolescent pregnancy rate by 75%

In order to meet these overarching goals, the strategy proposes six strategic objectives for action and promotes their systematic and simultaneous integration to address the primary causes of mortality and morbidity and fundamental social, behavioral and cultural factors. These are:

- Increasing access to AYH information and age appropriate CSE and life-skills education;

- Enhancing equitable access to high quality, efficient and effective adolescent and youth friendly health services;

- Strengthening strategic information and research on adolescents and youth;

- Promoting a supportive and enabling policy environment;

- Supporting and facilitating youth engagement and ownership of health programs; and

- strengthening inter-sectoral coordination, networking and partnership

The framework also employs twenty-four outcome targets by key program priority areas based on the target conditions. Its respective implementation strategies, performance targets and priority interventions accompany each of these priority areas. It outlines the implementation arrangement and service delivery strategies based on the life cycle approach aligned with the HSTP's strategic lines of Population Oriented Outreach/Schedulable Services, Family Oriented Household Services, and Individual Oriented Clinical Services.

Measuring performance against set targets in the AYH program is crucial to generating essential information to guide strategic investments and operational planning. Monitoring and evaluation of the AYH strategy will rely on various systems and data sources (HMIS, population surveys, research) and aligns with performance tracking of the overall health system.

The overall cost of implementing the strategy is estimated at ETB 37.8 Billion for the five-year period. This overall cost reflects the financial sum of two categories of costs: 98 percent or ETB 36.9 Billion is the money for implementing mainly service delivery activities in integration with the mainstream primary health care programs and thus already wedged in the costed plans of the respective national program strategies and includes the following:

- Healthcare cost for delivering services on SRH, HIV/AIDS, nutrition, mental and psychosocial health, NCDs and injuries (calculated as drugs and supplies cost) – ETB 28,663,324,014.00

- Cost for supervision, review and coordination – ETB 93,994,789.00

- Infrastructure and equipment cost – ETB 8,142,526,830.00

- General program management cost – ETB 595,833.00

The second category is the new/additional money of ETB 867.5 Million or just 2 percent of the overall cost required for implementing activities that are specific to the AYH program; and includes costs for the following:

- Designing the new AYH training curriculum & developing the training package – ETB 223,324,992.00

- Training of health care providers and managers on AYH – ETB 1,959,923.00

- M&E, quality and research on AYH – ETB 10,688,177.00

- Communication, media and outreach activities – ETB 640,941,996.00

- Developing the minimum interventions package, the service protocols and related technical guidelines – ETB 1,250,000.00

BRIEF OVERVIEW OF THE NATIONAL REPRODUCTIVE HEALTH STRATEGY

Maternal and Child Health Directorate, FMOH, Addis Ababa, Ethiopia

Ethiopia is among the countries with a good progress in reducing maternal mortality. According to the Ethiopian Demographic and Health Surveys (EDHS), Maternal Mortality Ratio (MMR) has dropped from 871 in 2000 to 676 in 2011 per 100,000 live births. According to estimates by the UN Inter-Agency Group (UN-IAG), substantial declines in maternal deaths have been achieved over the last two decades. According to their estimate, the MMR had declined from 1250 to 353 maternal deaths per 100,000 live births between 1990 and 2015. The number of women who died during pregnancy or childbirth had also decreased nearly by 70%, from 31,000 in 1990 to around 13,000 in 2013. Based on this achievement, Ethiopia was acknowledged as one of the countries in progress towards MDG5 MMR target of 267 per 100,000 live births. According to the 2014 Countdown report, the majority of maternal deaths occur during the intrapartum and immediate postpartum periods due to hemorrhage (25%), pre-eclampsia/eclampsia (16%), and infection (10%). Unsafe abortion accounted for 10% of avoidable maternal deaths.

Child mortality has also declined significantly. The under-five mortality rate had dropped from about 205 per 1,000 live births in 1990 to 59 per 1,000 live births in 2015. Despite remarkable success in improving child health and declaring achievement of MDG4 three years before the deadline, the neonatal mortality rate (NMR) is still in the high range. The most recent estimate by the UN Inter-agency Group revealed that the NMR in the country in 2013 was 28 per 1,000 live births. The perinatal mortality rate also had not shown significant change between 2000 and 2011.

Among other remarkable changes, the total fertility rate has declined from 5.5 in 2000 to 4.1 children per woman in 2014; the contraceptive prevalence rate has increased from 8% in 2000 to 42% in 2014; and the prevalence of anemia among pregnant women decreased from about 27% in 2005 to about 17% in 2011. The 90% of pregnant women attending antenatal care being counseled and tested for HIV in 2014 is another big success. However, only 69% of HIV-positive women have received antiretroviral treatment (ART) and 59% of HIV-exposed newborns received ARV prophylaxis.

In 2015, the ANC4+ visits coverage and skilled birth attendance increased to 67% and 60%, respectively. Adolescent pregnancy rate has decreased from 17% in 2010 to 12% in 2014. Findings of equity analysis in the HSTP indicated that social determinants affected RMNCH indicators and influenced equity.

The national Reproductive Health (RH) Strategy of Ethiopia was implemented during the period 2007 to 2015. The strategy was designed in line with the broader strategic framework and context of the Health Sector Development Program (HSDP) and aligned with the lifespan of the third and fourth plans of the HSDP. It aims at building on the momentum occasioned by the Millennium Development Goals to garner the multi-sectoral support needed to meet the reproductive and sexual health needs of our culturally diverse population.

While the current strategy provided the means for reducing mortality and morbidity and improving the health of mothers and newborns, several global and national developments had happened during the last ten years. This has necessitated revision to prepare a comprehensive and up-to-date strategy that incorporates these developments to be used as one of the policy tools to potentiate transformation in the health sector and accelerate national progress towards ending preventable maternal and child deaths. New interventions such as community-based management of neonatal sepsis and "Option B+" for PMTCT have already been introduced and being largely scaled up.

There is also a need to scale up existing high-impact interventions whose population coverage lags behind the target such as skilled birth attendance and antiretroviral prophylaxis for neonates born to HIV infected mothers. The revision of the current strategy is imperative to consolidate the encouraging gains in maternal, newborn, child and adolescent survival and the long-term vision of the country to end all preventable maternal and child deaths by 2035.

The development of the national RH strategy 2016-2020 was informed by a comprehensive situational analysis that provided an in-depth view of the current status of the health of Ethiopian mothers and their children resulting from interventions provided in the past strategy. The strategy provides an overall guidance and reflects on the core targets and priority actions for the implementation of three five-year national strategic plans: maternal and newborn health, family planning and fertility, and adolescent and youth reproductive health presented as the strategic foundations of the national RH strategy. The strategy also outlines the key approaches for addressing reproductive organ cancers and the social determinants of reproductive health with emphasis on gender.

This RH strategy encompasses 12 strategic objectives catered under core thematic areas of: improving maternal and newborn health (MNH), improving family planning, improving adolescent and youth reproductive health, prevention and management of reproductive organ cancers, addressing the social determinants of reproductive health, and prevention and treatment of pelvic organ prolapse. It provides an overall guidance and reflects on the main targets and strategic interventions for the implementation of these strategic objectives pooled around 23 strategies. Seven of the objectives relate to improving equity and access to quality RH services, enhancing good governance, improving the regulatory system for RH, improving the logistics and supply chain management of RH commodities, improving community participation and engagement for RH, improving financing and resource mobilization and improving research and evidence for decision making. Four are related to capacity building and include enhancing the use of technology and innovations, improving development and management of human resources, improving health infrastructure and enhancing policy and procedures. The remaining one strategy addresses the social determinants of reproductive health.

While implementing this strategy, the service delivery modalities shall give due emphasis to the continuum of care approach where essential services for mothers, newborns, children, adolescents and youth will be delivered in an integrated package at critical points in the life cycle, in a dynamic health system.

The implementation of this strategy is also contingent upon the execution of the Health Sector Transformation Plan and the 20-Year Health Sector envisioning under the overarching umbrella of the Revised National Health Policy of Ethiopia. The strategy aligns with the vision of the HSTP for the next five years to reducing maternal mortality to 199 per 100,000 live births and neonatal mortality to 10 per 1,000 live births by scaling up RMNCAH services. In line with this, Ethiopia has committed to increase contraceptive prevalence rate to 55 percent among married women, thereby reducing total fertility rate to 3, reducing adolescent pregnancy rate to 3 percent, increasing coverage of skilled birth attendance to 90 percent and increasing ART treatment of HIV-positive pregnant women to 95 percent. In order to have coordinated efforts and effective courses of action, the Ministry of Health will coordinate the implementation of the national RH strategy and assume responsibility for its execution, supervision and monitoring in collaboration with key stakeholders/partners and the broader membership of the RH community.

MALARIA ELIMINATION AS A CONTINUUM OF CONTROL PROGRAM

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INTRODUCTION

Ethiopia is among the countries where the 1960s' launched Malaria Eradication Program was unsuccessful. The major malaria epidemic which claimed the lives of estimated 150,000 people in 1958, Elicit the government to launch the malaria eradication program the following year 1959, though the endeavor didn't succeed because of various technical, resource and programmatic reasons.

Historically, malaria in Ethiopia has been the leading cause of outpatient, inpatient visits and deaths. Malaria prevention and control is a high priority of the Ethiopia government. In line with this, a huge scale up of anti-malaria interventions has been implemented since 2005 [1]; Which includes distribution of more than 90 million long-lasting insecticide-treated nets (LLINs), through mass campaigns targeting the entire population at risk, indoor residual spraying (IRS) in designated epidemic-prone areas, and expanded diagnostic testing and effective anti-malarial treatment to people at risk.

As a result of the successful scale-up for impact (SUFI) of the globally recommended interventions, massive expansion of health facilities and the effective implementation of the innovative Health Extension Program (HEP), trends in outpatient and inpatient admissions and deaths has dramatically declined and the frequency of epidemics has halted throughout the country .

The intensity of transmission in most parts of the country is now low and even very low in some areas. The latest malaria indicator survey revealed a microscopy parasite prevalence of 0.5% in areas < 2,000 masl [8], with most of these being P. falciparum. Thus, encouraged by the gains following the SUFI, the Federal Ministry of Health (FMoH) declared and committed itself to implement sub-national malaria elimination in areas of low transmission where feasible and scale up to the national level to eliminate malaria by 2030 using a step wise approach strategy.

WHY ETHIOPIA IS MOVING TOWARDS ELIMINATION?

1. CURRENT ACHIEVEMENTS

Because of unprecedented investment in globally recommended anti-malarial interventions, all at-risk communities currently have access to preventive interventions (LLINs/IRS), and all health facilities in the public sector use confirmatory test and treat cases with appropriate anti-malarial drugs.

Sustained high coverage of such interventions has led to a monumental reduction of health facility based malaria morbidity and mortality report by more than 47% and more than 84%, respectively, between 2012 and 2017.[1] Similarly, the most recent world malaria report indicates that in Ethiopia malaria incidence and death decreased by 50% and 60% respectively, between 2010 -2015.[2] Moreover, frequency and magnitude of malaria epidemics has also decreased substantially due to the expanded deployment and use of appropriate interventions.[ ]
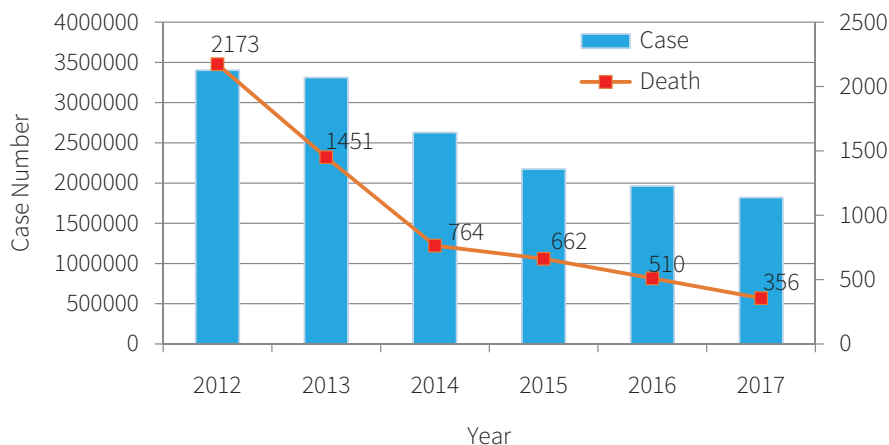
Figure 1. Malaria Morbidity and Mortality Trend in Ethiopia (2012-2017), October 2017

Source: FMoH; Health and Health Related Indictor (HMIS) Data from 2012-2017

Based on national health management information system and surveillance data, many malaria-endemic districts recorded annual malaria incidence of less than 5%. Malaria Indicator Survey findings in 2007, 2011, and 2015 also show low levels of malaria prevalence in the country [8]. This reduction in malaria is particularly true in the central and north-eastern part of the country and warranties for exploring malaria elimination goal. When the number of malaria cases significantly reduced in areas where malaria had been rampant, it might create a sense of complacency in the community to optimally utilize the exiting anti-malaria intervention and this could lead to sporadic epidemics. Thus, encouraged by the significant progress following unprecedented scale up of key anti-malarial interventions and sustained intensive control, and to avert the likely hood of sporadic epidemics, the FMOH has committed to the elimination of malaria from the whole country with the goal of nationwide elimination by 2030 [3]. It is to be noted that the decrease in malaria burden has not been uniform, it would be difficult to go nationwide elimination at this point in time. Thus, sub-national malaria elimination is initiated in six regions in 239 districts that fulfill basic criteria of malaria elimination. Additional districts will be enrolled into elimination programme subsequently based on standard criteria. Ending the disease or total cessation of transmission of the disease from the country will be achieved by 2030.

I.   IMPROVED CAPACITY OF THE HEALTH SYSTEM

The country has made major expansion of health facilities in recent years. Notably, health extension programme (HEP) has helped reaching out of the most disadvantaged communities in the periphery. With the HEP, more than 38,000 health extension workers (HEWs) deployed throughout the country. These HEWs diagnose malaria cases using rapid diagnostic test (RDT) and treat malaria cases based on test results. Moreover, there has been massive expansion of health centers and hospitals in the country.

In addition to expansion of health facilities, availability of trained health human resources improved through expansion of health colleges and increased uptake of undergraduates. Moreover, capacities of pharmaceutical supply system, disease surveillance, and M&E have been improved.

II.   CURRENT GLOBAL MOMENTUM AND COMMITMENT

There is a renewed global movement and commitment to end the disease for good. In line with this, various technical strategies and guidelines have been developed by responsible bodies, including the Global Technical Strategy (GTS) and the African Malaria Strategy (AMS). Many countries have been working in line with the GTS. Likewise, Ethiopia has developed national roadmap, which is aligned with the WHO GTS,[3] which aims to

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[2] FMOH (2017). National Malaria Elimination Roadmap. Addis Ababa

[3] World Health Organization. Global Technical Strategy for malaria 2016-2030. 2015. ISBN 978 92 4 156499 1.

reduce malaria incidence and mortality by at least 90% by 2030, and AMS[4], which targets elimination of malaria from all African countries by 2030. Furthermore, the planned reorientation of the malaria programme toward elimination is aligned with 'healthy and well-nourished citizens', which is the third goal of Agenda 2063[5],that endorsed by the African heads of state in 2013. Therefore, the country has to fulfill its commitment in the fight against malaria by aligning its strategies with regional as well as global strategies.

III.   AMPLE OPPORTUNITIES

There are many research and development initiatives in the areas of new drugs, vaccines, diagnostics and vector control tools that could hasten malaria elimination endeavor. Some new drugs and tools are at a final stage of field trial and others would be employed in the endemic countries very soon.

PROSPECTS OF ENDING MALARIA

Malaria is a preventable, treatable and curable disease. Yet, it claims hundreds of lives and causes ill health to close to two millions in the country. Malaria also drains economy by reducing productivity of the workforce and imposing high costs for its prevention and control. On the other hand, recent developments and achievements show that ending malaria could be a reality where proven interventions are sustained. Elimination represents a bold and brave target to fight for that will yield many positive returns. Elimination of malaria:

- Interrupts the occurrence of the disease, which in turn avoids expenses related to anti-malaria interventions.

- Creates healthy people and a productive workforce, which facilitates an increase in productivity and boosting of economies.

- Improves school attendance. Having well educated citizens is a key for socio-economic development of the country.

- Improves trade, investment and tourism activities, which in turn facilitate the overall socio-economic

  development of the county.

NEXT NATIONAL ACTIVITIES

Sub-national malaria elimination has been embarked since February 2017. So far, capacity building and program re-orientation is undertaking. In order to be successful in the national elimination endeavor, the capacity of the country's health system in terms of availability of trained human resources, adequate finance, and logistics needs to be ensured. The existing surveillance system has to be reoriented in order to detect every infection on time, treat cases promptly, and submit reports in a timely manner. Monitoring of drugs and insecticides' resistance needs to be done regularly. Furthermore, targeted communities have to be mobilized to own the elimination initiative so they can actively engage in the planning and implementation of appropriate interventions, including proper use of anti-malaria interventions. Additionally, regular operational research needs to be conducted, and new tools and technologies need to be introduced as appropriate.

Finally, the fight for malaria elimination is not an optional undertaking for the country. It is a historic move that paves the way for transforming Ethiopia and building of a bright future for the upcoming generation. Appreciating the energy and commitment it demands, all stakeholders and actors should not lose heart in the fight to end the toll of malaria. Moreover, the international donor and scientific communities' commitment in providing meaningful support is much needed in this historic time. By standing together in this fight, malaria would become a disease of past.

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[4] Regional Office for African, WHO. African Malaria Strategy (AMS): Accelerating towards malaria elimination in Africa. 2015. (Unpublished draft).

[5] Agenda 2063: The Africa we want. African Union 2015. ISBN: 978-92-95104-23-5

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HEALTH NATIONAL ADAPTATION PLAN TO CLIMATE CHANGE

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INTRODUCTION

Along human development and civilization, a lot of changes happened to the environment. The expansion of agriculture and mining as well as the wide use of fossil fuel as means of energy source leads to increase the concentrations of Green House Gases in the atmosphere. The ever increasing greenhouse gases concentration in atmosphere is causing global warming by masking reflected back sun rays. Overall, these changes in environment bring a change in climate. The climate change can be expressed by frequent drought, intensified flood, occurrence of frequent heat waves and forest fire, the melting down of ice in arctic and Antarctic islands, the scarcity of drinking water, the expansion of existing climate diseases and the emergence of new climate sensitive diseases.

Though climate change effects revealed worldwide, climate change does not harm equally the poor and rich as well as developing and developing countries. The poor people and developing countries are more affected by climate change as they have less capacity to cope with effects of climate change. Ethiopia like other developing countries is being affected by climate change posed effects such as frequent drought, flood, expansion of malaria to highlands, outbreaks of Acute Watery Diarrhoea, yellow fever, dengue fever and scabies, scarcity of potable water etc.

Ethiopia launched Climate Resilience Green Economy strategy in 2011 being aware of the ever increasing climate change would ruin the socio-economic growth achieved unless adaption and mitigation measures taken. This CRGE acknowledge health, agriculture and water sectors the most vulnerable sectors to climate change and its effects. Thus, Federal Ministry of Health developed Health National Adaptation Plan and address public health emergency.

SITUATION ANALYSIS

Ethiopia has achieved remarkable socio-economic growth in the last two decades. The average per capita income grew from $ 129 in 1999/2000 to $630 in 2013/14. Similarly, the proportion of people living below absolute poverty standard reduced from 48% in 1990 to 23.4% in 2013/14 (NPC and UN-Ethiopia, 2014). However, 83% of the population engaged in rain fed agriculture which accounts for 40% of GDP.

A lot of efforts made to increase access to education in past two decades. As a result, the number of primary schools increased from 9900 in 1995 to 32,048 in 2014. Thus, the school enrollment in primary education reached 93%. Similarly, the literacy rate in Ethiopia has grown from from 25% in 1995/96 to 46.7% in 2010/11 (NPC and UN-Ethiopia, 2014). Similarly, the access to basic health care reached 83% after striving to universal health coverage in last 20 years by constructing more health facilities, by deploying more health professionals and health extension workers to grass root levels, by supplying necessary medical equipment and medicines as well as by stretching the health delivery system to community level.

Similarly, the sanitation coverage increased dramatically since the launch of health extension programme. According Demographic and Health Survey (DHS) report of 2016, 61% of the rural communities and 93% of the urban communities had access to any form of latrine (CSA, 2016). However, the access to improved latrine is still low which is 28% (WHO and UNICEF, 2015) and far below millennium development goal. Furthermore, people practicing open defecation declined from 68% in 2005 to 32% in 2011(WHO and UNICEF, 2015). This shows that a remarkable change in open defecation practice has achieved but it is still being practiced by significant number of people despite all efforts being made. The improved water source coverage increased and reached 57%. But, still significant proportions of people do not have access to improved water sources. As a result, they are exposed to water borne diseases.

However, climate change is a threat to Ethiopia's development sustainability. Climate change in Ethiopia is posing frequent drought, intensified flood, under nutrition, outbreaks of climate sensitive diseases such as malaria, dengue fever, yellow fever, Acute Watery Diarrhoea, and Meningitis.

Drought occurred in Ethiopia for long time. The frequency of drought increased with climate change as it causes high evaporation of water and due to land degradation. Historically, the most frequently affected areas by drought are east and south Tigray, East Amhara, East Oromiya, Somali and Afar. Still around 10 million people live in drought prone areas though efforts made in food security activities able to reduce people food unsecured.

The report released by WHO and UNFCCC in 2015 also predicted that the country's humidity will increase irrespective of temperature increase in the future. If this is real, the threat of flooding in Ethiopia will increase as the amount and intensity of rain increases in the future. The Flood occurred in Ethiopia as splash flooding and inland flooding. The flood incidence Among places were frequently hit by splash flooding are places vicinage to lake Tana, places of Afar and Shoa at lower course of Awash River, places of South Omo along sides of the lower course of Omo river, Gambella aside to Baro River and places along sides of Wabi Shebelle at its lower course.

Both drought and flood are being exacerbated by climate change and variability which in turn reduce agricultural productivity that usually lead to malnutrition and food insecurity. Though government and partners made lot efforts to eliminate hunger, population pressure, land degradation and climate change hindering the efforts to eliminate hunger and to minimize under nutrition. The vulnerability and assessment made by FMOH and WHO in 2015 shows that the national average of stunting among children in 2014 was 58% with lowest in Addis Ababa (26.2%) and highest in Somali (81%).

Diseases like malaria, acute watery diarrhea, dengue fever, yellow fever and meningitis are highly sensitive to climate. Though the malaria mortality and morbidity decreased through integrated interventions being carried out in Ethiopia, malaria risk areas in Ethiopia is expanding due to temperature of highlands increased and becoming favorable for malaria vector anopheles mesquitoe breeding site. Dengue fever was reported in East Ethiopia for the first time in 2013 and 6,192 cases reported from Dire Dawa, Somali and Afar. The vector accountable for dengue fever as well as yellow fever is Aedes Egypt and found at altitude as high as 1700 meter above sea level beyond its previous favorable altitude that was below 1000 meter above sea level. Similarly, yellow fever re-emerged as an outbreak in South Omo in 2013 after 60 years and 159 cases were reported till January, 2014.

Acute Watery Diarrhoea is climate sensitive and aggravated during rainy season and drought as water sources overwhelmed by contaminated surface water and lack of safe water forces people to use unsafe water for all domestic purposes including drinking and food preparation receptively. Thus, Acute Watery diarrhea outbreak occurred in December 2015 following Elino posed drought and persists till now.

GOAL

The goal of the health national adaptation plan is to make sure the health system is climate resilient that contributes to main goal of HSTP.

STRATEGIC OBJECTIVES

The strategic objectives of the health national adaptation plan are: to enhance the early warning and surveillance system in the context of health emergency risk management; building the capacity of health sector for realization of climate resilient health system; enhance the resilience of health system in provision universal health coverage; and create enabling environment for health adaption to climate change implementation.

STRATEGIC APPROACHES

This HNAP has four strategic approaches through which interventions and activities are going to be implemented. These are:

1. **Mainstreaming climate change adaptation to Health Programs:** Strengthening the existing interventions is more effective than creating a new structure or function to tackle climate change driven health consequences. Therefore, mainstreaming climate change adaptation to relevant activities and duties of the health sector is crucial.

2. **Community Mobilization:** To aware the community at large, mobilizing people about climate change and its impact on health as well as options to adapt climate change will be carried out regularly. The social mobilization will be carried out principally by HDAs and HEWs through face to face communication. This social mobilization will be supplemented with distributing printed materials as well as through spots, documentaries and group discussion using existing mass media targeting specific   locality and/or nationwide.

3. **Strengthening partnership:** FMOH will establish partnership with the beneficiary communities as well as line ministries and other partners which have great contribution to overcome the adverse effects of climate change on health sector.

4. **Strengthening the existing health system:** this includes strengthening the existing integrated Diseases Surveillance and Response with especial emphasis to climate sensitive diseases; **c**apacitating health professionals and managers at all levels about health impacts of climate change and the adaptation measures to be taken; and the health management information system has to be strengthened in a way that it will be able to produce timely and quality information for decision making.

KEY INTERVENTION AREAS

1. The key interventions are selected based on the vulnerability and adaptation assessment findings, the situational analysis done as well as relevant sustainable development goals. These are:

2. **Strengthening and Expanding Health Infrastructure:** existing health facilities will be strengthened and new health facilities will be constructed to provide quality and to date health services. Measures such as having standing walls to prevent inland floods, having self-supply of water and energy, having natural and man-made ventilation will be taken to make health facilities climate resilient.

3. **Strengthening existing Integrated Disease Surveillance and Response:** Surveillance officers will get capacity building training to on how to use climate data to predict and prevent climate sensitive diseases transmission. This training also enhances health institutions' emergency preparedness and response with emphasis to drought, flood and extreme heat prone areas. Having a strong IDSR, health facilities will be informed to avail medicines to known climate sensitive diseases in time, to develop and use effective vaccines for some climate sensitive diseases, and to allocate adequate budget for activities that prevent and reduce climate change posed diseases and injuries.

4. Promoting climate resilient Sanitation facilities: FMOH and its partners will provide practical training on improved and climate proofed sanitation facilities options to selected environment health professionals aiming to replicate these sanitation facilities at grass root level.

5. **Promoting climate resilient water safety plan:** FMOH and Regional Health Bureaus will play a role of monitor of the water quality at intervals, and promoting   safe storage and water treatment at household level to promote water safety plan. . These roles play great in ensuring the quality of drinking water in both regular and emergency times.

6. **Promoting Family planning:** FMOH will promote   family planning services and options of contraceptives all over the country with special attention at vulnerable places where drought recurred, severe land degradation and dense population exist using all means to curb the population pressure.

7. **Revising building codes of health facilities:** FMOH will work with Ministry of Urban Development and Housing (MoUDH) collaboratively in revising building codes of health institutions so that health institutions will have appropriate engineering design to overcome weather extremes that include having better natural ventilation and plants for shading. FMOH will also incorporate a structure of self-supplied water source into the plan of health institutions where no other means of water supply or scarcity of water from common sources during renovation or building of new health institution.

8. **Promoting climate change mitigation initiatives:** FMOH in collaboration with MoWIE will work health facilities to have their own source of renewable energy with priority to health facilities with no access to the main grid of electricity. Moreover, hospitals which have remarkable inpatients will generate and use biogas energy from latrines and kitchen wastes. FMOH will also promote and encourages urban dwellers to walk on foot daily and/or to ride a bike since it is helpful practice to prevent some non-communicable diseases as well as to reduce carbon emission. Moreover, FMOH will also promote and encourage households to practice gardening and to plant edible fruits as they have triple advantages, a subsistence to household nutrition, providing shading service and absorbing CO_2.

9. **Promoting community health insurance scheme:** Health Insurance Agency (HIA) will expand and strengthen the initiation of community based health insurance scheme for the benefit of the poor and destitute community members through HDAs and civic societies' structures. Therefore, drought and flood prone areas will get priority while HIA is expanding   community based health insurance scheme in the country.

10. **Advocating and creating awareness on climate change and health:** FMOH will advocate climate change effects on health sector to political leaders, policy makers and influential people so that they would play their role in communicating and implementing H-NAP. The HEWs and HDAs will provide awareness creation to their community on climate change effects on health and adaptation options based on short term training they got and reading materials they collected. This community awareness creation will be supported by messages and discussions transmitted through mass medias like radio and television.

11. **Encouraging operational research on health and climate change:** FMOH and regional health bureaus will encourage and support universities, research institutions and individual researchers to conduct operational research in their respective regions on the contribution of climate change in aggravating climate sensitive diseases, the health impacts of climate change and disasters posed by climate change, endogenous coping mechanisms practiced by communities, etc.

Budget: as most of the activities will be mainstreamed to the existing initiatives, projects and programmes; and the extra budget require to implement this HNAP is minimal. Of the total budget required, 1,704,796,316.00 ETB,   to carry out the planned activities, 809,623,200.00 ETC (47.5%) will be covered by FMOH and respective regional health bureaus, and will be invested for community mobilization at grass root level. The budget deficit, 895,173,116.00 ETB, is expected to be mobilized from partners and various funding agencies.

Acknowledgement: We would like to express our gratitude to members of technical working group as well as experts and officials of FMOH and Regional Health Bureaus for their contribution in realizing this HNAP.

SECTION 3:

PROGRAM UPDATES, PROGRESSES

CONTRIBUTION OF HIV CATCH UP CAMPAIGN PROGRAM TO THE NATIONAL HIV/AIDS CARE AND TREATMENT PROGRAM

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INTRODUCTION

Cognizant of the devastating social, economic, psychological and demographic impacts of HIV epidemic, Ethiopia has implemented a successful Multi-Sectoral Response in the past 14 years which resulted in a 95% reduction in HIV incidence, 73% reduction in annual AIDS–related deaths and 29% reduction in the overall HIV prevalence (1). However, these gains could not be sustained unless efforts are strengthened specially in the face of the currently observed slowdown of momentum of HIV response.

To accelerate the HIV response towards ending the AIDS epidemic by 2030, UNAIDS has launched Fast-Track strategy in 2014 which was endorsed by the United Nations General Assembly. In the strategy, Fast-Track targets were set - reaching 90-90-90 targets by 2020. Ethiopia, one of the thirty five Fast-Track countries, has adopted the UNAIDS 90-90-90 targets in its 2015-2020 HIV/AIDS Strategic Plan which is an investment case approach (2).

Although few countries have already achieved and many are progressing significantly towards the 90-90-90 targets, the performance of Ethiopia remained lower because of slowdown of momentum of HIV Multi-Sectoral Response. In 2016, reports indicated 62% of the PLHIV knew their HIV status and 52.8% were on treatment. Although viral load testing service coverage is very limited nationwide, 85% of PLHIV who had viral load testing had suppressed viral load (3). HIV testing yield was progressively declining, reaching 0.42% in 2016, calling for the critical need for targeted HIV testing. If this low performance was left unchecked, the expected number of PLHIV on ART (481,500) by end of June 2016 would have been short of 89,656 which called for a different intervention named the HIV catch up campaign. The aim of the catch up campaign was to fill the performance gap timely and significantly improve and scale up the HIV response nationally to meet the 90-90-90 targets and ultimately end the AIDS epidemic by 2030 (4).

THE DESIGN OF THE NATIONAL HIV CATCH UP CAMPAIGN

To guide the implementation of the intervention, HIV testing, care and treatment Catch up Campaign document was prepared, and the following arrangements were put in place:-

- Leadership and coordination mechanism: At all levels of the health system, campaign command posts & Task Forces were established. Members of the Task Force were drawn from public health institutions, implementing partners, CSOs and development partners.

- Identification of campaign sites and health facilities: 178 towns with high HIV burden were identified where 776 Health facilities (Public, Private and NGO) were identified to conduct targeted HIV testing and timely initiation of ART.

- Identification of target population groups: 15 target population groups were identified.

- Detailed targets for Social Mobilization/demand creation and Clinical Interventions specific to the target population groups were set.

- Campaign specific M&E SOP and recording and reporting tools were developed with simultaneous reporting to the campaign coordination team and HMIS.

OBJECTIVE

To objectively determine the contributions of HIV Catch up Campaign (CUC) to the national HIV testing, care and treatment program.

METHOD AND MATERIALS

Data from the monthly Health Management Information System (HMIS) report and from Catch up Campaign project documents and reports were utilized. A range of literatures that includes national and international documents related to HIV/AIDS testing, Care and Treatment programs were reviewed. For the national performance, data is used from all HIV/AIDS service providing facilities and for the CUC performance, data is used from 776 health facilities which are selected for the CUC.

Analysis was done on the performance of HIV/AIDS testing, test yield and linkage of HIV positives to care and treatment. Performance of HIV testing, positivity and linkage to care and treatment before the initiation of CUC and after the CUC project was described and compared.

RESULT AND DISCUSSION

The CUC program was implemented based on the arrangements described above (CUC design section). Close monitoring of campaign performance through weekly reporting and providing a detailed and regular region specific feedback was performed by the campaign coordination team with great dedication. The Campaign Coordination Team was fully supported by the state minister/programs wing/ who is the chairperson of the CUC command post. Although the implementation of the Campaign was planned to begin in August 2008 EC, implementation was delayed to November 2009 EC due to coordination related reasons. The campaign data was reported to HMIS and to the campaign coordination team simultaneously; thus campaign data is a subset of national HMIS data.

Nationally, a total of 5,680,522 people were tested for HIV from November 2009 EC to June 2009 EC, among which 2,564,140 (45%) of the tested are from CUC sites. Among the total number of people tested nationally, 42, 347 (0.75%) were HIV positives compare to 35, 602 positives (1.4% positivity rate) from CUC sites. This shows that HIV testing yield is higher at CUC sites. Although the CUC target was very ambitious (identifying 70,527 new positives, which is 10 fold of the pre-campaign performance), 35,602 (50% of target) new HIV positives were identified of which 27,894 were linked to care and treatment during the campaign period (Table 1). Linkage of HIV positives is higher at CUC sites (78.6%) compared to the national linkage (72.6%) (5, 6).

Table 1: Number of people tested for HIV, tested positive and linked to HIV/AIDS care and treatment services, November 2009 EC to June 2009 EC

Data Source	Reporting Period	Indicators				
		Testing Volume (No. of people tested)	No. of Identified HIV Positives	Yield (%)	Linked to Care	% linked to care
National	Nov - June EFY 2009	5,680,522	42,347	0.75	30,753	72.6%
CUC sites	Nov - June, EFY 2009	2,564,140	35,602	1.4	27,989	78.6%

As shown in figure 1 below, the national HIV testing yield has been declining before the CUC was launched and lifted up from 0.42% in June 2008 EC in the pre-Campaign period to 0.75% (on average) during the HIV Catch up Campaign period. The national HIV testing yield during the campaign was consistently higher than the pre-campaign period. Moreover, HIV yield (positivity) from CUC sites is much higher than the national yield, with an average 1.4% positivity rate throughout the campaign period. This may be due to the fact that the CUC program used targeted testing from high HIV burden sites that resulted in more HIV positivity than the pre-campaign period.
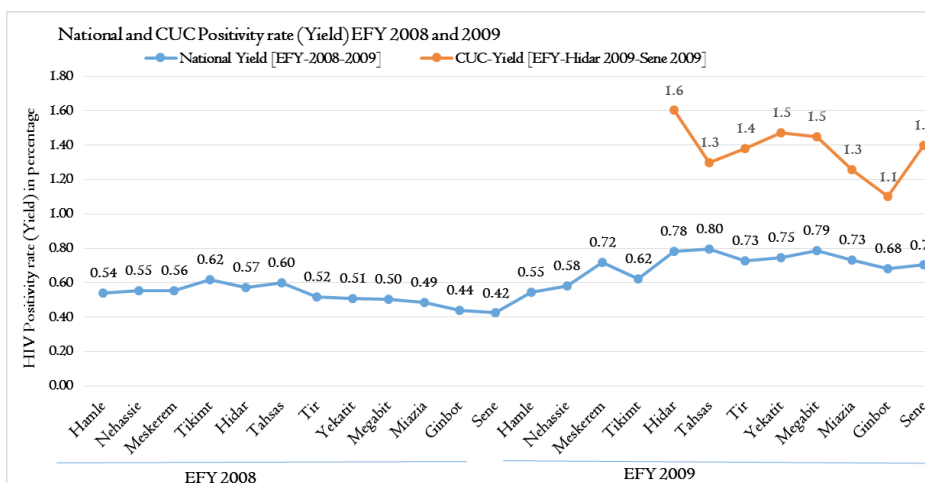
Figure 1: Trend of HIV testing yield (HIV positivity rate), national and CUC sites

Nationwide cumulative linkage during the campaign period was 72.6% and linkage from Catch up Campaign sites was 78.6%. Additionally, from the national 30,753 HIV positives linked from November 2009 EC to June 2009 EC, 27, 989 (91%) are from the CUC sites. These national level performance improvements in HIV testing, yield and linkage are as a result of the direct and indirect effects of Catch up Campaign interventions.

From the coordination and performance monitoring point of view, the weekly reporting, data quality and performance reviews by the catch up campaign coordination team followed by timely and region specific detailed feedback and a onetime participatory Integrated Joint supportive supervision have significantly contributed for the continuous improvement of campaign performance indicators. Moreover, the unreserved support provided by the state minister was instrumental.

The achievements mentioned above were made in the face of many challenges; major ones were:

- Competing priorities in FMOH and RHBs

- Inadequate engagement of key actors (RHBs/HAPCOs/Woredas/Health facilities leadership, health care providers, data management staff, Adherence Case Managers, religious leaders, Media and PLHIV associations)

- Limited social mobilization interventions for targeted HIV testing, and

- Inadequate budget

CONCLUSION AND RECOMMENDATIONS

The Catch up Campaign initiative has significantly contributed to the overall national HIV care and treatment program performance– HIV testing volume, identified positives, and linkage to care and treatment. HIV yield (positivity rate) and linkage to care and treatment is higher at CUC sites that shows that targeted HIV testing resulted in better yield and linkage to HIV/AIDS care and treatment.

Despite challenges faced, the encouraging catch up campaign achievements are indications for the possibility of greater nationwide HIV program performance improvements provided that major challenges are timely and meaningfully addressed. Involving leadership bodies and different stakeholders at all levels of the health system and close monitoring with timely feedback were key for the success of the program.

In order to further be successful in achieving the 90-90-90 targets, we recommend to focus more on targeted HIV testing and reach the hard to reach population groups. We need to increase the involvement of leadership bodies at all levels of the health system, adequately engage and motivate health care providers and data management staff, regularly review plan-performance and provide feedback timely. Moreover, Identifying, advocating, motivating and adequately engaging key actors are also critically important actions. Allocation of adequate budget for the HIV/AIDS program until HIV becomes a non-public health threat is also important for the success of the HIV/AIDS testing and care & treatment program.

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PROGRESS IN AVAILABILITY OF ADEQUATE AND SAFE BLOOD AND BLOOD PRODUCTS IN ETHIOPIA

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INTRODUCTION

Blood transfusion services are an indispensable component of any health care delivery system in the world and blood transfusion therapy is an essential component of the practice of modern medicine. Safe and adequate supply of blood is needed in order to save lives because blood is often the only means of survival. It has been known for centuries that blood transfusion can have serious and fatal consequences if it is not practiced within set norms and standards. Cognizant of this fact, WHO has adopted a number of resolutions urging Member States to organize their blood services in a manner that will minimize the attendant risks while ensuring adequate and safe blood supplies for their populations. Women and children are the ones in greatest need for blood transfusion service. The highest proportion of blood transfusion in Africa is given to children with severe anemia resulting from malaria and malnutrition, followed by women with pregnancy-related bleeding. The high maternal mortality rates partly attributed to complications of pregnancy, the high child mortality attributable to severe malarial anemia, the high mortality due to traffic accidents among others are all an evidence of the magnitude of the unmet need *(1)*.

In Ethiopia, blood banks were established in 1969 under the Ethiopian Red Cross Society (ERCS) to provide safe and adequate blood and blood products to hospitals. Until 2011, 0nly 11 blood banks were providing the services through ERCS network in the country. Since 2012, The National Blood Bank Service (NBBS) is transferred to the Federal Ministry of Health (FMoH) and the Regional blood banks were administered by the respective Regional Health Bureaus (RHBs).

Based on the WHO strategies and recommendations, many national blood transfusion services are established as agencies of the ministries of health developed into successful programs. Our development as part of health system strengthening within the context of the implementation of the 2008 Ouagadougou Declaration on Primary Health Care may be one way to ensure the consolidation and sustainability of, and universal access to, safe blood transfusion in our country *(1).*

In order to improve the transfusion services and ensure accessibility of blood and blood products in the country, NBBS was established as independent autonomous federal government institution in 2014 by the Ministers of Council Proclamation Number 330/2014. One of the mandates of the NBBS is to assure the availability of safe blood and blood products at the national level (2).

Blood transfusion, as a medical intervention, is intended to provide safe and adequate blood or blood components to health facilities to make available for people. However, blood transfusion may result in acute or delayed complications and carries the risk of transfusion-transmitted infections, including HIV, hepatitis viruses (hepatitis B and C viruses), and syphilis. In Ethiopia, the Central and Regional Blood Banks work aggressively to contribute towards the achievement of Health sector Transformation Plan(HSTP) through supplying adequate and safe blood and blood products to health facilities to mitigate various health related challenges (e.g., reduction of maternal and child mortality and anemia) and ensuring universal health coverage.

Much investment has been made in blood transfusion services in Ethiopia over the past 10 years. As a consequence, substantial progress has been made over the years in the organization and management as well as the clinical and technical aspects of blood transfusion services. Furthermore, FMoH has given due attention in strengthening the National and Regional Blood Bank Services. Currently, there are 25 functional blood banks (one Central Blood Bank located in Addis Ababa and 24 in regions) and more than 10 new blood banks are on pipe line to start services.

WHO GLOBAL STRATEGIC PLAN FOR UNIVERSAL ACCESS TO SAFE BLOOD TRANSFUSION

- Build capacity in countries to formulate and implement national blood policies and Plans

- Achieve 100% voluntary non-remunerated donation of whole blood and labile blood products

- Process blood into components, based on the needs of the health care system

- Establish haemovigilance systems for improved blood safety

- Implement national guidelines on the clinical use of blood

- Have > 75% of hospitals with an operational transfusion committee.

- Ensure 100% quality-assured testing of donated blood

KEY OBJECTIVES OF NATIONAL AND REGIONAL BLOOD BANK SERVICE:

Provide adequate, safe and timely prepared blood and blood product and other related service to all persons who need blood transfusion in Ethiopia.

OBJECTIVE

The objective of this article is to assess and describe the progress in the availability of safe blood and blood products in Ethiopia. It also aims to describe the trend in the availability of replacement and voluntary blood donations and determines blood donation rate in Ethiopia.

RESULT AND DISCUSSION

VOLUNTARY NON-REMUNERATED BLOOD DONATION (VNRD)

More than three decades after the first World Health Assembly resolution (WHA28.72) addressed the issue of blood safety, equitable access to safe blood and blood products and their safe and rational use still remain major concerns throughout the world. To address the challenge of inadequate access to safe blood transfusion, the Blood Transfusion Safety Team at WHO headquarters organized a 'Global Consultation on Universal Access to Safe Blood Transfusion' on 9–11 June 2007 in Ottawa, Canada and enacted a principle that blood donation should be voluntary and non-remunerated (3). This policy has been adopted by Ethiopia. Voluntary non-remunerated blood donors give blood free of charge and receive no other payment that could be considered as a substitute for money. Their primary motivation is to help unknown recipients and not to obtain any personal benefit. Blood donation by 1% of the total population can meet a nation's most basic requirements for blood and blood products.

Worldwide, fifty seven countries collect 100% of their blood supply from voluntary, unpaid blood donors, 73 countries collect more than 90% of their blood supply from VNRD while more than 50% of the blood supply is still dependent on family/replacement and paid blood donors in 72 countries (4). In Ethiopia, total blood donated from VNRD was lower than replacement blood until EFY 2005. After 2005 EFY, VNRD progressively increased through time. Ethiopia has registered a significant progress by collecting blood from Voluntary non-remunerated blood donors from 3,000 unit of blood (12%) in 1996 appreciably lifted up to 70,946 unit blood (98%) in 2009 EFY (fig.1 and 2). This has been achieved with relentless efforts from the Federal and regional government to expand the service.
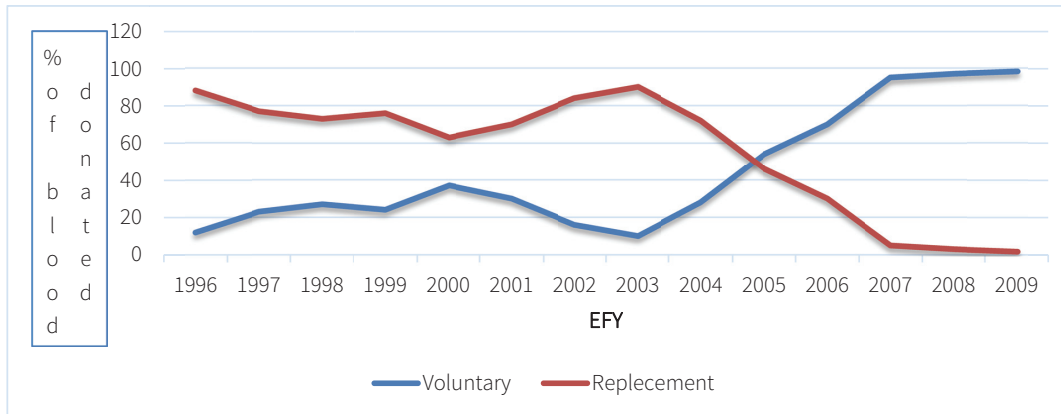
Figure 1: Trend of Voluntary Vs Replacement Blood Collection in Ethiopia, 1996 - 2009 EFY

BLOOD DONATION RATE

It is estimated that donations from 1% of the population is generally the minimum needed to meet a Nation's most basic requirements for blood. The average donation rate is 3% in developed countries, 0.75% in transitional countries, and an average of 0.37% in developing countries (5). A few year back, Family/replacement donors provide more than 90% of the blood collected in Ethiopia and were the one who give blood when it is required by a member of his/her family or community. Looking at the trend of volume of blood units collected and the rate of VRRD from 1996 to 2009 EFY, there is a significant progress in the proportion of blood units donated from voluntary blood donation. In 1996, a total of 25,004 blood units were collected in the country, among which only 3000 unit (12%) was from VNRD. The total number of donated blood units was increased to 173,923 units in 2009 EFY from which 98% was collected from VNRD (6,7). This shows that the total number of blood units and the proportion collected from VNRD has progressively increased through time.

Figure 2: Total units of blood collected from replacement and voluntary blood donation in Ethiopia, 1996-2009 EFY

WASTAGE OF COLLECTED BLOOD

Blood transfusion is a life-saving component of health care systems. Nevertheless, it can also be a quick and easy method of exposing patients to risks, particularly the transmission of infectious agen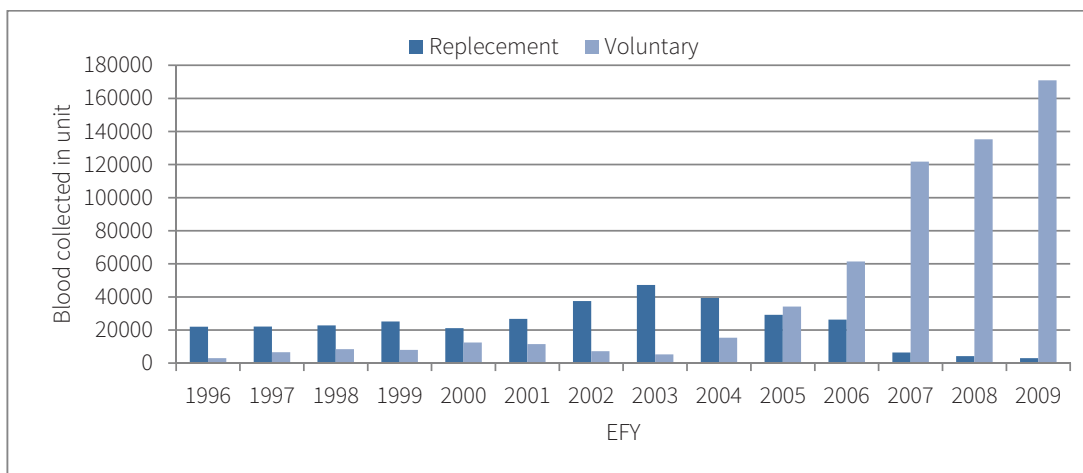ts to recipients. Despite substantial improvements in the safety of transfusion services worldwide, the presence of paid and replacement blood donors are still of concerns for ensuring sustainable safe blood donations. There is an established fact that the prevalence of HIV, hepatitis B, Hepatitis C viruses, and syphilis are lowest among unpaid blood donors who give blood voluntarily and higher in replacement donation. Blood-banking services in Ethiopia are mainly hospital-based and most hospitals obtain blood from relatives/family and friends of patients (replacement donors) who give their blood for the sake of a specific patient till 2005 EFY.

Several studies shows, significantly higher prevalence of HIV, HBV, syphilis and HCV in family donors compared to voluntary donors. As shown in figure 3 below, the prevalence of HIV and HBV in 1996 was 3.7% and 5.6% and 0% respectively. The prevalence of these transmissible diseases has been reduced progressively reduced. Figure 3 below shows trend of the prevalence of transfusion-transmissible infections (TTI's) from 1996 to 2009 EFY.
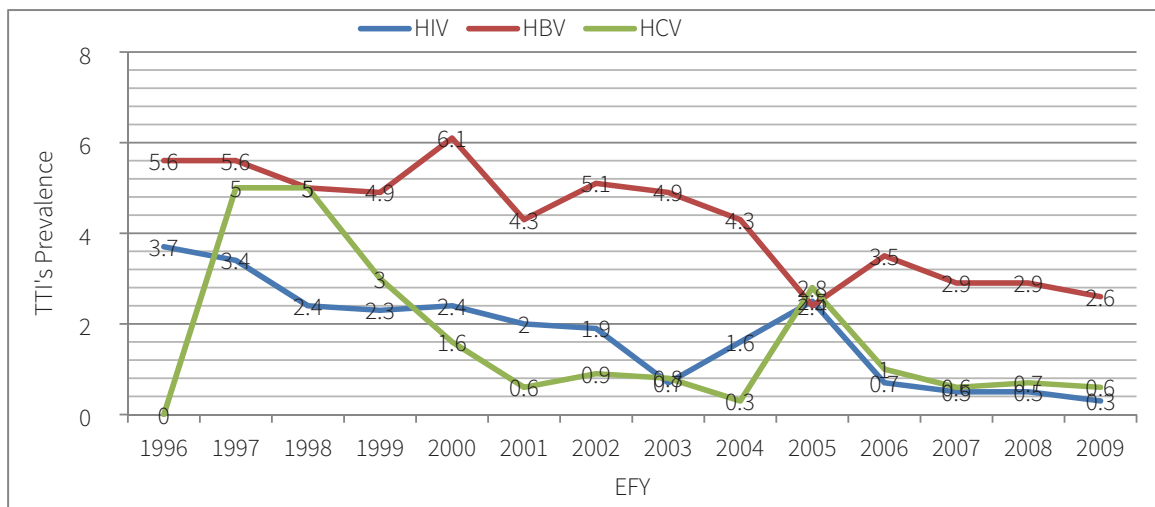
Figure 3: Trend in TTI Prevalence among Blood Donors in Ethiopia, 1996 – 2009 EFY

MAINTAINING SAFE AND ADEQUATE BLOOD SUPPLY IN ETHIOPIA

Reducing unnecessary transfusions were crucial in ensuring patient safety and blood product availability, and reducing costs. In order to strengthening the clinical interface, hospital transfusion committee was given a central role for the effective management of monitoring, audits, corrective actions and training to reduce unnecessary transfusions.

CHALLENGES IN ACHIEVING UNIVERSAL ACCESS TO SAFE BLOOD TRANSFUSION IN ETHIOPIA

The great achievements in the volume of blood donated, the increased proportion of VNRD, and reduced trend in TTI were not without challenges. Some of the challenges include: - Blood shortages, low voluntary blood donor and high discard rates in some regional blood banks, inappropriate clinical use of blood, Lack of commitment and poor implementation of blood bank services in some regions, lack of sustainable and adequate budgeting for mounting the blood bank services , poor inter-sector collaboration with programs such as malaria and maternal health service, high staff turnover (especially in central Addis Ababa blood bank), Inadequate technical staff in some regional blood banks , shortage of vehicles for field and blood collection, delay in procurements of equipment and supplies, problems in maintenance of equipment.

CONCLUSION

Blood bank service in Ethiopia has shown significant improvements since its establishment. The result of this article shows that there was a significant increment in the general volume of blood collected and the percentage of voluntary non-remunerated blood donation has significantly increased through time. The rate of transfusion related infections has also decreased over time. However, the total collected blood is not adequate and more effort is required to increase from what has now been collected.

The people of Ethiopia, regardless of their wealth or social status, need universal access to safe blood transfusions in situations where transfusion is a life-saving procedure. Lack of access to safe blood and blood products continues to place an unacceptable burden on health and economic development in our country. The governmental and community commitment change the family replacement blood collection manner to voluntary non remunerated blood donor from 12% to 98% in 2009EFY. The goal of Voluntary blood donation (VNBD) is to wipe off the scarcity of blood and ensure availability of safe and quality blood and other blood components, round the clock and throughout the year. This will lead to alleviation of human sufferings, even to the far-flung remote areas in the country. Therefore, equity in the availability and accessibility to safe blood and blood products for any citizen could be considered a need for achieving the Health sector transformation plan (HSTP)

RECOMMENDATIONS

For improving access to a safe and sufficient blood supply, national/regional blood transfusion services should:

1. Build national and regional capacity for the implementation of quality systems in blood transfusion services, including the development of national standards, documentation, training and assessment

2. Develop tools for the follow-up, monitoring and evaluation of the impact of WHO training programs.

3. Provide technical support for regional blood banks to the level of accreditation

4. Work with other relevant national institution, particularly the ministry of education, to incorporate the concept of blood transfusion in the preparatory, undergraduate and postgraduate curricula of schools.

5. Employment of technical staff and VAN for mobile blood collection site

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REVISION OF ETHIOPIA'S HEALTH MANAGEMENT INFORMATION SYSTEM (HMIS) IN 2017: REVISION PROCESS, ITS RESULTS AND CURRENT STATUS

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1. INTRODUCTION

Health Information System is one of the six building blocks of a national health system and it helps to provide good information on health challenges, on the broader environment in which the health system operates, and on the performance of a health system. Evidence based public health decision making requires quality data which can be generated from different sources (both routine and population based sources) (WHO, 2000). In Ethiopia, the routine Health Management Information System (HMIS) is managed primarily by the FMOH while population based information comes predominantly from Central Statistics Agency (CSA). Moreover, population based surveys and researches are conducted by the Ethiopian Public Health Institute (EPHI), Universities, different governmental & nongovernmental organizations and individuals (FMOH, 2012) .

HMIS is the routine collection, aggregation, analysis, presentation and utilization of health and health related data for evidence based decisions for health workers, managers, policy makers and others. It is one of the major sources of health data to monitor and evaluate the implementation of the health system and its performance. HMIS is one of the key data sources for the Ethiopian health system. Having a well-functioning HMIS is essential to track the implementation of national health programs and projects, specifically the current national Health Sector Transformation Plan (HSTP).

In the last one decade, various HMIS related activities have been done in Ethiopia. In 2007, a national level baseline HMIS assessment was conducted and resulted in redesigning of the national HMIS and its implementation since 2008 with principles such as standardization, integration and simplification. It was then revised again in 2014 and its implementation cascaded up to the lowest health units in the health system. The HMIS is then re-revised recently in 2017.

RATIONALE OF THE HMIS REVISION IN 2017

Ethiopia has developed a five years strategic plan (HSTP) with ambitious targets for the period 2015/16-2019/20 and has identified four transformation agendas that includes transformation in equity and quality of health care, Information Revolution, Woreda Transformation and creating a Caring, Respectful and Compassionate (CRC) health workforce. The HSTP requires a robust M&E system that can help to monitor HSTP targets and the priority health agendas of HSTP (FMOH, 2015). The indicators and data sources of the previous HMIS was in short of responding to the requirements of the HSTP initiatives that necessitated the revision of the indicators and data sources. Additionally, implementation of new health initiatives and programs such as Inactivated Polio Virus (IPV) vaccination, Human papilloma Virus (HPV) vaccination, nutrition related programs, emergency and Intensive Care Units (ICU); changes in the implementation modality of some programs such as HIV testing modalities, expanded services by health posts are the factors that necessitated the revision of the existing HMIS and cascading to all levels of the health system.

2. OBJECTIVES

GENERAL OBJECTIVE

The general objective of this article is to describe the national HMIS revision process in 2017 and the results of the revision process.

SPECIFIC OBJECTIVES

- To describe HMIS-2017 revision process
- To identify the revised HMIS indicators and the changes from the previous indicators
- To identify the revised HMIS recording & reporting tools and procedures

3. RESULTS AND DISCUSSION

3.1 HMIS Revision Process

The 2017 HMIS revision process was initiated in January 2017 by the National M&E Advisory Committee (NAC) meeting, a committee that comprises of experts and heads from the FMOH and from different development partners that has advisory role on national level HIS and M&E. During the meeting, the factors that necessitated the revision were discussed and agreed upon. Based on this, HMIS revision Technical Working Group (TWG) was established with members from the different directorates of the FMOH and experts from partner organizations. The TWG has conducted a series of discussions to develop the draft indicators, recording and reporting tools and procedures. During the revision process, document reviews and interview with program experts was done. The document review includes review of the existing HMIS indicators and tools, HSTP document and its indicators, national program implementation strategies and manuals, and international indicators such as Sustainable Development Goal (SDG) indicators, WHO 100 Global set of Indicators and PEPFAR HIV monitoring indicators. Once the TWG finalized the initial draft HMIS indicators, tools and procedures, a national consultative workshop was organized at which time a consultation was conducted with the FMOH directorates, RHB representatives and from different partner organizations. The consultative meeting on the draft HMIS indicators and tools brought important feedbacks and comments that were incorporated on the finalized version of the HMIS. After the first consultative meeting, the document was revised and sent to all the RHBs for comments and the TWG conducted a series of finalization consultations with each directorate at the FMOH. The final version of the HMIS indicators and HMIS tools was prepared after these intensive consultation processes.

During the selection of HMIS indicators, the HMIS revision TWG has adopted the following guiding principles:

- Consistency with HSTP strategic objectives and indicators
- Consistency with international and national indicator standards
- Consistency with the basics of indicator selection (Sensitivity, specificity, feasibility, validity…)
- In line with the basic principles of health Information System: Standardization, Integration and Simplification
- The significance of the indicator should be justifiable
- Participatory process

3.2 Revision outputs: Number of indicators and tools, comparison with the previous HMIS

The revision process has resulted in changes in the number and contents of indicators, changes in the recording and reporting tools/procedures such as registers & tally sheets and changes in the contents of reporting formats.

3.2.1 Revised HMIS Indicators

The number and contents of HMIS indicators are changed from what was defined in 2014. As a result of the revision process, a total of 131 indicators are selected for M&E of health programs via routine data collection from health institutions. The number of national HMIS indicators were 108 in 2008, 122 in the 2014 revision and 131 in the current 2017 revision. Changes of the HMIS indicators from the previous HMIS indicators includes changes in the total number, definitions, contents and types of indicators. Thirty three (33) new indicators were added, 24 existing HMIS indicators were removed, 15 of the existing indicators were modified and 83 of the existing HMIS indicators were kept in the new revised list of indicators. The figure below shows the changes in the number of HMIS indicators between 2014 and 2017.
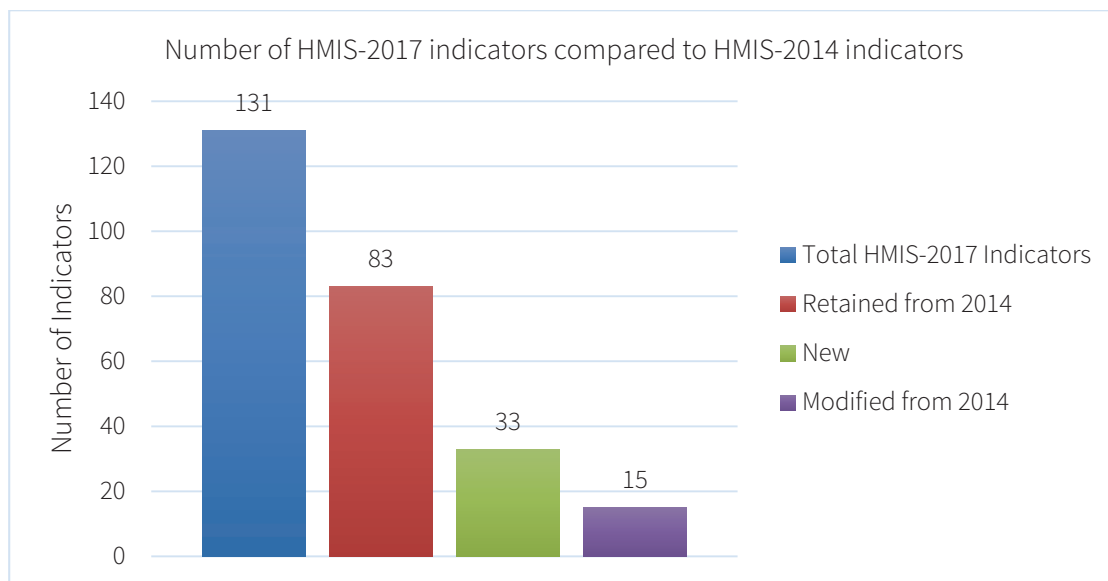
Fig. 1: Number of indicators in 2017 revision and changes from the 2014 HMIS list of indicators

The HMIS indicators are categorized as: Maternal, child health and Nutrition; hygiene and environmental health; Communicable diseases; Non-communicable diseases; Community Ownership; Resource Mobilization and Utilization; Health Insurance; Quality of Health Services; Evidence Based decision making; Health infrastructure; Human Capital & leadership and regulatory system. Table 1 below shows the number of HMIS indicators by each category.

Table 1: Number of HMIS Indicators by program areas

S.No	Indicator category	Total number of indicators (revised HMIS-2017)
1	Maternal and Child Health, and Nutrition	50
	Maternal Health	14
	PMTCT	7
	Child Health	21
	Nutrition	8
2	Hygiene and Environmental Health	2
3	Prevention and control of diseases	45
	All Diseases	3
	HIV/AIDS	10
	Tuberculosis	15
	TB/HIV	4
	Leprosy	3
	Malaria	5
	NTD	2
	NCD	3
4	Community Ownership	3
5	Resource Mobilization and Utilization	4
6	Health Insurance	3
7	Quality of Health Services	8
8	Pharmaceutical supply and services	4
9	Evidence based decision making	3
10	Health Infrastructure	4
11	Human Capital and Leadership	4
12	Regulatory System	1
	TOTAL	131

3.2.2 Revised HMIS tools and Procedures: Registers and tally sheets

HMIS recording tools include individual medical records, registers and tally sheets. In the revised HMIS, the existing recording tools are modified and new additional registers are developed to capture the required reportable data element and to easily monitor services at health facilities. A total of 38 HMIS registers and 16 tally sheets are revised to capture data at health centers and hospitals. Fifteen of the registers and 6 of the tally sheets are new and the remaining are modified from the existing registers and tally sheets.

3.2.3 Revised HMIS reporting formats

The routine HMIS captures monthly, quarterly and annually reportable data elements starting from the community level (health Posts) and health facilities (health Centers, Hospitals and Clinics) up to the Federal Ministry of Health of Ethiopia (FMOH). It is designed to capture routine reports from both the public and private health institutions. The types of reporting formats and the frequency of reporting is not changed from the previous reporting system but the contents of the reporting formats are updated based on the required data elements of the revised indicators.

3.2.4 Trainings on the revised HMIS

Following the finalization of the revision, capacity building activities were planned to be provided at all levels of the health system. For the capacity building purpose, the FMOH has developed HMIS related guides and training manuals. The guides and manuals include: HMIS Indicator reference guide, HMIS recording and reporting manual, Data quality training manual and Information use manual. The FMOH has provided a national level Master Trainers training for participants from all RHBs and partner organizations. Then, regional level HMIS TOT training was provided in all the 9 regions and 2 city administration.

4. CONCLUSION

The HMIS revision process was participatory with involvement of key stakeholders (both internal and external). Consulting stakeholders during the revision was key for the success of HMIS revision. The revision was a timely action to respond to the data requirements to monitor the HSTP and avoids parallel reporting. Close follow up of the cascaded training is very important. Moreover, regular mentorship and supportive supervision should be strengthened for the proper implementation of the revised HMIS at all levels of the health system.

Next Steps: Cascaded training to facility staff, distribution of HMIS materials, Supervision and close follow up through mentorship program.

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INTEGRATION OF WATER, SANITATION AND HYGIENE (WASH) FOR PREVENTION AND CONTROL OF NEGLECTED TROPICAL DISEASES (NTD) IN ETHIOPIA

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1. INTRODUCTION

Neglected Tropical Diseases (NTDs) are diverse group of communicable diseases affecting more than one billion people living in poverty, without adequate sanitation and in close contact with infectious vectors and domestic animals and livestock and costing billions of dollars every year. They disproportionately impact poor and rural populations, cause severe sickness and disability, compromise mental and physical development, contribute to childhood malnutrition, reduce school enrollment and hinder economic productivity.

Effective control of NTDs can be achieved when several public health approaches which include: preventive chemotherapy, innovative and intensified disease management, vector control and pesticide management, safe drinking-water, basic sanitation and hygiene services, and education and zoonotic disease management when and where applicable are combined.

Ethiopia is one of the countries that bear a significant NTDs burden in Africaand has prioritized eight NTDs for intervention. The list of NTDs prioritized for intervention includes trachoma, onchocerciasis, schistosomiasis, soil transmitted helminthiasis (STH), lymphatic filariasis, podoconiosis, leishmaniasis and Guinea-worm disease. The risks among the country population are greater than 80%, 75% and 38% for STH, Trachoma and Schistosomiasis respectively. The rest priority NTDs also pose risk for significant proportion of the country's population.

One of the central agendas of the Health Sector Transformation Plan (HSTP) of the country is equity and quality of health care as the substantial inequalities existing in health outcomes based on differences in economic status, education, place of residence and gender need to be addressed. NTDs disproportionately impact poor and rural populations. These same population lack access to safe and reliable water services and sufficient sanitation and tools to practice good hygiene behaviours. Hence addressing the NTDs and increasing access to safe water, sanitation, and hygiene services take stage in the equity and quality agendas of the HSTP.

The Ethiopian NTD Master Plan for 2016-2020 proposes a holistic approach that includes strengthening collaboration and coordination with other sectors and stakeholders, with a strong emphasis on coordination with the WASH sector in order to create a sustainable reduction of disease prevalence.

There is a growing evidence that WASH plays an important role in NTD transmission. Several systematic reviews summarising evidence and knowledge gaps have been published in response to the growing interest in WASH interventions for NTDs.

This article explores the opportunities for integration of WASH and NTD programs in Ethiopia where appropriate and collaboration where integration is not possible. It also presents experiences of integration of WASH for prevention and control of NTDs at district level in some areas of the country.

2. OBJECTIVE

The objectives of this material are to;

- Explore opportunities for integration of WASH for NTD prevention and control in Ethiopia and

- Discuss on integration of WASH at Woreda level to complement mass drug administration for prevention and control of NTDs

3. METHODS

Desk review of the available literatures focusing on NTDs and WASH in Ethiopia; review of WASH and NTD related reports, policy documents and strategies of different organizations and partners and a quick web scan of websites of WHO and other partners were the methods used to identify opportunities for integration of WASH for NTD prevention. In addition, in-depth interviews were conducted with federal and regional WASH partners to include the opinion of WASH program managers about integration. Triangulation of the different data sources were used to identify important opportunities and provide recommendation for integration of WASH for prevention and control of NTDs in Ethiopia.

4. RESULTS AND DISCUSSION

4.1 Opportunities for integration of WASH for NTD Prevention and Control in Ethiopia

There are substantial programs, organizations, partners, donors and forums where WASH interventions could be integrated for prevention and control of neglected tropical diseases at different levels in the country.

The One WASH National Program (OWNP): The government of Ethiopia launched the One WASH National Program (OWNP) in 2013 for achieving the WASH targets set in the Government's Growth and Transformation Plan (GTP). A WASH Implementation Framework (WIF) that acts as a guiding document for the implementation of an integrated one WASH programme (OWNP) and sets out roles and responsibilities in the WASH sector. Responsibility for development and provision of water supply and sanitation services is shared among four Federal Ministries; the Ministries of Water, Irrigation and Energy, Health, Education and Finance and Economic Development and their respective Bureaus at the regional level. In addition, consistent with Ethiopia's decentralization policy, Woredas/towns and communities are responsible for planning and managing their own water supply and sanitation services. The four Ministries have signed a Memorandum of Understanding (MOU) to operationalise OWNP based on the WaSH Implementation Framework (WIF) that was developed and officially launched by the same Ministries. According to WIG, the Ministry of Water and Energy leads on water supply, the Ministry of Health leads on hygiene and sanitation and the Ministry of Education leads on school sanitation and WASH clubs. The Ministry of Finance and Economic Development (MoFED) also has a critical role in terms of financing and financial management. Consideration of NTDs as a priority for allocation of resource and selection of Woredas would have better prospect in terms of outcome of the OWNP.

Major donors: Donors most active in the WASH sector include World Bank, African Development Bank, DFID, USAID, the European Union, the Government of Finland, the Netherlands Government, the Italian Development Cooperation (IDC), UNICEF, and JICA. Approaching donors for inclusion of NTD prevalence as measure for prioritization of WASH interventions as well as success indicator for funding would be an opportunity for integration.

Non-Governmental Organizations: Over 900 international and local NGOs are operating in the country and providing WaSH services which have the potential to impact NTDs**.**

The Water and Sanitation Forum: This is the Ethiopian civil society network of WASH NGOs, and has more than 79 members. It is recognized by government of Ethiopia (GoE) as the representative institution for WASH civil society and takes part in national level decision-making and coordination mechanisms. Another network, the WASH Ethiopia Movement is a voluntary coalition of representatives of government organizations, non-government organizations (NGOs), civil society organizations (CSOs), donors, the media, the private sector, faith-based organizations and individuals. The movement has established regional chapters to help it to work nationwide. There is close collaboration between GoE WASH ministries and WASH CSOs. Experienced CSOs in the sector join in the sector processes such as the Joint Technical Review, the annual Multi-Stakeholder Forum, and the Forum for Learning on Water and Sanitation (FLoWS). In addition, the WASH Media Forum was established in 2008 to trigger and maintain discussions between the media and WASH and to outline how the sector can increase its engagement and partnership with the media. These are important forums where NTD would be an agenda for integration.

Private sector: The private sector services in the WASH sector include consultancy services, drilling, construction and provision of electromechanical equipment. These are potential institutions for creating demand for healthy hygiene and sanitation behaviour thereby impact NTDs.

Community Based Organizations: There are many community structures currently managing water and sanitation supply schemes. These include The Water Supply and Sanitation Committees (WASHCOs). These are community engagement platforms for prevention and control of NTDs.

Increased cross-sectoral collaboration: Establishment of the National Hygiene and Sanitation Taskforce and the existence of relevant strategies and guidelines have paved the way for promoting feasible WASH initiatives throughout the country. The National Hygiene and Sanitation Taskforce is a multi-agency body chaired by the Ministry of Health. It is responsible for overall coordination of sanitation and hygiene programs/interventions ensuring harmonisation and alignment with public health programs. The National NTD Task Force was also established to coordinate and harmonise the programs of the government and NGOs. Hence these collaboration forums would serve as important advocacy platforms for integration of WASH for addressing NTDs.

4.2 Integration of WASH at Woreda level to complement MDA for prevention and control of NTDs

Experiences from WASH-NTD projects implemented locally have shed light on integration of WASH for NTD prevention and control. Schistosomiasis and soil transmitted helminths prevention project in Mekele and Adwa by NALA; Trachoma control project in certain Woredas of Amhara by Organization for Rehabilitation and Development in Amhara (ORDA), WASH-NTD project in four Woredas in Amhara region by CARE are some of the promising projects that have integrated WASH with routine MDA for prevention and control of NTDs. Below are some of the lessons from these projects as a success factor for integration of WASH in the ongoing NTD intervention strategies.

Mapping and engaging stakeholders: For implementing any community based intervention, it is important to understand existing community structures as well as the roles and responsibilities of the different stakeholders. Mapping and engaging those who have influence on WASH in a Woreda is important to reach optimal prevention. These includes local government authorities (Health, Education, Water, Agriculture, Women and Children Affairs), religious institutions, private business and NGOs. They could be engaged through a periodical consultative workshop, organizing a coordination committee, developing joint action plan and joint monitoring. Opportunities should be sought with these partners to integrate activities into the day to day operations conducted by partners.

Awareness and capacity building on NTDs: Building the capacity of focal points of existing community structures and stakeholders who have influence on the Woreda level WASH services is important for integration of WASH for NTD prevention. The focus of the capacity building topics includes disease burden, transmission, prevention methods and community level actions and behavior change communication for prevention of NTDs prevalent in the Woreda. Locally developed and culturally sensitive materials may be used for awareness creation and building the capacity of actors.

Infrastructure assessment, mapping disease hot spots and provision of local solution: Mapping disease hot spots where WASH services would be prioritized has to be one of the activities that has to be on the plan of action of the Woreda health office. Regular assessment of WASH service infrastructures availability and functionality in a community and institutions need to be conducted routinely for possible allocation of available resources and maintenance of WASH infrastructures. Detailed mapping of WASH coverage in comparison to disease burden in the different communities can help decision making on allocating resources to the different communities and in guiding partners on specific disease prevention activities that could be taken in their communities. Based on mapping results, provision of simple cost-effective solutions for WASH infrastructure scarcities in communities and schools are important enabling factors for intended behaviour. In order for a WASH program to be successful and sustainable, it is essential that community become true partners in the process, and not receive merely as a 'gift'. Schools and communities propose their WASH plan, and an estimated budget, to improve their existing WASH situation. Cost would be shared both by government/NGO WASH project and community including parent teacher association (PTA) and/or the community, either in the form of money, or in the equivalent amount of labour and other forms of work. Examples of shared WASH projects include constructing new latrines, renovations of water fountains and tanks, constructing concrete sinks for hand washing, adding doors to latrines for privacy, and many other basic and essential needs that were missing.

Health Education and Promotion in schools and community: Health education should reach different target populations within the community. The main target group would be school children, as they are the next generation and serve as messengers to the rest of their families. Second are women's groups who have the power to create societal change. Other groups that would be targeted include parents.

Health education events, such as Parasite Awareness Week (PAW) organized by school health/WASH clubs implemented in schools regularly would provide a platform for reaching children and their families. This would provide a temporary solution until the WASH or other large-scale projects are completed, and involve students to take responsibility in a proactive manner for the water and sanitation hygiene matters in their school. Different edutainment methods like poem, drama and songs would be good health education methods in schools.

Like children, women have the unique power to affect change both in their home and in the greater society. Using the pre-existing women's network model (the health development army), it is possible to reach hundreds of women by having health workshops to the leaders of these networks, who then pass on the information to their larger network of women. An in-depth workshop over the course of a few weeks could teach about NTDs, discuss with the women the different challenges they face in order to combat these diseases, and what they can do in order to help facilitate the necessary societal changes for them and their families to live in a healthy environment.

Mass drug administration are also good platform for health education encouraging hand and face washing and importance of avoiding open defecation.

Intensified monitoring and evaluation: Joint supportive supervision and monitoring of activities at ground level, Woreda and kebele level review meetings and school WASH regular review meetings are some of the mechanisms for monitoring integration of WASH for NTD prevention and control. This will ensure sustainability of WASH interventions for NTDs.

5. CONCLUSION AND RECOMMENDATIONS

In conclusion, mass drug administration (MDA) is an important key intervention to reduce burden and interrupt transmission of NTDs. However, WASH is a critical intervention to sustain the achievements and prevent reinfection and hence there is a need for commitment from health program managers at all levels to lead collaboration that reaches the most vulnerable – those most affected by NTDs, and those without access to basic water and sanitation services and good quality affordable healthcare. The vast opportunities listed here shows that there are adequate platforms for integration of WASH into the existing NTD interventions in the country. The lessons from the small scale Woreda level project implementation showed that integration is possible and hence a call for action, the opportunity to make a difference in sustainably eliminating the NTD burden through WASH.

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ETHIOPIA' S URBANIZATION AND ITS IMPLICATION ON HEALTH: SUMMARY REPORT OF FIRST ANNUAL NATIONAL URBAN HEALTH CONFERENCE

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BACKGROUND

Urban health affects the livelihoods of all persons living within a city and requires the involvement of numerous actors to ensure its growth and protection. Growing global cities, such as Addis Ababa, represent locations of opportunity for all persons. Both laborers and industry perceive the city as the location with the highest chance of success. This emotive concept of hope is drawing millions into urban centers and it is projected to tilt the historical norm of the human habitat with nearly 66 percent of the global population living in cities by the year 2050. Ethiopia is poised to become Africa's top economic power and will boast one of the world's largest populations with a number projected to be near 190 million in the next 40 years with the majority expected to reside in urban areas. While this outlook is positive, the current health problems facing populations within Ethiopia's urban centers are numerous and expected to compound. Air pollution, poor sanitation, both communicable and non-communicable diseases, and injury from road traffic accidents are some of the many problems threatening the health status of millions of Ethiopians. For Ethiopia to meet the challenges and hopes of its future, actions need to be taken to tackle these growing health issues within its cities.

Hence, Federal Ministry of Health in partnership with the JSI implemented Strengthening Ethiopia's Urban Health Program with funding from USAID organized a two-day national conference on urban health in Addis Ababa from April 3-4, 2017. A summary of the process & outputs of the conference is presented as follows.

OBJECTIVES OF THE CONFERENCE

The conference was sought to share lessons and experiences from different scientific and experiential backgrounds in urban health and apply them to the current case of Ethiopia's growing cities. Being the first conference on urban health in Ethiopia, the event was expected to serve as a foundation to current and future efforts in improving the lives of the country's urban population.

THE KEY OBJECTIVES OF THE CONFERENCE WERE TO:

- Recognize the complexity of urban demographics and urban health and discuss inter-sectoral problems facing the sector.
- Advocate for healthy cities and towns.
- Identify action points to improve urban health in the country.

PARTICIPANTS OF THE CONFERENCE

The participants of this conference were: mayors of selected cities and towns, policymakers and ministers; donors and partner organizations, academics working in the fields of urban health, staff at the agencies, civil society organizations, professionals associations, health care providers and community representatives, representatives from regional health bureaus, city/town health offices and health facilities. The conference was attended by more than 300 participants.

PROCESS AND CONFERENCE AGENDAS

The following activities and processes had happened in order to address the workshop agendas:

1) **Booth presentations and demonstrations:** Evidences, learning, and best practices on urban health; hygiene and sanitation models, innovative practices were displayed and presented. The presents were from private sector, academia, development partners, government agencies, entrepreneurs.

2) **Commitment from high level officials and artists:** High level government officials including from the Prime Minister Office and all relevant Ministries and Artists were in attendance. Artist Seleshi Demessie and artist Tagel Seifu made inspiring speeches and they presented their commitment to creating healthy cities. Mayors also presented their commitment to work towards creating healthy cities.

3) **Technical panel discussions:** Six panel discussions on selected topics focusing on urbanization and its implication on health, urban health extension program and primary health care and urban WASH were organized. Knowledgeable and high level technical experts were selected to serve as panelists and case stories were also presented by health extension professionals.

4) **Concluding discussion and commitment by regional health bureaus officials**: At the end of the conference, regional health bureau heads of Amhara, Tigray, Addis Ababa, Dere Dawa, Gambella, Benishangul-gumuz, Harari, and representatives of Somali, Oromia, and Afar regions presented their commitment for urban health during a panel discussion moderated by State Minster of Health H. E. Dr. Kebede Worku.

Challenges identified during the conference and proposed short term and long term solutions

THEME I: URBAN HEALTH EXTENSION PROGRAM (UHEP)

CHALLENGE I: ACCESSIBILITY AND QUALITY OF UHEP NEEDS SIGNIFICANT IMPROVEMENT

PROPOSED SHORT-TERM INTERVENTIONS

- Strengthen the ties/ relationship between the HC and Urban Health Extension Professionals (UHE-Ps) and establish functional referral system.

- Develop guidelines, scope of practice and tools according to the revised UHEP implementation manual to help the UHE-Ps provide quality health services to their Clients.

- Classify towns by population size, demographic profile and burden of diseases and tailor the service accordingly.

- Revise and simplify the client categorization/ prioritization tool to make it user friendly for the UHE-Ps.

- Institute/ expand community based quality improvement process.

- Assess current situations and develop models and guidelines for the UHE-Ps on how to provide UHE services in youth centers/ gatherings, schools and other homeless populations.

PROPOSED LONG-TERM INTERVENTIONS

- Finalize and share findings of the vulnerability assessment conducted by AAU to indicate areas for further studies on the determinant of urban health. AAU/SPH in collaboration with JSI/SEUHP will share the report to RHBs.

- Determine the health need of the urban citizens in terms of their vulnerability to and risk for certain diseases or injuries and prevalence / burden of those ailments by generating more evidence that can be used by policy makers.

- Redefine UHEP as needed based on evidence- based critical health need of the population to provide highly targeted services.

- Establish/ strengthen PPP for urban health program.

CHALLENGE II: THE HUMAN RESOURCE FUNCTIONS OF UHEP LACK CLARITY, STANDARDIZATION, AND LONG-TERM PLAN.

PROPOSED SHORT-TERM INTERVENTIONS

- Assess all possible motivational parameters and develop evidence based financial and non- financial motivation schemes and guidelines.

- Customize and cascade national HRH strategy and introduce clear career path, educational opportunities, and routine and regular in- service/ on-job training.

- Equip the health centers (HCs) with the required and need-based technical and managerial capacity to help them provide all necessary support to the UHE-Ps.

- Strengthen UHE-Ps' performance evaluation system.

- Accredit current UHE-Ps` qualification through COC. Facilitate all possible means for the UHE-Ps to help them pass the exam.

- Design and implement clear strategy, system, and process to facilitate recruitment of new UHE-ps. This could be through the training of new generic UHE-Ps or through transfer of level IV HEWs.

- Define code of practice for UHE-ps such as dressing code, standard bags and other related matters.

PROPOSED LONG-TERM INTERVENTIONS

- Standardize placement of the UHE-Ps: place them in a separate standard Health Post if placing them in the HC remains difficult (optional).

- Carry out work-load analysis for the UHE-Ps and advocate to the Government to match their salary with the workload.

- Establish UHE-Ps professional association and self- helping organizations.

- Advance UHEP through the Family Health Team (FHT) service delivery approach.

THEME II: URBAN PRIMARY HEALTH CARE REFORM

CHALLENGES

- Inadequate attention and support from sector health offices at different levels.

- Shortage of human resource and room structure at health centers to practice the family health team approach.

- Lack of transportation and communication services.

- Ownership problem / regions are not ready to own the PHCU reform.

- Absence of fee waiver and CBHI system for providing medication and complete health care services at community level.

- Absence of basic medical equipment and drug supplies for the FHT.

- Household categorization method needs simplification.

- Lack of coordination with the private sector is a major challenge to provide comprehensive services.

PROPOSED SHORT-TERM INTERVENTIONS

- Utilize the findings of the PHCU reform rapid appraisal and take corrective actions to strengthen the piloting of the PHCU reform.

- Mapping relevant stakeholders and communicate them to have contribution for PHCU reform implementation.

- Find interim solutions to fill the human resource gaps by transferring professionals from other health centers.

- Arrange transportation or provide transportation allowance for the FHT members.

- Advocating to regions to own the program.

- Assign appropriate person in RHBs and respective lower structures to provide support and monitor the progress of the PHCU reform.

- Incorporate the PHCU reform into woreda based plan.

- Design a mechanism to avail drugs and supplies to the FHT from the government system.

- Modify the existing client categorization/population segmentation approach to simplify the process.

PROPOSED LONG-TERM INTERVENTIONS

- Conduct a study to assess cost benefit of the PHCU reform.

- Revise health center staffing structure to enable them hire additional new health workers including social workers and mental health professionals.

- Expand health center rooms to accommodate specific OPDs needs of the family health team.

- Engage in continuous high level advocacy to ensure political attention and multi-sectoral collaboration.

- Facilitate the implementation of CHIS and community based health insurance in PHCU reform implementation areas.

- Allocate budget at HC level to run the PHCU reform process.

- Develop area specific, well customized and easily applicable HH categorization methods.

- Document lessons from each implementation site in all regions and further utilize experience from other relevant countries to customize and refine the current model for scale up.

- Prepare roadmap that outlines the engagement of the private sector.

THEME III: WATER, HYGIENE, AND SANITATION

CHALLENGES

- Poor coordination of urban water, sanitation and hygiene service providers.

- Poor urban sanitation and waste management services delivery that lacks the capacity to address the full chain of service delivery (from generation to final disposal).

- Poor involvement of the private sector and lack of PPP system on urban sanitation and waste management service delivery.

- Shortage of hygiene and environmental health professionals at all level puts pressure on the capacity of the health system.

- Lack of community engagement on urban sanitation and hygiene.

- Low recording and reporting of urban WASH data and poor utilization of existing data for planning and action.

- Low resource allocated for urban WASH service delivery.

- Urban environmental health and hygiene issues are getting less priority at all levels.

- Social mobilization of urban WASH lacks intensity and consistency.

PROPOSED SHORT-TERM INTERVENTIONS

- Organize workshop to establish/revitalize national urban environmental health and hygiene steering committee and technical working group as per the MoU and IUSHS implementation guideline.

- Print and distribute all documents; IUSHS, SAP, MoU, NEHS and IG and follow-up their utilization.

- Cascade the signing of MoU at regional and city/town level among key WASH sector offices as per the IUHSS.

- Develop detail annual environmental health and hygiene work.

- Organize national discussion workshop for national One Wash National Program (OWNP) steering committee members, and major donors of the program to work more on urban sanitation and waste management and to expand the services delivered to other big towns based on the lessons learned from small towns.

- Organize experience sharing visit for higher officials.

- Conduct awareness creation to community on sorting of solid waste at households level using different medias - Radio, TV, social media.

- Conduct assessments and develop sustainable fee collection system for solid waste collection services.

- Document and share the lesson to other regions on the river buffer zone development project being implemented in Addis Ababa to control river pollution.

- Document and share UNICEF's urban WASH towns implementation achievements so far for experience sharing and lesson learned.

- Document and share current public latrine construction and management models being implemented in A.A, Mekele and other towns.

- Document and share best practices on communal latrine construction and management arrangements.

- Conduct quick assessment on the existing conditions on the involvement and roles of the private sector on urban sanitation and waste management service delivery.

- Develop public private partnership models that can be applicable to different category of towns.

- Support the private sector to establish association that will work with the Technical Working Group.

- Assess the need of environmental health professionals and what level of certification/ deployment is necessary.

- Filling existing structure gaps by employing hygiene and environmental health professionals.

- Engage urban community on proper urban WASH service through UHEPs and HDAs.

- Build capacity of urban health extension professional on community mobilization approaches and provide regular supportive supervision for its implementation.

- Link WASH and waste management data collections system with CHIS – as per the strategic indicators indicated in IUSHS, SAP and provide training on data management, analysis interpretation, dissemination and utilization at all level.

- Allocating budget for urban WASH services.

- Begin having model cities for certain specialized urban WASH issues that can be used as learning hubs.

- Organize advocacy workshop for members of parliament to enhance knowledge about urban health and the upcoming challenges so as to support the sector.

PROPOSED LONG-TERM INTERVENTIONS

- Develop detail five years work plan to implement IUSHS – SAP and mobilize resource to implement the developed work plan.

- Conduct regular steering committee (SC) and TWG meetings as indicated in the MoU and follow its utilization.

- Organize regional and city/town level workshops to establish region and city/town, sub city/woreda and kebele level urban environmental health and hygiene steering committee and technical working groups with clear work plan.

- Develop and implement city/town level sanitation and hygiene investment plan and follow it is implementation.

- Organize regional level discussion workshops for the regional OWNP to work more on urban sanitation and waste management service delivery.

- Follow the implementation of the key lessons from experience sharing visits.

- Capacitate UHEPs to introduce and piloting HH level waste reduction at the source including segregation, reuse and recovery- 3Rs based on MOUDH standards through providing different color coded waste collecting bins linking it to those consumers who will buy and use the segregated waste for other purposes.

- Start solid waste on-site sorting at household level in selected pilot towns/kebeles.

- Expand basic sanitation and hygiene services particularly for those living in slum and peri-urban areas including people living following river side's (informal settlers) such as communal latrine construction, pit emptying, drainage system and solid waste management service delivery.

- Develop and implement sanitation and hygiene facilities technology options applicable for different localities including urban slums through sanitation marketing.

- Enforcing existing laws through applying the MOUDH standard and MOEFCC in producing and distribution of plastic bags produced below the standard through introducing alternative bags that can be biologically degradable.

- Ban production and distribution of plastic bags thinner than 0.03 MM as indicated in solid waste management proclamation number 513/99.

- Assessment study on different type of revenue collection mechanisms for solid waste to make similar and easy for waste collection service delivery payment at households level.

- Encourage private enterprise to engage in safe environmental and hygienic practices through the use of tax write offs or other benefits.

- Based on the assessment findings begin training of environmental health professionals in collaboration with academic institutions.

- Organize community advocacy workshops/mobilization/ at regional and city/town level by involving health Ambassadors and other prominent persons.

- Develop or customize urban sanitation and hygiene approaches that can address urban communities.

- Develop M&E system that helps to track urban sanitation and waste management indicators being implemented by different sector actors.

- Organize sanitation fund.

- Providing needs based training for leaders, especially for town mayors on urban health issues. This would include specifically leadership training and focused seminars on urban health topics.

CONCLUSION

In summary the national urban health conference was a very successful forum with regards to the topics discussed, participations, and action points identified. As the first of its kind lessons were gathered that will be used as inputs for the next conference that will be held in Harar. All responsible government and non-government bodies are advised to implement the agreed action points.

NATIONAL PHARMACEUTICALS PROCUREMENT LIST FOR TERTIARY HOSPITALS AND SPECIALITY CLINICS IN ETHIOPIA: REPORT OF DEVELOPMENT PROCESS AND FINAL RESULT

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ABSTRACT

BACKGROUND: For the past many years, the Government of Ethiopia has invested heavily in health system strengthening guided by its pro-poor policies and strategies resulting in significant gains in improving the health status of Ethiopians. Despite this, the country is still facing challenges in the pharmaceuticals supply management and medical equipment management at all levels of the health system. To address these multifaceted problems, the Ministry of Health has prepared comprehensive "Pharmaceuticals Procurement List (PPL)"; so that the problems can be addressed in step-by-step manner, but as quickly as possible. Therefore; this development process and final result report presents major findings and recommendations of developing national Pharmaceuticals Procurement list in Ethiopia.

METHODS: Establishing a technical team comprising of different expertise, designing a roadmap, organizing technical consultative meetings and various stakeholders were engaged to develop the national procurement list.

RESULT: For the first time in Ethiopia, essential medicines, medical and laboratory supplies and medical equipment for tertiary hospitals and specialty centers have been defined and integrated into one list with the recognition that all three are integral to the diagnosis and appropriate treatment of diseases. The national Pharmaceuticals Procurement List has been developed for tertiary hospitals level and made as comprehensive as possible. It also includes both Pharmaceutical Fund and Procurement Agency (PFSA) Pharmaceuticals Procurement List and Health insurance drug list. All in all, a total of 862 types of medicines (2,253 medicines types of dosage forms), 1,158 types of medical equipment items, 946 types of medical supplies and 947 types of laboratory reagents and chemicals have been listed.

CONCLUSION AND RECOMMENDATION: The list preparation exercise showed that it is essential to define key pharmaceuticals required at each level of care in order to maximize the utilization of available resources and to support health professionals provide standard health services. Therefore, it is recommended to discuss and work with Food, Medicine and Featlh Care Administration Control Authority (FMHACA) to expedite pharmaceuticals registration process for those products that are not yet registered by the Authority, to discuss and work with PFSA to revise the Agency's Pharmaceuticals Procurement List based on the newly developed list and also discuss with all stakeholders including the private sector and other organizations on possible ways how pharmaceuticals that are not included in PFSA PPL can be made available in a sustainable manner. The list will guide the quantification and procurement processes which will in turn improve the quality of the overall health care services.

INTRODUCTION

For the past many years, the Government of Ethiopia has invested heavily in health system strengthening guided by its pro-poor policies and strategies resulting in significant gains in improving the health status of Ethiopians (1). As a result, remarkable achievements have been gained including meeting many of the MDGs (2). Though good trends are observed, the country is still facing a triple burden of diseases consisting of communicable diseases, non-communicable diseases and injuries (3). This burden coupled with the ever increasing demand

for quality health care urges the Government to be increasingly focused on addressing equity in access to health care, quality in health services provision and in strengthening community engagement and ownership in health decision-making and management.

Another critical area that the government facing challenges is the pharmaceuticals supply management and medical equipment management at all levels of the health system.

Assessment made in 17 Federal and Addis Ababa City Government hospitals, which are supposed to give tertiary level of care, revealed that the availability of key medicines varies significantly among hospitals; the performance of both public and private importers in supplying medicines in response to hospital requests was 44.7%. The availability of key medicines at the dispensaries of these hospitals at the time of visit ranged from 33.3% to 100% (4). This shows the need to work hard to ensure the continuous availability of needed pharmaceuticals at these referral hospitals, including pharmaceuticals used for the management of non-communicable diseases (NCDs).

Procurement lead time for some pharmaceuticals and medical equipment's is still very long and medical equipment installation and maintenance issues are not yet properly addressed (1). In addition, there are significant numbers of medicines that are not registered by the regulatory authority of the country (5) and hence, according to anecdotal reports, this results in illegal medicines trafficking (contraband) and individual patients are forced to bring life-saving medicines from abroad.

To address these multifaceted problems, the Ministry of Health has devised a strategy so that the problems can be addressed in step-by-step manner but, as quickly as possible. One of these strategies is first to define the list of medicines, medical supplies and medical equipment for the tertiary and specialty level of care. Based on the list, a national pharmaceuticals procurement list will be developed which will guide FMHACA to increase the number of pharmaceuticals registered in the country so as to ensure that all required pharmaceuticals are made available through the legal channel with ensured safety and quality. The list will also be used to guide the Pharmaceuticals Fund and Supply Agency (PFSA) and other importers on what pharmaceuticals to focus.

Accordingly, PFSA will have a pre-defined list of pharmaceuticals to work on and to supply the nation in uninterrupted and sustainable manner for the selected pharmaceuticals. For the remaining pharmaceuticals, other alternative strategies will be devised including involving the private sector, other non-governmental and parastatal bodies in an organized and coordinated way so that the public demand for pharmaceuticals can be addressed comprehensively. At health facilities level too, the list can be used as a guide in the forecasting and quantification so that availability of required pharmaceuticals for the public is ensured. Therefore; this development process and final result report presents major findings and recommendations of developing national Pharmaceuticals Procurement list in Ethiopia.

GENERAL OBJECTIVE: The general objective of developing the national list of pharmaceuticals for tertiary level and specialty health care is to ensure that all needed pharmaceuticals are available in continuous and sustainable manner at those hospitals and specialty centers.

SPECIFIC OBJECTIVES: The specific objectives of developing the national list of pharmaceuticals are:

- To ensure that the necessary medicines, supplies including reagents and medical equipment's are available in tertiary hospitals and specialty centers in sustainable manner;

- To guide public & private suppliers on the actual need of such health facilities so that they focus their investment;

- To serve as a basis for the Ministry's and other stakeholders' efforts in forecasting and addressing the needs of the tertiary hospitals and specialty centers;

- To serve as a basis for the Ministry and other stakeholders in monitoring, evaluating and regulating the performances of the tertiary hospitals and specialty centers; and

- To document the list of medicines, medical supplies, medical equipment and their specifications by disease category for different age groups for tertiary level healthcare so that any revisions can be done whenever necessary.

METHODS: To develop the list, a technical team comprising of different expertise and led by Pharmaceuticals and Medical Equipment Directorate (PMED) of FMOH has been established. After many consultation works a technical team has designed a roadmap on how to achieve the final result. Following that, one day orientation and consultative meeting was held on the prepared roadmap and other medicine selection guiding principles with selected specialists, subspecialists, and other stakeholders. At the end of the discussion, the experts were agreed to come with drafted pharmaceuticals list relevant to their area of expertise and with an assistance from the central team in the process.

A second technical workshop was conducted among a wider experts and exhaustively worked on the draft list; thereby the first comprehensive draft list of medicines, medical equipment, laboratory reagents and supplies was produced for all disease categories. The product selection was mainly based on expert availability, diagnosis capacity, product efficacy and other technological parameters. After the workshop, the central technical team have reviewed the list in detail. Particularly, for categories which were not done at all or not done satisfactorily, the technical team members were assigned to work with health professionals from Black Lion Specialized Hospital, Yekatit 12 Hospital and St. Paul Millennium Medical College Hospital. After repeated visits to this health facilities & a discussion with the health professionals, a second version of the pharmaceuticals list was prepared for larger audience comments or for a validation workshop.

The final validation technical workshop was conducted and a total of 85 specialists, subspecialists, pharmacists, biomedical engineers, and laboratory technologists attended the workshop from 25 institutions which include tertiary level and University hospitals, FMOH, PFSA, FMHACA, Regional Health bureaus (RHB), Ethiopian Cardiac Center, Ethiopian Public Health Institute (EPHI) and partner organizations (CHAI & GHSC/PSM). The second draft list of pharmaceuticals was shared to each groups of different disease category so that the members could critically review each item and make amendments whenever necessary. Then they added other parameters such as description of items, quantities required per patient/ward/facility, etc. In addition, for medicines they indicated whether the specific item is a vital, essential or non-essential product for the specialty department.

Biomedical engineers & laboratory specialists established their own teams and worked with respective groups to assist them in identifying required medical equipment and laboratory reagents needed and to develop detailed specifications for each individual items based on the level of service delivery. Finally, the products from each disease category were aggregated into a summary product list.

RESULTS AND DISCUSSION: For the first time in Ethiopia, essential medicines, medical and laboratory supplies and medical equipment for tertiary hospitals and specialty centers have been defined and integrated into one list with the recognition that all three are integral to the diagnosis and appropriate treatment of diseases. Using the list to guide the quantification and procurement processes by disease condition will result in the right conditions being treated at the right level of use and will possibly improve the quality of the overall health care services.
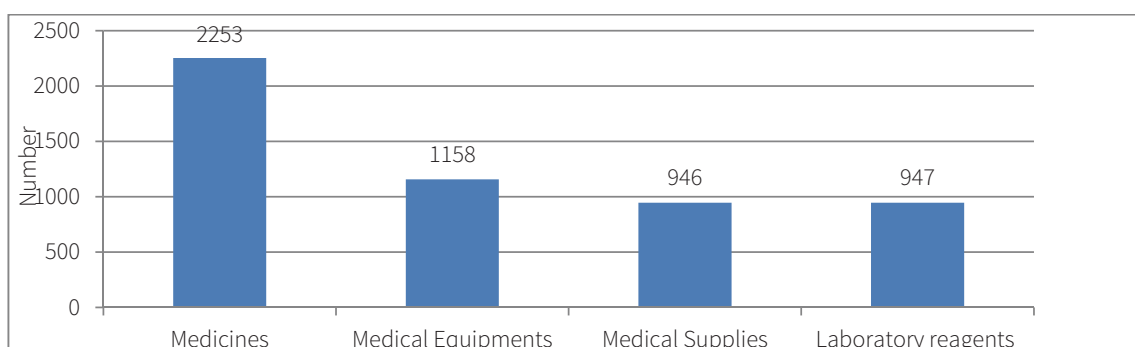

Figure 1: Number of list of Medicines, Medical Equipment's, Medical Supplies and Laboratory reagents and chemicals needed for specialized hospitals, July 2017, Ethiopia.

After the end of this all efforts, a total of 862 types of medicines with unique active ingredients or 2,253 medicines with different dosage forms, 1,158 types of medical equipment items, 946 types of medical supplies and 947 types of laboratory reagents and chemicals have been uniquely listed specialized hospital. The same list was also developed for each specialty department of the hospital too. The following figure shows number of medicines and medical equipment needed per each specialty department.
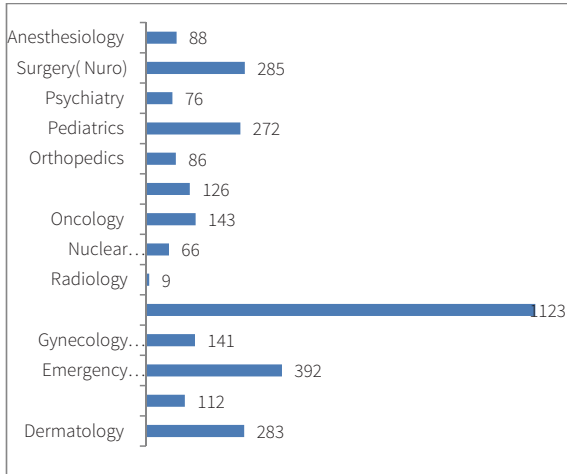
Figure II A: Number of medicines listed for each specialty departments of tertiary level hospital, July 2017
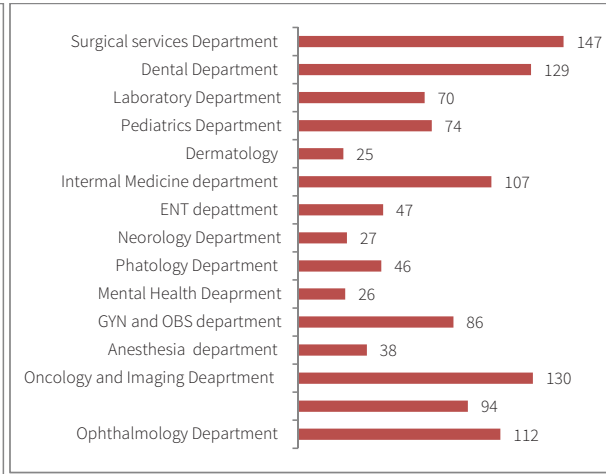
Figure II B: Number of Medical Equipment listed for each specialty department of tertiary level hospital, July 2017

The national Pharmaceuticals Procurement List is comprehensive which includes both PFSA Pharmaceuticals Procurement List and Health insurance medicine list. See figure below.6
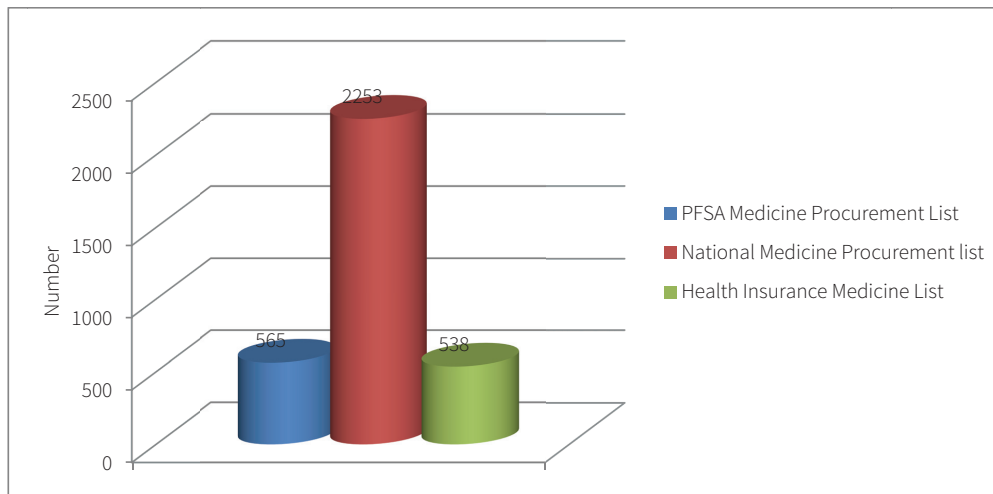
Figure III: Comparison of national medicine Procurement list, PFSA Medicine List, Health Insurance Medicine List, July 2017, Ethiopia

CONCLUSION AND RECOMMENDATION: Considering the fact that this is the first list of its kind for the country early revision of the list was recommended to be held annually or after two years. The final procurement list will guide the countries pharmaceutical supply activities and rational use of medicines. Most importantly it will enable continues supply of medicines; thereby improves quality health care provision for the greater community. All stakeholders (FMHACA, PFSA, the health institutions, and other private suppliers and partners) pharmaceutical related actives will be guided by this comprehensive list of document. Therefore, this document will improve public-private collaborative effort on healthcare provision activities. The following were some of the limitations and challenges of the list preparation exercise.

- Data unavailability on diseases morbidity and medicinal efficacies. HMIS disease classification is not exhaustive. Use of ICD 10 disease classification was recommended.

- The number of available specialists and sub-specialists in some areas is limited in order to get broader audience views.

- Some of the medical equipment list needs some refinement as details on the names and descriptions were not complete.

Major tasks ahead include, but not limited to:

- Endorsement of the list by the FMOH higher officials.

- Discussion and work with PFSA to agree on Agency's Pharmaceuticals Procurement List (PPL).

- Discussion and work with FMHACA to decide on how pharmaceuticals that are not yet registered by the Authority get a fast track registration access.

- Discuss with all stakeholders including the private sector and other organizations on possible ways how pharmaceuticals that are not included in PFSA PPL can be made available in a sustainable manner.

- Design monitoring and evaluation framework to assess the performance of the PFSA and "the alternative" supply system in implementation of the new supply model.

- Tertiary hospital treatment guideline development

ACKNOWLEDGMENT: We would like to express our sincere gratitude and special thanks to all participants and their respective health institutions who were involved in the process of procurement list preparation for their relentless efforts and commitment. Our special thanks go to the members of the technical team at Ministry of Health and partner organizations. Finally, we would like to thank GHSC-PSM and CHAI for generous financial, logistics and technical support for the success of this document.

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SECTION 4:
RESEARCH ARTICLES

EQUITY IN UTILIZATION OF SKILLED DELIVERY SERVICE: IS THE INTERVENTION REACHING THE POOREST AND UNEDUCATED MOTHERS IN ETHIOPIA?

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ABSTRACT

BACKGROUND: The fifth Millennium Development Goal (MDG) targeted at improving maternal health. In this regard, Ethiopia has shown substantial progresses in the past two decades. Nonetheless, these impressive gains are unevenly distributed among Ethiopian women with different socio-economic characteristics. This study aimed at investigating levels and trends of skilled delivery service, and wealth and education related inequalities from 2000 to 2016.

METHODS: Longitudinal data analysis was conducted on Ethiopian Demographic and Health Survey (EDHS) data of 2000, 2005, 2011 and 2016. The outcome variable was skilled delivery, while data on economic status and education level were used as dimensions of inequality. Rate Ratio (RR) and Rate Difference (RD) inequality measures were applied. STATA for windows version 10.1 statistical software was utilized for data analysis and presentation. The strength of association of inequality dimensions with the outcome variable was assessed using a 95% confidence interval.

RESULTS: From total deliveries, 5.62%, 6.3%, 10.8% and 28% of them were attended by skilled birth attendant in 2000, 2005, 2011 and 2016 respectively. In the most recent survey (EDHS 2016), proportion of births attended by skilled birth attendance among women who completed secondary and above education was about 5.42 [95% CI (4.53, 6.09)] times more when compared to women with no formal education. Proportion of births attended by skilled birth attendance among women in the richest quintile was about 5.11 [95% CI (3.98, 6.12)] times higher than that of women in the poorest quintile. Moreover, gap of inequality on receiving skilled delivery service has increased substantially from 24.2 (2000) to 53.8 (2016) percentage points between women in the richest and poorest quintiles; and from 44.9 (2000) to 76.0 (2016) percentage points between women who completed secondary and above education and women with no formal education.

CONCLUSIONS: Skilled birth attendance remained low and virtually unchanged during the period 2000–2011, but increased substantially in 2016. Gap on wealth and education related inequalities increased linearly during 2000–16. Most pronounced inequalities were observed in women's level of education revealing women with no formal education were the most underserved subgroups. Encouraging women in education and economic development programs should be strengthened as part of the effort to attain Universal Health Coverage (UHC) of Sustainable Development Goals (SDGs) in Ethiopia.

Keywords: Equity, Maternal health, Universal Health Coverage (UHC), Ethiopia

1. INTRODUCTION

The health status of many populations in developing countries has been substantially improved over the past two decades [1]. Despite the progress achieved so far, Millennium Development Goals (MDGs) particularly the goal of reducing maternal and newborn mortality remains underachieved in many sub-Saharan African countries [2]. Equitable maternal and child health services to improve the health of the women and children across their life course are one of the key priorities of Universal Health Coverage (UHC) [3]. Addressing health service inequalities such as the inequalities between the rich and the poor within one country pose a challenge to policy makers [4].

Inequalities in maternal health have been widely acknowledged, both across countries [5–7] and within countries [8]. The proportion of births delivered by skilled birth attendant has been identified as the maternal health intervention indicator with the most pronounced economic-related inequality [8].

On this subject, over the past decades, Ethiopia has made great efforts to strengthen its health system and improve the health of women. Ethiopia is one of the few African countries that has reached its target in improving maternal health and reducing child mortality [9]. Despite these encouraging achievements, key child and maternal health services were struck with unfair distribution of maternal health service within and across regions, and across population subgroups based on variety of socio-economic variables [10] such as, between richest versus poorest and most educated versus less educated.

Ethiopia has made substantial progress in improving the health of the population by achieving most of the health-related MDGs [7]. Despite rapid and double digit economic growth over the past two decades, Ethiopia remains one of the poorest countries in the world [12] with 22% of the people living below the income poverty line [13]. Ethiopia is considered as an example for low-income countries to attain MDGs with limited resource coupled with a sustained political will and commitment to provide innovative policies, strategies and programs [14]. However, analyzing improvements through an equity lens reveals that the rapid economic growth has not been enjoyed fairly across the different segments of the population. In addition, the impressive gains in health sector in recent years are unevenly distributed, and aggregated indicators hide striking inequalities across the population subgroups.

For this reason, the Ethiopian Federal Ministry of Health has designed a new plan, the Health Sector Transformation Plan (HSTP) 2015/16–2019/20, to improve health by addressing inequalities [15]. Inequalities in the main socio-economic stratifiers such as poorest versus richest and less educated versus most educated are major contributors to the overall inequalities in the country. The pervasive inequity among its population, particularly between the poorest and the richest, remains the major health sector challenge.

In the perspective of achieving UHC in a country as diverse as Ethiopia, having large social inequalities combined with fast economic growth, it is clear that inequalities must be measured and trends need to be understood. With policy-makers who are increasingly looking at quantitative evidence to make evidence based decision-making to address health inequalities, monitoring equity and measuring the level of health service inequality is of paramount importance.

2. OBJECTIVE

The purpose of this study is to examine level and trend of skilled delivery service coverage, and wealth and education related inequalities associated with receiving the service in Ethiopia during 2000–2016.

3. METHODOLOGY

Longitudinal data analysis was conducted on Ethiopian Demographic and Health Survey (EDHS) data of 2000, 2005, 2011 and 2016. The study was conducted in Ethiopia from August to December 2016. The data for this study were retrieved from EDHS data of 200–16. The datasets were main sources to describe key health indicators measuring level of morbidity, mortality and socio-economic progress. Thus, data on skilled delivery with relevant socio-economic characteristics were extracted for this study.

The Demographic and Health Survey (DHS) program provides household-level data on health, healthcare utilization and ownership of assets for about 60 low and middle income countries in three subsequent periods. The data are based on nationally representative surveys. In most countries a sample of 5000–10,000 women aged 15–49 years are interviewed to collect data about key health and socioeconomic indicators [16]. The sample was selected using a stratified, two-stage cluster design and Enumeration Areas (EAs) were the sampling units for the first stage. In the most recent survey (EDHS 2016), sample included 624 EAs, 187 in urban areas and 437 in rural areas. A representative sample of 17, 067 households were selected for the 2016 EDHS [17].

Inequality data and statistics give us an important insight into the state of national economy and the health status of a certain society [18]. To this end, selection of appropriate stratifiers is essential to assess level of inequality from different dimensions [18]. Thus, data on economic status and educational level were used to categorize populations according to dimensions of inequality. These two dimensions of inequality represent common sources of inequality and can be widely applied to populations in low and middle income countries [18]. Economic status is described in terms of a household wealth index which accounts for ownership of certain

household items and access to specific services. On the basis of wealth index, women are categorized into five subgroups; poorest, poorer, medium, richer and richest [16]. Education as a dimension of inequality reflects the highest level of education attained by a mother. Three levels are specified; no education, primary and secondary and above subgroups [18].

Simplest inequality measures: absolute inequalities, using Rate Difference (RD) and Relative inequalities, using Rate Ratio (RR) were applied in this study. Relative Concentration Index (RCI) was also utilized to assess level of inequality across subgroups. STATA for windows version 10.1 statistical software was utilized for data analysis and presentation. The strength of association of inequality dimensions with the outcome variable was assessed using a 95% confidence interval [19]. The results were presented using tables and graphs.

4. RESULTS

SOCIOECONOMIC AND DEMOGRAPHIC CHARACTERISTICS OF THE STUDY POPULATION

In EDHS 2016, a total of 16,515 women in a reproductive age group were included in the study. Out of them, 12, 849 (77.8%) were rural residents. Almost half (47.8%) of the women never attended formal education, while only 2841 (17.2%) completed secondary and above education. The mean age of the women was 27.7 (SD ±9.2), 58.1% of were below the age of 30, reflecting the young age structure of the population. The mean family size of the study population was 5.7 (SD ± 2.68) persons (Table 1).

Table 1 Socio-economic and demographic characteristics of the mothers in Ethiopia in 2016 (n = 16, 515)

Characteristics	Frequency	Percentage
Place of residence		
Urban	3666	22.2
Rural	12849	77.8
Highest education level		
No education	7894	47.8
Primary	5780	35.0
Secondary	1916	11.6
More than secondary	925	5.60
Wealth status		
Poor	5797	35.1
Medium	3154	19.1
Rich	7564	45.8
Religion of the mother		
Orthodox	6986	42.3
Catholic	182	1.1
Protestant	2940	17.8
Muslim	6177	37.4
Others+	231	1.40
Source of water for drinking		
Improved*	4905	29.7
Unimproved	11610	70.3
Toilet facility		
No facility	5334	32.3
Improved**	1040	6.3
Unimproved	8736	52.9

+Traditional belief

*Piped water into dwelling, Piped water to yard/plot, Public tap or standpipe, Tube-well or borehole, Protected dug well, protected spring, Rainwater

**Flush toilet, Piped sewer system, Septic tank, Flush/pour flush to pit latrine, Ventilated improved pit latrine, Pit latrine with slab, Composting toilet

Only 9.9% of the women gave birth at health facilities for the last 5 years preceding the survey. Six thousand five hundred fifty three percent Six thousand five hundred fifty three percent (39.7%) of the women never gave birth during their life course while 5236 (31.7%) of them had at least one child. Majority of the women (83.7%) never received a family planning service for the last12 months preceding the survey and only 5789 (35%) visited a health facility for same period. More than half of the women (62.4%) did not have any kind of occupation.

TREND AND LEVEL OF INEQUALITY

In the most recent survey (EDHS 2016), skilled delivery service coverage was 28.0%; 13.1% among poorest women subgroup and 66.9% among richest women subgroup (Fig. 1). This implies that proportion of births attended by skilled birth attendant among women in the richest subgroup was about 5.11 [95% CI (4.53, 6.09)] times higher as compared to their poorest counterparts (Table 2). Level of inequality is more pronounced as the concentration curve (Fig. 2) curved downwards with a Relative Concentration Index (RCI) of 0.57 (57%), with women in the richest subgroup accounting for a disproportionately larger fraction of skilled delivery services.
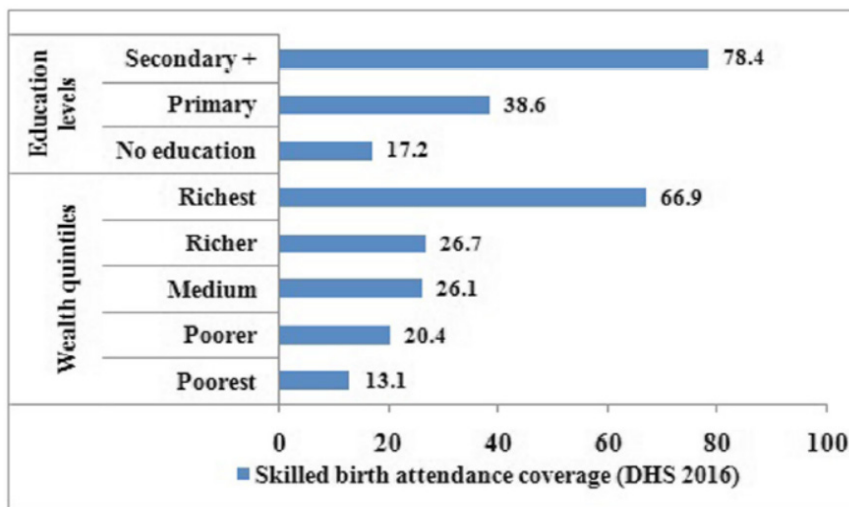
Figure 1 Skilled delivery service dis-aggregated by education and wealth quintile in Ethiopia in 2016

Proportion of births attended by skilled birth personnel also varied significantly across education levels; lowest among women with no formal education (17.2%) and highest among women who completed secondary and above education (78.4%). This implies a 61.2 [95% CI (56.11, 68.08)] percentage point difference (Fig. 3); indicating women who completed secondary and above education received skilled delivery service about 5.42 [95% CI (3.98, 6.12)] times higher as compared to women with no formal education (Table 2).

Table 2 Skilled delivery inequality by education and wealth characteristics of mothers in Ethiopia in 2016

EDHS	Inequality dimensions	RD (in percentage points)	SE	95% CI	
2000	Richest vs. poorest	24.23	2.44	19.45	29.01
	Secondary and above vs. no education	44.89	4.94	35.20	54.59
2005	Richest vs. poorest	27.84	2.74	22.47	33.21
	Secondary and above vs. no education	55.37	3.95	47.63	63.11
2011	Richest vs. poorest	47.52	3.45	40.75	54.28
	Secondary and above vs. no education	69.09	4.64	60.00	78.18
2016	Richest vs. poorest	53.81	4.58	47.36	57.19
	Secondary and above vs. no education	51.54	4.76	44.65	55.48

CI Confidence Interval, EDHS Ethiopian Demographic and Health Survey, RD Relative Difference, SE Standard Error

Proportion of births attended by skilled health personnel remained low and stagnant between 2000 and 11, but showed an exponential increment in 2016 (Fig. 3). Though, the increment was not distributed fairly to women with different socio-economic characteristics such as between richest versus poorest and most educated versus not educated subgroups.

Fig. 2 Distribution of the concentration curve disaggregated by economic status in Ethiopia (EDHS 2016)
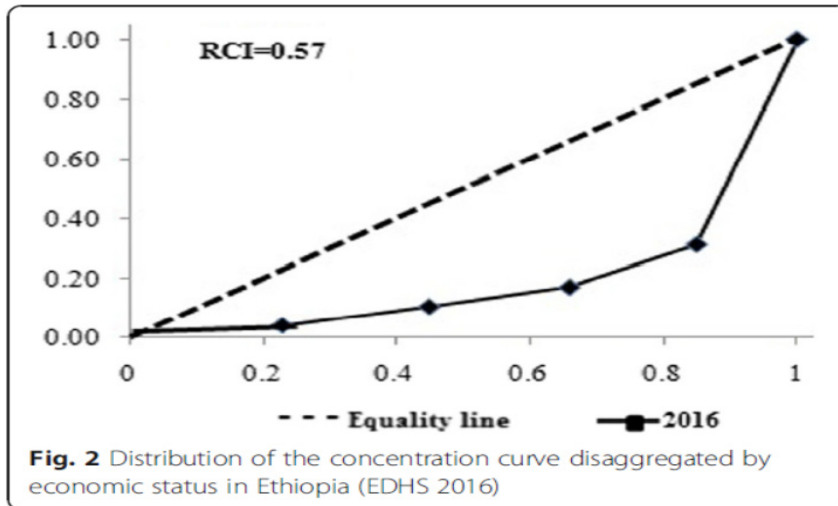
When disaggregated by economic status, proportion of births attended by skilled health personnel never exceeded five percentage points among women in poorest and poorer subgroups except in 2016. In general, proportion of births attended by skilled health personnel increased by 12.0 percentage points among women in the poorest quintile (from 1.1% in 2000 to 13.1% in 2016) and 18.1% percentage points among women in the poorer quintile (from 1.3% in 2000 to 20.4% in 2016). On the contrary, proportion of births attended by skilled health personnel increased by 23.5 percentage points among women in the richer quintile (from 3.2% in 2000 to 26.7% in 2016) and 41.6% percentage points among women in the richest quintile (from 25.3% in 2000 to 66.9% in 2016). The data also revealed considerable differences in proportion of births attended by skilled health personnel among women with no formal education (increased from 2.3% in 2000 to 17.2% in 2016) and women who completed secondary and above education (increased from 45.0% in 2000 to 78.4% in 2016) (Fig. 3).

Fig. 3 Trends of inequality in skilled delivery service disaggregated by economic status and education in Ethiopia (EDHS 2000–16)
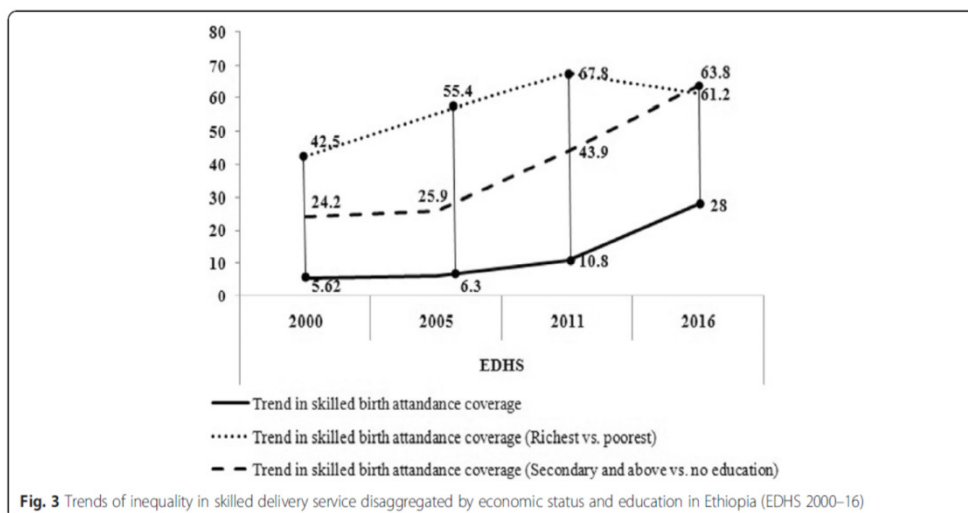
Economic and education related inequalities on receiving skilled delivery service got worsened across the periods. The findings indicate substantially large and consistent inequalities among women in the poorest and richest quintiles (RD: 24.2, 25.9, 43.9 and 63.8 percentage points during 2000, 2005, 2011 and 2016 respectively) (Fig. 3). Similarly, across education subgroups, large and linearly increasing gaps were observed (Fig. 3) among women with no formal education and women who completed secondary and above education (RD: 42.5, 55.4, 67.8 and 61.2 percentage points during 2000, 2005, 2011 and 2016 respectively).

5. DISCUSSION

The present study aimed to examine levels and trends of proportion of births attended by skilled health personnel, and assess economic and education related inequalities using data from a nationally representative survey. It demonstrated how skilled delivery service and socio-economic related inequalities has arisen between 2000 and 16 and revealed which women subgroups are the most underserved.

Findings of the study revealed that proportion of births attended by skilled health personnel was found to be very low in Ethiopia. Other similar studies from Ethiopia [20, 21] also reported that skilled delivery coverage was low, even as compared to Tanzania and other sub-Saharan African countries [22-24]; 5.62% in 2000, 6.3% in 2005, 10.8% in 2011, and 28% in 2016. The demonstrated increment might be attributed by the Health Extension Program (HEP) [25]. The program delivers healthcare services both at the health post and in the community, with strong focus on sustained preventive health actions and increased health awareness [26]. The health extension workers are expected to provide post abortion care, family planning, antenatal care (ANC), clean delivery attendance and postnatal care. Furthermore, they are responsible for referring women with obstetric complications to health centers and hospitals where basic and comprehensive emergency obstetric care is available. However, other studies [27-28] have shown the in-competencies of HEWs for managing labor and complications and their incapable role in supporting births [29-31].

The observed findings of the study underscored statistically significant levels of socio-economic inequalities in proportion of births attended by skilled health personnel; most importantly, proportion of births attended by skilled health personnel was observed to be affected by wealth and education characteristics of women.

The association of education and receipt of skilled delivery was consistent. Women who completed secondary and above education were more likely to deliver with assistance of skilled birth attendant when compared to women with no formal education. This result of the current study is also in line with evidences from Ethiopia [20, 31-37] as well as from other sub-Saharan African countries [20, 24, 37-39]. The effect of education on skilled birth attendance can be explained in a range of ways such as either improving income to spend on healthcare or improving attitude and knowledge towards better healthcare service delivery [42]. Education improves women income and ability to afford the cost of healthcare [43, 44]. Better educated women are also considered to have improved knowledge, attitude and practice of skilled maternity services and benefited in using such services [45-47].

Similarly, our findings also give credence that proportion of births attended by skilled health personnel increased with rising economic status. The findings revealed that women in the poorest quintile typically experienced lower levels of skilled delivery service as compared to their richest counterparts. This is in agreement with findings from previous studies from Ethiopia [48] and other parts of the world [49, 50]. This may be due to the reason that even though skilled delivery services are provided freely in Ethiopia, there may be directly and indirectly associated costs that women in the richest quintile can afford [51]. In broad terms, financial capability of the family and costs of a facility delivery including transportation costs may not be afforded by women among poorest quintile. While directly affecting whether a woman can actually reach a facility for delivery (second delay), the anticipation of high costs will affect whether a decision for a facility delivery is made in the first place (first delay) [40].

Overall, the coverage gap among richest vs. poorest women is the greatest unfairness [52] and, confronts with defined goal of UHC "to ensure that all peoples obtain the health services they need without suffering financial hardship when paying for them" [53, 54].

Results from trend analysis verified that the gap in equity in skilled delivery service has worsened and increased linearly across economic status and education levels. Thus, richest and women who completed secondary and above education are the better off subgroups in receiving skilled delivery service. The observed findings from the inequality analysis are in conformity with what is obtainable in previous studies [55-60]. Overall, the evidence we found suggested that towards universal health coverage for skilled delivery services in Ethiopia is still a long way to go as majority of poorest and uneducated women do not make use of the available skilled delivery services.

6. LIMITATIONS OF THE STUDY

Authors did not apply statistic tests on performing time trend analysis since number of years considered were few. This study employed secondary data which was primarily collected for DHS objectives. Because of this, we were not able to report on information about other relevant variables such as type of labor (cesarean or natural). Findings of the study did not include variables routinely collected through Health Management Information System (HMIS) reports.

7. CONCLUSIONS

Skilled delivery service remained low and has shown small increment in Ethiopia during 2000–2011, but showed substantial increment in 2016. Gap on wealth and education related inequalities increased linearly during 2000–16. Most pronounced inequalities were seen by women level of education revealing women with no formal education were the most underserved subgroups. Encouraging mother's education and economic development programs geared at improving incomes of women should be strengthened. Further studies should be conducted to assess determinants of skilled delivery service and their relative contribution over socioeconomic related inequalities as Ethiopia is looking forward in achieving UHC of Sustainable Development Goals (SDGs).

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MEASURING EFFICIENCY OF PUBLIC HEALTH CENTERS IN ETHIOPIA

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INTRODUCTION

Ethiopia's health sector over the last 20 years has seen unprecedented expansion particularly at the primary health care (PHC) level. The development of the health sector was made possible by strong political commitment, a substantial increase in external support, and rapid economic growth (1). Plans for continued investments in PHC include improvements in efficiency of resource use as it moves into a new transformational phase starting with the Health Sector Transformation Plan (HSTP). Over the next five years (2015/16-2019/20) Ethiopia plans to achieve universal health coverage (UHC) by expanding PHC coverage to everyone through improved access to quality basic curative and preventative health care services and strengthening implementation of the nutrition program (2,3).

Significant resources are needed to achieve all of the health targets laid out in the HSTP and second Growth and Transformation Plan (2015/16-2019/20) (GTP II). A funding gap of 4.37 billion birr or 28% of the resources required was determined based on estimates of resources needed to achieve the health targets set out in HSTP and GTP II and resources available over the next 5 years. Efficiencies in the health sector potentially free up even more resources to be used on the provision of quality health care, and one of the five ways to generate fiscal space for health (4).

An estimated 20% to 40% of health spending is wasted due to inefficient use according to the World Health Report (2010) (5); a reduction in such inefficiencies could help to reduce the funding gap.

Improved resource efficiency continues to be emphasized in Ethiopia's National Health Financing Strategy (2015-2035), and delivering health care that maximizes resource use and avoids waste is one of the dimensions of quality highlighted in HSTP's strategic theme around "Excellence in quality improvement and assurance"(3).

This note highlights some of the findings from a preliminary efficiency analysis for primary health centers. It provides initial evidence for the Federal Ministry of Health (FMOH) to assess the degree that some primary care facilities have inefficiencies of resource allocation and use compared to others.

This note highlights some of the findings from a preliminary efficiency analysis for primary health centers. It provides initial evidence for the Federal Ministry of Health (FMOH) to assess the degree that some public health center facilities are less "efficient" compared to others and showcasing possible factors for the findings. It determines which health centers are relatively inefficient compared to others, areas where the inefficient health centers could become more efficient by maximizing resource use through either reduction of inputs given the level of output or increase output given the levels of inputs, and future analytical work to guide more efficient resource allocation and use that ultimately frees up more resources to provide quality essential health care.

METHODS

Data was used from the primary health care cost study for Ethiopian fiscal year (EFY) 2006 conducted by the Harvard T.H. Chan School of Public Health, Breakthrough International Consultancy, and FMOH (6). A total of 40 health centers were included in the analysis, and were sampled from 2 city administrations (Addis Ababa and Dire Dawa), 2 major regions (Amhara and Oromia), and 1 developing regional state (Benishangul-Gumuz). Health center departments or cost centers are inpatient department (IPD), outpatient department (OPD), maternal and child health (MCH) department, and delivery department. Different patient visits were scaled to comparable outpatient visits, by using cost per patient by department as weights, capturing use of facility inputs to produce an inpatient discharge, MCH visit, or delivery.

For this study we have used the concept of cost efficiency as our definition of efficiency. This is an attribute of performance that is measured by examining the relationship between a specific product of the health care system (also called an output) and the financial value of the resources used to create that product (also called inputs). Based on this definition, a health center would be efficient by minimizing inputs used to produce a given output or maximize output for a given set of inputs. Therefore, Cost efficiency is examined in two ways:

## I.   EFFICIENCY IN RESOURCE ALLOCATION

Efficiency in resource allocation examines differences across health facilities between total expenditure and total output. These variations, subject to certain assumptions, are first level evidence of the extent of (in)efficiency.

II.   INPUT EFFICIENCY

We explore input efficiency for primary hospitals by relating human resource levels in facilities to measures of output to provide estimates of human resource productivity and technical efficiency. Human resource productivity is assessed by measuring the relationship between clinical staff and health center outputs along with the range and composition of output production for clinical staff. Technical efficiency, consisting of pure technical efficiency and scale efficiency, is measured by using a non-parametric analytical technique known as Data Envelopment Analysis (DEA).

FINDINGS

Ethiopia's PHC system consists of three levels of facilities – health posts, health centers, and primary hospitals, which comprise the primary health care unit (PHCU). This analysis is focused on health centers. A close relationship exists between health center spending and output, especially among urban health centers. This is indicated by the health centers in the study being closely fitted to the black line[1] in Fig. 1. We expect as patient volume (output) increases, the cost per patient would decrease, indicating economies of scale for health centers. A slight decrease in cost per patient for both rural and urban health centers as outpatient equivalent visits increases, demonstrates a subtle economy of scale (Fig. 2).
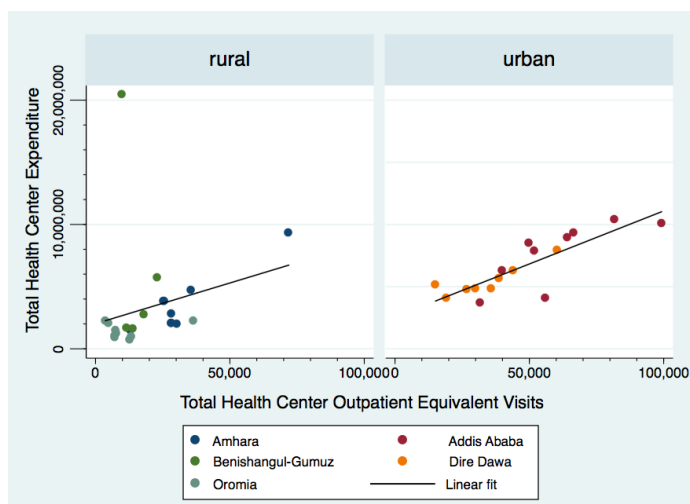
Equity is one of the core goals for the HSTP (2015/16-2019/20). This includes, but not limited to, reducing barriers to health care access in terms of lack of income to pay for health services, inconvenient working hours of health facilities, and physical access; most of which are demand-side equity issues (3). Equity improvements could also be made on the supply-side with more equitable resource allocation for health care providers. A relatively crude estimate of equitable resource allocation showed that urban health centers are spending more per person (184 birr) compared to rural health centers (88 birr).

Fig. 1 Total health center expenditure in birr by Outpatient equivalent visits

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[1]The solid black line tracks the average performance at each level of expenditure and output within the sampled health centers.

The provision of certain health services might be more cost effective among health centers compared to primary hospitals delivering the same service. For example, MCH department is about 150 birr less at health centers compared to primary hospitals (6). This accounts for an average of 42% of services provided at this point of care.

The average number of outpatient equivalent visits per clinical staff per day is 3.7, this is good as compared to Kenya with an average 7 outpatient equivalent visits per medical staff per day and Ghana with 4 outpatient equivalent visits per medical staff per day in 2011 (9, 10). This, along with the high average number of clinical staff of 26 compared to the minimum requirement of 12, points to an overstaffing problem relative to output. In general despite, global reports claiming significant health workforce shortages when assessing density of key clinical staff, especially among Sub-Saharan African countries (7, 8). Output production of skilled professionals remains extremely low for Ethiopia.

Fig. 2 Health center expenditure per outpatient equivalents in birr by total outpatient equivalent visits
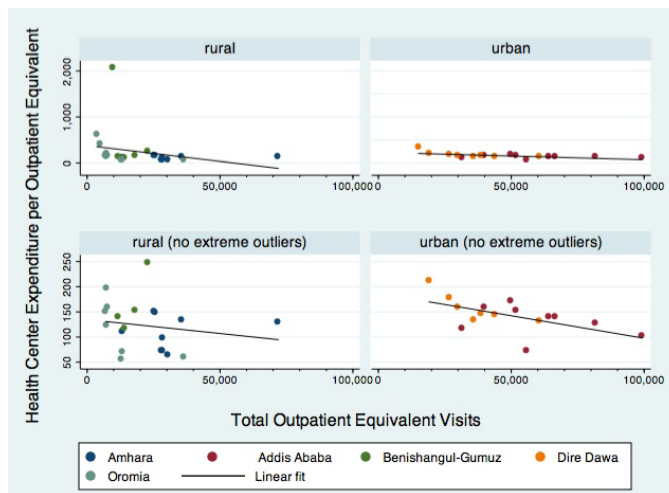
Data envelopment analysis (DEA) was used to estimate technical efficiency scores (pure technical efficiency and scale efficiency) for the 40 health centers. Efficiency scores ranged from 0 (completely inefficient) to 100% (efficient). Fourteen out of 40 (35%) health centers were technically efficient, while the remaining 26 (65%) were technically inefficient for Ethiopian fiscal year (EFY) 2006. The average pure technical efficiency score among the inefficient health centers is 79%, implying that on average, the inefficient health centers could reduce their inputs by 21% without reducing outputs. Only 10 health centers were scale efficient. The average scale efficiency score among the inefficient health centers was 82%, indicating a potential increase in total outputs by 18% within the existing health center capacity and size. An increase in outputs would reduce unit costs of service provision at health centers however this depends on the demand for health care services, which relies more on individual preferences to care, perceptions of quality, and accessibility – factors not necessarily within the control of a health provider.55.7 million birrs (26% of total annual expenditure among studies health centers) would be the input cost savings if the 26 inefficient health centers became as efficient as the pure technically efficient health centers in the study, given current output levels. This breaks down to an input savings 328 medical and 446 non-medical staff or 23.56 million birr in human resource expenditures, 21.67 million birr for drugs and supplies and 10.5 million birr for indirect expenditures.

CONCLUSION

This analysis for health centers demonstrates some potential areas where improvements in resource allocation and use could lead to more efficient health service provision. Focusing on expanding some departments among health centers, along with encouraging patients to utilize lower level of primary care services, may lead to more optimal level of resource use. However, additional evidence on the most cost-effective health providers for certain primary care services in needed.

Equity continues to be a core goal for Ethiopia's health system development as a means to support the achievement of UHC. Among the sampled health centers, we found an inequitable distribution in spending, with higher per capita spending among health centers located in urban areas compared to those in more rural areas. Such inequity might be brought on by differences in revenue sources, such as donors, direct government budget support, or more retained revenue (with the higher demand for urban services) from user fees.

A substantial amount of input savings was estimated if inefficient health centers became as efficient as the most efficient health centers in the sample. Demand for quality health services is expected to grow with increase in access. Perhaps reducing inputs given the level of output is not the best approach for the FMOH. It would be beneficial to continue adopting demand generation activities such as behavior change communication to increase outputs for health centers as there is substantial capacity to absorb an increase in patient load based

on health center size in terms of structure and human resource ability to see more patients per day.

Limitations: One must be very cautious in drawing too many strong conclusions from this analysis because this current analysis does not show why potential inefficiencies (or efficiencies) are occurring among the sampled health centers, and whether these are influencing factors nationwide. Solutions to the inefficiencies highlighted in this paper for health centers are still not clear, more analytical work is needed.

Producing further evidence that attempts to answer these and other questions around efficiency of primary care providers would provide the FMOH with the complete picture of cost efficiency and ways to improve it for a more efficient and equitable primary care system. Such work includes incorporating primary hospitals into analysis once data is available and conducting site visits to health facilities that were found to be least and most efficient to understand factors influencing findings.

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BUILDING A WEB-BASED DECISION SUPPORT SYSTEM (DSS) TO PREDICT UNDER-FIVE CHILD MORTALITY IN A DEVELOPING COUNTRY: APPLICATION OF DATA MINING TECHNOLOGY

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ABSTRACT

Background: Improving child health and reducing child mortality rate are key health priorities in developing countries. This study aimed to identify determinant sand develop, a web-based child mortality prediction model in Ethiopian local language using classification data mining algorithm.

Methods: Decision tree (using J48 algorithm) and rule induction (using PART algorithm) techniques were applied on 11,654 records of Ethiopian demographic and health survey data. Waikato Environment for Knowledge Analysis (WEKA) for windows version 3.6.8 was used to develop optimal models. 8157 (70%) records were randomly allocated to training group for model building while; the remaining 3496 (30%) records were allocated as the test group for model validation. The validation of the model was assessed using accuracy, sensitivity, specificity and area under Receiver Operating Characteristics (ROC) curve. Using Statistical Package for Social Sciences (SPSS) version 20.0; logistic regressions and Odds Ratio (OR) with 95% Confidence Interval (CI) was used to identify determinants of child mortality.

Results: The child mortality rate was 72 deaths per 10 0 0 live births. Breast-feeding (AOR = 1.46, (95% CI [1.22. 1.75]), maternal education (AOR = 1.40, 95% CI [1.11, 1.81]), family planning (AOR = 1.21, [1.08, 1.43]), preceding birth interval (AOR = 4.90, [2.94, 8.15]), presence of diarrhea (AOR = 1.54, 95% CI [1.32, 1.66]), father's education (AOR = 1.4, 95% CI [1.04, 1.78]), low birth weight (AOR = 1.2, 95% CI [0.98, 1.51]) and, age of the mother at first birth (AOR = 1.42, [1.01–1.89]) were found to be determinants for child mortality. The J48 model had better performance, accuracy (94.3%), sensitivity (93.8%), specificity (94.3%), Positive Predictive Value (PPV) (92.2%), Negative Predictive Value (NPV) (94.5%) and, the area under ROC (94.8%). Subsequent to developing an optimal prediction model, we relied on this model to develop a web-based application system for child mortality prediction. **Conclusion:** In this study, nearly accurate results were obtained by employing decision tree and rule induction techniques. Determinants are identified and a web-based child mortality prediction model in Ethiopian local language is developed. Thus, the result obtained could support child health intervention programs in Ethiopia where trained human resource for health is limited. Advanced classification algorithms need to be tested to come up with optimal models.

Keywords: Child mortality, Data mining, Ethiopia

1 INTRODUCTION

Child mortality is a core indicator for child health and well- being. In 2000, world leaders agreed on the Millennium Development Goals (MDGs) and called for reducing the Child mortality rate by two thirds between 1990 and 2015. This particular goal is known as the MDG 4 [1]. It refers to the death of infants and children under the age of five or between the ages of one month to four years. The global Child mortality rate dropped 53(50, 55) %, from 91 (89, 92) deaths per 1000 live births in 1990 to 43 (41, 46) in 2015. Over the same period, the annual number of under-five deaths dropped from 12.7 million to 5.9 million [1]. The world as a whole has achieved an accelerating progress in reducing the child mortality rate. Promisingly, sub-Saharan Africa, the region with the highest child mortality rate in the world, has also registered a substantive reduction. Its annual rate of reduction increased from 1.6% in 1990s to 4.1% in 2000 – 2015. This remarkable decline in child mortality since 2000 has saved the lives of 48 million children [1].

Results from the Ethiopian Demographic and Health Survey (DHS) data of 2011 show childhood mortality has declined significantly. Child mortality rate has declined by 47% from 166 deaths per 1000 live births to 88 deaths per 1000 live births [2]. The Ethiopian Demographic and Health Survey (EDHS) collect and ac- cumulate a wide variety of data. There is an urgent need for a new generation of computational techniques and tools to assist health professionals in extracting useful information and knowledge from this big datasets [3].

Big data analytics is an emerging discipline that analyzes large volumes of data [4]. Data mining mainly focuses on finding meaningful information from huge dataset [5]. The algorithms of data mining are one of the methodologies of the big data analytics. These algorithms help solve questions that the traditional statistical tools fail to answer. Data mining is growing in various applications widely like analysis of organic compounds, medicals diagnosis, product design, targeted marketing, credit card fraud detection, financial forecasting, automatic abstraction, predicting shares of television audiences [6]. It uncovers previously unknown pat- terns from the big datasets and then uses the information to build predictive models [7]. Data mining techniques extract implicit in- formation and knowledge which are potentially useful and un- known in advance. This extraction is from the mass, incomplete, noisy, fuzzy and random data to build predictive models [8].

While highly trained and skilled physicians are very scarce in low and middle-income countries, equipping health professionals and health facilities that had inadequate resources with decision support systems for investigating likelihood of child mortality is fundamental for reducing child mortality and improve child health in Ethiopia. Therefore, this study aimed to identify determinants and build a web-based prediction model for child mortality in Ethiopia by applying data mining techniques and algorithms.

2. METHODOLOGY

The study was conducted in Ethiopia. Decision tree analysis for data mining was applied on EDHS data of 2011. The study was con- ducted from December 2015 to June 2016. EDHS 2011 dataset was utilized. Thus, relevant environmental, socio- economic and health characteristic data were extracted from the dataset [9].

A total of 11,654 records that met inclusion criteria were retrieved. Data was extracted from EDHS 2011 children's dataset. Extracted data were cleaned, coded, transformed and entered into Waikato Environment for Knowledge Analysis (WEKA) 3.6.4 soft- ware. The extracted dataset was stratified into "Alive" and "Dead" groups. The "Alive" group comprised mothers whose child was alive during the survey. Classification data mining task was performed. Classification analysis is the organization of data in given classes. Also known as supervised classification, the classification uses given class labels to order the objects in the data collection where all objects are already associated with known class labels. The classification algorithm learns from the training set and builds a model. The model is used to classify new objects [6].

In this study, two classifiers, J48 and Pruning Rule Based Classification Tree (PART) classification algorithms were deployed for prediction model building. J48 classifier is a simple C4.5 decision tree for classification. It creates a binary tree. The decision tree approach is most useful in classification problem. With this technique, a tree is constructed to model the classification process. Once the tree is built, it is applied to each tuple in the database and results in classification for that tuple [10, 11].

Using Statistical Package for Social Sciences (SPSS) version 20.0, binary and multivariable logistic regressions was used to assess the association of various determinants of child mortality. In a multi- variable logistic regression analysis all variables that were found significant at a p -value of 0.25 and 95% Confidence Interval (CI) in the bi-variety analysis were entered into the model using a back- ward step wise method [12] . Variables

which were significant at p -value of 0.05 level and 95% CI were considered to be predictors of child mortality and used for model building. All predictor selection procedures were performed using training dataset.

Official approval to utilize the EDHS data for this study was obtained from data originators, Macro International USA before the data was extracted from the web platform. During data collection by Macro International, an informed consent was sought from all study participants after detailed description of all the issues related to the study were passed across to the respondents. Eligible respondents who did not want to participate in the study were excluded from the survey. Each consenting participant signed appropriate agreement form before the commencement of the interview.

3. RESULTS

DESCRIPTIVE STATISTICAL SUMMARY

A total of 11,654 under-five children were included in the study with a response rate of 99.9%. Out of 11,654 children, 5987 (51.4%) were male. The majority of the children, 9668 (83.0%), were from rural areas of the country. The mean age of their mothers was 29.04 (±6.6), 65.7% of whom were below the age of 30. Almost half of the mothers, 5447 (46.7%) were Muslims followed by 3617 (31.0%), Orthodox Christians and 2237 (19.2%), Protestants. More than half of the mothers (54.3%) were not working; 20.4% were farmers, and 25.3% had non-agricultural occupation. The mean family size of the study population was 6.13 (±.023) persons. The mean age of children was 2.03 (±.97).

DETERMINANTS OF UNDER-FIVE CHILD MORTALITY

Binary and multiple logistic regressions were conducted to assess the association of various determinants of child mortality. In the multivariable analysis, maternal education, parental education, breast-feeding, family planning, low birth weight, preceding birth interval, presence of diarrhea and age of the mother at first birth were found were significantly associated with childhood mortality (Table 1).

Table 1 Bivariate and Multivariate analysis determinants of under-five child mortality in Ethiopia.

Characteristics	Child		Crude OR (95% CI)	Adjusted OR (95% CI)	P-value
	Dead	Alive			
Breast-feeding					
No	502 (13%)	3367 (87.0%)	3.23 (2.79, 3.73)*	1.46 (1.22, 1.75)*	0.000
Yes	344 (4.4%)	7441 (95.6%)	1.00	1.00	
Place of residence					
Urban	121(6.1%)	1865(93.9%)	1.00		
Rural	725 (7.5%)	8943 (92.5%)	0.8 (0.65, 0.97)		0.13
Preceding birth interval					
< 2 years	50 (5.0%)	956 (95.0%)	1.9 (1.61, 2.16)**	4.90 (2.94, 8.15)*	0.000
2–5 years	465 (9.9%)	4241 (90.1%)	2.1 (1.56, 2.84)*	2.12 (1.77, 2.54)*	0.002
> 5 years	331 (5.6%)	5611 (94.4%)	1.00	1.00	
Occupation of mother					
Working	393 (7.5%)	4820 (92.5%)	1.00		
Not working	450 (7.2%)	5878 (92.3%)	0.93(0.81, 1.01)		0.08
Maternal education					
No education	621 (7.6%)	7521 (92.4%)	1.2 (1.03, 1.42)**	1.4 (1.11, 1.81)*	0.003
Primary and above	225 (6.4%)	3287 (93.6%)	1.00	1.00	
Low birth weight					
No	601 (7.5%)	7392 (92.5%)	1.00	1.00	
Yes	231 (6.4%)	3402 (93.6%)	1.3 (1.05, 1.44)**	1.2 (0.98, 1.51)**	0.042
Age of mother					
15–24	246 (8.6%)	2612 (91.4%)	1.02(0.92, 1.13)		0.61
25–34	368 (6.1%)	5639 (93.9%)	0.84(0.61, 0.96)		0.58
35–49	232 (8.3%)	2557 (91.7%)	1.00		
Parental education					
Primary and above	510 (8.5%)	5497 (91.5%)	1.00	1.00	
No education	333 (5.9%)	5299 (94.1%)	1.51, (1.28, 1.71)*	1.4 (1.04, 1.78)**	0.016
Presence of diarrhea					
Yes	748 (7.4%)	9335 (92.6%)	1.00	1.00	
No	98 (6.2%)	1473 (93.8%)	0.8 (0.66, 1.03)**	1.54 (1.32, 1.66)*	0.000
Age of mother at first birth					
18–24	51(5.91%)	811(94.09%)	2.42 (1.14–4.02)	1.42 (1.01–1.89)	0.023
25–34	2(9.52%)	19 (91.48%)	3.6 (2.61, 4.57)*	3.0 (2.23, 4.08)*	0.000
35–49	793(9.04%)	9978 (91.96)	1.00	1.00	
Sex of child					
Male	472 (7.8%)	5516 (92.2%)	1.00		
Female	374 (6.6%)	5293 (93.4%)	1.21(1.05, 1.39)		0.23
Received family planning service last 12 months					
No	721 (7.6%)	8737 (92.4%)	1.00	1.00	
Yes	125 (5.7%)	2063 (94.3%)	0.70 (0.61, 0.91)*	1.21 (1.08, 1.43)**	0.033
Age of child					
< 1		4181 (38.6%)	1.03 (0.91, 1.15)		0.59
1–2		2099 (19.4%)	0.64 (0.58, 0.69)		0.71
3–4		4528 (42.0%)	1.00		

PREDICTIVE MODELING FOR UNDER-FIVE CHILD MORTALITY

The anticipated model predicted survival status of under-five children in Ethiopia. We anticipated proposed four sub models by using J48 and PART classification algorithms. All sub models were evaluated using performance measures accuracy, the area under the Receiver Operating Characteristic (ROC) curve, F-measure and precision. Results showed that the performance of J48 classification algorithm is better than PART. Among all sub-models, sub-model C had better sensitivity, AUC, and Positive Predictive Value (PPV) when compared to those of sub-model A, B and D (Table 2). The model had scored an accuracy of 93.38%. This shows that out of 11,654 instances, 10,873 (93.38%), were correctly classified whereas 781 (6.62%) instances, were incorrectly classified. Of the total 11,654 instances, the model had scored true positive rate of 92.23% and false positive rate of 7.76%. The sensitivity and specificity of the model were 94.38% and 92.40% respectively. The PPV and Negative Predictive Value (NPV) were 92.2% and 94.51% respectively. The area under ROC for the model was 94.8% which showed that the model had a good accuracy in classifying the data by showing that there are more true positives than false positives. The precision and recall values for this model were 93.4% and 93.4% respectively which were significantly balanced yielding an F-measure of 93.4%.

Table 2 Accuracy analysis of every sub-model in the prediction model

	Algorithm	Sensitivity (%)	Specificity (%)	AUC (%)	PPV (%)	NPV (%)	95% CI of AUC
Sub-model A	J48	93.3	91.4	93.8	91.2	93.5	0.911–0.952
	PART	84.3	82.4	84.8	82.2	84.5	0.818–0.873
Sub-model B	J48	93.6	91.2	93.8	91.2	93.9	0.918–0.958
	PART	64.3	62.4	64.8	62.2	64.5	0.620–0.671
Sub-model C	J48	94.3	92.4	94.8	92.2	94.5	0.928–0.968
	PART	71.3	69.4	71.8	69.2	71.5	0.697–0.741
Sub-model D	J48	92.3	90.4	92.8	90.2	92.5	0.901–0.934
	PART	73.6	71.2	73.8	71.2	73.9	0.706–0.762

PART, Pruning Rule Based Classification Tree; AUC, Area Under-Curve; PPV, Positive Predictive Value; NPV, Negative Predictive Value; CI, Confidence Interval

WEB-BASED PREDICTION MODEL FOR UNDER-FIVE CHILD MORTALITY

Relying on rules extracted from optimal J48 model, we developed a web-based prediction application system with widely spoken Ethiopian national language Amharic. The application predicts risk of child mortality (Fig. 1) and mainly used to consult health professionals improving child and maternal health in Ethiopia. The application is very easy to use and user friendly. Furthermore, it is developed with local language that enables system users to easily interact with the application. Determinant variables used for application building were listed on categorical order in local language and options what to choose from are listed in a drop down list. Health professionals insert necessary information based on variables and application delivers information concerning the likelihood of childhood mortality.
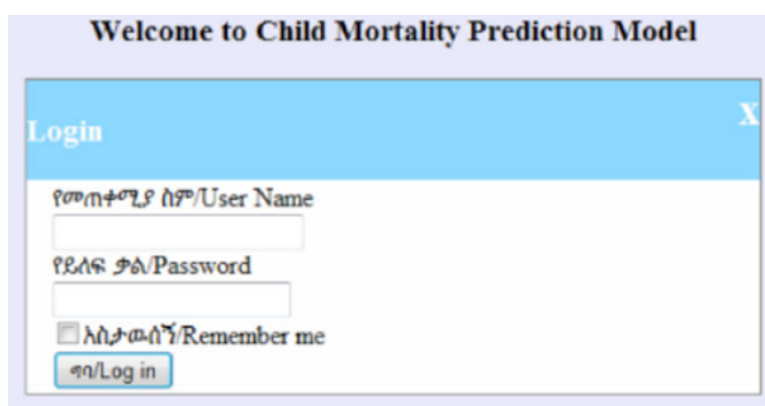

Figure 1 The User interface of Web-based child mortality prediction model login screen.

4. DISCUSSION

The aim of this study was to identify determinants of childhood mortality among under-five children in Ethiopia and developing a web-based predictive model for child mortality in Ethiopian local language using a data mining approach. Data mining is becoming popular in healthcare field because there is a need of efficient analytical methodology for detecting unknown and valuable information in health data [11]. In health industry, data mining provides several benefits such as detection of the fraud in health insurance, availability of medical solution to the patients at lower cost, detection of causes of diseases and identification of medical treatment methods. It also helps the health- care researchers for making efficient healthcare policies, construct ing drug recommendation systems, developing health profiles of individuals [13]. Breast-feeding, maternal education, preceding birth interval, and low birth weight, family planning, and paternal education, age of the mother at first birth and presence of diarrhea were found to be determinants of child mortality. Most studies have found a strong association between breast-feeding and childhood mortality. Our finding corroborates the significance of breast-feeding in explaining the risk of childhood mortality in Ethiopia. Similar study reported that non breast-fed children were at higher risk of child- hood mortality than those breastfed children [14]. Our finding also gives credence to the differential in years of preceding birth interval in the risk of childhood mortality. The study result revealed that children with less than five years of preceding interval are at higher risk of childhood mortality than those children with more than five years of preceding birth interval. This is consistent with the findings from low and middle income countries [15, 16]. It is also evidenced in the current study that likelihood of childhood mortality was higher among children with low birth weight. This is similar with the results reported from Ethiopia as well as the multi country study reported by the Lancet [17, 18]. Our study further showed that the risk of childhood mortality was higher among mothers who had unmet need for family planning. A study has re- ported unmet family planning need in Ethiopia is reported to be higher. The consequence of unmet family planning need is mothers are forced to have unwanted pregnancies. This led to for the child to have an increased risk of mortality [19]. The current study further revealed that family planning use significantly associated with the likelihood of childhood mortality. Children born from mothers who visited family planning services are at lower risk of mortality than those born from mothers who never visited family planning services. This finding is consistent with reports from developing countries [20, 21] . This is due to mothers who visited family planning services are better off and could possibly have a relatively better health seeking behavior. In our study, children born from mothers with lower education status are at a higher risk of childhood mortality. This result is in line with the results reported from Nigeria [22]. This study has revealed the potential applicability of data mining technology to develop a web-based application prediction model based on demographic, socio-economic, parental, environ- mental, and epidemiological factors. In line with quantitative re- search methods, data mining techniques on survey data lend for assessing the determinants of child mortality. Such findings may be relevance for health intervention programs in the country particularly with regard to reducing the risk of child mortality. The web based prediction model provide an option to predict the probability of mortality which can be used as early warning to identify children who are at risk of dying. Developing application systems will play an essential role in assisting physicians to make efficient and effective decision making which further improves healthcare delivery. Our finding is in conformity with similar study conducted for liver cancer prediction [13]. During the model building and testing process, the importance of the suggestions and opinions given by domain experts was also observed that model can help health professionals to counsel potential risk factors of childhood mortality. In addition, child health domain experts agreed that this prediction model could support health professionals identify children having an increased risk of mortality. Hence, such predictive models help health professionals augment their actions to educate the mothers as well as take preventive measures to reduce child mortality in Ethiopia (Fig. 2).
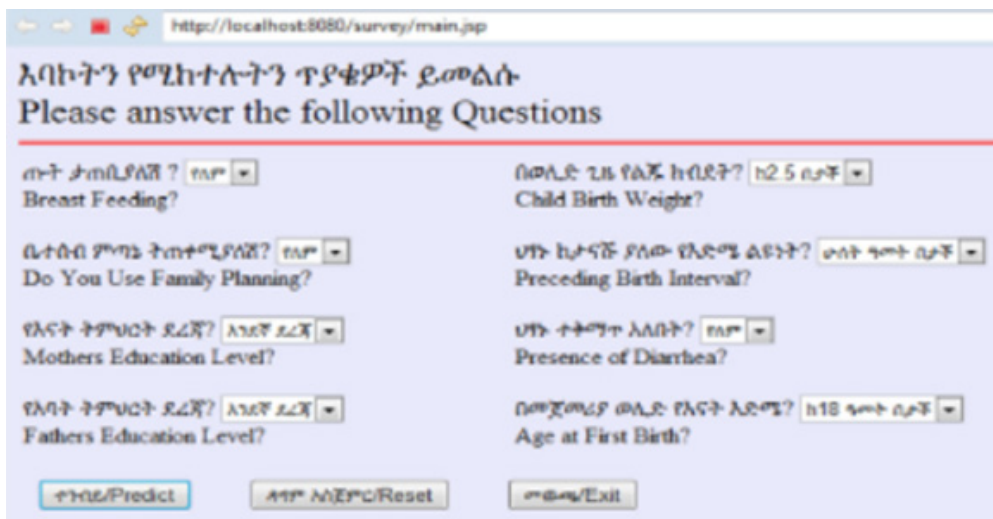
Figure 2 The user interface of Web-based child mortality prediction model.

5. CONCLUSION

This study identified determinants of child mortality and developed a web-based child mortality prediction model in Ethiopia. Breast-feeding, maternal education, preceding birth interval, and low birth weight, family planning, and paternal education, age of the mother at first birth and presence of diarrhea are the determinant factors associated with child mortality. A web-based application system for child mortality prediction was developed in Ethiopian local language. In this study, employing decision tree and rule induction techniques resulted nearly accurate prediction models. The rules generated by J48 algorithms are much more comprehensible to enlighten the outcome easily. Thus, the result obtained from this study and the developed web based prediction model could support child health intervention programs in Ethiopia. Advanced classification algorithms should be tested to come up with optimal models. Development of web-based prediction model with other widely spoken languages of Ethiopia is essential.

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TRADITIONAL MEDICINE: AN OVERVIEW OF RESEARCH AND DEVELOPMENT IN ETHIOPIA

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1. INTRODUCTION

Traditional medicine refers to health practices, approaches, knowledge and beliefs incorporating plant, animal and mineral based medicines, spiritual therapies, manual techniques and exercises, applied singularly or in combination to treat, diagnose and prevent illnesses or maintain well-being (1). The WHO estimated that 80% of the world population relies on traditional medicine prepared mainly from natural products (animals and plants) to meet their daily health requirements (2). WHO estimates that 35, 000 – 70,000 plant species are used for medicinal purposes around the world (3).

Ethiopia is a center of diversity for a number of flora and fauna, the sixth centers of biodiversity in the world. The country is endowed with rich flora, having more than 7000 species of vascular plants out of which an estimated 12% are endemic and about 887 species are used as medicinal plants. The majority of Ethiopian people depends on traditional medicine for their health care, and more than 95% of traditional medicinal preparations made from plant origin. Ethiopia is also a home for many languages, cultures and beliefs that have in turn contributed to the high diversity of traditional knowledge and practice of the people, which among others include the use of medicinal plants (4).

Through technological research and development, Far East Asian countries such as China, South Korea and India have been able to meet 75% of their health care needs from the utilization of herbal medicines, traditional medicine practices and creating high market demand for their herbal products. The output of Chinese materia-medica was estimated to value US$83.1 billion in 2012; Republic of Korea, US$7.4 billion in 2009; United States of America, US$14.8 billion in 2008 (5; 6). Hence, developing countries like Ethiopia should invigorate their efforts to develop and utilize local medicines that are most appropriate to their local circumstances especially for use in the Primary Health Care and cut down huge cost associated with incessant drug importation (6). In Ethiopia, there are efforts on research and development of traditional medicines; however, its trend is not as such recognized.

2. OBJECTIVE

The main aim of this review was to chronicle the trend of research and development of Ethiopian Traditional medicine for the last 30 years. The specific objectives were to examine the pattern of such research outputs; highlight some technical developments in Traditional medicine with emphasis on barriers and future research effort especially in the commercialization of traditional medicine in Ethiopia.

3. METHODS AND MATERIALS

Data for this review were generated from the published research findings on Ethiopian traditional medicine on different peer reviewed journals and proceedings for the last 30 years (1985-2014) by using search words such as Ethiopian medicinal plants, traditional medicine, formulation, toxicity, standardization and phytochemistry on searching engine Google, Google scholars and Pub med. The data were then categorized to the study thematic area or research activities. Then the number of research findings in each thematic area was determined and computed as a percentage of all research outputs for the period under review.

4. RESULTS AND DISCUSSION

About 454 published articles on Ethiopian traditional medicine were recorded in different peer reviewed journals. The research activities have been dramatically increasing from year to year (Figure 1). The 454 published articles were contains 553 research activities as shown in Table 1. About 404 (73.06%) were on biological activities. The most research activities done in medicinal plants within the specified period were on anti-microbial activities 115 (20.8%), antiprotozoals 76(13.7%) and Ethno-medicinal study 54(9.7%). The development or formulation studies were undertaken moderately 17(3.1%) while medicinal plants for non-communicable diseases such as hypertension, diabetics, cancer and mental illness are still growing.
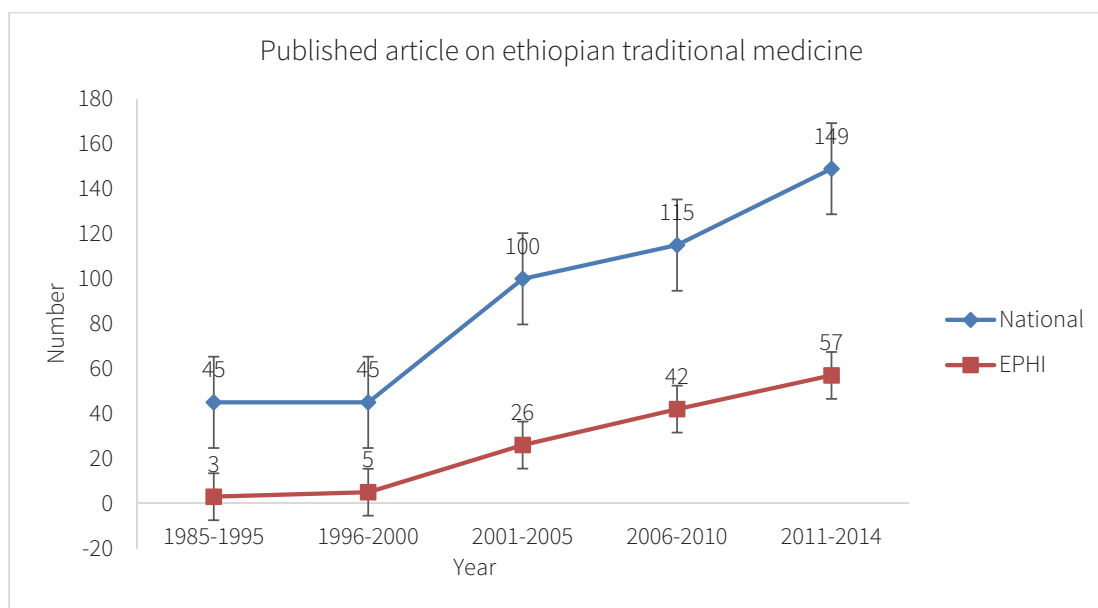
EPHI -Ethiopian Public Health Institute

Figure 1- Number of Publications of Ethiopian medicinal plants in peer reviewed journal 1985-2014)

The pattern of research output is skewed towards anti-microbial, antiprotozoal, ethnomedicinal and phytochemistry. This may be due to many reasons. The first could be the magnitude of the health problems in the country. For example over 60% of the Ethiopian population at risk of malaria (7) and non-communicable diseases are also emerging in Ethiopia accounts for 30 percent of total deaths (8). Antimicrobial drug resistance may be the second reason, which has been recognized as a growing global health threat (9-14). This may also have triggered a plethora of research interests in such areas with the hope of finding new and improved method of treatment. The third reason may be due to inadequate facilities, funds, and limited technical know-how to conduct researches in the areas like tuberculosis, cancer and HIV/AIDS.

The other most important research area in Ethiopian traditional medicine as per this review was ethnobotanical documentation. Conveyance of the knowledge on traditional medicine from person to person based on cultural rules of age, gender, lineage or religious disciple leads, to the fast disappearance of ethnophamacological information even though mostly tacit in nature (4; 15). In view of the rapid loss of the knowledge, its documentation of botanico-historical roots has become an essential task of ethno-allied disciplines (16; 17). This review showed that Ethiopia is in a good start for documenting the indigenous knowledge and of sustainable medicinal plant biodiversity conservation even if a lot more is expected.

Table 1: Categorization of scientific research on Ethiopia traditional medicine from 1985-2014

Se No.	Category	Number of publications	%
1	Knowledge, Attitude and Practice	42	7.6
2	Phytochemistry	36	6.5
3	Formulation (solid, semi-solid and liquid)	17	3.1
4	Ethnomedicinal study of medicinal plants (Human and Veterinary)	54	9.7
5	Toxicity (chronic/sub chronic, dermal)	19	3.4
6	For agents causing Communicable diseases (Human)		
6.1	Antimicrobial activity (Antibacterial, Antiviral, antifungal activity)	115	20.8
6.2	Antiprotozoal activity	76	13.7
6.3	Antimycobacterial activity	10	1.8
6.4	Wound healing activity	5	0.9
7	Non communicable diseases (Human)		
7.1	Mental illness /anxiolytic	11	2.0
7.2	Anti-diabetic activity	11	2.0
7.3	Diuretic effect	6	1.1
7.4	Anti-asthmatic effect	6	1.1
7.5	Antihypertensive activity	5	0.9
7.6	Anticancer activity	2	0.4
8	Insecticidal/repellant activity		
8.1	Repellent activity	10	1.8
8.2	Insecticidal activity	17	3.1
8.3	Larvicidal activity	11	2.0
9	Others		
9.1	Anthelmintic activity	18	3.2
9.2	Anti-inflammatory, analgesic and antipyretic activity	42	7.6
9.3	Antioxidant and Hepatoprotective	25	4.5
9.4	Gastrointestinal activity	10	1.8
9.5	Anti-fertility activity	5	0.9

One hundred seventy four medicinal plants were screened for biological activity of which *Moringa stenopetala, Glinus lotoides, Lippia adoensis, Phytolacca dodecandra, Albizia gummifera, Artemisia afra, Croton macrostachyus, Rumex abyssinicus* were the most researched medicinal plants for their pharmacological activity (efficacy and safety) and their phytochemistry (Table 2 Those medicinal plants frequency below four not displayed here).

Table 2: Medicinal plants most researched on Ethiopia traditional medicine from 1985-2014

S.N	MEDICINAL PLANT SPECIES	NUMBER	%	RESEARCHED AREA
1	Moringa stenopetala	15	8.62	Anti-Hypertension, anti-diabetics, anti-trypanosomial, anti-bacterial, toxicology
2	Glinus lotoides	8	4.60	Mulluscidal, toxicology, chemical composition
3	Lippiaadoensis	8	4.60	Antimicrobial, analgesic, antipyrectic, antioxidant
4	Phytolacca dodecandra	7	4.02	Antimicrobial, anti-Rabies, Mullucidal, antischistosomal
5	Albizia gummifera	6	3.45	Anti-microbial, larvicidal, Anthelmentic, antileishmaniasis
6	Artemisia afra	6	3.45	Antioxidant, spasmolytic, cytotoxicity, anti-trypanosomal
7	Croton macrostachyus	6	3.45	Antimicrobial, anti-malarial, antigonorial, antileishmaniasis
8	Rumex abyssinicus	6	3.45	Antimicrobial, analgesic, antiinflamatory, anticancer, Diuretic
9	Ajuga remota	5	2.87	Antimalaria, analgesic, antipyretic
10	Artemisia abyssinica	5	2.87	Antioxidant, antitrypanosomal, antimycobacterial
11	Bersama abyssinica	5	2.87	Antimalarial, antioxidant, antiviral
12	Calpurnia aurea	5	2.87	Antimicrobial, chemical isolation
13	Milletia ferruginea	5	2.87	Larvicidal, antibacterial, antileishmaniasis
14	Ocimum basilicum	5	2.87	Antimicrobial, antioxidant, insect repellant
15	Ocimum lamiifolium	5	2.87	Analgesic, Antipyretic, antiinflamatory, antimycobacterial
16	Ocimum suave	5	2.87	Analgesic, Antipyretic, antiinflamatory, insect repellant
17	Plumbago zeylanica	5	2.87	Antimicrobial, Antimalarial, Genotoxicity
18	Thymus schimperi	5	2.87	Antimicrobial, antihypertensive
19	Artemisia rehan	4	2.30	Antimalarial, spasmolytic, chemical isolation
20	Asparagus africanus	4	2.30	Antimicrobial, Antimalarial, chemical isolation
21	Clerodendrum myricoides	4	2.30	Antimicrobial, anatimalarial, antispasmodial
22	Cymbopogon citratus	4	2.30	Antimicrobial, antimalarial, insect repellant
23	Echinops kebericho	4	2.30	Antiplasmodial, toxicity, chemical isolation, anthelmentic
24	Foeniculum vulgare	4	2.30	Anxiolant, antimicrobial, anti-sheap ked
25	Syzigum guineense	4	2.30	Atihypertension, antidiarrhea, Antiinflammatory
26	Verbascum sinaiticum	4	2.30	Antibacterial, hepatoprotective, antimicrobial, antileishman-iasis
27	Warburgiaugandensis	4	2.30	Antimalaria, antiplasmodial, antimicrobial, chemical isolation

5. CHALLENGES OF RESEARCH AND DEVELOPMENT OF ETHIOPIAN TRADITIONAL MEDICINE

Effort at local traditional medicine research and development is yet to yield the desired benefits due to low funding of research and development activities, lack of adequate infrastructural facilities, non-commercialization of most research results, lack of framed policy, problems in sustainability of medicinal plant resources, no registration and licensing of traditional healers for their practices and products, lack of trust within and among traditional healers and researchers and lack of clear guideline for indigenous knowledge rights and the protection of intellectual property.

6. LIMITATION OF THE REVIEW

This review did not include studies before 1985 and after 2014, unpublished studies in universities and other institutes and did not outline the different stakeholders efforts for the development of traditional medicine.

7. CONCLUSION AND RECOMMENDATIONS

This review set out the trends of traditional medicine research in Ethiopia. Further strengthen the research and development is essential for the isolation of active pharmaceutical ingredients, pharmaceutical excipients and formulation development of herbal medicines to support the local pharmaceutical sectors for the commercialization of Ethiopian traditional medicine. Government can support the establishment of traditional medicine council, harmonizing the policy framework of the different stakeholders, strengthen the regulations and legislation of Traditional medicine. Furthermore, among other things that traditional medicine research and development should be intensified and linked to manufacturing investment if Ethiopia intends to meet the 21st century health challenges and particularly the health sustainable development goals.

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INFORMATION FOR DECISION MAKING FROM ROUTINE REPORTS GENERATED ABOUT PHARMACEUTICAL TRANSACTED AND SERVICES RENDERED IN 19 HOSPITALS OF AMHARA REGION

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ABSTRACT

Background: Health information system is one of the cross cutting building blocks whereas financing is among the key component of Health System Strengthening (HSS) of World Health Organization (WHO). Implementing appropriate, reliable and sustainable measurement strategies to generate the required data is critical for decision makers; however, there are major gaps in data availability and quality. In Ethiopia, findings showed that the reliable information for decision making on availability of   products, finance and service was inadequate. Due to this, it was impossible to audit products, finance and services.

Objective: To reveal how it is possible to generate reliable information for decision making on product, finance and service; including the WHO indicators, using APTS monthly reports from 19 hospitals of Amhara region.

Methods: The Amhara region enacted regulation, on a system called "Auditable Pharmaceutical Transactions and Services (APTS)". Generation of reliable information is one of the five result areas of APTS. The region implemented APTS in 42 health facilities; among them, 19 hospitals implemented the system before one year. Therefore, APTS monthly report of the 19 hospitals is used for this analysis.

Result: The result revealed that it has been possible to generate reliable information automatically on daily and monthly basis with real and strong reference that is serial numbered of financial tools (vouchers, sales tickets and registers). The APTS reports are being produced using simple formula from excel sheet in 13 hospitals and using modern Structured Query Language (SQL) software in 6 big hospitals of the region. The percentage share of medicines budget for mothers and children, is found ranging from 7% to 22%. Ataye Hospital and Felege Hiwot hospital are found the highest by percentage 22% and by value (ETB59,7000) per month, respectively. The affordability of medicines dispensed for patients on cash was found to be costly than the World Health Organization recommendation (W.D =1); for Amhara region, the average Wage Days was found to be (W. D = 1.6). The regional average wastage rate of medicines is declining with logarithmic trend line of negative 3.32. The number of patient visits (served) in pharmacies of the regional hospitals per month ranged from 3650 to 31,999, excluding unit dose dispensing. The average number of medicines per encounter at OPD was found to be 2.88% in one of the hospitals; indicating further drug use evaluation.

Conclusion: Reliable information on product, finance and services with clear and objective references to be traced are being possible to be generated using APTS data source that is shared routinely from each health facility through email and is being used for further discussion and decision making in Amhara Region.

BACKGROUND

Health information systems is one of the cross cutting building blocks whereas financing is among the key component of HSS of WHO [1]. Information is needed to track how health systems respond to increased inputs and improved processes, and the impact they have on improved health indicators. Implementing appropriate, reliable and sustainable measurement strategies to generate the required data is critical for decision makers; however, there are major gaps in data availability and quality [2].

In Ethiopia, findings showed that the reliable information on decision making concerning availability of products, financial transactions and service rendered was inadequate. Due to this, it was impossible to get the real data, audit on product consumed and stock available, financial value transacted and service rendered; by whom, for whom and on how much does it costs and to give decisions and to take actions [3,4, 5]. All together resulting in poor quality of pharmacy service, medicines management, low availability of medicines and poor patient satisfaction (74.5%) [4, 5,6]

To avert these problems, all the Ethiopian regional governments and city administrations enacted APTS legislations. Amhara region is the pioneer to enact and implement regulation on APTS. The system, APTS is a data driven package of the overall pharmacy operations; designed to address five result areas; effective workforce deployment & development, budget efficiency, transparency & accountability, reliable information, and customer satisfaction by reducing waiting time and increasing care time [4,7].

Therefore, this article demonstrates how it is possible to generate reliable information on product, finance and service using the APTS data sources regularly on monthly basis easily, including the WHO indicators which should have been collected using costly survey.

METHODS

Interventions used were engaging various stakeholders (the civil service bureau, finance bureau, legal bureau, and audit bureau), preparing tools, enacting legislations on APTS, calculating workload and deploying pharmacy staffs including pharmacy accountants, training them so that they use the APTS tools and to generate reliable information on daily and monthly basis. The region implemented APTS in 42 health facilities after piloted in Debre Markos Hospital; among them, 19 hospitals implemented the system before one year. Therefore, APTS daily summary and monthly report of the 19 hospitals is used for this analysis. Report generation started using a simple formula from excel sheet and growing to using modern SQL software. To identify results of the interventions and measure results, the monthly reports of APTS shared through email routinely were reviewed and analyzed by team of professionals.

RESULTS AND DISCUSSION

The result revealed that generation of reliable information is being possible automatically on monthly basis with real and strong reference that is serial numbered financial tools (vouchers, sales tickets and registers). The information including WHO indicators, which should have been collected by costly survey, are being possible to be generated automatically from routine APTS reports collected from 19 hospitals through email on monthly basis, and being used for decision making. The category of information is on products; (consumption to stock ratio, stock turnover rate, wastage rate, availability of key medicines, and number of medicines prescribed and dispensed, number of medicines per prescription and so on). The second category of information is on finance; (financial value transacted including received, issued, dispensed for free, on credit, sold on cash, gross profits, for percentage budget share of medicines dispensed for mother and children, and affordability of medicines by comparing with the WHO standard indicators. The third is on service; (the number of patient served per pharmacist per month, and per health facility per month, the number of counseling made per dispenser per month, the number of prescription evaluated per dispenser per month, number of patient served by program). These APTS daily summary and monthly report information are being generated using simple formulated excel sheet in 13 hospitals and using modern SQL software in 6 big hospitals of the region. By doing so, the results of APTS monthly report data of 19 hospitals from Amhara region, from July 2016 to May 2017 showed the following results.

The number of patient visits (served) in pharmacies of various Amhara region hospitals per month ranged from 3650 to 31999 (figure 1) that shows Felege Hiwot Referral Hospital is a hospital overloaded by patients more than any hospital. The regional average of patient visits in pharmacies was found to be 9751 per day.
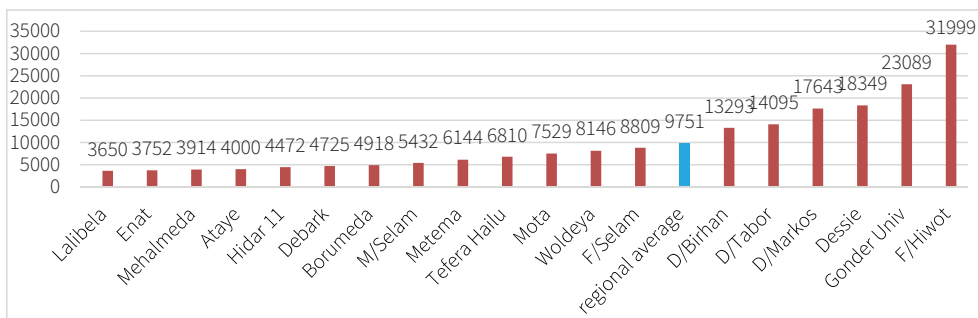
Figure 1: Number of patient' visits (served) in pharmacies (excluding unit dose dispensing), Amhara region hospitals from July 2016 to May 2017

The average number of clients served per dispenser per month ranged from 279 to 1451(figure 2), the number of counseling made per dispenser per month was found ranged from 475 to 3197 and The Amhara regional average was found to be 1763. The number of patients to be served by a single professional had been standardized by using APTS principles (1000 patients per month) and the monthly service report is being used to identify which health facility is over loaded by customer, who by profession is under or over performing. Using the data produced the region and the health facilities are giving decisions including permitting for additional professionals only for those hospitals that are serving more patients than the standards. Using such information, the regional health bureau evaluates hospitals regularly, calculated, requested and get approval of new positions from the civil service bureau; likewise, the Amhara region did permit a total of 50 new positions for deserved APTS implementing health facilities in the year 2017.
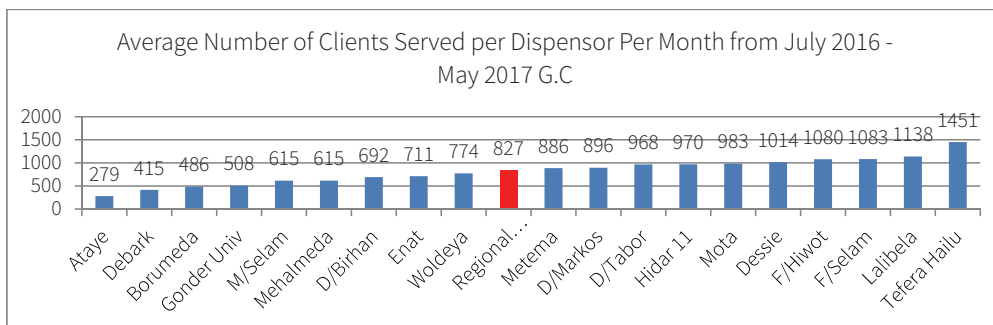

Figure 2: Average number of clients served per dispenser per month from July 2016 to May 2017 in Hospitals of Amhara region

The regional average price of medicines dispensed per client on cash for one visit was found to be 50 ETB and ranging from 33 to 86 in Tefera Hailu and Borumeda, respectively. The findings showed that in Borumeda hospital patients with dermatological cases were being very expensive than others. According to the data sources of medicines, the reason for this hospital to be expensive is since medicines used for dermatology cases were not available in Pharmaceutical Fund and Supply Agency (PFSA). Therefore, the hospital is obliged to buy them from private suppliers which is expensive than the government supplier (PFSA). The other tertiary hospitals are expensive due to using medicines for referred and patients with chronic diseases. For such problems, national solutions are expected.

The affordability of medicines dispensed for patients on cash was found to be costly than the World Health Organization recommendation (W. D=1); being the regional average wage days 1.6 and with the maximum of 2.7 wage days (figure 3). The finding also indicate that the salary scale of Ethiopian government worker is less than many of the other world since other factors affecting affordability—including international medicines prices indicator guides and related information shows that the medicines dispensed in Ethiopia are not so expensive than the other world specially those supplied by PFSA [9,10]. Formula: affordability is calculated as price of medicines sold on cash for patients (P) X 30 days divided by smallest monthly salary of unskilled government worker (ETB 960) equivalent to $ USD 41.4. The source of smallest salary is the civil service bureau of Amhara region. Even though, the salary range was variable during the year, to ease the calculation, the present smallest salary ETB 960 equivalent to 41.12 USD is taken for this calculation.

Figure 3; Affordability of medicines sold on cash using wage days from July 2016 to May 2017 in 19 hospitals of Amhara region
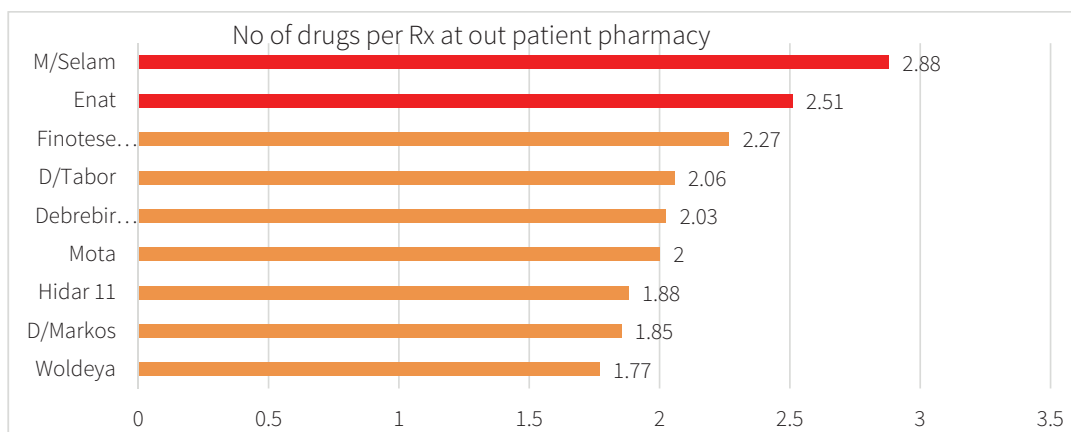

Figure 4: Number of drugs (medicines) per prescription in out-patient pharmacies from July 2016 to May 2017

The mother's share of medicines budget found ranging from 7% (Borumeda Hospital) to 22% (Ataye Hospital); figure 6. Felege Hiwot Hospital being the highest by value dispensing 591000 per month (figure 5). This information is being used for health bureaus to budget or refund to hospitals specially for specific programs. By using such APTS report information, hospitals have been refunded the price of medicines procured from PFSA and dispensed for mothers and children for free. Mehal Meda Hospital was one of the beneficiary of this information in 2017. The consumption to stock ratio ranges from 4% (inefficient hospital) to 22% (efficient hospital) per month. PFSA suggested hospitals to have a maximum of 4month stock and use one fourth in a month. Therefore, efficient hospitals consume percentage near to 25%. Decision makers can easily see and take intervention by looking the consumption to stock ratio from the monthly report. The gross profit from medicines sales was found ranging from birr 30,000 to birr 591,000 per month including medicines sales sponsored by health insurance. The average number of medicines per prescription was found to be ranging from1.77% to 2.88% (figure 4). This shows that the above two hospitals (M/Selam and Enat seems to have more drugs per prescriptions than others. This result indicates also that the two hospitals are the candidate for detailed drug use evaluation since the result has a probability to be a general indicator for Poly-pharmacy even though it is impossible to decide before detailed drug use evaluation analysis.
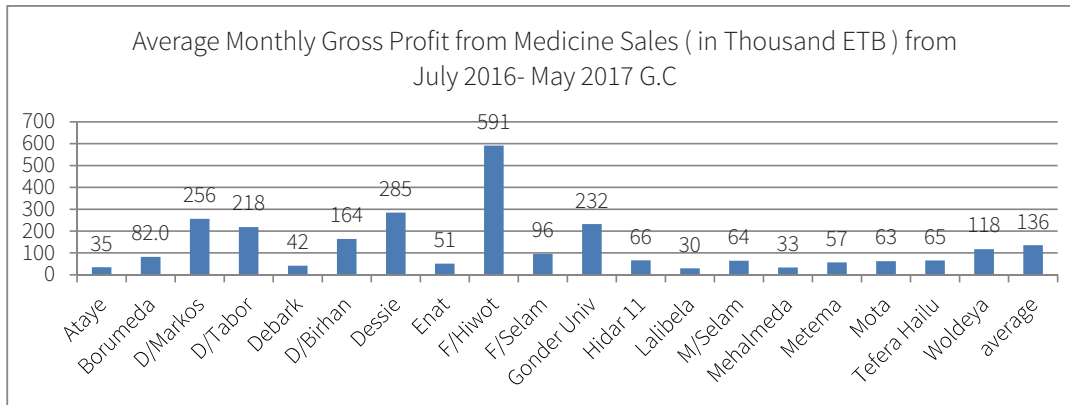
Figure 5: Average monthly gross profit from medicines sales including medicines dispensed on cash and on credit-sponsored by various stakeholders
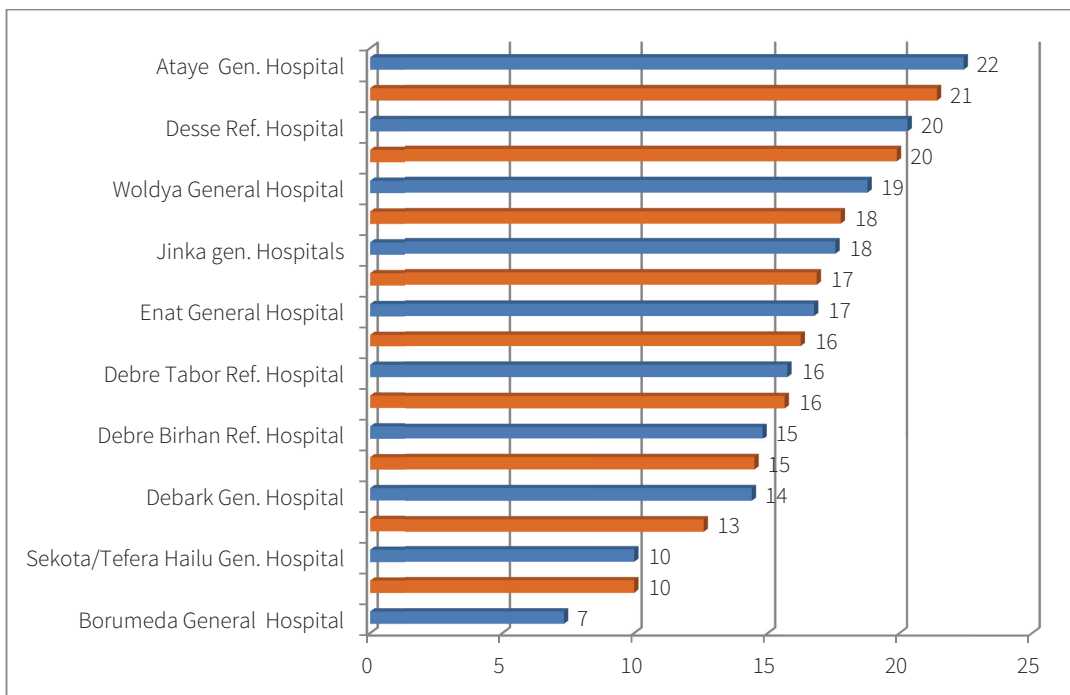

Figure 6: The percentage share of maternity medicines by value from medicines dispensed for all patients in 19 Amhara regional hospitals
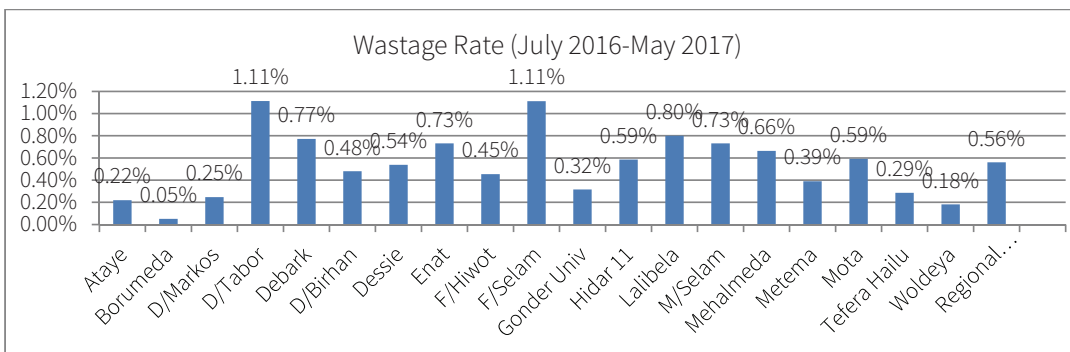

Figure 7: wastage rate of medicines in 19 hospitals of the Amhara region from July 2016 to May 2017

The regional average slope of wastage rate of medicines was found declining with logarithmic trend line of negative 3.321; from the national average baseline wastage rate of 8.2% and regional baseline average of 10% to 0.21%; passing the national wastage rate target (2% by 2020) of the Health Sector Transformation Plan (HSTP) [3]. The regional wastage rate of the year 2017 was found ranging from 0.18% to 1.1% (figure 7)

CONCLUSION AND RECOMMENDATION

Various results showed both general and specific indicators and reliable information including the WHO indicators, that have references are being possible to be produced and used for decision makers in Amhara region sourced from the APTS reports and shared routinely from each health facility through email. Therefore, it is recommended that the APTS tools should be used for information revolution nationally regarding to products and financial transactions, human resource level of effort measurement, workload analysis and pharmacy services. The six Hospitals that use the Modern SQL software for producing APTS reports makes information production very easier than those using excel sheet even though both could produce the report. Therefore, data generated from the daily and monthly reports of APTS can be used as a source for pharmaceutical information revolution. To do so, scaled up to all more than 4000 health facilities in Ethiopia by 2020 [8] and beyond to African Countries using modern software to be used as the best tool for information revolution.

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MONITORING HOSPITAL BASED STILL BIRTH RATE THROUGH STATISTICAL PROCESS CONTROL AS AN EVALUATION OF PERFORMANCE IN QUALITY IMPROVEMENT THROUGH THE ETHIOPIAN HOSPITAL ALLIANCE FOR QUALITY INITIATIVE

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ABSTRACT

OBJECTIVES

Worldwide stillbirth rate has declined by 14% (from 22.1 stillbirths per 1000 births in 1995 to 18.9 stillbirths per 1000 births in 2009). Despite the decline trend, annually 2.6 million babies are stillborn. Unlike the global trend, the African region has a decline rate of less than 1%. The stillbirth rate for developed countries is estimated between 4.2 and 6.8 per 1000 births, whereas for the developing world, the estimate ranges from 20 to 32 per 1000 births. Still birth particularly intrapartum death as a fresh still birth is a proxy quality indicator of the care particularly a quality of care being delivered at the time of labor and delivery. Hence this study assesses the improvement in the input and process components of national quality of care standards and track the outcome measure of still birth rate (SBR) as a result of the integrated audit-feedback cycle with collaborative learning intervention from national level quality alliance initiative (EHAQ)

SETTING

Ethiopian lead hospitals with a better performance in adopting the quality of care initiative among 8 regional state government inclusive of hospitals from 2 of the federal state. These are Addis Ababa, Dire Dawa, Afar, Tigray, Amhara, Oromia, SNNPR, and Harari regional states.

DESIGN and STRATEGY

19 lead hospitals (better performance in implementing the Ethiopian hospital reform implementation guideline) were enrolled for collaborative audit-feedback cycle interventions for 10 nationally defined MNCH quality standards through a joint supportive supervision for baseline assessment based on the standardized self-assessment audit tool on November 2014 after 8 months elapsed time in between for hospitals to improve the feedback that were provided for 8 months and reassessed on August 2015 as second supportive supervision. Final validation based on the tool by independent expert validator were conducted on March 2015 simultaneously. The cohort mortality of SBR was analyzed using the Statistical process control chart for variation throughout 16 months. Paired T-test distribution was also used to analyze changes in SBR before and after for statistical significance as a result of collaborative audit and feedback cycle. Statistical significant change in SBR per 1000 live birth before and after with paired T-test and a shift, trend, too few runs and variation from the control limit (CL) as out of control beyond 1δ, 2 δ, and 3 δ were taken.

RESULTS

The difference of the mean in SBR between baseline and validation was 5.96 and SD of 64.36 (95% CI -25.06,36.98) statistically not significant (P=0.691). Nevertheless, there were no significant improvement in the reduction of SBR in the paired t-test between the baseline and validation (P=0.691); the SPC chart for SBR has 2 decline trends in response to the first and second SS from November 2014 to February 2015 and from August 2015 to November 2015 respectively that signals a significant decline of SBR respectively.

LESSON LEARNT

The national level integrated audit-feedback cycle supplemented with collaborative learning session of the EHAQ model has significantly impact in reduction of hospital based SBR as evidences by decline trend following supervision beside improving the input and process of defined quality of care standard.

The prevalence of Still birth (fresh as simplified case definition for the intrapartum death) reflects and an indicator of quality of care in labor and delivery that can be avoided with standard labor monitoring and acting accordingly in timely fashion using Pantograph.

The SPC chart is a gold standard analysis tool for monitoring the status of progress in the outcome measure SBR over the before and after paired t-test in such quality assurance for improvement approach.

Three lessons can be taken from the experience and evidence;

- **Sustainability:** The transition of ownership to RHB would better be a step up action to sustain and supervise closely and frequently enough

- **Cost-efficiency:** integration to the existing regional routine supervision plan and program would reduce the cost incurring to run the initiative in the future.

- **Effectiveness:** Labeling and tagging quality tag as lead need a paradigm shift from focusing on the input and process standard to the measure of outcome based on the reduction of mortality and prevalence of complication from birth process. Hence the monitoring practice can be scaled up through system redesigning on the existing traditional monitoring practice to the computer based Statistical process control-SPC for all ultimate desired outcome of MNCH that could be integrated with the DHIS-2 of the ministerial initiative

INTRODUCTION

Worldwide stillbirth rate has declined by 14% (from 22.1 stillbirths per 1000 births in 1995 to 18.9 stillbirths per 1000 births in 2009). Despite the decline trend, annually 2.6 million babies are stillborn. [1]

Unlike the global trend, the African region has a decline rate of less than 1%. The stillbirth rate for developed countries is estimated between 4.2 and 6.8 per 1000 births, whereas for the developing world, the estimate ranges from 20 to 32 per 1000 births.

Two thirds of all stillbirths occur in just two regions: South-East Asia and Africa 7, In sub-Saharan Africa, an estimated 900,000 babies die as stillbirths. It is estimated that babies who die before the onset of labor, or ante partum stillbirths, account for two-thirds of all stillbirths in countries where the mortality rate is greater than 22 per 1,000 births. [9]

Still birth particularly intrapartum death as a fresh still birth is a proxy quality indicator of the care particularly a quality of care being delivered at the time of labor and delivery. Hence one of the high impact intervention beyond increasing the institutional skilled birth attended delivery (the rate has increased from 56% in 1990 to 68% in 2012 and 73% in 2013) is globally believed to be a high concern. [10]

However, evidence shows that giving birth in a health facility with a 'skilled' attendant is not sufficient to reduce maternal and newborn deaths including still birth babies. Hence improving quality of care and patient safety are therefore critical if we want to accelerate reductions in maternal and newborn mortality. [10]

As poor quality of care contributes to the facility based preventable high mortality and morbidity 11; improving the quality of care at during birth and early postnatal period are of much important and cost efficient in order to avoid the preventable facility based maternal and newborn mortality.

According to IOM effectiveness is one of the dimensions of quality. It is defined as reliable application of evidence based intervention during antenatal and critically during intrapartum period that will ultimately result in better pregnancy outcome as well as patient satisfaction from experience of care.

Although audit and feedback cycle had been used to assess input, process components of standards of care as part of building blocks of health system performance, the routinely observed practice in the process components of care worth mentioning of labor monitoring through Partograph monitoring of fetal condition as a behavior of midwives were seldom measured as well as clients' satisfaction from the care as a measure of moms' experience on care. [9]

Criterion based audit of inputs and processes components of care have assessed midwives/doctors' behavioral change but little had been studied its correlation with outcome measure of mortality reduction specifically with SBR.

DESIGN AND STRATEGY

This national quality assurance initiative of EHAQ model were assessed for MNCH QoC among initially enrolled 19 LEAD hospitals randomly distributed within 8 regional state government of Ethiopia inclusive of hospitals from 2 of the federal state. These hospitals were Addis Ababa, Dire Dawa, Afar, Tigray, Amhara, Oromia, SNNPR, and Harari regional states. Hence these hospitals were 19 lead hospitals namely Dubti, Dilchora, Jugol, Bisidimo, Mekele general hospital, Lemlem Karl, Axum/St Merry hospital, Debretabor General hospital, Debremarkos Referral hospital, Nejo hospital, Nigist Eleni general hospital, Shashemenie referral hospital, Yabello District hospital, Butajira general hospital, St. Paul medical millennium college, Hidar 11 memorial, Debra Birhan, Fiche and Bishoftu hospitals.

The collaborative learning integrated audit and feedback cycle had developed MNH self-assessment audit tool that consists of 10 quality of care standards with their verification criteria were used throughout baseline and validation assessment. The audit tool was tested as a pilot and standardized for use of national MNH audit tool.

Thus the quality standards for MNCH QoC standards were;

1. Availability of essential resources and physical Infrastructure through direct observation.

2. Infection prevention and patients' safety

3. Emergency obstetric care retrospectively through patients' medical record review

4. Evidence based care for normal labor and delivery obstetric through a chart review of medical record review and observation.

5. Comprehensive quality of care delivered in the ANC

6. Evidence based care as case management for PPH and eclampsia through patients' medical record review

7. Quality of care with respect to the indication and continuum of care as per the national guideline for C-Section care

8. The status of availability of list of routine basic laboratory service posted with result turnaround time as part of care in MNCH unit.

9. Quality of care standard for Pediatric services in the hospital setting

10. Utilization of national MNCH guideline and quality of MDSR program as audit and response.

The baseline assessment as the first supportive supervision was conducted on 19 lead hospitals on November 2014. The second follow up supportive supervision as re-audit was conducted on August 2015 followed by final validation that took place on March 2016. As a quality collaborative intervention beside the audit-feedback, cluster meeting was being conducted to evaluate their performance, share resources and benchmark best practices and innovations among member hospitals on quarterly bases and biannual review meetings at regional and national level.

The hospital based SBR were tracked as a retrospective cohort in a time serious SPC chart for analysis of variation as a common or special cause variation.

The variation from SPC chart were compared with before and after paired t-test study. The seasonal variation in the rate of birth and still birth rate as a confounding factor were analyzed using the time serious variation of astronomical data points. However, investigation for the explanation as well as controlling the confounding factors were beyond the scope of this review.

Rule of decision for high and low MMR based on SPC chart were used outliers beyond + or - 1δ as a stable zone, while + or - 3δ as uncontrolled and unpredicted variation in MMR beyond the upper control limit. The test of significance and sustainability were decided based on for a shift, trend, too few runs as special cause variation with the reference to the mean MMR (control limit –CL)

RESULT

Standard-1; that sets minimum requirement on the essential physical resources availability and infrastructure inputs has shown improvement in 70% of 19 lead hospitals with the difference of the mean score is 1.32 (0.52, 2.52) which the change is statistically significant (P-value of 0.001).

STANDARD	Mean score before	Mean score after	difference of Mean	SD	95% CI Lower	95% CI Upper	Sig. (2-tailed)
Essential resources & infrastructure	5.6	6.85	-1.32	1.53	-2.05	-0.58	0.001
IPPS	6.2	9	-3.11	2.73	-4.42	-1.79	0
Emergency obstetric care	21.85	28.73	-7.34	4.39	-9.45	-5.22	0
Normal Labor and delivery care	6.34	8.21	-1.86	2.27	-2.98	-0.73	0.003
ANC care	6.65	5.465	1.27	1.48	0.56	1.98	0.002
Case management of PPH and eclampsia	6.3	7.56	-1.99	3.54	-3.69	-0.28	0.025
Pediatric quality of care	6.05	12.35	-6.32	2.81	-7.67	-4.96	0
Laboratory service for MNCH	3.6	4.37	-0.76	1.17	-1.33	-0.19	0.011
C-Section quality of care	10.35	12.65	-2.45	2.53	-3.67	-1.23	0.001
MDSR and utilization of guideline	3.6	5.02	-1.55	2.27	-2.64	-0.46	0.008

Standa rd-2 that sets list of quality statement for Infection prevention and patients safety (IPPS) standards has been improved among 70% of hospitals with difference of the mean between baseline and validation after 16 months as 3.11 (1.79, 4.42) that statistically significant as well.Standard-3 and 4 that sets measurable quality of statement evidence based care for normal labor & delivery, and emergency obstetric care improved among 85% and 84% of hospital respectively where the difference of the mean 1.86 (0.54, 2.27), and 7.34 (5.22, 9.45) statistically significant with P=0.03, and 0.000 respectively.

The improvement on evidence based care of case management for two major direct cause of maternal mortality namely PPH and eclampsia as standard 5 have shown improvement among 72% of hospitals in the scored value with the difference of the mean score was 1.98 (0.81, 3.54) signifies that the improvement is statistically significant with P=0.025.

Maternal Death Surveillance & Response performance as per the national MDSR guideline merged with availability of national MNCH related guidelines as standard had improved among 65% of hospitals from their baseline scores with difference in the mean score as 1.55 (0.51, 2.27) statistically significant (P= 0.008).

Pediatric care standard consisted of 14 statements as composite input and output/process standard had shown the highest improvement in all of the 19 lead hospitals (100%) with the difference in the mean score of 6.32 (4.96, 7.67) statistically significant (P= 0.000). On the contrary, the standard that set minimum requirement for routine laboratory care for clients' of MNCH unit had shown the least change in the difference of the mean score 0.76 (0.19, 1.33) but statistically significant (P=0.011) observed in 70% of hospitals.

SPC CHART OF STILL BIRTH RATE

Nevertheless, there were no significant improvement in the reduction of SBR in the paired t-test between the baseline and validation (P=0.691); the SPC chart for SBR has 2 decline trends in response to the first and second SS from November 2014 to February 2015 and from August 2015 to November 2015 respectively that signals a significant decline of SBR respectively.

The SPC chart also revealed that the baseline SBR was out of control limit above +1δ that declined over the cohort period except for the month of April 2015 and July 2015 (slightly above +1δ). The highest reduction of SBR was observed on the month of February 2016.
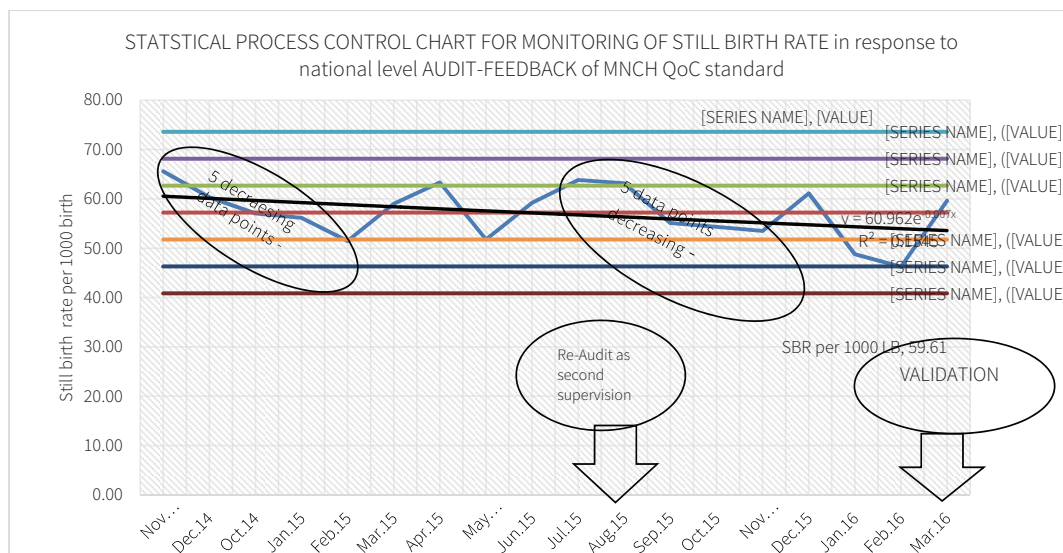

Figure 1: Statistical process control chart for hospital based SBR in for all hospitals

LESSON LEARNT

The national level integrated audit-feedback cycle supplemented with collaborative learning session as a quality assurance for improvement intervention of the EHAQ model has significantly impact in reduction of hospital based SBR signaled by two declining trend following first and second supervision respectively but not on validation.

The reduction of SBR could be attributed to the supervision that reflects the implementation of the normal labor and delivery quality standard that includes the Partograph labor monitoring as a key quality statement.

The prevalence of Still birth (fresh as simplified case definition for the intrapartum death) reflects and an indicator of quality of care in labor and delivery that can be avoided with standard labor monitoring acting timely using Partograph.

A big lesson that can be drawn from this finding is that a frequent supervision can have a significant impact in the behavior of the health care providers towards sticking to the high impact interventions set under the standard (proper labor monitoring through the use of Partograph and acting accordingly)

Three lessons can be taken from the review of both outcome measure of quality-SBR and MMR;

- **Sustainability:** The transition of ownership to RHB would better be a step up action to sustain and supervise closely and frequently enough since once improving the MNCH QoC standard was a flagship initiative of EHAQ that have a life span of maturity and can't be run long through the initiative.

- **Cost-efficiency:** integration to the existing regional routine supervision plan and program would reduce the cost incurring to run from the national level.

- **Effectiveness:** Labeling and tagging quality tag as lead need a paradigm shift from focusing on the input and process standard to the measure of outcome based on the reduction of mortality and prevalence of complication from birth process. Hence the monitoring practice can be scaled up through system redesigning on the existing traditional monitoring practice to the computer based Statistical process control-SPC for all ultimate desired outcome of MNCH that could be integrated with the DHIS-2 of the ministerial initiative

The SPC chart is a gold standard analysis tool for monitoring the status of progress in the outcome measure where in this care the SBR and advantageous over the before and after paired t-test (tells only the status at before and at the end but not all the detail history) when using for quality assurance for improvement strategy.

Taking into account the advantage of SPC chart for aggregated hospital data; analyzing individual hospital level improvement in the target and observing their level of variation with subsequent investigation of their efforts and interventions would be an advanced approach in such national level audit-feedback cycle of quality assurance process.

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THE BURDEN OF ROAD TRAFFIC INJURIES AMONG TRAUMA PATIENTS IN ETHIOPIA: A SYSTEMATIC REVIEW AND META-ANALYSIS

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ABSTRACT

Introduction: Road traffic injury has been occurred significantly; and it is one of the main reasons of admissions at Ethiopian hospitals. There is a need of information to develop and implement such a like public health emergency management strategy. Therefore, this systematic review and meta-analysis was aimed to estimate the national pooled prevalence of road traffic injury among trauma patients in Ethiopia.

Methods: The preferred reporting items for Systematic Reviews and Meta-Analyses of statement guideline was employed. International databases, including PubMed, WHO Global Health Library, Excerpta Medica Database, and Wiley online library databases were searched. Additionally, gray literature, like World Wide Science, psycEXTRA, and Google scholar were accessed. The quality of each article was appraised based on Joanna Briggs Institute criteria.The computed I-squared value was 99.6%this indicated that the included studies were characterized by high heterogeneity. P-value of Egger's regression test was 0.243 implies the absence of potential publication bias.

Results: Researches published or conducted from 2000 to 2017 were included. A total of 17 hospital-based studies with 61,716 trauma patients and 10,505 road traffic injury cases were included in the study. The overall pooled prevalence of road traffic injuries among trauma patients in Ethiopia was found to be 31.5% (95%CI: 25.4%, 37.7%). In the subgroup analysis, the highest (33.3 % (95% CI: 22.9, 43.7) prevalence accounted for Addis Ababa, the capital city of Ethiopia. In addition, the time-trend analysis showed that an increased prevalence of road traffic injuries among trauma patients.

Conclusion and recommendation: The pooled prevalence of road traffic injuries among trauma patients in Ethiopia was significantly high. Strengthening road safety management, safer roads and mobility, promoting using of safer vehicles and safer road users, and establishing immediate post-crash response throughout the country need more emphasis to reduce road traffic injuries.

Key words: Ethiopia; Hospitals; road traffic injury; trauma patients

INTRODUCTION

Road traffic injuries (RTIs) have been one of the major causes of injuries and trauma related death in the world. Nearly 20 to 50 million people injured and 1.2 million died each year (1) which pose significant burden on health care system (2). In 2013, 973 million people continued injuries and 4.8 million people died from injuries (3). Consequently, in terms DALYs lost ranked among the top ten leading causes of disease (4, 5). It also expected to become the first cause of death for children 5 to 15 years of age in the near future (6). The projection between 2000 and 2020 showed an 80% increase of road traffic related deaths and injuries in low- and middle-income countries which will become the third leading cause of death (7). Most (90%) of death from road traffic accidents occurred in developing countries (8) which is considered as hidden epidemic causes of morbidity and mortality in these countries (9). Even though legislation on speed control and alcohol consumption, using seatbelt and helmet, designing safer roads and vehicles (5), and new traffic laws (10) are being promoted for implementation, RTIs have been reported in many parts of the world as in Europe (1.8), America (2.2),eastern Mediterranean (2.8), western Pacific (4.1), Africa (4.7), and Southeast Asia (8.6) millions RTIs occurred (11).The estimated prevalence of RTIs among trauma patients in sub-Sahara Africa is 32% (12) which results the worst health outcomes (13, 14). A review study stated that 48% of bed occupancy in surgical wards in some countries was due to RTIs in which patients were the most frequent users of operating theatres and intensive care units (15). Globally, the cost of road trauma is estimated to be approximately US $518 billion per year (16) for the combined economic burden of medical treatment and lost productivity; and resulted that many health care resources are devoted on patients admitted due to RTIs. Consequently, RTIs will have a significant outcome on the social, economic, political, and health development of a nation. Currently, Ethiopia approaches 8 key processes (17) for better outcome of the health of the societies. Among these, public health emergency management is the one. Allowing for RTIs as a public health emergency which shortens the life of many individuals is essential. In Ethiopia, different studies have been conducted to determine the prevalence of RTIs. These studies were characterized by great variability and the findings from these studies were inconsistent and inconclusive. Therefore, this systematic review and meta-analysis was aimed to estimate the pooled prevalence of RTIs in Ethiopia context. The finding from this review will be an impute for policy makers regarding road traffic accidents.

METHODS AND MATERIALS

Protocol: The result of this review was reported based on PRISMA statement guideline (18, 19).

Inclusion and Exclusion

i.Publication status: Both published and unpublished hospital based studies that were conducted from 2003 to 2017 and reported the prevalence of RTIs in Ethiopia were included in the study. In this review, for one article studied the prevalence of injury among total patients in hospitals, number of injured were considered as a source population and cases of RTIs driven from it (20).

ii. Language: There was no language restriction.

iii. Study designs: Primary observational study designs or secondary data analysis from document review were considerd. Studies from non-hospital settings, drivers, police records, the community and studies were excluded. In addition, since global estimation about the burden of RTIs considered the year from 2000 to 2020, studies published before 2000 were excluded from the review. However, no studies got between the year 2000 and 2002. Furthermore, estimated proportion of RTIs from total patient at hospitals (21) was excluded.

iv. Type of population: Trauma Patients

v. Study setting: Hospitals based study

vi. Searching strategy: The core search terms and phrases were "injury", "trauma", "unintentional injury", "intentional injury", "road traffic injury", "road traffic collision", "trauma patient", "injured patient", "factors", "predictors", "risk factors", "associated factors", "emergency", "hospital", "Ethiopia". A search strategy developed using different Boolean operators used for advanced PubMed search was illustrated (see online supplementary A1). International database including PubMed, Excerpta Medica Database, Web of Science, WHO Global Health Library, and Wiley online library were searched. Additionally,gray literatures, like Google scholar, World Wide Science, and psycEXTRA were accessed. Moreover, articles with incomplete reported data were handled through contacting corresponding authors.

Study selection: Two reviewers independently evaluated the titles and abstracts of retrieved studies. Related articles and abstracts with the required search terms included in the full text review. Two authors independently reviewed the full text to determine eligibility of each study. Articles without full text included after contact of corresponding authors through email. Full text articles reviewed included when the two reviewers agreed. Disagreement was handled by consensus on the basis of standardized article quality assessment tools. The selection process (Figure 1) and selected studies illustrated (Table A2).

Risk of bias and quality assessment: Two reviewers appraised the quality of articles. Disagreement was solved by consensus or by interference of third reviewer. Risk of bias within the studies was examined using the check list from Joanna Briggs Institute (22) through criteria of which (1) appropriate sample frame, sampling technique, (3) sample size adequacy, (4) description of study participants and setting, (5) data analysis with sufficient coverage of sample, (6) valid measurement, (7) valid measurement for all participants, (8) appropriate statistical analysis, and (9) response rate used (see online supplementary quality appraisal checklist). Studies considered low risk, when it scored six and above indicators of the quality assessment. Any studies with more than three items with unclear classifications and/or one or more low-quality indicators were classified as high risk of bias.

Data extraction: Two independent reviewers extracted all the necessary data, and discrepancies during data extraction was resolved through consensus .Third reviewer involved if there were differences between two data extractors continued. The data extraction format includes first author, year of publication or year of study for unpublished articles, study area (region), study design, target population, sample size, and cases with RTIs were collected.

Outcome measurement: Proportion of RTIs was estimated from the trauma patients.

Statistical analysis: Data were extracted in Microsoft Excel format and it was imported into STATA 14 for further meta-analysis. Descriptive approach was applied for pooled prevalence of RTIs. Significant heterogeneity (23) was observed between the included studies. As a result, random effect model (24) was computed to estimate the Der Simonian and Laird's pooled effect and reported using forest plot. To minimize the random variations between the point estimates of the primary study, regional wise subgroup analysis was conducted. In addition, the time-trend analysis was explained using the estimated pooled prevalence for the studied years. Potential publication bias was also checked using Egger's regression test (25), which resulted no publication bias was observed among the included studies. Fill and trim analysis was not conducted in the absence of publication bias (26).

RESULT

Literature searches and selection: In the initial search, we found 706 records through search engines of PubMed (654) and other sources (52). From these 313 records remained after removing duplication. After examination and screening for the title and abstract, 278 were excluded. Finally, we assessed the full text of 35 remaining records for eligibility, and 18 records further excluded, which are not fulfilling the inclusion criteria. Finally, only 17 studies were included in the meta-analysis. Selection process of included studies clarified (Figure 1).
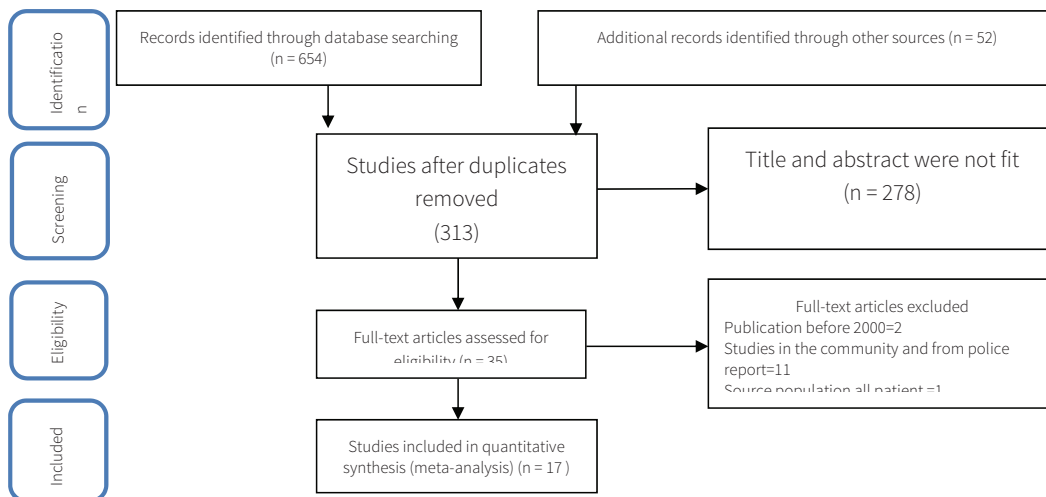
Figure 1: Studies selection process flow chart for the studies included in the analyses

Characteristics of the studies: The meta-analysis included 17 studies which included from 2003 to 2017. Only 6 studies reported between 2003 and 2010 and 11 studies after 2010. Regarding study design, almost all are cross-sectional study. A total of 61,716 trauma patients were included. Sample size ranged from 52 to 40,752. (see online supplement table 1a). Among nine region and two administrative cities in Ethiopia, studies were included representing data from four region (10 studies) and Addis Ababa, capital city of Ethiopia (7 studies) (Table 1).

Table 1: The region where hospitals existed and number of study with proportion

Region where studied Hospitals existed	Number of study	Percent (%)
Amhara	4	23.5
Addis Ababa	7	41.2
Oromia	3	17.6
Tigray	1	5.9
SNNPs	2	11.8

Quality of studies: Based on quality appraisal criteria included studies had no significant indication of bias for prevalence estimation of RTIs. Quality classifications displayed in Table 2. The main risk of bias in these studies is due to the lack of appropriate sample selection, and description. However, no studies were excluded based on quality issues (20, 27-40).

Table 2: Quality status of studies included in the systematic review and meta-analysis of RTIs among trauma patients in Ethiopia from 2003 to 2017 (n=17).

Author/year	Description about the study	Quality status
Wolde A et al/2008	A one-year descriptive study about patterns of injuries in Addis Ababa	Low risk
Ayele TA et al/2014	A cross-sectional study about magnitude and patterns of injuries among patients in Gondar University Hospital	LOW RISK
Bashah DT et al/2015	A cross sectional study about prevalence and associated factors of injury among patients in the emergency departments of Amhara Regional Hospitals	LOW RISK
Amdeslasie F et al /2016	A retrospective chart review about patterns of trauma patients at emergency clinics of public health hospitals in Mekelle	LOW RISK
Abebe GM et al/2006	A cross-sectional study about patterns of accidents among children visiting Jimma University Hospital	LOW RISK
Kebede T et al/2008	A retrospective review Injury surveillance in six hospitals of Addis Ababa	LOW RISK
Woldemichael K &Berhanu/2011	A retrospective review to determine magnitude and pattern of injury in Jimma University Hospital	LOW RISK
Mengistu Z &Azaj A/2012	A retrospective card review to trauma severities scores and their prediction of outcome among trauma patients in two hospitals of Addis Ababa	LOW RISK
Osman M et al /2003	A prospective study in twenty health institutions to assess the magnitude and patterns of injuries in North Gondar administrative zone	LOW RISK
Taye M &Munie T /2003	A retrospective review to test trauma registry in Tikuranbessa hospital, Addis Ababa	Low risk
UNThomas F &Nebyouseyoum /2014	A cross sectional study to assess pattern of injury among patients visiting emergency department of Hawassa University Hospital	Low risk
Tiruneh BT et al/2014	A cross-sectional study to assess the incidence of road traffic injury and associated factors among patients visiting the emergency department of TikurAnbessa Hospital, Addis Ababa	Low risk
HAILEMICHAEL F ET AL/2015	A cross-sectional study to assess magnitude and outcome of road traffic accidents among trauma victims at Hospitals in Wolaita zone	Low risk
UNWuhib Z &Tigist B /2013 to 2014	A cross-sectional study to assess the patterns of childhood injuries at TikurAnbessa Hospital	Low risk
UNTiruneh BT et al/2017	A cross-sectional study about factors associated with unintentional injury among pediatrics age population in the Hospitals of Amhara regional state	Low risk
Admassie Det al/2010	Brief communication: Adult limb fractures in Tikur Anbessa Hospital caused by road traffic injuries: Half year plain radiographic pattern	Low risk
Aenderl I et al/2014	Head injury-a neglected public health problem: a four-month prospective study at Jimma University specialized hospital, Ethiopia	Low risk

UN=unpublished studies

Meta-analysis: The prevalence of RTIs among trauma patients ranged from 1.3 % to 62.5% in individual studies. The highest (62.5%) prevalence of RTIs among trauma patients was reported in SNNPs and the least (1.3%) in Oromia. The finding of 17 studies reveald that the overall pooled prevalence of RTIs from trauma patients in Ethiopia was 31.5% (95%CI: 25.4%, 37.7%). In this systemtatic review and meta-analysis, severe heterogeneity was observed across the study (I2 =99.6% and p=0.000). We also assessed the presence of publication bias using Egger regression test, but there was no publication bias (P=0.243) (Figure 2).

Estimated pooled prevalence of RTIs among trauma patients

Author/year		ES (95% CI)	% Weight
Bashah DT et al/2015		33.90 (27.78, 40.02)	5.74
Tiruneh BT.et al/2014		36.80 (31.79, 41.81)	5.85
Ayele TA et al/2017		39.80 (35.93, 43.67)	5.94
Woldemichael K & Berhanu /2011		30.30 (27.59, 33.01)	6.01
Abebe GM et al/2006		1.30 (0.26, 2.34)	6.07
Amdeslasie F et al /2016		14.10 (11.32, 16.88)	6.01
Hailemichael F et al/2015		62.50 (57.66, 67.34)	5.86
Wuhib Z & Tigist B /2013 to 2014 (Un)		22.10 (17.93, 26.27)	5.92
Osman M et al /2003		14.70 (13.14, 16.26)	6.06
Taye M & Munie T /2003		41.00 (39.44, 42.56)	6.06
Wolde A et al 2008		11.10 (10.80, 11.40)	6.08
Thomas F & Nebyouseyoum /2014(Un)		54.00 (48.74, 59.26)	5.83
Kebede T et al/2008		24.20 (23.32, 25.08)	6.08
Mengistu Z & Azaj A/2012		49.10 (43.69, 54.51)	5.81
Tiruneh BTet al/2017 (un)		19.40 (16.81, 21.99)	6.02
I Anderl et al/2014		36.50 (23.41, 49.59)	4.78
Daniel A et al/2010		49.70 (44.93, 54.47)	5.87
Overall (I-squared = 99.6%, p = 0.000)		31.54 (25.35, 37.72)	100.00

NOTE: Weights are from random effects analysis
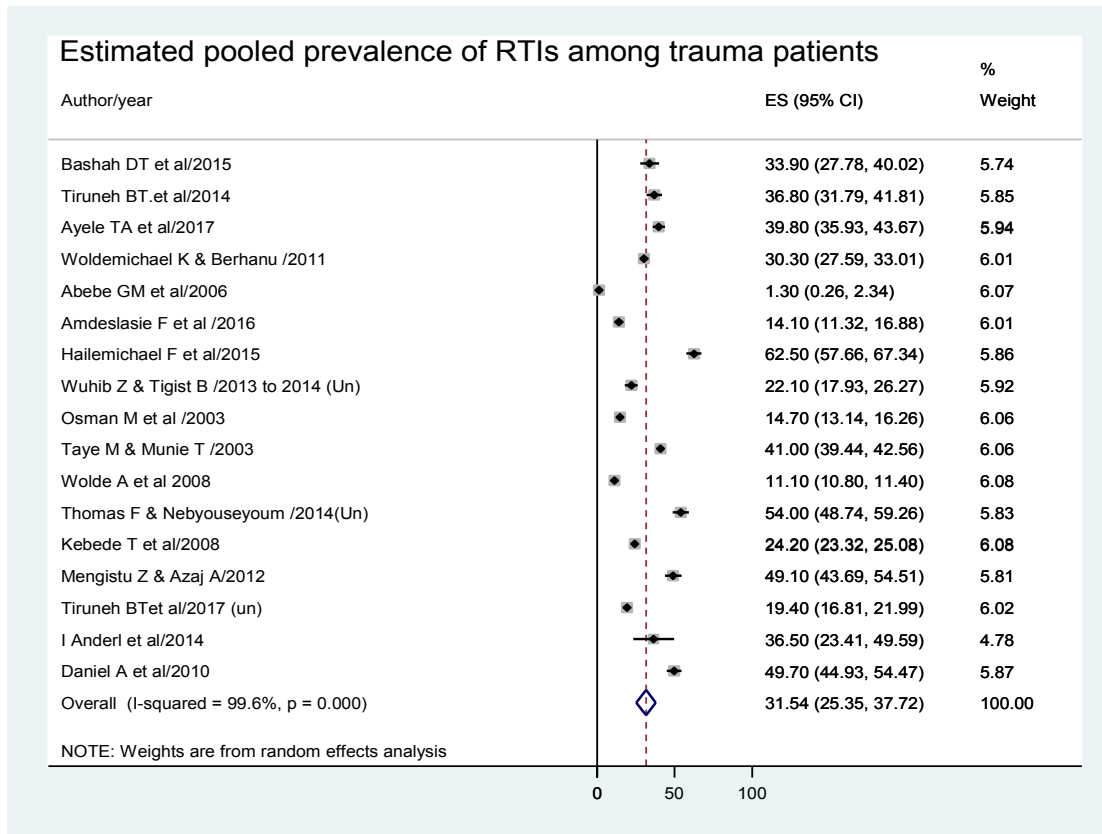
0   50   100

Figure2: Estimated pooled prevalence of RTIs of studies conducted and its 95%CI, the midpoint of each line illustrates the prevalence rate estimated in each study. The diamond shows the pooled prevalence throughout the country.

Subgroup analysis by region: In this meta-analyis, we conducted subgroup analysis based on the regions of the country where the studies were conducted. The subgroup analysis of this study revealed that the pooled prevalence of RTIs among trauma patients was high in Addis Ababa, the capital city of Ethiopia, 33.3 % (95% CI: 22.9, 43.7; I2 =99.8%) (figure3).

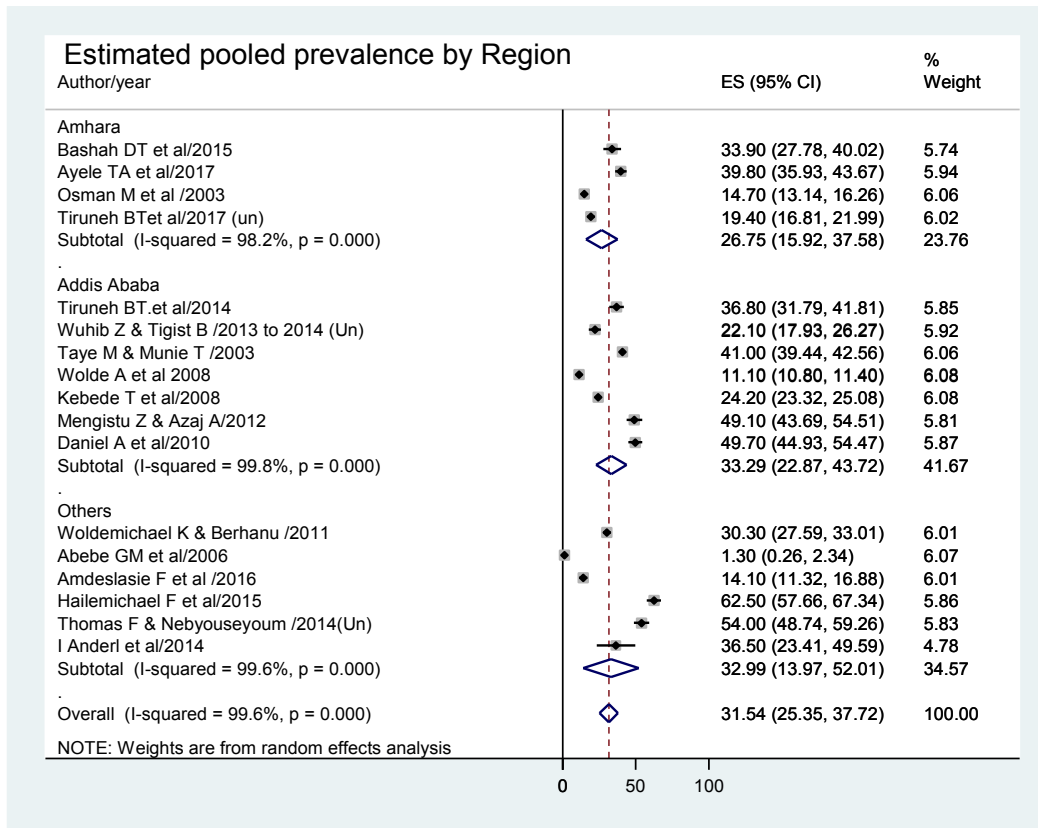| Estimated pooled prevalence by Region		
Author/year	ES (95% CI)	% Weight
Amhara		
Bashah DT et al/2015	33.90 (27.78, 40.02)	5.74
Ayele TA et al/2017	39.80 (35.93, 43.67)	5.94
Osman M et al /2003	14.70 (13.14, 16.26)	6.06
Tiruneh BTet al/2017 (un)	19.40 (16.81, 21.99)	6.02
Subtotal (I-squared = 98.2%, p = 0.000)	26.75 (15.92, 37.58)	23.76
.		
Addis Ababa		
Tiruneh BT.et al/2014	36.80 (31.79, 41.81)	5.85
Wuhib Z & Tigist B /2013 to 2014 (Un)	22.10 (17.93, 26.27)	5.92
Taye M & Munie T /2003	41.00 (39.44, 42.56)	6.06
Wolde A et al 2008	11.10 (10.80, 11.40)	6.08
Kebede T et al/2008	24.20 (23.32, 25.08)	6.08
Mengistu Z & Azaj A/2012	49.10 (43.69, 54.51)	5.81
Daniel A et al/2010	49.70 (44.93, 54.47)	5.87
Subtotal (I-squared = 99.8%, p = 0.000)	33.29 (22.87, 43.72)	41.67
.		
Others		
Woldemichael K & Berhanu /2011	30.30 (27.59, 33.01)	6.01
Abebe GM et al/2006	1.30 (0.26, 2.34)	6.07
Amdeslasie F et al /2016	14.10 (11.32, 16.88)	6.01
Hailemichael F et al/2015	62.50 (57.66, 67.34)	5.86
Thomas F & Nebyouseyoum /2014(Un)	54.00 (48.74, 59.26)	5.83
I Anderl et al/2014	36.50 (23.41, 49.59)	4.78
Subtotal (I-squared = 99.6%, p = 0.000)	32.99 (13.97, 52.01)	34.57
.		
Overall (I-squared = 99.6%, p = 0.000)	31.54 (25.35, 37.72)	100.00
NOTE: Weights are from random effects analysis		

Figure 3: The prevalence of RTIs of studies conducted and its 95%CI According to the location of the studies assessed, the midpoint of each line illustrates the prevalence rate estimated in each study. The diamond shows the pooled prevalence throughout in the regionsofEthiopia. Others (Oromia, SNNPs, Tigray)

POOLED PREVALENCE BASED ON YEAR

The time-trend analysis showed that RTIs among trauma patients from 2003 to 2017 increased (Figure 4).
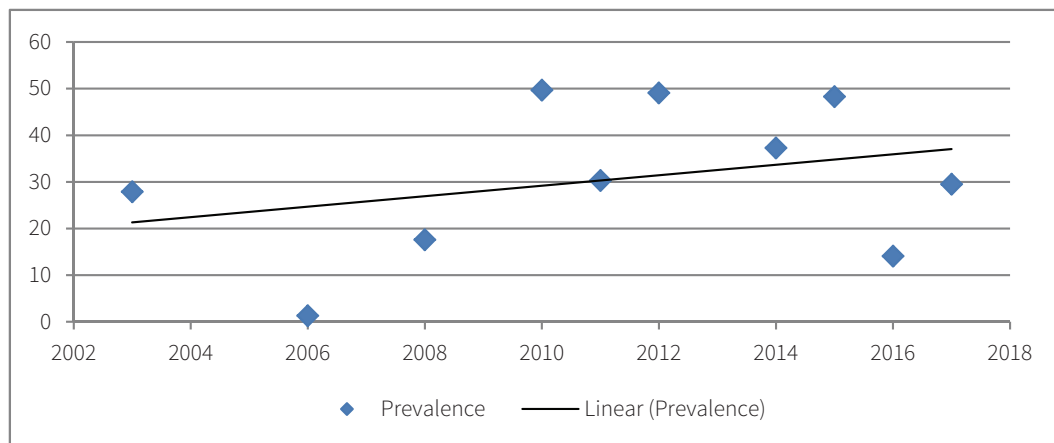

Figure 4:The time-trend of RTIs among traumatic patients from 2003 to 2017

DISCUSSION

Globally, road traffic injury is a major public health problem , but it is under reported including Ethiopia (41). In spite of under reporting data, the WHO report showed that Ethiopia is one the countries in which many people had got injury by road transportation (13). The finding from this study revealed that the pooled prevalence of

RTIs among trauma patients in Ethiopia was estimated at 31.5%. The finding from this study is comparable with a meta-analysis study conducted in SSA (32 %) (12). A comprehensive review in 1997 also revealed that RTIs accounted for between 13% and 31% of trauma admissions at hospitals of low-and middle-income countries (15).

Moreover, based on the subgroup analysis, the pooled prevalence of RTIs is showed a difference among regions; lower prevalence of RTIs was observed in Amhara region and the highest prevalence was observed in Addis Ababa, which agreed to a region considered as others (SNNPs, Tigray, and Oromia). The higher prevalence of RTIS in Addis Ababa might be attributed to the fact that Addis Ababa is the capital city of Ethiopia, high traffic flow is existed in which by the year 2013 around 16, 422 only public transportation buses were involved (42). The lowest prevalence in Amhara region might be due to the fact that in other regions limited researchs have been conducted. Notably, one study in Tigray, three in Oromo, and two in SNNPs were measured as others in the subgroup analysis. Additionally, compared to Addis Ababa, number of vehicles and accidents recorded in Amhara region were lower.

General Assembly resolution 64/2551 of March 2010 proclaimed 2011–2020 the Decade of Action for road safety to reduce the predicted level of RTIs by increasing activities conducted at national, regional and global levels (43). However, globally, from 1990 to 2015, road traffic injury rates increased (44). Likewise, this meta-analysis revealed that, in Ethiopia, the prevalence of RTIs among trauma patients was slightly increased from 2003 to 2017. This might be due to the fact that there are increasing road traffic accidents in the country. Many contributing factors for road traffic accidents are identified among different individual studies. The possible reason might be due to driving at midnight, over speeding, failing to give priority for other vehicles and pedestrians, vehicle technical problems (45). Besides,lack of awareness, increasing traffic flow, inappropriate road infra-structure, skills of driver, not using seatbelt, carelessness of the driver, driver age and experience, massive road and rail way construction may also contributes for increment of RTIs. There is nevertheless evidence that RTIs throughout the world can be reduced if effective accident prevention strategies are implementing. Therefore, as global recommendation, a reduction in RTIs can be achieved through strengthening road safety management, and safer roads and mobility, promoting using of safer vehicles and safer road users, and establishing immediate post-crash response throughout the country. The most important implication of this review for research is that there is a need for frequent research to realize and clarify the trend and risk factors for RTIs among trauma patients in Ethiopia.

Strength and Limitation: The limitations of this review regarding sample size the result may not represent national figure because limited studies have been conducted, so far. Regardless of this limitation, it is the first meta-analysis study of its kind and provides crucial information on the burden of RTIs in Ethiopia.

CONCLUSION

In conclusion, this study revealed that the pooled prevalence of RTIs among trauma patients in Ethiopia was significantly high. The time trend analysis noted increasing in RTIs from 2003 to 2017. Besides, to these there was a significant RTIs variation in the regions of the country. Therfore, the implementation of policies to decrease the burden of RTIs should get more emphasis.

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THE IMPACT OF WIDE AGE GROUP MEASLES SUPPLEMENTAL IMMUNIZATION ACTIVITIES (SIAS) ON THE NUMBER AND INCIDENCE OF MEASLES IN ETHIOPIA

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INTRODUCTION

Measles is one of the leading causes of under-five mortality in Ethiopia (1), and measles Supplemental Immunization Activities (SIAs) has been implemented in an interval of 2-3 years for the last decade in Ethiopia. However, measles incidence has been increasing in recent years despite the efforts. Measles SIAs was conducted in June 2013, the post measles coverage reporte showed 90.7% (2). However, the measles cases doubles in 2014 and almost increase by three fold in 2015(3). This was mainly due to accumulation of susceptible children that were missed in routine immunization and not targeted in the follow up measles SIAs that only targeted children aged 9-59 months age group. The federal ministry of Health (FMOH) of Ethiopia along with Expanded Program on Immunization (EPI) partners has been insisting, for support to implment wide-age group measles SIAs that cover up to the age of 14 years. However, there was no positive response from Global Alliance for vaccine and Immunization (GAVI). In 2016 follow up measles SIAs was planned for under five age group using GAVI financial source. The FMOH used its own resources to cover the measles SIAs for the age group of 5-14 years throughout the country. Accordingly, measles SIAs was conducted in 545 woredas to children aged 9 months to 14 years of age in April 2016. Similarly, in 2017 the FMOH used its own resources and conducted wide age group measles SIAs in the remaining woredas that were not covered in 2016. Besides, all 9-59 months old children were covered nationally in 2017 including those that were covered in 2016 to fill any immunity gap. In the measles SIAs conducted in 2017, readiness assessment tool was used to monitor level of preparation of for measles SIAs implementation and partner mapping was done to support the planning, implementation and monitoring of measles SIAs at national and sub-national level.

OBJECTIVE

The objective of this study is to describe the impact of wide age group measles SIAs on the number of cases and incidence of measles in Ethiopia, compared with previous measles follow up SIA. In addition, data triangulation approach in measuring impact of measles SIAs on population measles vaccination coverage and use of measles vaccine effectivness and proportion of measles vaccinated cases from surveillance data to determine measles population coverage is described.

METHODS

Measles case based surveillance data 2013-2017 along with measles SIAs implemntation status of woredas in 2013 and 2016 was analysed using micro soft excel and SPSS20. The measles cases distribution, by age, region, vaccination status, time of occurrence in relation to measles SIAs implementation was described. Comparison of measles incidence in districts that implement measles SIAs in 2016 and those that did not implemented was compared. The impact of follow up measles SIAs 2013 which targeted 9-59 months age group was compared with that of 2016 that targeted children aged 6-179 months old.

Vaccine effectiveness analysis serves as critical evaluation for immunization program and vaccination coverage(4). Measles vaccine effectiveness at population level can be estimated from measles case based surveillance reports using the following formula(4,5,6).

$$E = \frac{PCV - PPV}{PPV * (PCV - 1)}$$

Where:

- PPV is percent of population vaccinated

- PCV is Proportion of measles cases reported from case based measles surveillance

- VE is measles vaccine effectiveness

The percent of population vaccinated PPV (coverage) can be calculated if PCV is known and the vaccine has a known, relatively constant VE. Hence measles coverage (PPV) can be estimated using the algebraic transformation of the above formula as depicted as given the following eqution:

$$PPV = \frac{PCV}{VE*PCV+(1-VE)}$$

The proportion of cases vaccinated for measles was calculated from the case based measles surveillance data, and the above formula was used to measure the impact of measles SIAs 2016 on population measles vaccination coverage.

RESULTS

There were 6,539 measles cases reported in 2013 and the number of confirmed measles cases increased in 2014 and 2015 to 13,311 and 17,745 following the measles SIAs 2013 which was conducted in June 2013 and targeted children aged only 9-59 months nationally.

Figure 1: Confirmed measles cases by month, Ethiopia Jan 2008-July 2017

The number of measles cases in the 545 woreda that conducted wide age group measles has significantly declined in the 12 months following the April 2016 wide age group measles SIAs implementation. The number of measles cases decreased from 7,101 twelve months before the wide age group SIAs to 486 cases, which is a 93% reduction in measles cases.

On the other hand comparison of measles cases 12 months before and after April 2016 showed a 20% increase in the number of measles cases in woredas that did not conducted wide age group measles SIAs in April 2016.

Table 1. Measles cases in woredas that conducted April 2016 SIAs and other woredas 12 month before and after April 2016 measles SIAs

Period	woredas not implemented measles SIAs April 2016				woredas implemented measles SIAs April 2016			
	0-4 years	5-14 years	>=15 years	Total	0-4 years	5-14 years	>=15 years	Total
12 months before Apr2016	556	413	184	1153	3723	2494	890	7107
12 months after Apr2016	513	401	464	1378	169	167	150	486
% decline in cases	8%	3%	-152%	-20%	95%	93%	83%	93%

According to the comparison between SIAs (9-59 months) of June 2013 and April 2016, the wide age SIAs showed significant impact in reduction of measles cases and incidences which is recorded as lowest incidences in the past 10 years while recorded the highest incidence was in 2015 after the 2013 SIAs.

The population coverage following measles SIAs is measured either using administrative reports from the campaign by dividing children vaccinated to the target population or through coverage surveys. In this analysis additional method is used to estimate the population coverage from the proportion of measles cases vaccinated taking in to consideration the measles vaccine effectiveness in the different age groups.
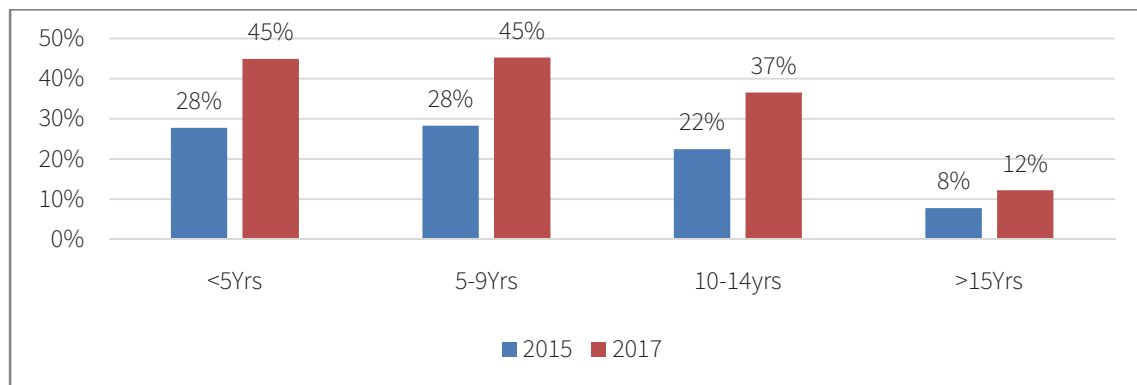

Figure 2. Proportion of measles cases vaccinated with one or more measles vaccine doses by age group 2015 vs 2017

Accordingly, using the proportion of vaccinated cases from cases based surveillance data given in figure 2 for 2015 and 2017, the population measles vaccination coverage was estimated for 2015 and 2017(figure 3). The population measles coverage has increased in 2017 following the measles SIAs implementation in 2016 and 2017.
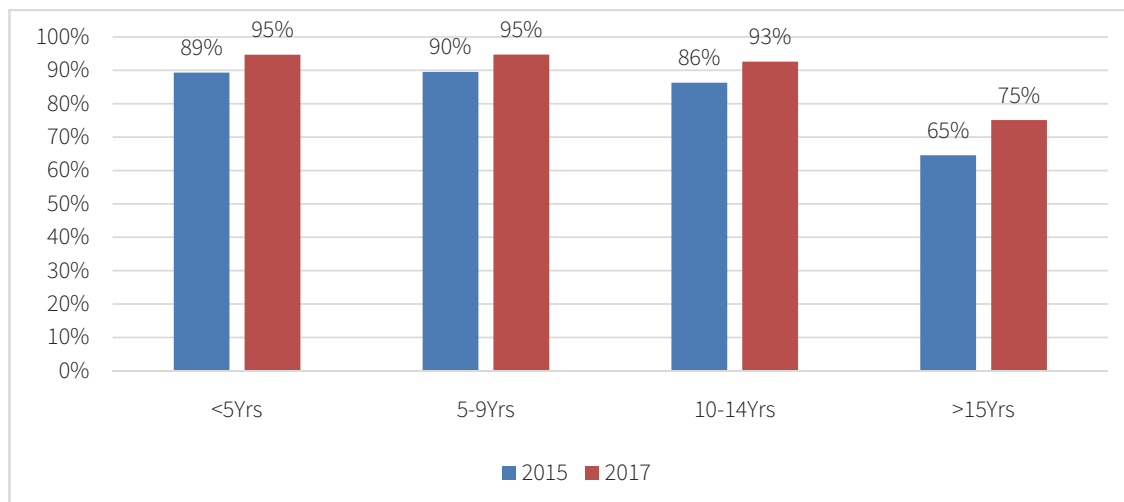

Figure 3. Measles Vaccination population coverage estimated from case based surveillance data comparison 2015 vs 2017

DISCUSSION

Measles cases and incidence remained high in Ethiopia in the last decade despite elimination efforts. The reason for increasing measles incidence following measles SIAs 2013 was that most (>60%) of the measles cases in 2014 and 2015 were above the age of five years who are not targeted in the measles SIAs. And those under five years affected were in zones with poor measles SIAs implementation as evidenced by low measles SIAs coverage (as reported from the post measles SIAs coverage survey report 2013).

Hence, the reasons for the continued measles outbreak were: sub optimal measles routine immunization coverage, measles SIAs only targeting under five-year children (leaving large susceptible population missed out), not introducing measles second dose vaccine into routine immunization and administration of invalid measles doses to children before the age of nine months. Though GAVI support was targeted for under five children, the FMOH took a bold decision to fund and vaccinate children aged 5-14 years in the 2016 and 2017 measles SIAs. This effort has reached and vaccinated a significant portion of the susceptible population in Ethiopia which is evidenced by the significantly reduced measles incidence in 2017. In addition, the FMOH has endorsed the introduction of Measles Second Dose (MCV2) and applied for co-financing to GAVI. The MCV2 introduction application is approved for 2018 introduction. Measles incidence normally decreases following measles campaigns. In Vietnam the incidence of measles was reduced from 5.44 in 2001 to 0.14 per 100,000 in 2002 following a national measles campaign which achieved 99% coverage (7). However, without high coverage with two doses of measles vaccine in the routine program, resurgence of measles outbreak is common in countries with single dose schedule even after SIAs achieving high coverage. In Vietnam, despite high MCV1 coverage which surpassed 93% since 1993 with a one-dose schedule, measles outbreaks occurred every 7-8 years, indicating the limitation of a single dose approach to interrupt circulation of measles virus. Hence the introduction of a measles second dose in the routine immunization program is an important programmatic opportunity to build population immunity, and fast track the progress towards measles elimination.

CONCLUSION

Accumulation of susceptible children due to suboptimal routine measles immunization, combined with suboptimal and narrow age scope measles SIAs resulted in continued measles outbreaks in Ethiopia.

Measles surveillance data can be used in an innovative approached for triangulation and population measles coverage estimation. In this analysis the impact of the measles SIAs in 2016 and 2017 has been estimated from the proportion of measles vaccinated cases and measles vaccine effectives, which can be used as one source to cross validate post measles coverage survey and admin coverage estimates.

The FMOH decision and implementation of wide age group measles SIAs in 2016-2017 has significantly contributed to measles incidence reduction. As measles SIAs has transient impact on measles incidence, the planned MCV2 introduction by MOH is crucial to achieve the goal of measles elimination.

In the mean time until high coverage of MCV2 is achieved, Ethiopia should continue to implement high quality follow-up measles SIAs with age targets tailored according to the measles epidemiology in the country.

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HOSPITAL-BASED SENTINEL SURVEILLANCE OF PEDIATRICS BACTERIAL MENINGITIS, ETHIOPIA, 2002-2015

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ABSTRACT

Background: Acute bacterial meningitis is one of childhood disease with high fatality rate and chronic sequelae. However, there is limited information on the causative agents and circulating strains following the introduction of Haemophilus influenzae type-b and Pneumococcal Conjugate Vaccines. Therefore, the aim of this study was to determine the disease burden, impact of vaccination & circulating bacterial serotypes in children in three paediatrics bacterial meningitis surveillance sentinel sites.

Materials and Methods: We have analysed data collected from children age less than five years old for the period from January, 2002 to December 2015. Data presented in this study were obtained from paediatrics bacterial meningitis sentinel surveillance sites of three Hospitals.

Results: A total, of 8,274 suspected acute bacterial meningitis cases were enrolled and bacterial pathogens were identified in 8.8 % (724) of the case. Above 90.3% (654) were vaccine preventable bacteria; - Streptococcus pneumoniae accounting for 46.9% (307), then Hib Haemophilus influenzae for 31.7% (207) and Neisseria meningitis for 21.4% (40). 98.1% of circulating strains for Haemophilus influenzae was type b. Meningococcal meningitis groups A, B, C and W135 were identified. The prevalence of confirmed meningitis after seven years of Hib vaccine introduction declined from 16.4% (127) to 2.9% (173), Hib meningitis 4.5% (35) to 0.9% (34) and pneumococcal meningitis 4.5%(35) to 1.5% (58).

Conclusion: Although this study was limited to a few sentinel sites using this longitudinal dataset we have found statistically significant reduction of acute bacterial meningitis (OR; 0.153, 95% Cl; 0.12-0.195). It is recommendable to expand, strengthen the surveillance system and conduct further studies that focus on population-based.

Keywords: Acute Bacterial meningitis, Paediatric, Conjugate vaccine, Ethiopia

INTRODUCTION

Acute Bacterial Meningitis (ABM) is the most prevalent and potentially life-threatening type of bacterial meningitis. ABM causes the highest case and death in younger children and elderly. The burden of the disease differs from region to region (1). Globally, it is estimated that bacterial meningitis affects about 1.2 million people each year, of which the sub-Saharan Africa has the greatest disease burden compared to other regions (2). In order to overcome the scourge of ABM, conjugate vaccines against ABM were introduced in many countries. However, ABM still represents a significant cause of childhood morbidity and mortality in sub-Saharan Africa including Ethiopia. The disease has high fatality rate, neurological complication (31.3%) and one in five survivors left with sequelae (50%) (2, 4, 5). In Ethiopia, there are limited studies that documented ABM in children. However earlier studies in our country showed the burden of paediatric bacterial meningitis is more commonly caused by Haemophilus influenzae (Hib) and S. pnuemoniae (Spn) (6, 7, 8, 9). Therefore, the aim of this study was to determine the disease burden, impact of vaccination & circulating bacterial serotypes in children in three pediatrics bacterial meningitis surveillance sentinel sites.

OBJECTIVE

The objective of this study was to determine the burden & the type of circulating strain of ABM in children less than five years of age.

MATERIALS AND METHODS

STUDY SITE

Data was generated from the sentinel surveillance sites for paediatric bacterial meningitis that exists in three hospitals. This study was conducted in three sentinel hospitals. Two of them were located in Addis Ababa city; Tikur Anbessa Specialized University Hospital (TASUH) and Yekatit-12 Hospital (Y12H) while the third site is Gondar University Teaching and Referral Hospital (GUTRH). Paediatrics bacterial meningitis sentinel surveillance was implemented during 2002 in TASUH, and again the surveillance extended to Y12H and GUTRH in 2008.

STUDY DESIGN, PERIOD AND DATA SOURCE

This is a prospective study that involved analysing data for the period between January, 2002 and December 2015. The sources of data presented in this study were obtained from PBM sentinel surveillance sites. All ABM cases that meets the standard criteria of WHO case definitions were included in the study (WHO IB-VPD case definition). Parent or guardian was requested to give their verbal consent to perform LP and participate in the surveillance.

STATISTICAL ANALYSIS

Data was cleaned using excel sheet and analysed using SPSS statistical software version 21.0 (IBM Armonk, NY). Categorical variables were reported as proportion and were compared using Pearson Chi-squared test. Odds ratios (OR) and 95% confidence interval (95% CI) were computed and reported.

ETHICAL CONSIDERATION

This study obtained ethical clearance from Scientific Ethical and Review Committee Office of Ethiopian Public Health Institute. Confidentiality of information was protected by making the hard copies accessible to only staff working on.

RESULTS

CHARACTERISTICS OF STUDY PARTICIPANT AND SETTING

A total of 8,274 suspected acute bacterial meningitis was reported from three sentinel surveillance hospitals from 2002-2015. Less than half (46.2%, n=3,824) of the cases enrolled were females. The mean and commonly affected groups age were 13 and less than 11 months. More than half (57.3%, n=4742) of study participants were enrolled by TASH, then followed by Y12H that enrolled above a quarter (25.9%, n= 2141) and the rest was enrolled by GUTRH (16.8%, n=1391) (fig.1).
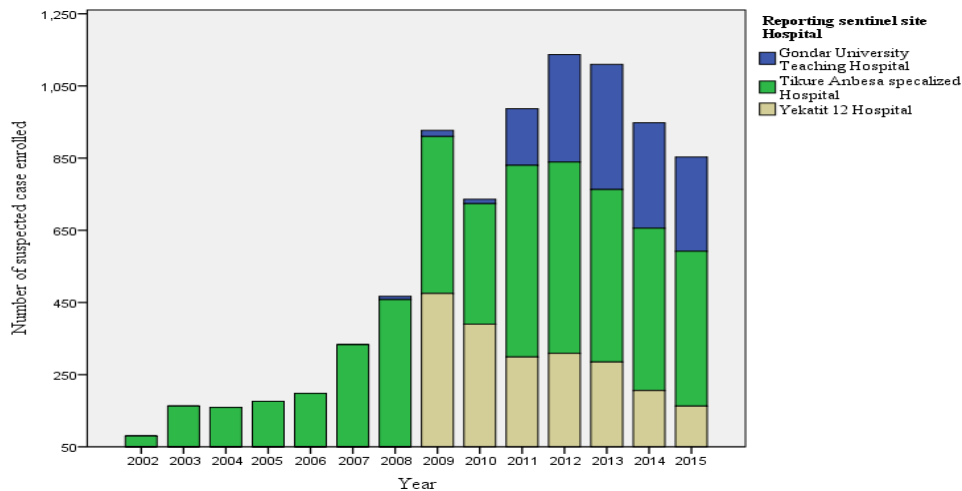
Figure 1: Case of Paediatrics ABM Enrolled per year by study sites, Ethiopia, from 2002- 2015

Bacterial pathogen was detected in 724 (8.9%) of patients. Among identified pathogens 90.3 %(n=654) of them were the most common vaccine preventable diseases that causing ABM; S. pneumoniae 46.9% (n=307), Hib 31.7 %(n=207) and N. meningitides 21.4% (n=140) (fig.2).
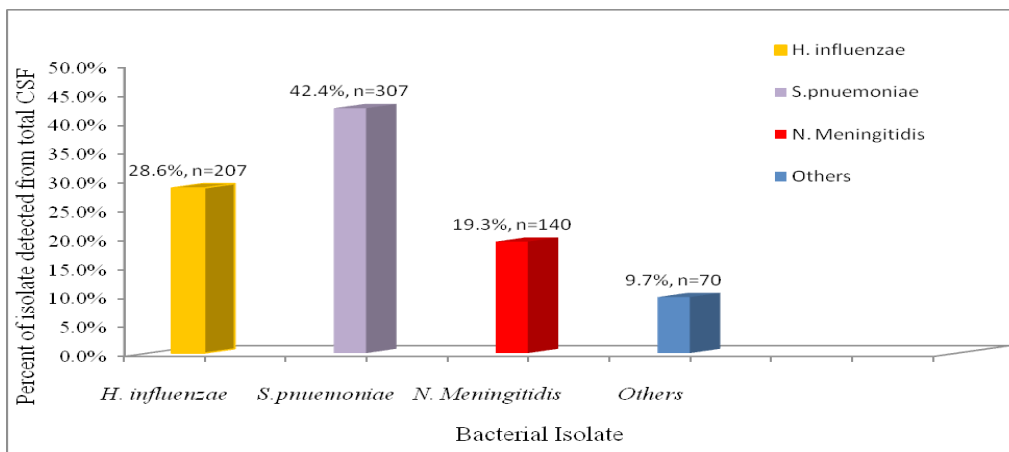

Figure 2: Type of identified pathogens among children bellow 5 years old in Ethiopia,2002-2015

Confirmed meningitis causing ABM showed variation over the years using culture (fig.3). 98.1% (n=203) of circulating serotypes for Haemophilus influenzae was type b, whereas S.pneumoniae serotypes showed more than a fold increments in non-vaccine type strains from 24.0 % to 54.8% while meningococcal meningitis group A, B, C and W135 were identified.
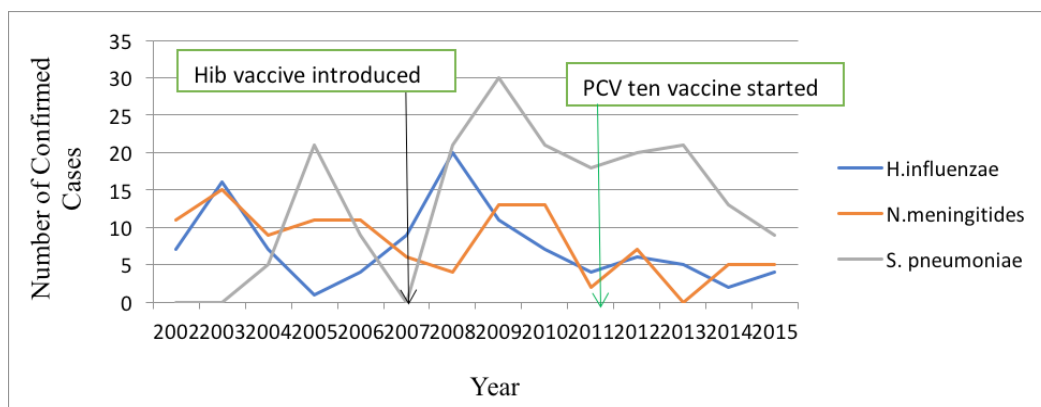
Figure 3: Number of Confirmed Meningitis cases in Ethiopia, per year since 2002-2015

The prevalence of confirmed meningitis after seven years of Hib and four year of PCV 10 vaccine introduction showed change in case decline from 16.4% (127) to 2.9% (173), (OR; 0.153, 95% Cl; 0.12-0.195), Hib meningitis 4.5% (35) to 0.9% (34) and pneumococcal meningitis 4.5%(35) to 1.5% (58). In addition, other bacteria like group B streptococci and salmonella species were identified.

From the 261 identified bacterial pathogens causing ABM in sentinel hospital laboratories, 75.9% (n=198 of N=261) of them were sent to central laboratory for quality control and serotyping. Of which, 63.1% (n =125 of 198) of them showed growth. Culture and real time PCR result comparison was made considering molecular test as gold standard. The sensitivity of culture against PCR was 19.5% (n=22 of 113). The specificity, Positive and negative predictive values of this test method was, 100%, 100% and 64.2%, respectively.

DISCUSSION

Despite some operational challenges of facility-based surveillance, using this surveillance data we were able to analyse disease the trend in magnitude and causative agent of ABM. Above ninety percent of causative agents that detected in this study were vaccine preventable bacteria (1,2,8). Based on this study our data analysis showed the reduction of ABM burden over years. In fact, the surveillance system improved in different way like laboratories detection capacity of agent, improved communication and data reporting, the prevalence of confirmed ABM showed dramatic change in reduction compared to data pre-Hib vaccine introduction under surveillance (16.4 to 2.9%) and with other studies (5,6,7,8). Comparing surveillance data before and after vaccine introduction, both Hib and S. pneuminae meningitis was showed low positivity rate over each year indicating that the vaccines intervention impact on disease burden and similar results also found in other studies (1,2,3,4,5,11,12). The other key point was the circulating serotypes over years of strains replacements for H. influenzae indicating almost all agent was Hib, whereas S.pneumoniae serotypes showed more than . The emergence of a non-vaccine type strain was very low in case of H. influenzae, over seven years, whereas Spn shifted by more than half within three years. Compared to previous study conducted in Ethiopia before vaccine intervention, the circulating strains for Spn were replaced by half. Hence, these differences indicate the role of vaccine on circulating vaccine serotype strains and more than two-fold increments in non-vaccine types strains while meningococcal meningitis groups showed increasing in W135 and decreasing group A.

The comparison made between the two methods was very low agreement and highlights the need for laboratory capacity building and the advantage of PCR in improved estimation of disease (4,5,28). As deferent available evidence suggest that cerebrospinal fluid management process highly matters detection rate due to many reasons (28,29,30).

LIMITATIONS OF THE STUDY

1. This study miss important variables like disease complication, sequelae, antibiotics profile, organism antibiotics profile, bacterial meningitis case flow and hospitalization.

2. Based on data of paediatrics bacterial meningitis, sampling method and representativeness: this surveillance estimate burden of disease in children from few Hospitals, which limits is the representativeness of our population and the study sites covers a few areas.

CONCLUSION

The information generated from this study was very valuable and more important in showing disease burden, circulating strains and the need for new vaccine development in the future. PCR test was able to detect five times more bacteria than culture. The decrease in prevalence of confirmed case can be attributed to the vaccine interventions; there are still needs of sustained attention in monitoring diseases. Therefore, it is recommended that the vaccine coverage should be strengthened. In order to monitor the shift in non-vaccine serotypes the surveillance system should be expanded. Moreover, introduction of multivalent meningococcal meningitides is recommended.

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COUPLES AGREEMENT ON FAMILY PLANNING USE AND ASSOCIATED FACTORS IN DUBTI WOREDA, AFAR, ETHIOPIA

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1. INTRODUCTION

For many years, women have been the respondents in most knowledge, attitude, and practice surveys related to family planning, contraceptive prevalence as well as demographic and health **(1, 2)**. Although convenient, this method has left a gap in knowledge about partners' agreement, and poses uncertainty on whether the contraceptive behavior of couples can be accurately inferred from these data. Focusing on couples agreement offers the opportunity to explore the consistency between couples in their recall and reporting of their contraceptive use **(3)**.

The fact that women bear the physical and emotional strain of pregnancy and childbirth has led to determination of contraceptive prevalence rates based solely on the female population **(4, 5).** However, in evaluating the most effective ways to increase family planning utilizations, it is important to gain an understanding of the degree to which couples agree on family planning use **(6)**.

Therefore, this population study aimed at the identification of factors associated with couple's agreement on family planning use and to propose possible recommendations to improve agreement and utilization of family planning services by couples. The results of this study would add a value to the policy makers, health bureau personnel, couples, health personnel and future researches.

2. STUDY OBJECTIVES

2.1 General Objective

The general objective of this study is to assess couples' agreement on family planning use and associated factors in Dubti Woreda, Afar Ethiopia, August to September 2015.

2.2 Specific objectives

- To determine couple's degree of agreement on family planning use

- To identify factors associated with couples' agreement on family planning use

3. METHODS AND MATERIALS

3.1 Study design

A community based cross sectional study was conducted

3.2 Study setting and period

The study was conducted in Dubti Woreda from August to September 2015. Dubti Woreda is 574 km away to northeast of the capital of Addis Ababa, this Woreda has a latitude and longitude of 11°44′N 41°05′E / 11.733°N 41.083°E with an elevation of 378 meters above sea level. Administratively Dubti Woreda is divided in to 14 Kebeles, 1 urban and 13 rural, and an estimated population size of 65,314, of whom 34,893 are men and 30,449 women. 16,997 women are in the age range of 15-49. The majority of the inhabitants were Muslim, with 88.01%, while 11.46% of the population said they professed Ethiopian Orthodox Christianity**.**

Although the few available studies indicate the relevance of couple's agreement on family planning use, data on agreement status of couples, especially in small Woredas, are still scarce, causing a lack of information. Agreement of couples that influence the utilization of family planning and reproduction need to be thoroughly

studied in different socio-cultural contexts especially in remote Woredas like Dubti, in order to develop appropriate interventions to achieve the desired outcome of family planning programs.

3.3 Source population

The source population was currently married couples residing in Dubti Woreda.

3.4 Study population

The study population was currently married couples who lived more than six months in the selected Kebeles (least administrative units).

3.4.1 Inclusion and Exclusion criteria

Currently married couples residing in Dubti Woreda where the age of women is15-49 years old who lived in the study area for 6 months or more, were included. Respondents who were seriously ill (unable to give the required information) during the data collection were excluded.

3.4.3 Sample size determination

In this study, using single population proportion formula sample size was determined using Epi info 7 statistical software. Taking proportion (p)for proportion of agreement of couples in sub-Sahara African countries on contraceptive use 47% (i.e., p=0.47)**(7),**with the assumption of 95% CI, margin of error of 5%. A minimum number of 383 currently married couples was the required number in the study. When we consider the design effect of 1.5 and 10% non-response rate, the total sample size used for the study was 633 married couples.

3.4.4 Sampling procedure

A stratified multi-stage sampling technique was employed to select study participants from urban and rural locations. Initially from the strata targeting the smallest administrative units in Ethiopia called "Kebele", 4 rural and 1 urban Kebeles were selected randomly using lottery method. The sample size was distributed to each kebele proportional to the Household (HH) size of the Kebeles. A HH was the basic sampling unit in each kebele and the eligible HH list in the chosen Kebeles were generated from the Kebeles record offices and simple random sampling technique was performed using the random number table. When we found more than one eligible respondent in the selected HH, only one couple was chosen by lottery method. In cases where no eligible respondents were identified in the selected HH, the next HH was used. The interview took place in the selected HHs by interviewing the couples on the same day, but separately to avoid an influence on each other.
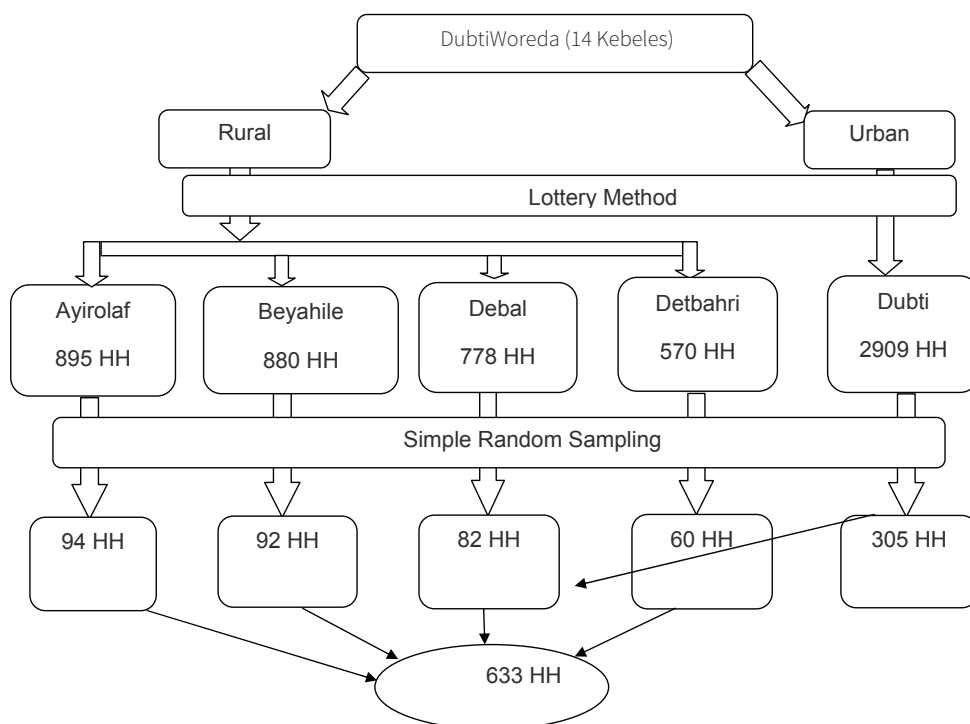
Fig.1: Schematic presentation of sampling procedure on couple's agreement on family planning use and associated factors in Dubti Woreda, Afar Ethiopia, 2015.

3.5 Study Variables

3.5.1 Dependent variable

Couples agreement on family planning use

3.5.2 Independent variables

Socio-demographic characteristics: age, educational status, marriage type, occupation, ideal family size, wealth index, residence and reproductive factors.

3.6 Operational definitions

Couple: male and female who are in a marital relationship.

Couples agreement on FP use: refers to the contraceptive agreement of couples to use the method of their choice (modern or traditional, male and female methods) at the time of the data collection. Husbands' and wives' reports were treated as agreement when both said either "yes" or "no"; otherwise, they were treated as disagreement.

3.7 Data collection procedures (instrument, personnel, data quality control)

A structured questionnaire was prepared in English language and translated to Amharic language. The survey questionnaire was pre-tested in 30 couples in Logya town which has similar socio demographic characteristics of Dubti Woreda and the necessary modifications and corrections were made to standardize and ensure its validity. Using the questionnaire, currently married couples were interviewed by four trained health extension workers as data collectors and one supervisor with experience in data collection. The selections of data collectors were based on the ability to speak Amharic and Afar language. The data collectors and supervisor were selected different from the study area in Semera-Logia city administration to avoid social desirability bias and they had training for two days mainly on the objectives of the study, understanding of the questionnaire and basic techniques of interviewing and how to handle ethical issues.

3.8 Data processing and analysis

Data was entered into Epi Info 3.5.1 and analysis was done using Statistical Package for Social Science (SPSS) version 20 software. A Univariate analysis was done using frequency and percentage.

Cross tabulation for kappa statistics was done to see the level of agreement. After adjusting for background factors, we examined the results from model of the relative influences of spousal attitudes and preferences on family planning use based on joint reports of use. Associations between dependent and independent variables has been assessed using Odds ratio with 95% confidence interval using multiple logistic regression; p-value less than 0.05 was considered as statistically significant.

3.9 Ethical considerations

Ethical clearance was sought from ethical review committee of University of Gondar College of Medicine and Health Sciences. Moreover; all selected participants were communicated about the objective of the study in order to obtain their verbal consent before interviewing. Participants were informed about their full right to withdraw or refuse to participate in the study at any time. Privacy and confidentiality of information given by each respondent were kept properly and names were not recorded.

4. RESULTS AND DISCUSSION

The observed agreement between husbands and wives regarding reporting of reproductive health events and family planning attitudes varied from moderate 67% for ideal family size to a high of 97.4% for a number of currently living children. But the unadjusted kappa statistic varied from 0.47(P≤0.000) for contraceptive attitude to 0.97(P≤0.000) for a number of living children.

Table 1: Agreement level between husbands and wives regarding family planning use, contraceptive practice, attitude and fertility desire in Dubti Woreda, 2015 (n=629)

Wife	Husband				
Ever use of FP	*NO (%)*	**YES (%)**	**TOTAL**	**Proportional agreement**	**Kappa**
No	181(28.8)	25(4)	206(32.8)	**87.3**	**0.72**
Yes	55(8.7)	368(58.5)	423(67.2)		
Total	236(37.5)	393(62.5)	629(100)		
Cont. attitude	**Disapprove**	**Approve**	**Total**		
Disapprove Approve	105(16.7)	31(4.9)	136(21.6)	**78.9**	**0.47**
	102(16.2)	391(62.2)	493(78.4)		
Total	*207(32.9)*	422(67.1)	629(100)		
Ideal family size	-	-	-	**67**	**0.49**
Current FP use	**NO**	**YES**	**Total**		
No	490(77.9)	3(0.5)	493(78.4)	**91.6**	**0.71**
Yes	50(7.9)	86(13.7)	136(21.6)		
Total	540(85.9)	89(14.1)	629(100)		
Fertility desire	**Want no more**	**Want more**	**Total**		
Want no more	83(13.2)	43(6.8)	126(20)	**90.1**	**0.66**
Want more	19(3)	484(76.9)	503(80)		
Total	102(16.2)	527(83.8)	629(100)		
Currently living children	-	-	-	**97.4**	**0.97**

Current use of contraception as reported by husbands and wives showed 91.6% (95% CI: 83.9 to 98.1%) overall agreement. The kappa statistic was 0.71 (P ≤ 0.000), which corresponds to substantial agreement. Current use of contraception was reported by 7.9% wives while the husband reported using none. 0.5% husbands reported

current use of contraception while their wives did not. These findings also add another dimension to the issue of differential reporting between husbands and wives that has not been given previous consideration. That is wives may be reporting use of some methods that husbands are not reporting. It may be inferred that there is covert contraceptive use by wives or it could be due to differences in perception regarding contraceptive methods amongst spouses as well as hesitation on the part of males to report female methods that their wives are using. Whatever the explanation, these discrepancies also emphasize the importance of obtaining information from both men and women when measuring contraceptive prevalence rate. In a study using data from six demographic and health surveys of sub-Saharan Africa, contraceptive use agreement ranged from 47% to 82%, but among couples in whom one or both reported use, both categories represented less than half in all nations except Zimbabwe**(7)**.

According to a study done in Haryana India, Cross tabulation for ever use of contraception (irrespective of the method) showed excellent agreement according to Fleiss' classification **(8)**. In our study also, Proportional agreement for ever use of contraception showed excellent agreement. Ever use of contraception was reported by 8.7% wives when husbands reported that they had never used any contraception. In most of the cases, the wives had taken Injectable and it could be that they did not inform their husbands regarding this. Ever use of contraception was reported by 4% of husbands when wives reported otherwise. In most of the cases, the method used by the husbands was a male-dependent method: Abstinence and withdrawal. This difference may be attributable to differences in perception between spouses regarding traditional methods or may be indicative of existence of multiple sexual relations with other partner either before or outside of marriage. Studies from many countries indicate that use of withdrawal is frequently under reported **(6,7,9)**.

A study done in Mekele city showed that there was agreement between husbands and wives in attitude towards contraception. In our study also, there was substantial agreement between couples in contraceptive attitude. However, this is an attitudinal variable for which the kappa value suggested only moderate agreement. In 16.2% of cases, wives approved of contraception whereas husbands did not, and in 4.9% of cases, husbands approved of contraception whereas wives did not. Discrepancies in the reporting of events indicate reporting errors on the part of one or both spouses, differences of attitudes and intentions are expected because these are subjective indicators. Available studies show that in many developing countries, most decisions that affect family life including family size and contraceptive use are made by men. Research in Kenya suggests that contraception is 2–3 times more likely to be used when husbands, rather than wives, want to cease childbearing **(4)**. Male involvement in family planning would not only ease the responsibility born by women in terms of family planning use, but would also accelerate the understanding, effective use and continuation more likely. On the other hand, even if the wife wants to use a contraceptive, she may not be able to use it or may be forced to discontinue the method if the husband disapproves of contraception.

From the present study, the significant difference in agreement between husbands and wives on family planning use indicates that current estimates of family planning use based on wives' response alone may be overestimates. Thus, there is need for formulating policies keeping the husbands' perspectives also in view.

The final model of couple's agreement on family planning use in this study revealed that approval of family planning, educational status, marital type among spouses; wealth index and age of couples were found to have significant impact on couple's agreement on family planning use. Most of the factors have been reported elsewhere and are in agreement with the family planning literatures. The findings of our study have highlighted that the percentage of couple's agreement to use family planning methods increases with increasing level of family planning approval. The percentage of couple's agreement to use family planning methods is almost 6.5 times higher when both partner approved use of family planning methods than either of the partner approve. This result also suggests that couples' joint approval of family planning have the strongest effect in increasing the likelihood of couple's agreement on family planning use. A similar association was observed in a study carried out in Nigeria, where greater joint approval enhanced contraceptive use by women **(10)**.

Husbands only approval also had higher odds of agreement to use family planning methods. In contrast, only wives' approval for family planning use had decreased odds of agreement to use family planning methods. Notably, this finding will help to shed light on the issue of whose view or approval is more influential in family planning use and also supports the claim that male involvement in family planning would accelerate effective use and continuation of family planning methods more likely. Previous research indeed indicated that husband's approval has the most important determinant of contraceptive use **(7, 11)**.

In agreement with this study, the type of marital union is significantly associated with couple's agreement to use family planning methods in Malawi, Zambia, and Zimbabwe. Couples in polygynous unions have lower odds of

using a modern contraceptive method compared with their counterparts in monogamous unions. Studies that investigated the effect of polygyny on contraceptive use argued that women in this type of marriage avoid use of contraceptives so that they can have large families**(7, 12)**. Furthermore, either of couples who were greater than secondary education and wife elementary but her husband uneducated, had lower odds of agreement on family planning use than when both of the spouses are greater than secondary education.

Couples agreement to use family planning methods was negatively associated with higher household wealth index. One explanation is that they may be better positioned to seek additional children. This contrasts to speculation by other researchers that use of modern methods is more likely among couples in wealthier households compared with those in poorer households **(7)**. Little evidence was found from this study that location of residence influences couples' agreement on family planning use.

To some extent, the finding of the present study provides more evidence that information from one spouse cannot fully represent the views of the other partner, nor of the couple. Therefore, consideration of combined models using reports from each spouse may help to detect variations between spousal reports and lead to understandings not attainable in single-partner formulation. Many problems and unresolved issues remain regarding the validity and reliability of either partner's sole reports, as well as of couples' data. The challenge remains to build on existing work and to improve the measurement, modelling and use of couple-level data.

Table 2: OR (and 95% CI) from logistic regression analyses on couples agreement on future FP use

Variables	Initial model	Final model
AGE		
Husband ≤ 30, wife < 30	1.17(0.7-1.9)	0.45(0.2-0.8)*
Husband 30-39, wife < 30	1.70(1.01-2.8)*	0.58(0.3-1.1)
Husband 30-39, wife >= 30	1.70(0.9-3.0)	0.72(0.3-1.4)
Husband >= 40, wife < 40	1.09(0.6-1.8)	0.63(0.3-1.1)
Husband 40-49, wife >= 40	0.35(0.1-1.1)	0.28(0.1-1.1)
Husband >= 50, wife >= 40	1	1
Education		
Both uneducated	0.16(0.09-0.2)**	0.58(0.2-1.2)
Husband elementary,wife uned.	0.18(0.1-0.3)**	0.45(0.2-0.9)*
Wife elementary, husband uned/elem.	0.12(0.04-0.3)**	0.23(0.1-0.8)*
At least one >= secondary	0.24(0.1-0.4)**	0.32(0.1-0.6)*
Both >= secondary	1	1
Approval of FP		
Both disapprove	1	1
Only wife approve	0.40(0.2-0.6)**	0.47(0.3-0.7)**
Only husband approve	2.33(1.2-4.3)**	2.71(1.3-5.4)*
Both approve	6.38(4.5-9.0)**	6.51(4.2-9.9)**
Ideal family size		
Both want ≤ 4 children	2.44(1.6-3.6)**	1.26(0.7-2.2)
Only wife want ≤ 4 children	1.04(0.6-1.7)	1.09(0.5-2.1)
Only husband want ≤ 4 children	1.36(0.6-3.0)	0.58(0.2-1.5)
Both want > 4 children	1	1
Place of residence		
Urban	1.29(1.01-1.66)*	1.10(0.7-1.5)
Rural	1	1
Marital type		
Monogamous marriage	4.40(3.1-6.1)**	2.49(1.6-3.8)**
Polygamous marriage	1	1
Ethnicity		
Both Afar	0.27(0.1-0.4)**	0.97(0.5-1.7)
At least one not Afar	1	1
Wealth Index		
Poorest	1	1
Lower middle	1.10(0.7-1.6)	0.93(0.5-1.5)
Middle	0.96(0.6-1.4)	1.08(0.6-1.7)
Upper middle	0.78(0.5-1.1)	0.55(0.3-0.9)*
Highest	0.42(0.2-0.6)**	0.62(0.3-1.0)

*P<0.05 **P<0.001

5. CONCLUSION

The results of this analysis indicated that overall, a greater degree of agreement was observed for family planning use. Socio economic status of couples, their type of marriage and the educational status of couples are factors that affect the agreement of couples on family planning use. In addition, age of the couples and approval of family planning use was found to be significant factors. The differences were significant in explaining how spousal views of both spouses and husbands attitude matter and contribute to a fuller understanding of how couples' agreement on their family planning use. More attention is needed in increasing men's active involvement in family planning programs to increase couples' agreement on family planning use in the future.

6. RECOMMENDATIONS

Having studied couples' agreement on family planning use and associated factors in Dubti Woreda, the following recommendations were made:

FOR POLICY MAKERS:

- The policy makers should take into account the context of engaging both husbands and wives in family planning issues.

- FP program, which is aimed at increasing men's active involvement in the use of contraception, needs to be designed.

REGIONAL HEALTH BUREAU AND WOREDA HEALTH OFFICE:

- Any strategy to improve family planning use in the area needs to address inequalities in family planning uptake by couple's education and their marriage type.

- The inclusion of men as targets of family planning campaigns will have an important influence in its acceptance and usage. The findings of this study showed that husbands have considerable influence on couple's agreement on family planning use.

OTHER RELEVANT BODIES AND NGOS:

- Start planning from attitude and practice gap so that appropriate interventions can be designed.

RESEARCHERS:

- Qualitative exploration may provide reach data

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MODE OF DELIVERY, MATERNAL PREFERENCES AND ASSOCIATED FACTORS, IN HAWASSA CITY PUBLIC AND PRIVATE HOSPITALS, SOUTHERN ETHIOPIA

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ABSTRACT

Introduction: The quality of obstetric care is reflected on the magnitude of perinatal and maternal mortality rates of a certain country. Despite of advances in modern obstetrics, maternal morbidity and mortality remains an international problem. Proper choice of mode of delivery is necessary to tackle this problem. Now a day's the rate of caesarean delivery has unacceptably increased throughout the world including Hawassa city, Ethiopia. **Objective:** To assess prevalence, maternal preference on mode of deliveries and associated factors in Hawassa city public and private hospitals, Ethiopia, 2017.

Methods: An institution based cross sectional study design was conducted from January 01- 30/2017 among mothers who were on labor and postnatal follow up. Systematic random sampling technique was used to get the total of 300 participants. Data entry was done using EPI data 3.5.1 and exported to statically package of social science version 20.0 software for analysis. The presence of association between independent and dependent variables was assessed using odds ratio with 95% confidence interval by applying logistic regression model.

Results: The prevalence of caesarean section was 49.3%. After controlling the possible confounding factors caesarean section rate increases significantly with monthly income above poverty, previous pregnancy complication, Current obstetrics problem, maternal preference for caesarean section delivery and Parthograph follow up. Of the 300 women, 87 % (n=261) preferred vaginal delivery.

Conclusion: The rate of caesarean section in Hawassa city was very high when compared with world health organization recommended rate. Monthly income above poverty, previous pregnancy complications, Current obstetrics problem, Parthograph follow up and maternal preference were the factors that contribute for caesarean section rate increment.

Most of the mothers prefer vaginal delivery than caesarean section delivery in Hawassa city. Maternal preference on caesarean section delivery also increases with previous pregnancy complications and not followed with Parthograph.

Key words: Associated factors, Ethiopia, Maternal preferences and Mode of deliveries.

1. INTRODUCTION

The quality of obstetrics care is reflected on the magnitude of perinatal and maternal morbidity and mortality rates of a certain country, which is considered as one of the vital indicators of health status. Despite advances in modern obstetrics care, maternal morbidity and mortality remains an international problem (1). Caesarean section is a surgical intervention designed to prevent or treat life threatening maternal or fetal complications (2).

Ethiopian Federal Ministry of Health (EFMOH) has applied multi-pronged approaches to reducing maternal and newborn morbidity and mortality, improving access to and strengthening facility-based maternal and newborn services is one such approach, and is also a major issue of concern in Health Sector Transformation Plan 2015/16-2019/20 of Ethiopia (2).

Caesarean section (C/S) rates have been rising progressively worldwide with a wide variability amongst various countries and regions (3). Though the safety of caesarean section has improved till date the morbidity rates are still high in comparison to the vaginal delivery (4).

According to the WHO, the C/S rate in any population should lie within the range of 5-15% and there is no justification in any specific geographic region to have more than 10-15% C/S births (5).

The C/S rate in Addis Ababa has increased considerably from 2.3% in 1995–1996 to 24.4% in 2009–2010. Since 2003 the rate persisted beyond the upper optimum level of 15% (2). Most of the studies conclude that vaginal delivery is safe, given a good selection of patients, assistance by qualified staff and careful management during delivery (6).

The aim of this study was to assess mode of delivery, maternal preferences and associated factors, in Hawassa city public hospitals, Southern Ethiopia.

2. METHODS

An institution based cross sectional study design was conducted from January 01- 30/2017 among mothers who were in labor and postnatal follow up. The sample size was determined using single population proportion formula and Epi Info version 7 at 95 % of confidence interval with 76.6**%** for the prevalence of vaginal deliveries (2), with **(α=0.05),** 5% marginal error **(**d=0.05**).** The final sample size was 304 by considering 10% none response rate. All laboring mothers after 28 weeks of gestation who lives in Hawassa city and come to give birth was included in the study. mothers who did not listen and speak were excluded. The participants were allocated proportionally to each hospital. All mothers can speak, listen and living in Hawassa city as a resident were included in the study. Systematic random sampling technique was used to get the total of 304 participants. Four (04) obstetric care providers who have BEmONC training were recruited and training was given for 02 days on the objective, relevance of the study, confidentiality of information, respondent rights, informed consent, and technique of interview. One BSc midwife was selected and trained to supervise the data collection. Data entry was done by using EPI Info 3.5.1 and exported to SPSS version 20.0. The presence of association between independent and dependent variables was assessed using odds ratio with 95% confidence interval by applying logistic regression model.

Mode of deliveries is the means of birth of the fetus either through vagina or by caesarean section.

A vaginal delivery is the birth of a fetus through vagina, in this study the birth of the fetus through vagina spontaneously or assisted by forceps and vacuum.

Caesarean Section (C/S):- Delivery of fetus, placenta & membranes through an incision in the abdominal and uterine walls.

3. RESULTS

3.1 Socio-demographic characteristic and experiences of study participants

A total of 304 mothers were participated in the study, with 98.7% response rate. The ages of participants were from 18 to 45 years old. The mean age of the study population was 27.02 with SD 4.95 years. Sidama was a dominant ethnic group, which accounted for 35.3% (n=106). From the participants 45.7 %(n=137) were house wives. Thirty one point three percent (n=94) of the participants were graduated from college or university.

3.2 Obstetric factor and experiences of study participants

From the participants 88.3 %(n=265) were multi Para. Most of the pregnancy 93.3 %(n=280) were planned. Majority 89 %(n=267) of the participants gave birth at term. Concerning antenatal care 95 %(n=285) of the mother had ANC visit. Thirty percent of the mothers were referred due to ante partum hemorrhage, pregnancy induced hypertension, fetal distress and premature rupture of membrane (PROM)

3.3 Mode of delivery in Hawassa city

The prevalence of caesarean section in Hawassa city is 49.3 %(n=148), from this 71.6% were emergency caesarean section.

3.4 Decision for caesarean section delivery

Most of the caesarean delivery decision was decided by the obstetricians.

3.5 Maternal preferences for mode of delivery

Most (87%) of the mothers prefer spontaneous vaginal delivery. The main reason for preference for most (61.7%) of the mothers is fear of caesarean section complications.

3.6 Factors associated with caesarean delivery in Hawassa city

Monthly income above poverty, previous pregnancy complication, Current obstetrics problem, maternal preference for c/s delivery and Parthograph follow up were the factors associated with caesarean delivery (Table 1).

Table 1: Factors associated with caesarean section delivery among mothers attending labor and postnatal follow up services in Hawassa city hospitals, SNNPR ,2017, (n=300)

Characteristic/s		C/S delivery		OR (95%CI)		P -Value
		No	Crude	Adjusted		
Age	18-32	130	137	0.79(0.38-1.63)		
	33-45	18	15	1.00		
Residency	Urban	118	115	1.27(0.73-2.18)		
	Rural	30	37	1.00		
Marital status	Married	144	143	2.27(0.68-7.52)		
	Not married	4	9	1.00		
Monthly Income	Above poverty	115	101	**1.76(1.05-2.94)***	**3.78(1.86-7.69)***	**0.000**
	Under poverty	33	51	1.00	**1.00**	
ANC follow-up	Yes	139	146	0.64(0.22-1.83)		
	No	9	6	1.00		
Pregnancy	Planned	142	138	2.40(0.89-6.43)		
	Un planned	6	14	1.00		
GA	Term	133	134	1.19(0.58-2.46)		
	Pre/post-term	15	18	1.00		
Day of admission	Working day	110	123	0.68(0.39-1.18)		
	Weekend	38	29	1.00		
Previous Px compli-cation	Yes	55	17	**4.69(2.56-8.59)***	**4.63(2.15-9.97)***	**0.000**
	No	93	135	1.00	**1.00**	
Condition of mother	Stable	141	147	0.68(0.21-2.20)		
	Unstable	7	5	1.00		
Parthograph follow up	Yes	105	43	1.00	**1.00**	
	No	143	9	**0.15(0.72-0.33)***	**0.12(0.04-0.32)***	**0.000**
Amniotic fluid	Rupture	30	28	1.13(0.64-1.99)		
	Intact	118	124	1.00		
Current obstetrics problem	Yes	50	26	**2.48(1.44-4.25)***	**8.15(4.25-15.62)***	**0.000**
	No	98	126	1.00	**1.00**	
Number of senior	Two	40	25	**1.88(1.07-3.23)***	0.57(0.06-5.47)	0.630
	More than two	108	127	**1.00**	1.00	
Maternal preference	C/S	35	3	**15.38(4.61-51.29)***	**13.86(3.53-54.42)***	**0.000**
	SVD	113	149	1.00	**1.00**	
Payment for deliv-ery	Yes	39	20	**2.36(1.30-4.29)***	4.55(0.44-47.34)	0.200
	No	109	132	1.00	1.00	
Parity	Prime Para	18	12	1.62(0.75-3.48)		
	Multi Para	130	140	1.00		

*P-value<0.25

** Adjusted for socio demographic characteristic/s and some concepts of Mode of delivery

3.7 Factors associated with maternal preference for caesarean delivery in Hawassa city

Previous pregnancy complication and not having Parthograph follow up were the factors associated with maternal preference for Caesarean delivery **(**Table 2**).**

Table 2: Factors associated with maternal preference for caesarean section delivery among mothers attending labor and postnatal follow up services in Hawassa city hospitals, SNNPR, 2017, (n=300)

Characteristic/s		Maternal Preference C/S delivery		OR (95%CI)		P -Value
		No	Crude	Adjusted		
Age	18-32	35	232	1.51(0.19-2.29)		
	33-45	3	30	1.00		
Residency	Urban	35	198	**3.77(0.08-0.89)***	2.45(0.61-10.12)	0.204
	Rural	3	64	1.00	1.00	
Marital status	Married	36	251	0.79(0.17-3.70)		
	Not married	2	11	1.00		
Monthly Income	Above poverty	33	183	**2.85(1.07-7.57)***	2.24(0.69-7.26)	0.178
	Under poverty	5	79	1.00	1.00	
ANC follow-up	Yes	36	249	0.94(0.20-4.34)		
	No	2	13	1.00		
Pregnancy	Planned	36	244	1.33(0.29-5.96)		
	Un planned	2	18	1.00		
GA	Term	36	231	2.42(0.55-10.50)	1.99(0.37-10.72)	0.420
	Pre/post-term	2	31	1.00	1.00	
Previous Px complication	Yes	25	47	**8.80(4.19-18.45)***	**10.02(4.50-22.33)****	**0.000**
	No	13	215	1.00	**1.00**	
Parthograph follow up	Yes	23	225	**0.25(0.12-0.53)***	**0.25(0.10-0.62)****	**0.002**
	No	15	37	1.00	**1.00**	
Amniotic fluid	Rupture	4	54	0.45(0.15-1.33)		
	Intact	34	208	1.00		
Current obstetrics problem	Yes	11	128	**0.43(0.20-0.89)***	0.53(0.22-1.29)	0.164
	No	27	134	1.00	1.00	
Payment for delivery	Yes	9	50	1.32(0.59-2.96)		
	No	29	212	1.00		
Parity	Prime Para	2	28	0.46(0.17-2.03)		
	Multi Para	36	234	1.00		

*P-value<0.25

** Adjusted for socio demographic characteristic/s and some concepts of maternal

3.DISCUSSION

This study was conducted in Hawassa city, south nation nationalities and people regional state southern Ethiopia. One out of two women gave birth by caesarean section. The prevalence of caesarean section in Hawassa city is 49.3 %(n=148), from this 71.6% were emergency caesarean section. This finding is incomparable with WHO recommended rate (5-15%) and the study conducted in Addis Ababa 24.4 % **(**2**).**

The prevalence of caesarean section delivery in private hospitals (65%) were higher than public hospitals (45%). The difference may be due to payment related decisions for mode of delivery which means in public hospitals any service related to delivery is free. But in private hospitals the service is not free, for spontaneous vaginal delivery (34.4 USD) and caesarean section (130.4 USD).

Most 87 %(n=261) of the mothers preferred vaginal delivery. This finding is higher than the study conducted in brazil 70.8% of the mother prefers vaginal delivery **(7).** The main reason for preference of vaginal delivery was fear of caesarean section complications.

Monthly income above poverty, previous pregnancy complications, Current obstetrics problem, Parthograph follow up and maternal preference were the factors that contribute for caesarean section rate increment.

4. CONCLUSION AND RECOMMENDATIONS

- The rate of caesarean section in Hawassa city was very high when compare with the WHO recommended prevalence.

- Most of the mothers prefer vaginal delivery than caesarean delivery in Hawassa city.

- Hawassa city health bureau and other concerned bodies need to take action to minimize the rate of caesarean delivery in the city.

- Hawassa city hospitals need to consider the prevalence of caesarean delivery and take aq responsibility for it.

- Parthograph follow up of every laboring mother is necessary to reduce the prevalence of caesarean delivery.

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SECTIONS	PAGE