MSF Paediatric Days 2022
Poster N°52

Cornelius Rau[1,2,3], Daniel Lüdecke[1], Laure B. Dumolard[2], Jan Grevendonk[2], Brenton M. Wiernik[4], Robin Kobbe[1], Marta Gacic-Dobo[2], M. Carolina Danovaro-Holliday[2]

What is the quality of global child immunization data reported to WHO and UNICEF? Insights from 194 countries over 20 years (2000–2019)

[1] University Medical Center Hamburg-Eppendorf (UKE), Germany [2] World Health Organization (WHO), Switzerland [3] Harvard T.H. Chan School of Public Health, USA [4] University of Florida, USA

Key points

Question
What was the extent and time trend of potential quality issues in global child immunization coverage data over the past 20 years?

Findings
In this cross-sectional analysis of data from 194 countries, 18.2% of coverage data reported to the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) between 2000–2019 contained potential data quality issues. The proportion of potentially problematic data declined significantly by 5.1% per year. However, not all country groups showed a significant improvement.

Meaning
Progress has been made in improving the quality of global immunization coverage data, but some country groups require further support.

Background

Analyzing immunization coverage data is crucial to guide decision-making in national immunization programs and monitor global initiatives such as the Immunization Agenda 2030. We aimed to assess the quality of reported child immunization coverage data for 194 countries over 20 years.

Methods

We analyzed child immunization coverage as reported to the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) between 2000–2019 by all WHO Member States for Bacillus Calmette-Guérin (BCG) vaccine birth dose, first and third doses of diphtheria-tetanus-pertussis-containing vaccine (DTP1, DTP3), and first dose of measles-containing vaccine (MCV1). We assessed completeness, consistency, integrity, and congruence and assigned data quality flags in case anomalies were detected. Generalized linear mixed-effects models were used to estimate the probability of flags worldwide and for different country groups over time.

Analysis approach:

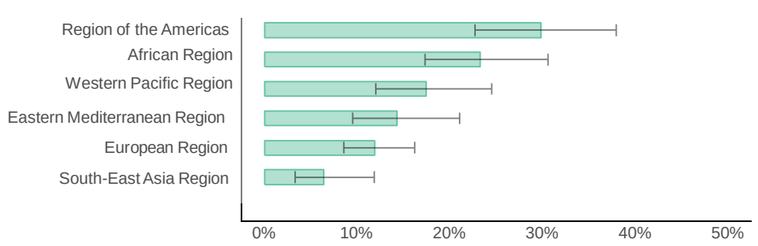
❶ Data quality checks
Completeness, consistency, congruence, integrity

❷ Flagging
Summarizing data and flagging anomalies

❸ Modelling
Estimation of probability of flags and trend analysis

Results

The probability of data quality flags was 18.2% globally (95% confidence interval [CI] 14.8–22.3). The lowest probability was seen in South-East Asia (6.3%, 3.3–11.8, p = 0.002), the highest in the Americas (29.7%, 22.7–37.9, p < 0.001). The probability of data quality flags declined by 5.1% per year globally (3.2–7.0, p < 0.001). The steepest decline was seen in Africa (-9.6%, -13.0 to -5.8, p < 0.001), followed by Europe (-5.4%, -9.2 to -1.6, p = 0.0055), and the Americas (-4.9%, -9.2 to -0.6, p = 0.026). Most country groups showed a statistically significant decline, and none had a statistically significant increase.



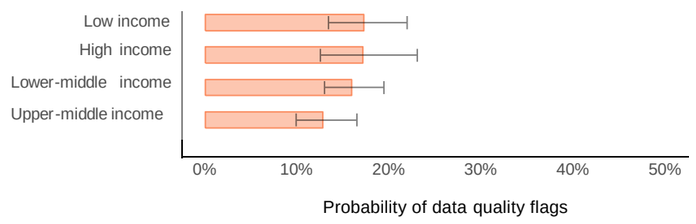


Figure 1: Modeled probability of data quality flags for immunization coverage reports for DTP1, DTP3, MCV1, and BCG by WHO World Region and World Bank Income Groups, 194 WHO Member States, 2000–2019.

Notes: Error bars represent 95% confidence intervals (CI). Country data as reported by 15 July 2020. BCG = Bacillus Calmette-Guérin vaccine birth dose. DTP1 = first dose of diphtheria-tetanus-pertussis-containing vaccine. DTP3 = third dose of diphtheria-tetanus-pertussis-containing vaccine. MCV1 = first dose of measles-containing vaccine. Countries were grouped for all years together by WHO World Region and separately for each year by World Bank income groups.

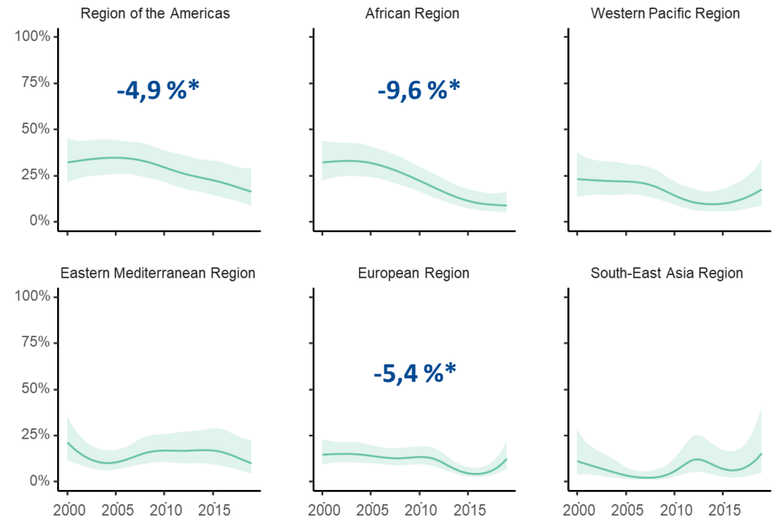


Figure 2: Modeled trends of the probability of data quality flags for immunization coverage reports for DTP1, DTP3, MCV1, and BCG, by WHO World Region, 194 WHO Member States, 2000–2019 (* = p<0.05)

Notes: Shading represents 95% confidence intervals (CI). Country data as reported by 15 July 2020. BCG = Bacillus Calmette-Guérin vaccine birth dose. DTP1 = first dose of diphtheria-tetanus-pertussis-containing vaccine. DTP3 = third dose of diphtheria-tetanus-pertussis-containing vaccine.

Discussion

About one in five vaccine coverage reports sent to WHO/UNICEF between 2000–2019 contained data that warrant further quality investigation. Tackling data quality requires increased commitment from stakeholders at all levels.

Strengths

- All 194 WHO Member States included
- Long study period
- Systematic approach

Limitations

- Secondary data analysis
- Reasons for data quality problems unclear
- No sub-national data
- Pre-pandemic time period

Conclusion

Over the past two decades, the quality of global immunization coverage data appears to have improved. However, progress has not been universal. The results highlight the need for joint efforts so that all countries collect, report, and use high-quality data for action in immunization.

Acknowledgements

MCD-H, LBD, MGD, and JG work for the World Health Organization. The authors alone are responsible for the views expressed in this publication and they do not necessarily represent the decisions, policy, or views of the World Health Organization. CR is a board member of the German Society for Tropical Pediatrics and International Child Health (GTP). RK is a board member of the German Society for Paediatric Infectious Diseases (DGPI). RK reports honoraria for lectures in non-pharmaceutical educational events in pediatrics, infectious diseases, and tropical medicine. RK attended an advisory board meeting on shortage of immunoglobulins by Shire Germany in 2020. CR and RK have been involved in clinical trials for which their employer has received funding from Pfizer/BioNTech and Sedana Medical. All other authors declare no competing interests.

Further Reading

Rau C, Lüdecke D, Dumolard LB, Grevendonk J, Wiernik BM, Kobbe R, et al. Data quality of reported child immunization coverage in 194 countries between 2000 and 2019. PLOS Global Public Health 2022(2): e0000140. http://doi.org/10.1371/journal.pgph.0000140