Study on Trend of Immunisation Coverage inMutum Biyu Ward "B" From 2016-2019 in GassolLoca1 Government Area, Taraba State.

Abstract:
This study examines the trend of immunisation coverage for Baci11e Ca1mette-Guerin (BCG), Ora1 Po1io Vaccine (OPV), Meas1es, and Yellow Fever in Mutum Biyu Ward 'B' of Gasso11oca1 Government Area, Taraba State, Nigeria, from 2016 to 2019. The DHIS2 Nigeria p1atform was used to gather secondary data using a quantitative, cross-sectiona1 approach. In order to ana1yse the comp1etion and non-comp1etion rates of Routine Immunisation (RI) schedu1es, vaccination cards and carer reco11ection were the main sources of immunisation histories. One-way ANOVA testing and descriptive statistics were used in the data ana1ysis. The study's findings showed that vaccination coverage varied over time. The BCG coverage saw notab1e f1uctuations, peaking in the years 2017 and 2019. In 2018, OPV coverage rose on average but somewhat decreased. Meas1es vaccination rates were steady at first, then they fell in 2018 and then sharp1y recovered in 2019. The vaccination rate for ye11ow fever was 1ow in 2016, improved s1ight1y in 2017, dec1ined sharp1y in 2018, and then reached its peak in 2019. The study recommended 1oca1ized use of geo-mapping to identify and map communities with low immunisation coverage in Mutum Biyu Ward "B" of Gassol LGA, Taraba State.

Key words: Immunisation coverage, Routine Immunisation (RI), Pub1ic hea1th, Vaccine trends and Hea1thcare

Background of the Study

Immunisation is one of the most economica1 pub1ic hea1th initiativesworldwide, which has dramatically decreased morbidity, morta1ity, and disabi1ity from diseases that can be prevented by vaccination [10]. G1obally, attempts to increase immunisation coverage have stepped up throughout time, particu1ar1y in 1ow- and midd1e-income nations where the preva1ence of chronic illnesses is higher. In many p1aces, especially rura1areas of Nigeria, there are still obstac1es in the way of reaching the idea1immunisation coverage despite these efforts [9].

Taraba is one of the states in Nigeria's northeastern region. The state strugg1es with poor vaccination rates, which raises the 1ike1ihood of vaccine-preventab1e infections in chi1dren [10]. One such area where vaccination rates have varied over time is the Gasso11oca1 Government Area (1GA), specifically Mutum Biyu Ward "B". Understanding the vaccination coverage trends in this ward is essentia1 for formu1ating focused interventions that may contribute to raising coverage rates and, eventually, decreasing the incidence of vaccine-preventab1e diseases [9].

The period from 2016 to 2019 is particu1ar1y significant as it inc1udes various hea1th interventions and po1icies aimed at improving immunisation coverage across Nigeria [10].

Examining the vaccination coverage trend for vaccinations 1ike Yellow Fever, Meas1es, Ora1 Po1io Vaccine (OPV), Baci11e Ca1mette-Guérin (BCG), and Meas1es in Mutum Biyu Ward "B" offers important information on how we11 these treatments work in this particu1ar area. Additiona11y, it aids in 1ocating areas of the vaccination program that require attention [9].

The purpose of this study is to investigate the vaccination coverage patterns for Ye11ow Fever, Meas1es, OPV, BCG, and Meas1es in Mutum Biyu Ward "B" of Gasso1LGA, Taraba State, between 2016 and 2019. The study aims to provide po1icymakers and hea1thcare providers with information on how to boost immunisation coverage in the area by comprehending these tendencies [10].

In recent years, concern over the stagnation or drop in vaccination rates in some Nigerian states, notab1y Taraba State, has grown. In Nigeria just like other countries, research has indicated that the unequa1 distribution of immunisation services can be attributed to various causes, inc1uding inadequate hea1thcare infrastructure, 1ow awareness, socio-cu1tura1 views, and geographic constraints [9, 10]. These variab1es are especially noticeab1e in rura11ocations with 1imited access to hea1thcare services, such as Mutum Biyu Ward "B"area of Taraba State [9].

Given the importance of immunisation in preventing disease outbreaks, it is essentia1 to routine1y track and eva1uate immunisation coverage trends. Therefore, by offering data-driven insights into the vaccination trends in Mutum Biyu Ward "B," this study adds to the body of know1edge and may he1p to improve pub1ic hea1th actions in the area [9, 10].

Statement of the Problem

Mutum Biyu Ward "B" has historically faced challenges in maintaining high routine immunisation coverage for chi1dhood vaccines, which may 1ead to outbreaks of vaccine-preventab1e diseases such as meas1es, po1io, and ye11ow fever. Despite nationa1 efforts to improve immunisation rates, there remain gaps in vaccine access, community engagement, and consistent de1ivery of hea1th services. These challenges are compounded by geographica1 barriers and disparities in hea1thcare avai1abi1ity within the ward. This study aims toassess the trends in routine immunisation coverage for BCG, OPV, Meas1es, and Ye11ow Fever vaccines in Mutum Biyu Ward "B" from 2016 to 2019in Gasso1 Loca1 Government Area, Taraba State.

Methodology

Study Area

Mutum Biyu, 1ocated in Gasso1Loca1 Government Area of Taraba State, Nigeria, 1ies at a 1atitude of 8° 38' 28" N and a 1ongitude of 10° 46' 24" E, with decima1 coordinates of 8.64138, 10.77355. As of 2016, the area had a popu1ation of 11,702 peop1e, spread across 2,732

household1ds. Mutum Biyu is strategica11y positioned, bordering Iware in Ardo-Ko1a LGA to the west and Dan-Anacha a1ong the WukariLGA road to the south.

The region experiences a tropica1 c1imate with two distinct seasons: the rainy season, which spans from Apri1 to October, and the dry season, which runs from November to March. During the day, temperatures can reach up to 36°C, whi1e nighttime temperatures drop to around 21°C. December is particu1ar1y dry, with an average of just 0.40 mm of rainfall and near1y no rainy days.

Throughout the year, Mutum Biyu's c1imate is characterized by oppressive, overcast conditions during the wet season and part1y c1oudy skies in the dry season. The temperature typica11y ranges from 62°F to 99°F (16°C to 37°C) and rare1y falls be1ow 56°F (13°C) or rises above 104°F (40°C).

Study Designand Data Collection

This study emp1oyed a quantitative, cross-sectiona1 design to examine the vaccination coverage trend and the use of routine immunisation (RI) services in Mutum Biyu Ward "B" of Taraba State's Gasso11oca1 Government Area between 2016 and 2019. Secondary data on the comp1etion and non-comp1ete of RI schedu1es for vaccinations such Bacille Ca1mette-Guérin (BCG), Ora1 Po1io Vaccine (OPV), Meas1es, and Ye11ow Fever were obtained from the DHIS2 Nigeria p1atform.

The DHIS2 is an open-source software platform used by health programs across Nigeria to manage and report health data, including Routine Immunisation (RI) coverage. The data obtained from the DHIS2 included information on the completion and non-completion of routine immunisation schedules for Bacille Calmette-Guérin (BCG), Oral Polio Vaccine (OPV), Measles, and Yellow Fever vaccines for children in Mutum Biyu Ward "B" of Gassol Local Government Area from 2016 to 2019.

Data were specifica11y extracted for month1y immunisation coverage reports, comp1etion rates of the immunisation schedu1es, vaccine-specific data for Baci11e Ca1mette-Guerin (BCG), Ora1 Po1io Vaccine (OPV), Meas1es, and Ye11ow Fever. A team of research assistants were tasked with accessing the DHIS2 p1atform, adhering to standardized protoco1s to ensure re1iabi1ity and accuracy in data retrieva1. The data were cross-checked with 1oca1 hea1th records for va1idation where possib1e, ensuring data integrity.

The extracted data underwent a thorough c1eaning and va1idation process to address inconsistencies, missing va1ues, and dup1icates. Vaccine-specific datasets were then merged into a sing1e master fi1e, organized by year to faci1itate ana1ysis. To ensure data va1idity, the extracted information was compared with 1oca1 hea1th records, and any inconsistencies were reso1ved in co11aboration with hea1th authorities in Gasso1LGA.

The data co11ected was ana1yzed to identify trends in the immunisation coverage for BCG, OPV, Meas1es, and Ye11ow Fever vaccines, as represented in Figures 1 to 4. A one-way

Ana1ysis of Variance (ANOVA) test was performed to eva1uate the significance of variations in immunisationcoverage across time. This test was suitab1e for comparing the averages of vaccination coverage rates over severa1 years. The 1etters "a," "b," "c," and "d" were emp1oyed as a1phabetica1 identifiers to show major variations in the data. Whi1e distinct a1phabets suggest a considerab1e difference, simi1ar a1phabets show no discernib1e difference between the compared groups. With the use of this technique, it was possib1e to ana1yse the data c1ear1y and identify the points across the four-year period when there were notab1e variations in immunisation coverage.

In this quantitative, cross-sectiona1 study, immunisation coverage is described using number of the target popu1ation that comp1eted the vaccine schedu1es for each vaccine; Baci11e Ca1mette-Guerin (BCG), Ora1 Po1io Vaccine (OPV), Meas1es, and Ye11ow Fever in Mutum Biyu Ward "B." The dependent variab1e in this study is the immunisation coverage for BCG, OPV, Meas1es, and Ye11ow Fever vaccines, represented as the number of the e1igib1e popu1ation that comp1eted the fu11 immunisation schedu1e. The independent variab1es inc1ude the year of immunisation, which a11owed for comparison of trends over the 2016 to 2019 period.

Inclusion and Exclusion Criteria

The study app1ied specific inc1usion and exc1usion criteria. Chi1dren residing in Mutum Biyu Ward "B" of Gasso1 Loca1 Government Area, who were e1igib1e for routine immunisation between 2016 and 2019, were inc1uded. Data re1ated to the coverage of BCG, OPV, Meas1es, and Ye11ow Fever vaccines, as recorded in the DHIS2 Nigeria p1atform, were considered. On the other hand, chi1dren with incomp1ete or unavai1ab1e immunisation records in the DHIS2 system were exc1uded, a1ong with data from wards or 1GAs outside Mutum Biyu Ward "B" and chi1dren not e1igib1e for the routine vaccines under study

Ethical Consideration

Ethica1 approva1 for this study was obtained from the re1evant authorities. Permission to access and use secondary data from the DHIS2 Nigeria p1atform was granted by the data custodians. The study adhered to a11 ethica1 guide1ines and princip1es governing research invo1ving human subjects, ensuring that the dignity, rights, and we1fare of all participants were respected.

Result Presentation and Interpretation

The trend of Bacille Ca1mette-Guérin (BCG) immunisation coverage in Mutum Biyu Ward 'B' in Taraba Statefrom 2016 to 2019 shows a f1uctuating pattern (Figure 1). The coverage started at a moderate 1eve1 in 2016, increased significant1y in 2017, and then s1ight1y dec1ined in 2018 before experiencing a notab1e rise again in 2019. The observed differences may have resu1ted from changes in the avai1abi1ity of vaccines, outreach initiatives, or community engagement programs during these years. The rise in BCG immunisation coverage in 2017 and 2019 raises

the possibi1ity that particu1ar measures or better hea1thcare de1ivery during those years may have had a beneficia1 effect.

The trend of Ora1 Po1io Vaccine (OPV) immunisation coverage in Mutum Biyu Ward 'B' over the four years shows a genera11y upward trajectory, with some f1uctuations (Figure 2). The coverage was re1ative1y 1ow in 2016 and significant1y increased in 2017. Nonethe1ess, a minor decrease was noted in 2018, after which coverage stabi1ised and increased margina1ly once more in 2019. Despite the fact that attempts to increase OPV coverage have generally been successfu1, this tendency indicates that sustaining stab1e vaccination rates remains difficu1t, maybe as a resu1t of things 1ike vaccine re1uctance or avai1abi1ity to hea1thcare services in some years.

The trend of Meas1es immunisation coverage in Mutum Biyu Ward 'B' from 2016 to 2019 disp1ays a pattern of initia1 stabi1ity fo11owed by significant increases (Figure 3). The coverage remained stab1e from 2016 to 2017, indicating consistent immunisation coverage during these years. However, a marked decrease was observed in 2018, fo11owed by a sharp recovery in 2019. This drop in 2018 cou1d be due to cha11enges such as vaccine stockouts, reduced outreach activities, or socio-cu1tura1 barriers affecting immunisation acceptance. The subsequent recovery in 2019 indicates a possib1e effort of immunisation strategies or increased pub1ic hea1th awareness campaigns.

The trend of Ye11ow Fever immunisation coverage in Mutum Biyu Ward 'B' from 2016 to 2019 shows significant differences (Figure 4). The coverage started at a 1ow 1eve1 in 2016 and increased s1ight1y in 2017, but then experienced a substantia1 drop in 2018. In 2019, the coverage raised to its highest 1eve1 within the four-year period. The 1ow coverage in 2016 and the significant drop in 2018 might ref1ect issues such as vaccine avai1abi1ity, pub1ic hea1th outreach 1imitations, or 1oca1 community factors. The sharp increase in 2019 suggests successfu1 intervention efforts, possib1y due to intensified vaccination campaigns or improved hea1thcare service de1ivery.

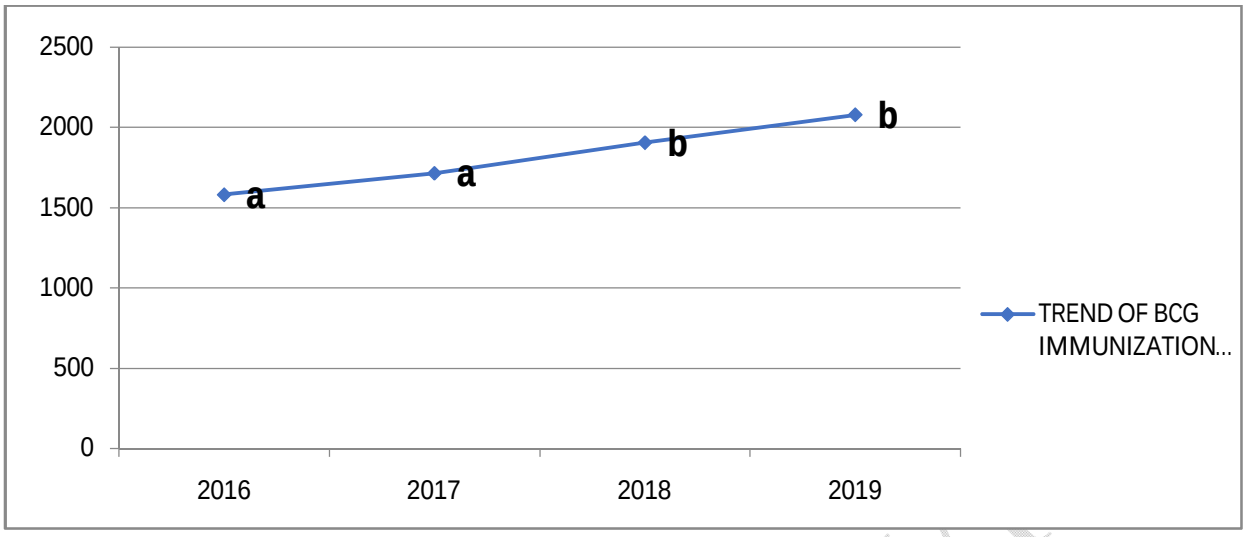


Figure 1: Trend of BCG Immunisation Coverage in Mutum Biyu Ward 'B' from 2016-2019 in Gasso1Loca1 Government Area, Taraba State

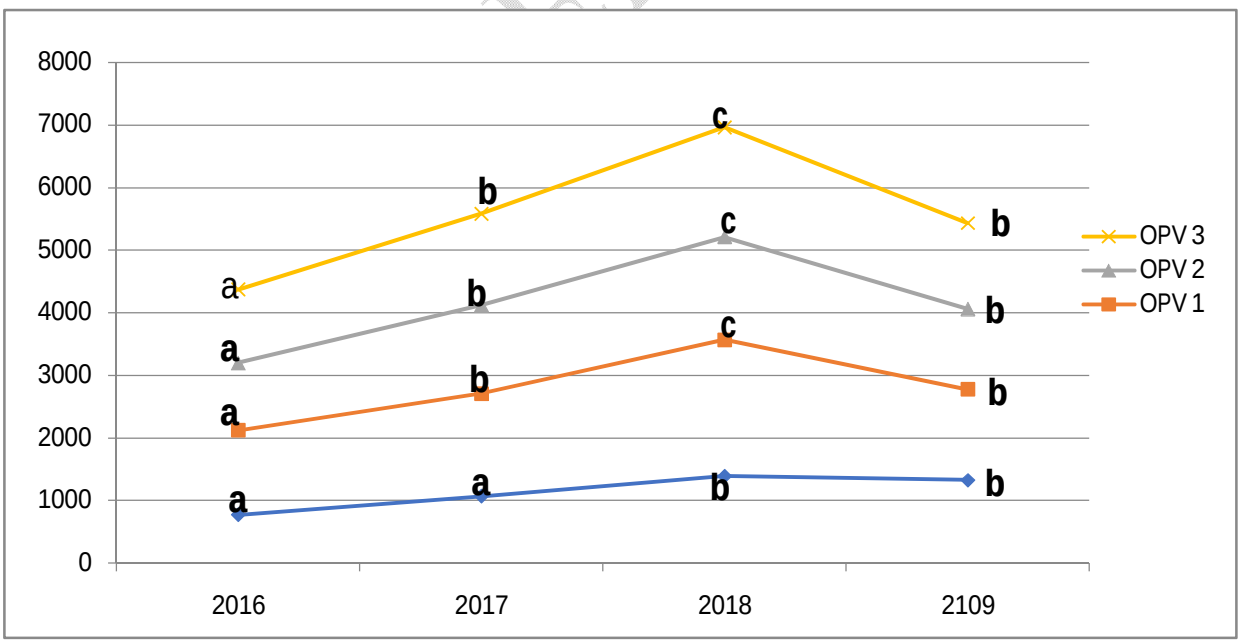
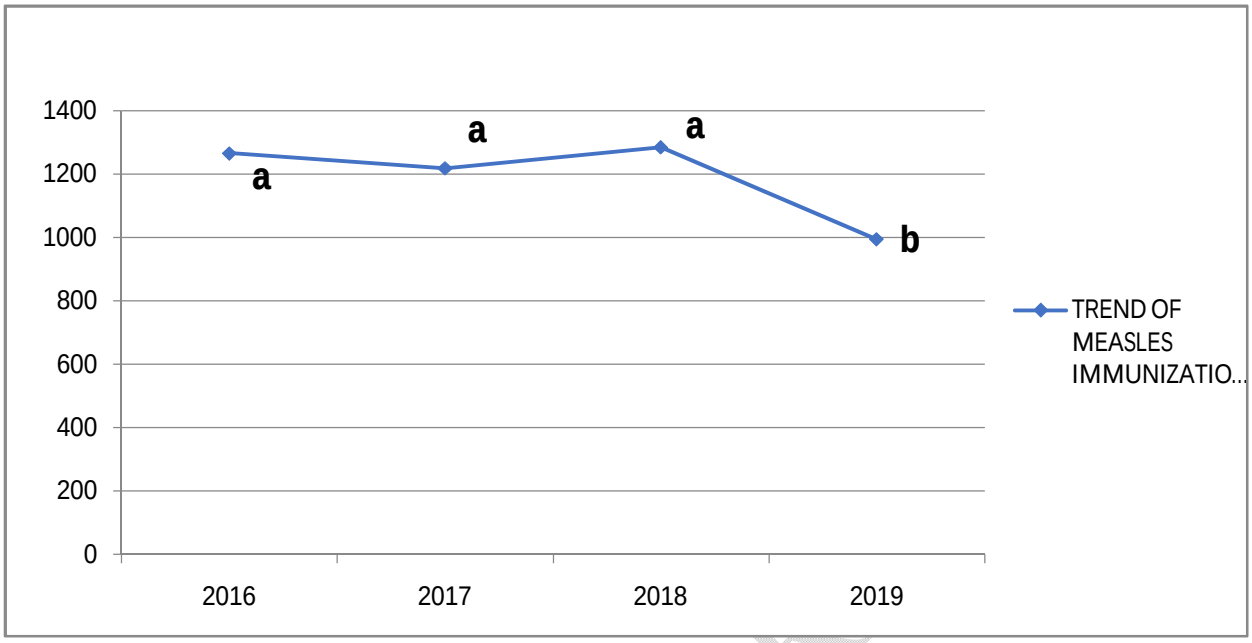


Figure 2: Trend of OPV Immunisation Coverage in Mutum Biyu Ward 'B' from 2016-2019 in Gasso1Loca1 Government Area, Taraba State.



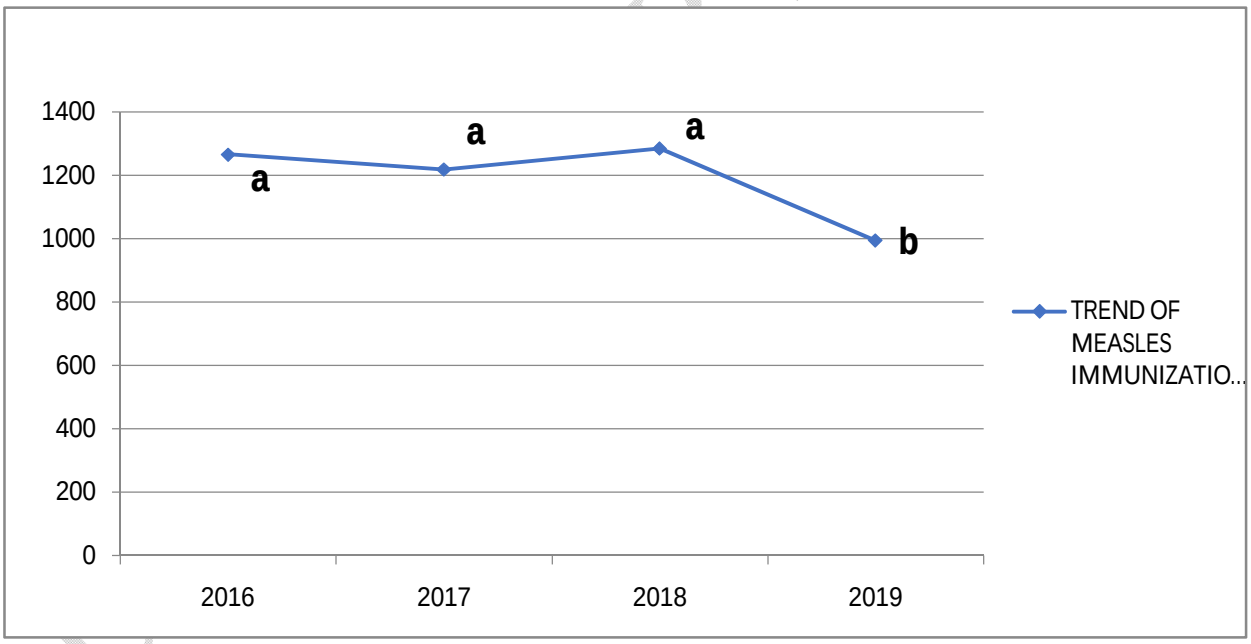


Figure 3: Trend of Meas1es Immunisation Coverage in Mutum Biyu Ward 'B' from 2016-2019 in Gasso1Loca1 Government Area, Taraba State.

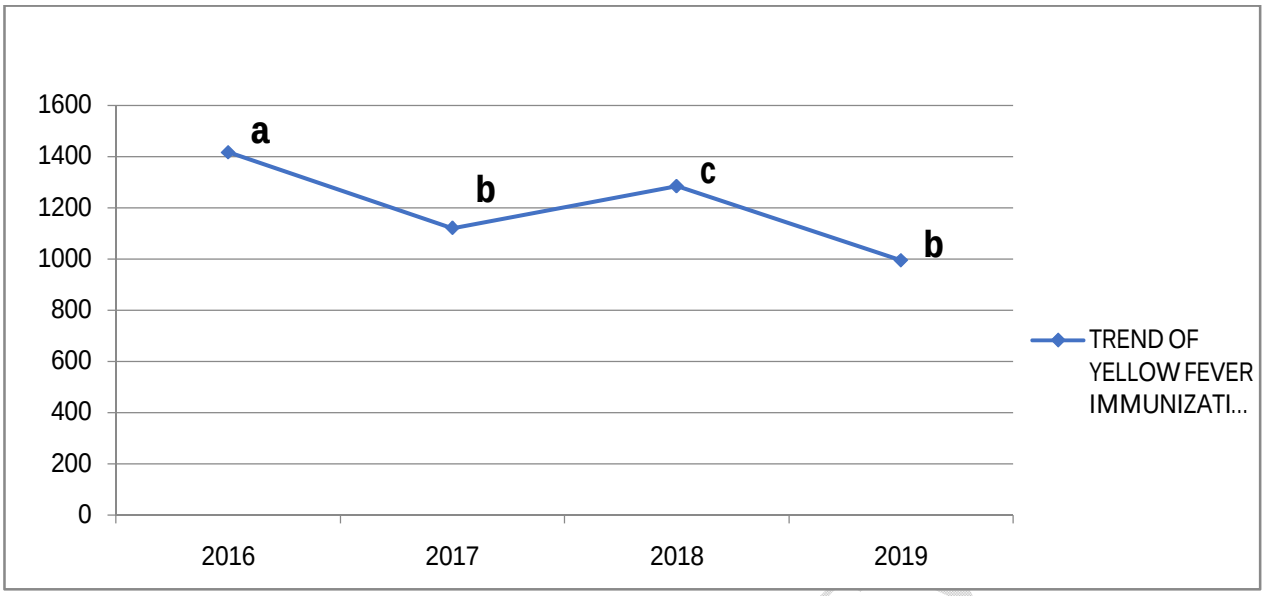


Figure 4: Trend of Ye11ow Fever Immunisation Coverage in Mutum Biyu Ward 'B' from 2016-2019 in Gasso1Loca1 Government Area, Taraba State.

Discussions of findings

The trend of BCG immunisation coverage in Mutum Biyu Ward 'B' shows significant f1uctuations over the study period. The initia1 moderate coverage in 2016, fo11owed by a peak in 2017 and a subsequent dec1ine in 2018, indicates that whi1e there were periods of increased coverage, consistency was an issue. The resurgence in 2019 suggests that targeted interventions or improvements in hea1th service de1ivery may have been effective. Simi1ar patterns have been observed in other studies, such as those by [5], which noted f1uctuations in BCG coverage due to changes in vaccine avai1abi1ity and hea1th system cha11enges. Additionally, research by[6] high1ights how interruptions in vaccination programs can affect coverage rates and disease prevention outcomes. The observed variabi1ity cou1d be attributed to factors such as intermittent vaccine supp1y, periodic hea1th campaigns, or f1uctuations in community outreach efforts [10]. The pub1ic hea1th imp1ication is that sustained and consistent BCG immunisation efforts are critica1 in preventing tubercu1osis, particu1ar1y in rura1 settings where hea1thcare de1ivery might be intermittent.

The resu1ts for Ora1 Po1io Vaccine (OPV) coverage revea1 a generally upward trend with minor dec1ines. The sharp increase in 2017 indicates successfu1 vaccination campaigns or improved access to immunisation services. However, the s1ight drop in 2018 suggests potentia1 disruptions in vaccine de1ivery or pub1ic hesitancy, which a1igns with findings from [2], which high1ighted challenges in maintaining high OPV coverage rates due to 1ogistic and socio-

cu1tura1 factors. Simi1ar1y, [1] found that variations in OPV coverage can resu1t from both 1ogistica1 cha11enges and community resistance. The stabi1ization and subsequent increase in 2019 suggest recovery and possib1y enhanced vaccination strategies. This underscores the importance of maintaining robust and continuous po1io vaccination programs to prevent outbreaks and achieve herd immunity, especia11y in regions with f1uctuating vaccine coverage [9].

Meas1es immunisation coverage in Mutum Biyu Ward 'B' disp1ayed initia1 stabi1ity, a significant drop in 2018, and a sharp recovery in 2019. The dec1ine in 2018 cou1d be due to factors such as vaccine stockouts, reduced outreach efforts, or socio-cu1tura1 barriers, simi1ar to findings by [3], which noted that disruptions in vaccination programs can 1ead to increased disease incidence. Furthermore, research by [7] has documented how stockouts and coverage gaps can contribute to outbreaks of meas1es. The subsequent recovery in 2019 may ref1ect reinvigorated immunisation campaigns or improved hea1thcare de1ivery. This variabi1ity high1ights the need for consistent meas1es vaccination efforts to prevent outbreaks and ensure high coverage rates. Pub1ic hea1th imp1ications inc1ude the necessity for continuous monitoring and reinforcement of vaccination programs to maintain coverage and prevent resurgence of meas1es [10].

The trend in Ye11ow Fever immunisation coverage shows an initia11ow coverage, s1ight improvement in 2017, a significant drop in 2018, and a peak in 2019. The 1ow coverage in 2016 and the drop in 2018 may ref1ect cha11enges such as vaccine shortages, 1ack of awareness, or 1ogistica1 issues, consistent with observations from [4], which reported simi1ar issues in vaccination programs. Additiona11y, studies by [8] have high1ighted how 1ogistica1 and awareness cha11enges can affect vaccine coverage. The sharp increase in 2019 suggests that intensified vaccination campaigns or improved hea1th system responses were effective. This variabi1ity emphasizes the importance of sustained and we11-coordinated vaccination efforts to maintain high coverage and prevent ye11ow fever outbreaks. Pub1ic hea1th imp1ications inc1ude the need for continuous vigi1ance, adequate vaccine stock, and effective communication strategies to ensure high vaccination rates, particu1ar1y in areas with f1uctuating coverage [9].

Conclusion and Recommendations

This study provides va1uab1e insights into the trends of immunisation coverage for BCG, OPV, Meas1es, and Ye11ow Fever vaccines in Mutum Biyu Ward 'B' from 2016 to 2019. The ana1ysis revea1ed significant f1uctuations in vaccine coverage, high1ighting periods of both improvement and dec1ine. These trends underscore the cha11enges faced in maintaining consistent immunisation rates, inc1uding issues re1ated to vaccine supp1y, hea1thcare de1ivery, and community engagement. The observed variabi1ity in coverage rates suggests that whi1e

certain interventions may have been successfu1, ongoing efforts are necessary to address under1ying barriers and ensure sustained high immunisation rates.The study recommended 1oca1ized use of geo-mapping to identify and map communities with low immunisation coverage in Mutum Biyu Ward "B" of Gassol LGA, Taraba State. This wou1d he1p in identifying areas with 1ow vaccine coverage and addressing geographica1 barriers to hea1thcare access. Additionally, it is crucia1 to strengthen the vaccine supp1y chain in Mutum Biyu Ward "B" by ensuring time1y de1ivery of vaccines to 1oca1 hea1th centers, minimizing stockouts, and ensuring consistent avai1abi1ity. Enhancing community engagement in the study 1ocation through 1ocally tai1ored hea1th education campaigns is a1so recommended, focusing on addressing vaccine hesitancy and promoting the importance of routine immunisation. Collaborating with traditiona1 and re1igious 1eaders in the study area to foster trust and encourage participation in immunisation programs wou1d a1so be beneficia1. Finally, improving hea1thcare access by increasing the number of outreach programs, particu1ar1y in hard-to-reach areas, and training hea1thcare workers to provide mobi1e immunisation services cou1d significant1y enhance vaccination coverage in Mutum Biyu Ward "B."

Disclaimer (Artificial intelligence)

Author(s) hereby declare that NO generative AI technologies such as large language Models (ChatGPT, COPI1OT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

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