

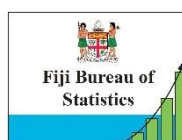
# MICS-EMIS Analysis: Fiji

## Country Overview: Process, Implementation and Lessons Learned

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The analysis builds on the methodological foundation of the MICS-EMIS linkage approach (MICS-Link), developed through collaboration between the main partners from the Fiji Bureau of Statistics (FBoS) and the Ministry of Education (MoE), and the UNICEF MICS team (Eva Quintana, James Kaphuka).

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## Abbreviations

|                      |                                                                                        |
|----------------------|----------------------------------------------------------------------------------------|
| CAPI                 | Computer-Assisted Personal Interview                                                   |
| DTS                  | Distance to school                                                                     |
| EMIS                 | Education Management Information System                                                |
| FBoS                 | Fiji Bureau of Statistics                                                              |
| FEMIS                | Fiji Education Management Information System                                           |
| FLS                  | Foundational Learning and Skills                                                       |
| MoE                  | Ministry of Education                                                                  |
| MICS                 | Multiple Indicator Cluster Survey                                                      |
| MICS-EAGLE<br>Equity | Multiple Indicator Cluster Survey Education Analysis for Global Learning and<br>Equity |
| TWG                  | Technical Working Group                                                                |
| UNICEF               | United Nations Children's Fund                                                         |

## Executive Summary

This report documents the process, outputs, and lessons learned from the MICS-EMIS Analysis in Fiji, one of the first global pilots of this kind and the first implementation in the country. Implemented through collaboration between the Ministry of Education (MoE), the Fiji Bureau of Statistics (FBoS), and UNICEF under the broader MICS-Link initiative, the exercise linked household survey and administrative school data to generate more policy-relevant education evidence.

School identification questions embedded in the 2021 Fiji MICS made it possible to link children in the survey to their schools in FEMIS. In Phase 2 (2025–2026), a Technical Working Group (TWG) comprising MoE, FBoS, and UNICEF guided the work using the 2021 MICS data and 2024–2025 FEMIS extracts. The linkage achieved a 98% match rate, connecting 5,827 of the 5,913 students in the MICS dataset to FEMIS schools and covering 779 schools, around 40% of all schools in Fiji.

The exercise produced five main outputs alongside the linked MICS-EMIS dataset itself: a technical workflow document; an analytical report responding to the policy questions identified by the TWG; an interactive dashboard providing structured access to FEMIS and linked MICS-EMIS findings; a dedicated distance-to-school analysis and policy brief; and a version-controlled GitHub repository containing all code and documentation for transparency and future replication.

## Key lessons and recommendations

The exercise demonstrated both the analytical value of linked MICS-EMIS analysis and the importance of strong FEMIS data systems to sustain this work over time. Alongside the analytical outputs, a separate technical note was developed for the Ministry of Education outlining concrete recommendations for strengthening FEMIS data quality, completeness, and linkage readiness. Three priority areas emerged:

- **Strengthening FEMIS data quality, standardization, and completeness:** The exercise highlighted the importance of stronger and more standardized FEMIS data systems to support future linkage work. Key recommendations include clearer record management rules, standardized categories for core variables, and improved completeness checks for priority indicators. These recommendations are further detailed in the accompanying FEMIS technical note developed for the Ministry of Education.
- **Sustaining and improving the linkage mechanism:** Future MICS rounds should embed official FEMIS school codes directly in the CAPI questionnaire to enable direct linkage and avoid post-survey manual matching of school names.
- **Prioritizing timelines:** The 2021 MICS data were around five years old by the time analysis was completed. Future exercises should align MICS and FEMIS data cycles and initiate linkage as early as possible after data release to maximize policy relevance.

## Conclusion

The Fiji exercise demonstrates that MICS-EMIS linkage is practically feasible and analytically valuable. The 98% match rate, the range of outputs produced, and the insights generated on equity, access, and school resources all confirm the potential of this approach. At the same time, the exercise is as much a system-strengthening process as an analytical one: the lessons on FEMIS data quality and linkage design provide a concrete roadmap for making future analysis faster, more reliable, and more directly useful for education planning in Fiji.

# 1. Introduction

This document presents the process, implementation, and lessons learned from the MICS–EMIS analysis in Fiji. The initiative was undertaken through collaboration between the Ministry of Education (MoE), the Fiji Bureau of Statistics (FBoS), and UNICEF, with the objective of linking household-level data from the Multiple Indicator Cluster Survey (MICS) to administrative school-level data from the Fiji Education Management Information System (FEMIS).

FEMIS provides administrative information on schools, students, and teachers and plays a central role in education planning and financing. MICS, in contrast, captures detailed information on children’s socio-economic background, foundational learning skills, and home learning environment. Linking these two systems allows analysis of how household characteristics interact with school resources, access, and learning outcomes.

Following the integration of school identification questions into the 2021 MICS survey, the MICS–EMIS analysis was conducted in 2025 using the 2021 MICS data and 2024–2025 FEMIS extracts. The work focused on cleaning and harmonizing both data sources, constructing a linked dataset, addressing nationally defined policy questions, and documenting lessons to inform future linkage cycles.

The findings and outputs presented in this report aim to support education planning in Fiji and contribute to strengthening data interoperability under the broader MICS–Link initiative.

## 2. The MICS-Link Framework

The Fiji MICS-EMIS work sits within the broader MICS–Link initiative, which aims to link MICS data with other data sources (including EMIS) to promote data interoperability and inform government policies. The integration of MICS and EMIS expands the scope of education analysis and evidence available for planning and program implementation and creates the possibility to bring together household and child characteristics (e.g., household wealth, functional difficulty, child labour, home learning environment) with school resources and school characteristics, including distance to school.

### 2.1 Phase 1: Operationalizing linkage through the MICS instrument

Phase 1 consists of operationalizing the linkage by incorporating specific questions into the MICS questionnaire, led by the MICS team of UNICEF. Countries implement MICS, including questionnaire finalization, training and fieldwork, data collection, data processing, and public release of the MICS microdata. Importantly, MICS–Link questions, covering such school-related information as school name and location, must be added at the stage of questionnaire finalization: they cannot be introduced once a survey has pre-tested instruments or is already in the field.

In Fiji, Phase 1 was implemented by embedding school identification questions into the MICS Computer-Assisted Personal Interview (CAPI), enabling children in MICS to be linked to schools in FEMIS using reported school name and location.

### 2.2 Phase 2: MICS–EMIS analysis

Phase 2, supported under GPE-KIX funding, focuses on the analytical use of the linked data and the co-creation model. It includes:

1. Creation of a working group (TWG) to guide the analysis of the linked data
2. Quantitative analysis, including geo-coded analysis such as distance to schools
3. Building capacity within the country to explore novel methodological and analytical approaches
4. Knowledge mobilization and evidence-based planning, including identifying bottlenecks and supporting future data integration possibilities

Under KIX funding, Phase 2 places a strong emphasis on co-creation and collaboration: UNICEF and the Ministry of Education jointly define the policy questions informed by the linked dataset, and the analytical process is deliberately structured to strengthen national ownership, institutional capacity, and long-term sustainability.

Fiji was among the early pilot countries for MICS–EMIS linkage (alongside Eswatini), and the Fiji outputs were designed to serve as reference materials for additional countries implementing MICS–Link between 2024–2026.

## 3. Data Collection and Sources

### 3.1 MICS household survey (2021)

The MICS household survey was carried out by FBoS in 2021, capturing data from 22,900 individuals, including 5,913 students. The survey collected a wide range of variables spanning socioeconomic indicators and foundational learning metrics, providing a comprehensive dataset for understanding educational contexts at the household level.

### 3.2 FEMIS administrative data (2024–2025 extracts)

FEMIS is a comprehensive platform through which all public schools in Fiji report their data. School management is responsible for inputting information into FEMIS, including enrolment records that have implications for school financing and funding allocations.

FEMIS data were shared with the MICS–EMIS analytics team in two batches: the first in July 2024, the second in February 2025.

### 3.3 Linked dataset coverage

Using the linkage approach, 98 percent of students in MICS could be matched to an EMIS school, resulting in a linked dataset covering around 40 percent of schools in Fiji. Coverage was strengthened through manual cleaning and validation of reported school names, particularly for “Other, specify” responses in the MICS instrument.

## 4. Implementation Process

The Fiji MICS–EMIS analysis consisted of a structured workflow designed to transform raw MICS and FEMIS inputs into analysis-ready linked datasets, and then apply a policy-question-driven analysis in collaboration with the TWG.

### 4.1 Establishing the TWG and defining the policy questions

The work was guided by a Technical Working Group (TWG), comprising representatives of the MoE, FBoS, UNICEF, and technical experts. The TWG identified a set of policy questions to guide the analysis, covering school coverage, equity and allocation, access and distance to school, learning outcomes, and the

feasibility of advanced analytical approaches. The TWG process was central to ensuring the work was aligned to national policy needs and system-strengthening priorities.

## 4.2 Cleaning and harmonizing FEMIS data

A substantial portion of the work involved cleaning and harmonizing FEMIS school-, teacher-, and student-level records to make them internally consistent and suitable for analysis and linkage. This included:

- Detecting inconsistencies and duplicate records (especially in teacher data)
- Identifying of discrepancies between aggregate enrolment figures and individual student records
- Standardizing key open-text fields (e.g., teacher designation, qualification, ethnicity, date of birth)
- Assessing completeness and missingness in core infrastructure and resource indicators
- Creating standardized school-level indicators that could be used for equity and resource analyses

## 4.3 Linking MICS students to FEMIS schools

The final step of the data preparation process involved linking MICS student records to FEMIS schools using a dedicated MICS–EMIS linkage file that maps school identifiers across the two systems.

In preparation for linkage, the MICS data were carefully reviewed, particularly the “Other, specify” school responses. These open-text entries were manually matched with FEMIS school names and locations. This manual validation substantially improved linkage quality and reduced the number of unmatched students.

Using the cleaned MICS school information and the linkage file, 5,827 of the 5,913 students in the MICS dataset were successfully matched to an EMIS school, resulting in a linked dataset covering 779 schools.

The linkage enabled the construction of an integrated dataset connecting household and child characteristics (such as household wealth, locality, and foundational learning outcomes (literacy and numeracy)) to school characteristics (such as size, staffing, infrastructure, and resource availability), forming the basis for the subsequent analytical work.

## 4.4 Analysis, documentation, and packaging of outputs

Once the linked dataset was constructed, analysis was implemented following the TWG policy questions and complemented by dedicated analytical modules (including geospatial distance-to-school work). A major focus of the Fiji work was to document the process and outcomes in ways that are reusable, transparent, and replicable for future cycles.

# 5. Outputs Produced

The Fiji MICS-EMIS analysis generated a linked MICS-EMIS dataset alongside a set of complementary outputs designed to ensure transparency, support THE evidence-based policy dialogue, strengthen practical use of the data by MoE and UNICEF, and provide a foundation for future replication. Together, these outputs document the full analytical process, present the findings in structured form, and translate the results into accessible tools for planning and decision-making.

## 5.1 Workflow document

A comprehensive technical workflow document was developed to formalize the entire data preparation and linkage process. The document provides a detailed, step-by-step description of FEMIS data cleaning, harmonization, linkage to MICS, and the construction of analysis-ready datasets.

Its primary purpose is to ensure transparency and reproducibility. By clearly documenting data sources, transformation procedures, standardization decisions, linkage methods, and final outputs, the workflow creates a durable reference that can be reused, updated, and scaled in future data cycles.

The document also records key data challenges encountered during implementation, including duplicate records, missing data, and inconsistencies between school-level aggregates and individual-level records. It describes the specific corrective and standardization steps applied to address these issues, thereby serving both as technical documentation and as a diagnostic record of system-level data constraints.

## 5.2 Policy questions document

A structured analytical report was produced in response to the policy questions defined by the TWG. These questions addressed school coverage and representativeness, equity and allocation patterns, access and distance to school, learning outcomes, and the feasibility of more advanced analytical approaches.

This output serves two important functions. First, it provides a comprehensive analytical record of what the linked MICS–EMIS dataset can support in terms of policy-relevant insights. Second, it highlights areas where improvements in FEMIS data completeness, internal consistency, or future MICS instrument design would enable more robust and comprehensive analysis over time. By explicitly documenting analytical constraints alongside results, the report strengthens strategic data use and supports targeted system improvements.

## 5.3 Interactive Dashboard

Following data cleaning and linkage, the datasets were visualized through a [web-based dashboard](#). The dashboard provides structured access to both the cleaned FEMIS administrative data and the linked MICS–EMIS analysis results.

The platform is organized into two main sections: FEMIS Data and MICS–EMIS Analysis. It allows users to explore the education system through interactive tables and visualizations, making the findings accessible to policymakers and technical staff without requiring statistical software.

The FEMIS section presents a descriptive overview of the school system. It shows where schools are located and who they serve, including the number of schools by level and district, student distribution by school size, and student composition by sex and ethnicity. It also presents key infrastructure indicators such as availability of toilets, safe drinking water, electricity, internet, libraries, and student–teacher ratios. Schools can be examined through an interactive School Resource Index, and a data overview module highlights data completeness and consistency across school-, teacher-, and student-level records. This section therefore supports both system planning and data quality assessment.

The MICS–EMIS Analysis section presents findings from the linked household and school data. It shows how school size and resources vary by household wealth and locality, how school conditions relate to foundational learning outcomes, and how low-resource schools are distributed across demographic

groups. It also includes regression analysis examining the relationship between school resources and learning outcomes while accounting for household characteristics.

A dedicated Distance-to-School section presents travel distance patterns calculated as straight-line distance from survey clusters to schools. Results are disaggregated by school level, wealth, locality, sex, and region, providing evidence on geographic access and disparities.

By integrating administrative data, household data, equity analysis, and spatial access patterns in a single platform, the dashboard can serve as both an operational planning tool and a mechanism for evidence-based policy dialogue. It translates the technical outputs of the MICS–EMIS analysis into a format that can directly inform education planning and resource allocation discussions.

## 5.4 Distance-to-school analysis

A dedicated spatial analysis was conducted to examine distance-to-school patterns. This analysis explores the relationship between the nearest available school and the school actually attended, travel distances, bypassing patterns, and access constraints across school levels, wealth groups, locality, and regions.

The analysis carefully documents methodological considerations, including the use of MICS survey cluster centroids rather than exact household coordinates. Given the highly skewed distribution of travel distances, appropriate summary measures such as median distances were used to represent typical travel patterns.

By focusing specifically on geographic access, this output provides targeted evidence to inform school planning, transportation considerations, and discussions on regional and socioeconomic disparities in access to education. These are all presented in a comprehensive policy brief.

## 5.5 GitHub Repository

All documentation and R-based code developed for the Fiji MICS–EMIS analysis have been stored in a dedicated GitHub repository. The repository contains the scripts used for FEMIS data cleaning, harmonization, linkage to MICS, and analytical outputs, as well as supporting documentation that explains the structure and workflow of the project.

The repository is designed to allow stakeholders to reproduce the FEMIS data preparation and analytical steps with minimal setup, or to extend the analysis for further policy work. By storing the full workflow in a structured and version-controlled environment, the project ensures transparency in methods and strengthens long-term sustainability.

# 6. Lessons Learned

## 6.1 Analytical Lessons Learned

### 6.1.1 FEMIS Data

An essential learning from the MICS-EMIS analysis in Fiji has been identifying areas of improvement for the FEMIS data. During the cleaning of the FEMIS data, as well as the analysis, several issues have been identified and highlighted such that the MoE could use this to improve the FEMIS system. The three main lessons are described below.

1. **Standardization of open-text fields is critical for consistent analysis:**

A key lesson learned is that the use of open-text fields for core individual-level variables (such as ethnicity, qualification, and designation) leads to substantial inconsistency across records and requires extensive manual cleaning. For example, the teacher dataset contained 61 different ethnicity entries, many of which were spelling variations or inconsistent labels, but these could ultimately be grouped into just four categories. Introducing standardized drop-down categories with a clearly defined “other” option would improve data consistency, reduce errors, and significantly lower the analytical burden in future data cycles.

2. **Teacher-level data requires clearer rules on record uniqueness and alignment:**

The analysis revealed that teacher-level data contains extensive duplication, incomplete identifiers, and not a full complete coverage of schools. In addition, large discrepancies between teacher counts reported at the school-level and those derived from individual teacher records make it difficult to establish reliable staffing figures. A key lesson is the need for clearer rules on teacher record uniqueness (e.g. over time and across schools), stronger identifier requirements, and improved internal consistency checks between individual and school-level teacher data.

3. **Student-level data would benefit from stronger internal validation mechanisms**

While student-level data shows fewer duplication issues than teacher data, the presence of duplicate student records and sizeable differences between school-reported enrolment figures and individual student counts limit confidence in enrolment indicators. This highlights the importance of strengthening validation between aggregate enrolment figures and individual student records, as well as clarifying how transfers, re-enrolments, and inactive records should be handled in the system.

#### 6.1.2 Completeness of FEMIS Data

Another key lesson from the MICS–EMIS analysis is that the completeness of school-level FEMIS data directly affects what analyses can be carried out and how confidently results can be interpreted. While a small set of core variables is consistently reported, many infrastructure and resource indicators show substantial missingness.

Missing data are especially pronounced for Early Childhood Education (ECE) schools, where information on internet, electricity, water source, toilets, and libraries is missing for a large number of schools. Completeness issues are also present, but to a lesser extent, for primary and secondary schools across several key infrastructure variables. In addition, some requested variables are entirely absent across all school levels, suggesting gaps in data collection rather than reporting.

This level of missingness limits the identification of under-resourced schools and reduces comparability across school types and regions. Most importantly, it constrains the construction of a robust school resource index, as composite indicators require consistent data across multiple variables. Improving completeness at the point of data collection is therefore essential to enable more advanced, equity-focused analysis and targeted education planning.

Finally, data gaps also meant that not all policy questions could be addressed. For example, the absence of school-level learning outcomes or test results in FEMIS prevented analysis of how school resources and teacher characteristics relate to student performance at the school level. Using outcome data from FEMIS would substantially expand the analytical value of future MICS–EMIS linkage exercises.

### 6.1.3 MICS Data

The MICS–EMIS linkage in Fiji highlighted two key lessons relevant for both the current analysis and future MICS-Link implementations. Although context-specific, these issues are likely to arise in other countries linking MICS household survey and administrative education data.

First, the use of “Other, specify” school responses in MICS introduces challenges for linkage. In Fiji, a substantial number of students reported schools not selected from the dropdown list, requiring manual matching based on school names and locations. While most cases could be matched, some students nonetheless remained unmatched. This underlines the importance of manually cleaning the “Other, specify” responses to enable a better match.

Second, mismatches between the school level reported in MICS and the level recorded in EMIS complicate analysis. These inconsistencies likely reflect reporting errors or ambiguity where multiple school levels operate on the same compound. Clear guidance is needed on how to treat such cases analytically, and future survey design could reduce mismatches by restricting school selection options based on the education level reported.

### 6.1.4 Merging MICS and EMIS

The final step of the MICS–EMIS analysis involved linking MICS student records to FEMIS schools using a dedicated MICS–EMIS link file, which maps school identifiers across the two systems. Using this approach, 98 percent of students in the MICS data could be successfully matched to an EMIS school, resulting in a linked dataset covering around 40 percent of schools.

A key lesson learned is that the need for a separate linking file could be avoided if EMIS school codes were used directly in the MICS CAPI questionnaire to ensure native coherence of data. Relying on post-survey code matching introduces additional complexity, manual validation, and potential mismatches, particularly when school lists differ across years. Embedding official EMIS codes in CAPI would enable direct, unambiguous linkage between MICS and EMIS, improving accuracy, reducing processing time, and simplifying future linkage exercises.

## 6.2 Process Lessons Learned

### 6.2.1 Timeliness

From a process perspective, timeliness emerged as a key challenge. The analysis relied on data collected in different periods, resulting in a substantial time lag between data collection and analysis. The Fiji MICS data were collected in 2021 and released in August 2022, while the FEMIS data used for linkage were received in 2024 and early 2025. As a result, the linked MICS–EMIS analysis was only conducted in late 2025 and early 2026, when the household survey data were already around five years old.

This delay limited the immediacy of the findings for policy use and increased the likelihood of mismatches between survey responses and administrative records due to school openings, closures, or structural changes over time. The experience highlights the importance of aligning data release schedules and initiating linkage and analysis as early as possible to maximize the relevance and policy impact of MICS–EMIS analysis.

## 7. Conclusion

The Fiji MICS–EMIS analysis demonstrates the practical feasibility and value of linking household survey data with administrative education data to generate more integrated and policy-relevant evidence. By connecting children’s socio-economic characteristics and learning outcomes from MICS with school-level information from FEMIS, the analysis enabled insights that would not be possible using either data source alone.

Through a structured and collaborative process guided by the Technical Working Group, the initiative produced a cleaned and harmonized administrative dataset, a high-coverage linked student–school dataset, and a set of complementary outputs designed for transparency, usability, and sustainability. These include a documented technical workflow, a policy-question-driven analytical report, a dedicated distance-to-school analysis, an interactive dashboard for practical use, and a version-controlled GitHub repository containing code and documentation.

At the same time, the exercise highlighted that the analytical potential of linked systems depends strongly on data quality, completeness, and internal consistency within FEMIS, as well as on careful design of linkage mechanisms within survey instruments. The lessons identified in this report provide a clear pathway for strengthening FEMIS data collection practices, improving internal validation procedures, and refining future MICS–Link implementations, including consideration of embedding official FEMIS school codes directly into the MICS CAPI system and aligning data release timelines to reduce delays.

Overall, the Fiji experience illustrates that MICS-EMIS linkage is not only an analytical exercise but also a system-strengthening process. By documenting both results and constraints, this overview contributes to institutional learning within Fiji and provides a practical reference for other countries seeking to strengthen data interoperability, analytical capacity, and evidence-based education planning under the broader MICS–Link initiative.