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Research Article

# Determinants for Effective Implementation of EPI on Vaccine Coverage for Under Five Years Old Children in Remote Areas in Kilwa District Council

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## Abstract

This paper assessed determinants for effective implementation process of expanded program immunization on vaccine coverage for under five year's old children in remote areas in Kilwa District Council. The study employed qualitative approach and conducted the study in 13 health facilities. The study interviewed relevant participants involved in vaccination program in the health services, but also reviewed relevant documents. Data generated were transcribed verbatim and analyzed using thematic analysis. Findings further showed that expanded program on immunization in Kilwa district succeeded at a great extent but some of the health facilities didn't reach the target due to shortage of vaccine such as BCG, OPV1, 2&3 and DTP, shortage of fund to run the EPI program within the district and shortage of health workers. Lactating mothers do not always bring their children back to the clinic on the return dates, but also shortages of equipment for immunization. The study concluded that, knowledge of lactating mothers concerning immunization was adequate except that the uptake of vaccination among babies was found to be low. The study recommends more health education by healthy workers on importance of immunization at the study place

## Introduction

Immunization is pointed out as the most important public health interventions and proven strategy of preventing morbidities and mortalities among under five children [1]. According to international report indicated that globally 2-3 million number of children under 5-year old youngsters are dying while others being disabled due to inoculation just [1]. As per World WHO (2019) [1], vaccination deflects ailment or illness, disability, and death from Vaccine-Preventable Diseases (VPDs). WHO (2017) [2] distinguishes the rules for leading an extended program on vaccination; idea advancement, arranging and arrangement, directing the audit, blend and suggestion and implementation.

According to WHO (2019) [1], in a span of five years from 2009 to 2014, global immunization coverage remained between 83%-84%. In spite of that, the coverage is not uniform in all regions; there exists pockets of lower than optimal immunization coverage. For instance, in 2013, global coverage was at 84% but in African region, the coverage rate was only at 75% compared to 96% coverage in Western pacific and European regions (CDC, 2014).

Consequently, despite the immunization coverage being above the herd immunity threshold which is 80%, some regions, 1.5 million childhood mortalities are still linked to vaccine preventable diseases (WHO, 2019) [1]. The distribution of these childhood mortalities portrays the disparity in immunization coverage where Africa has the highest under-five mortality rates (U5MR) of all the world's continents [3]. In 2011, DPT3 coverage in Africa for children under 12 months was 71%. Nearly 14 million children did not receive the first dose of DPT, whereas 8.4 million children started but did not complete the 3-dose DPT series. In

2013, estimated 21.8 million eligible children did not complete the 3-dose series (WHO, 2014). In Sub-Saharan Africa, one child in every 13 children die before their fifth birthday, which is 14 times higher than in developed countries (WHO, 2019) [1].

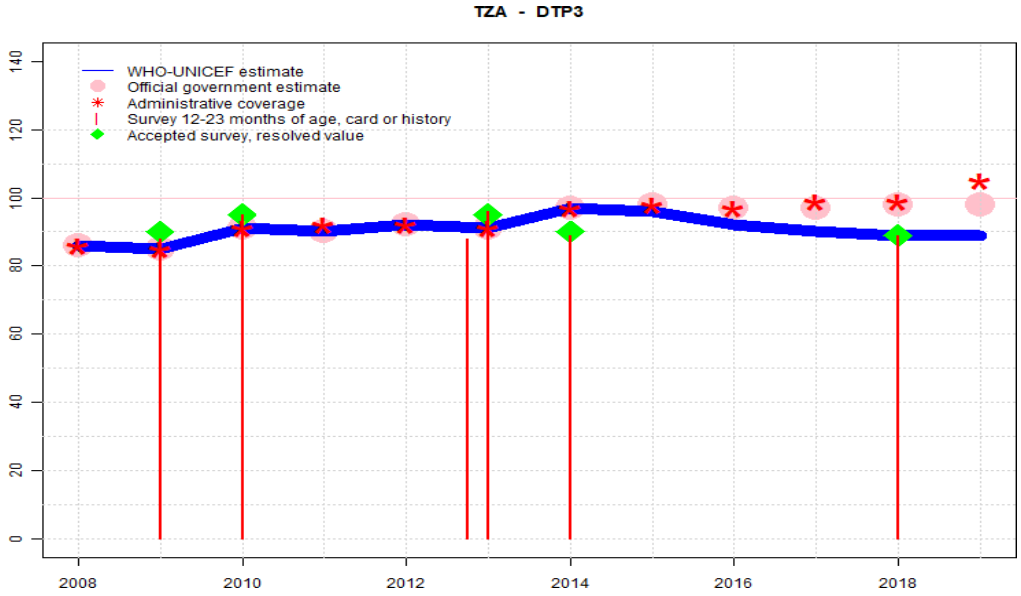


**Figure 1:** Penta 3 Coverage.

**Source: WHO report (July 2020)**

The government through Ministry of Health and Social Welfare customized the Expanded Program on Immunization (EPI) into Tanzania Expanded Program on Immunization in 1980 to coordinate the immunization services in the country [4]. Through the Division of Vaccines and Immunization's (DVI), EPI added hepatitis B vaccine (HepB) and Hemophilus influenza type b (Hib) to DPT to form a pentavalent vaccine which prevents against diphtheria, pertussis, tetanus, hepatitis B and Hemophilus influenza [4].

Furthermore, the government of Tanzania supported provision of immunization whereby 13 antigens delivered free of charge in all public and private health facilities [4]. The vaccines provided were BCG, OPV, DPT-Hib-HepB, PCV13, Rotavirus, Measles Rubella and Tetanus Toxoid. In 2017, the coverage of more than 90% was achieved in all antigens except for the second dose of Measles Rubella (MR2) which was 78% reflecting that parents or caretakers were not informed or reminded of the second dose of Measles Rubella vaccination visit [4]. In 2017, a total of 152 (83%) out of 184 district councils achieved the DPT-Hib-HepB 3 coverage of at least 90% and the number of children who did not complete three doses of DPT-Hib-HepB reduced from ,65 122 reported in 2016 to 34,149 for 2017 [4].

Tanzania's vaccination coverage has remained below the WHO recommended rates and has been on decline since late 1990s when it was 72.7 percent, 72.3 percent in 2004 as well as 68%, in 2014 [4]. In Tanzania, the Ministry of Health and Social Welfare modified the Expanded Program on Immunization (EPI) into Tanzania's Expanded Program on Immunization in 1980. This was meant to harmonize the immunization services in the country, whereas 13 antigens delivered free of charge in all public and private health facilities (WHO, 2019) [1]. About 90% the government of Tanzania achieved to provide the antigens except for the second dose of Measles Rubella (MR2) which was 78%. This replicates that, parents or caretakers were not knowledgeable or reminded of the second dose of Measles Rubella vaccination visit.

Immunization coverage remains a problem in some of the Health facility at Kilwa District such as Kisangi Dispensary, Nandete Dispensary, Zingakibaoni Dispensary still the OPV and measles coverage is below 80 % (VIMS, 2019).

In addition, immunization coverage remains a problem in some of the Health facility at Kilwa District such as Kisangi Dispensary, Nandete Dispensary, Zingakibaoni Dispensary still the OPV and measles coverage is below 80 % (VIMS, 2019). This means that there is low coverage of vaccination due to the factor that there is little awareness among mothers on why there is a need to vaccinate, failure of mothers to return the children for the 2nd and 3rd doses due to fear of side reaction; negative perception upon contraindication of immunization and limited information on place and/or time of immunization. Little is also known on evaluation of

implementation process of expanded program on immunization on vaccine coverage for under five years old children in remote areas in Kilwa district council.

The government of Tanzania supported provision of immunization whereby 13 antigens delivered free of charge in all public and private health facilities [4]. The vaccines provided were BCG, OPV, DPT-Hib-HepB, PCV13, Rotavirus, Measles Rubella and Tetanus Toxoid. In 2017, the coverage of more than 90% was achieved in all antigens except for the second dose of Measles Rubella (MR2) which was 78% reflecting that parents or caretakers were not informed or reminded of the second dose of Measles Rubella vaccination visit [4]. Therefore, this study sought to examine the factors facilitating or hindering processes for implementation of EPI on vaccine coverage for under five years old children in remote areas in Kilwa District Council.

**Previous Research Evidence**

Yihunue, et al. (2015) conducted the study on childhood immunization in Ethiopia for 12-24 months old children and found that fully immunized children were 24.3%. This utilization was below the set national target of 66%. The finding and conclusion from this study indicates that health facilities had to obtained appropriate information in relation to childhood immunization. Also, based on the findings the study recommends that all the health workers should be equipped with training in relation to childhood immunization. According to Cana van, et al. [5] conducted the study by using demographic information obtained from developing countries such as Rwanda, Uganda, Kenya, Burundi, Tanzania, and Ethiopia and checked on rates of fully immunized child for BCG, polio and DTP as per WHO. The study findings revealed that children's should be directed to one among the vaccines provided so as to prevent the spread of disease. Also, based on the study recommends that there should be examination of political stability in each of the developing countries under this observation.

Ozcirpici, et al. [6] conducted the study on the immunization services for young children in Gaziantep, Turkey. The study findings reveal that the level of immunization drop about 84% due to individual personalities as well as the perception generated from the society regarding the vaccination. Therefore, more education should be provided in order to raise the awareness on the importance of immunization. Onsuma, et al. [7] conducted on the maternal health and children immunization status in Kenya. The findings revealed that most of the children in Kenya they use BCG 94%, poliomyelitis 77%, DPT 91% and measles 74%. But also, BCG vaccines has not fully arranged compared to other vaccination.

Therefore, the conclude that more education concern the importance of immunization service should be provided. Gianluca, et al. [8] they conducted the study where by the findings from their study revealed that variables such as low utilization of antenatal clinics, low perception on immunization, many children in the family, inaccessible health facilities, inadequate knowledge on immunization and retention of child health card in the health facility plays a major role in decrease the level of vaccination service. The study conclude that health education should be provided and more time should be allocated so as to improve the process of immunization. Furthermore, according to Etana and Deresa (2012) [9] examne the study on children aged 12-24 months to identify risk factors linked to uptake of immunization in central Ethiopia. The findings revealed that about 34.5% are fully vaccinated and unvaccinated 23.7%. Also, the study indicates that the main reasons for this outcome is due to the inadequate knowledge on the vaccination.

According to Hussein et al., [10] conducted the study on the factors that influence immunization coverage among children aged 12-23 months in Oromia Regional State, Eastern Ethiopia. The study revealed that there is low rate of vaccination coverage due to mothers had an inadequate knowledge concerned the education of vaccination. On the other hand, Belachewet al. [11] on his study the findings revealed that most of the mothers had poor knowledge concern the education of immunization. Moreover, based onLilian et al., (2013) conducted the study on the full immunization among children aged 12-23 months in Kaptembwo location, Nakuru County in Kenya. The study revealed that the drop-out rate between the first and third pentavalent vaccine coverage was 8.9%. But also, this study didn't cover other related factors such as accessibility in terms of distance so as to identify defaulters and reduce drop-out rate.

## Methodology

A cross sectional study design was employed to determine the implementation of Expanded Program on Immunization for under five children in remote areas. The researcher adopted cross sectional because of its flexibility, less expensive and less time consuming compared to other study designs. Also, the study targeted populations to whom the findings are generalized. These include CHMT members including DMO, DRCHCO, DIVO from Kilwa District and all parents or guardian with under 5 children, under 5 children, health care providers from health facilities. See in the Figure 2 below;

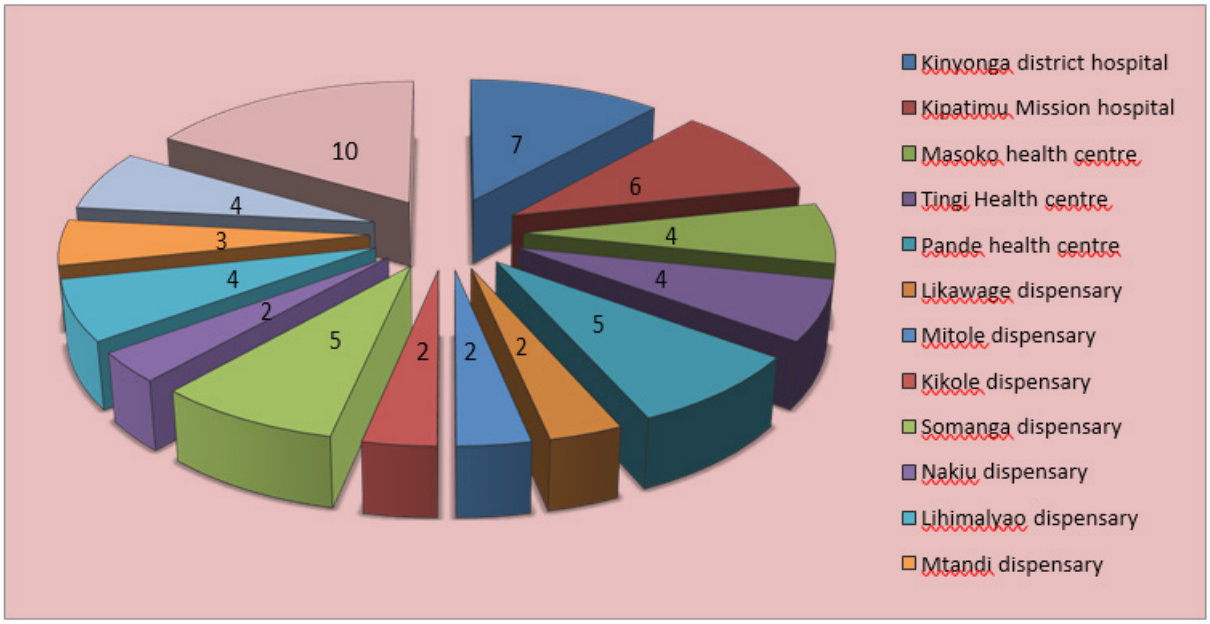


**Figure 2:** Proportion distributions of Respondents by health facilities.

The sample size was pre-determined. The appropriate sample size for the study obtained was 60. Purposive sampling technique was used to select the sample size these techniques enabled not all the respondents to have an equal chance of being selected. The study was conducted between May and July 2021 and included 60 participants from different health facilities in Kilwa District, Tanzania.

Kilwa District is one among the six districts in the Lindi region. According 2012 Population and Housing Census Kilwa District was estimated to have total population of 190,744 with male 91,661 and female 99,083 with average of house hold size 4.4 sex ratio 93. The council has 60 health facilities 53 Dispensaries, 5 health center and 2 hospitals. Therefore, a total of

13 health facilities were involved in the study in which 2 were from Hospital, Kinyonga district hospital and Kipatimu mission hospital. 3 Health Centre, which is Masoko, and Tingi in urban area and pande in hard to reach area which stipulated at rural area,8 Dispensaries which is Likawage, Mitole, kikole, somanga, Nakiu, Lihimalyao, Mtandi, Mavuji stipulated at rural in hard to reach areas. The council has 6 divisions with 23 wards, 91 villages, and 10streets with 2 Township the study was conducted in 13 wards.

| Facility | Male | Female | Total |
|---|---|---|---|
| Kinyonga district hospital | 1 | 6 | 7 |
| Kipatimu Mission hospital | 1 | 5 | 6 |
| Masoko health centre | 1 | 3 | 4 |
| Tingi Health centre | 1 | 3 | 4 |
| Pande health centre | 1 | 4 | 5 |
| Likawage dispensary | 0 | 2 | 2 |
| Mitole dispensary | 0 | 2 | 2 |
| Kikole dispensary | 0 | 2 | 2 |
| Somanga dispensary | 1 | 4 | 5 |
| Nakiu dispensary | 0 | 2 | 2 |
| Lihimalyao dispensary | 0 | 4 | 4 |
| Mtandi dispensary | 1 | 2 | 3 |

| | | | |
|---|---|---|---|
| Mavuji dispensary | 0 | 4 | 4 |
| CHMT members | 4 | 6 | 10 |
| Total | 11 | 49 | 60 |

**Figure 3:** Summary of the study participants.

The facility operating immunization services in this study area is 57, out of 57 health facilities 13 were randomly selected, 3 from urban 10 from rural ward; from selected facilities a list of 60 participants was obtained. Non-probability sampling technique to identify the key informants who provided the information for this study. Thirty eight (27) healthcare workers and 10 CHMT members were purposely selected depending on the key information required from them. Mothers and care givers of under 5 children were conveniently selected who were visit RCH clinic. Saturation was used to determine the final number of respondent .60 participants was consented to participate. The study includes all under five children with immunization schedule between June 2020 up to Aug 2021.

All mothers and care givers of under 5 children who were available on the day of data collection were conveniently selected Included in the study, while mothers and care givers of above 5 children and those who didn't agree to participate in the study were excluded. All health care providers who works on RCH clinics and CHMT member were purposely selected included in study for the relevant information.

## The Interviews

Qualitative data collection methods which comprise primary and secondary data collection, the primary source used in-depth interview to health care workers, CHMT members and mother and care givers of under five children, secondary data was obtained from various documentary sources including publish and unpublished records, DHIS report. Questions were prepared in English and Kiswahili language. The interview guide was pilot-tested among health care provider from Mpara Dispensary in Kilwa DC changes were made in language to make some questions easier to understand. Interviews were tape-recorded and notes were taken during the interviews. Every day after the interviews, the notes prepared and listened to the tape-recorded interviews and made a summary. The recorded interviews were transcribed verbatim and translated into English. Smart phone were used to communicate with respondents, interview were conducted with 60 participants by Principal investigator with research assistants, most of interviews were conducted at health facilities, the process of interview took approximately 45 minutes.

Data analyzed by using qualitative contents analysis. The transcribed texts were imported into the Atlas. Version 8.2.4, then codes using pre-determined themes, emerging themes were deductively coded, and the output were created, quotation, memo, and families for writing report.

Ethical clearance was obtained from Mzumbe University through Ethical Clearance Committee, which provided ethical approval by providing an approval letter to respective District Executive Directors (DED). The permission for the collection of data was obtained from DED of Kilwa DC. All participants were informed about the purpose of this study and secure that participating in this study is merely volunteer. Written consent was provided to the participants before interviews and verbal consent was asked during discussions.

### The Findings from the factor affecting implementation of EPI Financial constraints

During an interview, CHMT Members mentioned that, inadequate funding was the major obstacle towards effective implementation of vaccination interventions. All aspects of vaccination program are found to be disrupted by poor funding. DHO reported that the gaps existing in funding have been behind poor implementation of EPI activities in terms of coverage. This was as quoted below;

Inadequate of fund for operational activity which leading to non-implementation of critical activities e.g., supervision, distribution of medical equipment and supplies under the current budgetary, we do supervision but it delayed due to lack of funds/ Transport. More over our mobile sessions have transport challenge. (CHMT member, June 2021)

DHS also reported that, funding challenge led to poor implementation of EPI activities in terms of coverage. This was as mentioned as follows;

There is delayed disbursement of funds from different source e.g. Funds from basket fund, sometimes it delays more than 2 quarter, which cause shortage of fuel and repair or maintenance of vehicle and refrigerator, leading to restricted field visits of vaccinators and the monitoring staff. (CHMT member, June 2021)

Some CHMT members were of the arguments that there was no effective funding of vaccination activities for both campaigns and routine immunization activities. Also, these activities were not given priority during implementation of immunization programs.

### Inadequate Infrastructure and Equipment

Also, the finding obtained from the respondents revealed that their poor mobilization of vaccine due to absence of well-equipped offices, absence of adequate vehicles, motorcycles as well as other transportation means. There was also no readiness of all other equipment which were needed in carrying out these activities. DIVO highlighted that a major challenge is lack of mobility. This

was as quoted below;

One of the major challenges is lack of mobility. You cannot succeed in undertaking social mobilization work effectively if at all there is no mobility given that you will have to pass through different places. We do have one vehicles attached to immunization services health department, it is not able to distribute all 57 health facility at once, it better to have more than one vehicle. And the vehicle is Nissan which comprise one sit with the only driver which make difficult to use that vehicle in supportive supervision, it is difficult to carry more than 3 CHM" (CHMT member, June 2021).

**Health Worker Shortages**

Majority of the respondents revealed that, there is a shortage of health personnel especially in rural area of about 70% hence this shortage affects the delivery of vaccination in most of rural areas. This is supported by one of the respondent from Mavuji dispensary who was quoted said that;

We are facing the challenge of inadequate number of staff. This increases burden to us especially in attending all people who attend the clinic. The number of people who are to be provided with services is higher comparing to the number of staffs available. The end result of this is that lactating mothers took too long waiting for service". ( Health care worker,2021)

One respondents from Mtandi dispensary provided that the existing gap was not addressed permanently through reliance on voluntary community mobilizers as well as traditional and religious leaders who were regarded as community mobilizers.

**Training Deficiencies**

As per the responses provided by respondents of the study, it was revealed that the structure on the ground did not translate into having qualified personnel at the community level to attain the intended objectives of the immunization programme. They further provided that limited trainings on immunization to some staffs is a barrier to the proper implementation of immunization program in various health facilities around the district. As per their observation, most of health care providers can still be incapable of attaining their purposes of the program even after receiving trainings. This is because they still lack effective monitoring and supervision. One respondent was interviewed on the issue of communication and negotiation skills of health care providers. The response was;

You know what, they didn't train us on the immunization services especially to new employed, we didn't understand well about some tools of HIMS. We even don't know the criteria used for children who not supposed to receive vaccine some contraindication of the antigens so far, I heard there are different criteria used for some vaccine, I don't have the guideline showing those reaction, side effect and knowing which side effect made to community make them fear to vaccinate. Furthermore, we are not sufficiently knowledgeable and updated on all aspect of immunization and related field e.g. IMCI (Health care workers, 2021)

**Attitudes Among Community Members**

Health care providers who participated in interviews raised similar issues. As expected, some people resist to vaccinate their child was more frequently referred to by communities in various villages and health workers provided that this tendency acts as among drawbacks towards effective implementation of immunization program. In Kiwawa dispensary, the habit of resisting vaccination was witnessed in response to some of vaccinations. Respondents of the study provided that one of the reasons behind resistance was traditional beliefs. Also, variety of religious groups and measles vaccine campaigners use to spread rumors about the infertility caused by vaccination or others believes that it causes a dangerous infection, which is regarded as a method of checking population growth in Muslims. In some villages, it was revealed by respondents of the study that there are cases of resistance to vaccination by some of religious groups in particular communities.

**Vaccine Stock Out**

The study found a problem of vaccine stock out, some of the vaccine is out of stock from regional level to district level up to facility level, which cause some children miss some dose of vaccine in particular time the health in charge of Pande health center describe as follows, it quoted below;

We experience the problem of out of stock of vaccine in February up to April 2021, especially BCG, OPV, MR, most of the children didn't receive that vaccine at that time, after sometimes we received other vaccine, but there is still a problem of MR vaccine, and this challenge is cross cutting issue, it is still a problem to regional, district level. (Facility in charge, 2021)

Also some of the Lactating mother at Somanga dispensary describes this challenge as follows;

…Today my child not immunized because of vaccine out of stock, my child has nine month I bring here for MR vaccine, but not achieve to receive immunization services today (Lactating mother, 2021).

## Discussion

### Financial Constraints

One of the factors that were pointed out as presented in chapter six which hinder the process for implementation of EPI on vaccine coverage for under five years old children is financial constraints. Lack of sufficient funds affects not only the purchase of drugs but

also the movement of health personnel from one place to another during the practice of vaccine provision. A study by Onyango et al. (2012) also found that, most vaccination programmes do not reach target due to financial constraints. Another study by Okech et al. (2015) also found financial constraints to the implementation of immunization programmes. Sufficient budgeting in health sector will be the most solution to solve the problem of financial constraints. It is something which is known vividly that the health of a human being should be gives the first priority, and if that is the case we also expect the budget of health sector to be given the first priority. By doing so it is obvious that the problem of financial constraints will be solved.

**Health Worker Shortages**

Shortage of health workers was also another factor which was found to be affecting the implementation of immunization programmes in Kilwa district council. The number of health staffs in rural areas where larger number of citizens reside is not equivalent by number of citizens. Special concern should be in place in rural areas by making sure that more health staff are recruited and posted in rural areas. Poor infrastructure in rural areas is one of the reasons why few of the posted new recruits in health sector running away and going back in cities. In that sense the improvement of infrastructure in rural areas is very crucial. A study by Anasel (2017) [12] also found that, insufficient staff in the health sector hinders the process of implementation of EPI in rural areas particularly. Another study by Lilian et al. [13] further came up with challenge of insufficient number of health staff in the process of immunization.

**Training Deficiencies**

Training deficiencies is also another factor which affects immunization process. This is due to the fact that there is no translation by the structure on the ground into having adequate qualified personnel at the community level to attain immunization program objectives. Lack of trainings on immunization to some staffs is a barrier to the proper implementation of immunization program in various health facilities around the district. Lack of proper supervisions and monitoring affects totally the whole process of immunization implementation.

Properly trained staff always performs better compared to one who is not properly trained. The importance of training staff properly particularly in the immunization activities can't be ignored. The study conducted by Sembuche et al. (2010) [14] pointed out the benefits of providing proper training to health personnel practicing immunization activities. Another study by Koskei et al. (2014) also showed the importance of providing appropriate training to those concerned by immunization activities.

**Attitudes among Community Members**

Attitude among community members is also an important factor that can facilitate or hinder the process for implementation of EPI on vaccine coverage. Good attitude of community members on vaccine provision do facilitate the process for implementation of EPI and on the contrary bad attitude of community members on vaccine provision hinders the process of implementation of EPI. A good example is provision of Covid-19 vaccine; some have good attitude on it and majority have bad attitude on it. In that case we can see still majority of the people in the country are not ready to get vaccine on Covid-19. An awareness campaign is the most important tool which can help the community to develop good attitude towards vaccine provision to their children. A study by Charles et al. (2010) pointed out the importance of making aware the community on the importance of vaccine so that there won't be bad attitude of the community towards vaccines. Findings are also similar to those by Gupta et al. [15].

**Vaccine Stock Out**

Vaccine stock out as pointed earlier is also a factor which hinders process for implementation of EPI. The community can be ready to get vaccine, but if there is no sufficient stock then the

Community cannot get vaccine. The study which was carried out by Roberts et al. [16] pointed out significances of sufficient stock of vaccine. Stock out of vaccine is affecting the process of immunization in most developing countries [17]. In that sense, developing countries have to come up with appropriate solution to this challenge [18,19].

## Conclusions

The study found that the process of immunization runs from national, regional and district levels but also there is supportive supervision although there are challenges that sometimes the process of implementation of immunization only reaches the regional level. The study also found that Kilwa district has achieved 90 % target in some of facilities for EPI although some of the facilities did not reach the target. The study also found that challenges facilitating or hindering processes EPI implementation include; financial constraints, inadequate infrastructure and equipment, shortage of health workers, training deficiencies, attitudes among community members as well as vaccine stock out. In a nutshell implementation process for expanded programme immunization on vaccine coverage for under five years old children has been achieve at Kilwa District despite a number of challenges mentioned.

### Recommendations

- The study recommends that various strategies could use in order to facilitates the delivery of the EPI services and also, to increase the immunization service.
- Also, the Ministry of Health should sponsor various seminars and programs in relation to vaccination for the purpose of reach the unreached families in relation to immunization service.
- Also, ethics and good conduct among health worker should be enhanced so as to create a friendship environment with patient.
- Moreover, various strategies could be used in order to minimize the time that for respondents to acquire the service.
- Also, based on the findings obtained from this study, it is recommended for provision of education so as to create awareness on the immunization service.
- Also, more health facilities should be built in order to provide the service to those families in rural area also, rather than concentrating only in urban areas.

### Policy Implications

Kilwa District Health Directorate through the government support could develop interventions that can be tailored to improve the childhood immunization rates and provide a foundation for developing effective childhood vaccination educational materials for mothers especially at the health facilities especially rural areas and also

### Area for Further Study

Further studies specifically focused on the vaccine coverage specifically on HPV vaccine to the girls aged 9- 13yrs delivered in routine setting at school based. The study suggests that more has to be done in health facilities in Kilwa district and it is important to cover the large scope so as to involve the whole region of Lindi.

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