EDOREN
Education Data, Research and Evaluation in Nigeria

# Education data in Nigerian national household survey data

Review of survey reports and evidence from microdata

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# Executive summary

## Summary of findings

This report examines published results, metadata, and microdatasets from recent surveys and administrative data collections covering education indicators in Nigeria in an attempt to answer the following questions:

1. Are published estimates of key indicators comparable?

2. Is it possible to improve the comparability of indicators from microdata analysis and do these indicators show any statistically significant changes over time, especially at state level?

3. Does the analysis suggest that some surveys are more reliable than others?

Our conclusions are as follows:

1. Indicators published in different survey reports are rarely fully comparable either because they use different measurement techniques (such as reported as opposed to tested literacy) and different question wording in the education section of the questionnaire (e.g. *currently attending* versus *attendance at any time during the school year*), are collected at different times in the school year (vital for key data such as attendance), choose different ways to report (e.g. using different age ranges for indicators, target populations, etc.) or use different sampling and grossing techniques.

2. It is possible to correct for and explore in more detail some of these effects *ex-post* by recalculating indicators from common definitions using microdata. A high degree of comparability in the indicator definition can be achieved between the Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS). Given that their question wordings are slightly different, indicator definitions from other surveys can be aligned but not fully harmonised. The analysis focuses on attendance rates and female youth (aged 15–24) literacy. Sampling errors are high in state-level data, and are affected by inefficient sample design in some of the surveys. Given the sample design of the surveys, there is no statistical evidence from household surveys to support any positive changes in attendance rates or female youth literacy in Girls' Education Project Phase 3 (GEP3) states over recent years. At national level, there is evidence of an improvement in terms of secondary school attendance rates, although the evidence on improvements in attendance rates at primary level is less conclusive.

3. Based on the exploratory microdata analysis, the DHS (and the linked Nigeria Education Data Survey (NEDS)) appear to be less afflicted by the outliers indicated by age heaping or measurement error in school attendance or literacy that are found for the Harmonised Nigeria Living Standards Survey (HNLSS) and the subset of indicators and states in the MICS. In addition, the large range of corrective weights in use suggests there may be some underlying problems with the master sample or sampling frame of enumeration areas (EAs), or perhaps in the procedures for estimating weights.

There are two key implications for development partners to be drawn from these findings:

- If national household surveys maintain a similar sampling design for the next rounds of surveys, programmes will have to produce large changes in indicators for the population to create statistically significant differences in the state-level indicators. As an indication, the DHS 2008 produced 95% confidence intervals for primary net attendance ratios (NARs) in GEP3 states that were around 20 percentage points wide, while in the MICS 2011 it was up to 30 percentage points.

- Producing comparable surveys that can be used to calculate statistically significant estimates of the sort of changes in key educational indicators that can reasonably be expected at state level will require harmonisation of methods between the surveys, collaboration between the technical teams and agencies funding the surveys, greater cooperation between the institutions responsible for the major surveys (i.e. the National Bureau of Statistics (NBS) and the National Population Committee (NPC)), and possibly greater sample sizes or panelling. This is a prerequisite for improving data quality and relevance. In the first instance we would recommend an investigation into the sampling and weighting issues of all the surveys by David Megill or another independent sampling expert with a good international reputation.

## Overview

Data sources that inform about education statistics in Nigeria have increased in number and diversity in recent years. In addition to data collected through the Education Management Information System (EMIS) and school censuses, a large number of household surveys conducted over the past decade provide data on education outcomes, such as attendance rates or literacy. In order to make best use of the collected data when evaluating the progress made in terms of education, it is necessary to assess to what extent education data from national household surveys can provide reliable estimates of changes in education outcomes over time and at national, zonal and state level. Good-quality survey data can also be a useful source to triangulate and complement administrative data collected through the EMIS. These questions are especially relevant to EDOREN as household surveys have been proposed as sources for various outcome and impact indicators of the GEP3 in the latest logframe of March 2013.

Since published results are more accessible to most users than the survey microdata, it is of interest to examine indicators as well as metadata published in survey reports. This report provides a comparison of estimates published in the survey reports of the major nationally representative household surveys that have taken place in Nigeria since 2003. A selected set of indicators is then re-estimated using survey microdata to provide estimates based on harmonised indicator definitions. Table 1 outlines the reports and datasets that have been examined. Survey microdata are analysed in order to investigate how indicator estimates change when harmonised indicator definitions are applied. The analysis also attempts to explore in more detail the likely reasons behind outliers among the estimates. Also, confidence intervals at national averages, zonal and state level are computed to assess whether the differences between household surveys are statistically significant. As education programmes have been implemented at state level, there is a strong interest in evaluating changes at that level.

**Table 1: Reports and microdata examined**

| | DHS | EdData | CWIQ | MICS | DHS | GHS | HNLSS | Literacy survey | NEDS | MICS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2003 | 2004 | 2006 | 2007 | 2008 | 2008 | 2009 | 2010 | 2010 | 2011 |
| Report | X | | X | X | X | X | | X | X | X |
| Microdata | X | X | | X | X | | X | | X | X |

DHS: Demographic and Health Survey; EdData: Education Data for Decision-making survey; CWIQ: Core Welfare Indicators Questionnaire survey; MICS: Multiple Indicator Cluster Surveys; GHS: General Household Survey; HNLSS: Harmonised Nigeria Living Standards Survey; NEDS: Nigeria Education Data Survey. Note: EdData and NEDS are two rounds of the same survey programme.

## Are the indicators in published survey reports comparable?

The analysis of the survey reports suggests that the indicators in published survey reports are rarely directly comparable, although surveys conducted as part of the same survey programme (e.g. the MICS 2007 and 2011) tend to be more comparable than, for instance, the MICS and the HNLSS data. The comparability of indicators is hampered by differences in the survey instruments and survey design and also by the choice of different indicator definitions for presentation in survey reports. The former include aspects such as the

sample design, design of the questionnaire module, timing of the fieldwork in relation to the academic year, weighting of estimates and the data entry procedures used. Survey instruments and a detailed description of the design can provide useful metadata for a better understanding of results and insights for further developments, but they cannot be changed *ex-post*.

Indicator definitions, however, have a clear potential for further harmonisation in national survey reports. For instance, *de facto* population is analysed in the DHS 2008 report. Other survey reports give preference to a *de jure* definition of the population of interest. Adjusted NARs are shown in the MICS reports, while other reports give non-adjusted rates. The age ranges over which indicators are calculated also differ across surveys. Definitional differences may be driven by the requirement that internationally standardised definitions be used in the DHS and MICS reports, etc. From a national policy perspective, computing indicators that adhere to harmonised definitions across surveys conducted within the country would be important in order to allow for the monitoring of education outcomes over time.

Whether harmonisation of definitions is feasible *ex-post* depends on the comparability of survey instruments. Literacy indicators, for instance, cannot be harmonised if the measure incorporates literacy tests conducted during the interview in some surveys (e.g. DHS, MICS) while other surveys rely exclusively on self-reporting (e.g. Core Welfare Indicators Questionnaire (CWIQ) surveys, HNLSS). The comparison suggests that, in the case of Nigeria, self-reported literacy tends to be higher than literacy that includes a test for at least a subset of the survey respondents. The MICS and DHS, however, have been adopting a very similar design in their education questionnaire modules as well as in questions on literacy asked to a sample of women.

Inconsistencies in published estimates are also found within reports based on the same dataset. In particular, several reports provide estimates in the main body of the report that differ from those in annexes that present selected standard errors. For instance, Table SE.2 in the Annex of the MICS 2011 report (p. 280) gives an estimate of 52.85 for the secondary school NAR (adjusted) while Table ED.5 in the main report text (p. 179) shows an estimate of 54.2 for the same indicator. It is not clear what causes such discrepancies.

## Insights from indicators calculated from microdata

By removing one source of variation, the resulting set of indicators should provide a better picture of the evolution of education statistics in Nigeria over time. Access to microdata allows one to explore the variables that contribute to fluctuations in the estimates. Estimates of confidence intervals provide further insights into the adequacy of national household survey data for evaluation of changes over time, especially at zonal and state level. The discussion here focuses on attendance rates and female youth literacy, with other indicator estimates being available in a separate document.

Using definitions that are as harmonised as possible (with the DHS 2003 definitions as benchmark), estimates of attendance dates generally tend to be below those presented in reports. The gap between the MICS and the DHS estimates also shrinks. This implies that the improvements in net attendance suggested by the recent MICS 2011 survey are still present, but national primary NARs have only improved from 60% in the DHS 2003 to 64% in the MICS 2011, the most recent survey examined. Moreover, the inspection of confidence intervals suggests that changes in primary net attendance between the DHS 2008 and the MICS 2011 at zonal and state level are rarely statistically significant. At secondary school level, some changes are statistically significant at zonal level but the confidence intervals in the analysed surveys are too large to provide any assessment of changes at state level. For instance, the MICS 2011 secondary NAR estimate for Katsina (28%) has a 95% confidence interval that ranges from 15% to 41%. The fact that some of the survey weights have very large ranges contributes to an increase in the standard errors. Sample sizes at national level are sufficiently large for even small differences to be statistically significant. For instance, there is statistically significant evidence that national secondary NARs have improved over the last decade.

The HNLSS data, for which only a draft report is available, are interesting given the large sample size. However, based on the dataset provided to EDOREN by NBS in April 2013, it appears that there are limitations to the comparability. Data require further checks and cleaning, as the skip pattern in the education module shows a range of inconsistent response patterns. These two aspects relate to the numerator in attendance ratios, i.e. the number of children attending school. The other key variable for attendance indicators is a correct measure of age to assess whether a child should be in school. HNLSS data show considerable age heaping within the primary school age range, which suggests that the ages recorded were not accurate.

Primary school attendance ratios for certain zones in the MICS 2007 also seem to be affected by flaws in the data. A clear outlier is the North East, for which the MICS 2007 gives a primary NAR of just 11%. In both the preceding and subsequent DHS rounds, NARs were considerably higher, with 44% in 2003 and 40% in 2008, the latter just one year after the MICS 2007. These kinds of fluctuations are not observed for other zones. While variation is of course possible, such large changes over a short period are relatively unlikely. Exploration of the microdata shows that both the numerator (the data include fewer children of primary school age who attend school) and the denominator (there are relatively more children in the primary school age bracket) have an influence on this result. Another example highlighted in the microdata analysis is the comparison of the female youth literacy rate across states in the DHS 2008 and the MICS 2011. For Sokoto, the MICS 2011 suggests a literacy rate of 62%; however, the DHS 2008 measures the literacy rate in that state at 12%, using a harmonised definition of the indicator that combines a measure of educational attainment and the results of a literacy test during the interview. Moreover, the MICS 2011 measures both a higher proportion of at least secondary educated females than DHS 2008 and better outcomes in the literacy test.

Note that while such outliers at regional or state level will be partly 'washed out' in the national-level estimates, they will still influence the national average. The drop in primary net attendance from the DHS 2003 to the MICS 2007 may be such an example.

The EdData Survey/NEDS constitute a special case. While the other surveys analysed are multi-topic surveys, the EdData Survey and NEDS focus specifically on education. They are also different in terms of the sampling approach, as households in the NEDS are selected from among households interviewed in the preceding DHS. With a different questionnaire structure and a different respondent (parent/guardian instead of household head/other competent household member), the results on aggregate indicators such as attendance rates may not be directly comparable. This kind of survey can provide very rich information for more detailed analysis of in-school and out-of-school children and their households.

Overall, the analysis suggests that the microdata estimates of the selected indicators from DHSs are relatively comparable across DHS rounds and from NEDS across NEDS rounds. The DHS and the MICS are theoretically comparable. However, the exploratory analysis of the data shows that there might have been problems with the collection of attendance information and ages in certain states/regions and possibly also in relation to the computation of survey weights. These issues limit the comparability of existing DHS and MICS data. To assess which indicators and which geographical areas can be compared would require more detailed analysis and ideally also data to benchmark against – these are, however, rather difficult to obtain. Also, it is important to keep in mind that a very limited set of indicators has been examined in this report and conclusions might change based on other education indicators.

## Possible areas for improved harmonisation across national household surveys

This report only examines a selected set of indicators and it is not possible to uncover all reasons for discrepancies between report and microdata estimates as well as outliers within a series. Indeed, shocks can lead to short-term increases or decreases in school attendance, and some 'outliers' may reflect actual

variation in the indicator of interest. Nevertheless, several aspects emerge from this comparison of indicators that could improve the harmonisation of education data across household surveys:

- If feasible, harmonisation of the **indicator definitions** presented in national survey reports would facilitate the comparison of estimates across reports.

- From a more long-term perspective, the harmonisation of **education questionnaire modules** could further contribute to enhancing comparability across surveys in Nigeria. The MICS and DHS questionnaires are already very similar in this regard. The HNLSS questionnaire module could be simplified and question routing and formulation could be adapted to the MICS and DHS in regard to attainment and attendance. The review by the Education Policy and Data Center (2009), part of the International Household Survey Network, provides a good discussion of and recommendations on the formulation of questions. An aspect that is likely to be important in Nigeria and not well addressed in the majority of survey questionnaires examined (with the exception of EdData/NEDS) is a clarification of the school type covered, such as public or private, religious (integrated), etc. A generic question on 'school' may not be specific enough and what is measured depends on the instructions provided in interviewer training. Interviewer training manuals are, however, rarely available to the data analyst. The measure of literacy would also benefit from harmonisation. Literacy tests as conducted in the DHS and MICS (and EdData/NEDS) can provide a more objective evaluation of literacy than self-reported levels. The discrepancies in results between the DHS and MICS mentioned above suggest that tests are differently implemented and the test procedure could possibly be further improved. The analysis of literacy based on MICS data, for instance, is also limited by the fact that only women of a certain age group responded to these questions. Integrating such a literacy measure in a household roster is costly, but it would be helpful in order to provide estimates for other population groups.

- Education indicators rely heavily on the correct measure of **age**, and indicators are only comparable if age distributions across surveys are consistent. Ideally, an external data source would be used as a benchmark. However, population projections by age groups based on the 2006 Census may be equally flawed. Moreover, a measure of the month of birth could improve the standardisation of age at the start of the school year. In the absence of the question on month of birth, some surveys impute this variable. A standardisation of the methodology across survey publications would be helpful.

- Surveys have been designed to provide point estimates at state level. However, the findings suggest that **confidence intervals are too large to assess changes** in estimates at state and even zonal level across surveys, unless the change is very large. Moreover, while attendance rates can be computed at the state level, other indicators such as the intake ratio in the first grade of primary or transition rates from Grade 6 of primary to Grade 1 of secondary school are based on very few observations. Especially when disaggregating by sex or state, it is not always possible to produce such indicators from survey data. As a large-scale survey is costly, surveys that already have a large sample – such as an improved education module in the HNLSS – could be a useful source for disaggregated data. The large range of weights in some surveys should also be further examined, as weights affect both the point estimates and the variances. Also, large cluster sizes as in the DHS 2008 with around 41 households interviewed per EA represent an inefficient sampling design.

## Comparing household survey and EMIS data

The last section of this report provides a preliminary comparison of attendance and enrolment rates at state level from survey and EMIS data respectively. Availability of EMIS data for GEP3 states is relatively limited at the time of writing, in particular because of the lack of population denominators (e.g. the

projected number of children of primary school age in a specific state) that are needed to compute enrolment ratios. In most survey datasets, weight variables are normalised, i.e. they sum to the sample size and not the population. Therefore, population estimates of the number of children attending school cannot be computed that could be compared to enrolment numbers.

In most states for which net enrolment ratios (NERs) have been computed, NERs based on EMIS data are higher than NARs from household survey data, and even surpass the theoretical maximum of one in some states and years. This difference emerges relatively clearly, although one should keep in mind from the discussion above that some survey data estimates are also not comparable. Very high NERs can be driven by over-reporting of enrolment and/or population denominators being too small. Comparing EMIS data over the years suggests less year-to-year fluctuation than can be observed from the survey data.

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# List of abbreviations

| | |
|---|---|
| ASC | Annual School Census |
| CIE | Centre for International Education |
| CWIQ | Core Welfare Indicators Questionnaire |
| DFID | Department for International Development |
| DHS | Demographic and Health Survey |
| EA | Enumeration Area |
| EdData | Education Data for Decision-Making |
| EDOREN | Education Operational Research and Evaluation Nigeria |
| EMIS | Education Management Information System |
| ESSPIN | Education Sector Support Programme in Nigeria |
| GAR | Gross Attendance Ratio |
| GEP3 | Girls' Education Project (Phase 3) |
| GHS | General Household Survey |
| GPI | Gender Parity Index |
| HH | Household |
| (H)NLSS | (Harmonised) Nigeria Living Standards Survey |
| IDS | Institute of Development Studies |
| JSS | Junior Secondary School |
| LGA | Local Government Area |
| MDG | Millennium Development Goals |
| MICS | Multiple Indicator Cluster Survey |
| NADA | National Data Archive |
| NAR | Net Attendance Ratio |
| NBS | National Bureau of Statistics |
| NEDS | Nigeria Education Data Survey |
| NER | Net Enrolment Ratio |
| NPC | National Population Committee |

| | |
|---|---|
| OPM | Oxford Policy Management |
| PSU | Primary Sampling Unit |

# 1 Introduction

Data sources that inform about education statistics in Nigeria have increased in number and diversity over recent years. In addition to data collected through the EMIS and the school census, multi-purpose household surveys that include modules on education, special purpose household and establishment surveys and programme-specific impact evaluation studies all provide data on pupils, teachers, and schools. DFID-supported education programmes in Nigeria suggest using a combination of household survey data from various surveys and administrative data sources to assess outcome and impact indicators (as in, for example, the GEP3 logframe of March 2013). In order to make the best use of collected data, it is necessary to assess to what extent education data from national household surveys are comparable across surveys. Moreover, it is important to understand whether survey data can be used to cross-check and complement administrative data collected through the EMIS.

Depending on the level of detail in the survey questionnaire and on the sample size, indicators such as attendance rates and literacy rates can be constructed at national, zonal and, in some cases, state level in order to track the evolution of the population's education characteristics over time and across space. However, comparability of indicators across surveys relies on adherence to consistent and comparable survey methodologies, including comparable survey instruments and indicator definitions. Comparable standards in reporting also facilitate the readability of survey publications and would enable funders and stakeholders to use household survey data for the evaluation of education programmes. In addition, better harmonisation of indicators would make more cost-effective use of individual surveys. This report provides an overview of the existing household survey data sources and compares indicators as presented in survey reports. It discusses consistency in the data series and highlights reasons for lack of comparability. Selected indicators are then re-computed based on available survey microdata and compared to those published in survey reports. Finally, household survey estimates are compared to education statistics from administrative data sources.

## 1.1 Overview of household surveys conducted between 2003 and 2011

Many large-scale nationally representative household sample surveys have been conducted over the past decade in Nigeria (Table 2). These include the 2003 and 2008 rounds of the DHS, both times followed by special purpose education surveys (EdData Survey, 2004; NEDS, 2010) that re-interviewed a subsample of households from the DHS sample; two rounds of the MICS in 2007 and 2011; and living standard surveys/CWIQ surveys focusing on monitoring poverty and well-being (2003–04, 2006 and 2009).

**Table 2: List of household surveys with education questions conducted in Nigeria, 2003 to 2011**

| YEAR | SURVEYS |
|---|---|
| **2003** | DHS, NLSS (2003–04); General Household Survey (GHS) (quarterly) |
| **2004** | Nigeria DHS EdData Survey |
| **2005** | GHS |
| **2006** | CWIQ; GHS |
| **2007** | MICS; GHS |
| **2008** | DHS; GHS |
| **2009** | HNLSS; GHS; National literacy survey |
| **2010** | NEDS; GHS; National literacy survey |
| **2011** | MICS; Panel-GHS |

Notes: This listing of surveys is based on information from the NBS website and the DHS, EdData Survey and NEDS reports; more recent surveys that are not yet processed are therefore not included (e.g. DHS 2013). Years refer to year of data collection rather than year in which the main report was published. For some cited surveys information is limited to a summary on the website and no results have been published in the form of a survey report.

The DHS and the MICS are worldwide survey projects and the survey design largely follows internationally standardised procedures that have been tested in numerous countries. They facilitate the requirement of international agencies to compare countries at a global level. The DHS had previously been conducted in 1990 and 1999 and the MICS in 1995 and 2000. Similarly, the Nigeria Living Standards (NLSS, HNLSS) and CWIQ surveys have been developed in cooperation with the World Bank and share survey and instrument design features with living standard surveys and core welfare indicator surveys conducted in other countries, although nonetheless they are designed for a national rather than international audience. Information collected through these surveys should allow for monitoring of internationally standardised indicators, such as the Millennium Development Goal (MDG) indicators. In addition, GHS that ask only a few questions on the educational characteristics of household members have been conducted at (approximately) yearly intervals.[1] More recently, national literacy surveys have been added to the suite of national household surveys.

**Box 1 – Summary of aims of main surveys**

**Demographic and Health Survey (DHS):** DHSs are nationally representative household surveys that provide data for a wide range of indicators in the areas of population, health, and nutrition. Surveys are conducted about every five years. Information is collected on all household members in a household roster and on children aged 0–5, women aged 15–49 and men aged 15–59 using separate questionnaires. The DHSs are in the ambit of the NPC.

**EdData Survey/NEDS:** The 2004 EdData (Education Data for Decision-Making) Survey and its successor the 2010 Nigeria Education Data Survey (NEDS) are nationally representative surveys of children aged 4–16 and their parents/guardians, designed to provide information about education and decisions about schooling. The surveys were linked to preceding DHS iterations (2003 and 2008) as households with children in the eligible age range were re-interviewed. Additional households were selected to achieve sufficient sample sizes for estimates at the state level. These education surveys were implemented by the NPC.

**Multiple Indicator Cluster Survey (MICS):** MICSs have been conceptualised to monitor the progress of child survival, development, protection and participation, and more generally to measure the achievements and gaps in the targets of the MDGs, particularly as they may affect children and women. The MICSs are institutionalised within the NBS.

**Core Welfare Indicators Questionnaire Survey (CWIQ); (Harmonised) Nigeria Living Standard Survey (NLSS, HNLSS):** The CWIQ, NLSS and the HNLSS are designed as instruments to measure and monitor poverty and well-being indicators. Living standard surveys include a household expenditure module to track poverty, while CWIQ surveys assess welfare and well-being through indicators such as asset ownership and dwelling characteristics, subjective poverty, and access to, use of and satisfaction with education and health facilities. The HNLSS 2009 brings the two approaches together. Its Part A corresponds to the CWIQ questionnaire and Part B to the NLSS questionnaire. The CWIQ and living standards surveys are produced by the NBS.

**General Household Survey (GHS):** The GHS focuses on measuring the basic socioeconomic and sociodemographic characteristics of the population, in particular demographic events, child nutrition, education, employment, asset ownership and housing characteristics/projects. The GHS is conducted by the NBS in collaboration with the Central Bank of Nigeria and the Nigerian Communications Commission.

Information collected on the population's educational characteristics varies in terms of both the detail and topics covered across the different surveys. Multi-purpose surveys, such as the GHS, include a very limited

[1] Since 2004, the GHS has been organised jointly with a compilation of administrative data series (System of Administrative Statistics) that provides state-level education statistics relating to the number of institutions, number of teachers (public, private), number of pupils, sources of funding, operational costs or information on ICT in education institutions.

set of questions on the education of the household population, covering current school attendance, highest level and grade reached/completed, and self-reported literacy. While still being multi-purpose surveys, the DHS, the MICS and the living standards surveys collect additional information on the previous year's school attendance and/or ask about repetition and dropping out from schooling. Moreover, the DHS and the MICS test literacy through a reading test during the interview instead of relying on self-reporting by the respondent. Finally, the EdData Survey and NEDS provide a rich set of education-specific data on a subsample of the population (i.e. children of school age). On the other hand, national literacy surveys target the entire population and ask a restricted set of questions about literacy (tested in 2009, self-reported in 2010) and literacy programmes.

Surveys also differed in terms of sample size. Surveys conducted at the beginning of the 2000s were designed to compute estimates at the national and zonal level. Since then, sample sizes have been increased to allow for computation of statistics at state level, and even at the level of local government areas (LGAs) in the case of the CWIQ Survey, the HNLSS and the literacy surveys.

This listing of surveys shows that there is certainly no shortage of national household-level data sources in Nigeria. If survey designs and reporting standards are comparable, survey data could be exploited to produce time series for key education indicators. This should be the case for successive rounds of the same survey (DHS, MICS, etc.). It is less clear whether indicators constructed from different survey series are equally comparable.

## 1.2 Data sources examined in this report

In a first step, attendance and literacy indicators as reported in tables contained in survey reports are compared and contrasted at national, zonal and – sample size permitting – state level (GEP3 states). Survey reports considered include those for the DHS 2003 and 2008 surveys, NEDS 2009, the CWIQ Survey 2006, and the MICS of 2007 and 2011. The information in GHS reports and the literacy survey reports is limited to literacy and is examined for that indicator only for those years for which survey reports are available. The NLSS 2003 report does not include net/gross attendance indicators and presents literacy only in regard to English. The information provided in the NLSS 2003 report is insufficient to undertake comparisons with other surveys. The EdData Survey report of 2004 is also not considered as it seems to present attendance and literacy results using the DHS 2003 data instead of the data collected through the EdData Survey itself. Similarly, the NEDS 2010 report indicates that the DHS 2008 was used as the source for common indicators such as attendance rates and literacy, as the NEDS data only cover children up of the age of 16 and could not be used to produce a whole set of comparable indicators. According to the description in the report, indicators were estimated based on DHS data for households found in the DHS 2008 and then re-interviewed in the NEDS 2010. However, the estimates presented differ between the two reports and are therefore presented separately. One should keep in mind, however, that the underlying data source appears to be the DHS rather than the NEDS. So far, only a draft report of the HNLSS 2009 has been published and this is therefore not considered.

The aim of this exercise is to inspect the published data series and to detect possible outliers. Major discrepancies in surveys that were conducted at short intervals would point toward differences in survey characteristics or methodology (especially survey weights) or reporting choices as opposed to differences due to actual changes in educational characteristics over time. As a variety of household surveys are suggested as sources for evaluating the outcomes/impacts of education programmes (e.g. in the logframe for GEP3), it is important to ensure that series are indeed comparable. In addition, the comparison may give an indication as to which survey data are more reliable than others.

In a second step, several potential sources of discrepancies across published indicators are scrutinised and discussed:

- Survey design, in aspects relating to sampling, fieldwork timing, data processing, and the wording of questions from which key indicators are derived; and

- Definition and construction of indicators as presented in reports and the application of weights to the results to represent the population.

Aspects relating to the survey design cannot be changed *ex-post* (with the exception of changing corrective weights) and can only inform future data collections. However, the microdata collected often allow for further harmonisation of indicator definitions if the main discrepancy in estimates is due to choices made at the reporting and analysis stage.

Therefore, in a third step, key indicators have been re-computed from microdata using indicator definitions that are as comparable as possible. Surveys used for the microdata analysis include the DHS 2003 and 2008, EdData Survey 2004 and NEDS 2009, and the MICS 2007 and 2011. The HNLSS data have also been analysed as the large sample size makes it an interesting potential source for indicators down to the state level. However, HNLSS data obtained from NBS in April 2013 do not seem to have been sufficiently cleaned, despite the claim on the relevant National Data Archive (NADA) page on the NBS website that edits have been implemented.[2] In particular, it appears that there were problems with the skip patterns in the education module of the questionnaire. To ensure a minimum level of consistency within the data set, the routing of the education questionnaire module was enforced for this analysis, but no further data cleaning has been undertaken. Other microdata sources were not available for analysis at this point. Confidence intervals are also computed to assess whether differences in indicator estimates across surveys are statistically significant.

[2] See http://www.nigerianstat.gov.ng/nada/index.php/catalog/38/dataprocessing.

# 2 Education indicators published in survey reports

## 2.1 Attendance rates

Primary and secondary school NARs and gross attendance ratios (GARs) are the most commonly used measures of school participation, and tracking the participation of children in school is the most basic measure of performance in the education sector. The NAR is usually defined as the proportion of children of official primary (secondary) school age who attend primary (secondary) school. GARs refer to the number of children in primary (secondary) school expressed as a percentage of the number of children of primary (secondary) school age. Thus, children who are over-age or under-age for the respective school level are included in the numerator, meaning GARs can therefore exceed 100.

The Gender Parity Index (GPI) is computed as the ratio of girls to boys attending primary (secondary) school and can indicate sex-based differences in access to schooling. A GPI of one indicates parity between sexes.

The education system in Nigeria has a 6-3-3-4 structure with six years of primary school, three years of junior secondary school, three years of senior secondary school, and four years of first degree tertiary education. With a school entry age of six, the relevant age ranges for attendance indicators are age six to 11 as the official primary school age and age 12 to 17 as the official secondary school age.

Indicator estimates are taken from the thematic tables in the survey reports. These do not always coincide with selected indicator estimates provided in Annex tables for sampling error measures. For instance, it seems that the Annex in the DHS 2008 (Table C.2) confounded estimates for NAR primary females with estimates for NAR primary for both sexes. Also, Table SE.2 in the Annex of the MICS 2011 report (p. 280) gives an estimate of 52.85 for the secondary school NAR (adjusted) while Table ED.5 in the main report text (p. 179) shows an estimate of 54.2 for the same indicator. Other discrepancies can be found within reports.

Discrepancies in indicator definitions across survey reports are identified and discussed in section 3.2.

### 2.1.1 National level

Considering the first (DHS 2003) and the last point in the data series (MICS 2011), national school attendance remains low but appears to have increased over the past decade, at least in terms of the NARs at both the primary and secondary school levels. A closer look at the estimates suggests that there is considerable variation related to the type of survey rather than a monotonic trend. For instance, the MICS estimates generally exceed DHS/NEDS estimates. Indeed, the increase in primary school attendance is largely driven by the MICS 2011 estimates. However, overall, estimates for net primary school attendance at national level are not characterised by extreme outliers. At secondary school level, there seems to be a positive trend in net attendance for both sexes. Still, the discrepancies between secondary school NAR and GAR estimates in the DHS 2008 and the NEDS 2010 reports are considerable. This is remarkable, in particular if both estimates are based on the DHS 2008 data as is stated in the reports' table notes. For instance, there is a 12.4 percentage point gap in the secondary school GAR for boys.

**Table 3: Comparison of reported NAR, GAR, and GPI at national level**

| Report | DHS | CWIQ | MICS | DHS | NEDS/ DHS | MICS | Range (pp) |
|---|---|---|---|---|---|---|---|
| **Indicator** | **2003** | **2006** | **2007** | **2008** | **2010** | **2011** | |
| **NAR primary (all)** | 60.1 | 61.5 | 64.4 | 62.1 | 61.0 | 70.1 | **10.0** |
| **NAR primary (female)** | 56.5 | 59.8 | 62.4 | 59.1 | 58.4 | 68.0 | **11.5** |
| **NAR primary (male)** | 63.7 | 63.0 | 66.2 | 64.9 | 63.5 | 72.0 | **8.5** |
| **GPI NAR primary** | 0.89 | 0.95 | 0.94 | 0.91 | 0.92 | 0.94 | **0.1** |
| **GAR primary (all)** | 88.0 | *n.a.* | *n.a.* | 84.3 | 85.1 | *n.a.* | **3.7** |
| **GAR primary (female)** | 81.2 | *n.a.* | *n.a.* | 79.5 | 80.5 | *n.a.* | **1.7** |
| **GAR primary (male)** | 94.6 | *n.a.* | *n.a.* | 88.9 | 89.8 | *n.a.* | **5.7** |
| **GPI GAR primary** | 0.86 | *n.a.* | *n.a.* | 0.89 | 0.90 | *n.a.* | **0.0** |
| **NAR secondary (all)** | 35.1 | 45.6 | 50.7 | 49.1 | 44.1 | 54.2 | **19.1** |
| **NAR secondary (female)** | 32.6 | 45.9 | 50.1 | 46.4 | 44.2 | 54.3 | **21.7** |
| **NAR secondary (male)** | 37.5 | 45.4 | 51.3 | 51.8 | 44.0 | 54.2 | **16.7** |
| **GPI NAR secondary** | 0.87 | 1.01 | 0.98 | 0.90 | 1.00 | 1.00 | **0.1** |
| **GAR secondary (all)** | 61.2 | *n.a.* | *n.a.* | 73.0 | 65.1 | *n.a.* | **11.8** |
| **GAR secondary (female)** | 53.3 | *n.a.* | *n.a.* | 65.9 | 62.6 | *n.a.* | **12.6** |
| **GAR secondary (male)** | 69.0 | *n.a.* | *n.a.* | 80.0 | 67.6 | *n.a.* | **12.4** |
| **GPI GAR secondary** | 0.77 | *n.a.* | *n.a.* | 0.82 | 0.93 | *n.a.* | **0.2** |

Notes: It is not clear what causes the discrepancies in the MICS reports. *n.a.:* not available in report; the unweighted number of cases is only provided for selected indicators in report sections on sampling error estimates, e.g. MICS 2011 primary NAR: N=24980; pp: percentage point.

### 2.1.2 Zonal level

Table 4 presents the NARs and GPIs at primary and secondary level. All survey estimates show large differences across the regions, with high attendance ratios in the South. Attendance ratios are lowest in the North West and the North East. Moreover, there is no strong evidence for an increase in school participation over time, with the exception of the most recent estimates based on the MICS 2011. The GPI is around one in southern states, indicating that girls and boys have equal access to schooling. However, estimates disaggregated at the zonal level and based on smaller samples show an even larger range across surveys. In particular, the MICS 2007 NAR estimates for the North East region are considerably lower than estimates from other survey reports, such as the CWIQ Survey 2006 and the DHS 2008 that were implemented one year before and after the MICS respectively. Other surveys do not exhibit the same kind of extreme values.

**Table 4: Comparison of reported NARs and GPIs at zonal level**

| Report | DHS | CWIQ | MICS | DHS | NEDS/ DHS | MICS | Range (pp) |
|---|---|---|---|---|---|---|---|
| **Indicator** | **2003** | **2006** | **2007** | **2008** | **2010** | **2011** | |
| | | | **NAR primary (all)** | | | | |
| **North Central** | 70.2 | 73.3 | 83.7 | 70.5 | 66.4 | 72.5 | **17.3** |
| **North East** | 44.4 | 43.7 | 13.7 | 43.7 | 40.8 | 49.1 | **35.4** |
| **North West** | 41.7 | 42.2 | 48.2 | 43.4 | 41.0 | 50.4 | **9.4** |
| **South East** | 80.2 | 82.3 | 95.9 | 82.8 | 80.1 | 90.1 | **15.8** |
| **South South** | 82.2 | 81.6 | 96.1 | 80.1 | 79.6 | 90.9 | **16.5** |
| **South West** | 82.8 | 76.8 | 97.4 | 76.6 | 79.1 | 91.6 | **20.8** |
| | | | **NAR primary (female)** | | | | |
| **North Central** | 68.9 | 73.0 | 82.8 | 69.2 | 65.2 | 69.9 | **17.6** |
| **North East** | 39.1 | n.a. | 12.5 | 40.3 | 38.0 | 47.7 | **35.2** |
| **North West** | 34.2 | 38.6 | 43.5 | 37.1 | 35.5 | 47.3 | **13.1** |
| **South East** | 78.3 | 81.2 | 95.7 | 83.2 | 80.0 | 90.1 | **17.4** |
| **South South** | 81.1 | n.a. | 95.8 | 80.1 | 79.9 | 90.5 | **15.9** |
| **South West** | 84.6 | n.a. | 97.0 | 75.2 | 78.0 | 91.7 | **21.8** |
| | | | **NAR primary (male)** | | | | |
| **North Central** | 71.4 | 73.4 | 84.5 | 71.7 | 67.7 | 74.9 | **16.8** |
| **North East** | 49.5 | n.a. | 14.8 | 46.8 | 43.5 | 50.5 | **35.7** |
| **North West** | 49.0 | 45.3 | 52.8 | 49.8 | 46.7 | 53.8 | **8.5** |
| **South East** | 82.4 | 83.4 | 96.2 | 82.4 | 80.3 | 90.0 | **15.9** |
| **South South** | 83.2 | n.a. | 96.3 | 80.1 | 79.3 | 91.3 | **17.0** |
| **South West** | 81.2 | n.a. | 97.8 | 77.8 | 80.2 | 91.5 | **20.0** |
| | | | **GPI NAR primary** | | | | |
| **North Central** | 0.96 | 0.99 | 0.98 | 0.97 | 0.96 | 0.93 | **0.06** |
| **North East** | 0.79 | n.a. | 0.84 | 0.86 | 0.87 | 0.94 | **0.15** |
| **North West** | 0.70 | 0.85 | 0.82 | 0.74 | 0.76 | 0.88 | **0.18** |
| **South East** | 0.95 | 0.97 | 0.99 | 1.01 | 1.00 | 1.00 | **0.06** |
| **South South** | 0.97 | n.a. | 0.99 | 1.00 | 1.01 | 0.99 | **0.03** |
| **South West** | 1.04 | n.a. | 0.99 | 0.97 | 0.97 | 1.00 | **0.08** |
| | | | **NAR secondary (all)** | | | | |
| **North Central** | 37.7 | 46.4 | 58.7 | 46.0 | 37.4 | 50.5 | **21.3** |
| **North East** | 19.1 | 25.8 | 8.1 | 25.7 | 21.8 | 31.6 | **23.5** |
| **North West** | 14.7 | 25.4 | 30.1 | 26.7 | 24.4 | 34.4 | **19.7** |
| **South East** | 48.5 | 64.9 | 69.8 | 68.7 | 59.0 | 69.3 | **21.3** |
| **South South** | 51.5 | 59.7 | 72.3 | 66.1 | 58.4 | 75.1 | **23.6** |
| **South West** | 61.0 | 58.7 | 78.3 | 68.7 | 65.0 | 75.6 | **19.6** |
| | | | **GPI NAR secondary (all)** | | | | |
| **North Central** | 0.76 | 0.91 | 0.90 | 0.83 | 0.93 | 0.93 | **0.17** |
| **North East** | 0.65 | n.a. | 0.71 | 0.75 | 1.00 | 0.91 | **0.34** |
| **North West** | 0.48 | 0.82 | 0.67 | 0.57 | 0.76 | 0.86 | **0.38** |
| **South East** | 1.14 | n.a. | 1.02 | 1.00 | 1.04 | 1.05 | **0.14** |
| **South South** | 1.00 | n.a. | 1.03 | 0.98 | 1.00 | 1.07 | **0.09** |
| **South West** | 0.96 | n.a. | 0.98 | 1.01 | 1.04 | 1.00 | **0.07** |

Notes: Indicator estimates are taken from the thematic tables in survey reports. These do not always coincide with selected indicator estimates provided in Annex tables for sampling error measures. n.a. not available in report (in particular, zonal estimates for the CWIQ Survey 2006 were found in 'zonal flyers' and male/female estimates were not always provided in the summary text); pp: percentage point.

### 2.1.3 State level (GEP3 states)

Finally, we compare indicator estimates from survey reports at state level for the five GEP3 states, which are Bauchi (North East), Katsina, Sokoto, Zamfara (North West), and Niger (North Central). The DHS 2003 was not designed to provide estimates at state level. The extreme values previously observed for the MICS 2007 are also suggested by state-level statistics, although not for all states. The estimate of a primary

school NAR of 9.5 for Bauchi does not seem consistent, given the estimates ranging between 35.5 and 40.5 from other surveys. Similarly, the estimates reported in the MICS 2007 report for Niger are considerably higher than those in the DHS, NEDS, and MICS 2011 reports. For other states, such as Katsina or Zamfara, estimates are more in line with the other surveys. Similarly to what was observed for the national and zonal levels, the MICS 2007 survey seems to be particularly problematic. Estimates from other surveys suggest a slight downward trend in attendance for most GEP3 states that is only reversed in the most recent round of the MICS. The GPI at primary school level also fluctuates from one survey to the other. For instance, it is at 0.84 in Sokoto according to the MICS 2003 report, drops to almost half (0.48) in the DHS and NEDS/DHS reports, and is back to 0.83 in the MICS 2011 report. This difference is due to a lower NAR among females in the DHS and NEDS/DHS reports relative to the MICS reports, on the one hand, and a higher NAR among males on the other hand.

**Table 5: Comparison of reported NARs and GPIs at GEP3 state level**

| Report | DHS | CWIQ | MICS | DHS | NEDS/ DHS | MICS | Range (pp) |
|---|---|---|---|---|---|---|---|
| **Indicator** | **2003** | **2006** | **2007** | **2008** | **2010** | **2011** | |
| **NAR primary (all)** | | | | | | | |
| **Bauchi** | n.a. | 41.0 | 9.5 | 40.5 | 37.2 | 35.5 | **31.0** |
| **Katsina** | n.a. | 43.8 | 42.0 | 38.9 | 38.1 | 49.0 | **10.9** |
| **Niger** | n.a. | 57.5 | 72.2 | 44.4 | 39.7 | 51.6 | **32.5** |
| **Sokoto** | n.a. | 32.1 | 24.8 | 31.1 | 28.9 | 35.5 | **10.7** |
| **Zamfara** | n.a. | 26.1 | 25.4 | 20.5 | 18.4 | 34.8 | **16.4** |
| **NAR primary (female)** | | | | | | | |
| **Bauchi** | n.a. | 36.8 | 7.1 | 36.2 | 34.1 | 34.7 | **29.1** |
| **Katsina** | n.a. | 42.3 | 35.7 | 31.8 | 30.9 | 43.6 | **12.7** |
| **Niger** | n.a. | 54.8 | 69.1 | 36.0 | 32.0 | 45.2 | **37.1** |
| **Sokoto** | n.a. | n.a. | 22.6 | 20.0 | 18.3 | 32.2 | **13.9** |
| **Zamfara** | n.a. | 21.4 | 18.3 | 16.9 | 15.8 | 31.7 | **15.9** |
| **NAR primary (male)** | | | | | | | |
| **Bauchi** | n.a. | 44.2 | 11.6 | 44.4 | 40.0 | 36.2 | **32.8** |
| **Katsina** | n.a. | 45.0 | 48.4 | 46.3 | 46.1 | 55.0 | **8.9** |
| **Niger** | n.a. | 59.7 | 74.9 | 51.5 | 46.0 | 57.6 | **28.9** |
| **Sokoto** | n.a. | n.a. | 26.9 | 42.0 | 38.2 | 38.8 | **15.1** |
| **Zamfara** | n.a. | 30.1 | 31.7 | 24.4 | 21.3 | 38.4 | **17.1** |
| **GPI NAR primary** | | | | | | | |
| **Bauchi** | n.a. | 0.83 | 0.61 | 0.82 | 0.85 | 0.96 | **0.35** |
| **Katsina** | n.a. | 0.94 | 0.74 | 0.69 | 0.67 | 0.79 | **0.12** |
| **Niger** | n.a. | 0.92 | 0.92 | 0.70 | 0.70 | 0.78 | **0.23** |
| **Sokoto** | n.a. | n.a. | 0.84 | 0.48 | 0.48 | 0.83 | **0.36** |
| **Zamfara** | n.a. | 0.71 | 0.58 | 0.69 | 0.74 | 0.83 | **0.25** |
| **NAR secondary (all)** | | | | | | | |
| **Bauchi** | n.a. | 22.5 | 4.6 | 14.2 | 12.7 | 14.5 | **9.9** |
| **Katsina** | n.a. | 22.3 | 16.7 | 15.9 | 17.0 | 29.9 | **14.0** |
| **Niger** | n.a. | 34.2 | 56.3 | 26.7 | 22.4 | 28.9 | **33.9** |
| **Sokoto** | n.a. | 17.9 | 14.8 | 11.4 | 12.8 | 16.9 | **5.5** |
| **Zamfara** | n.a. | 20.0 | 18.4 | 18.7 | 17.0 | 25.2 | **8.2** |

Notes: n.a. not available in report. In particular, no disaggregation at state level is given for the DHS 2003. Also, estimates have been taken from zonal flyers for the CWIQ Survey 2006 and male/female estimates were not always provided in the report text; pp: percentage point.

## 2.2 Literacy (any language)

The level of literacy is another key education outcome indicator and all surveys collect some information on it, albeit measured differently and reported for different age groups. According to the DHS reports, literacy rates for women aged 15–49 have remained relatively stable over the time period covered at a level of approximately 50%. Estimates for the 15–24 age group show more variation. The estimates given by the CWIQ, GHS, and the literacy survey reports suggest much higher youth literacy levels than the MICS. An important part of this discrepancy is likely to be due to the different survey instruments used, i.e. self-reported status in the CWIQ, GHS and literacy surveys as opposed to simple literacy tests conducted during the interview in the case of the MICS and DHS (covering only individuals with primary education or lower).

### 2.2.1 National level

**Table 6: Comparison of adult/youth literacy rates at national level**

| **Report** | **DHS** | **CWIQ** | **GHS** | **MICS** | **DHS** | **GHS** | **NEDS/ DHS** | **Literacy survey** | **MICS** | **Range (pp)** |
|---|---|---|---|---|---|---|---|---|---|---|
| | Tested | SR | SR | Tested | Tested | SR | Tested | SR | Tested | |
| **Indicator** | **2003** | **2006** | **2007** | **2007** | **2008** | **2008** | **2010** | **2010** | **2011** | |
| **% literate (15–49) female** | 48.2 | n.a. | n.a. | n.a. | 53.7 | n.a. | 49.5 | n.a. | n.a. | **5.5** |
| **% literate (15–24) female** | n.a. | 75.3 | 70.7 | 56.3 | n.a. | 74.7 | n.a. | 81.6 | 65.6 | **25.3** |

Notes: n.a. not available in report; Tested: Simple literacy tests were conducted during the interview with individuals with primary or lower education attainment. SR: self-reported literacy; pp: percentage point.

# 3 Sources of discrepancies: comparison of survey design and indicator definitions

The preliminary comparison of reported indicator estimates showed fluctuations in education statistics reported by surveys that may be partly caused by survey methodological and reporting choices rather than actual changes. For instance, considering that attendance rates cover six years, one would not expect large jumps in surveys conducted almost back-to-back. That said, in the event of shocks such as outbursts of violence in a given year, fluctuations are of course possible. Variation increases at zonal and state levels in comparison to estimates at the national level.

This section describes the main survey design elements, fieldwork characteristics and the definitions of indicators included in the reports. A comparison of these features represents the first step in an assessment of the extent to which estimates can be compared.

## 3.1 Survey design

Information on the design of surveys is obtained from the survey reports and the NADA page on the NBS website.

### 3.1.1 Sample design

All surveys use a multi-stage sample design with clusters (one or several EAs) as primary sampling units (PSUs) and household units selected within sampled clusters as secondary sampling units. The sampling frame for the PSUs is a listing of EAs from the last population census before the survey, i.e. 1991 for the DHS 2003, CWIQ Survey, and MICS 2007, and the 2006 population census for the DHS 2008, HNLSS, and MICS 2011, as provided to the organisation implementing the survey.[3] Women, men or children in a set age range constitute, in some surveys, the third sampling unit. In the DHS 2003, three sampled PSUs could not be accessed due to inter-communal disturbances, while two clusters were not covered in the EdData Survey 2004 and the DHS 2008 respectively.

The number of households selected within each cluster ranges from 10 in the case of the HNLSS and the CWIQ Survey, which followed a very similar sampling strategy, to 41 in the case of the DHS 2008. The latter is considerably larger than the usual practice, which is to avoid cluster sizes larger than 10 to 20. The reason is that standard errors increase if households within the same EA have similar outcomes in terms of variables of interest (i.e. the intra-class correlation is high). In this case, confidence intervals may be too large to identify statistically significant differences in education outcomes. Most survey reports include an Appendix with standard error and confidence interval estimates, but only for selected indicators and subpopulations. According to the DHS 2008 report, 95% confidence intervals for NAR primary at zonal level are up to 11 percentage points wide. The microdata analysis in the next section will provide the confidence intervals for selected indicators from all household surveys to discuss whether there is indeed statistical evidence for a change from one survey to another. Point estimates are not affected by the number of secondary sampling units within each PSU.

The MICS 2007 and 2011, DHS 2008 and NEDS 2010 achieved a realised sample of between 27,000 and 34,000 households. The sample size of the DHS 2003 and EdData Survey 2004 is considerably smaller as the main reporting domain was at the national/zonal level and not the state level. A larger sample of households was selected for the CWIQ Survey and the HNLSS, which were designed to provide reliable estimates at the LGA level. While large sample sizes lower the sampling error, one should note that the

[3] The CWIQ Survey, MICS, and HNLSS are conducted as part of the five year-long National Integrated Survey of Households, which constitutes a replicated, rotational sample of EAs per state. Surveys that fall into a given sub-period use the replicates as the sampling frame.

non-sampling error tends to increase due to the management challenges of a large volume of field workers and data. Non-sampling error occurs, for instance, if responses are misreported, are affected by interviewers or wrongly recalled, or if mistakes were made during data entry/processing or due to sampling frame coverage and non-response. Unit non-response appears to be negligible as reported response rates were close to 100% in all surveys.

**Table 7: Comparison of sample design features**

| | DHS | EdData | CWIQ | MICS | DHS | HNLSS | NEDS | MICS |
|---|---|---|---|---|---|---|---|---|
| | **2003** | **2004** | **2006** | **2007** | **2008** | **2009** | **2010** | **2011** |
| **PSU** | 365 EAs | EAs covered in DHS 2003 | 7,740 EAs | 1,110 EAs | 888 EAs | 7,740 EAs | EAs covered in DHS 2008 | 1480 EAs |
| **Secondary sampling units** | 19–24 HHs | Eligible HHs (children aged 4–16 in DHS 2003) | 10 HHs | 25 HHs | ~ 41 HHs | 10 HHs | Eligible HH (children aged 2–14 in DHS 2008) | 20 HHs |
| **Sampling frame (PSU)** | Listing of EAs for 1991 census | Not applicable | Listing of EAs for 1991 census | updated 1991 census EA listing | Listing of EAs from 2006 census | Listing of EAs from 2006 census | DHS 2008 household listing for additional households | Listing of EAs from 2006 census |
| **Sample size (realised)** | 7,225 HHs | 4,268 HHs | 75,929 HHs | 26,735 HHs | 34,070 HHs | 77,390 HHs | 20,823 HHs from DHS 2008 + additional sample = total of 26,934 HHs | 29,077 HHs |
| **Lowest-level reporting domain** | Zone | Zone | LGA | State | State | LGA | State | State |
| **Response rate (of covered households)** | 98.6 | 98.0 | 98.5 | 94.0 | 98.3 | 99.9 | 97.9 | 97.0 |

### 3.1.2 Survey instrument, fieldwork schedule and data processing

Well-designed training and fieldwork procedures with extensive data checks are important so as to minimise the non-sampling error component. Fieldwork schedules can influence the comparability of survey estimates of school participation and responses obtained about attendance can refer to different school years if data collection spans more than one academic year. For instance, fieldwork for the DHS 2008 started in the 2007–08 school year but continued into the start of the 2008–09 school year. In the DHS 2008 case, mixing of school years is precluded by the question formulation, as a reference to a specific school year (2007–08 for current attendance; 2006–07 for attendance during the previous year) is given.

Fieldwork timing together with the question formulation may also matter if there is non-random variation in participation over the year (e.g. higher attendance at the beginning of the school year, lower at the end during harvest season). As the MICS and the DHS ask about attendance 'at any time during the school year', the timing of fieldwork should not affect the response. This is different for the CWIQ Survey/HNLSS, for which the questions in the survey instruments refer to 'current' school attendance.

Moreover, education indicators rely on a correct identification of the age of the child to assess whether the child is attending the correct grade/level of schooling for his or her age. Using the age at the last birthday may overestimate the number of 'over-age' children (i.e. those older that the official school age for a given grade) when fieldwork takes place late in the school year. However, a standardised age measure such as age at the start of the school year requires the month of birth to be measured or relies on imputation

methods. The question on the month of birth for children aged five and above is only included in the EdData Survey/NEDS and the MICS 2011 questionnaires.

Depending on the context, questions on the month of birth tend to be hampered by relatively high non-response, which may suggest that the respondent does not know the answer (14% of those aged 6–17 according to the age variable do not provide the month of birth in the MICS 2011). The MICS 2007 report indicates that it estimates/imputes age at the beginning of the school year, without providing further details on the methodology. It is therefore difficult to replicate the methodology for other surveys. Overall, the MICS and the DHS have an almost identical education questionnaire module.

**Table 8: Comparison of selected instruments and fieldwork characteristics**

| | DHS | EdData | CWIQ | MICS | DHS | HNLSS | NEDS | MICS |
|---|---|---|---|---|---|---|---|---|
| | **2003** | **2004** | **2006** | **2007** | **2008** | **2009** | **2010** | **2011** |
| **Fieldwork schedule** | March–August 2003 | February–July 2004 | 32 days in 2006 | March–April 2007 | June–Oct 2008 | Nov 2008–Jan 2009 | March–Aug 2010 | Feb–March 2011 |
| **Data entry** | At NPC Abuja, concurrent to fieldwork | At NPC Abuja, concurrent to fieldwork | At NBS Abuja, started concurrent to fieldwork; scanning | In each zone, double entry; April–Oct 2007 | At NPC Abuja, mainly concurrent to fieldwork; July 2008–Feb 2009 | At six NBS zonal offices; scanning | At NPC Abuja, concurrent to fieldwork; double entry | In each zone; concurrent to fieldwork; double entry |
| **Timeliness of reports** | 04/2004 | 11/2004 | Three months after fieldwork | 09/2007 | 11/2009 | Only draft report | 05/2011 | 04/2013 |
| **Question about school attendance** | During current school year, did (NAME) attend school at any time? | Has (NAME) attended a formal school at any point during the current school year?* | Is (NAME) currently in school? | During the (2006–07) school year, did (NAME) attend school or preschool at any time? | Did (NAME) attend school at any time during the (2007–08) school year? | Is (NAME) currently in school? | Has (NAME) attended a formal school at any point during the current school year?* | During the (2010–11) school year, did (NAME) attend school or preschool at any time? |
| **Age measure** | Age at last birthday (years) | Age; Birth month/ year | Age at last birthday (years) | Age at last birthday (years) | Age at last birthday (years) | Age at last birthday (years) | Age; Birth month/ year | Age; Birth month/ year |
| **Respondent education questions** | Household head/ competent respondent | Parent/ guardian or independent child | Household head/ competent respondent | Household head/ competent respondent | Household head/ competent respondent | Household head/ competent respondent | Parent/ guardian or independent child | Household head/ competent respondent |

Sources: survey reports. * This is the question used for computing indicators from microdata in the following section. According to the information provided in the survey report, the attendance rates presented in the report are based on a subset of the DHS 2008 data.

Data entry organisation also differed across the various surveys. Data entry was centralised in NPC and NBS headquarters in the case of the DHS/NEDS and CWIQ Survey, while a decentralised approach with data entry at the six zonal offices was chosen for the MICS and the HNLSS. Both approaches come with pros and cons. Data entry and processing at a central office allows for centralised supervision and decisions on solutions to identified problems. Decentralised data entry implies shorter delays between the conducting of an interview, data entry and validation, and reports back to the field. However, standardised procedures must be in place to ensure that different teams follow the exact same steps in the various offices, and that the resulting dataset is complete with no batches or questionnaires lost. According to the MICS reports, standard procedures had been developed through the global MICS project.

Questionnaires were scanned in the case of the CWIQ Survey and the HNLSS. Scanning can reduce manual data entry errors such as typing errors. The procedure relies, however, on questionnaires being filled out in a very specific way (e.g. boxes should not be ticked but shaded) and staples have to be removed in order for questionnaires to be correctly scanned. These requirements may introduce other sources of error. Nevertheless, the double entry procedures used in regard to the MICS and NEDS reduce the likelihood of errors due to data entry.[4]

The reports for the DHS 2003, EdData Survey 2004, the CWIQ Survey 2006, and MICS 2007 were published within six months of the end of data collection. The DHS 2008 and NEDS 2010 reports were published around one year after fieldwork, while the delay for the most recent MICS of 2011 was two years. The HNLSS Part A report on the NBS website is a draft version, over four years after the survey was implemented. The delays for the latter two surveys are too long to monitor population characteristics and provide timely inputs into policy decisions. In the case of very short turnaround times, however, as in the case of the CWIQ Survey, procedures for data validation and correction must ensure that published results are correct. As the CWIQ report notes, skips in the questionnaire structure were not strictly checked by programmers. A secondary automatic validation and correction procedure was implemented to compensate for the lack of manual checks.

Information provided on the schooling of children also depends on the respondent. Parents/guardians – who respond to the questionnaire in the EdData Survey/NEDS – may be better informed about school attendance than other proxy respondents in the household.

## 3.2 Definition of indicators published in reports

Which education indicators to report, and which definition to use, is partly conditioned by the survey instrument, partly by the survey aims and partly by international standards. In the latter case, it may be possible to re-compute indicators based on standardised definitions from microdata. Table 9 provides an overview of the definitions used in reports. It covers the attendance and literacy indicators discussed above, as well as other indicators published in a small number of survey reports.

**Eligible respondents** for attendance ratios are *de jure* ('usual') household members in all reports apart from the DHS 2008, which uses the *de facto* definition. A *de jure* definition seems more apposite in this context, as children in boarding school etc. would normally also be captured. The question is asked to household members aged 5–24 in the DHS and the MICS, while school participation is captured for all household members independent of age in the CWIQ Survey. The difference in age ranges considered is reflected in the GARs.

The numerator of the **primary NAR** includes only children of primary school age who are attending primary school in the case of the DHS and CWIQ Survey,[5] while the MICS reports use the 'adjusted' indicator where children attending secondary school are also included. A similar difference can be noted for secondary school NARs. The larger numerator may be one of the reasons that the MICS estimates tend to be larger than DHS estimates. However, there are nevertheless a considerable number of exceptions to this rule, in particular with the MICS 2007 zonal and state-level estimates. Another discrepancy pertains to the age range: all reports refer to the official primary school age range of 6–11 and secondary school age range of 12–17 except for the DHS 2008, which cites ages 6–12 for primary school and 13–17 for secondary school. All NARs in the DHS 2008 report are consequently affected. Differences regarding the age measure – at time of survey or at the beginning of the school year – have been discussed in Section 3.1.2.

[4] The DHS reports do not clearly state whether single entry or double entry procedures were used.

[5] The CWIQ report refers to 'enrolment' and this terminology is maintained in this report. However, the question asked refers to attendance not enrolment, information on which is usually obtained through administrative records rather than surveys. It is therefore directly compared to the attendance estimates provided by other surveys.

The MICS reports do not include **GARs**, and indeed criticise the use of GAR for computing GPIs as 'provid[ing] an erroneous description of the GPI mainly because in most of the cases the majority of over-aged children attending primary education tend to be boys' (NBS 2013, p. 183).

Definitions of **literacy** also vary across surveys and survey reports. The fact that different age ranges are used has already been pointed out in Section 2. The MICS reports collect data on literacy exclusively for female respondents, while the NEDS addresses parents/guardians and children aged 4 to 12. The DHS, MICS, and NEDS share the approach of testing literacy during the interview for respondents who have less than secondary education. The CWIQ Survey uses self-reported information,[6] which may explain why literacy levels were almost twice as high as those suggested by estimates from the MICS 2007. Moreover, the CWIQ Survey asks about reading and writing ability, while other surveys ask only about reading. Literacy indicators in the main body of the DHS/NEDS reports refer to reading *part of a sentence or a whole sentence* (or having attended secondary school or higher). It is not clear whether the MICS reports restrict literacy to the ability to read *a whole sentence* (or having attended secondary school or higher).

Other indicators are less frequently reported on, but could potentially be computed based on a wider range of datasets. These include **primary net intake rates, dropout** and **repetition rates** (at primary level), **primary completion rates** and **transition to secondary school**. Within the DHS and MICS suites of surveys, definitions for these indicators are used in a consistent way across survey rounds. The CWIQ report and MICS reports use very different definitions for the primary completion rate. The MICS definition reflects more closely the one recommended by UNICEF ChildInfo (http://www.childinfo.org/education_methodology.html) and the education statistics programme ADePt developed by the World Bank (Porta et al., 2011). However, while the list of indicators in Appendix F of the report notes that children of any age attending primary school are captured in the numerator, the report text refers to age 11 only.

Levels of **numeracy** are rarely measured. Only the NEDS conducts simple numeracy tests with children aged 5–16.

[6] Self-reporting is also used in GHS surveys and the literacy survey (2010).

## Table 9: Indicator definitions used in survey reports

| | Reports | DHS | CWIQ | MICS | DHS | EdData, NEDS | MICS |
|---|---|---|---|---|---|---|---|
| **No.** | | **2003** | **2006** | **2007** | **2008** | **2004, 2010** | **2011** |
| | **Eligible pop. (indicators 1–9)** | *De jure* household population aged 5–24 | *De jure* household population (all ages) | *De jure* household population aged 5–24 | *De facto* household population aged 5–24 | Eligible children (*de jure* household population aged 4–16); but report based on *de jure* household population aged 5–24 from DHS data | *De jure* household population aged 5–24 |
| **1** | **NAR primary** | % of the primary school-age (6–11) population that is attending primary school | Enrolment (net) is defined as the number of children of primary school age (6–11) currently in primary school (grades P1 to P6) divided by the number of children of primary school age (6–11) | % of children of primary school age, i.e. 6–11, attending school in 2006–07 whether primary or secondary (NAR adjusted) | % of primary school-age children (6–12) attending primary school in 2007–08 school year | % of primary school-age children (6–11) attending primary school in survey year | As in MICS 2007: school year 2010–11 |
| **2** | **GAR primary** | Number attending primary school (aged 5–24) divided by number of primary age children | Enrolment (gross) is defined as the number of children of all ages currently in primary school (grades P1 to P6) divided by the number of children of primary school age (6–11) | Not reported | Number attending primary school (aged 5–24) in 2007–2008 divided by number of primary age children | DHS data: as in DHS 2008 | Not reported |
| **3** | **NAR secondary** | % of the secondary school-age population (12–17) that is attending secondary school | Enrolment (net) is defined as the number of children of secondary school age (12–17) currently in secondary school (grades S1 to S6) divided by the number of children of secondary school age (12–17) | % of secondary school-age children attending secondary or higher levels | % of secondary school-age children (13–17) attending secondary school in 2007–08 | DHS data | As in MICS 2007: school year 2010–11 |
| **4** | **GAR secondary** | Total number of secondary school students up to age 24, expressed as a percentage of the official secondary school-age population | Enrolment (gross) is defined as the number of children of all ages currently in secondary school (grades S1 to S6) divided by the number of children of secondary school age (12–17) | Not reported | Total number of secondary school students up to age 24 in 2007–08, expressed as a percentage of the official secondary school-age population | DHS data: As in DHS 2008 | Not reported |

| | Reports | DHS | CWIQ | MICS | DHS | EdData, NEDS | MICS |
|---|---|---|---|---|---|---|---|
| **No.** | | **2003** | **2006** | **2007** | **2008** | **2004, 2010** | **2011** |
| **5** | **Dropout rate (primary)** | Percentage of students in a given grade in the previous school year who are not attending school | Not reported | Not reported | As in DHS 2003: previous school year specified as 2006–07 | As in DHS (2008, 2003) | Not reported |
| **6** | **Repetition rate (primary)** | Percentage of students in a given grade in the previous school year who are repeating that grade in the current school year | Not reported | Not reported | As in DHS 2003: previous school year specified as 2006–07 | As in DHS (2008, 2003) | Not reported |
| **7** | **Primary completion rate** | Not reported | Ratio between the number of persons who completed primary school in the year before the survey and the number of children of primary school age (6–11) | Number of children (in Appendix F: of any age; in report text: age 11) attending the last grade of primary school (excluding repeaters)/Total number of children of primary school completion age surveyed | Not reported | Not reported | As in MICS 2007: school year 2010–11 |
| **8** | **Transition to secondary school** | Not reported | Not reported | Percentage of children in the last grade of primary school during the previous school year that attend secondary school | Not reported | Not reported | As in MICS 2007 |
| **9** | **Primary net intake rate** | Not reported | Not reported | Percentage of children of school entry age currently attending first grade | Not reported | Not reported | As in MICS 2007 |

| | Reports | DHS | CWIQ | MICS | DHS | EdData, NEDS | MICS |
|---|---|---|---|---|---|---|---|
| **No.** | | **2003** | **2006** | **2007** | **2008** | **2004, 2010** | **2011** |
| **10** | **Literacy** | Respondent's (women: 15–49, men: 15–59) ability to read all or part of a simple sentence in any of the major language groups of Nigeria (if attended secondary school or higher assumed literate) | Adult: population 15+ who could read and write in any language (self-reported)<br>Youth: population 15–24 who could read and write in any language (self-reported) | Percentage of women aged 15–24 who are able to read a short simple statement about everyday life or who attended secondary or higher education | As in DHS 2003 | Literacy of parents/guardians + Literacy children aged 4–12: Ability to read part, or all of a sentence in Hausa, Igbo, Yoruba, or English.<br>Parents/guardians: assumed literate if secondary or higher education | As in MICS 2007 |
| **11** | **Numeracy** | Not measured | Not measured | Not measured | Not measured | Ability to perform simple addition (measured for children aged 5–16) | Not measured |

Notes/Sources: indicator definitions are retrieved from survey reports; information on base population is taken from survey questionnaires.

## 3.3 List of comparable indicators from microdata

The review of indicators presented in the reports shows that definitions in terms of the base population or the concept are rarely comparable. Definitions are most similar across rounds of the same survey (e.g. the DHS), but even in that case discrepancies are observed from one round to the next. While varying definitions are partly due to the fact that international standard definitions vary across suites of surveys, a better harmonised presentation of results would facilitate the use of published household surveys results.

Table 10 provides a list of indicators that can be computed based on survey microdata using more comparable definitions than those presented in survey reports. For GARs, repetition rates, transition rates, and survival rates to be computed with EdData/NEDS data, an age restriction would have to be imposed (i.e. from age five – youngest in the DHS and the MICS – to 16 – oldest age in EdData/NEDS). The list is based on key indicators presented above, on the one hand, and is informed by the indicators listed in the GEP3 logframe (March 2013 version) on the other hand. It is hence not exhaustive in relation to all school participation, progression, and attainment indicators that could be computed from a subset of survey data sources.

For some indicators where the EMIS is the suggested source, household survey data can be used to compute similar indicators to those based on EMIS data allowing for triangulation based on two data sources. This is, for instance, the case for enrolment rates, GPIs, survival rate to Grade 6, primary Grade 1 intake, and transition from primary Grade 6 to junior secondary school. Limitations that have to be considered are that survey data would provide data on attendance rather than enrolment and that the size of survey samples may not allow for disaggregation at state level.

### Table 10: List of indicators based on harmonised definitions[7]

| | Numerator | Denominator | DHS 2003 | EdData 2004 | CWIQ 2006 | MICS 2007 | DHS 2008 | HNLSS 2009 | NEDS 2010 | MICS 2011 |
|---|---|---|---|---|---|---|---|---|---|---|
| **All: *de jure* population; age at last birthday** | | | | | | | | | | |
| NAR primary/JSS/Sec (total, male, female) | School-age (6–11; 12–14; 12–17) population that is attending primary school grades in survey year | School-age (6–11; 12–14; 12–17) population | X | (X)[a] | X[b] | X | X | X[b] | (X)[a] | X |
| GAR primary/JSS/Sec (total, male, female) | Total number of primary/JSS/sec school students (5–24); 5–16 in EdData/NEDS | School-age (6–11; 12–14; 12–17) population | X | (X)[a] | X[b] | X | X | X[b] | (X)[a] | X |
| GPI NAR primary | NAR primary/JSS/Sec for females | NAR primary/JSS/Sec for males | X | (X)[a] | X[b] | X | X | X[b] | (X)[a] | X |
| Youth literacy (aged 15–24), female | Females aged 15–24 who can read all or part of sentence in test (any language) or attended education beyond primary school | All females aged 15–24 | X | | | X | X | | | X |
| Repetition rate for primary school: proportion of pupils (total, male, female) | Pupils (aged 5–24; aged 5–16 in NEDS) (total, male, female) in any grade of primary in a given school year and who also attend that same or a lower grade in the following school year | All pupils in given grade in primary school (aged 5–24; age 5–16 in NEDS) in previous year | X | (X)[a] | | X | X | | (X)[a] | X |
| Primary to secondary transition rate | Pupils (aged 5–24; aged 5–16 in NEDS) (total, male, | All pupils in Grade 6 of primary school (age 5– | X | (X)[a] | | X | X | | (X)[a] | X |

[7] The comparability of treatment of formal/religious schooling and public/private schooling in survey instruments still needs to be examined. The public/private differentiation may influence age range/grade definitions for key indicators: NBS (2007) p. 43: 'In Nigeria, the final grade in government-owned primary school is grade 6; it is grade 5 in privately owned primary schools; but most primary schools are government-owned.'

| | Numerator | Denominator | DHS 2003 | EdData 2004 | CWIQ 2006 | MICS 2007 | DHS 2008 | HNLSS 2009 | NEDS 2010 | MICS 2011 |
|---|---|---|---|---|---|---|---|---|---|---|
| | female) in the last grade of primary who are promoted to first grade of secondary the following school year | 24; age 5–16 in NEDS) in previous year | | | | | | | | |
| Primary school net intake rate (total, male, female) | Pupils of primary school entry age (age 6) attending Grade 1 of primary school in survey year | All pupils of primary school entry age | **X** | **X** | **X**[b] | **X** | **X** | **X**[b] | **X** | **X** |
| Survival rate to Grade 6 of primary: percentage of a cohort of pupils (total, male, female) attending the first grade of a primary cycle in a given school year who are expected to reach Grade 6, regardless of repetition | | | **X** | **(X)**[a] | | **X** | **X** | | **(X)**[a] | **X** |
| Educational attainment (total, male, female) | Individuals aged 15–49 who never attended school / started or completed primary school / started or completed secondary school or higher, missing information | All individuals aged 15–49 | **X** | | **X** | **X** | **X** | **X** | | **X** |

Notes: (1) **(X)**[a] – Given the age range covered in the EdData Survey/NEDS, NAR and GAR secondary cannot be computed, and the age range for GAR primary and GAR JSS would have to be capped at age 16. In the subsequent analysis, GARs are not presented for the EdData Survey and NEDS. (2) **X**[b]**:** as there is a slight difference in the question wording on school attendance in the CWIQ Survey/HNLSS compared to the DHS/MICS, full harmonisation is not possible. Still, the difference between being 'currently in school' and 'at any time during the school year' may not translate into differences in estimates. Therefore, indicators are computed and presented in the microdata analysis.

# 4 Education indicators computed from microdata

The tables in this section compare estimates presented in reports with estimates computed from available survey microdata following the definitions provided in Table 10. The discussion is limited to attendance rates and literacy among women aged 15–24. Other indicators defined in Table 10 have also been calculated and are available in a separate spreadsheet. Reliability of survey estimates, especially at zonal and state-level disaggregation, may also be hampered by large standard errors. Depending on the size of the confidence intervals, *changes* suggested by point estimates may not be statistically significant. Therefore, confidence intervals (95%) have been computed and are plotted as error bars around the point estimates. Differences between estimates from two surveys are statistically significant if the bars do not overlap.[8]

Survey weights are crucial for correct estimates of both point estimates – such as the NAR primary – and confidence intervals in complex samples such as those analysed. Survey weights reflect the selection probability, but may also contain corrections for non-response and *ex-post* adjustments to match population characteristics based on external data. As can be seen from Table 11, the range of the survey weight variable included in the data sets differs greatly between the surveys. While weights in the DHS 2008, NEDS 2010 and MICS 2007 have a rather small range, there seem to be outliers in both the MICS 2011 and the HNLSS 2009. The fact that some sampling units have high or low weights relative to other sampling units leads to an inflated variance.

**Table 11: Range of normalised survey weights in household member data sets (children data sets in the case of EdData and NEDS)**

| Data | DHS | EdData | MICS | DHS | HNLSS | NEDS | MICS |
|---|---|---|---|---|---|---|---|
| | 2003 | 2004 | 2007 | 2008 | 2009 | 2010 | 2011 |
| **Range survey weights** | [0.17; 5.8] | [0.17; 5.9] | [0.14; 3.9] | [0.38; 1.94] | [0.04; 17.3] | [0.1;2.5] | [0.04; 13.2] |

Sources: DHS 2003 microdata; EdData Survey 2004 microdata; MICS 2007 microdata; DHS 2008 microdata; HNLSS 2009 microdata; NEDS 2010 microdata; MICS 2011 microdata.

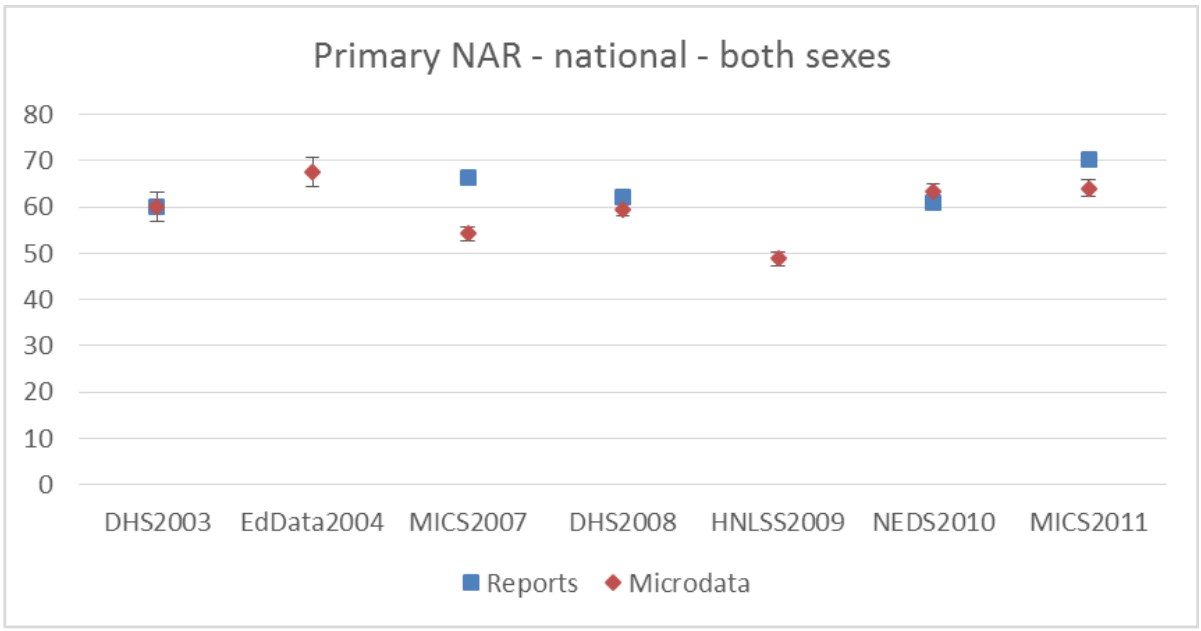
## 4.1 Attendance rates

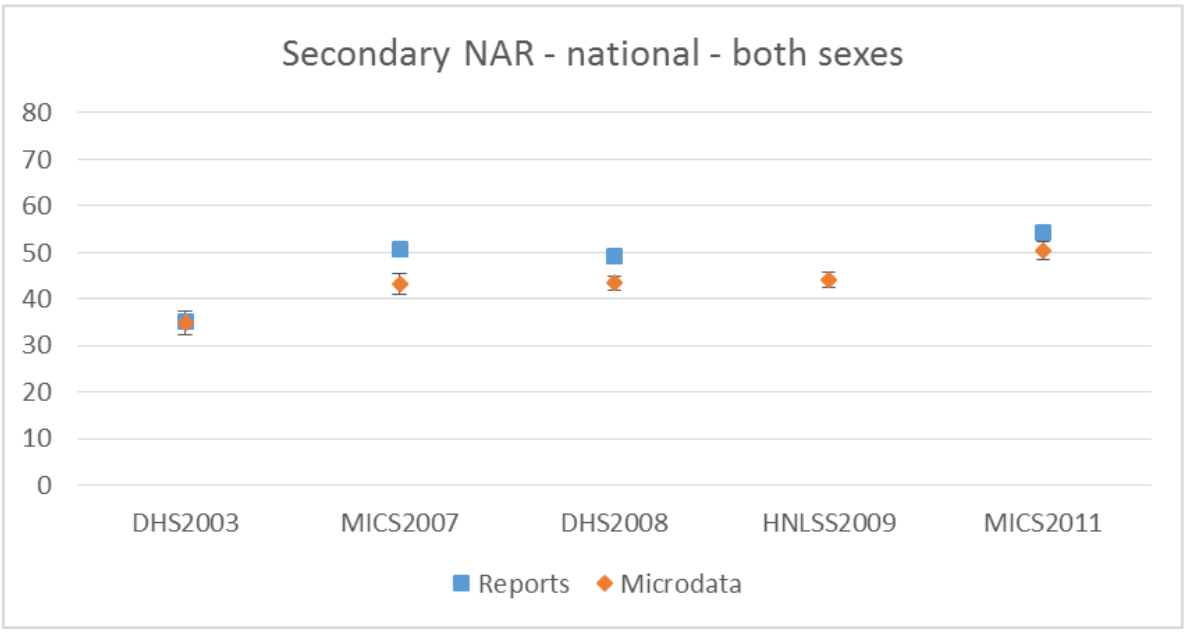
### 4.1.1 National level

Table 12 and Figure 1 present attendance rates at national level.[9] The estimates from reports and microdata are almost identical in the case of the DHS 2003. This is a good check, as the definition of the attendance rates follows the one used in the DHS 2003 report. The DHS 2003 report definition is chosen to provide a benchmark against the earliest year in the series and because the same definition can be applied to the other data sources examined. However, it should be noted that the choice of non-adjusted attendance rates does not imply that they are in general preferable to adjusted attendance rates as presented in the MICS. As explained above, the NEDS 2010 report presented estimates based on DHS 2008 data. The report and microdata estimates are therefore not directly comparable.

[8] This is a rather conservative test. Differences may be statistically significant even if confidence intervals overlap.
[9] The figures plot results only for years with available household survey data. Years without data – 2005 and 2006 in the case of Figure 1 – have been omitted. Therefore, the periods between data points are not necessarily of equal length.

**Figure 1: Primary and secondary NAR (Nigeria)**




Sources: DHS 2003 report and microdata; EdData Survey 2004 microdata; MICS 2007 report and microdata; DHS 2008 report and microdata; HNLSS microdata; NEDS/DHS 2010 report and NEDS 2010 microdata; MICS 2011 report and microdata. Note: Error bars on microdata estimates indicate 95% confidence intervals.

After the adjustment in the definition, the recent increase in primary and secondary NARs indicated by the MICS 2011 report is still present; however, it is smaller. In the case of the primary NAR at national level, the improvement over the entire period considered is small, as the estimate in 2011 is at a similar level to the one suggested by the NEDS 2010 and about four percentage points higher than in the DHS 2003 and DHS 2008. There is considerable downwards as well as upwards variability according to EdData, MICS 2007 and HNLSS, which are further discussed below. Secondary school NARs seem to have experienced a larger increase, from 35% in 2003 to approximately 50% according to the latest MICS. Differently from the primary-level estimates, survey microdata estimates suggest a monotonic trend for secondary-level attendance. Moreover, according to the GPI, females have caught up with males in terms of secondary net attendance (Table 12).

**Table 12: Comparison of reported and estimated NARs, GARs, and GPIs at national level**

| Reports/ Data | DHS | DHS | Ed Data | MICS | MICS | DHS | DHS | HNLSS | NEDS/ DHS | NEDS | MICS | MICS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (report) | (data) | (data) | (report) | (data) | (report) | (data) | (data) | (report) | (data) | (report) | (data) |
| **Indicator** | **2003** | **2003** | **2004** | **2007** | **2007** | **2008** | **2008** | **2009** | **2010** | **2010** | **2011** | **2011** |
| **NAR PRY (all)** | 60.1 | 60.0 | 67.6 | 64.4 | 54.2 | 62.1 | 59.5 | 48.8 | 61.0 | 63.2 | 70.1 | 64.1 |
| **NAR PRY (female)** | 56.5 | 56.4 | 63.4 | 62.4 | 53.1 | 59.1 | 56.7 | 48.4 | 58.4 | 60.4 | 68.0 | 62.1 |
| **NAR PRY (male)** | 63.7 | 63.4 | 71.5 | 66.2 | 55.3 | 64.9 | 62.7 | 49.1 | 63.5 | 65.9 | 72.0 | 66.1 |
| **GPI NAR PRY** | 0.89 | 0.89 | 0.89 | 0.94 | 0.96 | 0.91 | 0.91 | 0.99 | 0.92 | 0.92 | 0.94 | 0.94 |
| **GAR PRY (all)** | 88.0 | 91.0 | *n.a.* | *n.a.* | 76.3 | 84.3 | 84.0 | 70.5 | 85.1 | *n.a.* | *n.a.* | 87.5 |
| **NAR Sec (all)** | 35.1 | 34.8 | *n.a.* | 50.7 | 43.2 | 49.1 | 43.4 | 44.1 | 44.1 | *n.a.* | 54.2 | 50.5 |
| **GPI NAR Sec** | 0.87 | 0.87 | *n.a.* | 0.98 | 1.03 | 0.90 | 0.95 | 1.00 | 1.00 | *n.a.* | 1.00 | 1.02 |
| **GAR Sec (all)** | 61.2 | 61.1 | *n.a.* | *n.a.* | 69.6 | 73.0 | 68.9 | 68.8 | 65.1 | *n.a.* | *n.a.* | 77.6 |

Sources: DHS 2003 report and microdata; EdData Survey 2004 microdata; MICS 2007 report and microdata; DHS 2008 report and microdata; HNLSS microdata; NEDS/DHS report and microdata; MICS 2011 report and microdata.

Certain outliers remain visible in the microdata estimates, especially in the case of primary school attendance rates. Although the same households are re-interviewed, estimated NARs from the EdData Survey/NEDS tend to be higher than the DHS estimate. The fact that NEDS focuses on education while the DHS, MICS and HNLSS are multi-topic surveys may be one factor in this. Given the focus on education, the questionnaire routing leading to the attendance questions differs from the questionnaire modules in other analysed surveys. Questionnaire routing can on its own affect response (see Education Policy and Data Center, 2009, for a review of education questionnaire modules). It also affects the type of schooling covered, as attendance in Islamiyya schools, Qur'anic schools and Tsangaya schools that teach academic subjects such as English or Mathematics is identified at the beginning of the questionnaire. Follow-up questions on level and grade explicitly include children attending these types of schools. It is not clear if these students would also be captured by the question formulation most commonly used in multi-topic surveys, which is *'During the current school year, did (NAME) attend school at any time?'* Finally, the fact that parents/guardians instead of the household head are responding to questions about their children's school attendance may also affect the response.

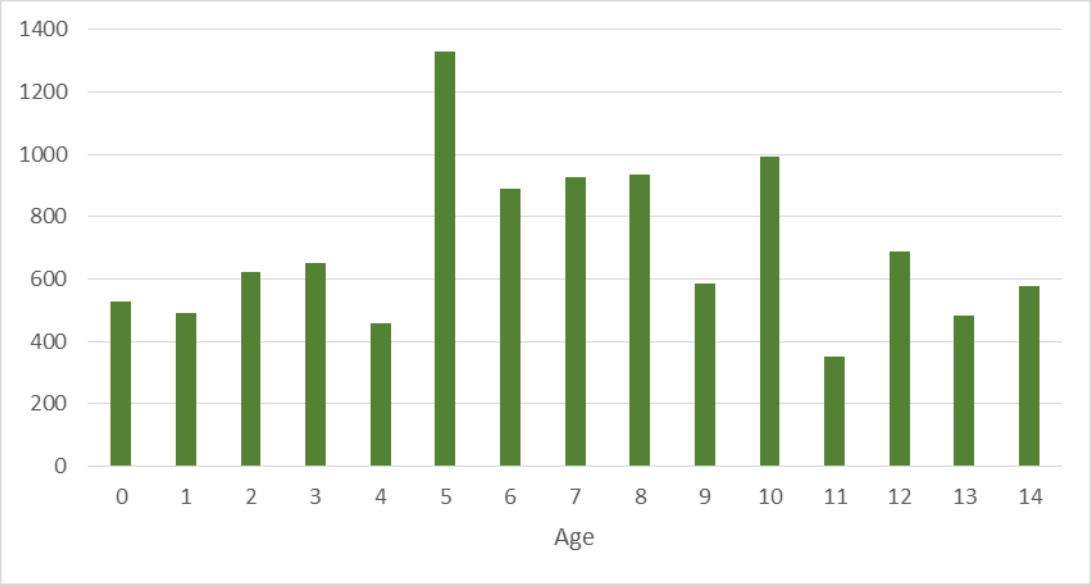
The HNLSS 2009 has a considerably larger sample size than the other household surveys examined and would be well suited for calculation of indicators at state or possibly even LGA level. However, HNLSS estimates of primary school attendance rates are between nine and 17 percentage points below the levels of the DHS 2008 and MICS 2011, and while year-to-year fluctuations are possible this large drop at national level seems unlikely. An exploratory examination of the data suggests strong age heaping at ages six, eight, and 10, which would inflate the denominator, i.e. the number of children of primary school age (6–11). Moreover, the HNLSS questionnaire routing limits questions about level and grade attended to children *currently* attending school. This is a narrower concept than the attendance measure 'at any time during the school year' captured in other surveys. Secondary school NARs and GARs are more in line with estimates from the surveys conducted in 2008 and 2011. Further data cleaning may improve the estimates from the HNLSS.

### 4.1.2 Zonal level

The primary NAR estimates at national level based on the MICS 2007 microdata suggested a drop in net attendance compared to the DHS 2003. Once one considers the estimates disaggregated at zonal level presented in

Table 13 (NAR Primary all), this variation seems to be exclusively driven by the estimate for the North East (11% at national level, compared to 44% in the DHS 2003 and 40% in the DHS 2008). While fluctuations are possible, such large changes over a short period are relatively unlikely. This outlier, already discussed above based on survey reports, is confirmed in the microdata analysis. In all other zones, MICS 2007 estimates of primary net attendance are close to those obtained with DHS 2003 data. *Ex-post* it is difficult to establish which survey characteristics are driving this result. NARs are low if the denominator – the number of children of primary age – is particularly high and/or if the numerator – the number of children attending primary school among this age group – is particularly low. Exploring the data it seems that both factors may contribute. One observes that the age distribution according to the household roster shows a relatively high number of observations in the primary school age range (see Figure 2). Moreover, for 85% of the 6–11 year olds in the North East the response to the filter question in the education questionnaire module (*'Has [NAME] ever attended school or preschool?'*) is negative. This means that only 15% of primary school-age children go on to be asked about their current school attendance. For comparison, the percentage of primary school-age children with a positive answer to the filter question in other regions ranges from 51% in the North West to 97% in the South West.

**Figure 2: Weighted age distribution (ages 0–14) in MICS 2007 – North East – sample**




Source: MICS 2007 microdata; Notes: the bars show the weighted number of observations at each age (0–14).

**Table 13: Comparison of reported and estimated primary NARs and GPIs at zonal level**

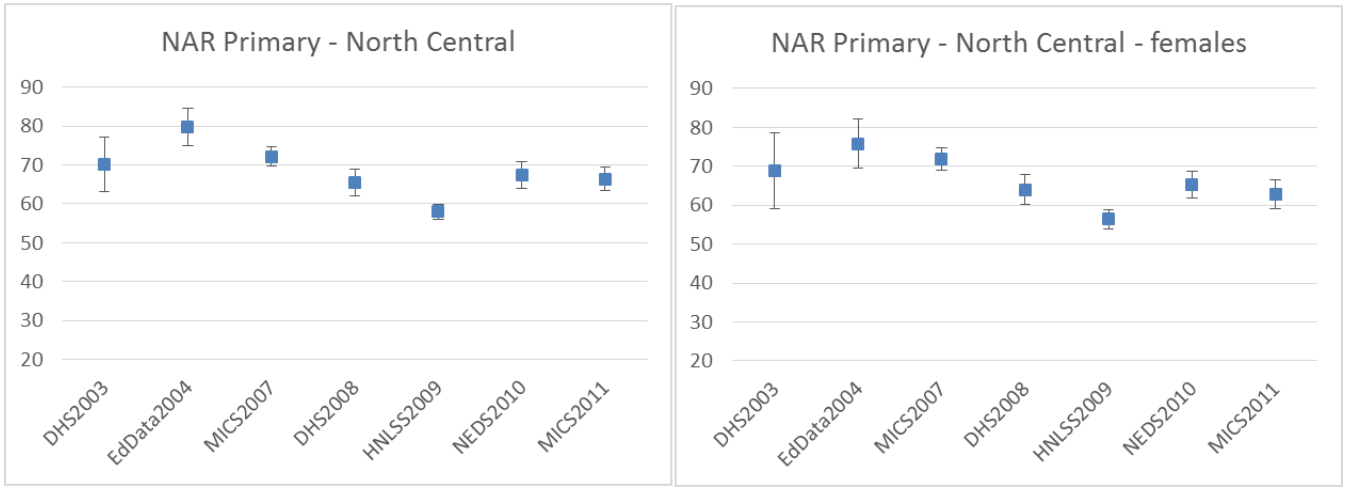
| Reports/ data | DHS | DHS | EdData | MICS | MICS | DHS | DHS | HNLSS | NEDS/ DHS | NEDS | MICS | MICS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (report) | (data) | (data) | (report) | (data) | (report) | (data) | (data) | (report) | (data) | (report) | (data) |
| **Indicator** | **2003** | **2003** | **2004** | **2007** | **2007** | **2008** | **2008** | **2009** | **2010** | **2010** | **2011** | **2011** |
| **NAR primary (all)** | | | | | | | | | | | | |
| **North Central** | 70.2 | 70.1 | 79.7 | 83.7 | 72.1 | 70.5 | 65.5 | 58.0 | 66.4 | 67.5 | 72.5 | 66.4 |
| **North East** | 44.4 | 44.4 | 54.1 | 13.7 | 11.2 | 43.7 | 40.2 | 31.2 | 40.8 | 45.0 | 49.1 | 46.7 |
| **North West** | 41.7 | 41.4 | 55.7 | 48.2 | 41.7 | 43.4 | 40.8 | 29.8 | 41.0 | 48.2 | 50.4 | 47.4 |
| **South East** | 80.2 | 79.4 | 84.8 | 95.9 | 79.3 | 82.8 | 77.8 | 69.2 | 80.1 | 82.3 | 90.1 | 84.3 |
| **South South** | 82.2 | 82.0 | 80.1 | 96.1 | 79.7 | 80.1 | 79.3 | 63.6 | 79.6 | 84.0 | 90.9 | 81.4 |
| **South West** | 82.8 | 82.8 | 81.6 | 97.4 | 82.4 | 76.6 | 78.3 | 69.7 | 79.1 | 79.4 | 91.6 | 80.1 |
| **NAR primary (female)** | | | | | | | | | | | | |
| **North Central** | 68.9 | 68.9 | 75.8 | 82.8 | 72.0 | 69.2 | 64.0 | 56.4 | 65.2 | 65.2 | 69.9 | 62.8 |
| **North East** | 39.1 | 39.1 | 50.8 | 12.5 | 10.3 | 40.3 | 37.5 | 30.6 | 38.0 | 42.8 | 47.7 | 45.9 |
| **North West** | 34.2 | 34.2 | 47.1 | 43.5 | 38.3 | 37.1 | 35.3 | 28.5 | 35.5 | 42.5 | 47.3 | 44.6 |
| **South East** | 78.3 | 77.4 | 85.8 | 95.7 | 80.1 | 83.2 | 77.4 | 67.8 | 80.0 | 83.1 | 90.1 | 83.3 |
| **South South** | 81.1 | 81.0 | 80.8 | 95.8 | 80.0 | 80.1 | 79.5 | 63.8 | 79.9 | 84.1 | 90.5 | 81.2 |
| **South West** | 84.6 | 84.6 | 79.3 | 97.0 | 82.2 | 75.2 | 77.2 | 69.9 | 78.0 | 78.0 | 91.7 | 79.9 |
| **NAR primary (male)** | | | | | | | | | | | | |
| **North Central** | 71.4 | 71.2 | 83.3 | 84.5 | 72.2 | 71.7 | 67.1 | 59.4 | 67.7 | 69.6 | 74.9 | 69.6 |
| **North East** | 49.5 | 49.5 | 57.3 | 14.8 | 12.1 | 46.8 | 42.8 | 31.7 | 43.5 | 47.2 | 50.5 | 47.6 |
| **North West** | 49.0 | 48.5 | 63.9 | 52.8 | 45.0 | 49.8 | 46.4 | 30.9 | 46.7 | 54.1 | 53.8 | 50.5 |
| **South East** | 82.4 | 81.8 | 83.8 | 96.2 | 78.4 | 82.4 | 78.3 | 70.5 | 80.3 | 81.5 | 90.0 | 85.3 |
| **South South** | 83.2 | 83.1 | 79.4 | 96.3 | 79.4 | 80.1 | 79.2 | 63.4 | 79.3 | 83.8 | 91.3 | 81.5 |
| **South West** | 81.2 | 81.2 | 83.7 | 97.8 | 82.5 | 77.8 | 79.4 | 69.5 | 80.2 | 80.8 | 91.5 | 80.3 |

Sources: DHS 2003 report and microdata; EdData Survey 2004 microdata; MICS 2007 report and microdata; DHS 2008 report and microdata; HNLSS microdata; NEDS/DHS 2010 report and NEDS 2010 microdata; MICS 2011 report and microdata.

A comparison of NARs shows overall a slight downward trend in the North Central region over recent years (Figure 3;

Table 13). The confidence intervals depicted on the left-hand side suggest a statistically significant change between the MICS 2007 and the DHS 2008/MICS 2011. The pattern is very similar when only girls are considered.

**Figure 3: Primary NAR all and Primary NAR females (North Central zone)**




Sources: DHS 2003 microdata; EdData Survey 2004 microdata; MICS 2007 microdata; DHS 2008 microdata; HNLSS 2009 microdata; NEDS 2010 microdata; MICS 2011 microdata. Note: Error bars indicate 95% confidence intervals.

The MICS 2011 estimates show improvements in primary school net attendance in other regions in northern Nigeria, especially for females, compared to the DHS 2008. However, as illustrated in Figure 4, confidence intervals overlap.

**Figure 4: Primary NAR for females at zonal level, DHS 2008 and MICS 2011, with 95% confidence intervals**


Sources: DHS 2008 and MICS 2011 microdata; Note: Error bars indicate 95% confidence intervals.

Table 14 shows point estimates for secondary school NARs. Over the series considered, attendance rates generally appear to have increased (although some upwards and downwards variability remains). Comparing the DHS 2008 and the MICS 2011, more recent improvements are also visible; point estimates

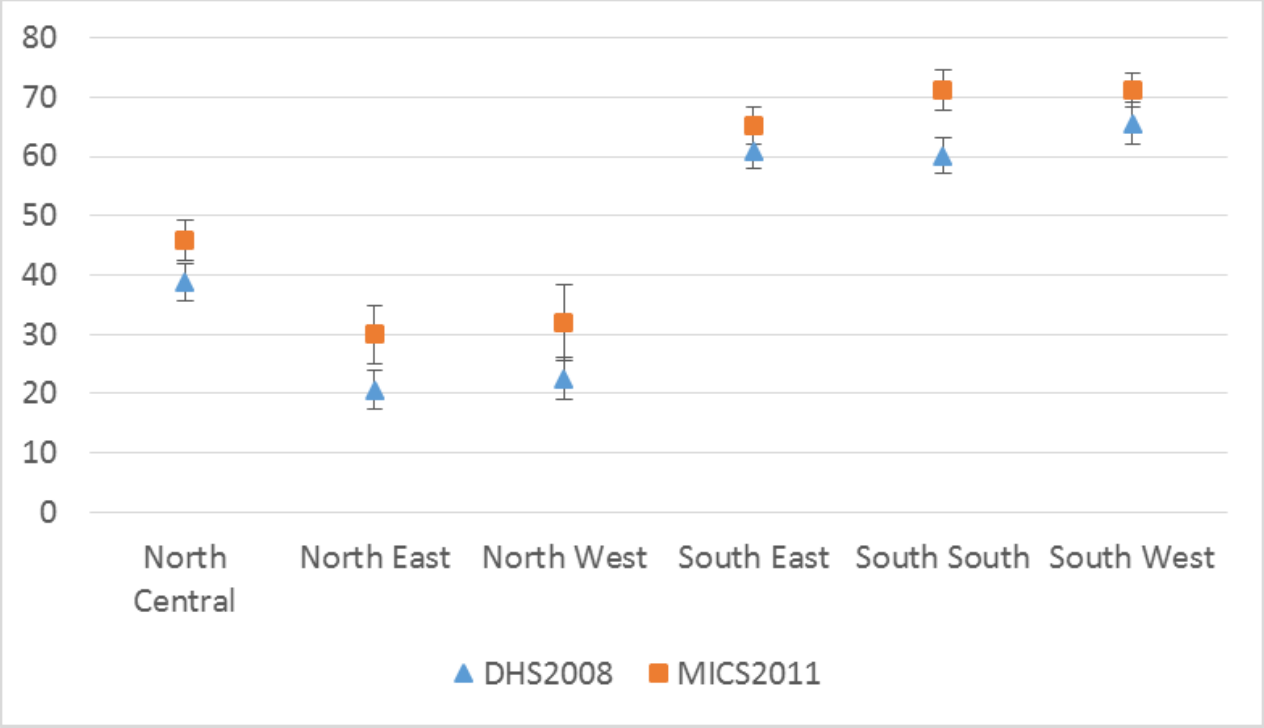
for the MICS exceed those for the DHS in all zones. The confidence intervals of the DHS 2008 and the MICS 2011 estimates do not overlap for the North East, North West, and South South (Figure 5).

**Table 14: Comparison of reported and estimated secondary NARs and GPIs at zonal level**

| Report/data | DHS (report) | DHS (data) | MICS (report) | MICS (data) | DHS (report) | DHS (data) | HNLSS (data) | MICS (report) | MICS (data) |
|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **2003** | **2003** | **2007** | **2007** | **2008** | **2008** | **2009** | **2011** | **2011** |
| **NAR secondary (all)** | | | | | | | | | |
| **North Central** | 37.7 | 37.3 | 58.7 | 48.4 | 46.0 | 38.7 | 44.7 | 50.5 | 45.9 |
| **North East** | 19.1 | 18.4 | 8.1 | 6.5 | 25.7 | 20.6 | 24.6 | 31.6 | 29.9 |
| **North West** | 14.7 | 14.7 | 30.1 | 24.8 | 26.7 | 22.6 | 20.4 | 34.4 | 32.0 |
| **South East** | 48.5 | 48.4 | 69.8 | 57.9 | 68.7 | 60.8 | 60.0 | 69.3 | 65.2 |
| **South South** | 51.5 | 51.3 | 72.3 | 64.0 | 66.1 | 60.1 | 55.7 | 75.1 | 71.2 |
| **South West** | 61.0 | 60.8 | 78.3 | 68.5 | 68.7 | 65.6 | 67.3 | 75.6 | 71.2 |
| **NAR secondary (female)** | | | | | | | | | |
| **North Central** | 32.6 | 32.6 | 55.6 | 46.9 | 41.6 | 36.4 | 43.0 | 48.6 | 41.0 |
| **North East** | 14.9 | 13.6 | 6.6 | 5.6 | 22.1 | 19.2 | 23.1 | 30.0 | 28.9 |
| **North West** | 9.5 | 9.5 | 23.8 | 21.3 | 19.3 | 18.2 | 18.2 | 31.8 | 27.5 |
| **South East** | 51.4 | 51.1 | 70.4 | 59.7 | 68.7 | 61.5 | 60.4 | 70.8 | 61.4 |
| **South South** | 51.5 | 51.3 | 73.4 | 65.7 | 65.5 | 59.8 | 56.1 | 77.6 | 72.1 |
| **South West** | 62.2 | 59.5 | 73.4 | 69.2 | 68.9 | 66.4 | 66.9 | 75.5 | 71.4 |

Sources: DHS 2003 report and microdata; MICS 2007 report and microdata; DHS 2008 report and microdata; HNLSS microdata; MICS 2011 report and microdata.

**Figure 5: Secondary NARs at zonal level, DHS 2008 and MICS 2011, with 95% confidence intervals**




Sources: DHS 2008 and MICS 2011 microdata; Note: Bars indicate 95% confidence intervals.

### 4.1.3 State level (GEP3 states)

The following table compares state-level estimates of NAR primary and secondary presented in reports and obtained from microdata. As already discussed at the zonal level for the North East, the outlier observed for the MICS 2007 is also found for Bauchi state. The case of Niger in the MICS 2007 also requires further investigation. The measured primary NAR for girls is almost double the level measured by the DHS in the

following year. Variations in the GPI based on NAR primary remain similar to the published estimates. For instance, the DHS and NEDS measure a GPI in Sokoto of just 0.5, while the MICS and the HNLSS give a much more gender-balanced result of 0.8 to 0.9.

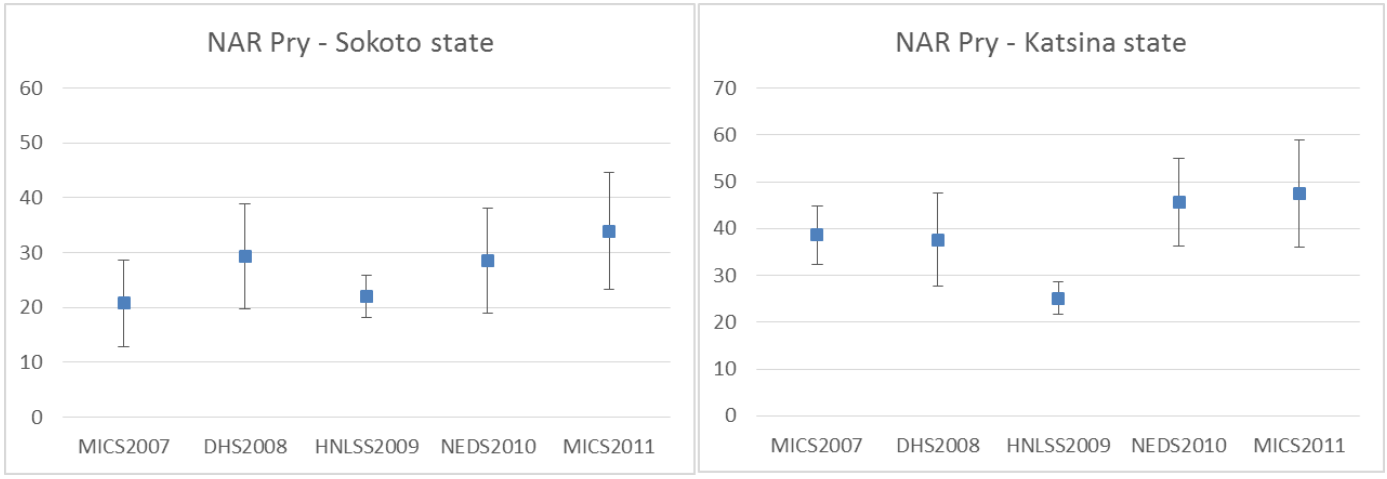
**Table 15: Comparison of reported and estimated secondary NARs and GPIs in GEP3 states**

| Reports/ data | MICS | MICS | DHS | DHS | HNLSS | NEDS/ DHS | NEDS | MICS | MICS |
|---|---|---|---|---|---|---|---|---|---|
| | Report | Data | Report | Data | Data | Report | Data | Report | Data |
| **Indicator** | **2007** | **2007** | **2008** | **2008** | **2009** | **2010** | **2010** | **2011** | **2011** |
| **NAR primary (all)** | | | | | | | | | |
| **Sokoto** | 24.8 | 20.7 | 31.1 | 29.3 | 22.0 | 28.9 | 28.6 | 35.5 | 33.4 |
| **Katsina** | 42.0 | 38.6 | 38.9 | 37.6 | 25.1 | 38.1 | 45.6 | 49.0 | 47.5 |
| **Bauchi** | 9.5 | 8.0 | 40.5 | 36.6 | 27.8 | 37.2 | 45.1 | 35.5 | 39.6 |
| **Niger** | 72.2 | 64.6 | 44.4 | 40.5 | 41.0 | 39.7 | 46.3 | 51.6 | 51.7 |
| **Zamfara** | 25.4 | 21.8 | 20.5 | 18.0 | 15.3 | 18.4 | 26.4 | 34.8 | 30.2 |
| **NAR primary (female)** | | | | | | | | | |
| **Sokoto** | 22.6 | 19.0 | 20.0 | 19.2 | 21.1 | 18.3 | 19.0 | 32.2 | 31.2 |
| **Katsina** | 35.7 | 33.6 | 31.8 | 30.1 | 22.0 | 30.9 | 39.6 | 43.6 | 41.3 |
| **Bauchi** | 7.1 | 5.7 | 36.2 | 34.0 | 27.0 | 34.1 | 42.9 | 34.7 | 38.2 |
| **Niger** | 69.1 | 61.8 | 36.0 | 32.9 | 36.7 | 32.0 | 37.9 | 45.2 | 45.1 |
| **Zamfara** | 18.3 | 17.0 | 16.9 | 15.5 | 15.5 | 15.8 | 20.5 | 31.7 | 24.6 |
| **NAR primary (male)** | | | | | | | | | |
| **Sokoto** | 26.9 | 22.3 | 42.0 | 38.1 | 22.7 | 38.2 | 37.2 | 38.8 | 37.1 |
| **Katsina** | 48.4 | 43.2 | 46.3 | 45.8 | 28.0 | 46.1 | 51.8 | 55.0 | 53.4 |
| **Bauchi** | 11.6 | 9.8 | 44.4 | 39.0 | 28.4 | 40.0 | 47.2 | 36.2 | 37.0 |
| **Niger** | 74.9 | 67.2 | 51.5 | 46.9 | 44.7 | 46.0 | 54.0 | 57.6 | 55.2 |
| **Zamfara** | 31.7 | 26.3 | 24.4 | 20.6 | 15.1 | 21.3 | 33.3 | 38.4 | 36.4 |
| **GPI NAR primary** | | | | | | | | | |
| **Sokoto** | 0.8 | 0.9 | 0.5 | 0.5 | 0.9 | 0.5 | 0.5 | 0.8 | 0.8 |
| **Katsina** | 0.7 | 0.8 | 0.7 | 0.7 | 0.8 | 0.7 | 0.8 | 0.8 | 0.8 |
| **Bauchi** | 0.6 | 0.6 | 0.8 | 0.9 | 1.0 | 0.9 | 0.9 | 1.0 | 0.9 |
| **Niger** | 0.9 | 0.9 | 0.7 | 0.7 | 0.8 | 0.7 | 0.7 | 0.8 | 0.8 |
| **Zamfara** | 0.6 | 0.6 | 0.7 | 0.8 | 1.0 | 0.7 | 0.6 | 0.8 | 0.8 |
| **NAR secondary (all)** | | | | | | | | | |
| **Sokoto** | 14.8 | 14.1 | 11.4 | 9.9 | 16.7 | 12.8 | *n.a.* | 16.9 | 22.2 |
| **Katsina** | 16.7 | 12.8 | 15.9 | 14.8 | 13.3 | 17.0 | *n.a.* | 29.9 | 26.5 |
| **Bauchi** | 4.6 | 3.6 | 14.2 | 11.4 | 16.4 | 12.7 | *n.a.* | 14.5 | 20.1 |
| **Niger** | 56.3 | 50.2 | 26.7 | 23.0 | 31.0 | 22.4 | *n.a.* | 28.9 | 27.9 |
| **Zamfara** | 18.4 | 17.7 | 18.7 | 14.7 | 12.1 | 17.0 | *n.a.* | 25.2 | 21.9 |

Sources: MICS 2007 report and microdata; DHS 2008 report and microdata; HNLSS microdata; NEDS/DHS report and NEDS 2010 microdata; MICS 2011 report and microdata.

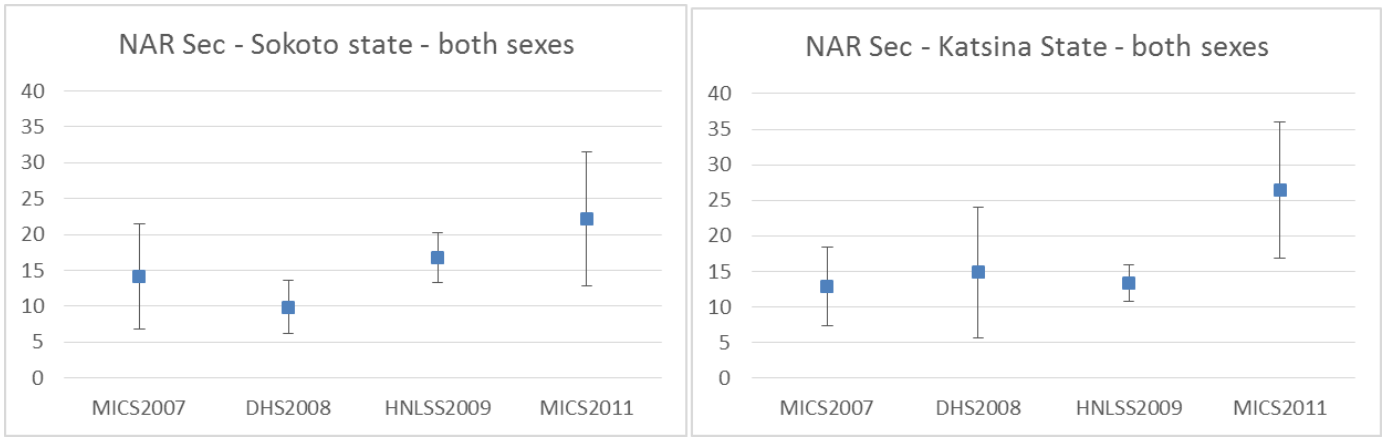
The point estimates for Sokoto, Katsina and Zamfara indicate some positive change in attendance rates over the period analysed. To assess whether this is a 'real' change, confidence intervals have to be examined. As illustrated in Figure 6 and Figure 7, confidence intervals are in some cases over 20 percentage points wide (MICS 2011) and largely overlap. Although the surveys are designed to provide state-level estimates, they appear to be of limited use for evaluating changes over time, especially when changes from one survey to the next are of smaller scale. The HNLSS, which has a very large sample size, is an exception, despite the presence of extreme survey weights. Such a large operation comes, however, with the risk of larger non-sampling errors. As indicated before, the HNLSS data still require further checking and data cleaning.

**Figure 6: NAR primary in Sokoto and Katsina states, with 95% confidence intervals**




Sources: MICS 2007 microdata; DHS 2008 microdata; HNLSS microdata; NEDS 2010 microdata; MICS 2011 microdata. Note: Bars indicate 95% confidence intervals.

**Figure 7: NAR secondary in Sokoto and Katsina states, with 95% confidence intervals**




Sources: MICS 2007 microdata; DHS 2008 microdata; HNLSS microdata; MICS 2011 microdata. Note: Bars indicate 95% confidence intervals.

## 4.2 Female youth literacy

Finally, literacy rates for women aged 15–24 are compared. This indicator refers to a different age group and is based on different questions compared to the previously analysed attendance rates. Furthermore, as women constitute a separate sampling unit in both the DHS and the MICS, data are saved in different files and are weighted differently. Problems observed for the attendance rates may therefore not carry over to other education indicators of interest.

As the EdData Survey/NEDS measure literacy for children and a subgroup of adults (parents/guardians of children in the sample), the population is not comparable to all women of a specific age group examined in the DHS and the MICS. The literacy measure in the HNLSS relies on self-reporting by the respondent. The analysis is therefore limited to DHS and MICS that both conduct a simple reading test with women who have attended primary school or lower. Results include not being able to read, being able to read part of the test sentence, and reading the whole sentence in any of the major languages. In the estimate presented, reading part or reading the full sentence in any of the major languages in Nigeria are coded as literate, following again the definition used in the DHS 2003. This is different to the MICS reports, where only women who read the whole sentence are coded as literate. Moreover, all women who have attended secondary school or higher are also considered to be literate.

### Table 16: Literacy rates among females aged 15–24

| Data | DHS | MICS | DHS | MICS |
|---|---|---|---|---|
| | 2003 | 2007 | 2008 | 2011 |
| **National** | 59.1 | 65.5 | 64.3 | 72.7 |
| **North Central** | 56.7 | 65.7 | 62.3 | 72.1 |
| **North East** | 34.8 | 27.1 | 31.1 | 42.6 |
| **North West** | 27.9 | 29.2 | 29.0 | 44.5 |
| **South East** | 95.6 | 93.4 | 93.9 | 95.3 |
| **South South** | 85.9 | 88.7 | 89.1 | 95.3 |
| **South West** | 88.1 | 92.8 | 88.8 | 93.0 |
| **Sokoto** | *n.a.* | 9.0 | 11.9 | 61.9 |
| **Katsina** | *n.a.* | 10.6 | 7.2 | 42.0 |
| **Bauchi** | *n.a.* | 27.4 | 16.2 | 16.2 |
| **Niger** | *n.a.* | 41.0 | 24.8 | 38.6 |
| **Zamfara** | *n.a.* | 28.4 | 16.0 | 20.1 |

Sources: DHS 2003 microdata; MICS 2007 microdata; DHS 2008 microdata; MICS 2011 microdata. Notes: (1) Base population: women aged 15–24, non-responses due to health problems or missing language card excluded from denominator. (2) DHS and MICS record the educational level and attainment of sampled women in the household roster and in the woman's questionnaire. Discrepancies can be found in the data, indicating problems with proxy responses. The estimates presented in this section use the women datasets.

Estimates suggest a positive trend at the national level, with an increase from 59% (according to the DHS 2003) to 66% (according to the MICS 2007), with a further increase in recent years to 73% based on the MICS 2011. However, the national average estimated based on the MICS 2011 has to be considered with some caution. Estimates for some states appear to be very high, given that a considerable share of the 15–24 age group analysed in the MICS 2011 should be covered in previous surveys. For instance, literacy among young women in Sokoto can hardly have increased from 12% in 2008 to 62% in 2011. Differences in the literacy measure can stem from discrepancies in the level of education measured or the results of the literacy tests for women with less than primary education. Table 17 illustrates the contributions of test outcomes and education level to the literacy indicator in Sokoto for the two surveys. A higher percentage of young women in Sokoto have at least some secondary education according to the MICS 2011. Moreover, a much larger percentage was able to read at least part of the sentence. The latter indicates that the way the test was conducted was not fully comparable across the two surveys.

### Table 17: Components of female youth (aged 15–24) literacy indicator, Sokoto

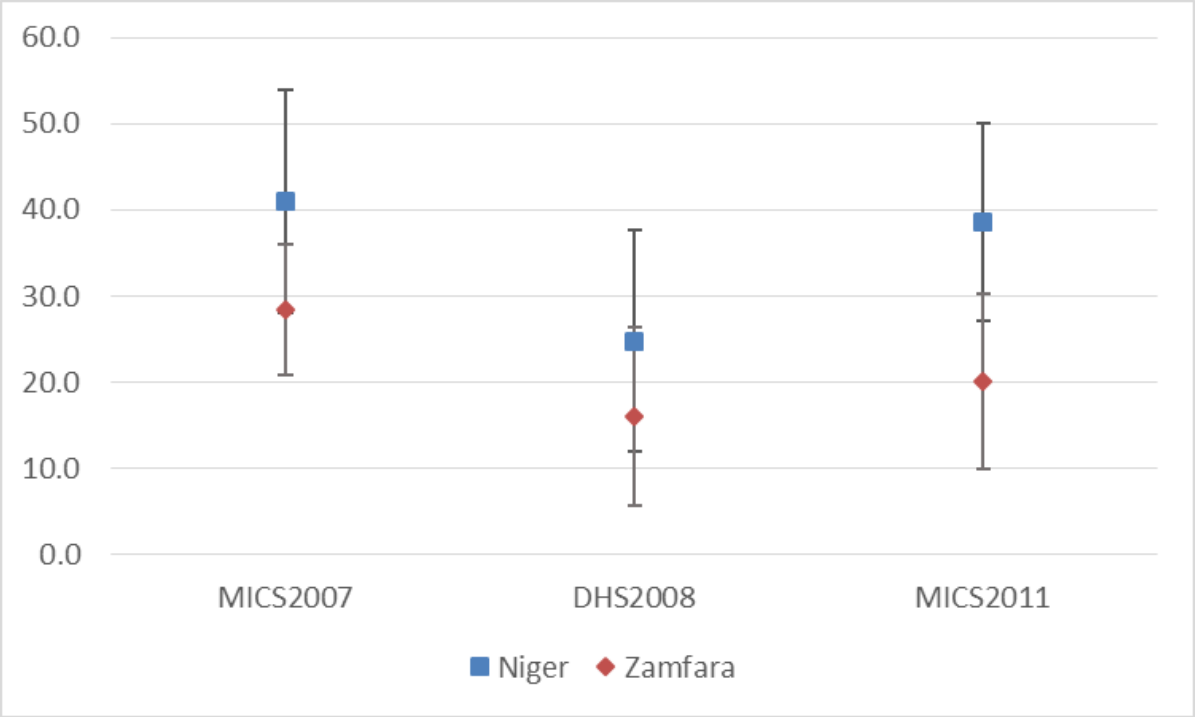
| Data | DHS | MICS |
|---|---|---|
| | 2008 | 2011 |
| **Literate** | | |
| Secondary or higher | 7.3 | 15.2 |
| Able to read part of the sentence | 2.4 | 33.1 |
| Able to read full sentence | 2.2 | 13.6 |
| **Illiterate** | | |
| Not able to read | 88.1 | 38.1 |
| **Total** | **100.0** | **100.0** |

Sources: DHS 2008 microdata; MICS 2011 microdata. Notes: (1) Base population: women aged 15–24, non-responses due to health problems or missing language card excluded from denominator. (2) DHS and MICS record the educational level and attainment of sampled women in the household roster and in the woman's questionnaire. Discrepancies can be found in the data, indicating problems with proxy responses. The estimates presented in this section use the women datasets.

A similarly large leap as for Sokoto is observed for Katsina state, with 7% of young women literate according to the DHS 2008 and 42% according to the MICS 2011. Estimates are closer for Niger and Zamfara states. The point estimates suggest higher levels of literacy based on the MICS 2007 and the MICS 2011 than the DHS 2008. As seen before in the case of attendance rates, Figure 8 shows that confidence intervals

at state level are large, at over 25 percentage points in some cases. The large confidence intervals limit the possibility of using household surveys for the evaluation of differences in educational outcomes across states and changes over time.

**Figure 8: Female literacy rates (aged 15–24) in Niger and Zamfara (MICS 2007; DHS 2008; MICS 2011)**




Sources: MICS 2007 microdata; DHS 2008 microdata; MICS 2011 microdata. Notes: (1) Base population: women aged 15–24, non-responses due to health problems or missing language card excluded from denominator. (2) DHS and MICS record the educational level and attainment of sampled women in the household roster and in the woman's questionnaire. Discrepancies can be found in the data, indicating problems with proxy responses. The estimates presented in this section use the women datasets.

# 5 Comparison of household survey and EMIS data

## 5.1 Comparison of net attendance/enrolment and GPIs

Key education indicators such as participation in schooling in the form of attendance/enrolment ratios can be computed from administrative data captured through the EMIS or from national household surveys. Survey data as a complement to EMIS data can be particularly valuable when administrative data collection is sporadic or non-standard across states or when population denominator estimates are poor, as well as if the aim is to analyse education data according to individual and household background characteristics or reasons for not attending school. As discussed in the EMIS review in the EDOREN inception report (EDOREN, 2013), annual school censuses (ASCs) in Nigeria suffer from resource constraints in terms of the collecting and processing of data, especially in GEP3 states. This said, the weaknesses in the survey data that have been discussed in the previous sections also have to be kept in mind. Differences in measurement approaches can, moreover, lead to considerable discrepancies between the two types of data sources. This section provides a preliminary comparison of indicators at state level that can be obtained from either data source. Survey data estimates are those computed from the microdata and use harmonised indicator definitions. This section first presents indicators from the surveys and the EMIS at state level, followed by a short discussion of possible reasons for discrepancies.

Table 18 compares primary school NARs at state level calculated from the MICS, DHS, HNLSS, and NEDS data with NERs retrieved from the ASC publications. At the time of writing, no published figures or population denominators could be accessed that would allow NERs to be computed for GEP3 states, except for Katsina in 2009–10 and Zamfara in 2012–13. Therefore, the states targeted by the Education Sector Support Programme in Nigeria (ESSPIN) programme have been included in addition to those in the GEP. The ASC data series for years 2009–10 to 2012–13 are complete for ESSPIN states, but there are large discrepancies between the NERs from administrative data and NARs from household surveys conducted over a similar time period. The differences are particularly pronounced for Kano, Kaduna, and Katsina, where the very high primary school participation rates suggested by the EMIS are not backed by household survey evidence. The two data sources provide a more consistent picture for Jigawa, Kwara, Enugu, and Lagos, albeit not for all years. For the majority of data points, the NERs from the EMIS exceed the NARs from survey estimates.

Year-to-year variations are, overall, lower for EMIS data than for estimates from different surveys. The only exception is Enugu, where NERs almost double between EMIS 2009–10 and EMIS 2010–11.

**Table 18: NARs from survey data and NERs from the EMIS in ESSPIN and GEP states**

| | MICS | DHS | HNLSS | NEDS | MICS | EMIS | EMIS | EMIS | EMIS |
|---|---|---|---|---|---|---|---|---|---|
| | 2007 | 2008 | 2009 | 2010 | 2011 | 2009–10 | 2010–11 | 2011–12 | 2012–13 |
| | NAR (primary school) | | | | | NER (primary school) | | | |
| **ESSPIN states** | | | | | | | | | |
| **Kano** | 39.9 | 49.0 | 32.2 | 56.7 | 54.1 | 106.2 | 106.2 | 99.0 | 113.2 |
| **Kaduna** | 65.2 | 68.5 | 50.6 | 69.8 | 69.9 | 100.0 | 104.3 | 98.4 | 108.1 |
| **Jigawa** | 42.0 | 33.3 | 25.8 | 49.9 | 42.0 | 50.6 | 52.8 | 53.5 | 53.9 |
| **Kwara** | 83.4 | 63.7 | 60.8 | 68.3 | 75.4 | 77.9 | 75.9 | 87.0 | 77.4 |
| **Enugu** | 76.7 | 69.2 | 70.1 | 76.0 | 84.1 | 48.6 | 85.7 | 83.8 | 75.5 |
| **Lagos** | 82.7 | 81.2 | 67.9 | 82.6 | 82.7 | 76.1 | 81.7 | 79.0 | 80.1 |
| **GEP states** | | | | | | | | | |
| **Sokoto** | 20.7 | 29.3 | 22.0 | 28.5 | 33.9 | n/a | n/a | n/a | n/a |
| **Katsina** | 38.6 | 37.6 | 25.1 | 45.6 | 46.5 | 1.19 | n/a | n/a | n/a |
| **Bauchi** | 8.0 | 36.6 | 27.8 | 45.1 | 35.0 | n/a | n/a | n/a | n/a |
| **Niger** | 64.6 | 40.5 | 41.0 | 46.3 | 48.8 | n/a | n/a | n/a | n/a |
| **Zamfara** | 21.8 | 18.0 | 15.3 | 26.4 | 32.7 | n/a | n/a | n/a | 53.7 |

Sources: MICS 2007 microdata; DHS 2008 microdata; HNLSS 2009 microdata; NEDS 2010 microdata; MICS 2011 microdata. Notes: (1) NARs are computed from survey data as the number of primary school-age children (6–11) attending primary school (grades 1–6) in the survey year over all primary school-age children, with a *de jure* household member definition. NERs are retrieved from the Desk Review of the EMIS in GEP and ESSPIN states (EDOREN, 2013) and from Federal Ministry of Education and UNICEF (2014) for the case of Zamfara. (2) n/a - not available to author at the time of writing.

The GPI captures gender-related differences in school participation. There is no evidence of females or males being systematically undercounted in the data sources. In Kano and Lagos, the GPI based on EMIS data suggests a more equal access to schooling for boys and girls than the indicator estimated from survey data. In most other states, however, EMIS data indicate a larger disadvantage for girls than survey data estimates. For Sokoto, where GPI estimates from survey data exhibit particularly large variations, EMIS data are more consistent with the DHS and NEDS estimates than with the MICS and the HNLSS data.

**Table 19: GPIs from survey data and from the EMIS in ESSPIN and GEP states**

| | MICS | DHS | HNLSS | NEDS | MICS | EMIS | EMIS | EMIS | EMIS |
|---|---|---|---|---|---|---|---|---|---|
| | 2007 | 2008 | 2009 | 2010 | 2011 | 2009–10 | 2010–11 | 2011–12 | 2012–13 |
| | GPI (primary school) | | | | | GPI (primary school) | | | |
| **ESSPIN states** | | | | | | | | | |
| **Kano** | 0.75 | 0.76 | 0.84 | 0.76 | 0.87 | 0.91 | 0.92 | 0.94 | 0.97 |
| **Kaduna** | 0.95 | 0.90 | 1.07 | 0.93 | 1.08 | 0.84 | 0.86 | 0.86 | 0.86 |
| **Jigawa** | 1.01 | 0.67 | 0.77 | 0.86 | 0.90 | 0.70 | 0.71 | 0.75 | 0.76 |
| **Kwara** | 0.97 | 0.98 | 0.98 | 1.05 | 1.07 | 0.91 | 0.92 | 0.93 | 0.93 |
| **Enugu** | 0.99 | 0.89 | 0.99 | 1.05 | 1.00 | 0.98 | 0.94 | 0.99 | 0.98 |
| **Lagos** | 0.99 | 0.95 | 1.00 | 0.96 | 1.00 | 1.05 | 1.02 | 0.81 | 1.02 |
| **GEP3 states** | | | | | | | | | |
| **Bauchi** | 0.59 | 0.87 | 0.95 | 0.91 | 0.83 | n/a | n/a | 0.73 | 0.75 |
| **Katsina** | 0.78 | 0.66 | 0.79 | 0.77 | 0.76 | 0.64 | n/a | 0.68 | n/a |
| **Niger** | 0.59 | 0.70 | 0.82 | 0.70 | 0.89 | 0.68 | 0.72 | n/a | n/a |
| **Sokoto** | 0.92 | 0.50 | 0.93 | 0.51 | 0.76 | 0.43 | n/a | 0.47 | 0.50 |
| **Zamfara** | 0.64 | 0.76 | 1.03 | 0.62 | 0.81 | n/a | 0.48 | 0.47 | 0.53 |

Sources: MICS 2007 microdata; DHS 2008 microdata; HNLSS 2009 microdata; NEDS 2010 microdata; MICS 2011 microdata. Notes: (1) The GPI indicator is computed from household survey data as NAR primary for females over NAR primary for males. The GPI indicators based on administrative data are retrieved from the Desk Review of the EMIS in GEP and ESSPIN states (EDOREN, 2013), and are calculated directly from ASC data for Bauchi 2011–12 and 2012–13 and Sokoto 2011–12 and 2012–13. (2) n/a – not available to author at the time of writing.

## 5.2 Discussion of possible reasons for discrepancies

There are various possible sources of discrepancies between indicator estimates from surveys and EMIS data, related to the measurement of enrolment and attendance as well as the coverage of different types of schools.

**Enrolment versus attendance (the numerator in NER/NAR):** ASCs measure enrolment as reported by the schools while the surveys examined in this comparison ask household heads or parents whether children living in the household are actually attending school. Most survey questions refer to attendance at any point in time during the academic year instead of attendance at the time of the survey, reducing the effect of dropouts when the survey takes place later in the academic year. Nevertheless, students who are enrolled but do not attend school in a given year will not be captured by household surveys. Also, while more and more common, not all household surveys refer to a specific academic year (e.g. 2008–09). If the data collection spans several academic years, the resulting 'blended' NAR might differ from the NER capturing a single academic year.

At the same time, misreporting of enrolment may occur in ASCs, especially if there is an incentive structure to inflate the number of pupils. Enrolment is also overestimated if children are enrolled in more than one school. The findings are in line with this reasoning, as NER estimates generally exceed NAR estimates.

**Estimates of school-age population (the denominator in NER/NAR):** Discrepancies can also be due to the denominator rather than the numerator. Household surveys collect data on children who attend school, but also on children who are out of school in a given survey year. The denominator of all children aged 6–11 can be computed directly from the survey data. Administrative data are only available for children who are enrolled. The denominator has to be based on other data sources, and often needs to be estimated. In the case of Nigeria, the population census from 2006 provides the baseline data for population denominators, but projections for subsequent years rely on strong assumptions regarding population growth rates. The use of estimated population growth rates for denominators is another factor explaining why the NERs from EMIS data exceed the theoretical maximum of one for several states, while NARs have, by definition, an upper bound of one.

Moreover, as private schools tend to be less well captured in school censuses, denominators have to be adjusted accordingly. Without information on the proportion of children in and out of school likely to attend private rather than public schools, this adjustment is again based on estimates.

**Which school types are captured**: In most of the surveys examined for this comparison, no distinction is made between different school types. The instrument enquires more generally as to whether the child 'attended school at any time during the [school year]' (DHS 2008). An exception is the NEDS, which distinguishes between formal schooling (including religious schools that teach academic subjects such as Mathematics and English) and religious schools that do not satisfy this criterion, and also asks about private/public schooling. For NEDS, attendance is limited to formal schooling, but includes both government and private schools.

**Standardised versus non-standardised GPI:** The GPI based on EMIS data is computed as the number of girls enrolled divided by the number of boys enrolled in primary school. The standardised survey-based indicator is defined as NAR for females over NAR for males. Discrepancies between the two indicators only arise if there are more males or females in the school-age population.

The issues discussed relate to general differences between enrolment and attendance measures and the types of schools captured in administrative and survey data. Reasons for variations at state level with larger gaps for some and more consistent information across data sources for other states are difficult to assess without a full understanding of the ASC data collection processes on the one hand and survey design and fieldwork specificities on the other.

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