

Concordance of self-assessment and self-reporting of National Immunization Technical Advisory Group process indicators in the Eastern Mediterranean Region

Gerald Etapelong Sume¹, Wedyan Meshreky¹, Md Sharifuzzaman¹, Messeret Shibeshi¹ and Quamrul Hasan¹

¹Immunization, Vaccine Preventable Disease and Polio Transition Unit, Department of Universal Health Coverage Communicable Diseases, WHO Regional Office for the Eastern Mediterranean, Cairo, Egypt (Correspondence to Gerald Sume: sumeetapelong@who.int).

Abstract

Background: There have been concerns regarding the quality of immunisation data reported by countries through the WHO/UNICEF electronic joint reporting form (eJRF). The first region-wide assessment of the National Immunization Technical Advisory Groups (NITAGs) conducted in 2023 in the WHO Eastern Mediterranean Region using the NITAG maturity assessment tool (NMAT) offered an opportunity to verify NITAG process indicators.

Aim: To assess immunisation data from different sources in the region and their concordance with the NITAG process indicators, in order to improve data reporting.

Methods: We compared 6 NITAG process indicators reported by 19 Eastern Mediterranean Region countries and territories in 2023 using the eJRF and NMAT. Using WinPepi we calculated Cohen's Kappa coefficient and 95% confidence interval for conflict of interest and overall indicators.

Results: Overall concordance of the 6 process indicators between eJRF and NMAT was 90% (102 of 114 indicator-pairs), adjusted Kappa 0.319 (95% CI -0.152–0.985). All indicators had $\geq 90\%$ concordance except conflict of interest, which was 74% (adjusted Kappa 0.409; 95% CI -0.238–0.985). Concordance decreased with lower income level, from 100% in high-income countries to 77% in Gavi-eligible countries. eJRF reports indicated higher achievement of 5 out of the 6 process indicators compared.

Conclusion: Concordance was weaker among Gavi-eligible (lower-income) countries. Harmonising indicator formulations, conducting external data audits and supporting lower-income countries can improve the reliability of NITAG reporting.

Keywords: immunisation, vaccination, NITAG, NMAT, eJRF, Eastern Mediterranean

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Introduction

The National Immunization Technical Advisory Groups (NITAGs) are a group of national experts from various fields who provide independent technical advice for policymaking to the Ministry of Health on vaccine and immunisation issues (1). In 2010, the structure and reporting of NITAGs performance were formalised by WHO by inserting NITAG process related questions into the WHO/UNICEF electronic joint reporting form (eJRF). The questions are used to calculate 6 NITAG process indicators to determine how well a NITAG is functioning (NITAG functionality).

The eJRF is a standardised reporting tool used globally by all the United Nations Member States and associated territories to share immunisation data with WHO and UNICEF each year (2). The data is self-reported; one person from each country enters the data and another person reviews it before submission. The WHO regional offices and headquarters then review the data and provide feedback on any evident data gaps or errors

to the Ministry of Health through the WHO country offices. The data covers the previous calendar year and is usually submitted around April. eJRF is thus an important resource for tracking trends in the existence and functionality of NITAGs and to guide regional and global immunisation strategies.

To strengthen NITAGs, the NITAG maturity assessment tool (NMAT) was developed in 2023 to support in evaluating and improving the performance of NITAGs. Unlike eJRF which focuses on NITAG functionality, NMAT provides a more detailed picture of how developed or mature a NITAG is (NITAG maturity) using 7 indicators, 21 sub-indicators and 80 criteria rated across 5 maturity levels: basic, developing, intermediate, advance, and leading edge (3,4).

In 2023, NITAG chairs, members and the secretariat of 19 Member States and the Occupied Palestinian Territory of the WHO Eastern Mediterranean Region (EMR) conducted a self-assessment of their NITAGs using the NMAT and used the results to develop improvement plans (5).

The quality of data reported through the immunisation health information system has often been queried by the users. For example, a comparison of Ethiopia's yearly coverage estimates for over 20 years using data from different sources, including the eJRF showed major and persistent data discrepancies (6). A systematic review examining the factors limiting data quality in low- and middle-income countries identified issues such as data inaccuracy, lateness, incompleteness, and human error (7). Most studies using data from the eJRF have discussed the risk of bias and limitations associated with its use (8–11). Despite these shortcomings, NITAG process indicators remain a valuable resource and are widely used at global and regional levels.

The introduction of the NMAT in 2023 provides an opportunity to triangulate NITAGs data, irrespective of whether the NMAT assessment was conducted externally or self-reported. Although self-assessment of NITAGs using NMAT is more convenient, easier to implement and can be completed with limited resources, an external assessment may be less prone to biases, allowing a more objective and more reliable evaluation.

Until date, no study at the global, regional or country level has compared or triangulated the NITAG indicators data from eJRF with findings from NMAT assessments. This is, therefore, the first, given the important role NITAGs play in immunisation policymaking and the need for optimal data quality. In our efforts to improve NITAGs reporting and reporting tools, we examined how closely the 2023 eJRF data and NMAT self-assessment align.

Methods

Study design

This study was conducted in the WHO EMR, which comprises the Occupied Palestinian Territory and 21 Member States, each of which has an established NITAG. In 2023, the region's population was 809 901 233 (12). It is a retrospective comparative analysis using 2023 country data from 2 data sources: eJRF and NMAT self-assessment.

We extracted data, as reported by EMR countries and territories in April 2024 through their eJRF, on the 6 NITAG process indicators for 2023 from the WHO

immunisation data portal (13). We also extracted data on the same 6 NITAG process indicators from the NMAT spreadsheets that were submitted to the regional office as part of country NMAT self-assessments conducted in 2023. All the data were received by the regional office by June 2023.

We compared the 6 questions on NITAG process indicators in the eJRF with their equivalent indicators in the NMAT (Table 1).

We grouped the countries based on a combination of the 2023 World Bank income level and Gavi eligibility classifications (14) to create 3 country groups as frequently used to guide actions in the region: high-income countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates), non-Gavi eligible middle-income countries (Egypt, Iran, Iraq, Jordan, Lebanon, Occupied Palestinian Territory, Libya, Morocco, Tunisia) and Gavi-eligible countries (Afghanistan, Djibouti, Pakistan, Somalia, Sudan, Syria and Yemen). Countries in each group share similar financial and programmatic characteristics that define targeted operational support provided to countries by the immunisation unit of the regional office.

We defined concordance as the consistency in reporting by countries for the same indicator in both the eJRF and the NMAT. That is, either a “No” or “Yes” in both data sets for the same indicator.

Data analysis

We created a database with the 2023 data for the 6 process indicators and calculated the frequencies, to compare the concordance in reporting for each indicator by country and by country group (Table 1). We also calculated the overall 2023 concordance for the 6 indicators put together and for each country group. The concordance was expressed as a proportion. We determined the proportion of countries in the EMR with concordance for each of the 6 indicators individually, and the proportion for all indicator pairs across the region for both data sets. We examined the variation in concordance by country groups and used WinPepi to calculate Cohen's Kappa coefficient and 95% confidence interval for conflict of interest and overall indicators (15). This is because the value of the other indicators taken individually were small; some cells had zero, hence unable to calculate Kappa and/or 95% confidence interval values. The same applied when stratified by country income. A Kappa <0

Table 1 Electronic joint reporting form NITAG process indicator questions and corresponding NMAT equivalent

S/No.	Electronic Joint Reporting Form NITAG questions	Corresponding NMAT questions
1.	Does the NITAG have written terms of reference?	NITAG has written terms of reference including a mandate defining scope of work
2.	Is there a legal or administrative basis for the NITAG?	Official measures or documents have established the NITAG
3.	Are at least 5 areas of expertise represented?	At least 5 areas of expertise represented among NITAG members
4.	Did the NITAG meet at least once in 2023?	NITAG meets about once a year AND agenda and background documents are circulated at least one week before meetings
5.	Were agendas and documents shared at least a week before meetings?	NITAG meets about once a year AND agenda and background documents are circulated at least one week before meetings
6.	Are members required to disclose conflicts of interest?	Declaration of interest is mandatory for core members upon appointment

was agreement worse than expected or disagreement, kappa = 0 no agreement, 0.01–0.20 poor agreement, 0.21–0.4 (fair agreement), 0.41–0.60 (moderate agreement), 0.61–0.80 (good agreement), and 0.81–1.0 (very good agreement). The results were presented in bar charts and tables.

Ethics consideration

This study did not require ethics approval because we used existing publicly available data and did not involve human participants.

Results

Of the 22 EMR countries and territories, 21 (95%) submitted their 2023 eJRF data and 20 (91%) conducted a self-assessment using NMAT in 2023. Among these 20 countries one did not submit their 2023 eJRF data. We therefore analysed the data for 19 countries.

Overall concordance

Out of an expected 114 indicator-pairs for the 19 countries, there was an overall 90% (102) concordance in reporting between NMAT and eJRF, with an adjusted Kappa coefficient of 0.319 (95% CI -0.152–0.985) (Table 2). The 12 discordant pairs were reported from 6 countries (3 non-Gavi eligible middle-income countries and 3 Gavi eligible countries).

Concordance across countries

Thirteen countries (68%) had concordant reports for all 6 NITAG process indicators, 3 (16%) countries had concordant reports for 4 indicators, 2 (11%) had concordance for 5 indicators and 1 country (5%) for 2 indicators. More countries reported meeting each NITAG process indicator in the eJRF than in the corresponding indicator for NMAT (Figure 1).

Concordance across indicators

All the 19 countries showed concordance in reporting the existence of a legislative or administrative basis for NITAG. Eighteen countries (95%) showed concordance in

reporting the existence of a written terms of reference for the NITAG and 14 countries (74%) showed concordance for the indicator related to NITAG members requiring to declare their interest (Table 2).

Concordance across country groups

Six of the 19 countries were high-income countries, 8 were non-Gavi eligible middle-income countries and 5 were Gavi eligible. Two Gavi-eligible countries did not conduct NMAT assessment in 2023 and one non-Gavi eligible middle-income country did not submit eJRF. Concordance in reporting for all the 6 NITAG process indicators was highest among high-income countries (100%), followed by 90% for non-Gavi eligible middle-income countries (adjusted Kappa 0.76) and 77% for Gavi eligible countries (adjusted Kappa 0.132). The indicator related to the declaration of interest had the least concordance; only 63% concordance among non-Gavi eligible middle-income countries and 60% among Gavi-eligible countries (Figure 2).

Discussion

In 2023, the overall concordance in reporting of NITAG process indicators between the eJRF and NMAT among EMR countries was generally very high, with Gavi-eligible countries showing the lowest concordance level. More countries reported meeting each of the 6 NITAG process indicators in the eJRF than in the NMAT.

Variation in concordance and temporality

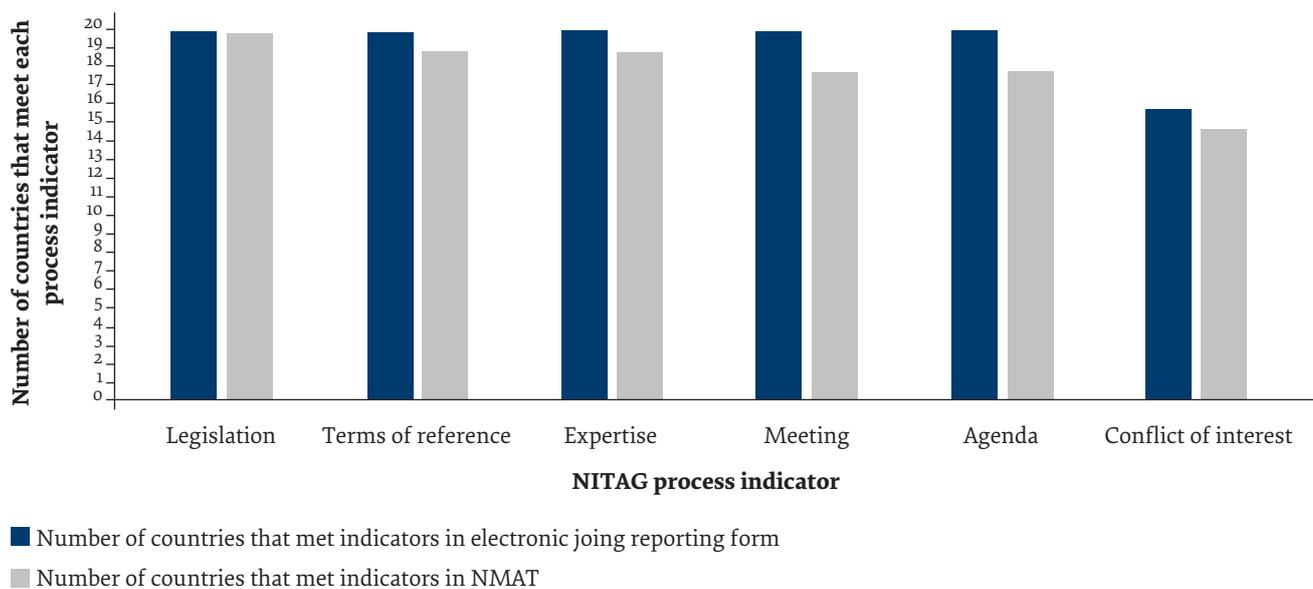
The high level of concordance in our study suggests little discrepancies in reporting of NITAG process indicators between the 2 data sets. On the other hand, the agreement being fair as per the Kappa value is better than chance but not strong enough, probably due to inconsistencies in reporting. Although the indicator reporting on the existence of a legislative or administrative basis for the NITAG was the only indicator that all countries reported concordantly, for the remaining indicators, the difference was limited to 1 or 2 countries, with more positive responses in the eJRF than NMAT. This variation

Table 2 Concordance in country reporting between NMAT and electronic joint reporting form reports by NITAG process indicator, Eastern Mediterranean Region, 2023

NITAG process indicator	Number of country concordant pairs	Number of country discordant pairs	Percentage concordance	Cohen's Kappa coefficient	Adjusted Kappa	95% confidence interval
Legislation	19	0	100			
Term of reference	18	1	95			
Expertise	17	2	90			
Meeting	17	2	90			
Agenda	17	2	90			
Conflict of interest	14	5	74	0.28	0.409	-0.238–1.000
Overall	102	12	90	0.22	0.319	-0.152–0.985

² by 2 tables with cells having zero as value prevented us from calculating Kappa and 95% confidence intervals for the other process indicators except conflict of interest

Figure 1 Number of countries that met each NITAG process indicator as reported in NMAT and electronic joint reporting form, Eastern Mediterranean Region, 2023



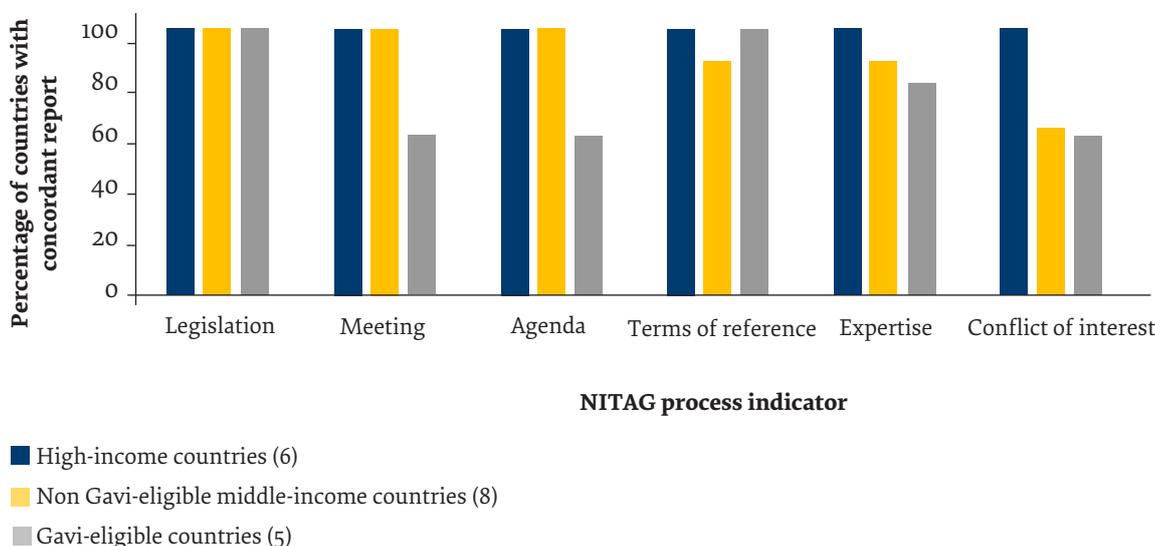
may be due to the various biases associated with self-reported data using the eJRF, as already described in several studies (8-11).

NMAT was conducted by a group comprising the NITAG chair, NITAG members and secretariat, potentially applying more rigour than eJRF, which is typically completed by one technical officer and later reviewed by a supervisor or reviewer. Another explanation is that countries may have implemented corrective actions between conducting the NMAT (March to June 2023)

and submitting the eJRF data (April 2024). Following the NMAT, NITAGs developed improvement plans, (5), therefore, it is possible that countries used the remaining 6 months of 2023 to implement activities to meet NITAG process indicators before reporting on them in eJRF in April 2024.

A regional capacity building workshop on NITAG roles and responsibilities and the evidence to recommendation process organised by the regional office in June 2023 and attended by 9 countries may have contributed to these

Figure 2 Concordance in country reporting between NMAT and electronic joint reporting form per NITAG process indicator by country group, Eastern Mediterranean Region, 2023



Total number of countries assessed = 19. See Table 1 for compared indicators

improvements. Four of these countries later reported meeting one or more NITAG process indicators in the eJRF, which they had not met when they conducted their NMAT. Therefore, the timeline mismatch between reporting in the eJRF and NMAT, implementation of corrective actions from improvement plans, including the regional capacity building workshop, may explain the greater proportion of criteria met in the eJRF and hence a lower concordance for some indicators.

Consistent with previous findings, the indicator related to the prevention and management of conflict of interest remained the weakest aspect of NITAG operations in the EMR (5,8). In this analysis, the declaration of interest or having a system to manage conflict of interest had the lowest concordance; 5 countries reported discordant responses, of which 3 initially reported “No” in NMAT (March to June 2023) but later reported “Yes” in eJRF (April 2024). These 3 countries were among the 9 that participated in the June 2023 NITAG capacity building workshop and at least one of them subsequently shared their policy to prevent and manage conflict of interest with the regional office. This suggests genuine efforts by countries to strengthen NITAGs and may be a reflection of real improvements in performance and positive changes in reporting as opposed to incoherent reporting.

Variation in income

The lower concordance among non-Gavi eligible middle-income countries and Gavi-eligible countries than high-income countries may be a reflection of systemic and governance challenges in the structure and functioning of the immunisation programme and broader health system, including data quality issues. Previous studies have linked poor immunisation data quality in low- and middle-income countries to fragmented health information systems, overreliance on targets and weak data management processes (7). In a previous publication, we had reported that NITAG functionality in the EMR decreased with decreasing income levels and that high-income countries had better NITAG maturity

and NMAT criteria scores than middle- and low-income countries using NMAT data (5,8). The low concordance in low- and middle-income countries may also be explained by limitations in qualified human resources for health.

Study limitations

The main limitation of this study is the difference in temporality between when NMAT (March to June 2023) was conducted and eJRF data were submitted (April 2024), which limits direct comparison of the data at a time point and may have led to misclassification and reduction in concordance. We used self-reported data, which is prone to bias. Although both NMAT and eJRF data are self-reported, our triangulation from both sources found high level concordance, lending confidence in the reported data. Data from an external assessment and third-party data quality assessment findings will provide a more robust comparison with self-reported data. Future studies should further triangulate self-reported NITAG indicators with other external validated sources such as health information systems and independent reviews. Only 2 NITAG process indicators (legislation and terms of reference) have similar, written formulations in NMAT and eJRF, which may affect comparability. The differences in the way the other 4 indicators are formulated may affect country understanding, responses and, thus, explain some discrepancies.

Conclusion

There is an overall high level of concordance and fair agreement in country reporting of NITAG process indicators between eJRF and NMAT, but concordance was weaker among Gavi-eligible countries. Harmonising the wordings of indicator in both tools is essential. Advocacy and support for external assessments to improve NITAG indicators reporting should be prioritised.

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Competing interests: None declared.

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