Assessing the Resilience of Child Immunisation Programs in sub-Saharan Africa amidst the COVID-19 Pandemic: Tracking Coverage and Identifying Key Challenges

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Extended Abstract

Introduction: The COVID-19 pandemic had significant repercussions on healthcare accessibility and delivery in sub-Saharan Africa (sSA). Governments implemented various measures to contain the virus, such as lockdowns and travel restrictions, leading to disruptions in healthcare services, particularly for women's and children's health, affecting progress toward sustainable development goals (SDGs). This study examined the impact of the pandemic on child immunisation in Ethiopia and Kenya at the national and sub-national levels.

Methods: The study employed routine health management information system (HMIS) data to analyse changes in child immunisation coverage between the pre-COVID19 period of 2018 to 2019 and the during COVID-19 period of 2020 to 2021. The mean differences in immunisation coverage between the pre-COVID-19 and during COVID-19 were tested at a 5% significance level to detect changes. Geospatial maps illustrated coverage variations and changes between the two periods. Counterfactual coverage evaluations were conducted using Interrupted Time Series (ITS) analysis, assuming no COVID-19 impact. At sub-national level, aggregated annual proportions were used to create geospatial heat maps to show changes in immunisation coverage pre-COVID-19 and during COVID-19 periods and the differences in utilisation between the periods at 5% significance level for all counties and regions in Ethiopia and Kenya. The study was robust focusing on coverage of full immunisation, Bacillus Calmette–Guérin (BCG), Oral Polio Vaccine third dose (OPV3), Diphtheria, Pertussis and Tetanus third dose (DPT3) and measles for both Kenya and Ethiopia. The abstract highlights findings from full immunisation coverage in Ethiopia and Measles vaccine coverage in Kenya due to notable disparities in changes in coverage at national and sub-national level.

Results: National-level data indicated minor, statistically insignificant disruptions in coverage during COVID-19 peaks in both countries. At the sub-national level, on the other hand, wide variations have been observed, indicating different levels of vulnerability.

Ethiopia

Full immunisation coverage

Full immunisation coverage remained consistent pre-pandemic and during the pandemic period, with minor non-statistically significant declines in March and November 2020. Counterfactual analysis results indicated that COVID-19 had a limited impact on access to and utilisation of

immunisation services. At the sub-national level, trends generally mirrored those observed at the national level, with most regions experiencing an increase in full immunisation coverage. However, the Afar region showed no change in coverage, and the Gambela region exhibited a slight decline when comparing the pre-COVID-19 to the COVID period. Notably, a significant increase in full immunisation coverage was observed in the Somali region (MD: 4.6%, 95% CI: [4.48, 17.41]) (see **Figure 1**). Full immunisation data for the Tigray region were unavailable due to ongoing conflict[1], which disrupted data collection efforts over the project period.

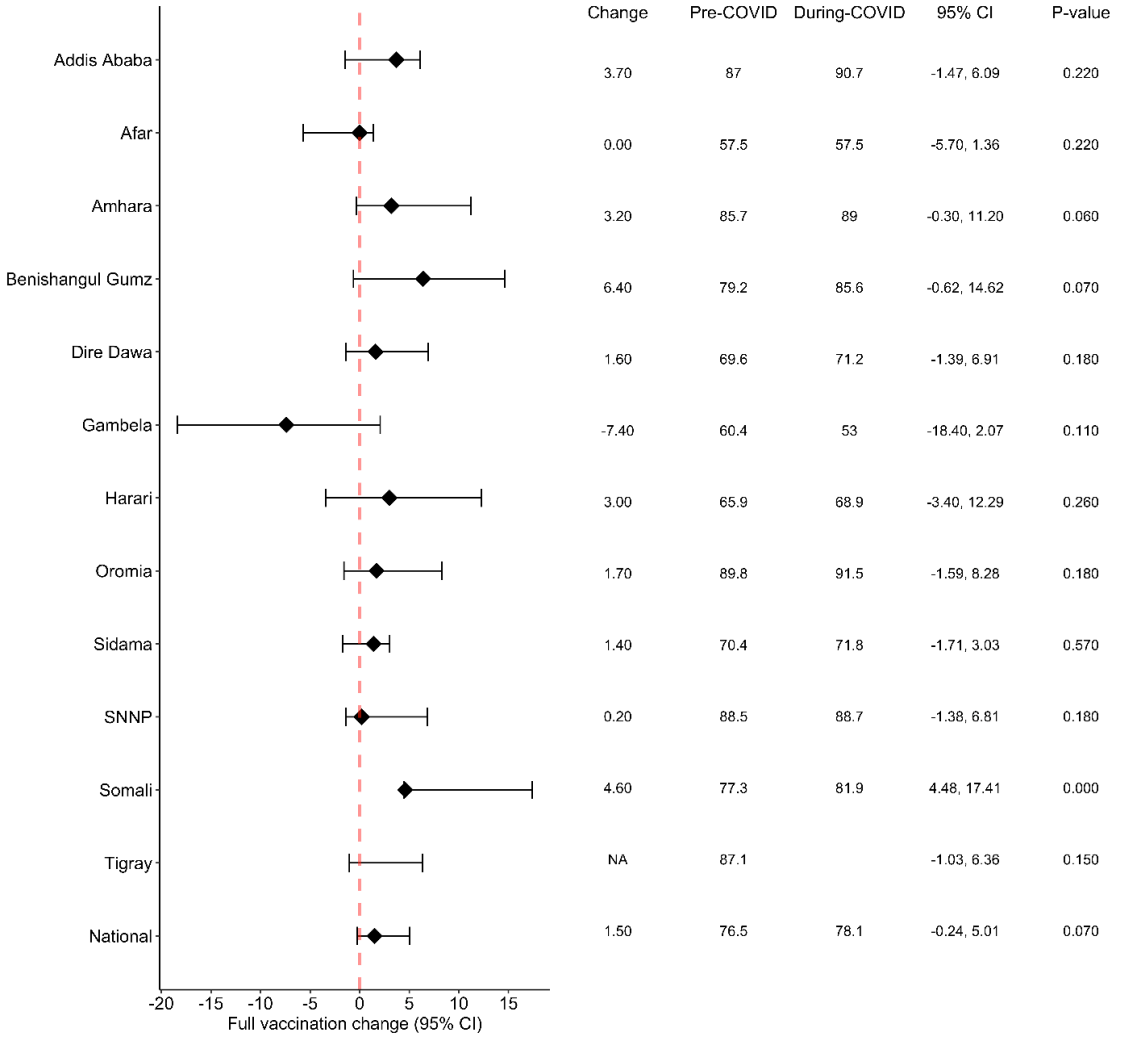

Figure 1: Change in full immunisation coverage pre- COVID-19 (2018-2019) and during COVID-19 (2020-2021) period at 95% confidence intervals in Ethiopia.

[1] Gesesew H, Kebede H, Berhe K, Fauk N, Ward P. Perilous medicine in Tigray: a systematic review. Confl Health. 2023;17(1):1–13.

Kenya

Measles vaccine coverage

At the national level, measles vaccine coverage exhibited increases, although the change was not statistically significant. In contrast to national measles vaccination coverage, eleven (11) counties in Southeast Kenya, such as Bomet and Bungoma, reported a significant increase in measles immunisation coverage (**Figure 2**). Mandera and Trans-Nzoia in the North-eastern region similarly reported an increase in measles coverage. Isoilo, Kitui, Marsabit, Taita Taveta Tana River, Turkana, and Wajir counties experienced a significant decline in measles vaccine coverage.

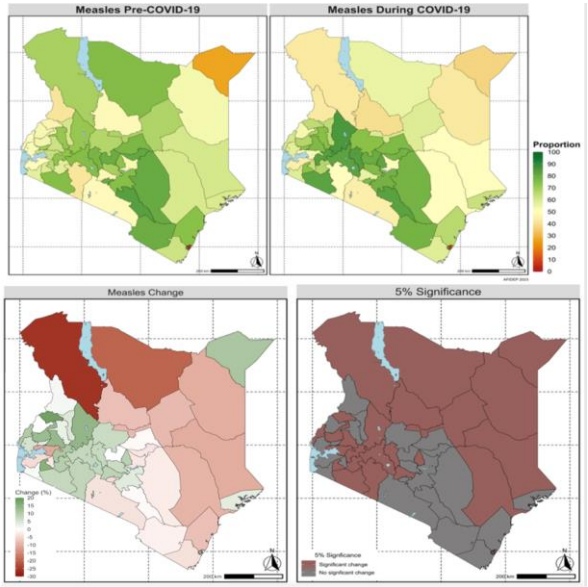

Figure 2: Top panel. Measles vaccination coverage (%) for Kenya pre-COVID-19 period of 2018 to 2019 (left) and during the COVID-19 period of 2020 to 2021 (right); (Green = high measles vaccination coverage rates or increase in coverage; Red = low measles vaccination coverage rates or decrease in coverage). Bottom panel. The difference in measles vaccination coverage between pre- and during- COVID-19 years (left) (Green = increase in measles vaccination in coverage rate, Red = reduction in measles vaccination coverage rates, White = no change); and its statistical significance (right) (Red = observed change is significant. Grey = observed change is not significant).

Discussion: Routine immunisation services in Ethiopia and Kenya faced short-term disturbances at the national level due to pandemic-related fears and restrictions[2]. Sub-national disruptions were observed in specific regions and counties, attributed to apprehension about virus exposure during facility visits and logistical challenges from pandemic controls, like inter-regional travel constraints and business closures. Conflicts and climate-related issues may have likely influenced disruptions in social, economic, and health outcomes in certain areas more than the pandemic

[2] Chiappini E, Parigi S, Galli L, Licari A, Brambilla I, Angela Tosca M, et al. Impact that the COVID-19 pandemic on routine childhood vaccinations and challenges ahead: A narrative review. Acta Paediatrica, International Journal of Paediatrics. 2021;110(9):2529–35.

itself[3]. For instance, Northern Ethiopia grappled with healthcare access disruptions due to conflict and food shortages in Tigray, prompting a shift towards relief efforts. Conversely, some regions and counties maintained or improved coverage owing to adequate vaccine stocks and campaigns.

Conclusion: This study reveals that routine immunisation services endured temporary disruptions at the national level in Ethiopia and Kenya. Notable disturbances were observed in specific regions and counties at sub-national levels. Conflict and climate-related challenges may also played a more substantial role in specific areas' health outcomes compared to the pandemic. While some regions adapted well, others faced exacerbated issues necessitating reprioritisation of efforts.

[3] Adilo TM, Endale SZ, Demie TG, Dinka TG. The Impact of COVID-19 on Supplies of Routine Childhood Immunization in Oromia Regional State, Ethiopia: A Mixed Method Study. Risk Manag Healthc Policy. 2022;15(December):2343–55.