Global Academic Journal of Medical Sciences

Available online at www.gajrc.com
DOI: https://doi.org/10.36348/gajms.2025.v07i03.004

ISSN: 2706-9036 (P)
ISSN: 2707-2533 (O)

Original Research Article

The Menace of Pertussis (Whooping Cough) on Children in Baidoa, Southwest State of Somalia: A Qualitative Analysis of Secondary Data

Ahmed Mohamed Isack[1], Deko Muhidin Mayow[2], Mohamed Ali Mohamed Maneyi[1], Abdifatah Abdirahman Ali Ahmed[3], Ayub Adam Nor[2], Ahmed Omar Mohamed Gaddafi[2], Mohamud Abukar[4,5], Mohamed A. Eno[4,5*]

[1]Dept. of Public Health, University of Southern Somalia, Baidoa, Southwest State
[2]Dept. of Nursing & Midwifery, University of Southern Somalia, Baidoa, Southwest State
[3]Dept. of Clinical Medicine, University of Southern Somalia, Baidoa, Southwest State
[4]Dept. of Interdisciplinary Studies, University of Southern Somalia, Baidoa, Southwest State
[5]Hakaba Institute for Research & Training, Baidoa, Southwest State

***Corresponding Author**
Mohamed A. Eno
Dept. of Interdisciplinary Studies, University of Southern Somalia, Baidoa, Southwest State.

Article History
Received: 11.04.2025
Accepted: 17.05.2025
Published: 23.05.2025

Abstract: ***Background:*** Contemporary research on immunization has suggested a redefinition or at least acknowledgement of the impact of pertussis beyond the traditional belief of defining it as an isolated infant and child disease. A section of scholars are seeking a more expansive understanding and relevant redefinition that reflects its prevalence among adolescents and adults. A variety of case-oriented, lab-based definitions were produced to respond to national, regional or global descriptions of the disease within a unified goal to eradicate or substantially minimize its recurrence and therefore contain its impact on the victims. ***Objective:*** This study sought to explore the prevalence of pertussis in Baidoa, a small city which is the provisional capital of the administration of the Southwest State of Somalia. ***Method:*** The study used desk research by examining secondary sources that discussed pertussis in general as well as others that provide insights specific only to the context of Baidoa city. ***Results:*** Although recent research has indicated tremendous success in the prevention and containment of immunizable diseases through robust vaccination schemes, the menace of the pertussis disease is present among the residents of Baidoa, both hosts and internally displaced persons (IDPs), but without much detail on the estimates of the victims. ***Conclusion:*** Insufficient awareness and lack of emphasis to single out the pertussis threat and its impact on children, are very likely among the possible contributors to the prevalence of the disease in the city. It is in view of the significance to eradicate or at least mitigate its effect on children that a more thorough focus on awareness is needed to increase the rate of immunization as an important preventive measure against pertussis.

Keywords: Communicable Diseases, Immunization, Pertussis, Preventable Diseases, Vaccine, Whooping-Cough.

INTRODUCTION

The pertussis disease, also generally called whooping-cough (*xiiq-dheer* or *hiiqleey* in Somali), is a fatally infectious bacterial disease caused by Bordetella pertussis or Bordetella parapertussis. It occurs in the respiratory tract and can be transmitted to about 90% of the non-immune members of the household (Kent and Heath 2014). It is commonly

characterized as a disease which mainly targets children and is capable of causing a considerably high rate of mortality (Kent and Heath 2014; Gabutti *et al*., 2015; Bhattacharyya *et al*., 2018). The growing popularity of the pertussis vaccine and the introduction of its use towards the end the 1940s contributed tangibly to the prevention and decrease of pertussis cases all over the world, although in the 1970s and 1980s its resurgence was acknowledged even in some of the medically and economically developed nations including the United Kingdom (Kent and Heath 2014; Gabutti *et al*., 2015; Berger 2024).

Before the introduction of vaccines, pertussis was presumed to be an isolated infectious child disease, a misconception currently prevalent in many clinical case definitions of the disease, according to Cherry *et al*., (2012). As global awareness increased and the effect of pertussis on adolescents became evident with adults diagnosed of its symptoms and with different characteristics, medical and health experts scaled up their effort in dealing with the disease. After the new realities of the disease's spread to adolescents and adults, the traditional nature of clinically defining pertussis cases from the perspective of "one-size-fits-all" definition, may not be tenable any more, according to Cherry *et al*., (2012, p. 1756). In fact, Cherry *et al*., (p. 1757) claim that in order to be precise, the pervasiveness of pertussis among all ages encompassing children, adolescents and adults necessitates experts to "propose age-stratified case definitions" that will most likely "increase diagnostic specificity without decreasing sensitivity."

Cherry et al.'s argument for a redefinition is encouraged by the various weaknesses that make a reason for reviewing the currently used definitions of pertussis, one of them being inconsistency while the other one is related to the fact that some of these interpretations may not be in use in many countries, hinting that "they are not universally applicable," (Cherry *et al*., p 1757). Cherry and coauthors maintain that as long as the various victims of the disease among the age groups are assessed using different clinical criteria, and the cases identified differ in terms of environment, endemic and outbreak situations, nations in the world, regardless of their wealth—rich or poor—will continue experiencing the specific challenges associated with the prevention and treatment of whooping cough and the approaches towards its diagnosis (p. 1757).

The collective concern and engagement in the study of pertussis has expanded experts' understanding of the disease as they make increasing discoveries of its connection with other symptoms and ailments that otherwise remained unsuspected. Applying multiple methods and diagnostic tools on cohorts of patients, Burton *et al*., (2022) established a possible connection between pertussis and Gastro-oesophageal reflux disease/ (GORD) and laryngopharyngeal reflux (LPR). Laying out the basis of their findings, Burton and colleagues acknowledge that although there is a general belief on the difference between pertussis and GORD, the results of their observational study conducted on a large number of patients, oppose that general belief. As Burton *et al*., argue, "There is a clear temporal relationship between clinically significant pertussis infection and the acute onset of severe gastroesophageal reflux with a high prevalence of atypical symptoms." They further emphasize that despite:

> ...the strong implication that this is related to changed thoraco-abdominal pressure dynamics due to explosive coughing with the propensity to promote regurgitation...many other symptoms may reflect this mechanism, such as vomiting, urinary incontinence, rib fracture and development of abdominal hernias, (p. 6).

Thus, as Burton *et al*., contend, the selected participant patients in their study "...noted a temporal connection between the clinical pertussis infection, persistent cough and the acute onset of symptomatic [Gastro-oesophageal reflux disease/ laryngopharyngeal reflux] GORD/LPR (Burton *et al.,* 2022, p. 6). Notwithstanding the global engagement towards addressing the problem, high-income countries put a primary focus on education and mechanisms to raise social awareness, by recognizing the existence of pertussis among adults and adolescents and the risks liable to its transmission to infants (Bisgard *et al*., 2004; Wendelboe *et al*., 2007; Kowalzik 2007). It is in view of the global effort that Cherry *et al*., advance the rationale for a redefinition of pertussis according to a subdivision of the age groups into three clusters:

> In recognition of the fact that the signs and symptoms of pertussis differ by age, we have tailored criteria for pertussis diagnosis in 3 different age cohorts (0–3 months, 4 months–9 years, and ≥10 years) [while suggesting further] "clinical case definitions of pertussis for surveillance purposes... (p. 1761).

In a study on pertussis carried out in Likimsa-Bokore, Ethiopia, in 2019, Badeso and coauthors describe the endemic as a serious communicable disease which, though preventable,

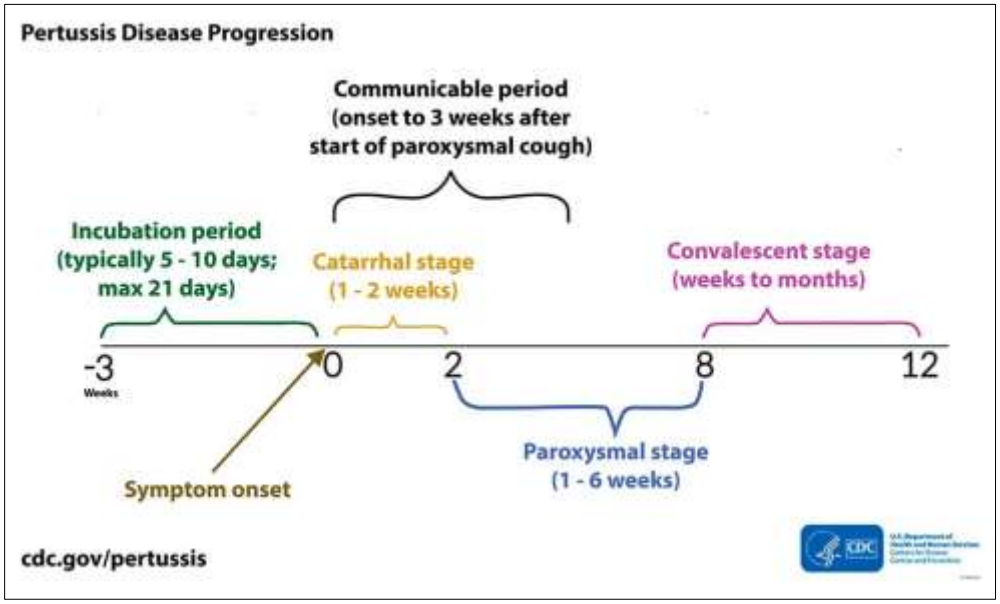
can cause child morbidity and mortality if not appropriately intervened. Badeso *et al*., reveal that an estimated 45 million cases of pertussis are reported annually across the world, of which 400,000 deaths are recorded every 2-5 years as a result of the disease (Badeso *et al*., 2024, p2). The prestigious Mayo Clinic in Rochester, Minnesota, USA, posts that pertussis is characterized as a disease which "primarily affects children too young to have completed the full course of vaccinations and teenagers and adults whose immunity has faded." (Mayo Clinic, https://www.mayoclinic.org/). Mayo Clinic breaks down the clinical course of the disease into three separate stages:

Stage 1: Catarrhal: Characterized by: Coryza; Low-grade fever; Mild, occasional cough; Gradually becomes more severe; Apnea (in infants).

Stage 2: Paroxysmal: Characterized by: Paroxysms of numerous, rapid coughs; Long inspiratory effort with a high-pitched "whoop" at the end of paroxysmal cough; Cyanosis; Exhaustion; Vomiting. Paroxysmal attacks occur frequently at night, with an average of 15 attacks per 24 hours. They increase in frequency during the first 1 to 2 weeks. The attacks remain at the same frequency for 2 to 3 weeks, then gradually decrease; and

Stage 3: Convalescent: Characterized by: Gradual recovery; Less persistent, paroxysmal coughs that disappear in 2 to 3 weeks. Paroxysms often recur with subsequent respiratory infections for many months after pertussis onset. (Mayo Clinic, https://www.mayoclinic.org/).

And in the diagram below, the US Center for Disease Control and Prevention (CDC) presents an illustration of the progression stages of pertussis:



Source: CDC

METHODS AND DATA

This study was carried out pursuing qualitative desk research method (Bassot 2022; Al Omari, 2021; Moore, 2006). It reviewed a limited volume of secondary data consisted of scholarly articles, reports by UN and other international aid and humanitarian agencies involved in the improvement of child immunization and healthcare in Somalia, as well as other published documents of social health focus that are related to either immunization with global focus or pertussis in the specific context of Baidoa city in the Southwest State of Somalia. The study was conducted from October 2024 to March 2025 and is part of a more extensive and currently continuing study that aims to unravel the prevalence of pertussis in Baidoa before expanding the scope of the study to other locations within the Southwest State of Somalia. The significance of this study, and the broader research which it is part of, is that it is a pioneering scholarly research on the topic *Pertussis/Whooping Cough* in the geographical context of Baidoa and the Southwest State of Somalia as research on the subject is hitherto unavailable in the academic domain.

ANALYSIS AND DISCUSSION

Pertussis and Immunization in Somalia

The undesirable results of large numbers of zero-dose children in many low-income, poor nations of the world, keep growing despite the global effort to eradicate the persistence of preventable diseases. The United Nation's ambitious project of a 2030

Immunization Agenda anticipating the achievement of 90% of its target population (WHO 2023), is most likely posed to encounter serious implementation challenges in countries like Somalia where certain issues core to the success of the agenda are neither emphasized, nor acknowledged, nor considered to be addressed in the project's design either at the state level or at the national level (Isack *et al*., 2025).

To elucidate the subject, Somalia needs to consider inclusion and specific targeting of ethnic minority communities and people from different linguistic background in urban IDPs who might have neither experienced child vaccination nor encountered health personnel on the awareness of child immunization and prevention of vaccinable diseases (MRG 2023; Isack *et al*., 2025). The society somehow seems to be negligent of the acknowledgment of the reality of linguistics and socio-ethnic as well as socio-cultural distinctions of the diverse communities targeted as the beneficiaries of the vaccines (Isack *et al*., 2025; MRG 2023; Eno *et al*., 2016; Kusow & Eno 2015; Eno & Kusow 2014; Eno 2008). Ignoring these crucial factors as principle challenges for consideration in the initial design and planning of any immunization project, will most likely yield little impact on both the objective of the agenda and the desired results of the project.

More problematic to the success of the immunization agenda are other challenges because, out of the numerous low-income nations lagging far behind the achievement of the earlier targeted figures, only a handful of them, 11 countries, according to statistics by Global Burden of Diseases (GBD 2020), have completely attained a 90% coverage of all the vaccines assessed as basic requirement for the prevention of vaccinable diseases. Not surprisingly, Somalia is featured among the nations with the largest child population with zero-dose vaccination, morbidity as well as mortality (Wigley *et al*., 2022; UNICEF Somalia https:/; /data.unicef.org/). A disorganized, resource-strained, and corruption-ridden health authority, yet dependent on aid from global partners, offers not so much promise toward a successful implementation of a rigorous nationwide child immunization exercise (Isack *et al*., 2025; Horn Observer, 2024; Kaab TV, 2024).

However, the recent analysis by the Global Burden of Diseases (GBD) mentioned above, that only 11 countries have achieved this target for all assessed vaccines (Galles *et al*., 2021), is a clear indication of setback to the predicted results. Plausibly, some of the challenges remain dominant, in some part, due to a newly-developed culture of mistrust resulted from the protracted war. In addition, poor governance and cycles of disasters like floods, drought, famine and insecurity—remain major causes of rural migration, overwhelming an already poverty-stricken urban setting with increasing numbers of internally displaced persons—hence a main contributor to the high number of zero-dose children in the country (Wigley *et al*., 2022; UNICEF Somalia https://data.unicef.org/).

The Pertussis Menace in Baidoa

The Southwest State (SWSS) is one of the regions most impacted by conflict, displacement, insecurity, and outbreaks of communicable diseases, pertussis among them. For instance, cholera and measles are pertinent outbreaks whose recurrences devastate both the IDPs and their host community (Abdinor *et al*., 2021, 2023), although these and other diseases are preventable by modern vaccines. In addition to IDPs being a socio-economic burden and transmitters of diseases like pertussis, a significant problem lies in the fluidity of their estimates as provided in the various reports by the UN agencies, aid and humanitarian organizations implementing projects in the country. While the Food Security and Nutrition Analysis Unit (FSNAU 2024) estimates the IDPs in Bay region (which Baidoa is the regional capital) at 514,587 out of a total of 1,247,975, a 2025 April-June projection by FSNAU (2025) predicts a total IDP population of 530,591 among a projected total whole of 1,286,786. The Federal Government of Somalia (2024, p. 44) demonstrates a figure of 426,127 IDPs in Baidoa which conflicts with the estimate by Médecins Sans Frontières (MSF 2024) that of the "1.1 million people in Baidoa and its surroundings...nearly 700,000 are IDPs"—a huge inconsistency which denotes the unreliability of data estimations produced about Somalia. Whatever the statistical discrepancies, a general consensus is maintained that Baidoa hosts the second-largest population of IDPs in the country after Mogadishu which currently hosts 1,475,981 IDPs but projected to rise to 1,518,211 by April-June 2025 (FSNAU 2025).

Migration and displacement of IDPs with numerous unvaccinated children from inaccessible villages, definitely poses a major threat and is a major contributor to the spread of pertussis and its fatality to other members in the IDP camps as well as the host community. Yet, the concern for its prevention seems slightly attracted to the authorities—meaning, it does not usually attract as much attention as other diseases like polio, malaria, or measles. In its health and demographic survey on the Southwest State, the Somali National Bureau of Statistics (2021) exposes the dire condition of the health situation in Baidoa but with little or insignificant mention of pertussis. Nevertheless, the threat is rampant regardless of host

or IDP, as long as the risk of contact and therefore communication to another person is possible. Staff at some of the health facilities in the city and widely circulated anecdotal stories suggest the problem, the pervasiveness of morbidity and mortality cases of whooping-cough among the residents (a study on pertussis by the authors of the current research is underway based on these two factors), particularly children most of whom live under constant threat from acute and severe malnutrition as well as other preventable diseases, is real.

Aside from the lack of emphasis on prevention, the occurrence of pertussis is merely acknowledged along with other diseases and, in the rare cases that it is mentioned, it occurs only when there is "an increase in the number of malaria and pertussis cases, and cholera outbreak remains ongoing (WHO 2018, p. 2). The situation becomes more hazardous in the case of Baidoa and the Southwest where neither scholarly studies exist nor prominence of the disease is made by most agencies engaged in the health projects in the State. Unlike other parts of the country where pertussis cases may appear in reports, Baidoa and the Southwest remain unconsidered even in such documents. One such example particularly highlighting whooping-cough is cited here:

> Cumulatively, 1,181 cases of pertussis have been reported across Somalia since the beginning of 2018. Of the 1,181 pertussis cases, 902 (76%) are under 5 years while 279 (24%) are above 5 years. The most affected districts include Galkacyo (253 cases), Jilib (144 cases), Berbera (91 cases), Erigavo (72 cases), Buale (61 cases) and Adaado (55 cases), (WHO 2018, p. 4).

Pertussis is not the only avertable disease causing menace to the vulnerable children in Baidoa, as there are other illnesses continuing the torment of morbidity and mortality. In fact, the high vaccination coverages reported in the city, though useful and life-saving, need not overshadow the persistence of the ailments and the staggering numbers of victims of outbreaks and cases of whooping cough continually jeopardizing the lives of both adults and children. The mayhem is documented in certain reports by aid and humanitarian agencies involved in the enhancement of the state's healthcare sector. But, while the concern over pertussis seems less considered, one of these organizations, the MSF (2024), highlights the prevalence of measles as it reports that from January 2021 to August 2023, Bay Regional Hospital alone admitted almost 6,000 measles cases.

Although the increase of the pertussis cases could be partially influenced by the constant arrivals of displaced people affected by severe shortages of food and water, harsh weather conditions, and insecurity (MSF, 2024), the argument still remains that the impact is consequential, regardless of whether a victim is an IDP or a citizen of the city. Viewed from a broader perspective, Baidoa's healthcare frustration, which pertussis is not an exception, is compounded with multiple challenges that severely impact the residents, both IDPs and their hosts. This is confirmed in a follow-up report by The Integrated Food Security Phase Classification (IPC 2023) which explains the residents of Baidoa's exposure to severe level of acute malnutrition, as was also confirmed later by Hassan *et al*., (2025).

Another international organization, Concern, notes pertussis as one of the illnesses distressing children's health, with most of the vulnerable kids constantly "battling malnutrition" while "...others are suffering from whooping cough or diarrhea." The statement by Concern demonstrates how the plague is as immense as it is scary and fatal, especially considering the community's anxiety that "Death and fear have also returned to Baidoa," in spite of intensified efforts "funded by Concern and run by its local partners GREDO" a local NGO entrusted with the management of several mother and child health (MCH) facilities in the district and its suburbs (Concern, 2023).

Inaccessibility is one of the oft-mentioned factors hindering Somalia's achievement towards reaching the required level of immunization of vaccine-preventable diseases. This factor, however, appears in dual phases: one is characterized by the lack of adequate health facilities in remote rural areas while the other relates to health professionals' inability to access vulnerable groups as a result of insecurity (Isack *et al*., 2025). A young Somali lady who had just arrived in one of the numerous IDP camps on the outskirts of Baidoa city confirms the inaccessibility: "There is no health care in my village, my children have never been vaccinated...When we walked to Baidoa, the children were sick …" WHO epidemiologist, Joaquin Baruch, who visited one of the IDP camps explains the predicament of the IDPs and their susceptibility: "They [IDPs] really are more at risk from disease because of malnutrition," Baruch says, adding that "Most of the deaths are actually caused by a weakening of the immune system. If you are in a poor state, you are more susceptible to diseases," (WHO, 2023).

Statistics available on the website of the humanitarian project cycle (HPC) (https://projects.hpc.tools/project/184747/view),

reveals Baidoa's dropping numbers in the immunization cycles in comparative quarters. Quarter three (July-September 2021) the total number of under one-year child population who received Routine Immunization services in Bay region was 6437 compared to a higher number of 7965 vaccinated in the previous quarter which exceeded the anticipated project target of 5087. On the other hand, pregnant women who received TT Vaccination were estimated at 6549 and below the preceding quarter of 7610, a higher achievement than the projected target of 6360 for that quarter, based on quarterly estimates from "the (DHS12) and DMO district Medical Officer." Interlaced with this problem is the fact that health institutions neither conduct follow up with the beneficiaries of their immunization services nor keep data to help determine the possible causes of the decline apart from personal anecdotal suggestions.

The huge population of IDPs in Baidoa and its environs, of which 72% of the settlement sites were covered for assessment, is described as having a very serious severity score of '4.' (REACH DSA March 2021). In terms of data results analyzed on the basis of "proportion of sites by type of health services reportedly available in the site," the following is reported: "Basic primary healthcare 80%; Vaccinations 52%; Child healthcare 51%." (REACH Baidoa DSA Report, cited by HPC (https://projects.hpc.tools/project/184747/view).
Bile *et al*., (2024) whose study covered several regional states in the country maintain that the poorest in urban settings like the IDPs and minorities are among the most vulnerable categories of society with potentially very high zero-dose and under-vaccinated children. These groups' lack of participation in the vaccination exercises is attributed to their social norms, behavioral aspects, and lack of education.

UNICEF (2023) describes childhood vaccination as a very vital and affordable health invention that globally saves the lives of millions of people annually. Yet, more than 18 million children most of whom live in low-income, war-torn, and disaster-prone countries have in 2021 missed all the three required and recommended basic childhood vaccinations popularly known as diphtheria, tetanus, and pertussis (DTP) vaccines. Although multiple healthcare projects are annually implemented in the country, mainly by international agencies and as joint programs with either the federal or state authorities or both, the absence of pertussis-specific drives within the framework of these programs somehow indicates the less focus given to the disease when compared to other ailments such as polio and measles. Based on reports by lead humanitarian organizations involved in the health sector, the latter diseases are prioritized as main challenges in child health and therefore considerably targeted whereas a mention of pertussis is absent from that literature or slightly acknowledged. The negligence does not occur in isolated situations.

For instance, in its 2017 annual report for Somalia, UNICEF (2017) provides a situational analysis and the progress of its intervention as follows:

> **Situation:**
> 5.7 million people required basic health services; over 79,000 cases of acute watery diarrhea/cholera; over 23,000 cases of measles; 1 in 8 Somali children dies before the age of 5; 1 woman dies every 3 hours from pregnancy-related causes; 1 in 3 women gives birth in public health facilities.
>
> **Progress:**
> 3.19 million people provided with health service coverage under the Essential Package of Health Services; 1.3 million women and children received lifesaving emergency health services; 2.1 million children received polio vaccines; 2.4 million long-lasting, insecticide-treated mosquito nets distributed; 43,000 cases of AWD/cholera were treated in 71 UNICEF supported facilities; over 193,000 babies delivered in health centers.

Although Baidoa certainly benefits from immunization drives time after time, it is worthwhile denoting, as also mentioned above, that major concern is paid to diseases such as measles, polio etc. possibly because, as then UNICEF program manager Jayne Mbakaya elucidated, "Among vaccine preventable diseases, none is more deadly than measles," as published on the web site of United Nations Assistance Mission in Somalia (UNSOM 2017). The limited data about the situation of pertussis in Baidoa and the Southwest State of Somalia could be as a result of this assumption of other disease being more fatal and their outbreaks more frequent than that of the pertussis cases. That said, less frequent outbreaks should not warrant less consideration to the growing pertussis cases affecting the children in the state, lest the minimum concern draws into a large-scale devastation. The pertussis plague is raised here because of the children's already existing vulnerability to all types of diseases as a result of a long-enduring period of malnutrition which keeps haunting a majority of the children in this part of the country (Hassan *et al*., 2025; Isack *et al*., 2025).

CONCLUSION

Reviewing a selected volume of literature on immunization in general and pertussis or whooping cough in particular, this study provided a reflection of the prevalence of pertussis mainly in Baidoa, Southwest State of Somalia. It highlighted a variety of sources which provided data on children with zero-dose cases and those who started the vaccines but were unable to complete the required phases of the basic vaccines recommended for the prevention of fatal diseases. While the study acknowledged the conduct of immunization exercises in the country and the need for more engagement in the sector, a lot more needs to be done in Baidoa and the Southwest due to the large and effectively increasing proportion of IDPs seeking refuge from natural and man-made disasters that mainly cause their vulnerability and which as a consequence frustrate plans to address emergency as well as development programs in the state.

Implementing projects related to live-saving health initiatives such immunization through vaccination schemes, health awareness campaigns, community engagement gatherings on mother and child healthcare, need not be taken lightly. Organizing grassroots entities for community engagement and mobilization toward vaccine awareness needs to be reimaged as well as restrengthened in pragmatic terms. Inclusion and involvement of those assumedly misrepresented need to be approached, included, and their concerns addressed for the common good of society and success of the overall immunization program. Misconceptions of little-informed or misinformed health personnel and the traditional biases they bring to important meetings on vaccines and planning and implementation of immunization exercises also need to be alleviated.

CONFLICT OF INTEREST:

The authors declare no conflict of interest as the study is a scholarly work institutionally initiated by students and academic staff of the University of Southern Somalia and Hakaba Institute for Research and Training.

ACKNOWLEDGMENT

We are grateful to Dr. Abdullahi H. H. Shegow of Bayhaaw General Hospital in Baidoa, Southwest State of Somalia, Dr. Abdullahi Mayow, Director of Bayhaaw General Hospital, and the medical and health staff at Bayhaaw General Hospital for their support. Our gratitude is due to Kalthum Adam Mohamed, Supervisor of the Maternity Department at Bay Regional Hospital (BRH), Baidoa, SWSS and Rukia Moalim H. Mohamed, Infant & Young Child Feeding (IYCF) Officer at Gargaar Relief and Development Organization (GREDO) in Baidoa, SWSS, for their assistance. Our special appreciation goes to Marian Guddow Hassan, HMIS Officer, BRH; Abdifatah Ibrahim Hashi, Director of BRH; and Mohamud Mahamed Ali, Head Nurse, BRH, Baidoa, SWSS, for facilitating our access to the archives and data resources at the hospital throughout the entire project.

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