



Report to

The United Nations Children's Fund, Zimbabwe

From

The Australian Council *for* Educational Research

In collaboration with the Zimbabwe Schools Examination Council

# Zimbabwe Early Learning Assessment (ETF program) Base-line Study

April 2013



## Abstract

The Zimbabwe Education Transition Fund (ETF) program is a four-year project currently being undertaken by the United Nations Children's Fund (UNICEF). The ETF program provides essential material resources and support for the systems and structures designed to increase access to quality education for all Zimbabwean children. The ETF gives special attention to the most vulnerable children.

The Zimbabwe Early Learning Assessment (ZELA) project aims to improve Zimbabwe's system of pupil learning assessment. It does this by introducing an early-grades learning assessment as a base-line for determining whether the EFT program (2010–2015) has worked. This includes producing positive outcomes for children, their care-givers, schools, and the education sector in general. The base-line is a measure of pupil performance in language and mathematics. Additional information collected by ZELA, needed to most fully understand these baseline measures and the program's impact include: pupil background characteristics, teaching resources, and funding and facilities.

The tools developed so far in the project provide a blue-print for monitoring and evaluation of the ETF program across the program's lifecycle. The blue print's key measure is the extent of improvement in pupil learning outcomes. The extent of this improvement will be measured in scores on tests of language and mathematics in the early years of schooling.

UNICEF contracted the Australian Council for Educational Research (ACER) to undertake this base-line study in 2011.

The activities associated with the base-line study were undertaken in collaboration with the Zimbabwe Schools Examination Council (ZimSEC), and incorporated training in order to enhance national capacity in pupil assessment.

This report was prepared by Dr Rachel Outhred and Dr Gabrielle Matters. It records details of the activities undertaken by the ZELA Project Team, which included other key staff at ACER and ZIMSEC– including but not limited to Timothy Chiwiye, Francis Chirume, Ebba Masiri, Collet Mpofo, Catherine Stubberfield, Dr Khoo Siek Toon, Daniel Urbach, Martin Murphy, Chris Freeman, Dr Petra Leitz and Adrian Beavis. Dr Gerald Elsworth of Deakin University Melbourne undertook the multilevel analyses.

## Abbreviations and acronyms

|        |   |
|--------|---|
| ACER   | Australian Council for Educational Research                             |
| ADEA   | Association for the Development of Education in Africa                  |
| ALA    | Annual Literacy Assessment  |
| ARG    | Assessment Reform Group   |
| ASER   | Status of Education Report  |
| BEGE   | Basic Education and Gender Equality                                     |
| BESO   | Basic Education System Overhaul   |
| ECD    | Early Childhood Development   |
| EFA    | Education for All   |
| EGLALN | Early-Grade Learning Assessment Literacy Numeracy                       |
| EGRA   | Early Grade Reading Assessments   |
| ENLA   | Ethiopia National Learning Assessment                                   |
| ETF    | Education Transition Fund   |
| GCSE   | General Certificate of Secondary Education                              |
| ICC    | Item Characteristic Curve   |
| IEA    | International Association for the Evaluation of Educational Achievement |
| IIEP   | International Institute for Educational Planning                        |
| IRT    | Item Response Theory  |
| MC     | Multiple Choice   |
| MDG    | Millennium Development Goal   |
| MLA    | Monitoring Learning Achievement   |
| NAEP   | National Assessment of Educational Progress                             |
| NAPLAN | National Assessment Program – Literacy and Numeracy                     |
| NGO    | Non-Government Organization   |
| NLA    | National Learning Assessment  |
| OECD   | Organization for Economic Cooperation and Development                   |
| OVC    | Orphans and Vulnerable Children   |
| PASEC  | Programme d'Analyse des Systèmes Educatifs des Pays de la Confemen      |
| PD     | Professional Development  |
| PISA   | Programme for International Student Assessment                          |
| QAO    | Quality Assurance Officer   |
| SACMEQ | Southern Africa Consortium for Monitoring Educational Quality           |
| SICME  | Sistema de Medición de Calidad de la Educación                          |
| SIP    | School Improvement Program  |
| TDP    | Teacher Development Program   |

|        |  |
|--------|--|
| TIMSS  | Trends in Mathematics and Science Study                          |
| UNESCO | United Nations Educational, Scientific and Cultural Organization |
| UNICEF | United Nations Children's Fund                                   |
| ZELA   | Zimbabwe Early Learning Assessment                               |
| ZimSEC | Zimbabwe Schools Examination Council                             |
| ZimVAC | Zimbabwe Vulnerability Assessment Committee                      |
| ZPR    | ZELA Psychometrics Report  |

## Contents

|   |    |
|---|----|
| Executive Summary .....   | 12 |
| Chapter 1 Education Transition Fund and the Right to Education.....                         | 15 |
| Millennium Development Goals .....  | 15 |
| The Need for an Early Learning Assessment .....   | 16 |
| Scope of the study .....  | 17 |
| Supporting national capacity.....   | 19 |
| The implementation of the study over time .....   | 19 |
| Limitations of the study .....  | 19 |
| Summary of Chapters.....  | 19 |
| Chapter 2 Literature review: National assessment.....                                       | 21 |
| National assessment defined.....  | 21 |
| Two basic models of national assessment.....  | 22 |
| Six differences in the two basic models of national assessment .....                        | 22 |
| National assessment programs in Africa.....   | 23 |
| Monitoring Learning Achievement .....   | 23 |
| Southern Africa Consortium for Monitoring Educational Quality .....                         | 24 |
| Programme d’Analyse des Systèmes Educatifs des Pays de la Confemen .....                    | 25 |
| Other national assessment programs in Africa .....  | 25 |
| The impact of national assessments in Africa.....   | 27 |
| National assessment programs outside Africa.....  | 28 |
| Early Grade Reading Assessments (EGRA) .....  | 28 |
| Status of Education Report (ASER).....  | 29 |
| Sistema de Medición de Calidad de la Educación (SICME) .....                                | 29 |
| National Assessment Program – Literacy and Numeracy (NAPLAN), Australia.....                | 29 |
| International surveys.....  | 30 |
| Programme for International Student Assessment (PISA).....                                  | 30 |
| Trends in International Mathematics and Science Study .....                                 | 31 |
| Progress in International Reading Literacy Study.....                                       | 31 |
| Comparison of national assessment programs.....   | 32 |
| Chapter 3 Theoretical framework .....   | 33 |
| Chapter 4 – How do the Zimbabwe pupils perform in the language and mathematics tests? ..... | 36 |

|   |    |
|---|----|
| Sub-group differences in English and Mathematics .....  | 36 |
| Gender .....  | 36 |
| Location.....   | 36 |
| Age.....  | 36 |
| Province .....  | 36 |
| Gender differences by province.....   | 37 |
| Proportion of pupils at, above and below the grade level benchmarks .....   | 39 |
| Achieving at a level .....  | 39 |
| Setting the levels .....  | 39 |
| Proportion of pupils achieving below, at and above the grade-appropriate level in English ...                         | 41 |
| Proportion of pupils below, at and above the grade level benchmarks for mathematics .....                             | 43 |
| Proportion of pupils below, at and above the grade level benchmarks in the African languages?.....                    | 44 |
| Targets .....   | 44 |
| Conclusions .....   | 45 |
| <br>  |    |
| Chapter 5 Predictors of performance on tests of language and mathematics at the beginning of Grade 3 in Zimbabwe..... | 46 |
| Pupil background characteristics .....  | 46 |
| Language of instruction and language spoken at home .....   | 47 |
| Number of books in the home .....   | 48 |
| Time spent working for the family .....   | 49 |
| The number of meals a day.....  | 50 |
| Whether the pupil attended an early Childhood Development Class.....  | 51 |
| Parental education levels .....   | 52 |
| The association between pupil background variables and achievement in English and mathematics.....                    | 54 |
| Teacher and teaching resources .....  | 54 |
| School resources.....   | 55 |
| Linking comment.....  | 55 |
| <br>  |    |
| Chapter 6 To what extent can improvement in test performance be attributed to the Education Transition Fund? .....    | 56 |
| Linking the data .....  | 56 |
| Possible influences on pupil performance.....   | 56 |
| Analysis .....  | 57 |
| Conclusions .....   | 61 |

|  |     |
|--|-----|
| References.....  | 62  |
| Appendix 1: National assessment programs .....                   | 65  |
| Appendix 2: Guides for parents, head teachers, and teachers..... | 69  |
| Appendix 3: Test Specifications .....                            | 82  |
| Appendix 4 Method .....  | 85  |
| Sampling.....  | 85  |
| Instrumentation .....  | 88  |
| Multiple-Choice Tests .....                                      | 88  |
| Test development.....  | 89  |
| Questionnaires .....   | 91  |
| Training .....   | 92  |
| Test Preparation and Administration .....                        | 92  |
| School visits .....  | 92  |
| Post-test Operations.....  | 93  |
| QAO report analysis .....  | 93  |
| Data analysis techniques.....                                    | 94  |
| Appendix 5 Results of the Questionnaires .....                   | 95  |
| Background.....  | 95  |
| Sampling .....   | 95  |
| The questionnaires.....  | 95  |
| Children out of school.....                                      | 96  |
| Access to Resources .....  | 96  |
| Books in the home and textbooks at the school .....              | 96  |
| Exposure to Early Childhood Development.....                     | 98  |
| Study Materials and Facilities.....                              | 98  |
| Home and Family.....   | 98  |
| Meals per day.....   | 98  |
| Hours Working for Family .....                                   | 99  |
| Parental Education .....   | 100 |
| Other information.....   | 100 |
| Language .....   | 100 |
| Pupil absence from school .....                                  | 101 |

|   |     |
|---|-----|
| School Characteristics .....                    | 101 |
| Sector .....                                    | 101 |
| School location .....                           | 102 |
| Length and number of classes .....              | 103 |
| Facilities .....                                | 103 |
| Funding .....                                   | 104 |
| Proportion of permanent teachers on staff ..... | 105 |
| Teacher qualifications.....                     | 105 |
| School days lost .....                          | 105 |
| Teacher days lost .....                         | 105 |
| Professional development .....                  | 105 |
| Characteristics of the pupil population.....    | 106 |

## List of figures and tables

|  |     |
|--|-----|
| Figure 1 Input–process–output model for pupil data   | 33  |
| Figure 2 English scale score (ESS) means, by province and gender   | 37  |
| Figure 3 Mathematics scale score (ESS) means, by province and gender   | 38  |
| Figure 4 Ndebele scale score (ESS) means, by province and gender   | 38  |
| Figure 5 Shona scale score (ESS) means, by province and gender   | 39  |
| Figure 6 Distribution of Grade 3 pupils achieving below, at and above a grade-appropriate level in English in 2012   | 42  |
| Figure 7 Distribution of Grade 3 test scores in mathematics, showing the zones for achieving below, at and above a grade-appropriate level, 2012   | 43  |
| Figure 8 Average English achievement score for different language groups showing differences between those pupils whose language of instruction is or is not the same as the language they speak at home | 47  |
| Figure 9 Average English achievement score according to home many books at home  | 48  |
| Figure 10 Average English achievement score according to the amount of time spent working for the family each day  | 49  |
| Figure 11 Average mathematics achievement score according to the number of meals each day  | 50  |
| Figure 12 Average mathematics achievement score according to whether pupils were enrolled in an early Childhood Development Class  | 51  |
| Figure 13 Average mathematics achievement score according to mother’s highest level of education   | 52  |
| Figure 14 Average mathematics achievement score according to father’s highest level of education   | 53  |
| Figure 15 Average English achievement level by school budget per student   | 55  |
| Figure 16 Possible influences on pupil performance   | 56  |
| Figure 17 Map of Zimbabwe with provinces   | 85  |
| Figure 18 Distribution of the number of textbooks per pupil (showing full distribution and the distribution for schools with 20 or less textbooks per pupil)   | 97  |
| Figure 19: Average number of meals pupils have per day, by Province  | 99  |
| Figure 20 Number of days absent since returning to school this term (pupils with no days absent are excluded)  | 101 |
| Figure 21 Distance of schools from District Centre (km)  | 102 |
| Figure 22 Average number of permanent classrooms comparing Satellite with other schools (showing 95% confidence intervals)   | 103 |

|  |     |
|--|-----|
| Figure 23 Distribution of schools according to the proportion of open air classrooms   | 104 |
| Figure 24 Distribution of annual budgets for all schools, schools with an annual budget less than \$200,000 and less than \$50,000 | 104 |
| Figure 25 Distribution of the proportion of teachers attending professional development over the previous three months             | 106 |
| Figure 26 Average proportion of pupils in fee arrears by province (showing the overall mean and 95% confidence intervals)          | 107 |
| Figure 27 Percent of pupils in fee arrears by school type  | 107 |
| Table 1 The proportion of pupils below, at and above the grade level benchmark for English and mathematics                         | 13  |
| Table 2 Location of the base-line study within the wider evaluation  | 19  |
| Table 3 Datasets – Input for Zimbabwe Study  | 34  |
| Table 4 Datasets – Output for Zimbabwe study   | 35  |
| Table 5 Summary statistics showing scores in English and Mathematics for boys and girls  | 36  |
| Table 6 Summary statistics showing scores in English and Mathematics for rural and urban pupils                                    | 36  |
| Table 7 The proportion of pupils below, at and above the grade level benchmark for English   | 41  |
| Table 8 The proportion of pupils below, at and above the grade level benchmark for mathematics                                     | 43  |
| Table 9 Targets percentage of pupils achieving at or above the grade-appropriate level 2012 - 2016                                 | 44  |
| Table 10 Correlations between various pupil background variables   | 54  |
| Table 11 Model estimates for English performance   | 59  |
| Table 12 Model estimates for Mathematics performance   | 60  |
| Table 13 Classification of six national assessment programs on eight dimensions  | 65  |
| Table 14 Five national assessments that relate to grades 2/3   | 67  |
| Table 15 History of selected national and international assessments  | 68  |
| Table 16 Location of ZELA within the analytic framework used in this review  | 68  |
| Table 17 Population compared with sample, by school type   | 86  |
| Table 18 Population compared with sample, by province  | 86  |
| Table 19 Population compared with sample, by province for Registered schools only  | 87  |
| Table 20 Population compared with sample, by province for Satellite schools only   | 87  |
| Table 21 Population compared with sample, by school type and urban/rural status  | 88  |

|   |     |
|---|-----|
| Table 22 Extract from test construction grid, English   | 90  |
| Table 23 Extract from test construction grid, Mathematics                                       | 90  |
| Table 24 Hours worked for the family  | 99  |
| Table 25 Distribution of the highest level of parental education completed                      | 100 |
| Table 26 Distribution of schools across sectors   | 102 |
| Table 27 Summary statistics for the proportion of pupils who are orphans or vulnerable children | 108 |

## Executive Summary

The Zimbabwe Early Learning Assessment (ZELA) Education Transition Fund (ETF) program is a four-year project commissioned by the United Nations Children's Fund (UNICEF) to support and enhance national capacity to review, reform, and re-orientate the current system of pupil assessment in Zimbabwe and to establish a baseline for determining whether the ETF program (2010–2015) has the desired effects on children, their care-givers, schools, and the education sector in general, as well as to identify the extent to which changes identified are attributable to the ETF program interventions.

In 2010 UNICEF and its partners supplied all Zimbabwean schools with resources as part of the ETF, aimed at attaining quality education and access for all. The intervention includes the provision of textbooks and the establishment of supporting infrastructure relating to the use of these books in schools. It was noted in 2011 that test scores on the Zimbabwe Early Learning Assessment (ZELA) would be used to identify the extent to which changes in test scores over time are attributable to the ETF program.

This report relates to Phase One of the ETF Learning Assessment Study and Evaluation. This phase is concerned with establishing the baseline data and information for the evaluation of the ETF program. UNICEF contracted ACER to undertake the study in 2012.

The major research questions for the study are:

1. How do the Zimbabwe pupils perform in the language and mathematics tests? Closely related to this is the question: Is there a noticeable pattern of change over time?
2. What are the relationships of the following groups of variables with performance on tests of language and mathematics at the beginning of Grade 3 in Zimbabwe?
  - Pupil background characteristics
  - Teacher and teaching resources
  - School funding and facilities
3. To what extent can improvement in test performance be attributed to the Education Transition Fund?

### Sample and Data Collection

The target population was pupils in Grade 3 in Zimbabwe. A representative sample was drawn which yielded approximately 16,500 pupils in approximately 500 schools across the ten provinces of Zimbabwe. 24% of sampled schools were satellite schools.

Four ZELA tests were administered, namely English, Ndebele, Shona and Mathematics, each containing 40 questions.

Responses to the Pupil Questionnaire, which contained 14 questions, were collected from 16,437 Grade 3 pupils. Responses to the School Head Questionnaire, which contained 31 questions, were collected from 419 School Heads (or their delegates).

## ZELA Tests

A single scale aligning the abilities of pupils with the difficulties of the items was constructed for each ZELA test (namely English, Ndebele, Shona and Mathematics) after thorough test-by-test analyses.

The reliabilities of each test were found to be high ranging from 0.86 to 0.91.

For each scale (English, Ndebele, Shona and Mathematics), the distribution of pupil abilities in ZELA 2012 was transformed to a scale with a mean of 300 and a standard deviation of 25.

### Findings:

*How do the Zimbabwe pupils perform in the language and mathematics tests? Closely related to this is the question: Is there a noticeable pattern of change over time?*

It was found that for English, 53.2 per cent of pupils were below the grade level benchmark, and that for mathematics it was 54.8 percent. Table 1 shows the full information.

**Table 1 The proportion of pupils below, at and above the grade level benchmark for English and mathematics**

|                   | English | Mathematics |
|-------------------|---------|-------------|
| Below grade level | 53.2    | 54.8        |
| At grade level    | 37.6    | 36.8        |
| Above grade level | 9.2     | 8.4         |

For the African languages that were used in the tests, it was found that;

- 62.4 per cent of the 10 184 pupils who completed Shona tests were achieving at or above the grade-appropriate level in Shona after completing Grade 2 in Zimbabwe
- 59.8 per cent of the 2 803 pupils who completed Ndebele tests were achieving at or above the grade-appropriate level in Ndebele after completing Grade 2 in Zimbabwe.

Other finding included;

- Girls slightly outperformed the boys in all four subjects; however, this difference was small.
- Urban pupils performed better than rural pupils in all four subjects.
- Pupils from satellite schools performed worse than pupils from non-satellite schools in all four subjects. .
- There was little to no difference in pupil performance by age group in all four subjects.
- The differences in performance of pupils by province further highlighted the differences between pupils from urban and rural regions. The differences were similar for all four subjects.

*What are the relationships of various variables with performance on tests of language and mathematics at the beginning of Grade 3 in Zimbabwe?*

Of a range of pupil background characteristics that were investigated, parental education (and in particular, the mother's education) was found to be one of the strongest predictors of pupil

achievement levels. The number of books in the home – probably an indicator of socio-economic status of the family – was the strongest predictor.

There were only weak associations between teacher characteristics and the level of teaching resources and pupil achievement. Similarly, there were only weak associations with levels of school funding and school resources and pupil achievement.

*To what extent can improvement in test performance be attributed to the Education Transition Fund?*

As this report is based on baseline data, it is premature to seek to address the question of the extent to which the ETF can be linked to improved test performance by pupils. A preliminary multilevel model of the data indicates, however, that there is scope for the program to have an effect on achievement levels of pupils.

## Chapter 1 Education Transition Fund and the Right to Education

Basic Education and Gender Equality (BEGE) is a key focus within UNICEF's Medium-Term Strategic Plan, which outlines UNICEF's contributions to the Millennium Development Goals (MDGs). Since 1946, UNICEF has worked to ensure the rights of all children and, guided by the Convention on the Rights of the Child, the Millennium Declaration and Education for All, this has included the right to education.

Following the Universal Declaration of Human Rights, the first critical international human rights legislation, subsequent Conventions and Covenants addressing human rights created a language of cross-cultural objectives characterising just societies as those morally committed to “dignity, equality, bodily inviolability, and freedom”.<sup>1</sup> The Vienna Declaration states on numerous occasions that “[a]ll human rights are universal, indivisible, interdependent and interrelated”.<sup>2</sup>

Article 28 of the Convention on the Rights of the Child 1990 acknowledges that State Parties recognise the right of the child to education on the basis of equal opportunity. Adopted by world leaders in the year 2000 and set to be achieved by 2015, the MDGs provide a framework for the entire international community to work together towards a common end – making sure that human development reaches everyone, everywhere.

### Millennium Development Goals

There are eight MDGs. These eight goals, in turn, break down into 21 quantifiable targets that are measured by 60 indicators. For example, Target 2a is to ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling. This is to be measured by:

- Net enrolment ratio in primary education
- Proportion of pupils starting grade 1 who reach last the grade of primary school
- Literacy rate of 15-24 year-olds, women and men.

Two aspects of the 21 targets in the MDGs are particularly relevant to this study because they relate to the source of the greatest education gaps in Sub-Saharan Africa and South Asia – literacy and gender differences. These are Target 2A (see above) and Target 3A. This target is to eliminate gender disparity in primary and secondary education preferably by 2005, and at all levels by 2015. It is measured by:

- Ratios of girls to boys in primary, secondary and tertiary education
- Share of women in wage employment in the non-agricultural sector
- Proportion of seats held by women in national parliament.

At the World Education Forum in Dakar in 2000, 164 governments pledged to achieve the target of education for all children, youth and adults. Education for All (EFA) is to be achieved through six

<sup>1</sup> Schaffer and Smith, 2004. *Human Rights and Narrated Lives, the Ethics of Recognition*. Published by Palgrave Macmillan, p. 2

<sup>2</sup> Moon, Ed. 1996, p. 37

goals including expanding and improving early childhood education, ensuring that by 2015 all children have access to, and complete, primary education of good quality, ensuring that the learning needs of all young people and adults are met through equitable access to appropriate learning and life-skills programs, achieving 50 per cent improvement in levels of adult literacy by 2015, achieving gender equality in education by 2015, and improving all aspects of the quality of education.

The UNICEF Basic Education and Gender Equality (BEGE) Focus Area supports national capacity to improve children's developmental readiness, reduce disparities in education, improve educational quality, retention, completion and achievement, and restore education in emergencies and post-conflict situations.

UNICEF's 'leadership agenda for equity' sharpens the strategic focus of its programs and policies to place an even greater emphasis on the most disadvantaged children, through supporting national capacity for scaling-up interventions, providing technical and programmatic guidance and engaging in strategic partnerships and policy dialogue.

In partnership with national governments, civil society actors, and other development partners, the Education Section maintains a commitment to work towards the provision of quality basic education for all children globally, and to enhance support for education for marginalized groups, including girls, who endure multiple social and educational inequalities.

### The Need for an Early Learning Assessment

After Zimbabwe regained its independence in April 1980, the Government of Zimbabwe expanded access to primary school education, more than doubling the number of primary school enrolments in seven years.<sup>3</sup> By 1982, primary enrolment rates were at almost 100 per cent.<sup>4</sup> Between 1982 and 2004, enrolment rates decreased and, in 2008, the provision of education services deteriorated dramatically. Reasons for the near collapse of the system over the years 2008–2010 were not only political (the elections) but also underfunding, low levels of teacher remuneration, and low levels of teacher and pupil morale. During this time school attendance fell to around 20 per cent,<sup>5</sup> with about 40 per cent of the country's teachers attending lessons.<sup>6</sup>

Since this time the sector has begun to recover, with education being a key sector in the new government's Short-Term Emergency Recovery Program.<sup>7</sup> The sector's staffing situation has begun to stabilise<sup>8</sup> and there is some evidence to suggest that the sector is becoming more equitable.<sup>9,10</sup>

In 2010 UNICEF and its partners supplied all Zimbabwean schools with valuable resources, such as textbooks, as part of the ETF, aimed at attaining quality education and access for all.

<sup>3</sup> *Zimbabwe Since Independence: A People's Assessment*. Nyanguru and Peil. African Affairs, 1991, 90, 607–620

<sup>4</sup> *Education Statistics: Zimbabwe*. UNICEF Division of Policy and Practice, Statistics and Monitoring Section, 2008

<sup>5</sup> Summary of Cost and Financing of the Education Sector in Zimbabwe, February 2010

<sup>6</sup> UNICEF Press Centre. 8 October 2008. Accessed at [www.unicef.org/media/on\\_4\\_August\\_2011](http://www.unicef.org/media/on_4_August_2011)

<sup>7</sup> Summary of Cost and Financing of the Education Sector in Zimbabwe, February 2010

<sup>8</sup> Summary of Cost and Financing of the Education Sector in Zimbabwe, February 2010

<sup>9</sup> Summary of Cost and Financing of the Education Sector in Zimbabwe, February 2010

<sup>10</sup> 'During the 1980s to 1990s funding of the school system in Zimbabwe was highly inequitable, however since richer parents now tend to send their children to private schools, public funding for education has probably become increasingly pro-poor.' Ibid.

Significant concerns, however, remain about the provision of quality education for primary school children in Zimbabwe. The Demographic and Health Survey (DHS) statistics indicate that the nation's rural and poor citizens are substantially overrepresented in drop-out rates and repetition rates,<sup>11</sup> 'O' level pass rates are still extremely low,<sup>12</sup> and there remains limited access to important material and non-material resources that support teaching and learning.<sup>13</sup>

The ZELA project aims to monitor and evaluate the effects of the ETF through the introduction of an early-grade-learning assessment in language and mathematics (not just numeracy). It does this by first establishing a set of base-line measures of pupil performance in language and mathematics. In order to control for factors that may influence this performance, data was also collected on pupil background characteristics, teaching resources, and funding and facilities.

The tools developed for the ZELA project will provide a blue-print for monitoring and evaluation of the ETF program across the program's lifecycle. The key measure of quality to be used in the monitoring and evaluation of the ETF is the extent of improvement in pupil learning outcomes (as measured by scores on a test of Language and Mathematics in the early years of schooling). Other measures will include examination of the extent to which schools are equally effective at producing these improvements, and the extent to which the social background of pupils and their communities shapes them.

### Scope of the study

The major research questions for the study are:

1. How do the Zimbabwe pupils perform in the language and mathematics tests? Closely related to this is the question: Is there a noticeable pattern of change over time?
2. What are the relationships of the following groups of variables with performance on tests of language and mathematics at the beginning of Grade 3 in Zimbabwe?
  - Pupil background characteristics
  - Teacher and teaching resources
  - School funding and facilities
3. To what extent can improvement in test performance be attributed to the Education Transition Fund? Addressing this question will need to take account of different levels of other resources and facilities in the schools.

A subset of these research questions relates to the base-line study, the focus of this report. The questions that the current study aims to answer are:

- How do early-grade Zimbabwe pupils perform in tests of language and mathematics?
- Is it possible to identify pupil-level and school-level variables that influence test performance?

In order to answer these questions, the following was done:

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11 Education Statistics: Zimbabwe. UNICEF Division of Policy and Practice, Statistics and Monitoring Section, 2008

12 Education at a Glance 2009. Zimbabwe Ministry of Education, Sport, Arts & Culture

13 Summary of Cost and Financing of the Education Sector in Zimbabwe, February 2010

- There was a review of the literature on international experience in national assessment with particular emphasis on Africa. This was done in order to ensure that the project worked with the latest and best information for implementing the project.
- A representative sample of Grade 3 pupils from schools across the ten provinces of Zimbabwe was drawn. This sampling strategy allows the study to generalise to the population of all Grade 3 pupils in Zimbabwe.
- The key components of the “ZELA 2012 Tool” – the tests of pupil performance – were identified and defined.
- Tests of Mathematics, English, Ndebele, and Shona were developed and administered.
- Security procedures surrounding test development, printing, administration and marking were developed and implemented.
- A School Head Questionnaire was developed and administered. This was designed to collect information about the school and the teachers at the school.
- A Pupil Questionnaire was developed and administered. This was designed to collection information about the pupil's family background so that their achievement levels could be more fully understood.
- A manual for school administrators was developed to ensure the tests were administered consistently and appropriately.
- School administrators were trained to ensure that they fully understood test protocols and the reasons for them.
- Quality Assurance Officers (QAOs) were appointed and trained. These officers were important for ensuring that the quality of the data was protected at key stages during their collection and processing.
- Training manual for school administrators to QAOs were produced. These provided guidelines for quality assurance practices as well as being the basis for their feedback to ACER on the conduct of the tests
- Visits to schools by ACER staff and QAOs were conducted as part of the quality assurance for the study
- Guides to school heads, teachers and parents were developed and dispatched.
- Procedures for data capture – that is, moving the information from the completed test forms and questionnaires to an electronic format.
- Data entry (in Zimbabwe) and data cleaning (in Australia)

At this point the data analysis and report writing commenced. Subsequently, a standard settings exercise was undertaken, and the results of this was incorporated into the report.

## Supporting national capacity

Activities associated with the base-line study were undertaken in collaboration with ZimSEC and incorporated incidental training in order to enhance national capacity in pupil assessment.

## The implementation of the study over time

The progression of cohorts of pupils being surveyed is summarised in Table 2. The number in parenthesis refers to the order of the test cycles over the duration of the evaluation.

**Table 2 Location of the base-line study within the wider evaluation**

| 2010        | 2012                             | 2013                             | 2014                             | 2015                             |
|-------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| Grade 2 (1) | Grade 2 (2)                      | Grade 2 (3)                      |                                  |                                  |
| EGLALN      | Grade 3<br>1 <sup>st</sup> cycle | Grade 3<br>2 <sup>nd</sup> cycle | Grade 3<br>3 <sup>rd</sup> cycle | Grade 3<br>4 <sup>th</sup> cycle |
| NA          | Base-line                        | Monitoring                       | Monitoring                       | Evaluation                       |

## Limitations of the study

The mathematics test was set in English and attempts were made to minimise the reading load on pupils. Nevertheless, it can be expected that mathematics is not the only construct being assessed, and that an irrelevant construct (such as reading comprehension) is also present in the mathematics tests. This phenomenon will occur in tests of mathematics that are set for pupils for whom English is their first (in some cases, only) language. Its effect will probably be stronger in a test of mathematics set for pupils for whom English is their second language.

The administration of ZELA 2012 was at the beginning of Grade 3 rather than at the end of Grade 2, and the test was curriculum-based. While the test developers aimed to use curriculum-appropriate content, and to pitch the test at the appropriate level for the pupils with respect to item difficulty, setting the test at the start of the school year has limitations. Pupils tend to regress in their achievement levels over holiday periods. They are not well established in the school routine and learning and so testing may not be undertaken in stable settings, which may impact on performance. Quite where to pitch the level of the tests, and what curriculum to reference is thus made more difficult.

## Summary of Chapters

Chapter 2 defines the notion of 'national assessment' and reviews the literature on the basic models of national assessment, national assessment procedures and national assessment programs in Africa and elsewhere.

Chapter 3 provides a brief account of the theoretical framework used by the study.

Chapter 4 addresses the first research question *How do the Zimbabwean pupils perform in the language and mathematics tests?*

Chapter 5 addresses the second research question: *What are the relationships between a range of variables with performance on tests of language and mathematics at the beginning of Grade 3 in Zimbabwe?*

Chapter 6 reports on the multilevel modelling that was applied to data from the tests and the questionnaires.

## Chapter 2 Literature review: National assessment

National assessment is the area of assessment that has received the most attention in the context of improving the quality of education. There is an increased interest in the role large-scale assessment programs can play as agents of reform and accountability. More and more education systems around the world have adopted national or system-wide testing programs to gather data that would provide an indication of the “health” of the education system. System-wide testing has become an important feature of the quality assurance frameworks of the education systems throughout Africa, the UK and the US.

The purpose of the review reported here is to draw upon international experience in national assessment. The review has a particular emphasis on Africa. It informed the development of the tests and questionnaires, and the conduct of the project.

This chapter begins by considering the meaning of the term 'national assessment'. It then considers two basic models of national assessment, followed by a more detailed examination of national assessments made in Africa. Next, it briefly considers national assessments outside of Africa, and concludes by discussing surveys that have been conducted in conjunction with national assessments.

### National assessment defined

For the purposes of this study, the notion of national assessment is defined, following Greaney & Kellaghan (2008) as:

... an exercise designed to describe the level of achievement, not of individual pupils, but of a whole education system or a clearly defined part of the system .

National (or system-level) assessments may have the following purposes:

- to determine how well pupils are learning in the education system as a whole
- to identify strengths and weaknesses in pupils' knowledge and skills
- to determine if the education system is under-serving any particular group(s) (e.g., boys or girls; language or ethnic groups; pupils in different types of school; pupils in different administrative or geographical locations)
- to identify factors associated with pupil achievement
- to monitor achievements in the education system over time
- in the case of international assessments, to provide comparative data on pupil achievements in two or more education systems. <sup>14</sup>

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<sup>14</sup> The World Bank (2011)

## Two basic models of national assessment

There are two basic models of national or system-wide assessment, both of which have changed in a number of ways over the years (Daugherty, 1997). One is derived from the US National Assessment of Educational Progress (NAEP). NAEP was introduced in 1969 and was redesigned in the early 1980s to allow the tracking of a cohort of pupils, in addition to measuring the level of pupils at a point in time. The other basic model is derived from the UK of assessment that was introduced with the National Curriculum in 1988.

Both models seek to obtain empirical data that can be interpreted as indicative of learning in specific curriculum areas at clearly identified levels of the education system. They differ, however, in a number of important respects, and these differences have implication for interpretation, impact, and cost. In the discussion below each of these six differences is defined in terms of the UK and US models.

### Six differences in the two basic models of national assessment

Six differences in national assessment models can be identified: (1) test population, (2) degree of standardization of the assessment, (3) allocation of tasks or items to pupils, (4) recipients of information about pupil performance, (5) comparisons over time, and (6) effects on teaching and learning. The following descriptions are drawn from Kellaghan and Greaney (2004).

#### *Test population*

The US model uses a sample of schools pupils, whereas in the UK all pupils at the relevant age-level participate in a census collection. Most assessments across the world are based on a sample of schools and pupils (as in the US), but in some countries, including Chile and France, all or most pupils at a targeted age or grade are assessed (as in the UK).

#### *Degree of standardization*

The US model adopts an analytic view of achievement, and relies on assessment administered under standardized conditions in a few sessions. In the UK the assessment is holistic and performance-based, integrated into everyday classroom practice, and administered over several days by teachers, thus avoiding what is seen as the artificial separation of assessment from teaching and learning. (There has recently been movement towards the use of more standardized procedures in the UK.) Each pupil may take only a fraction of a large number of assessment tasks, enabling the assessment to extensively examine the curriculum without requiring pupils to spend a lot of time responding to the demands of the assessment (as in Brazil and Ireland). Alternatively, all pupils may be required to respond to the same tasks (as in Uganda and Zambia). The New Zealand National Education Monitoring Project (NEMP) also involves a series of complex performance tasks, although in this case the assessments are carried out by pairs of specially trained teachers from other schools.

#### *Allocation of tasks or items to pupils*

In the US model of national assessment, each pupil takes only a fraction of a large number of assessment tasks (matrix sampling). This allows for extensive curriculum coverage without requiring pupils to spend a lot of time responding to a large number of assessment tasks. In

keeping with its holistic view of achievement, there is no provision in the UK model for systematic allocation of different tasks to different pupils.

#### *Recipients of information about pupil performance*

An assessment may or may not be designed to provide information about individual schools, or even individual teachers and pupils. (When information is available about individual schools, an assessment may become a high-stakes operation.) The US model does not provide information about individual schools or districts; the UK model does.

#### *Comparisons over time*

An important function of the US system is to monitor achievement over time. While there have been studies of change based on data obtained in the UK system, lack of standardization in assessment procedures means comparisons over time are risky. Assessments may differ in the detail in which they describe performance (for example, sub-domains may be used of the broader domain of mathematics or numeracy) . They may also differ in the extent to which they attempt to measure relationships between pupil achievement and factors such as school type or community characteristics.

#### *Effects on teaching and learning*

Assessments differ in the extent to which the data obtained from them are integrated into other aspects of the education system. The US system was not designed to have a direct impact on schools and teachers, although the information derived from an assessment might be used to inform policy decisions that eventually have an impact on them. The UK system, on the other hand, was designed for such an impact. It was intended to provide teachers with exemplars of good assessment practices which, it was hoped, would influence their curriculum priorities and methods of assessment. The publication of information on the performance of pupils was also intended to have an impact on schools and teachers.

### National assessment programs in Africa

In Africa, there are three major national assessments; (1) the Monitoring Learning Achievement (MLA) project, (2) the Southern Africa Consortium for Monitoring Educational Quality (SACMEQ) project, and (3) the Programme d'Analyse des Systèmes Educatifs des Pays de la Confemen (PASEC) – involve similar activities in several countries. There are also other national assessments, unrelated to any of the three other projects, carried out in individual countries.

#### *Monitoring Learning Achievement*

The MLA project, which began in 1992, is a joint United Nations Educational, Scientific and Cultural Organization, and United Nations Children's Fund (UNESCO/UNICEF) initiative. It is part of the EFA assessment that has as its objective the construction of a comprehensive picture of the progress of countries toward the EFA goals (Chinapah, 1997). In particular, it is a response to the need to monitor the extent to which pupils acquire useful knowledge, reasoning ability, skills, and values, as laid out in Article 4 of the World Declaration on Education for All (EFA) (UNESCO, 1990).

In MLA I, the achievements of Grade 4 pupils were assessed in literacy (reading and writing), numeracy, and life skills (that is, awareness and knowledge of health, nutrition, sanitation, and

hygiene). In MLA II, the achievements of Grade 8 pupils were assessed in mathematics and science. Common tests were used in all countries. Both MLA I and MLA II collected data on pupils' backgrounds, including family backgrounds, and school characteristics.

By 2002, MLA assessments have been carried out in more than 70 countries, 47 of which are in Africa (UNESCO, 2003a). Forty African countries participated in MLA I and 11 in MLA II. In Nigeria, results were presented by state. A regional approach was adopted in implementation to capitalize on local expertise and to develop capacity in participating countries. By March 2003, reports had been published on the MLA I assessments of 18 sub-Saharan countries and on the MLA II assessments of two. In addition to the national reports, a separate single report was prepared on the MLA I project in 11 countries (Botswana, Madagascar, Malawi, Mali, Mauritius, Morocco, Niger, Senegal, Tunisia, Uganda, Zambia, and Zimbabwe) (Chinapah et al., 2000). Only four of these countries had met their Jomtien learning target (that is, that 80 per cent of learners should attain the defined learning competencies) for Grade 4 pupils in life skills; only two countries met the target in literacy; and none in numeracy. Gender differences were small in all countries. With the exception of Mauritius, in all three learning areas, pupils in private schools performed better than did pupils in public schools. In most countries, ability of parents to assist their children with their schoolwork correlated with pupil achievement.

#### Southern Africa Consortium for Monitoring Educational Quality

The Southern Africa consortium for Monitoring Educational Quality (SACMEQ) is a collaborative, voluntary grouping of 15 ministries of education in Southern and Eastern Africa. The consortium works in close collaboration with the International Institute for Educational Planning (IIEP) in Paris, with the goal of building institutional capacity through joint training and cooperative educational policy research (Ross et al., 2000; UNESCO, 2003b). SACMEQ (I) was developed between 1995 and 1998, when eight education ministries collected information on baseline indicators for educational inputs, general conditions of schooling, equity assessments for human and material resource allocations, and literacy levels among Grade 6 pupils.

Except in Mauritius and South Africa, teachers and pupils were both tested. Between 1999 and 2002, 15 education systems participated in SACMEQ (II): Botswana, Kenya, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania (mainland), Tanzania (Zanzibar), Uganda, Zambia, and Zimbabwe. A major aim of SACMEQ is to promote capacity building by equipping educational planners in member countries with the technical ability to monitor and evaluate schooling and the quality of education. Through providing valid and accessible information systems as a basis for decision-making, the consortium seeks also to promote stakeholder involvement and greater transparency. A particular feature of its approach is its learning-by-doing training for educational planners, whom it seeks to involve directly in the conduct of studies.

As in the case of the MLA project, the results of the SACMEQ assessments indicated that education systems were failing to meet performance standards of ministries. For example, in Namibia and Zambia, fewer than 30 per cent of Grade 6 pupils met the specified minimum literacy standards (UNESCO, 2000a). Although in Zimbabwe more than 50 per cent of pupils met 'minimum' standards, this figure did not change over time (Machingaidze, Pfukani, and Shumba,

n.d.). Significant differences typically were found in the achievements of different regions and types of school within participating countries. Gender differences were not significant (Mioko, 1998).

#### [Programme d'Analyse des Systèmes Educatifs des Pays de la Confemen](#)

The Programme d'Analyse des Systèmes Educatifs des Pays de la Confemen (PASEC) was established in 1991 as a response to the Jomtien conference. PASEC acts as a network among Francophone countries for the sharing of information on educational evaluation instruments and results. It encourages the involvement of senior decision-makers and other stakeholders in the identification of policy issues, and emphasizes the need to base decisions on reliable data and to follow up these decisions with a realistic agenda for action, including time frames and cost estimates (Kulpoo & Coustère 1999). Initially only pupils in Grades 2 and 5 were assessed, in French and mathematics. This has since been expanded to include pupils in all grades from 2 through to 6. Data are also collected from pupils and teachers on a variety of school and background factors. Since 1994, the same tests have been used in all countries.

Countries that have participated in PASEC include Burkina Faso, Cameroon, the Republic of Congo, Côte d'Ivoire, Djibouti, Guinea, Madagascar, Mali, Niger, the Central African Republic, Senegal, and Togo. PASEC differs from other national assessments in Africa in that in some countries pupils are assessed both near the beginning (November) and at the end (May) of the academic year. It is thus possible to obtain some indication of growth (or 'the value' added) during the course of the year (though this is possible only for pupils who survive in the system). This approach reflects the strong research orientation of the program, which was in evidence at its inception, in its attempts to identify causal relationships upon which to base policies that seek to improve the efficiency and effectiveness of education systems. Efforts have been made to determine the impact of in-school factors such as teacher training, class size, and textbook availability as well as of non-school factors such as parental education, distance to school, and home language.

#### [Other national assessment programs in Africa](#)

In addition to the three programs described above, several countries, including Burundi, Eritrea, Mali, Namibia, Senegal, Uganda, and Zambia, have carried out national assessments of their own. These vary in their technical adequacy.

##### [Namibia](#)

In Namibia, the National Learner Baseline Assessment measured pupil achievement in English and mathematics at Grades 4 and 7 (Namibia Ministry of Education and Culture, Florida State University, and Harvard University, 1994). Reading and listening comprehension were also assessed in Oshindonga, in a subset of northern schools. The assessment was designed to help policy makers allocate resources to underachieving schools; its results suggested that the expectation of competence in English was too high, and that curriculum materials might need to be revised.

##### [Ethiopia](#)

Ethiopia has conducted national assessments, specifically Ethiopian National Learning Assessments (NLAs), for at least a decade. The first assessment activity was the Ethiopian Baseline National Learning Assessment. This was conducted in 1999/2000 by the Ministry of

Education in collaboration with the Basic Education System Overhaul (BESO) (I) project. The second assessment was the Ethiopian Second National Learning Assessment in 2003/2004 which was conducted with financial and technical assistance from AED/BESO. The third, Ethiopian Third National Learning Assessment was conducted in 2006/2007. A fourth NLA was not conducted although tests had been prepared during 2009. Grade 4 pupils were tested in English, Basic Reading, Mathematics and Environmental Science, all of which were prepared in different instructional languages. Grade 8 pupils were tested in English, Mathematics, Physics, Chemistry and Biology, all of which were prepared in English. The Ethiopian First National Learning Assessment of Grades 10 and 12, the first of its kind, was conducted at the end of the 2008/2009 academic year in English, Mathematics, Physics, Chemistry and Biology. Three rounds of ENLAs for Grades 4 and 8 and one round for Grades 10 and 12 have been successfully delivered and reported on to date indicating that the assessment program is feasible. ELNA is an example of the existence of standardized tests *and* external examinations in the same subjects. All of the test papers are prepared in English, the medium of instruction in secondary schools and universities and the most widely spoken foreign language. Amharic used to be the language of primary school instruction, but has been replaced in many areas by local languages such as Oromifa and Tigrinya. (After the fall of the Derg regime in 1991, the new constitution of the Federal Democratic Republic of Ethiopia granted all ethnic groups the right to develop their languages and to establish mother tongue primary education systems.)

#### *Uwezo (East Africa)*

Uwezo (“capability” in Kiswahili) is a four-year initiative that aims to improve competencies in literacy and numeracy among children aged 5–16 in Kenya, Tanzania and Uganda. Uwezo uses an innovative approach to social change that is citizen driven and that is accountable to the public. The initiative seeks to generate information on children’s competencies in literacy and numeracy in a manner that informs the public, stimulates national debate, and creates pressure in policy change. Uwezo’s approach enables policy makers as well as ordinary citizens, parents, pupils, local communities and the public at large to become aware of the actual levels of children’s literacy and numeracy.

Like ASER in India (see page 29), Uwezo’s Annual Literacy Assessment (ALA) is carried out at household level in order to establish comparability of children between 6 and 16 years of age in their literacy (English and Swahili) and numeracy levels.

#### *Zimbabwe*

The Zimbabwe Early Learning Assessment (ZELA), Education Transition Fund (ETF) programme is a four-year project commissioned by the United Nations Children’s Fund (UNICEF) to support and enhance national capacity to review, reform, and re-orientate the current system of pupil assessment in Zimbabwe and to establish a base-line in order to inform the determination of whether the ETF programme (2010–2015) has had the desired effects on children, their caregivers, schools, and the education sector in general, as well as to identify the extent to which changes identified are attributable to the ETF programme interventions.

ZELA tests English, Shona and Ndebele, and numeracy (mathematical operations and applications).

## The impact of national assessments in Africa

In the areas of policy debate and formulation, SACMEQ results have featured in presidential and national commissions in Zimbabwe and Namibia, prime ministerial and cabinet reviews of educational policy in Zanzibar, national education sector studies in Zambia, and reviews of national education master plans in Mauritius (Ross et al., 2000). MLA results were used in the preparation of education reform programs in Malawi and Uganda, and PASEC results were used in country analysis reports in Burkina Faso and Niger.

The programs are also seen to have contributed to capacity building. Following the MLA project, several countries, including Madagascar, Mali, Mauritius, and Morocco, carried out their own assessments. In Kenya and Zimbabwe, data cleaning methods used in SACMEQ were adapted for school census data; participant countries in the PASEC program similarly have improved their capacity in test construction and in the design and execution of surveys.

The PASEC countries additionally supported government policy by using information from the national assessments about grade repetition, class size, and textbook availability.

Information from the national assessments has in some countries also contributed to national debate. For example, in Mauritius, SACMEQ data were used in a debate on strategies to mitigate the effect of the Certificate of Primary Education and to support an improvement in the pupil-to-book ratio. In the Seychelles, SACMEQ results initiated a debate on streaming.

In several countries the SACMEQ results have caused education managers to reappraise the adequacy of the resources provided for education. Kenya, for example, has introduced benchmarks – such as desks per pupil and books per pupil – for the provision of classroom facilities. In Zimbabwe, repairs have been made to school buildings, special funds provided for classroom supplies, and training programs initiated on the management of school libraries.

Assessment results, particularly where they have helped identify system weaknesses, have also been used to justify the granting of major donor support. In Guinea, for example, the results of the PASEC assessment prompted the national government and the World Bank to develop a program to promote instruction in local languages in the early grades, with transition to French as the medium of instruction gradually taking place in later grades.

Care is needed in assessing the effects of national assessments. For example, while experience with the MLA project has led some education systems to increase the weighting given in the curriculum to life skills, there is as yet little reported evidence that this change has been translated into classroom practice. And in Mauritius, an external review team reported that relatively little had been done to act on policy suggestions made in three separate national assessments.

One study posed a series of questions on the use of national assessment results to senior education personnel in six countries (Ethiopia, Malawi, Niger, Nigeria, South Africa, and Uganda). The respondents reported that while the findings of national assessments were occasionally covered in the media, in none of the six countries did they feature in parliamentary debate. In only one country were the findings used to justify the granting of additional resources to schools. In four countries, results were shared with curriculum authorities, while in only two countries was feedback provided to teachers or schools, and in only one country was feedback provided to textbook publishers. Respondents in Ethiopia and Nigeria said that the national assessment results had not

been used in the formulation of educational policy. In Ethiopia, however, the results on national assessments were used to develop guidelines for the School Improvement Program (SIP), the Teacher Development Program (TDP), and in curriculum, education planning and administration.

### National assessment programs outside Africa

This section describes four national assessment programs outside Africa. These particular programs were chosen because they are very different from each other and because each of them is very different from ZELA. (The first program described below has been used both in and outside of Africa.)

#### Early Grade Reading Assessments (EGRA)

To complement existing international assessments, the Early Grade Reading Assessment (EGRA), was developed to assess the main skills that are known to predict reading success within the early grades of primary school (Grades 1 to 3). In most major international assessments (see page 30), children's reading skills are not assessed before Grade 4. This is often too late for remediation for poor readers. Also, most major assessment programs are composed of reading comprehension tasks, and do not take into account the level of word fluency (including accuracy and speed) and listening comprehension even though reading comprehension is linked to capacity in these sub-skills.

During a workshop held in Dakar, Senegal, the EGRA test was adapted to the local context in English (and French) and then adapted after pre-testing in schools in Gambia (and Senegal). The original test was made up of two tasks assessing text comprehension (aural and written), three tasks assessing accuracy and speed in reading high-frequency words (isolated words, words in context and pseudo-words), two spelling tasks, two phonemic awareness tasks, and a letter-knowledge task. EGRA also included a pupil questionnaire to capture meta-contextual information.

The Early Grade Reading Assessments (EGRA) initiative was developed with the support of the World Bank, which is the largest external education financier for developing countries and a key player in global efforts to reach the education MDGs to ensure that all children, everywhere, are afforded the right to learn.

EGRA is designed to complement traditional national and international assessments by providing timely and actionable information for improving the teaching of reading in the early grades of primary school. Most national and international assessments are paper-and-pencil administered in group settings to pupils in Grades 4 and above; that is, they implicitly assume pupils can read and write. In contrast, early-grade reading assessments are typically designed to orally assess the most basic foundational skills for reading acquisition, including pre-reading skills such as listening and comprehension. The test used in the EGRA initiative is based on recommendations made by an international panel of reading and testing experts and include timed one-minute assessments of letter naming, word reading, and connected text reading with comprehension.

In recognition of the importance of early reading the EFA Fast Track Initiative<sup>15</sup> adopted an indicator, requesting that countries measure “the proportion of pupils, who after two years of schooling, demonstrate sufficient reading fluency and comprehension to ‘read to learn’”. Measurement of this indicator revealed that, in many countries, a worrying proportion of pupils was unable to read a single work of text, even after several years of schooling.

#### Status of Education Report (ASER)

ASER (Hindi for “impact”) is a citizens’ initiative to assess basic learning levels of children in rural India by people outside government. Carried out annually in six languages, it is the largest household survey – 300,000 households; 700,000 pupils; and 25,000 volunteers. Administered in six languages, it measures enrolment as well as reading and arithmetic levels of children aged 6–14, with a particular interest in girls between 11 and 14.

An ASER survey has been carried out by Pratham (a large NGO cited by the Ministry of Human Resource Development) since 2005 in five states in India (Pradesh, Himachal Pradesh, Assam, Jharkhand and Rajasthan) with support from UNICEF and UNESCO. Pratham was established in 1994 to provide education to the children in the slums of Mumbai city. Since then its scope and geographical coverage have expanded and it now aims to provide quality education to millions of underprivileged children living in both rural and urban areas through a range of interventions.

#### Sistema de Medición de Calidad de la Educación (SICME)

The Chilean national learning outcome assessment system (Sistema de Medición de Calidad de la Educación (SICME)) has, for over 20 years, provided data about learning outcomes at the national and school levels. Meckes & Carrasco (2010) report that it:

... contributes to defining and evaluation educational policies, is used by teachers and schools to inform their practices, and contributes toward involving parents and fostering accountability at different levels of the system.

Referred to as the education system’s “thermometer”, SIMCE is a census-based standardized test in mathematics, Spanish (reading and writing) in Grades 4, 8 and 10 and natural and social sciences in Grades 4 and 8. It is administered annually for Grade 4 and biennially for Grades 8 and 10. The assessments are aligned with the national curriculum. The assessment program can therefore be described as discipline-specific.

#### National Assessment Program – Literacy and Numeracy (NAPLAN), Australia

Australia has a federal system of government in which primary responsibility for education is located in the various states and territories. Although all Australian state and territories and the federal education ministries adopted a national curriculum framework for the compulsory years of schooling based on agreed national goals in 1989, each state and territory implements the goals separately.

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<sup>15</sup> Global compact on education to help low-income countries achieve a free, universal basic education, launched in 2002 as a global partnership between donor and developing country partners to ensure accelerated progress towards the MDG of universal primary education by 2015

In 2008, the National Assessment Program – Literacy and Numeracy (NAPLAN) was introduced into Australian schools by the federal government. It involves census testing. Every year, all pupils in Years 3, 5, 7 and 9 are assessed on the same days using national tests in reading, writing, language conventions (spelling, grammar and punctuation) and numeracy. The federal government ties funds to the schools participation. NAPLAN tests are administered by a test administration authority in each state and territory during May of each year. Individual pupil reports are distributed to parents in September. The national summary report Achievement in Reading, Writing, Language Conventions and Numeracy is published in September. The full report is published in December (at the end of the school year).

NAPLAN is at the same time an “assessment of learning” and an “assessment for learning” (Black & Wiliam, 1998). That is, the results from the NAPLAN tests provide an important measure of how Australian schools and pupils are performing in the areas of reading, writing, spelling and numeracy as well as being used for individual pupil reporting to parents, school reporting and aggregate reporting by states and territories against national standards.

### International surveys

International surveys are often included in the definition of system-level assessments. They provide comparative data on pupil achievements in two or more education systems. This section considers three such tests - The Programme for International Student Assessment (PISA), the Trends in International Mathematics and Science Study (TIMSS) and Progress in International Reading Literacy Study (PIRLS). Although not administered in the early years of schooling PISA and TIMSS, along with PIRLS, are described because in many ways they represent the ‘gold standard’ in system level testing. They are sample-based international assessment programs (surveys) employing more than one response format, administered on a cyclical basis, and designed to produce comparative data (between countries and within countries over time)..

#### Programme for International Student Assessment (PISA)

PISA assesses the reading, mathematics and scientific literacy skills of 15-year-old pupils every three years, the focus having been on reading in 2000, mathematics in 2003, science in 2006, and reading in 2009 (Organization for Economic Cooperation and Development (OECD)). PISA also collects information from questionnaires. The results on PISA are used as the basis for international comparisons.

PISA documentation defines the skills that PISA assesses in terms of “everyday situations”, “the future”, “real life”, and the “knowledge society”. Skills to be assessed are identified through their real-life applicability because that is taken to be what makes them worth assessing. The test items use contexts that are intended to be real-life, but which do not carry with them such a load of local content that pupils in different locations would be disadvantaged by them.

Formats other than multiple-choice (MC) are used in PISA. In PISA Science 2006, for example, there were 38 multiple-choice items, 30 complex multiple-choice items, 37 open-response items, and five closed constructed response items.

In 2009 the PISA population was 65 (countries and non-whole-country-economies).

### Trends in International Mathematics and Science Study

TIMSS is conducted by the International Association for the Evaluation of Educational Achievement (IEA). The sample-based study provides international comparisons of pupil achievement in mathematics and science at Grades 4 and 8 on a regular four-year cycle, and also collects a rich array of information about the school and home contexts for learning mathematics and science. Data have been collected in 1995, 1999, 2003, 2007 and 2011, the most recent test-takers coming from some 60 countries including all the Gulf states. Countries that have participated in TIMSS have therefore been able to access information about the improvement or decline in the mathematics and science achievement of cohorts of their pupils over time.

Having collected detailed information about the mathematics and science curricula in each country, TIMSS then uses the curriculum, broadly defined, as the major organizing concept for the tests. Thus TIMSS helps countries to monitor and evaluate their mathematics and science teaching across time and across grades (IEA, 2005).

Two question formats are used in TIMSS assessment – multiple-choice and constructed-response, each format giving about half of the total score.

The scales for reporting pupil achievement on TIMSS are discipline-specific. For example, Grade 8 science in 2007 had four content domain scales: Biology, Chemistry, Physics, and Earth Science. The scales for reporting pupil achievement on PISA are trans-disciplinary. For example, PISA science in 2006 had three competency scales: identifying scientific issues, explaining phenomena scientifically, and using scientific evidence.

### Progress in International Reading Literacy Study

The Progress in International Reading Literacy Study (PIRLS) is an international comparative study of the reading achievement and reading behaviours and attitudes of fourth-grade pupils in the US and pupils in the equivalent of fourth grade in other participating countries.

PIRLS was first administered in 2001 and included 35 countries, in 2006 to pupils in 45 education systems (including countries and sub-national education systems, such as Canadian provinces and Hong Kong, a Special Administrative Region of the People's Republic of China), and in 2011. PIRLS is coordinated by the International Association for the Evaluation of Educational Achievement (IEA).

PIRLS is the successor to the IEA studies that started in 1970 and continued to 1991 with the Reading Literacy Study. The study of 2001 started the trend for the PIRLS cyclical testing. The PIRLS study consists of a main survey that consists of a written reading comprehension test and a background questionnaire. The PIRLS Reading Development Group (RDG) and National Research Coordinators (NRCs) from the 35 countries collaborate to develop the reading assessments. The assessment focuses on three main areas of literacy: process of comprehension, purposes for reading, and reading behaviours and attitudes. The background questionnaire is used to determine the reading behaviours and attitudes. The written test is designed to address the process of comprehension and the purposes for reading. There are two purposes for reading that are examined in this study: reading for literary experience and reading to acquire and use information. Each pupil receives 80 minutes to complete two passages and then time to complete the survey. There are eight passages in total, four for each purpose of reading.

## Comparison of national assessment programs

The assessment programs described above differ in many ways – from the purpose of the assessments to the way in which results are reported. Comparisons of these programs with each reveals many differences in format and scope of the program (for example, number of grades and number of subjects being assessed). All of them do provide a description of pupil achievement. It was from this rich source of information that the ZELA tests drew in their planning and implementation.

More details about the differences and similarities between the various assessments are shown in Appendix 1. This Appendix contains four tables. Table 1 takes six of the national programs described in this review of national assessments and classifies them on eight dimensions. The programs thus analysed are MLA, SACMEQ, PASEC, NAPLAN, ELNA, and EGRA. Table 2 takes national assessment programs that are relevant to a discussion of Grades 2 or 3. The programs that are analysed are PASEC, NAPLAN, EGRA, ASER, and Uwezo. Table 3 provides a time-frame for all nine national assessment programs discussed in this review: ASER, SICME, NAPLAN, EGRA, MLA, SACMEQ, PASEC, ENLA, and Uwezo. ZELA can be located within this analytic framework (i.e., in each of the summary tables). Table 4 extracts the relevant information from Tables 1–3.

## Chapter 3 Theoretical framework

This chapter provides the theoretical framework for the research study and describes sources of data, how outcomes are to be measured, and the approach to the research.

The input–process–output model for data in the pupil learning environment is represented diagrammatically in [Figure 1](#).<sup>16</sup> The entries in the boxes are illustrative. The framework is an adaptation of the 3P model of learning and teaching developed by Biggs (Biggs, 1999; Biggs & Moore, 1993), which portrays learning as an interactive system, identifying “three points of time at which learning-related factors are placed: presage, before learning takes place; process, during learning; and product, the outcome of learning” (Biggs, 1999). Biggs’s model draws attention to two sets of presage factors: meta-contextual factors and those factors specific to the learner. In the adaptation of his model to datasets, the presage components are data about pupils, teachers, and school organisation and resourcing. This model is capable of generating predictions and associations that are relevant to this study and the policy questions most likely to be addressed by it. Reading from top to bottom, from input through process to output, the diagram portrays the storyline for an individual pupil or pupil cohort.

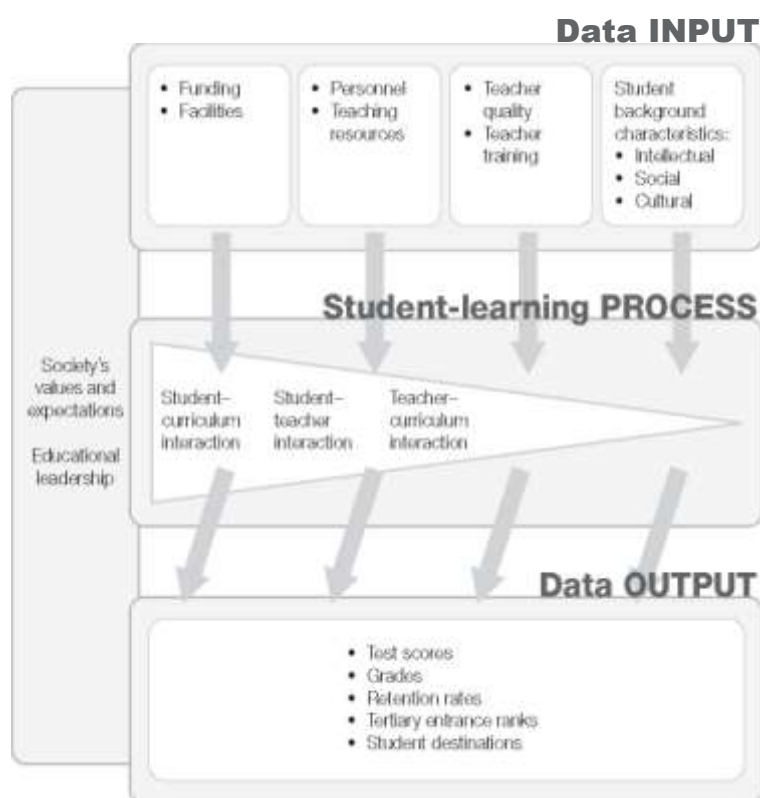


Figure 1 Input–process–output model for pupil data

<sup>16</sup> Matters, G. N. (2006). *Using data to support learning in schools: students, teachers, systems* (Australian Education Review No. 49). Camberwell: ACER.

A preliminary scan of reports<sup>17</sup> indicate that currently in Zimbabwe there is a severe shortage of teaching and learning materials and furniture in schools, most teachers need professional development, and there is a significant proportion of orphans and vulnerable children in the population. Thus the current study of the ETF program in Zimbabwe has gathered data about funding, facilities and resources, teacher quality and teacher training, and the pupils' backgrounds. Table 3 lists the data that were gathered as inputs for the model.

**Table 3 Datasets – Input for Zimbabwe Study**

| <b>Pupil level</b><br><b>(pupil background characteristics)</b>  | <b>Teacher level</b><br><b>(teacher quality and teacher training)</b>  | <b>School level:</b><br><b>Funding and facilities</b>   |
|--|--|---|
| <ul style="list-style-type: none"> <li>• Type of school attended</li> <li>• Age</li> <li>• Gender</li> <li>• Language spoken at home</li> <li>• No. of books in the home</li> <li>• Infrastructure accessed by the home (electricity and water)</li> <li>• No. of hours/day working for family/community</li> <li>• No. of meals eaten per day</li> <li>• No. of days absent in Term 1, 2012</li> <li>• Access to resources to study in the home</li> <li>• Socioeconomic status (parental education level)</li> </ul> | <ul style="list-style-type: none"> <li>• No. of teachers</li> <li>• Qualifications of teachers</li> <li>• Gender</li> <li>• Teacher absentee rate</li> </ul> | <ul style="list-style-type: none"> <li>• Province</li> <li>• School type</li> <li>• District</li> <li>• Language of instruction in the early years</li> <li>• Years of operation</li> <li>• Proximity to a large city</li> <li>• Pupil population – enrolled</li> <li>• Grade 3 pupil population – enrolled</li> <li>• Average class size</li> <li>• Minutes per lesson</li> <li>• Sessions per day</li> <li>• No. of days of closure of school operations</li> <li>• School infrastructure</li> <li>• Wash facilities</li> <li>• Orphans and vulnerable children (%)</li> <li>• Funding</li> <li>• Pupils with chairs (%)</li> <li>• Textbook supply</li> <li>• Pupils in fee arrears (%)</li> </ul> |

Data outputs are pupil scores on a new test of language (two subtests) and mathematics (two subtests). Table 4 provides an overview of these outputs.

<sup>17</sup> *Education at a Glance 2009*. Zimbabwe Ministry of Education, Sport, Arts and Culture, Summary of Cost and Financing of the Education Sector in Zimbabwe. February 2010, *Education Statistics: Zimbabwe*. UNICEF Division of Policy and Practice, Statistics and Monitoring Section, 2008, Nyanguru and Peil, 1991. *Zimbabwe Since Independence: A People's Assessment*. African Affairs, 1991, 90, 607–620.

Table 4 Datasets – Output for Zimbabwe study

|                              |                               |                            |                                 |
|------------------------------|-------------------------------|----------------------------|---------------------------------|
| Subtest score:<br>Operations | Subtest score:<br>Application | Subtest score:<br>Language | Subtest score:<br>Comprehension |
| Score for Mathematics        |                               | Score for Language         |                                 |

### Orientation of the research

The failings of development projects that do not collaborate with local institutions and communities have been well documented in the literature. Similarly, criticisms of local participation methods claim that participation can by-pass national institutional safeguards<sup>18</sup> and fail to engage multiple stakeholders.<sup>19</sup> In order to escape the binary options of ‘top down’ and ‘bottom up’ development projects, the methodology used in this project is oriented towards “choice ...using locally generated criteria informed by wider considerations.”<sup>20</sup> Such an approach needs national and international stakeholders to be involved in the decision-making process.<sup>21</sup> Therefore, collaborative approaches were used at all stages of the project, in order to ensure that outcomes are relevant and in order to build sustainability into the project.

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<sup>18</sup> Slocum Wichart Rocheleau and Thomas-Slayter. Eds. 1995. *Power, Process and Participation: Tools for Change*. Intermediate Technology Publishers. London.

<sup>19</sup> Outhred, 2010.

<sup>20</sup> Flood and Romm. Page 7.

<sup>21</sup> McIntyre. 2003. *Yeperenye Dreaming in Conceptual, Geographical, and Cyberspace: A Participatory Action Research Approach to Address Local Governance within and Australian Indigenous Housing Association*. *Systemic Practice and Action Research*, 16(5), 309-338.

## Chapter 4 – How do the Zimbabwe pupils perform in the language and mathematics tests?

This chapter addresses the research question: *How do early-grade Zimbabwean pupils perform in tests of language and mathematics?* As the only data currently available were collected in 2012, they cannot be used to address the related question: *Is there a noticeable pattern of change over time?*

It first provides a description of differences between various subgroups. It then examines the proportion of pupils below, at and above grade level benchmarks.

### Sub-group differences in English and Mathematics

#### Gender

Girls outperformed boys on average in English and Mathematics, but only slightly. See Table 5.

**Table 5 Summary statistics showing scores in English and Mathematics for boys and girls**

|             | <b>Gender</b> | <b>Mean</b> | <b>N</b> | <b>Std. Deviation</b> |
|-------------|---------------|-------------|----------|-----------------------|
| English     | Boys          | 297.4       | 8196     | 24.1                  |
|             | Girls         | 302.5       | 8475     | 25.6                  |
| Mathematics | Boys          | 298.4       | 8367     | 25.0                  |
|             | Girls         | 301.6       | 8405     | 24.9                  |

#### Location

Pupils from urban areas outperformed pupils from rural areas on average in English and Mathematics by a large margin. ('Urban' was defined as a school located in Bulawayo or Harare provinces. All other schools were defined as 'rural'.) See Table 6

**Table 6 Summary statistics showing scores in English and Mathematics for rural and urban pupils**

|             | <b>Gender</b> | <b>Mean</b> | <b>N</b> | <b>Std. Deviation</b> |
|-------------|---------------|-------------|----------|-----------------------|
| English     | Rural         | 297.0       | 14229    | 23.1                  |
|             | Urban         | 318.1       | 2344     | 28.2                  |
| Mathematics | Rural         | 297.6       | 14325    | 24.2                  |
|             | Urban         | 315.0       | 2343     | 24.8                  |

#### Age

There was little difference in pupil performance for the different age groups.

#### Province

Pupils from Bulawayo and Harare outperformed pupils from all other provinces in English and Mathematics, with the lowest performances from pupils from North Matabeleland and South Matabeleland. These differences are examined in detail immediately below.

### Gender differences by province

Gender differences were larger for the urban provinces Bulawayo and Harare than the rural provinces (see Figure 2<sup>22</sup> for English and Figure 3 for Mathematics).

The Shona and Ndebele tests were not administered in all provinces. Gender differences in performance on the Shona test were larger for Harare than other provinces reported (see Figure 5). Gender differences in performance on the Ndebele test were larger for Bulawayo than the other provinces reported (see Figure 4). Only one Masvingo school and one Midlands school chose to sit for the Ndebele test.

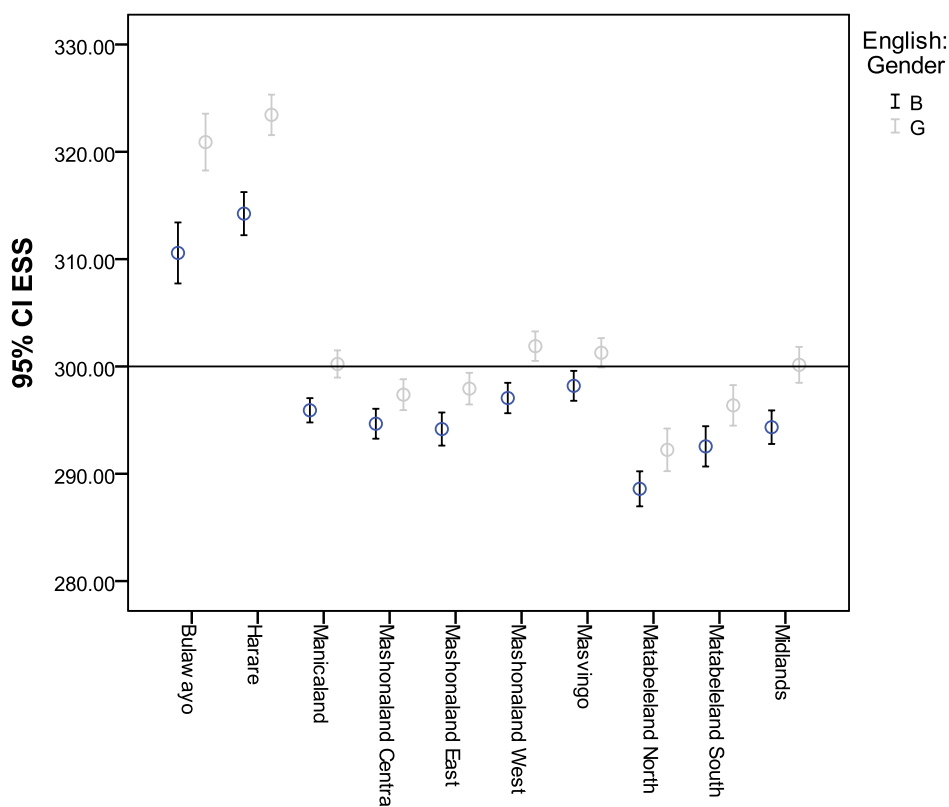


Figure 2 English scale score (ESS) means, by province and gender

<sup>22</sup> The display used for this and related figures is called an error bar chart. The chart shows two key pieces of information: the mean or average score and the 95 per cent confidence interval.

The value of the mean is denoted by the location of a circle. For example, the mean score for English by boys in Bulawayo is around 314 and this can be seen in circle located furthest to the left in this figure. The 95 per cent confidence interval is shown by the vertical line running through the mean. This interval provides an indication of where the true mean is most likely to be located. (Because the study uses a sample, the means shown are the best estimates available based upon the sample, which may vary from the population mean).

The confidence intervals are useful because they point to where differences are statistically significant. If the bars making up the confidence interval around one mean do not overlap with the bars around another mean, then the difference is statistically significant. For example, the confidence intervals around the mean for boys and the mean for girls in Bulawayo do not overlap, and so this difference in means is statistically significant. A statistically significant difference implies that this difference is likely to be real and not due random errors arising from the sampling.

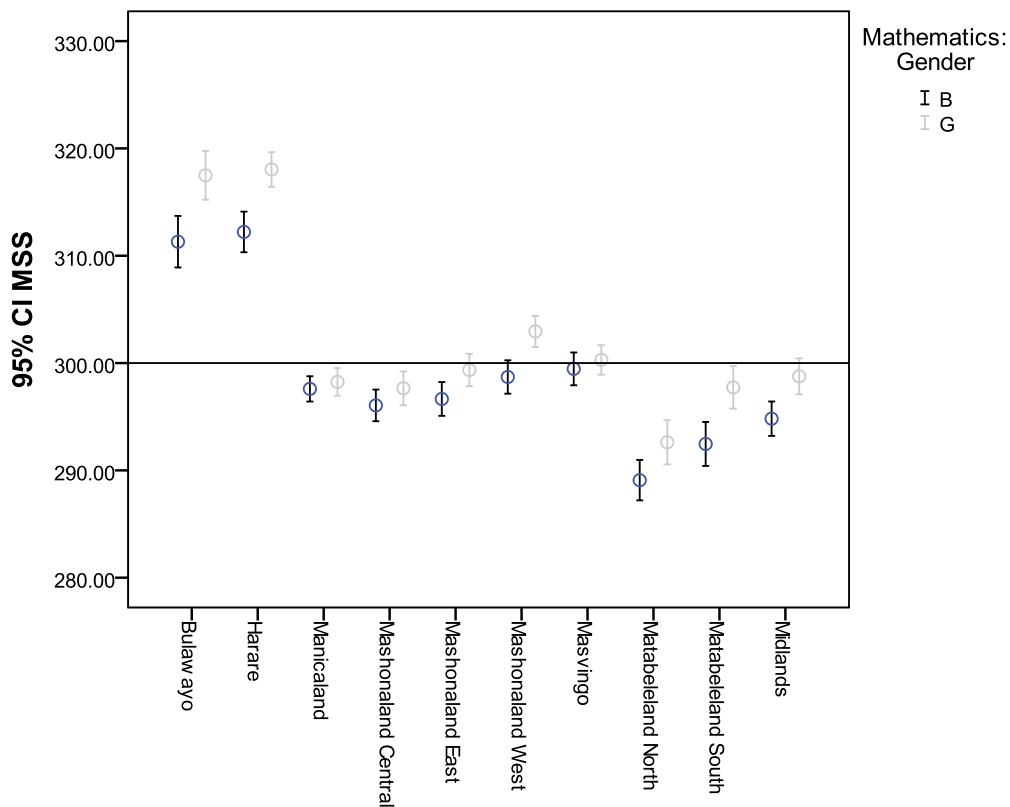


Figure 3 Mathematics scale score (ESS) means, by province and gender

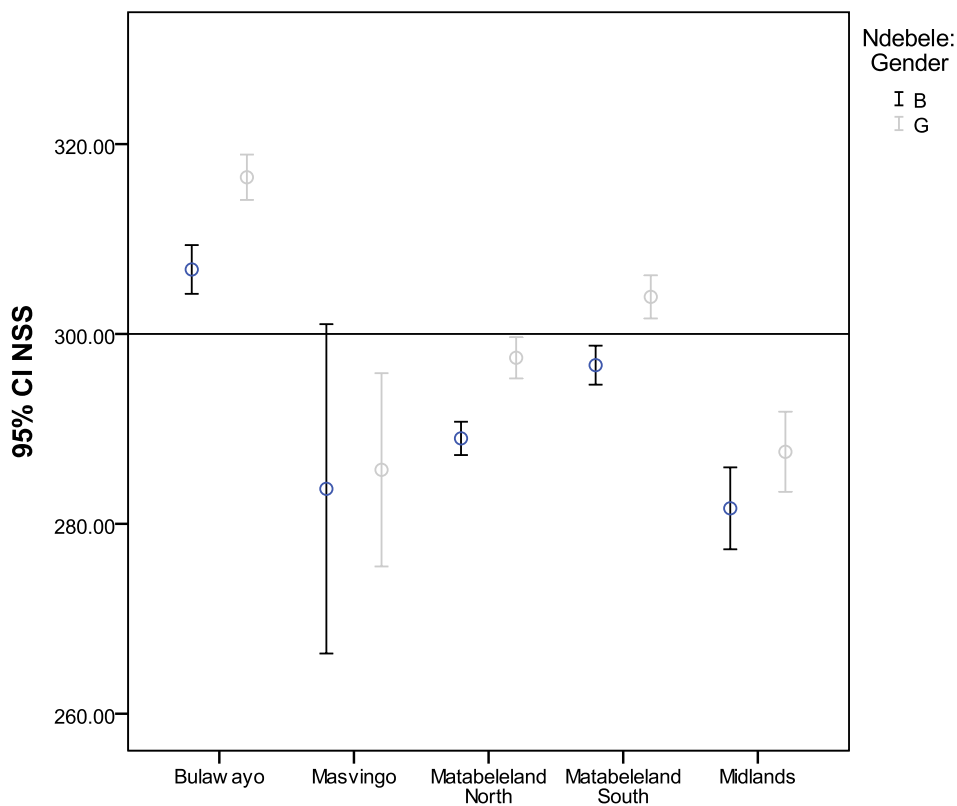


Figure 4 Ndebele scale score (ESS) means, by province and gender

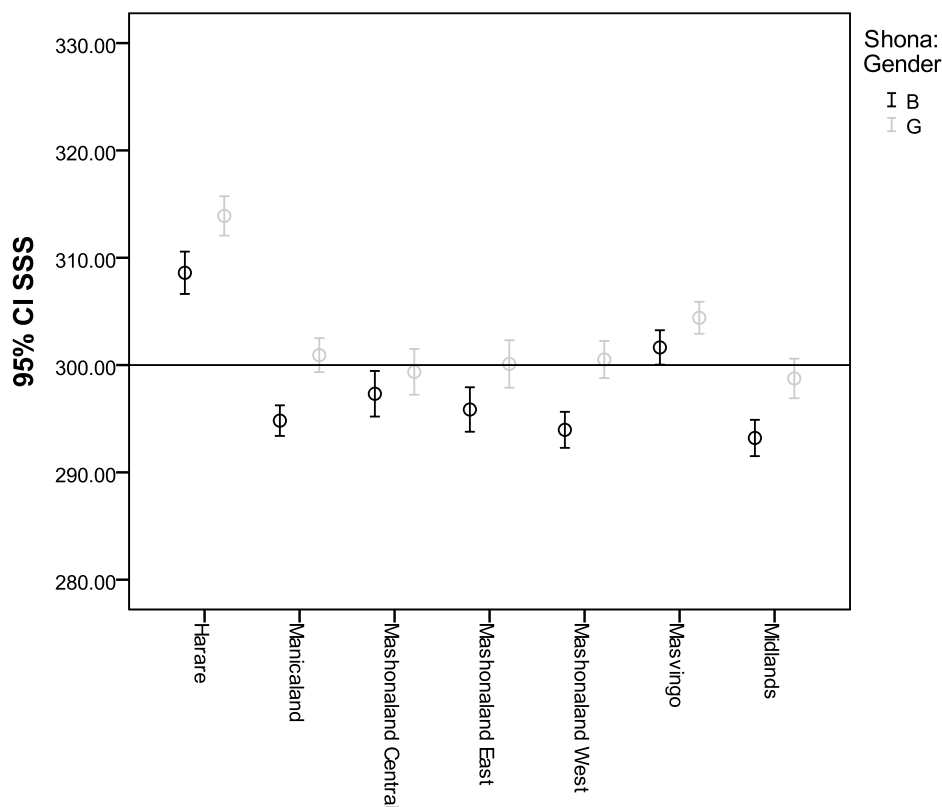


Figure 5 Shona scale score (ESS) means, by province and gender

### Proportion of pupils at, above and below the grade level benchmarks

The indicator to be used to measure changes in pupil achievement in English and Mathematics in Zimbabwe is the percentage of pupils achieving at or above the grade-appropriate level after completing Grade 2 in Zimbabwe.

#### Achieving at a level

'Achieving at a level' means a pupil would get at least half of the items correct in a test set specifically for pupils at their grade level. This test should be composed of questions ranging in difficulty, but always appropriate to the year level of the pupils. So some questions would be easier than others, but they would not fall outside this range. The cut-point separating 'below' the grade-appropriate level and the 'at' grade-appropriate level represents the minimum acceptable standard in the subject.

#### Setting the levels

To identify the appropriate range of difficulty, a panel of 14 language experts and a panel of eight Mathematics experts from ZIMSEC established three achievement levels based on judgements about what cut-point positions would best represent the appropriate standard expected at the end of Grade 2 in Zimbabwe.

The panels of experts also developed indicative standards for the three levels of achievement in Mathematics and English and two levels in Shona and Ndebele, describing what pupils achieving at each level can generally do.<sup>23</sup>

*Indicative standards for three levels of achievement for mathematics*

Pupils achieving at a grade-appropriate level can generally:

- Compare the magnitude of numbers below 100 and order objects from first to twentieth
- Recall simple multiplication facts when 2, 5 and 10 are factors
- Apply sets to solve multiplication problems and division problems using brackets
- Read time on the hour and on the half hour on a clock face
- Interpret pictorial representations of fractions
- Compare the area of plane shapes without the use of standard units
- Measure length in standard units
- Add two numbers in real-life context
- Count, add, compare and order numbers or objects in an unfamiliar context.

In addition, pupils achieving above a grade-appropriate level can generally:

- Count and write the number of objects in a given set
- Interpret the meaning of additional terms such as altogether, sum of n total
- Add two and three single- and double-digit numbers to give a total of up to 50
- Find the difference between any two numbers in the range 0 – 50
- Compare the length of various objects and the capacity of various containers without the use of standard units.

Pupils who are not yet achieving at the grade-appropriate level can generally:

- Find the product of two numbers by counting sets when the product is less than or equal to 100
- Recall basic division facts for multiples of 2, 5 and 10 up to 100
- Find a quotient by sharing equally when the dividend is less than or equal to 100
- Approximate numbers as nearer to 0, 10, 20 up to 100 Divide objects into halves and quarters
- Give the composition of Zimbabwean coins up to \$1 and calculate change for amounts not exceeding \$1

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<sup>23</sup> The method was an adaptation of the level-based method referred to as the “Bookmark” method, in which panels of experts consider the level to most appropriately represent the standard. The method used also has elements of the Angoff method (an empirical judgment technique), which is item-based.

- Read days of the week and place days of the week in their correct order
- Identify two-dimensional shapes and find the perimeter of these shapes using non-standard units
- Compare the mass of common objects and the rate of performed tasks without the use of standard units
- Interpret the meaning of a mathematical story, translate words into numerical statements, and solve the problem posed.

#### *Indicative Standards for three levels of achievement for English*

Pupils operating at the grade-appropriate level in English generally identify and name familiar objects in English, spell simple words correctly, and express in words the number of objects between 0 and 10. Pupils also know how to use simple prepositions with or without the help of a diagram, verb tenses (simple present, simple past, and simple future), possessive pronouns, and superlative forms of simple adjectives. They can use simple adverbs using the indefinite article (a/an), and use simple adverbs. Pupils locate detail in a text and find directly stated information. They connect ideas and make inferences.

Pupils achieving above a grade-appropriate level can generally identify and name familiar objects in English, spell simple words correctly, and express in words the number of objects between 0 and 10. Pupils also know how to use simple prepositions with or without the help of a diagram, verb tenses (simple present, simple past, and simple future), possessive pronouns, and superlative forms of simple adjectives. They can use simple adverbs using the indefinite article (a/an), and use simple adverbs. Pupils locate detail in a text and find directly stated information. They connect ideas and make inferences.

Pupils operating below the grade-appropriate level generally identify and name familiar objects in English, spell simple words correctly, and express in words the number of objects between 0 and 10.

#### *Proportion of pupils achieving below, at and above the grade-appropriate level in English*

The 2012 base-line study found that the percentage of pupils performing at or above the grade-appropriate level after completing Grade 2 in Zimbabwe is 46.8 per cent for English. See Table 7.

**Table 7 The proportion of pupils below, at and above the grade level benchmark for English**

|                   | <b>Per cent</b> |
|-------------------|-----------------|
| Below grade level | 53.2            |
| At grade level    | 37.6            |
| Above grade level | 9.2             |

The distribution of pupils within each English 'level' is represented in Figure 6. The distribution clusters around the cut-point for grade-appropriate achievement.

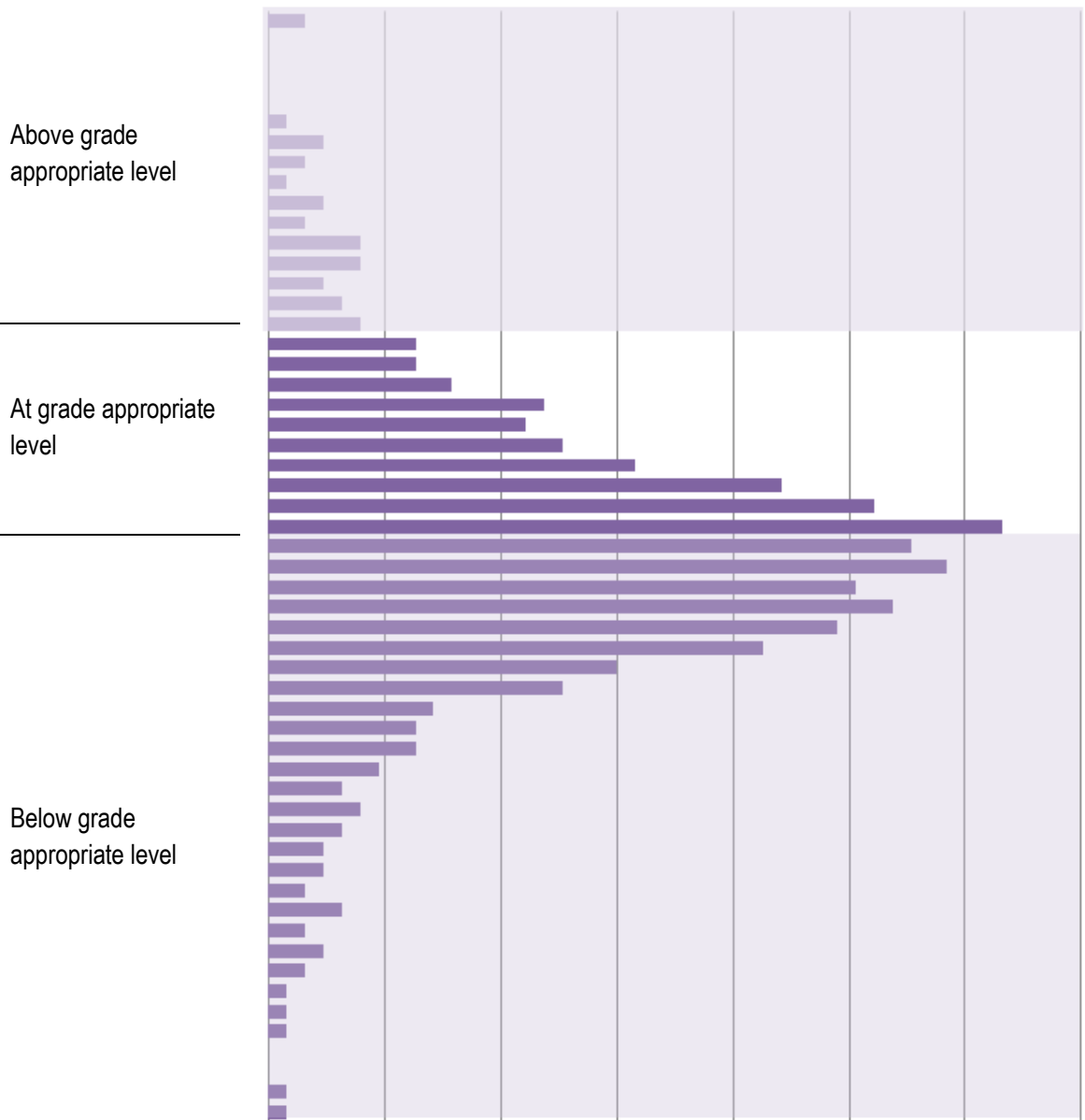


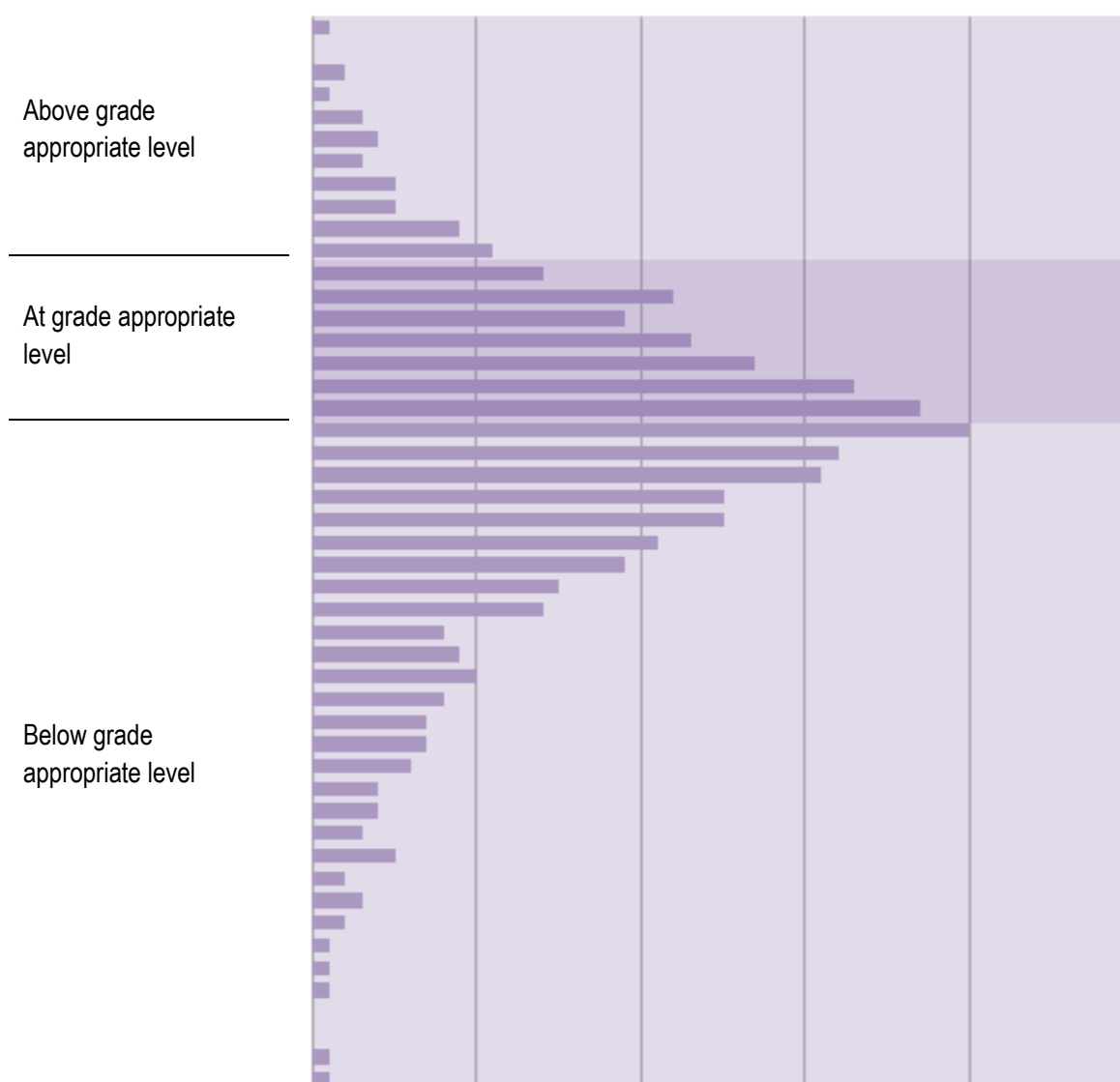
Figure 6 Distribution of Grade 3 pupils achieving below, at and above a grade-appropriate level in English in 2012

### Proportion of pupils below, at and above the grade level benchmarks for mathematics

The 2012 base-line study found that the percentage of pupils performing *at or above* the grade-appropriate level after completing Grade 2 in Zimbabwe is 45.2 per cent for Mathematics. Thus, 54.8 per cent were below the appropriate level. See Table 8. The distribution of pupils within each mathematics 'level' is shown in Figure 7. The distribution peaks (just) below the 'at grade level' cut-point, indicating a large number of pupils are on the cusp of achieving the grade-appropriate level.

**Table 8** The proportion of pupils below, at and above the grade level benchmark for mathematics

|                   | Per cent |
|-------------------|----------|
| Below grade level | 54.8     |
| At grade level    | 36.8     |
| Above grade level | 8.4      |



**Figure 7** Distribution of Grade 3 test scores in mathematics, showing the zones for achieving below, at and above a grade-appropriate level, 2012

### Proportion of pupils below, at and above the grade level benchmarks in the African languages?

As acknowledgement that some pupils have not yet had the opportunity to learn from the English syllabus, pupils were given the option to complete a test in Shona or Ndebele, in addition to English and Mathematics tests. Pupils were not randomly sampled from the population group for this activity; therefore their performance on the test is not representative of the population group. Further, the Shona and Ndebele tests were constructed from the English test so the Shona and Ndebele tests items draw on language rules applied from English to Shona and from English to Ndebele. The full range of principles and processes by which sentences are structured and meaning is made of text in Shona and Ndebele were not, therefore, tested.

For a number of pupils who completed the Shona or Ndebele test, the test was in the native language of that pupil, however for others it was not. Therefore, the Shona and Ndebele tests were measuring neither literacy nor language acquisition across the sample. Furthermore, the three language tests are not comparable. Therefore pupil achievement in Shona cannot be compared to pupil achievement in Ndebele or to pupil achievement in English.

Collectively, these constraints translate into test results that cannot be considered representative of the national situation. Therefore, results should be considered indicative of the extent to which a sample of pupils in Zimbabwe has mastered a sample of the principles that are applicable to the languages of Shona and Ndebele.

Based on the application of cut-points developed by subject experts from ZIMSEC:

- 62.4 per cent of the 10 184 pupils who completed Shona tests were achieving at or above the grade-appropriate level in **Shona** after completing Grade 2 in Zimbabwe
- 59.8 per cent of the 2 803 pupils who completed Ndebele tests were achieving at or above the grade-appropriate level in **Ndebele** after completing Grade 2 in Zimbabwe.

### Targets

In line with the Global Partnership for Education's objective to improve the quality of teaching in Grades 1 through to 7, MOESAC has selected the percentage of Zimbabwean pupils achieving at or above the grade-appropriate level in ZELA tests as an indicator by which to set targets for the Medium Term (to 2016). See Table 9.

**Table 9 Targets percentage of pupils achieving at or above the grade-appropriate level 2012 - 2016**

| Subject     | Baseline | 2014  | 2015  | 2016  |
|-------------|----------|-------|-------|-------|
| Mathematics | 45.2%    | 47.2% | 50.2% | 60.2% |
| English     | 46.8%    | 48.8% | 51.8% | 61.8% |

The distribution of pupils across achievement levels indicate that at the end of Grade 2, in all subject areas, a large minority are achieving above the grade-appropriate level.

While a proportion of pupils are yet to achieve the grade-appropriate level, intervention could have rapid and dramatic effects. This is a large group appear to be just below the level required, and also because rapid advances tend to be observable when pupils are starting to read.

## Conclusions

The observed differences in pupil performance on the tests of language and mathematics between sub-groups in Zimbabwe are similar to those from other studies in many countries regarding gender and location (urban versus regional).

In Southern Africa differences in gender performance are varied, with boys performing better in some school systems, and girls performing better in others.<sup>24</sup> However, it is important to consider, not just differences in performance, but also the direction and degree of differences in the system over time. For example, the 2011 SACMEQ working paper reported that gender differences in SACMEQ school systems did not change much between 2000 and 2007. Where boys performed better in 2000, they also performed better in 2007 and similarly with systems where girls performed better. This is unlike current patterns of gender differences in industrialised countries.<sup>25</sup>

At each stage of the ZELA cycle, the direction and magnitude of these differences will be able to be examined against the baseline.

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<sup>24</sup> Trends in the Magnitude and Direction of Gender Differences in Learning Outcomes, SACMEQ Working Paper September 2011. P11.

<sup>25</sup> Trends in the Magnitude and Direction of Gender Differences in Learning Outcomes, SACMEQ Working Paper September 2011. P11.

## Chapter 5 Predictors of performance on tests of language and mathematics at the beginning of Grade 3 in Zimbabwe

This chapter addresses the second research question of the study: *What are the relationships of the following groups of variables with performance on tests of language and mathematics at the beginning of Grade 3 in Zimbabwe?* It considers:

- Pupil background characteristics
- Teacher and teaching resources
- School funding and facilities

### Pupil background characteristics

This section examines the relationship between test scores and various pupil background characteristics. These include:

- Language of instruction and language spoken at home
- Number of books in the home
- Time spent working for the family
- The number of meals a day
- Whether the pupil attended an early Childhood Development Class
- Levels of parental education.

### Language of instruction and language spoken at home

The relationship between language spoken at home, language of instruction and performance on the English language test was examined. Figure 8 shows that, with the exception of English, pupils learning English through the medium of a language that is their first language, do not appear to perform significantly better or worse on English language tests than do those learning English through the medium of a second or third language.

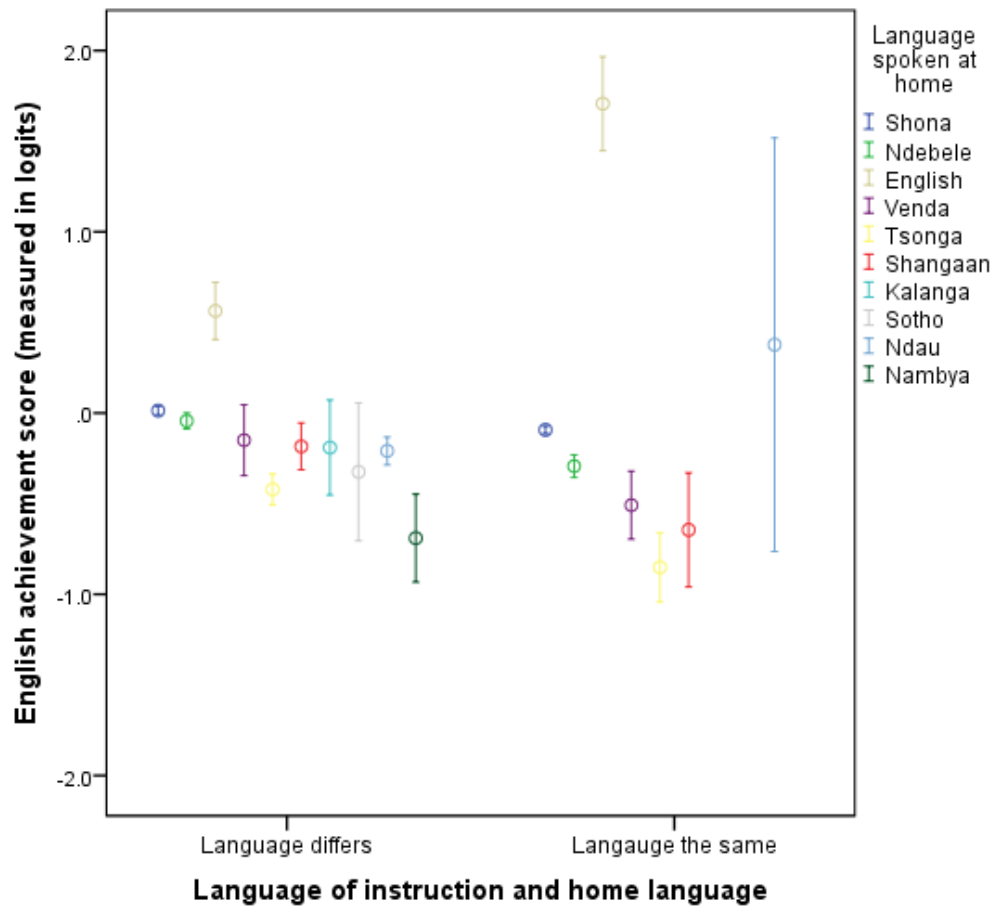


Figure 8 Average English achievement score for different language groups showing differences between those pupils whose language of instruction is or is not the same as the language they speak at home

### Number of books in the home

There is an association between the number of books in the home and pupil achievement levels on English and mathematics. (See Figure 9 for English.) On average, the more books in the home, the higher pupils achieve.

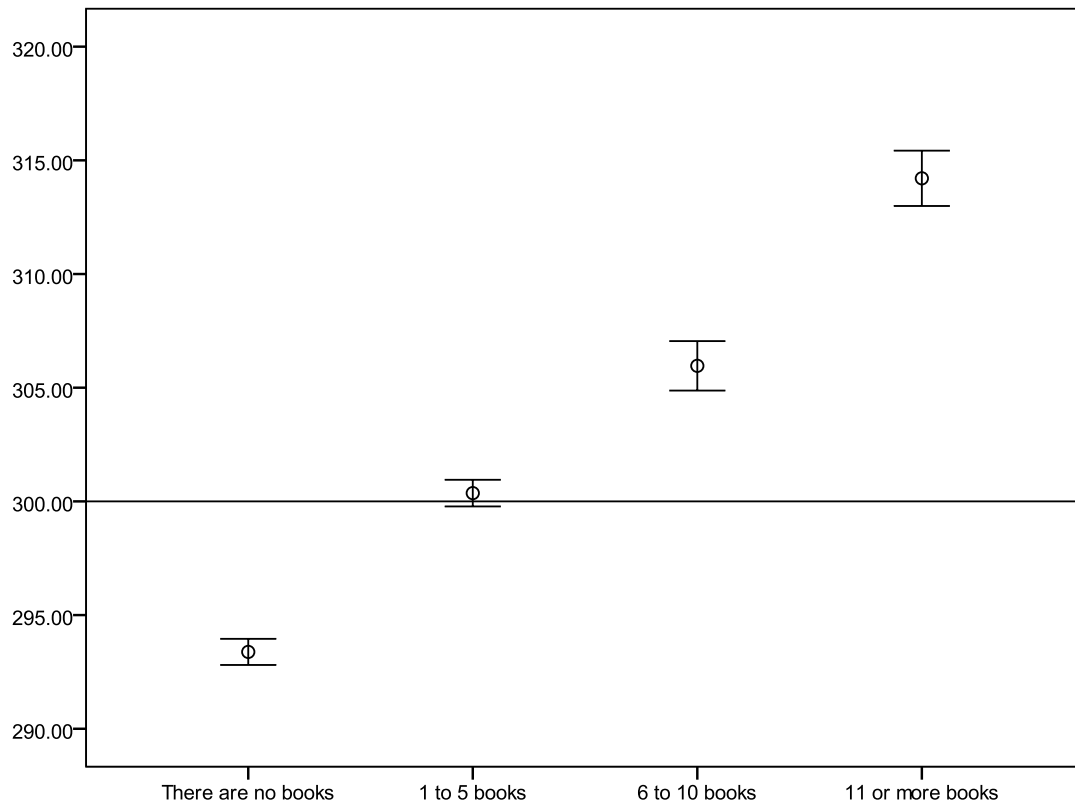


Figure 9 Average English achievement score according to home many books at home

### Time spent working for the family

There is an association between the amount of time spent working for the family each day and pupil achievement levels in English and mathematics. (See Figure 10 for English.) On average, the more time they spend, the lower pupils achieve, until they appear to reach a threshold at around two hours, beyond which achievement levels appear to be similar..

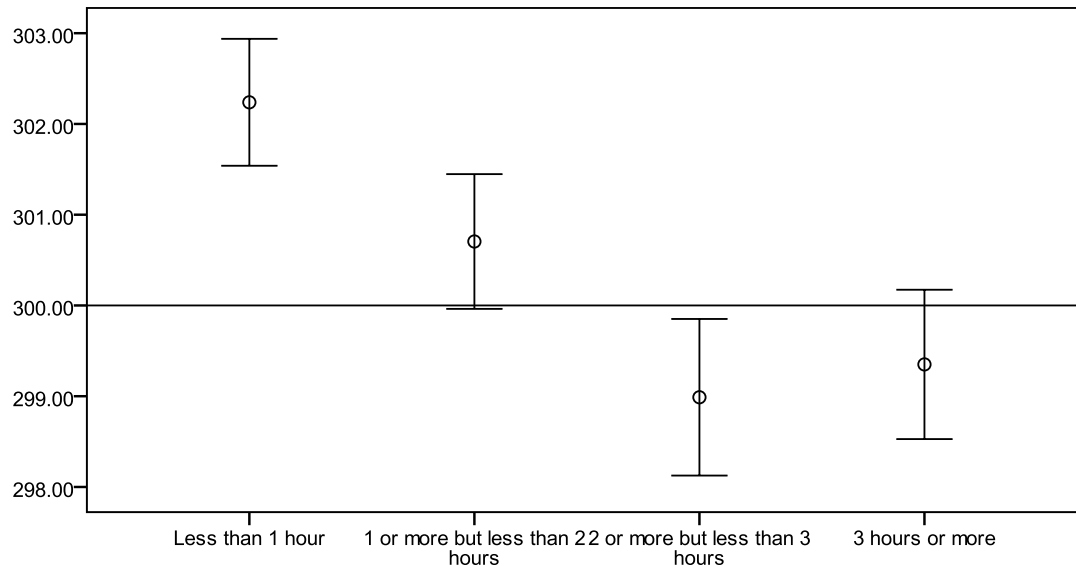


Figure 10 Average English achievement score according to the amount of time spent working for the family each day

### The number of meals a day

There is an association between the number of meals a pupil has each day and pupil achievement levels in English and mathematics. (See Figure 11 for mathematics.) On average, the more meals they have, the higher pupils achieve.

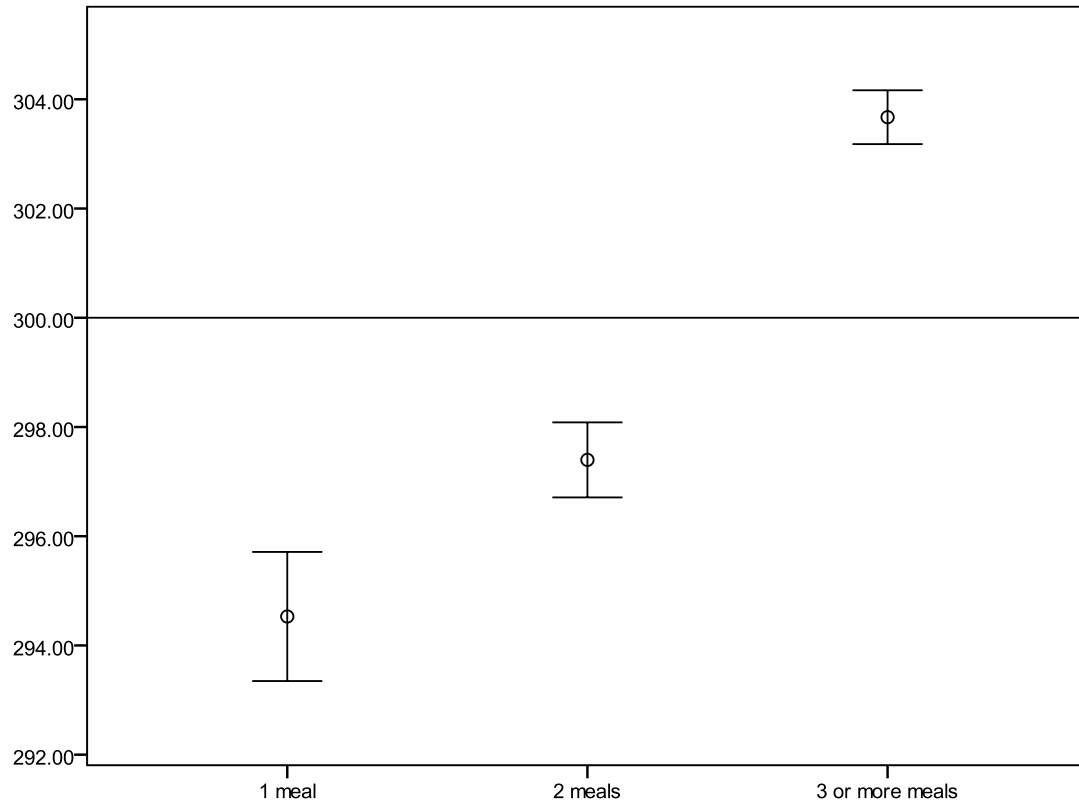


Figure 11 Average mathematics achievement score according to the number of meals each day

### Whether the pupil attended an early Childhood Development Class

There is an association between whether pupil attended an early Childhood Development Class and their achievement in English and mathematics. (See Figure 11 for mathematics.) On average, those who have attended achieve higher than those who have not.

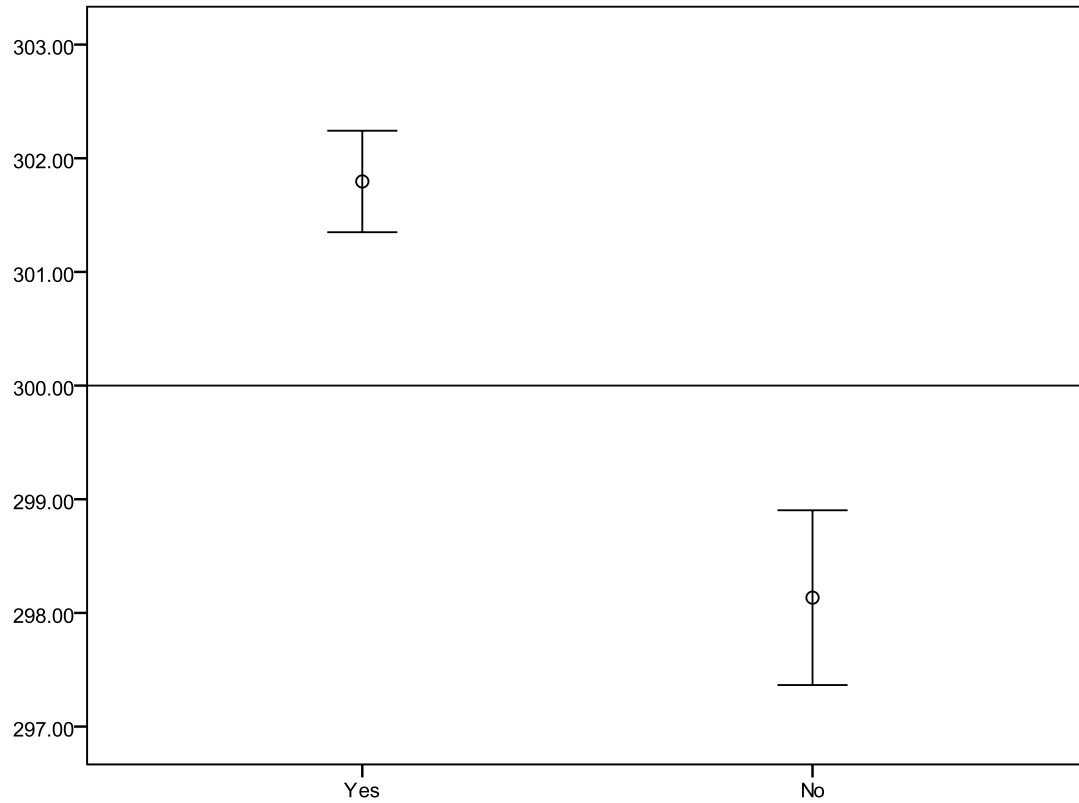


Figure 12 Average mathematics achievement score according to whether pupils were enrolled in an early Childhood Development Class

### Parental education levels

There is an association between parental educational levels and pupil achievement in English and mathematics. (See Figure 13 for mother's educational level and mathematics, and Figure 14 for father's educational level and mathematics.) On average, those who have attended achieve higher than those who have not.

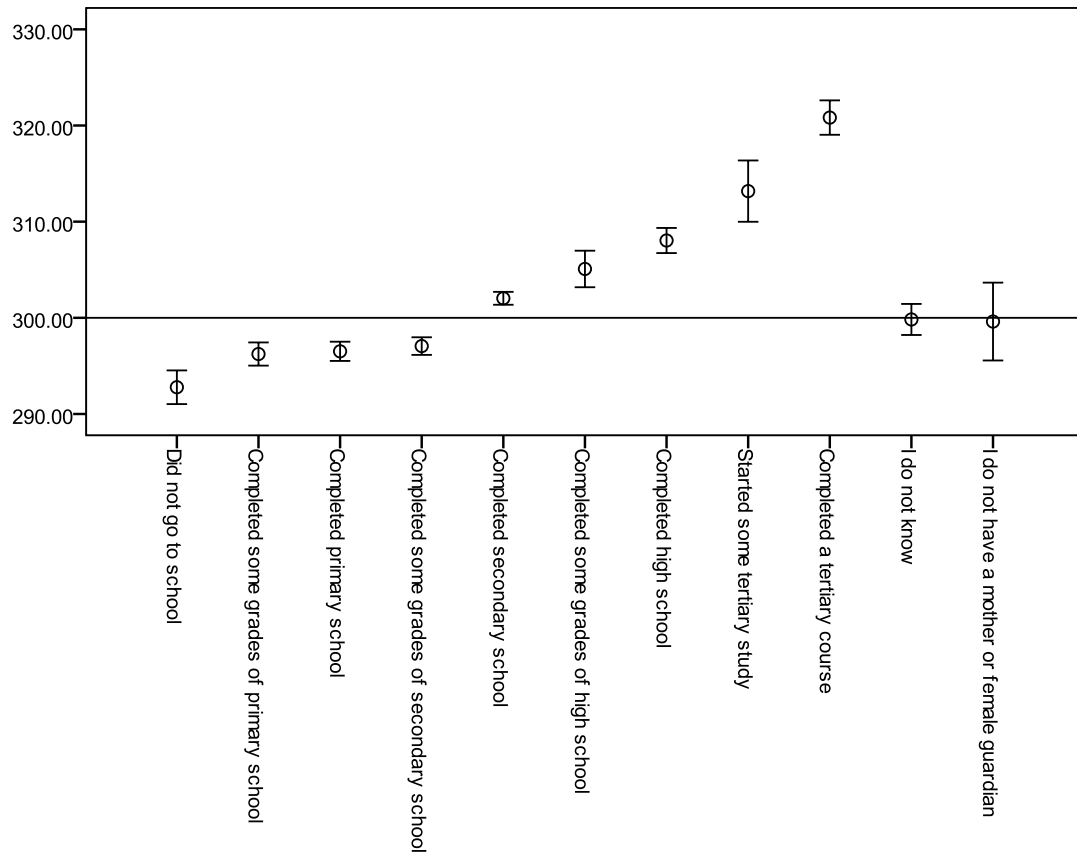


Figure 13 Average mathematics achievement score according to mother's highest level of education

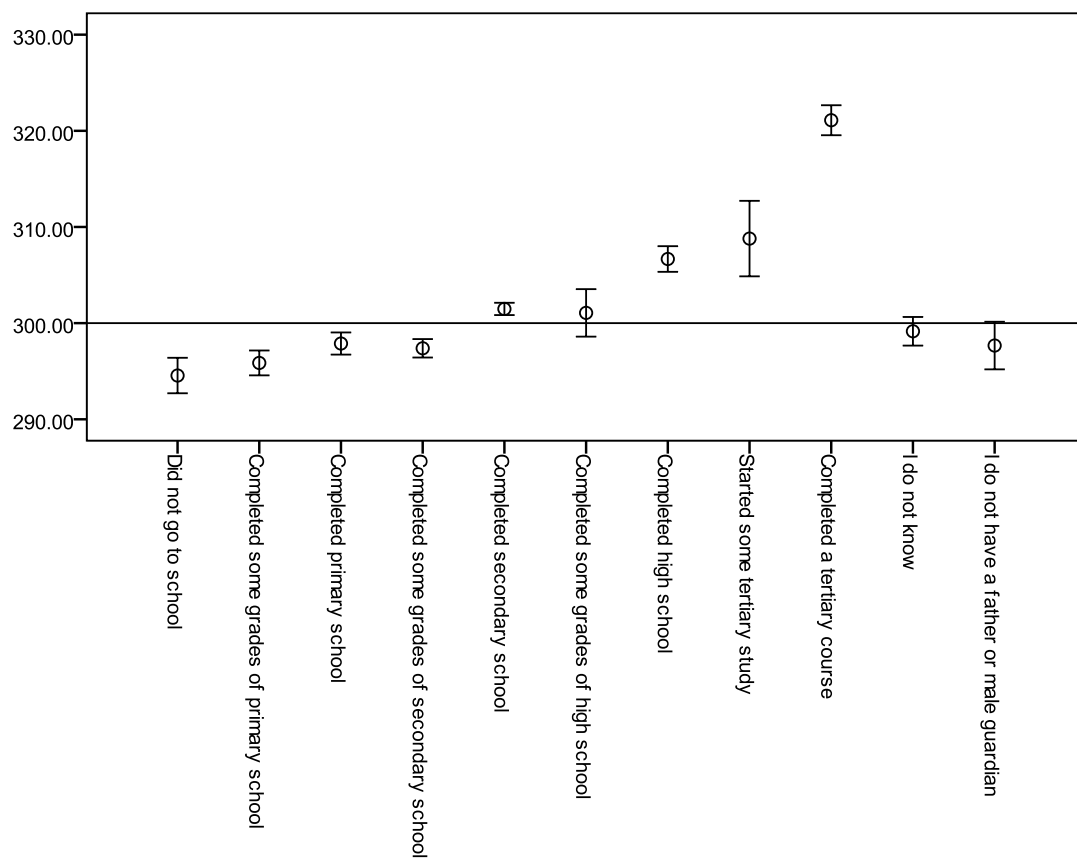


Figure 14 Average mathematics achievement score according to father's highest level of education

### The association between pupil background variables and achievement in English and mathematics

Table 10 shows the association between pupil background characteristics and achievement in English and mathematics. The two strongest predictors from this set of characteristics for English and for mathematics are the number of books in the home and the mother's educational level. The first of these is probably an indicator of the socio-economic status of the family. The finding that the mother's educational level has a stronger effect than father's is consistent with other findings in the research literature.

**Table 10 Correlations between various pupil background variables**

|  |                     | <b>English</b> | <b>Mathematics</b> |
|--|---------------------|----------------|--------------------|
| Q5 How many books are in your home                                 | Pearson Correlation | .281**         | .257**             |
|  | Sig. (2-tailed)     | .000           | .000               |
|  | N                   | 15290          | 15322              |
| Q8 Time spent working for family                                   | Pearson Correlation | -.050**        | -.050**            |
|  | Sig. (2-tailed)     | .000           | .000               |
|  | N                   | 15213          | 15241              |
| Q9 How many meals do you have a day                                | Pearson Correlation | .133**         | .144**             |
|  | Sig. (2-tailed)     | .000           | .000               |
|  | N                   | 15348          | 15387              |
| Q10 Have you been enrolled in an early Childhood Development Class | Pearson Correlation | -.069**        | -.065**            |
|  | Sig. (2-tailed)     | .000           | .000               |
|  | N                   | 15070          | 15100              |
| Q11 Highest level of education of mother (or female guardian)      | Pearson Correlation | .206**         | .182**             |
|  | Sig. (2-tailed)     | .000           | .000               |
|  | N                   | 15129          | 15110              |
| Q12 Highest level of education of father (or male guardian)        | Pearson Correlation | .147**         | .143**             |
|  | Sig. (2-tailed)     | .000           | .000               |
|  | N                   | 14859          | 14831              |

\*\* =statistically significant

### Teacher and teaching resources

There were only very weak or no associations found between pupil achievement levels and:

- the number of days teachers were absent on official school days

- the proportion of teachers with a teaching qualification in the school (due largely to the high proportion of teachers who have teaching qualifications)
- the proportion of teachers who had attended professional development.

### School resources

There was an association between schools size and pupil achievement, with larger schools having on average higher pupil achievement in English and mathematics achievement (Pearson's correlation of 0.24 and 0.28 respectively).

There was a very weak association between the school budget per student and achievement levels. Figure 15 shows that there is little, on average, difference between the lowest funded and highest funded schools for English achievement. The pattern was the same for mathematics, Ndebele and Shona.

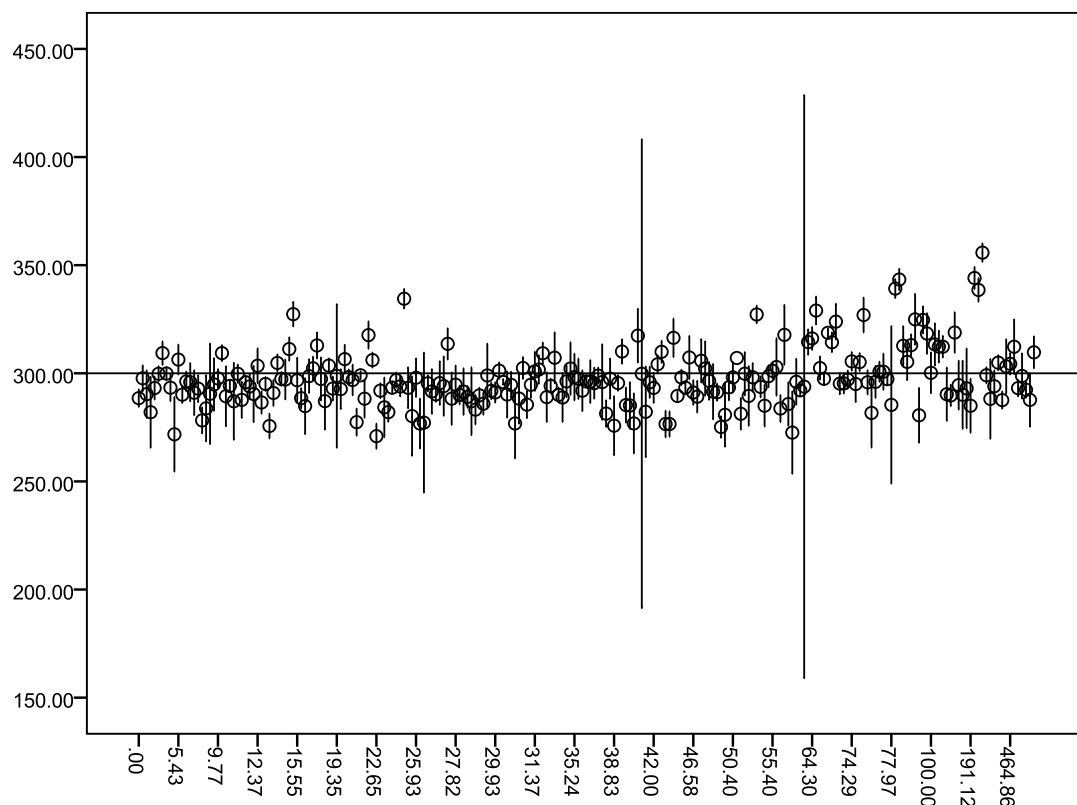


Figure 15 Average English achievement level by school budget per student

### Linking comment

The preliminary analyses reported in this chapter point to student background having some impact on student levels of achievement, but little from schools. However, these analyses are only indicative, and better, more sophisticated analyses can identify patterns in the data that otherwise might be hidden. It is to this end that the report turns now to the multi level modelling analysis of the data.

## Chapter 6 To what extent can improvement in test performance be attributed to the Education Transition Fund?

This chapter reports the third research question of the study; *To what extent can improvement in test performance be attributed to the Education Transition Fund?* Since only baseline data had been collected at the time this report was being written, it was not possible to answer this question. However, it was possible to use the data to identify the extent to which there is potential to identify the extent to which changes in Zimbabwe pupils' performance over time is attributable to the ETF program intervention. This is done by using multilevel modelling, which was applied to pupil performance data and responses to the questionnaires for pupils and school heads.

### Linking the data

As first step in the analysis, ZELA 2012 pupil performance data were linked to data from the pupil questionnaires and the school head questionnaires through school identification numbers that had been provided to schools. Of the 422 schools participating in ZELA 2012, some did not record an identification number and some recorded an identification number that was differed from the one in the pupil data. Thus data from only 247 schools could be linked. As this figure represents only 58.5% of schools in the sample, caution should be exercised in the interpretation of results from the multilevel modelling described in this chapter. Results reported here are preliminary only, and designed to highlight how they could be applied as part of the analysis once all data are available to the study.

### Possible influences on pupil performance

Figure 16 depicts an example of how pupil performance might be influenced by variables at the pupil level and by variables at the school level.

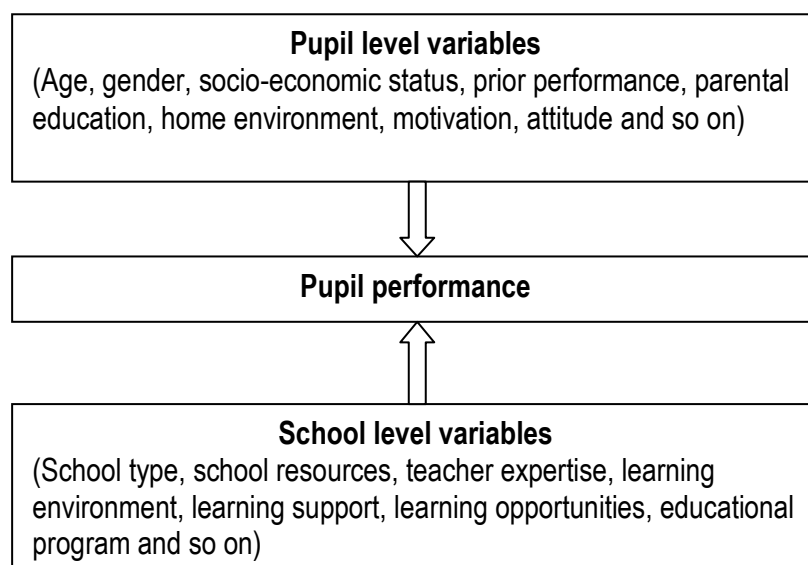


Figure 16 Possible influences on pupil performance

This example aligns with the theoretical model described in Chapter 3 (see input and output data).

The type of data collected has an hierarchical structure with pupils nested within schools. Because pupils within the same school share certain experiences, outcomes within schools might be more similar than outcomes between schools. Further, it is not only shared experiences within schools that are important. Pupils come from the same communities, and particular schools may select from within those communities, thus schools are likely to be more homogeneous on input as well as process. Multilevel modelling offers the opportunity to formulate explicitly and to test hypotheses that pertain to each of the two levels of the hierarchy (individual pupil level and school level). The variance components can be partitioned among different levels (in this case two) so that there can be an answer to the question: *What proportion of the total variation in pupil outcomes is explained by variables at two different levels?*, and further, *What characteristics of pupils and schools might explain this variation?*

One of the biggest predictors of pupil achievement is their ability. And so we would expect that a large proportion of variance will be explained at this, the pupil level. Pupil ability is, except from the most macro of perspectives (health, nutrition, ante-natal and post-natal care and so on), largely immune to policy changes. Pupils come to school with a more or less fixed amount of ability. Therefore, any variance that occurs at the school level is especially important because this can often be amenable to policy initiatives. That said, it is important to interpret between school variance with a sound understanding of the schooling system. If, for example, there are selective schools (either formally or informally), or the system creates tracks for pupils based on their achievement placing them in different schools, the amount of between school variance will be inflated compared with a system that does not stream or track pupils.

## Analysis

Analysis of the linked data was based on a two-level model: a within-school model at level 1 and a between-school model at level 2. The data were analysed using the multilevel modelling software HLM (Raudenbush, Bryk, & Congdon, 2004).<sup>26</sup>

Results from English and Mathematics tests were used for this preliminary analysis.

For each set of test data, three models were estimated:

1. An unconditional model without predictors (Model 0)
2. Model with pupil predictors added at level 1 (Model 1)
3. Model with pupil predictors at level 1 and school predictors added at level 2 (Model 2).

Pupil-level predictors used were:

- Age
- Gender
- Number of books at home
- Have TV at home

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<sup>26</sup> Raudenbush, S.W., Bryk, A.S., & Congdon, R. (2004). HLM 6 for Windows [Computer software]. Skokie, IL: Scientific Software International, Inc.

- Working for family
- Number of meals per day
- Early Childhood Development (ECD) class
- Parental education
- Computer as study material
- Calculator as study material.

School-level predictors used were:

- School sector
- Number of sessions
- Textbooks per pupil
- Budget per pupil
- Percentage of all teachers with professional development (PD)
- Percentage of mathematics teachers with professional development
- Percentage of reading teachers with professional development.

The unconditional model enables partitioning of the variance of performance scores into the within-school component and the between-school component. The intra-class correlation measures the degree of similarity of pupils within schools and is given by the proportion of total variance that is attributed to the between-school component. A high value of the intra-class correlation indicates a high degree of homogeneity within schools.

Table 11 and Table 12 display the parameter estimates for each of the three models for English and Mathematics, respectively.

Table 11 Model estimates for English performance

| Parameter                 | Model 0      | Model 1      | Model 2      |
|---------------------------|--------------|--------------|--------------|
| Fixed Effects             |              |              |              |
| Intercept                 | -0.90 (0.04) | -1.51 (0.07) | -1.56 (0.07) |
| Level 1 (Pupil Level)     |              |              |              |
| Age                       |              |              |              |
| Gender (Male=0, Female=1) |              | 0.18 (0.03)  | 0.18 (0.03)  |
| Books at home             |              | 0.11 (0.02)  | 0.11 (0.02)  |
| TV                        |              | 0.09 (0.03)  | 0.09 (0.03)  |
| Work for family           |              |              |              |
| Meals per day             |              | 0.12 (0.02)  | 0.12 (0.02)  |
| ECD                       |              |              |              |
| Parental education        |              | 0.12 (0.02)  | 0.12 (0.02)  |
| Computer                  |              |              |              |
| Calculator                |              | 0.16 (0.04)  | 0.16 (0.04)  |
| Level 2 (School Level)    |              |              |              |
| Private                   |              |              |              |
| Church                    |              |              | 0.27 (0.09)  |
| Sessions                  |              |              |              |
| Textbooks per pupil       |              |              |              |
| Budget per pupil          |              |              |              |
| PD All teachers           |              |              |              |
| PD Mathematics teachers   |              |              |              |
| PD Reading teachers       |              |              |              |
| Variance Components       |              |              |              |
| Within school             | 1.04         | 0.94         | 0.94         |
| Between schools           | 0.36         | 0.23         | 0.23         |
| Total                     | 1.40         | 1.17         | 1.17         |
| Intra-class correlation   | 0.26         |              |              |

Note: Standard Errors in Parentheses

Table 12 Model estimates for Mathematics performance

| Parameter                 | Model 0      | Model 1      | Model 2      |
|---------------------------|--------------|--------------|--------------|
| Fixed Effects             |              |              |              |
| Intercept                 | -1.34 (0.05) | -2.00 (0.07) | -2.13 (0.08) |
| Level 1 (Pupil Level)     |              |              |              |
| Age                       |              |              |              |
| Gender (Male=0, Female=1) |              | 0.16 (0.03)  | 0.16 (0.03)  |
| Books at Home             |              | 0.14 (0.02)  | 0.14 (0.02)  |
| TV                        |              | 0.15 (0.03)  | 0.14 (0.03)  |
| Work for family           |              |              |              |
| Meals per day             |              | 0.12 (0.03)  | 0.12 (0.03)  |
| ECD                       |              |              |              |
| Parental Education        |              | 0.14 (0.02)  | 0.14 (0.02)  |
| Computer                  |              |              |              |
| Calculator                |              | 0.17 (0.04)  | 0.17 (0.04)  |
| Level 2 (School Level)    |              |              |              |
| Private                   |              |              |              |
| Church                    |              |              | 0.29 (0.10)  |
| Sessions                  |              |              | 0.19 (0.08)  |
| Textbooks per pupil       |              |              |              |
| Budget per pupil          |              |              |              |
| PD All teachers           |              |              |              |
| PD Mathematics teachers   |              |              |              |
| PD Reading teachers       |              |              |              |
| Variance Components       |              |              |              |
| Within school             | 1.43         | 1.25         | 1.25         |
| Between schools           | 0.52         | 0.37         | 0.36         |
| Total                     | 1.95         | 1.62         | 1.61         |
| Intra-class correlation   | 0.27         |              |              |

Note: Standard Errors in Parentheses

The pupil-level variables that appear to influence pupil performance in English are:

- Gender
- Number of books at home
- Have TV at home

- Number of meals per day
- Parental education
- Calculator as study material.

The pupil-level variables that appear to influence pupil performance in Mathematics are the same as those listed above for English.

The school-level variables that appear to influence pupil performance are:

- School sector (English and Mathematics) – Church school
- Number of sessions (Mathematics only) – Two sessions.

These results cover most of what could be expected of an initial multi-level analysis. The estimates of the intra-class correlation are plausible, particularly if they are based on something approaching 'curriculum authentic' assessment of English and Mathematics. It is possible to trace an explanation of the total variance through the two subsequent models. So, for English  $(1.4-1.17)/1.4\% = 16.4\%$  of the total variance is explained by Model 1 (the pupil-level variables). Similarly for Mathematics  $(1.95-1.62)/1.95\% = 16.9\%$  of the total variance is explained by Model 1. This does not materially increase when the school-level variables are included, although one or two of this group of variables is statistically significant. The decrease in variance at both the pupil and school levels in Model 1 suggests that, in addition to explaining a meaningful proportion of the variance in achievement between pupils within schools, it appears that quite a high proportion of the between-schools variance is accounted for by these pupil differences. Among other possible explanations, these results suggest that there may be a considerable degree of local and regional selectivity in the sampled schools irrespective of the differences between the school systems (government, private, and church).

## Conclusions

These results show promise in terms of investigating ZELA's potential to identify the extent to which changes in Zimbabwe pupils' performance over time is attributable to the ETF program intervention.

The relatively high proportion of school-level variance at pre-test suggests that an intervention at the school level has got very clear 'space' to be effective, and give confidence that the effect will be detected. Two hypotheses suggested by these analyses are that:

1. An outcome of the intervention will be an increase in average achievement over the time of the intervention; and,
2. An outcome of the intervention will be a reduction in this proportion of school-level variance in achievement.

Determining this attribution is one of the main aims of the wider ETF evaluation study.

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## Appendices

## Appendix 1: National assessment programs

Table 13 through to Table 16 below accompany the text in Chapter 2, Section 6: *Comparison of national assessment programs*.

**Table 13 Classification of six national assessment programs on eight dimensions**

| Dimension | National Assessment Program  |  |  |  |   |                      |
|-----------|--|--|--|--|---|----------------------|
|           | MLA  | SACMEQ   | PASEC  | NAPLAN   | ENLA  | EGRA                 |
| Country   | 70 countries including 47 in Africa  | 15 countries in southern and eastern Africa: Botswana, Kenya, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, south Africa, Swaziland, Tanzania (mainland), Tanzania (Zanzibar), Uganda, Zambia, Zimbabwe | 12 francophone countries in Africa: Burkina Faso, Cameroon, republic of Congo, Cite d'Ivoire, Djibouti, Guinea, Madagascar, Niger, Central African Republic, Senegal, Togo | Australia  | Ethiopia  | General (world bank) |
| Purpose   | monitor the extent to which pupils acquire useful knowledge, reasoning ability, skills, and values, as laid out in article 4 of the world declaration on education for all | promote capacity- building by equipping educational planners with the technical ability to monitor and evaluate schooling and quality of education   | network for the sharing among francophone countries of information on educational evaluation instruments and results   | measure how schools and states are performing in literacy (reading, writing, spelling) and numeracy provide individual results to parents/pupils and schools | quality assurance provide information on pupil learning attainments and factors that determine those improvement of the system as a whole |                      |

*Table continued over the page...*

| Dimension                   | National Assessment Program         |                  |              |   |   |  |   |                                   |
|-----------------------------|-------------------------------------|------------------|--------------|---|---|--|---|-----------------------------------|
|                             | MLA                                 |                  | SACMEQ       | PASEC   |   | NAPLAN   | ENLA  | EGRA                              |
| Format                      | open and closed                     |                  | Closed       | open and closed<br>(test at beginning and end of the year)  |   | open and closed  | open and closed   | open                              |
| Population                  | Sample                              |                  | Census       | sample (teachers)<br>sample (pupils)  |   | Census   | sample  | sample                            |
| Grade                       | 4                                   | 8                | 6            | 2   | 5 | 3, 5, 7, 9   | 4, 8, 12  | 3                                 |
| Domain(s)                   | literacy<br>numeracy<br>life skills | maths<br>science | Subjects     | reading, vocabulary, some aspects of spelling and grammar, comprehension of sentences and texts and writing |   | literacy, numeracy   | English<br>mathematics<br>chemistry<br>physics<br>biology | reading fluency and comprehension |
| Pupils answer ... questions | Some                                |                  | Some         | All   |   | All  | all   | all                               |
| How results are reported    | grade, %                            |                  | published, % |   |   | published on <i>my school</i> website<br>report to parents, school reporting | % below basic, basic, proficient                          |                                   |

Table 14 Five national assessments that relate to grades 2/3

|        |   | Grade<br>[age] | Relevance | Test language        | Nature of test   | What is tested   |
|--------|---|----------------|-----------|----------------------|--|--|
| PASEC  | Africa<br>(francophone<br>countries)  | 2–6            | 2 & 3     | French               | open and closed items  | reading, vocabulary, aspects of spelling and grammar, comprehension of sentences and texts and writing |
| NAPLAN | Australia   | 3, 5, 7, 9     | 3         | English              | standardized written test  | literacy (spelling, comprehension something else), numeracy  |
| EGRA   | World<br>(already used in<br>Gambia, Senegal, Latin<br>America, The<br>Caribbean) | 3              | 3         | language of country  | various tasks including<br>timed one-minute<br>assessments of letter<br>naming, word reading,<br>and connected text<br>reading with<br>comprehension | reading fluency and comprehension  |
| ASER   | India   | [6–14 yrs]     | 2/3       | English<br>Swahili   | oral; visitation   | reading and arithmetic   |
| UWEZO  | East Africa<br>(Kenya, Tanzania and<br>Uganda)                                    | [7–16 yrs]     | 3         | Kiswahili<br>English | oral; visitation   | literacy and numeracy  |

Table 15 History of selected national and international assessments

| National assessment | Year of instigation /length of existence |
|---------------------|--|
| ASER                | 2005                                     |
| SICME               | 20 yrs                                   |
| NAPLAN              | 2008                                     |
| EGRA                | 2 yrs                                    |
| MLA                 | 1992                                     |
| SACMEQ              | i: 1995–1998; ii: 1999–2002              |
| PASEC               | 1991                                     |
| ENLA                | 1999                                     |
| UWEZO               | 2010                                     |
| PISA                | 2000                                     |
| TIMSS               | 1995                                     |
| PIRLS               | 2001                                     |

The shading in Table 15 separates the assessments that started in the early part of the 21<sup>st</sup> century from those that started at the end of the 20<sup>th</sup> century.

Table 16 Location of ZELA within the analytic framework used in this review

|                            |  |
|----------------------------|--|
| Country                    | Zimbabwe   |
| Grade                      | 2/3  |
| Purpose                    | Obtaining base-line data for research into whether the elf programme has had the desired effects |
| Format                     | Multiple-choice  |
| Population                 | Sample   |
| Domain(s)                  | Literacy (language and comprehension)<br>Mathematics (applications and operations)               |
| Pupils answer ...questions | All  |
| How results are reported   | On a common scale  |
| Test language              | English, Shona, Ndebele; Mathematics (in English only)   |
| Instigation                | 2012, after Early-Grade Learning Assessment Literacy Numeracy (EGLAN, 2010)                      |

## Appendix 2: Guides for parents, head teachers, and teachers

**Zimbabwe Early Learning Assessment (ZELA)**



Undertaken by the Zimbabwe Schools Examination Council (ZimSEC), in collaboration  
with the Australian Council *for* Educational Research (ACER)

Funded by the United Nations Children's Fund (UNICEF)

*A Guide for Parents*

### **What is the ZELA?**

The Zimbabwe Early Learning Assessment (ZELA) will test pupils from a sample of schools within Zimbabwe. The results from the test will provide data to assist with educational decision-making in Zimbabwe.

### **What is being tested?**

- How well children in Zimbabwe can read and understand simple text
- The mathematics skills of children in Zimbabwe at the end of Grade 2

In conjunction with the test, pupils will be asked to fill out a questionnaire.

### **Who sits for the test?**

Pupils who have been selected at random from a *sample* of schools with Grade 3 classes from all provinces in Zimbabwe

This means that not all schools will be involved.

### **Where do pupils go to sit for the test?**

Pupils go to their school.

### **When will the test be held?**

Pupil questionnaires will be administered by an independent Test Coordinator on:

- ❖ Tuesday, 6 March 2012

Questionnaires may require some input from parents. If this is the case, your child might come home from school on 6 March 2012 with some questions. These questions could relate to items about your home or your educational background. If you have any questions, please speak with the school teacher who will assist pupils in filling out the forms.

Test sessions will be administered by the same independent Test Coordinator on:

- ❖ Wednesday, 7 March 2012

### **Four papers just one test**

There will be four separate papers.

- 1) Literacy – *Language*
- 2) Literacy – *Comprehension*
- 3) Mathematics – *Operations*
- 4) Mathematics – *Applications*

Your child's teacher will explain to you what these terms mean.

Pupils must answer all the questions.

**What will the questions look like?**

There is a question and there are four possible answers. Here is an example from Mathematics.

$50 \div 5 = ?$

2  
 5  
 10  
 45

Pupils will be told to work out the right answer and then use a pencil to colour in the circle [○] beside the right answer it like this.

$50 \div 5 = ?$

2  
 5  
 10  
 45

Pupils must mark one answer only.

**What should pupils take into the test?**

- At least one sharp pencil
- One eraser

**What will be the language of the test?**

The literacy test will be in English and Shona or Ndebele.

The Mathematics test has symbols (+, −, ×, ÷) and not many words.

**How will the test be marked?**

The markers will give the pupil one mark for each correct answer, zero for questions not answered, and zero when the pupil provides more than one answer to a question.

**What happens to the results?**

Nobody will be able to find out *your child's* test score. The test does not count in the school achievement record. Your child will be an anonymous person in some research done by independent researchers to see how children in Zimbabwe are going with their language and mathematics after two years at school.

**What happens on the day?**

Please assist your child to arrive early so that s/he does not miss going into the room where the test is being held.

The independent Coordinator will give your child some instructions when s/he gets into the room.

Your child will have three 15-minute breaks during the test so that s/he can have a little rest, go to the toilet, and eat a small amount of food.

**How much time is allowed?**

Each of the four papers has a different amount of time allowed for your child to finish. The time for each paper will be between 15 and 20 minutes.

**Thank you for your assistance.**

**Zimbabwe Early Learning Assessment (ZELA)**



Undertaken by the Zimbabwe Schools Examination Council (ZimSEC), in collaboration  
with the Australian Council *for* Educational Research (ACER)

Funded by the United Nations Children's Fund (UNICEF)

***A Guide for Head Teachers***

### **What is the ZELA?**

The Zimbabwe Early Learning Assessment (ZELA) will test pupils from a sample of schools within Zimbabwe. The results from the test will provide information to assist with educational decision-making in Zimbabwe.

### **What is being tested?**

- How well pupils can read and understand simple text
- Pupil's mathematics skills at the end of Grade 2

In conjunction with the test, pupils will be asked to fill out a questionnaire.

### **Who sits for the test?**

Pupils who have been randomly selected from a *sample* of schools with Grade 3 classes from all provinces in Zimbabwe

This means that not all schools will be involved.

### **Where will pupils go to sit for the test?**

Pupils go to their school.

### **When will the test be held?**

A Head Teacher Questionnaire and a Pupil Questionnaire will be administered by an independent Test Coordinator on:

- ❖ Tuesday, 6 March 2012

The independent Test Coordinator will ask you to complete the Head Teacher Questionnaire in order to gather information on your school, including information on student enrolments, teaching staff, school facilities and resources. It is important to note that these results will not be reported on at a school level, and will not influence resource allocation to *your school*.

If you have more than one Grade 3 class, the Coordinator will select which class should be tested, using a pre-determined formula. The Coordinator will then administer the Pupil Questionnaire to the pupils within that class and will administer the tests to the same class the following day. Completion of the Pupil Questionnaire may require some input from parents. If this is the case, pupils may go home from school on 6 March 2012 with some questions for their parents. These questions might relate to their home and parents' education. Please ask teachers to assist pupils in gathering this information. Teachers may assist pupils in filling out the questionnaires.

Test sessions will be administered by the same independent Test Coordinator on:

- ❖ Wednesday, 7 March 2012

Teachers may not assist pupils in completing their tests. The independent Test Coordinator will administer the tests. No input from the teacher is allowed.

**Four papers just one test**

There will be four separate papers.

- 1) Literacy – *Language* (Paper A)
- 2) Literacy – *Comprehension* (Paper B)
- 3) Mathematics – *Operation*. (Paper C)
- 4) Mathematics – *Application* (Paper D)

Pupils will be told to answer all the questions.

**What will the questions look like?**

Teachers should ensure that pupils are familiar with the question format *before* the day of the test.

There is a question and there are four possible answers.

Here is an example from Mathematics.

|                          |
|--------------------------|
| $50 \div 5 = ?$          |
| <input type="radio"/> 2  |
| <input type="radio"/> 5  |
| <input type="radio"/> 10 |
| <input type="radio"/> 45 |

Pupils are to work out the right answer and then use a pencil to colour in the circle [] beside the right answer like this.

Pupils must mark one answer only.

|                                     |
|-------------------------------------|
| $50 \div 5 = ?$                     |
| <input type="radio"/> 2             |
| <input type="radio"/> 5             |
| <input checked="" type="radio"/> 10 |
| <input type="radio"/> 45            |

**What should pupils take into the test?**

- At least one sharp pencil (preferably HB)
- One eraser

A supply of pencils and erasers should be on hand for pupils who do not come prepared.

**What will be the language of the test?**

The Literacy test will be in English and Shona or Ndebele

The Mathematics test has symbols (+, −, ×, ÷) and not many words.

**How will the test be marked?**

Pupils get one mark for each correct answer, zero for questions left out, and zero if they give more than one answer to a question.

**What happens to the results of the test?**

Nobody will be able to find out *your school's* test score. The test does not count in the school achievement record. Each pupil will be an anonymous person in some research done by independent researchers to see how children in Zimbabwe are going with their language and mathematics after two years at school.

**What happens on the day?**

Teachers should advise pupils to arrive early so that they do not miss going into the room where the test is being held.

The independent Coordinator will give pupils some instructions when they get into the room.

Pupils will have a 15-minute break between papers A and B and between papers C and D so that they can have a little rest, go to the toilet, and have a small amount of food.

The first paper (Paper A) (with answers) will be taken from pupils by the supervisor so that pupils cannot change their answers after talking to friends over the break. When pupils return to the room they will get a second Literacy paper (Paper B).

You, the Head Teacher, are to decide how much time to leave before pupils at your school start their mathematics papers. A break of at least 30 minutes is recommended.

As is the case for Literacy, the first paper of Mathematics (Paper C) (with answers) will be taken from pupils by the supervisor so that pupils cannot change their answers after talking to friends over the break. When pupils return to the room they will get a second Mathematics paper (Paper D).

**How much time is allowed?**

A different amount of completion time is assigned to each of the four papers. The time for each paper will be between 15 and 30 minutes.

**Thank you for your assistance. It is greatly appreciated.**

## Zimbabwe Early Learning Assessment (ZELA)



Undertaken by Zimbabwe Schools Examination Council (ZimSEC), in collaboration with the Australian Council *for* Educational Research (ACER).

Funded by the United Nations Children's Fund (UNICEF)

*A Guide for Teachers*

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## Zimbabwe Early Learning Assessment

### Guide for Teachers

#### What is the ZELA?

The Zimbabwe Early Learning Assessment will test pupils from a sample of schools within Zimbabwe. The results from the test will provide data to assist with educational decision-making in Zimbabwe.

#### What is being tested?

- How well pupils can read and understand simple text
- Pupil's mathematics skills at the end of Grade 2

#### Who sits for the test?

Pupils who have been selected from a *sample* of schools with Grade 3 classes from all provinces in Zimbabwe.

This means that not all schools will be involved.

#### Where will pupils go to sit for the test?

Pupils go to their school.

#### When will the test be held?

Pupil questionnaires will be administered by an Independent Test Coordinator on:

- ❖ Tuesday, 6 March 2012

Questionnaires may require some input from parents. If this is the case, pupils may go home from school on 6 March 2012 with some questions for their parents. These questions may relate to items in the home or parent educational background. Please assist pupils in gathering this information and speak to parents to assist with this process. You may assist pupils to fill out the questionnaires.

Test sessions will be administered by the same Independent Test Coordinator on:

- ❖ Wednesday, 7 March 2012

You are not able to assist pupils with completing the tests. The Independent Test Coordinator will administer the tests. No input should be given by the teacher.

#### Four papers just one test

There will be four separate papers.

- 1) Literacy – *Language*
- 2) Literacy – *Comprehension*
- 3) Mathematics – *Operations*
- 4) Mathematics – *Applications*

Pupils will be told to answer all the questions.

**What questions will look like**

There is a question and there are four possible answers. Here is an example from Mathematics.

|   |
|---|
| $50 \div 5 = ?$<br><input type="radio"/> 2<br><input type="radio"/> 5<br><input type="radio"/> 10<br><input type="radio"/> 45 |
|---|

Pupils should work out the right answer and then use a pencil to colour in the circle [○] beside it like this.

|  |
|--|
| $50 \div 5 = ?$<br><input type="radio"/> 2<br><input type="radio"/> 5<br><input checked="" type="radio"/> 10<br><input type="radio"/> 45 |
|--|

Pupils can only mark one answer.

**What will be the language of the test?**

The literacy test will be in English and Shona or Ndebele.

The Mathematics test has symbols (+, −, ×, ÷) and not many words.

**How will we mark the test?**

The markers will give a pupil one mark for each correct answer, zero for questions left out, and zero when pupils give more than one answer to a question.

**What happens to the results?**

Nobody will be able to find out *your school's* test score. The test does not count in the school achievement record. Each pupil will be an anonymous person in some research done by independent researchers to see how children in Zimbabwe are going with their language and mathematics after two years at school.

**What to expect on the day**

Please advise pupils to arrive early so that they do not miss going into the room where the test is being held.

The Independent coordinator will give pupils some instructions when they get into the room.

Pupils will have a 15-minute break between papers A and B and between C and D so that pupils can have a little rest, go to the toilet and have a small amount of food.

The first paper (with answers) will be taken from pupils by the supervisor so pupils cannot change their answers after talking to friends over the break.

When pupils return to the room they will get another paper.

**How much time is allowed?**

A different amount of completion time is assigned to each of the four tests. Each paper will be between 15 and 30 minutes.

**Thank you for your assistance. It is greatly appreciated.**

## Appendix 3: Test Specifications

### 1. Description of the Zimbabwe Early Learning Assessment

- 1.1 The Zimbabwe Early Learning Assessment (ZELA) comprises two tests, ZELA Mathematics and ZELA English.
- 1.2 ZELA is a curriculum-based achievement test (i.e., one that tests knowledge, processes and skills learned in the curriculum).
- 1.3 The Mathematics test (paper) comprises 40 multiple-choice questions (MCQs). Twenty (20) MCQs test the sub-domain Operations (i.e., basic arithmetic) and 20 MCQs test the sub-domain Application (i.e., the application of operational skills to real-life contexts). Time allowed for the Mathematics paper is 70 minutes.
- 1.4 The English test (paper) comprises 40 MCQs. Twenty-three (23) MCQs test the sub-domain Language and 17 test the sub-domain Comprehension. Time allowed for the English paper is 60 minutes.

### 2. Test population

- 2.1 A random sample of 700 students selected from 500 schools in Zimbabwe in which there is a Grade 3 class, with probability proportional to size and taking account of the following: schools from urban and rural communities; independent and government schools; single-sex schools and coeducational schools; day schools and boarding schools; all provinces in Zimbabwe; a mixture of English-speaking school communities and communities for whom English is a second, third or fourth language for many; small, medium and large schools

### 3. Marking

- 3.1 Pupils select one of four options as the answer to the question and use their pencils to put a cross (×) inside the corresponding circle situated beside or under the question (i.e., on the paper not on a separate answer sheet).
- 3.2 Test developers verify keys.
- 3.3 Data entry operators use templates to enter the pupil's response – A, B, C, D, O (if there is no answer given), or 8 (if there is more than one answer given).
- 3.4 Data on pupil responses are collected and exported into a suitable file for marking and analysis.
- 3.5 A correct response scores one mark. Each incorrect response scores zero. Unattempted items and items with more than one response also score zero. There is no penalty for an incorrect response or for no response. The total “worth” of MCQ items on one test is 40.

### 4. Content and construct

- 4.1 The Mathematics paper covers a wide range of the knowledge and skills set down in the Grade 2 textbook, New Primary Mathematics.
- 4.2 The English paper covers a wide range of the knowledge and skills set down in the Grade 2 textbook, New Primary English.
- 4.3 The learning outcomes that are sampled in any instance of the ZELA are mapped on to syllabus content.
- 4.4 The validity of all items is checked at each stage of their development. All items are examined by expert panels.
- 4.5 MCQs are piloted on a population that closely resembles the Grade 3 population of Zimbabwe.
- 4.6 Selection of items from a viable set of items is undertaken using a construction matrix (or grid or table) to ensure range and balance of items across any version of the test.
- 4.7 There will be pupils who, solely by virtue of their backgrounds, approach the test differently equipped. A highly desirable property of a good item on a ZELA test is that pupils of different backgrounds are not necessarily advantaged or disadvantaged with regard to achievement on it.
- 4.8 The total score on the tests is a measure of student achievement in the knowledge and skills set down in the Grade 2 textbooks for English and Mathematics.

## **5. Dissemination**

- 5.1 No version of ZELA is released into the public domain.
- 5.2 Stringent security procedures are applied during all phases of test development, administration and scoring.

## **6. Outputs**

- 6.1 Total score on Mathematics test
- 6.2 Total score on English test
- 6.3 Total score on Shona and Ndebele tests (excluded from analyses)

## **7. Processes**

- 7.1 Item development
- 7.2 Panelling and trialling
- 7.3 Item banking
- 7.4 Test construction
- 7.5 Test administration
  - 7.5.1 Printing and dispatch

- 7.5.2 Security
- 7.5.3 Observations
- 7.5.4 Cheating
- 7.5.5 Special consideration
- 7.5.6 Data capture

## **8. Quantitative analyses**

- 8.1 Distribution of scores
- 8.2 Difficulty
- 8.3 Discrimination
- 8.4 Item functioning, classical item analysis and item response modelling
- 8.5 Reliability
- 8.6 Other as appropriate (e.g., omit analysis, factor analysis)

## **9. Manuals and handbooks**

- 9.1 Manual for school coordinators/test administrators
- 9.2 School Head guide
- 9.3 Teacher guide
- 9.4 Parent guide

## **10. Outputs**

- 10.1 Test scores for analysis of associations of academic achievement and student background characteristics, teacher quality and training, and funding and facilities (obtained from questionnaires for School Heads, teachers and parents)
- 10.2 Individual student scores are not made available to any person or agency.
- 10.3 The key output is the ZELA 2012 Psychometric Report.

## Appendix 4 Method

Two research questions are addressed in this report. Each relate to the base-line study:

- How do early-grade Zimbabwe pupils perform in tests of language and mathematics?
- Is it possible to identify pupil-level and school-level variables that influence test performance?

This chapter describes the procedures used to gather the data used to address these questions. It covers sampling, characteristics of the achieved sample, instrumentation, collection, collation and presentation of data, and the analysis techniques.

### Sampling

The target population was pupils in Grade 3 in Zimbabwe. A representative sample of Zimbabwean pupils in Grade 3 was drawn across the whole country. The sampling process yielded approximately 16,500 pupils in about 500 schools out of a population of around 5,600 schools. All ten provinces of Zimbabwe are represented in this sample. Two provinces were classified as predominantly urban (Harare and Bulawayo) and the other eight provinces as predominantly rural. For three provinces (Bulawayo, Matabeleland North, and Matabeleland South) the main language of instruction was classified as Ndebele and for the remaining seven provinces the main language of instruction was classified as Shona. Figure 17 is a map of Zimbabwe showing the ten provinces.

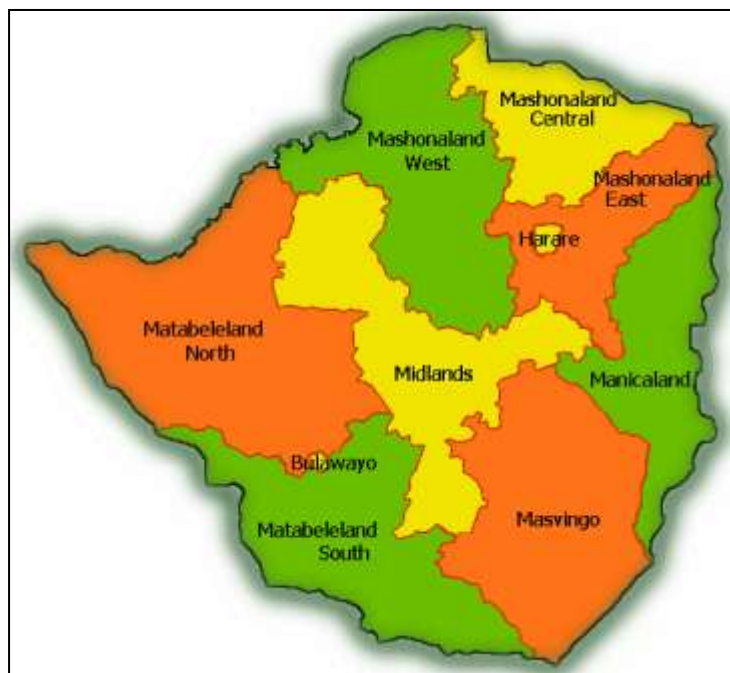


Figure 17 Map of Zimbabwe with provinces

The sampling was stratified by province, and by school type with Mother and Satellite schools over represented in the sample, and with Registered schools under represented. (Consequently, the data needed to be weighted back ahead of analyses provide estimates at the national level so that the proportions in the sample were equivalent to the proportion in the population across

Zimbabwe.) Table 17 shows the proportion and number of schools in the population, and the proportion and number of schools in the sample as it was drawn.

Table 17 Population compared with sample, by school type

| School type        | Population                      |                   | Sample   |                   |
|--------------------|---------------------------------|-------------------|--|-------------------|
|                    | Proportion of Grade 3 enrolment | Number of schools | Proportion of Grade 3's expected in the sample | Number of schools |
| Mother             | 11.4%                           | 559               | 31.5%  | 140               |
| Registered         | 78.3%                           | 4,307             | 46.3%  | 220               |
| Satellite          | 10.2%                           | 800               | 22.2%  | 140               |
| Missing            | 0.1%                            | 2                 |  |                   |
| <b>Grand Total</b> | <b>100.0%</b>                   | <b>5668</b>       | <b>100.0%</b>                                  | <b>500</b>        |

Table 18 shows the proportion and number of schools in the population, and the proportion and number of schools in the sample as it was drawn within each province.

Table 18 Population compared with sample, by province

| School type by province | Population                      |                   | Sample  |                   |
|-------------------------|---------------------------------|-------------------|---|-------------------|
| Mother                  | Proportion of Grade 3 enrolment | Number of schools | Proportion of Grade 3s expected in the sample | Number of schools |
| Bulawayo                | 0.4%                            | 2                 | 0.7%  | 1                 |
| Harare                  | 0.7%                            | 3                 | 1.6%  | 2                 |
| Manicaland              | 10.8%                           | 56                | 10.9%   | 15                |
| Mashonaland Central     | 13.5%                           | 66                | 16.4%   | 22                |
| Mashonaland East        | 7.2%                            | 46                | 6.1%  | 9                 |
| Mashonaland West        | 20.6%                           | 113               | 23.1%   | 32                |
| Masvingo                | 16.5%                           | 96                | 12.8%   | 19                |
| Matabeleland North      | 9.9%                            | 54                | 11.4%   | 15                |
| Matabeleland South      | 7.7%                            | 51                | 6.0%  | 9                 |
| Midlands                | 12.7%                           | 72                | 11.2%   | 16                |
| <b>Grand Total</b>      | <b>100.0%</b>                   | <b>559</b>        | <b>100.0%</b>                                 | <b>140</b>        |

Table 19 shows the proportion and number of Registered schools in the population, and the proportion and number of schools in the sample as it was drawn within each province. Table 20 provides the same information for Satellite schools only.

Table 19 Population compared with sample, by province for Registered schools only

| School type by province | Population                      |                   | Sample  |                   |
|-------------------------|---------------------------------|-------------------|---|-------------------|
| Registered              | Proportion of Grade 3 enrolment | Number of schools | Proportion of Grade 3s expected in the sample | Number of schools |
| Bulawayo                | 3.5%                            | 123               | 5.6%  | 11                |
| Harare                  | 6.3%                            | 208               | 12.8%   | 25                |
| Manicaland              | 17.1%                           | 731               | 16.4%   | 36                |
| Mashonaland Central     | 8.3%                            | 318               | 8.8%  | 18                |
| Mashonaland East        | 12.8%                           | 558               | 12.1%   | 27                |
| Mashonaland West        | 9.3%                            | 396               | 9.3%  | 21                |
| Masvingo                | 13.1%                           | 589               | 10.8%   | 25                |
| Matabeleland North      | 7.4%                            | 400               | 4.8%  | 13                |
| Matabeleland South      | 7.7%                            | 391               | 5.0%  | 13                |
| Midlands                | 14.5%                           | 593               | 14.4%   | 31                |
| <b>Grand Total</b>      | <b>100.0%</b>                   | <b>4307</b>       | <b>100.00%</b>                                | <b>220</b>        |

Table 20 Population compared with sample, by province for Satellite schools only

| School type by province | Population                      |                   | Sample  |                   |
|-------------------------|---------------------------------|-------------------|---|-------------------|
| Satellite               | Proportion of Grade 3 enrolment | Number of schools | Proportion of Grade 3s expected in the sample | Number of schools |
| Bulawayo                | 0.2%                            | 2                 | 0.5%  | 1                 |
| Harare                  | 0.7%                            | 3                 | 1.1%  | 1                 |
| Manicaland              | 8.1%                            | 61                | 9.2%  | 12                |
| Mashonaland Central     | 14.9%                           | 105               | 15.6%   | 20                |
| Mashonaland East        | 5.9%                            | 55                | 5.4%  | 8                 |
| Mashonaland West        | 26.6%                           | 191               | 26.2%   | 35                |
| Masvingo                | 20.7%                           | 158               | 20.3%   | 28                |
| Matabeleland North      | 9.1%                            | 77                | 10.0%   | 14                |
| Matabeleland South      | 4.1%                            | 60                | 2.8%  | 8                 |
| MIDLANDS                | 9.7%                            | 88                | 9.0%  | 13                |
| <b>Grand Total</b>      | <b>100.0%</b>                   | <b>800</b>        | <b>100.0%</b>                                 | <b>140</b>        |

Table 21 shows the proportion and number of schools in the population, and the proportion and number of schools in the sample as it was drawn by school type and location (urban and rural).

Table 21 Population compared with sample, by school type and urban/rural status

| School type             | Rural / Urban | Population                      |                   | Sample  |                   |
|-------------------------|---------------|---------------------------------|-------------------|---|-------------------|
|                         |               | Proportion of Grade 3 enrolment | Number of schools | Proportion of Grade 3s expected in the sample | Number of schools |
| <b>Mother</b>           | missing       | 0.5%                            | 4                 | 0.77%   | 1                 |
|                         | Rural         | 98.4%                           | 550               | 97.0%   | 136               |
|                         | Urban         | 1.1%                            | 5                 | 2.3%  | 3                 |
| <b>Mother Total</b>     |               | <b>100.0%</b>                   | <b>559</b>        | <b>100.0%</b>                                 | <b>140</b>        |
| <b>Registered</b>       | missing       | 1.0%                            | 55                | 0.6%  | 2                 |
|                         | Rural         | 89.2%                           | 3921              | 81.0%   | 182               |
|                         | Urban         | 9.8%                            | 331               | 18.4%   | 36                |
| <b>Registered Total</b> |               | <b>100.0%</b>                   | <b>4307</b>       | <b>100.0%</b>                                 | <b>220</b>        |
| <b>Satellite</b>        | Rural         | 99.1%                           | 795               | 98.4%   | 138               |
|                         | Urban         | 0.9%                            | 5                 | 1.6%  | 2                 |
| <b>Satellite Total</b>  |               | <b>100.0%</b>                   | <b>800</b>        | <b>100.0%</b>                                 | <b>140</b>        |

### Instrumentation

A set of evaluative tools was produced. The set, referred to as the “ZELA 2012”, was made up of the following components:

- Multiple-choice tests to gather information on pupil performance in mathematics and language at the beginning of Grade 3;
- Pupil questionnaires to gather information on contextual variables; and,
- School Head questionnaires to gather information on school-level variables.

Tests were administered in English, Mathematics (administered in English), Ndebele and Shona. Questionnaires were printed in English but conveyed to pupils orally in Ndebele and Shona by teachers if required.

### Multiple-Choice Tests

The test domains were mathematics and language, including English as well as two African languages, Ndebele and Shona. Tests were constructed in Zimbabwe in February 2012, by a panel of ZimSEC subject specialists and curriculum managers.

The 2012 administration of ZELA was at the beginning of Grade 3 rather than at the end of Grade 2 thus raising issues about the content of the tests and the difficulty of the items on the test. The timeline for test development was very compressed.

The aim of the ZELA *Mathematics test* is to establish a base-line to allow for the tracking of changes (anticipated to be improvements) over time. The test, ZELA Mathematics 2012, is a curriculum-based test designed to assess achievement of pupils at the beginning of Grade 3 in

mathematical operations and application. It is a test of subject Mathematics. The test consisted of 40 multiple-choice questions to be completed in 70 minutes. Questions 1–20 were deemed to be testing mathematical operations. Questions 21–40 were deemed to be testing the application of basic numeracy skills.

The ZELA *Language test* was administered in the context of the current policy, which is that children in Zimbabwe are to be introduced to English as a second language from Grade 1. They are to be taught in their Mother Tongue in Grades 1 to 3 and thereafter in English with the proviso that Shona and Ndebele can be used as languages of instruction where they would facilitate comprehension of concepts.

The test, ZELA English 2012, was designed to assess the achievement of pupils at the beginning of Grade 3 in English language and comprehension. It is a test of subject English. The test consisted of 40 multiple-choice questions to be completed in 60 minutes. Questions 1–23 were deemed to be testing language. Questions 24–40 were deemed to be testing comprehension.

Tests were also produced in Shona and Ndebele in parallel with the English test. The test items were not simply translations of the English versions. They were created in parallel so as to ensure that the same concepts or syllabus outcomes were being tested at the same level of difficulty.

#### Test development

Test development proceeded in 17 stages, as follows:

1. Create items
2. Refine items (review, revise and pilot)
3. Classify viable items (as in banking on a small scale)
4. Select items from set of viable items
5. Monitor collection of items
6. Edit and approve graphics
7. Present items as a balanced test according to recognised rules
8. Create parallel forms of the language test in Ndebele and Shona and ensure comparability
9. Reflect on test composition and lay-out
10. Produce tests (print after scrutiny)
11. Dispatch tests according to logistical plan
12. Administer tests in secure environment
13. Collect pupil response data
14. Code responses
15. Score test according to item code
16. Analyse results of test (e.g., scale)
17. Report on test (e.g., reliability, dimensionality)

Key stages are now described.

Sixty (60) items each for English and mathematics were produced in Australia. All items were generated with reference to the curriculum in Zimbabwe.

Items were validated by panels of subject experts in Zimbabwe, some of whom travelled to Harare from other locations for the work (which was undertaken over four days including a weekend). The test items, written in English, were reviewed by experts in English, Shona and Ndebele, all of whom were considered to be experts in Language in general.

Each panellist for English was provided with a grid to complete (see extract in Table 22). At the end of the first panelling session the Language reviewers produced individual matrices, although some reviewers did not have time to complete the task.

Each panellist for Mathematics was provided with a matrix to complete (see extract in Table 23). At the end of the first panelling session the Mathematics reviewers provided a consolidated matrix.

Table 22 Extract from test construction grid, English

| Item # | Graphic | Key | Curriculum Element | Test |   | Difficulty |   |   | Recommended action |        |        |
|--------|---------|-----|--------------------|------|---|------------|---|---|--------------------|--------|--------|
|        |         |     |                    | A    | B | E          | M | H | Accept             | Revise | Reject |
| 1      | ×       | C   | Past tense         | ✓    |   | ✓          |   |   | ✓                  |        |        |
| 2      |         |     |                    |      |   |            |   |   |                    |        |        |
| 3      |         |     |                    |      |   |            |   |   |                    |        |        |

Table 23 Extract from test construction grid, Mathematics

| Item # | Graphic | Key | Curriculum Element | Test |   | Difficulty |   |   | Recommended action |        |        |
|--------|---------|-----|--------------------|------|---|------------|---|---|--------------------|--------|--------|
|        |         |     |                    | C    | D | E          | M | H | Accept             | Revise | Reject |
| 1      | ✓       | D   | Mass               |      | ✓ |            |   | ✓ |                    | ✓      |        |
| 2      |         |     |                    |      |   |            |   |   |                    |        |        |
| 3      |         |     |                    |      |   |            |   |   |                    |        |        |

Suggested revisions that had been incorporated in items after the proceedings on the first day of panelling were presented to the reviewers on the second day. Item collections were circulated to reviewers, either Mathematics or Language (with attendant security).

On the third day, a collection of items for each of the tests was presented to panels for further review and verification of key. Editorials were undertaken. Calls for changes or additions to graphics were undertaken.

Parallel papers were produced for Shona and Ndebele, and these were subject to thorough critique.

Directions for administration to pupils for the cover pages of each test were composed and revised before final acceptance.

On the fourth day of panelling the Shona and Ndebele papers were finalised, and the language and mathematics panels were able to scrutinise final version of the English and Mathematics papers. The panel chairs signed off on the key to the tests (i.e., list of correct responses to the MC questions).

Electronic versions of the test papers were delivered to the printer by ACER staff with all due care to protect the security of the test papers. The printer, an external firm whose identity was undeclared to ZimSEC, was briefed by ACER staff. ACER personnel checked proofs for papers and requested several revisions. Revisions were checked before printing of papers. Papers were transported to ZimSEC by ACER staff.

The 40 items per test were selected from a collection of items (approx. 60 per test) produced by ACER in Australia. The items for the language test were composed in English. In Zimbabwe, the items selected from the collection were developed in Shona and Ndebele but not necessarily as a direct translation from English but as parallel versions, in that they tested the same or similar language skills (e.g., rhymes).

The first selection of items from the collection did not include an acceptable item for testing the mathematics concept *mass*. It was recognised that assessment is a sampling process and therefore that some syllabus topics are not necessarily covered in any version of a test. It was also acknowledged that untried items should not be included in test papers. Nonetheless, it was decided that a new item should be developed by the panel and included in the test.

Also the traditional 25 per cent of questions for each of A, B, C, D key did not fully eventuate due to an overriding design criterion, length of options. Question order in the paper was based on subjective views of difficulty. The easiest questions appeared earlier in the test.

Once the panel meetings concluded in Harare in February 2012 and the final composition of the tests had been confirmed, ACER prepared templates in Microsoft Access with validation routines to minimise mis-keying so that pupil responses could be collected and then exported into a suitable file for analysis.

### *Test and Item analysis*

Classical item analysis and Rasch modelling provided information on the behaviour of items and pupils on ZELA tests. The main section of the Psychometrics Report provides, amongst other things, a measure of the reliability of the tests and a detailed discussion of the functioning of items identified as “mis-fitting” items. The reliability of the tests were expressed in terms of Cronbach’s coefficient alpha.

### *Questionnaires*

There were two questionnaires. A pupil and a School Head questionnaire.

#### *The Pupil Questionnaire*

The Pupil Questionnaire contained 14 questions. The questionnaire asked about the demographic background of the pupil, the pupil’s school including pupil absences from school, and the study materials available to them.

### *The School Head Questionnaire*

The School Head Questionnaire comprised seven sections with a total of 31 questions. Section 1 asked about the background of the School Head. Section 2 asked about the demographics of the school, language of instruction, year of establishment, distance from district centre and type of school. Section 3 contained questions about the school teaching staff, the number of teachers in the school and their levels of formal education. Section four asked about pupil enrolment including total enrolments, Grade 3 enrolment, number of classes in the school, percentage of pupils who are orphans or vulnerable children (OVCs) and the percentage of pupils with a disability. Section five related to the typical length of lessons and number of school sessions held each day. Respondents were also asked about the number of teacher absences and schools days lost to special or unusual events. Section six asked about the utilities and resources available in the school. Questions ask about the classroom arrangements, textbooks, amenities and utilities in the school. The final section of the questionnaire asks about the school's annual plan and budget and the professional development experience of teachers.

### *Training*

Training sessions for test administrators were conducted in Rusape, Bulawayo and Kadoma between 28 February and 2 March 2012. The objectives of the sessions were to train data collectors and monitors in data collection for the project and in understanding the study's objectives and processes. Uniformity of procedures across sampled schools was emphasised as paramount.

Training sessions for Quality Assurance Officers (QAOs) were conducted in Harare on 27 February 2012. The content focus of sessions was on the observation and recording of administration processes against agreed testing protocols. Each QAO was provided with a hard-copy version of a manual describing procedures and protocols to be observed and followed.

### *Test Preparation and Administration*

Prior to administration of the test, letters from ZimSEC's Assistant Director of Test Development, Research and Evaluation were sent to district officers and school heads.

Before the test day guides providing information about the upcoming tests were distributed to teachers and school heads.<sup>27</sup> Guides were also distributed to pupils, and were intended to be taken home so that parents or carers would be aware of the testing that their children would be undertaking. During the testing sessions, administrators were required to complete a detailed checklist and a list of pupils in attendance for each test (with accompanying remarks when needed). Test administrators also distributed and collected questionnaires for pupils and head teachers. QAOs were required to observe the data collection processes and to record any breaches of procedure. QAOs did not intervene in procedures or processes associated with the testing.

### *School visits*

During ACER's initial consultations with ZimSEC in November 2011, it was noted by ZimSEC's Research Managers that visits to schools would be a useful exercise for ACER staff. With the

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<sup>27</sup> See Appendix 2.

support of ZimSEC's team and UNICEF program staff, ACER's In-Country Project Manager conducted school visits during the testing week.

### *Post-test Operations*

After all tests had been administered, templates were sent to ZimSEC from ACER. Tests, surveys and reports were collected through District Offices and returned to ZimSEC. Pupil-level and school-level data, province-based, were captured using the Microsoft EXCEL spreadsheet program and entered by data entry personnel in ZimSEC. Data entry operators at ZimSEC coded answers from each pupil's test paper (A, B, C, D, omit, or multiple response) to a spreadsheet provided by ACER. These spreadsheets were merged with other files at ACER where computer marking occurred according to a key (list of correct responses based on label of options, A–D plus omit), using a template to ensure accuracy of marking.

### *QAO report analysis*

Some reports were incomplete or filled out in a perfunctory manner, with few, if any, comments. Five QAOs were selected for cross-checking by telephone. Some short extracts from QAO reports follow.

#### *Seals*

Only one envelope out of 120 (30 QAOs, four envelopes per school) was not intact.

#### *Reference to pupils having difficulty*

Of the 30 schools visited, 27 were classified as rural and three as urban in the UNICEF textbook distribution database. Eight of the 27 QAO reports from rural schools stated that a number of pupils were unable to read or write.

Two QAOs observing test administration in rural schools stated that there was no furniture for pupils.

Ten of the 30 QAOs noted pupils having difficulty completing the test. In one school, eight pupils could not write their own names and were unable to read the test or respond to the questions; in another school, four pupils could not do so. In one case, most pupils were noted as 'non-readers' – they could not supply their name or class number on the test paper – but they still attempted to do the test. One QAO noted that instructions were translated into Mother Tongue (as was planned for) because the pupils could not understand English. Nevertheless those pupils attempted to do the test.

#### *Reference to attendance rate and pupils finishing early*

In one class that had an enrolment of 33 only nine were present for testing. Observations about pupils having finished the test paper earlier than the time allocated were fairly common. It is unclear whether there is any link between this phenomenon and pupils finding tests either easy or difficult.

#### *Reference to clear breaches of protocols*

One QAO noted that full explanations were not read to pupils despite the head teacher having been provided with the manual for administrators. Hence, pupils stopped work at the end of each question and waited for instructions to continue.

In another case, a QAO noted that the administrator erased pupil responses in the case where a pupil had chosen more than one option as the correct answer. At another school, the administrator asked pupils for their response and shaded the circles on their behalf. Pupils did not appear to have been familiar with the multiple choice format of the test papers.

QAOs observed cases where pupils showed their test papers to others.

The administrator in one case informed the class that she did not want to hear from any pupils that they could not read or write.

A lack of space at one school meant that pupils were forced to sit two to a desk, increasing the risk of copying. Another QAO noted that desks had to be sourced from other classrooms within the school.

Tests in Ndebele were dispatched by mistake to Matabeleland South.

### Data analysis techniques

Data from tests and questionnaires were analysed using the statistical packages Conquest and SPSS. Further analysis is reported in the *Zimbabwe Early Learning Assessment 2012 Psychometrics Report*.<sup>28</sup>

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<sup>28</sup> This report provides estimates of population means without having used replicate weights. This approach provides 80 estimated values on a variable (via a boot strapping method). Estimates are then produced by calculating, say, the mean, using each of these 80 values, and then taking the mean of the results. Without using this approach estimates for standard errors will be smaller and so claims about statistically significant results may sometimes be in error. In practice, the statistically significant differences observed in these data were, where policy relevant, large, and unlikely to be different from those reported here. The omission in the analyses of this step will be rectified in subsequent reporting of the ZELA data.

## Appendix 5 Results of the Questionnaires

### Background

This appendix provides summaries of the data collected through the questionnaires. This information should complement the more detailed investigations reported in the body of the report, especially about the context of the pupils and pupils.

### Sampling

Schools were selected for the sample with a probability proportional to their size, that is, the bigger the school, the higher the probability it would be selected in the study. This sampling design means all pupils have an equal probability for selection. This is important given that the study was of pupil achievement. As the number of teachers in a school is likely to be closely related to the number of pupils, data about the teachers in these schools should also generalise fairly robustly to all teachers in Zimbabwe. However, this sampling design also means that the schools selected in the sample may not be representative of all schools in Zimbabwe (as small schools will tend to be under represented in the sample). For this reason, the school level data need to be treated with some caution.

### The questionnaires

Data concerning pupil and school characteristics were collected through a Pupil Questionnaire and a School Head Questionnaire.

The pupil questionnaire contained 14 questions. Responses from 16,388 Grade 3 pupils were collected. (This is somewhat less than the number of pupils who completed the English and Maths tests. So not all pupils who completed a test completed a questionnaire.

Data concerning school characteristics, including pupil population, school location, school type, teacher quality and teacher training and funding and facilities was collected through a School Head Questionnaire.

The School Head Questionnaire comprised 31 questions exploring the background of the School Head themselves, their school, their staff and pupils. Responses of 422 School Heads (or their delegate) were collected. Due to three cases of missing data on the variable for which the weighting of the data was based, there were 419 valid cases available for analysis. Of the 422 sets of raw data collected For this section of the report, the responses from 419 School Heads are included.

Only 311 returned questionnaires provided needed to merge the School Head data to the pupil file, and hence the outcome variables (the pupil test scores).

The School Head Questionnaire began with questions asking about the position or role of the person answering the questionnaire. The questionnaire was intended for School Heads, however data collectors were instructed that in the case of an absent School Head, the Acting School Head was to complete the Questionnaire. About 59% of those responding were the School Head and so around 41% held other positions in the school.

### Children out of school

The data collected through the Pupil Questionnaire and School Head Questionnaire provide information on pupils within school. The ZimVAC 2012 Rural Livelihoods Assessment Report indicates that the percentage of children of school-going age not attending school varies by province and is highest in Matabeleland North at 18 per cent. Boys are affected to a much greater extent in these provinces, with about 23 per cent and 21 per cent of boys not in school within Matabeleland North and Matabeleland South, respectively.<sup>29</sup>

The data presented on the percentage of Orphans and Vulnerable Children (OVCs), pupil meals per day, and access to resources in the home were collected for the purposes of identifying pupil background characteristics that may be associated with success in education. If used to assess the extent to which children in Zimbabwe are able to access vital resources, the data needs to be treated cautiously because children out of school are not included in the sample. Children out of school are the most likely to experience challenges in accessing other vital resources. For example, the Rural Livelihood study report cites financial constraints as the most common reason children are out of school.<sup>30</sup>

### Access to Resources

Data about the resources available to pupils in the home and at school were collected through both the Pupil Questionnaire and the School Head Questionnaire.

#### Books in the home and textbooks at the school

Pupils were asked to report on the number of books in their homes. Pupils were instructed not to include magazines or school textbooks in the count of books for this question. 35 per cent of pupil's reported that there are no books in their home and 37 per cent reported between 1 and 5 books are in their home.

School Heads were asked to report on the number of textbooks in the school and how the textbooks are used.

To find the number of textbooks per pupil, the number of textbooks in the school was divided by the number of pupils. This analysis found that very few schools have no textbooks, less than three per cent of schools have one textbook per pupil and about a quarter of schools have about four textbooks per pupil. On average, there are about six textbooks per pupil in schools. Figure 18 shows the distribution across all schools, and also for only those schools with 20 or fewer textbooks per pupil. This second graph provides more detailed information for that region where most schools are located along the horizontal axis.

The relationship between textbook to pupil ratio and school type (Satellite and non-Satellite) was examined and no significant difference was found. Similarly there were no statistically significant differences found between provinces.

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<sup>29</sup> Rural Livelihoods Assessment May 2012 Report. ZimVAC, Food and Nutrition Council and the Scientific and Industrial Research and Development Centre. P. 20.

<sup>30</sup> Rural Livelihood Assessment May 2012 Report. P. 23.

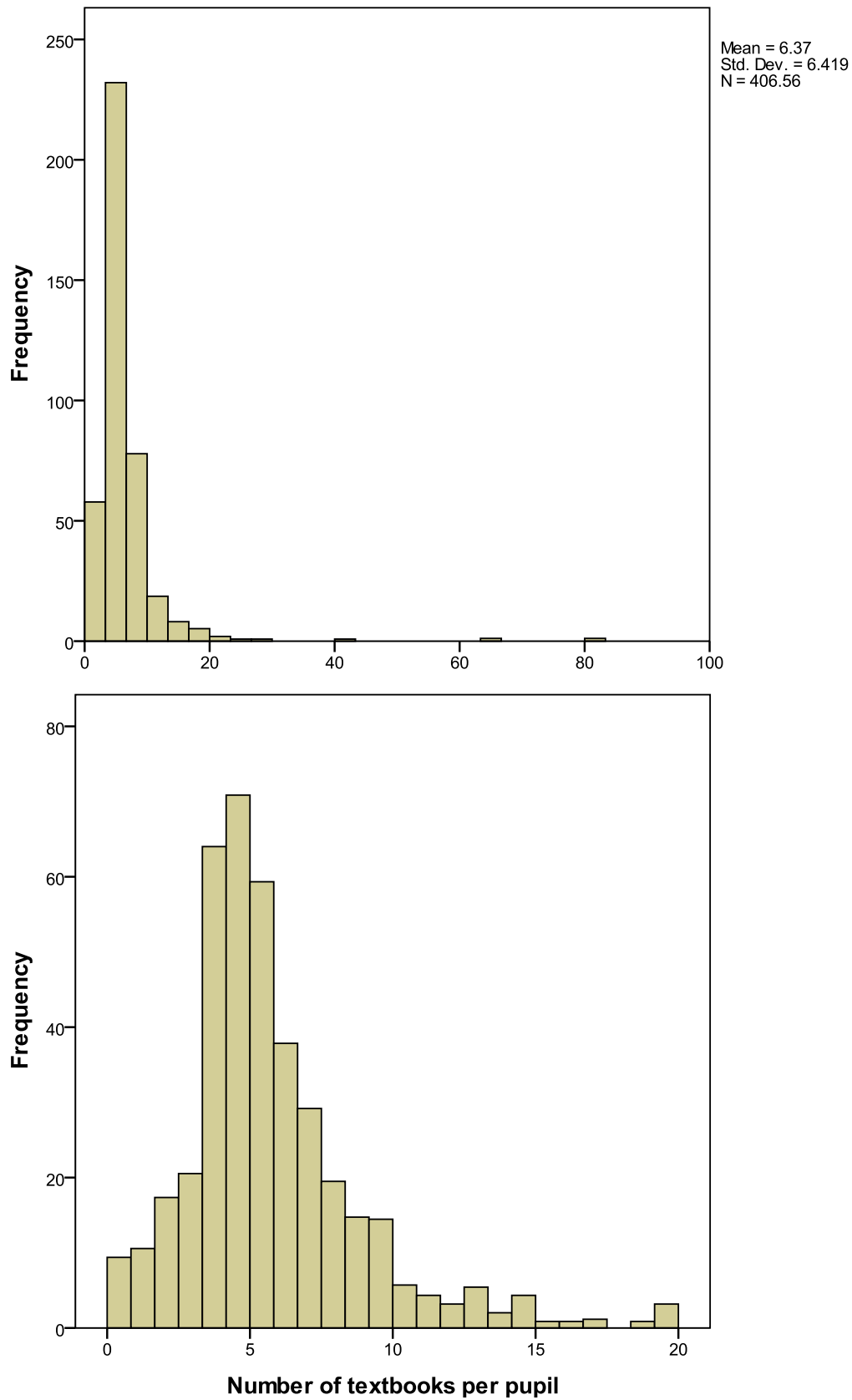


Figure 18 Distribution of the number of textbooks per pupil (showing full distribution and the distribution for schools with 20 or less textbooks per pupil)

Pupils and School Heads were asked about three occasions when textbooks might be used with three options given. These options included classroom instruction, library work and homework (where pupils are allowed to carry books home). Just over 90 per cent of Grade 3 pupils indicated that they used textbooks in the classroom and about 97 per cent of School Heads indicated the school used textbooks for classroom instruction. About six per cent of Grade 3 pupils indicated that they use textbooks in the library; however about 34 per cent of School Head responses indicated that textbooks are used for library work. Just over 11 per cent of Grade 3 pupils indicated that they use school textbooks at home, and 32 per cent of School Heads indicated the school allowed pupils to carry home textbooks for homework.

### Exposure to Early Childhood Development

Pupils were asked if they had enrolled in an Early Childhood Development (ECD) class. Just under 75 per cent of pupils had been enrolled.

### Study Materials and Facilities

Pupils were asked what study materials they have in their home, ticking all items that applied to them. The majority of pupils indicated that they have a pen (87 per cent) and a pencil (73 per cent) at home. Over half (54 per cent) indicated that they have a school bag, just under 30 per cent indicated they have a desk, one-fifth per cent indicated that they have a calculator and 13 per cent indicated that a computer is available in their home.

Pupils were asked about their access to utilities like water and electricity and the presence of television and radio in the home. Pupils were asked to tick all of the items that could be found in their home. About half of the pupils reported access to electricity in their home through the mains, a generator or solar energy. Nearly half of the pupils also indicated that they have a television in their home. Over 70 per cent of pupils indicated that they have a radio in the home and 30 per cent of pupils said that they have water piped to their homes.

School Heads were asked about the utilities available at their school. Around 40 per cent of School Heads indicated piped, tank or spring water and electricity (through the mains, a generator or solar energy) were available. A fifth indicated that a landline telephone is available at the school.

School Heads were also asked about the toilet facilities available at the school. About 80 per cent of schools had squat or pit toilets and just under 20 per cent had flush toilets. About two per cent of School Heads indicated that the school has no toilets.

### Home and Family

Information on resources available to pupils in the home and at school was collected through both the Pupil Questionnaire and the School Head Questionnaire.

### Meals per day

Pupils were asked if they ate one meal, two meals or three meals or more per day. This question was investigated by province. The average number was 1.85 (SD 1.24). Nearly 60 per cent of Grade 3 pupils reported eating three or more meals per day. Just over 10 per cent had only one meal per day.

Pupils are more likely to have three meals per day in the urban Bulawayo and Harare provinces compared to the rural provinces. Figure 19 shows the differences between Bulawayo and Harare and the other provinces are statistically significant, however the effect sizes are small to moderate, implying that while the differences are probably real, they are of small to moderate importance from a policy perspective.

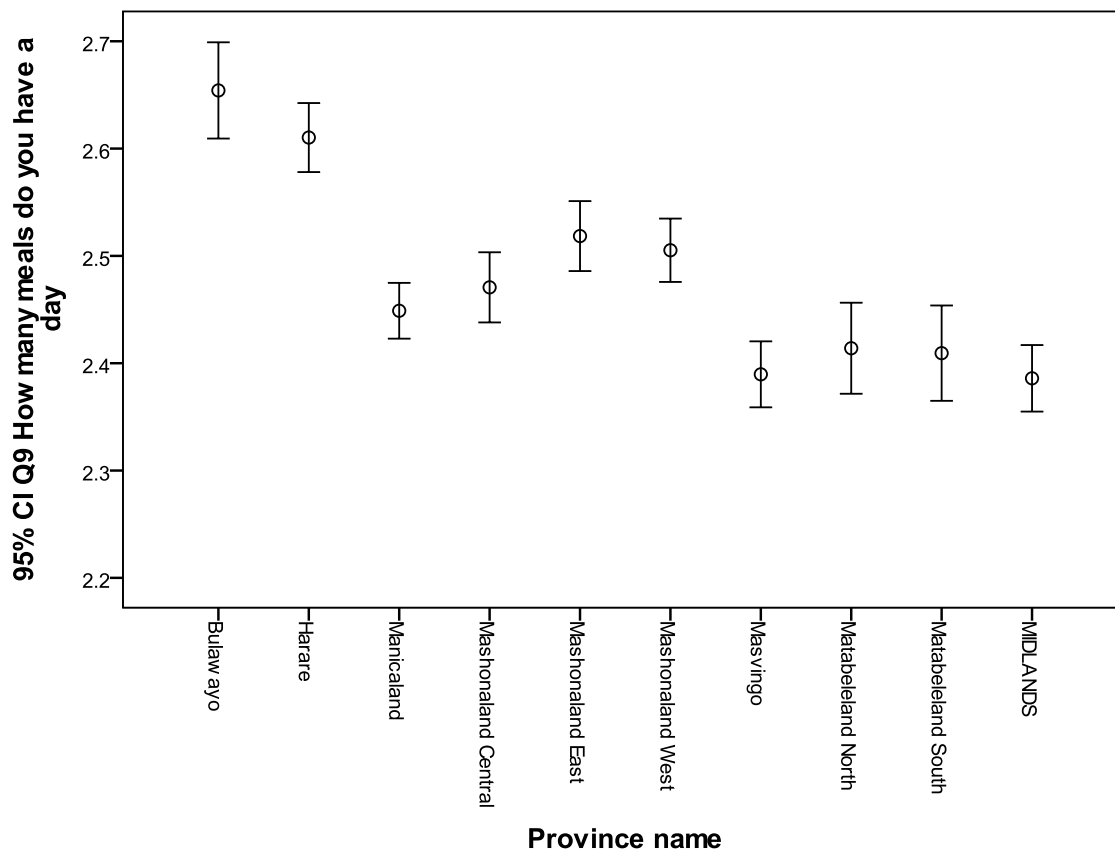


Figure 19: Average number of meals pupils have per day, by Province

#### Hours Working for Family

Pupils were asked how many hours they work for their family. Table 24 shows that most pupils did at least one hour of work for their family.

Table 24 Hours worked for the family

|                                 | Number       | Percent      |
|---------------------------------|--------------|--------------|
| Less than 1 hour                | 5361         | 33.4         |
| 1 or more but less than 2 hours | 4247         | 26.5         |
| 2 or more but less than 3 hours | 3032         | 18.9         |
| 3 hours or more                 | 3405         | 21.2         |
| <b>Total</b>                    | <b>16046</b> | <b>100.0</b> |

## Parental Education

Pupils were asked about the highest level of education completed by their parents or carers. They were given 11 options ranging from *Did not go to school* to *Completed a tertiary course*. (Options were also provided for pupils who did not know and who did not have a mother or female guardian or a father or male guardian.)

The pattern is similar for mothers and fathers, for example around 30 per cent of each group have completed secondary education (see Table 25). Around 5 per cent have completed a tertiary course.

A greater percentage of pupils do not know about their father's education and, possibly related to this, a greater percentage of pupils do not have a father.

**Table 25 Distribution of the highest level of parental education completed**

| Highest Level of Parental Education Completed | Mother       | Father       |
|---|--------------|--------------|
| Did not go to school                          | 5.2          | 4.5          |
| Completed some grades of primary school       | 9.2          | 8.3          |
| Completed primary school                      | 14.2         | 11.1         |
| Completed some grades of secondary school     | 15.9         | 15.0         |
| Completed secondary school                    | 28.5         | 31.0         |
| Completed some grades of high school          | 3.6          | 2.3          |
| Completed high school                         | 8.2          | 7.6          |
| Started some tertiary study                   | 1.1          | 1.0          |
| Completed a tertiary course                   | 4.5          | 5.4          |
| I do not know                                 | 5.5          | 6.3          |
| I do not have a mother/father                 | 0.8          | 2.4          |
|   | <b>100.0</b> | <b>100.0</b> |

The relationship between mothers and fathers who have not completed primary school was examined by Satellite and non-Satellite schools. There were only small differences observed.

## Other information

### Language

Pupils were asked what language they speak at home most of the time. Ten languages were presented to pupils. Nearly three quarters of Grade 3 pupils mostly speak Shona at home and 16 per cent mostly speak Ndebele at home. Other responses for language spoken at home included Tsonga, Ndau, English, Venda, Shangaan, Nambya and Sotho and ranged from 0.2 per cent speaking Nambya to three per cent speaking Ndau at home.

Schools Heads were asked what the language of instruction is in the first three grades at the school. Ten languages were presented to School Heads, however only seven languages were used as the language of instruction in the first three grades. Two-thirds of schools used Shona as the

language of instruction. English was the next most common language of instruction (17 per cent) followed by Ndebele (about 14 per cent). Venda, Tsonga, Shangaan and Ndaou were used as languages of instruction in the early years in a very small percentage of schools in Zimbabwe (4 per cent collectively).

### Pupil absence from school

Pupils were asked to indicate if they had been absent from school during Term One of 2013. Just under 40 per cent reported they had not been absent. Of those who were absent, the average number of days missed was 3.25 (SD3.4).<sup>31</sup>

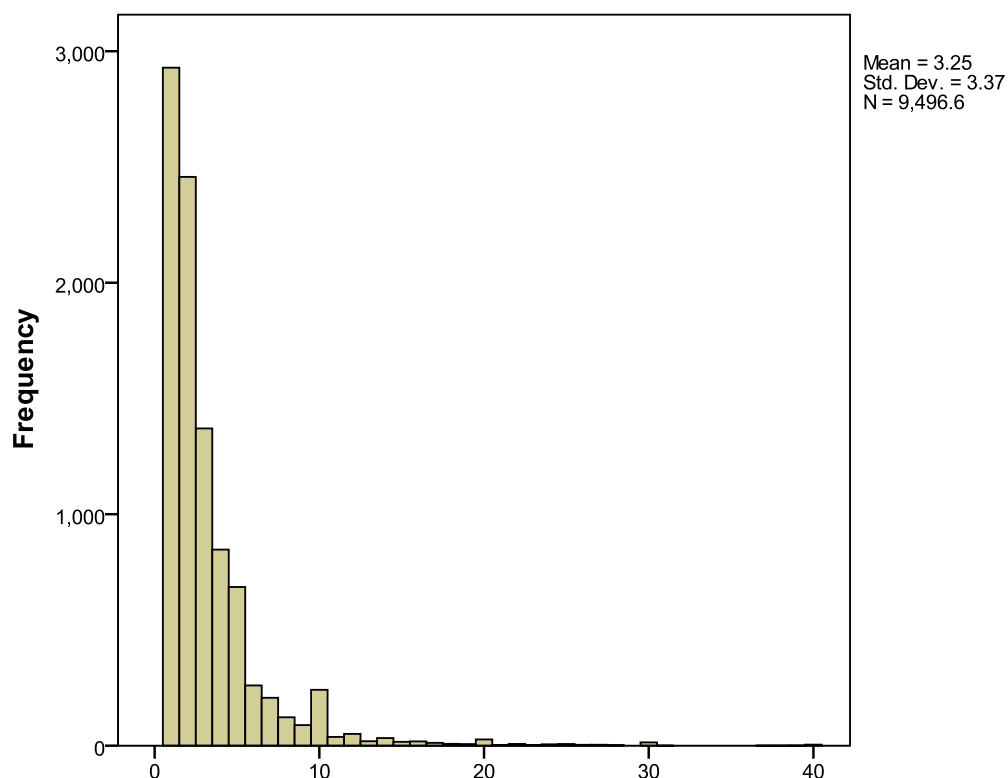


Figure 20 Number of days absent since returning to school this term (pupils with no days absent are excluded)

Figure 20 shows the distribution of the number of days absent. Most pupils have only a few days absent.

### School Characteristics

Data on schools were collected through the School Head Questionnaire. Data included school type, location, school operation, facilities and funding, teaching and teachers, and characteristics of the pupil population.

#### Sector

The majority of schools were government sector schools. (See Table 26.)

<sup>31</sup> Responses exceeding 40 days were filtered out because only 40 days of the school term had been completed at the time of the data collection.

Table 26 Distribution of schools across sectors

| Sector       | Number     | Percent      |
|--------------|------------|--------------|
| Government   | 278        | 69.2         |
| Private      | 90         | 22.3         |
| Church       | 34         | 8.5          |
| Missing      | 17         |              |
| <b>Total</b> | <b>419</b> | <b>100.0</b> |

### School location

School Heads were asked to indicate the number of kilometres by road from the school to the district centre. This was an open-ended question and responses ranged between 0 km and 700 km. The mean distance was 61km, however the majority of schools (60%) were located 0–60km away from the district centre (see Figure 21).

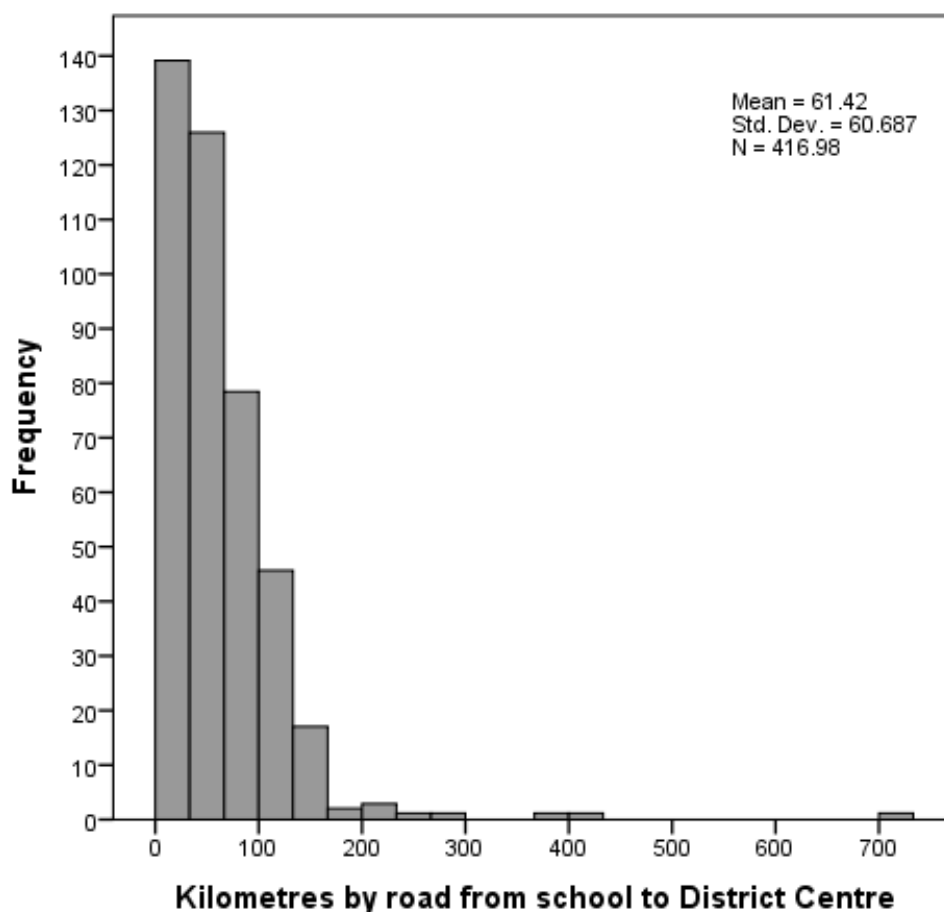


Figure 21 Distance of schools from District Centre (km)

### Length and number of classes

School Heads were asked how long a typical lesson is, on average, within their school. Over 90% of schools operate with 30-minute lessons.

Schools Heads were also asked to report on the number of sessions that operate in the school. Seventy-four per cent of schools operate with one session per day and 22 per cent operate with two sessions per day.

### Facilities

School Heads were asked to report on the number of permanent, temporary and open air teaching areas in the school.

Across the sample, the average number of permanent classrooms is just less than 11 per school but about 10 per cent of schools have no permanent classrooms.

There is a clear difference between Satellite and non-Satellite schools, with Satellite schools having far fewer permanent classrooms (see Figure 22).

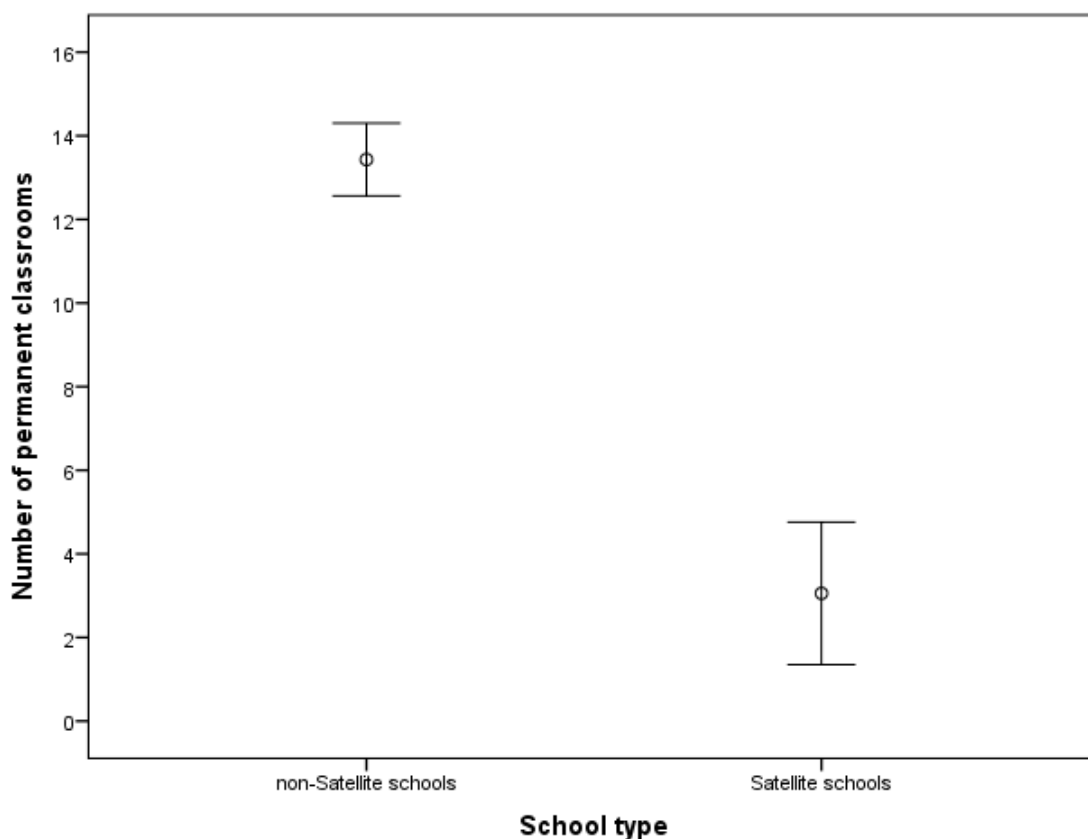


Figure 22 Average number of permanent classrooms comparing Satellite with other schools (showing 95% confidence intervals)

The *proportion* of classrooms that are permanent was also examined by school type. Again, the analysis showed a very clear difference between Satellite and non-Satellite schools, with Satellite schools having a much smaller *proportion* of permanent classrooms.

About 30% of schools have no open-air classrooms, very few schools have only open-air classrooms (less than 1%) and about 6% of schools report that half of the classrooms are open-air. Figure 23.

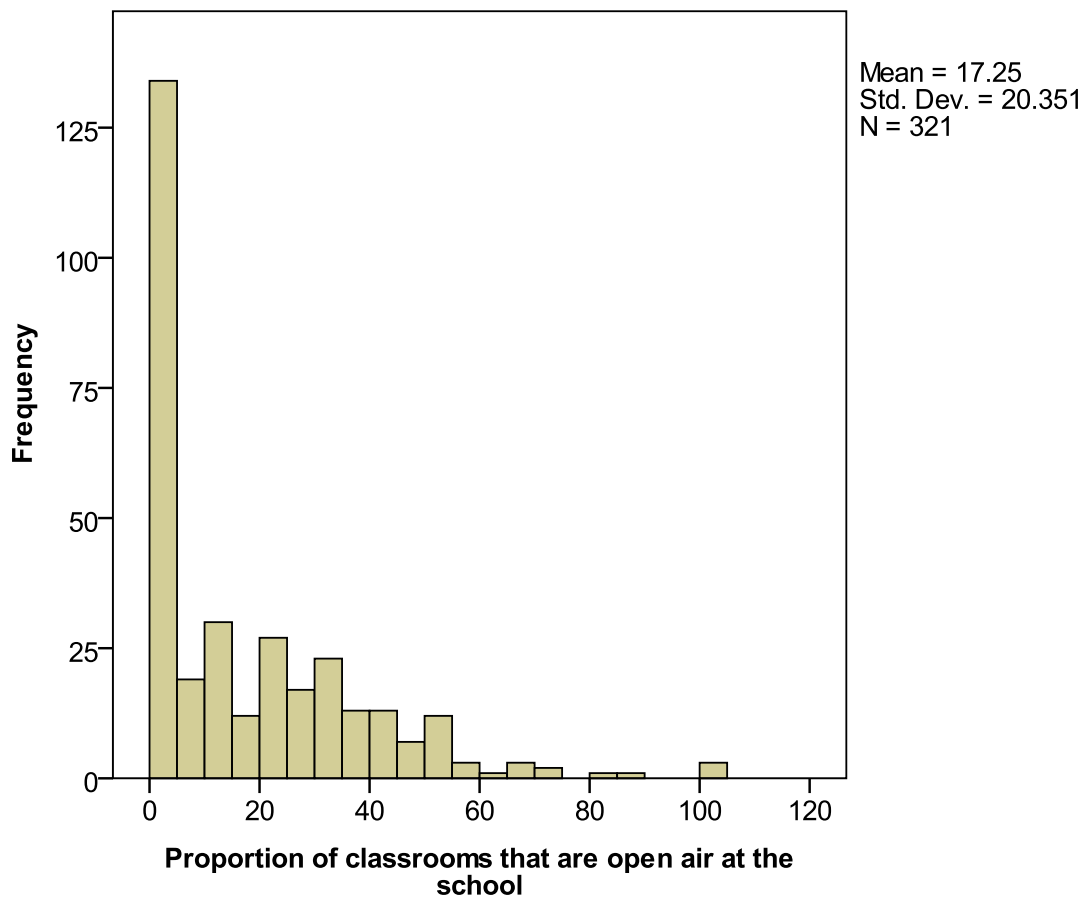


Figure 23 Distribution of schools according to the proportion of open air classrooms

There was no significant difference between the proportion of open-air classrooms at Satellite schools and non-Satellite schools.

Funding

About 95 per cent of the schools reported that they have an annual plan including an annual budget.

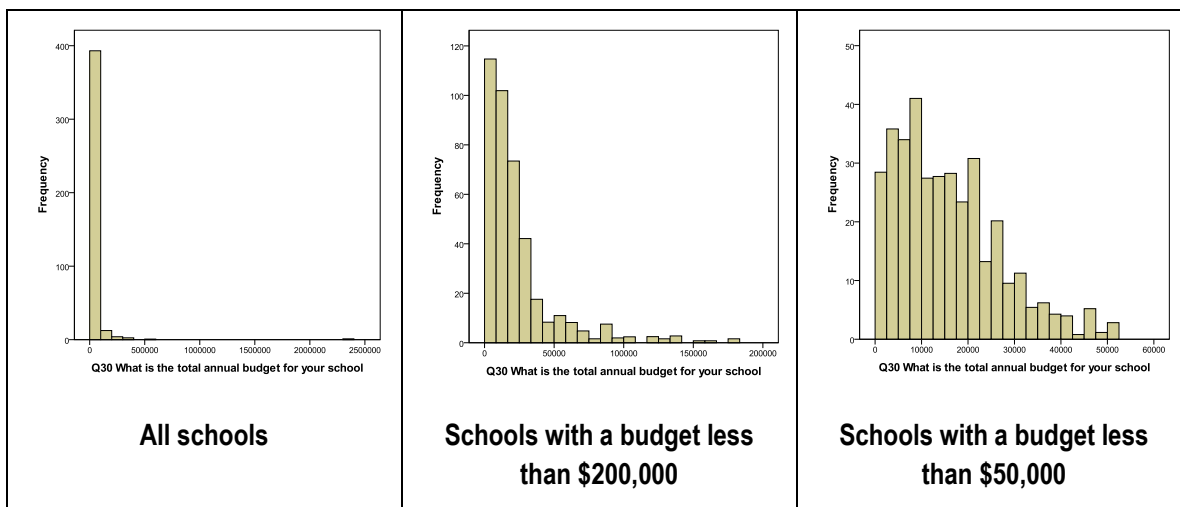


Figure 24 Distribution of annual budgets for all schools, schools with an annual budget less than \$200,000 and less than \$50,000

Annual budgets ranged between \$0 and \$2,340,012 USD. The average budget was \$35,023 (SD 131). Because the distribution is highly skewed (see Figure 24), percentiles provide a better guide:

|                              |         |
|------------------------------|---------|
| 25 <sup>th</sup> percentile: | \$7623  |
| 50 <sup>th</sup> percentile  | \$15179 |
| 75 <sup>th</sup> percentile  | \$27450 |

To find the annual budget per pupil, the annual budget was divided by the number of pupils at the school. Just under one quarter of schools had an annual budget per pupil of \$20 or less, 38 per cent had an annual budget per pupil of \$21 to \$40, and 17 per cent of schools reported an annual budget per pupil of more than \$41–60 per pupil.<sup>32</sup>

#### Proportion of permanent teachers on staff

About 80 per cent of teachers were permanent (and about 20 per cent were contract).

#### Teacher qualifications

On average schools have 64 per cent of their staff with tertiary education, 9 per cent of their staff with A-levels and 41 per cent of their staff with O-levels.

#### School days lost

School Heads were asked on how many official days did no teaching take place in the school, over the last year, as a result of events such as a late start of term, organisation of examinations, school festivals, national celebrations, storms etc. The number of teaching days lost ranged between zero and 63.

Nearly half of the schools indicated that no school days had been lost in the last year. The average number of school days lost per school across the sample was less than four

Satellite schools average about twice as many days lost compared with other school types. No significant differences were found between provinces.

#### Teacher days lost

School Heads were reported on the number of days that teachers were absent on official school days in the first term of 2012. The average number of teacher days lost was 7.4 days (SD 13.9) per school. About a third of schools reported that no teacher days had been lost.

The number of days absent per teacher at the school was calculated by dividing the number of absences reported by the number of teachers at the school. On average there were 2.1 days (SD 3.8) per teacher lost.

#### Professional development

School Heads were asked to indicate what percentage of teaching staff at the school attended a programme of professional development in the last three months. Just over one third of schools had none of their teachers attend any professional development. Six per cent of schools had all of their staff participating in professional development. Figure 25 shows the distribution of the proportion of teachers attending professional development in more detail.

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<sup>32</sup> See the ZELA Psychometric Report for further details.

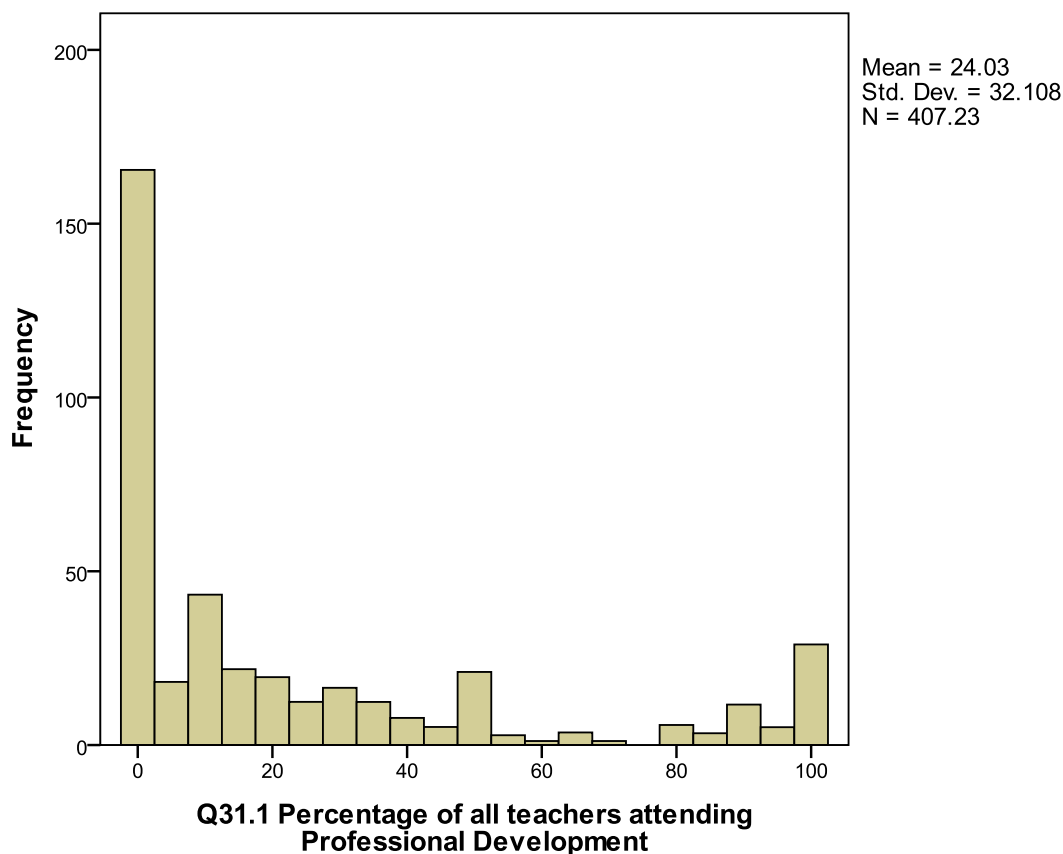


Figure 25 Distribution of the proportion of teachers attending professional development over the previous three months

In this figure, the columns are the counts of schools with a given percentage of staff receiving professional development. For example, in the column appearing about the zero indicates that there were over 150 schools with zero to about 5 per cent of teachers receiving professional development.

The percentage of staff participating in professional development in the last three months was examined by province and by Satellite and non-Satellite schools and no significant differences were found.

Just under 40 per cent of reading and just over 40 per cent of mathematics teachers had not attended professional development in the previous three months.

#### Characteristics of the pupil population

School Heads were asked to report on the per cent of the pupils in the school who are in fee arrears. Nearly all schools have at least some pupils in fee arrears. About half of schools have half or more of the pupil population in fee arrears and a small number of schools have all of their pupils in fee arrears. On average, in schools, about 45 per cent (SD 28.0) of pupils are in fee arrears.

Matabeleland North showed the highest percentage of pupils in fee arrears and Harare had the lowest (see Figure 26).

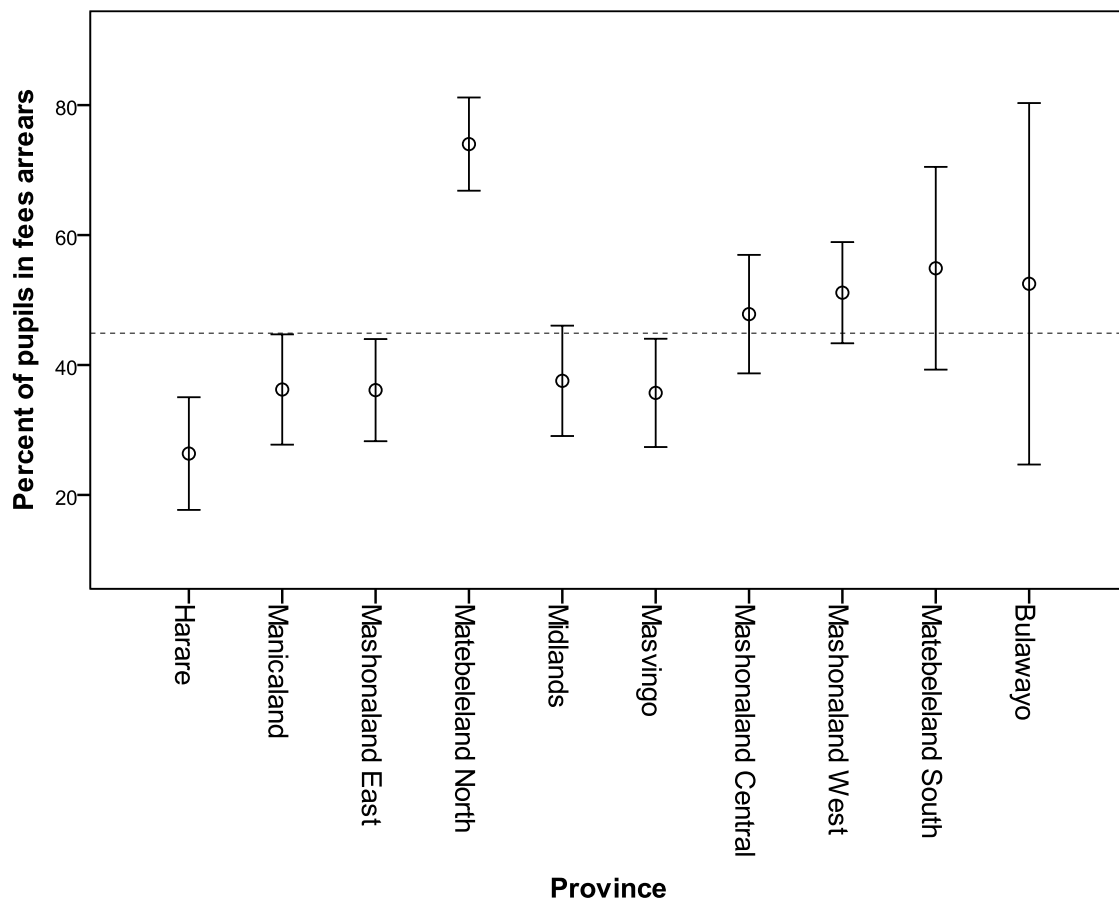


Figure 26 Average proportion of pupils in fee arrears by province (showing the overall mean and 95% confidence intervals)

On average Satellite schools had higher proportions of pupils in fee arrears (see Figure 27).

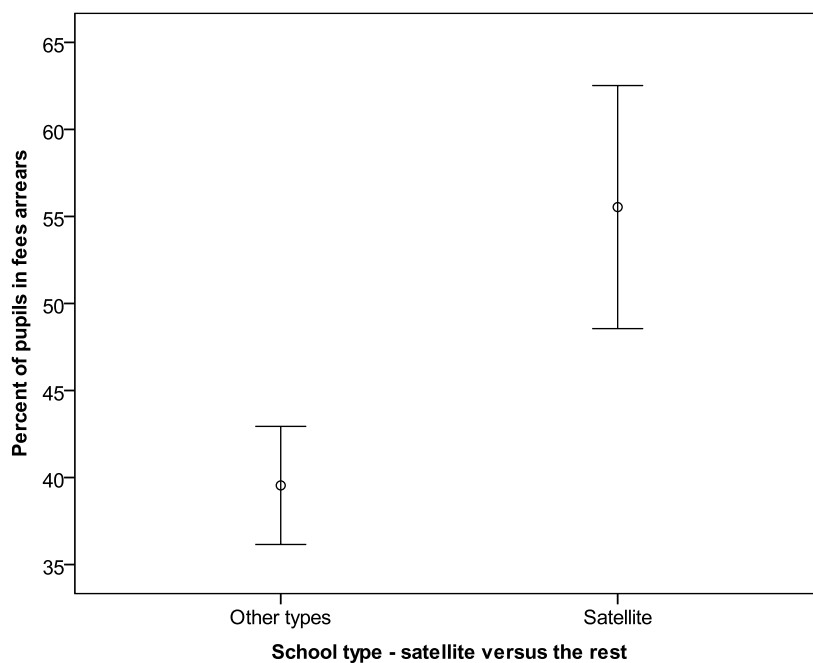


Figure 27 Percent of pupils in fee arrears by school type

Table 27: Summary statistics for the proportion of pupils who are orphans or vulnerable children

| Province                                 | Mean         | N          | Std. Deviation |
|--|--------------|------------|----------------|
| Bulawayo                                 | 15.30        | 5          | 7.801          |
| Harare                                   | 12.80        | 15         | 14.675         |
| Manicaland                               | 28.85        | 38         | 17.843         |
| Mashonaland Central                      | 31.36        | 35         | 18.838         |
| Mashonaland East                         | 21.32        | 30         | 14.417         |
| Mashonaland West                         | 24.97        | 63         | 15.105         |
| Masvingo                                 | 26.39        | 42         | 12.939         |
| Matabeleland North                       | 27.32        | 18         | 15.959         |
| Matabeleland South                       | 29.60        | 20         | 18.510         |
| Midlands                                 | 24.67        | 39         | 12.653         |
| Not classified into a province (missing) | 26.59        | 110        | 15.953         |
| <b>Total</b>                             | <b>25.91</b> | <b>415</b> | <b>15.891</b>  |

The average proportion of pupils per school who are who are Orphans or Vulnerable Children (OVC) was just over one quarter . The two urban provinces averaged much lower percentages of OVC in schools (see Figure 27, and for more detail Table 27). There was little difference in the average percent of OVC in Satellite schools compared to other schools.

Forty-four percent of schools reported that they have no disabled pupils, with the average proportion just over two percent. This is probably not an accurate figure. The 2012 BEAM report indicates that while ten per cent of Basic Education Assistance Module funds in Zimbabwe are set aside for disabled children, only 75 per cent of the funds had been spent at the time the report was released.<sup>33</sup> Authors cite a lack of awareness in school communities of the support available and a tendency for families to keep children with special needs at home, rather than enrolling them in school.<sup>34</sup>

<sup>33</sup> Process and Impact Evaluation of the Basic Education Assistance Module (BEAM) in Zimbabwe. Final Evaluation Report. CfBT Education Trust, Impact Research International and Paul Musker and Associates. Harvey Smith, Patrick Chiroro and Paul Musker. 20 March 2012. p47.

<sup>34</sup> Smith et al. 2012. p47.