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# PISA for development technical strand c: Incorporating out-of-school 15- year-olds in the assessment

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# PISA FOR DEVELOPMENT TECHNICAL STRAND C: INCORPORATING OUT-OF-SCHOOL 15-YEAR-OLDS IN THE ASSESSMENT

**Education Working Paper No.120**

**by Roy Carr-Hill, University College London's Institute of Education and University of York**

*This working paper has been authorised by Andreas Schleicher, Director of the Directorate for Education and Skills, OECD.*

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# PISA FOR DEVELOPMENT TECHNICAL STRAND C: INCORPORATING OUT-OF-SCHOOL 15-YEAR-OLDS IN THE ASSESSMENT


## Abstract

The success of PISA since its first survey administration in 2000 has attracted an ever increasing number of participating countries. With an increasingly diverse group of countries, the targeting of the original assessment may be less appropriate than when it was first conceived for a smaller more uniform group of countries. The purpose of this paper is to identify the technical issues in respect of Strand C (assessing competencies of those out-of-school) and to discuss and present ways of addressing these issues.

- **Counting and locating the out-of-school**: Fifteen-year-olds are rare: the project would need to visit around 10 households to find one 15-year-old. The Annual Status of Education Report (ASER) and Uwezo surveys involved interviewing all children between 6- and 16-year-olds. This exercise, targeted on a single year age group is, rather obviously, more difficult and needs some different approaches.
- **Constructing a sampling frame and finding 15-year-olds**: A two-stage process is recommended: first identifying households reporting that they have a 15-year-old and then returning with an appointment to verify age, establish her/his status vis-a-vis school and then, if appropriate, administering the questionnaire and the test. A probability sample can be designed but will involve an initial listing of 30 times as many households as the target population of out-of-school (OOS) 15-year-olds. The alternative is to target marginal, vulnerable areas where there are likely to be a higher percentage of OOS 15-year-olds: these would include isolated rural areas and urban slum areas. Poverty maps can be consulted to select the poorer rural and urban areas.
- **Surveying, testing and administering an interview**: The interview and test are, in most cases, probably best administered at home, as that is where most of the OOS 15-year-olds will be living and working; street children, etc. will have to be interviewed and tested where they can be found.
- **Design and development of instruments**: Given the range of education experiences of 15-year-olds, a set of instruments is needed ranging from the PISA booklets, to the national component for students below grade 7 that will be prepared under Strand A, to some of the PASEC/SACMEQ items, to a basic literacy assessment such as the ASER-type or EGRA early years assessment, to a pictorial/verbal assessment. A particular concern is that the OOS ('failed') 15-year-old is not further stigmatised through taking the test.

## Résumé

Le succès de l'enquête PISA depuis sa première administration en 2000 attire des candidats à la participation toujours plus nombreux. Face à la diversité croissante des pays participants, l'orientation de l'évaluation est susceptible d'être moins adéquate que lorsqu'elle a été initialement conçue, pour un groupe de pays plus petit et plus uniforme. Ce document vise ainsi à identifier les questions techniques relatives au volet C (dédié à l'évaluation des compétences des jeunes non scolarisés) afin de les examiner plus en détail et de présenter les moyens d'y répondre.

- **Recensement et localisation des jeunes non scolarisés** : Les jeunes de 15 ans sont peu nombreux : la visite d'environ 10 foyers serait ainsi nécessaire pour trouver un seul jeune de cet âge. Si le Rapport annuel sur la situation en matière d'éducation (Annual Status of Education Report, ASER) et les enquêtes Uwezo prévoyaient des entretiens avec tous les enfants âgés de 6 à 16 ans, le présent exercice ne cible, quant à lui, qu'un groupe d'âge d'une seule année : il est donc à l'évidence plus difficile à mener et requiert l'adoption d'approches différentes.

- **Élaboration d'un cadre d'échantillonnage et identification des jeunes de 15 ans** : Il est recommandé de procéder en deux étapes : tout d'abord, identifier les foyers déclarant un jeune de 15 ans, puis fixer un rendez-vous pour procéder à la vérification de l'âge de ce dernier, déterminer sa situation au regard de la scolarisation et, le cas échéant, lui administrer le questionnaire et l'évaluation. Il est possible de concevoir un échantillonnage aléatoire, mais il nécessitera l'identification préalable de 30 fois plus de foyers que la population cible de jeunes de 15 ans non scolarisés. Une solution alternative consisterait à cibler des zones vulnérables marginalisées susceptibles de concentrer un pourcentage plus important de jeunes de 15 ans non scolarisés, notamment les zones rurales isolées et les zones urbaines déshéritées. Il est possible de consulter des cartographies de la pauvreté pour identifier les zones rurales et urbaines les plus pauvres.
- **Enquête, évaluation et administration de l'entretien :** Dans la majorité des cas, il est probablement plus facile d'administrer l'entretien et l'évaluation à domicile, car c'est là que la plupart des jeunes de 15 ans non scolarisés sont susceptibles de vivre et de travailler ; l'administration de l'entretien et de l'évaluation aux enfants des rues et autres devra quant à elle se faire là où ils pourront être localisés.
- **Conception et développement des instruments** : Au vu de la diversité des expériences des jeunes de 15 ans en matière d'éducation, il est nécessaire de mobiliser tout un ensemble d'instruments, allant des carnets de test PISA à la composante nationale dédiée aux élèves dont le niveau d'instruction est inférieur à la 7$^{e}$ année (qui sera préparée dans le cadre du volet A), en passant par certains items des évaluations PASEC/SACMEQ, une évaluation de base de la littératie du type d'ASER ou de l'évaluation EGRA des jeunes enfants, ou encore une évaluation axée sur la mise en correspondance d'images et de mots. Il importe avant tout d'éviter que les jeunes de 15 ans non scolarisés (« en échec ») ne soient davantage stigmatisés en passant l'évaluation.

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## PREAMBLE

The success of PISA since its first survey administration in 2000 has attracted an ever increasing number of participating countries. The countries benefit by comparing the capacity of their student body with other countries throughout the world. PISA has been providing participating countries with information regarding the cumulative yield of their education systems since it first began in 2000 by assessing the competencies, skills and content knowledge of students at age 15 – the end of compulsory education in many countries.

With an increasingly diverse group of countries, the targeting of the original assessment may be less appropriate than when it was first conceived for a smaller more uniform group of countries. The PISA for Development project in coordination with the regular PISA surveys will enhance the assessments to provide more reliable and context relevant data and analysis. The PISA for Development project seeks to develop enhanced survey instruments to allow developing countries to better assess 15-year-olds' competencies, knowledge and skills in the key subjects of reading, mathematics and science. The work on enhancing the PISA instruments is covered in Strands A and B of the project. At the same time, one of the main strands of PISA for Development will be to provide participating countries with an opportunity to build their capacity to manage student assessment and to effectively use and apply the results for system improvement and improving the quality and equity of learning outcomes.

Countries, including Cambodia, Ecuador, Guatemala, Paraguay, Senegal, and Zambia, are participating in the PISA for Development initiative with the expectation that they will have access to a more precise measure of their students' capacity and through a specifically designed questionnaire will better understand the factors which contribute to student success in their own country.

The PISA for Development project seeks to develop an assessment that is more relevant for developing countries. With so many 15-year-olds out of school in these contexts, the project would fail in its aims if it did not look at methods for including out of school 15-year-olds in the assessment. If this strand of the project (Strand C) is successful, then it could be possible in future rounds of PISA for a measure of the competencies of out of school 15-year-olds to be introduced as a complement to the assessment of 15-year-olds in school, and so, even for countries currently participating in PISA who have sizeable numbers of out of school 15-year-olds, provide important context for interpreting the in-school results. This third strand of PISA for Development also seeks to help fill a data gap arising from the lack of adequate tools and methodologies to identify out-of-school youth, monitor progress towards universal basic education (defined as the first 9-10 years of schooling), measure the scope of and assess the reasons for exclusion, assess the yield of the different levels of education at age 15 and inform policy and planning. PISA for Development will also contribute to systematic analysis to identify the bottlenecks on the path to universal basic education and explain why policies are not yielding robust results.

## EXECUTIVE SUMMARY

With the support of its partners and in keeping with commitments to improved measurement of learning outcomes in the education in the post-2015 agenda discussions, the OECD decided in 2012 to investigate ways to enhance PISA to make it more relevant for developing countries. Through its PISA for Development project, adapted survey instruments will be produced to better enable developing countries to assess 15-year-olds' competencies in the key subjects of reading, mathematics and science, while at the same time providing the countries with an opportunity to build their capacity to manage student assessment and apply the result for system improvement. The project includes three technical strands:

- Strand A - enhancement of PISA's cognitive instruments;
- Strand B - enhancement of PISA's contextual questionnaires; and
- Strand C - the development of an approach and methodology for incorporating out-of-school 15-year-olds in the assessment.

The purpose of this paper is to identify the technical issues in respect of Strand C and to discuss and present ways of addressing these issues.

**Characteristics of out-of-school 15-year-olds in participating countries**

- The proportion of 15-year-olds currently out-of-school for the six participating countries is on average 30% and ranges from 10% in Ecuador to 48% in Senegal.
- Out of school 15-year-olds are poorer and are mainly to be found in rural areas; girls in poverty are more likely to be out of school by age 15 than boys.
- Disabled youth are more likely to be out of school and this increases the probability of them being poorer when adult.
- Those belonging to minority ethnic, linguistic or religious groups are also more likely to be out–of-school; but these categories are confounded with poverty.

**Counting and locating the out-of-school**

PISA is focused on students aged from 15 years 3 months to 16 years 2 months. Based on demographic statistics, 15-year-olds in the PISA for Development countries are about 2.2% (i.e., 1 in 45) of the population and with average household size in all six countries between 4 and 5 (except Senegal where household size is over 12), the project would need to visit around 10 households to find one 15-year-old.

The Annual Status of Education Report (ASER) and Uwezo surveys referred to in this paper involved interviewing all children between 6- and 16-year-olds, not a single year age group. This exercise, targeted on a single year age group is, rather obviously, more difficult and may need some different approaches.

Analyses of relatively recent DHS surveys give broadly similar 'hit' ratios but some of the discrepancies are troubling. First, the age-specific estimates in routine data are not very reliable because birth registration is low in many developing countries: among the participating countries, only Ecuador and Guatemala can claim complete (defined as over 90%) registration; the rate in Zambia is particularly low at 14%.

Second, household surveys indispensable for this exercise – among many others – have several weaknesses when surveying marginalised and poorer sub-groups. The lack of recognition of this problem has meant that survey findings are taken as accurate when, in fact they are biased under-estimates of the numbers and geographical distribution of the marginalised and vulnerable. These biases have to be taken into account in using the results of household surveys in planning for reaching marginal and vulnerable groups such as the out-of-school.

It is likely that most of the marginalised in the participating countries will be found among the isolated rural poor and informal settlements/ urban slums. A local anthropologist/ demographer/ sociologist should be included in the project's country teams to make estimates of the size and location of groups missing from survey sampling frames.

Given the challenges of counting and locating a single year age group in developing country contexts and the basis of the target PISA population, being related to how much schooling 15-year-old students would be expected to have and therefore their expected performance, the managers of PISA for Development may consider incorporating some flexibility in its approach to Strand C. PISA has been given to children of different ages and while it is designed for 15-year-olds, testing out-of-school children in a range of ages, say, from 14 to 16, may still yield valuable results.

**Constructing a sampling frame and finding 15-year-olds**

A two-stage process is recommended: first identifying households reporting that they have a 15-year-old and then returning with an appointment to verify age, establish her/his status vis-a-vis school and then, if appropriate, administering the questionnaire and the test. It is important to note that, as with main PISA, there will be some non-responses and also a portion of the population that will be difficult to reach.

A probability sample can be designed but it will involve an initial listing of 30 times as many households as the target population of Out-of-School 15-year-olds. Reducing the costs of such an exercise would involve substantial reductions in sample size, making the probability sample not very efficient.

The alternative is to target marginal, vulnerable areas where there are likely to be a higher percentage of out-of-school (OOS) 15-year-olds: these would include isolated rural areas; and urban slum areas. Poverty maps can be consulted to select the poorer rural and urban areas.

Identifying 15-year-olds may be relatively easier in rural areas where the village headman or other key informants may know them individually because village populations are small. Care would need to be taken in selecting the headman or other informant to ensure that this would not add bias.

In urban areas, where it is possible a mini-census, or area-specific census, should be carried out in selected locations to identify households with 15-year-olds. An initial suggestion that the project could approach subjects via their employers is unlikely to be fruitful in many developing countries as the majority of OOS 15-year-olds will be working with or for informal employees that are not contactable or with their family.

For Internally Displaced Persons and non-household populations, the various approaches that have been developed in other projects and programmes to capture those in institutions and on the street may be considered.

**Surveying, testing and administering an interview**

The experience of surveying out-of-school children through the OOSCI initiative, for example in the Democratic Republic of Congo, the Uwezo and ASER programmes in East Africa and India respectively,

and the surveys carried out through the Young Lives Project offer important lessons. The approaches used by these programmes and also those of PIAAC and LAMP may well work in terms of administering a questionnaire to OOS 15-year-olds, persuading them to take the test may be more difficult. The literature on the use of incentives is nearly all from developed countries (Groves et al., 2001); their use in developing country contexts may be more problematic, especially if citizen volunteers are used.

The interview and test are, in most cases, probably best administered at home because that is where most of the OOS 15-year-olds will be living and working; street children and others will have to be interviewed and tested where they can be found.

Great care will need to be taken in recruiting, selecting and training interviewers because teenagers are a notoriously difficult population sub-group to interview let alone test. In some circumstances, e.g. interviewing street children, it may be necessary for interviewers to work in pairs.

The possibility of administering both the questionnaire and the test via other modes of delivery, such as the mobile phone and other mobile devices, which would be more familiar to many 15-year-olds, and have been used in surveys in some countries, should be explored. This consideration should, of course, also take into account the impact of the mode of delivery on the performance on the test in each case.

**Design and development of instruments**

The aim of measurement in Strand C is the same as for the main PISA exercise conducted in Strand A. It is possible that the cognitive instruments developed in Strand A may be applicable for many of the OOS 15-year-olds, but there are some special difficulties with this particular group.

We will therefore need a set of instruments ranging from the PISA booklets, to the national component for students below grade 7, that will be prepared under Strand A to some of the PASEC/SACMEQ items, to a basic literacy assessment such as the ASER-type or EGRA early years assessment; to even a pictorial/verbal assessment and then some kind of filter that the interviewers can use to move through these assessments until they find the one that is most appropriate for the 15-year-old they have in front of them. A particular concern is that the OOS (‘failed’) 15-year-old is not further stigmatised through taking the test.

In developing the contextual questionnaire for Strand C, as with Strand B we need to be aware of the possibility of bias in responses to self-report questions. Under Strand B, PISA already relies on self-reports by the students for the analysis of the data that is collected, but it is the schools that determine who is eligible for PISA based on school records. In Strand C there will be no equivalent of the school to determine eligibility; therefore it may be necessary for cross-checks to be made between 15-year-olds and their care-givers. In addition, there may need to be additional modules for the contextual questionnaire specific to out-of-school children. Finally, the standard approach to socio-economic classification may not be appropriate for these particular sub-groups.

# INTRODUCTION

The aim of this Strand C of the PISA for Development project is to develop a methodology and approach for incorporating out-of-school (OOS) 15-year-olds in the assessment, both for developing countries in general and for the specific target countries, because countries are interested in the learning and learnt skills of all children, and not just those that are in school. If the project is successful, PISA would be able to offer countries a leading indicator of human capital in the population as a whole (not just those who have attained grade 7 and above at age 15). First we set out the context for this Strand within the overall project.

Strands A and B of PISA for Development are concerned with the assessment of 15-year-olds that are in school in the appropriate grades and these are defined according to PISA standards as follows:

- 15-year-old students attending educational institutions in grades 7 and higher. This means that participating countries should include:
  - 15-year-olds enrolled full-time in educational institutions.
  - 15-year-olds enrolled in educational institutions who attend only on a part-time basis.
  - Students in vocational training programmes, or any other related type of educational programmes.
  - Students attending foreign schools within the country (as well as students from other countries attending any of the programmes in the first three categories).

PISA's specific age definition is 15 years 3 months to 16 years 2 months and this was chosen as it corresponds to the age by which compulsory education ends in most OECD countries. The PISA assessment is based on the students' age and the amount of schooling that someone of that age should have completed; i.e. grade 7 and above. Given that, in the countries participating in PSA for Development, a significant proportion of 15-year-olds are in grades 6 or 5 and even lower grades, Strands A and B may also assess students that are in grades below 7 to better understand their capabilities. However, these results would not be included in the national results for the participating countries that are reported on the PISA scales. It should also be noted that the assessments completed in Strand C will also not be included in the national results for the participating countries that are reported on the PISA scales. However, the assessment and contextual data from Strand C will be included in the countries' national reports. Moreover, the ultimate goal of PISA for Development is to provide the means for establishing international benchmarks of human capital in the population as a whole at age 15 for the future. This ultimate aim has implications for the approaches, methodologies and instruments that are chosen for Strands A, B and C.

Strand C of the project is therefore concerned with the assessment of the 15-year-olds that fall outside the categories captured in Strands A and B; i.e. those that are out-of-school. In due course, it would be helpful to have a clear definition of the school attendance spectrum to determine who is truly enrolled and actively participating in school and who is not. This definition will be confirmed in Strands A and B so that the project can better define what an OOS 15-year-old is.

It should be emphasised that the situation in respect of this Strand of the project is very different from Strands A and B in several respects. The most obvious difference is that, in the case of Strands A and B the emphasis is on enhancing the existing PISA instruments to make these more relevant to developing countries and the work is regulated by PISA's technical standards and procedures. In Strand C, there are no

existing PISA instruments and procedures to be enhanced and followed – this area of the project breaks new ground for PISA. Thus the project will need to establish its own technical standards for Strand C and confront definitional problems, such as what counts as being in or out-of-school which are considered both theoretically and in practice in each country. In addition, given that many of the OOS 15-year-olds will tend to be from the poorest and most vulnerable groups in society, particularly households where the parents have very low or no education, including 15-year-olds with disabilities and particular ethnic, linguistic and religious groups, there will be other definitional problems associated with how poverty and vulnerability manifests itself in each country.

There are five other areas where Strand C will differ from Strands A and B. First, while Strands A and B have a sampling frame, Strand C does not. Although there is no intention in the project to contrast and compare the results from testing OOS 15-year-olds with those 15-year-olds in school - and the sample of OOS 15-year-olds tested in this first exercise is unlikely to be a fully representative probability sample - the natural implication of testing samples of all 15-year-olds is that, ultimately, a national estimate could be made for all children. This is indeed the long term goal that PISA for Development is designed to facilitate. This means that we have to be able to make an estimate of the numbers of 15-year-olds and how these are distributed between different locations, because we cannot construct an even approximately representative sample without developing a sampling frame.

Second, Strand C presents challenges in the identification and sampling of respondents. Once we know how to count and locate groups of 15-year-olds, we need to know how to find and identify them individually, and then how to sample and deliver the assessment of OOS 15-year-olds and, if considered relevant, their caregivers to answer a contextual questionnaire.

Third, Strand C will depart from the PISA standards in respect of the expected school attainment and cognitive instruments. The standard PISA, as implemented under Strand A, is based on tests of 15-year-olds, independent of the grade the students attend - although they must be at least in grade 7 to be included in the internationally comparable results.[1] In many low- and middle- income countries, a large proportion of 15-year-olds who are still in school will be attending lower grade levels and will therefore be excluded from the samples used in the internationally comparable results; but 15-year-olds in lower grades will be assessed in the PISA for Development pilot country national samples and the data from this will be used at the country level to assess the performance of 15-year-olds in school in whichever grade; equally, although some of the dropouts may have completed 6 or 7 years in the primary cycle (depending on the national system), the majority of OOS 15-year-olds will not have reached grade 7.

Strand C will focus on 15-year-olds that: (a) never had formal schooling; or (b) had some formal schooling but dropped out before age 15; or (c) have formally enrolled in school but are not attending. Given these different educational experiences, we will therefore need a set of assessment instruments for Strand C ranging from the PISA booklets, to the national component for students below grade 7, that will be prepared under Strand A to some kind of basic assessment based on PASEC/SACMEQ items, (to a basic literacy assessment), such as the ASER-type or EGRA early years assessment; to even a pictorial/verbal assessment. In addition, there will need to be filters that the interviewers can use to move through these assessments until they find the one that is most appropriate for the 15-year-old they have in front of them.

Fourth, Strands A and B are governed largely by the existing PISA standards, including existing manuals and frameworks. While Strand C will take as its starting point existing PISA standards and frameworks, the project will quickly depart from these as it deals with specific implementation issues, such

[1] For four of the participating countries, the age range of compulsory education includes 15 so those not in school will be formally 'out-of-school'. But the formal definition is irrelevant for this exercise because the target group is 15-year-olds out of school regardless of the formal age range.

as sampling and the development of instruments for the out-of-school population. It may be necessary to develop additional manuals and standards to govern these new processes.

Finally, it is also important to realise that this is a challenging survey exercise: the intention being to interview and test a reasonably representative sample of, on average, one third of the population of 15-year-olds in the participating countries. It is probable that a proportion of this target group may comprise a vulnerable population sub-group, many of whom will be difficult to find and may be unwilling to be interviewed (let alone tested). The survey poses two significant problems: how to construct a sampling frame which is an essential pre-requisite to drawing a sample; and how to ensure the effective delivery of the assessment, particularly for minority groups. In richer countries, there have, of course, been many surveys of minority vulnerable groups - such as carers, the disabled, etc. - in which the sampling frame has been constructed through door-knocking or carrying out a mini-census of households in specific areas in order to identify households with potential interviewees. These and other approaches are discussed in the following sections.

## BACKGROUND: ESTIMATES OF PERCENTAGES OUT-OF SCHOOL AND INITIAL GUIDANCE ON DEFINING OUT-OF-SCHOOL

This section provides a background discussion of estimates of 15-year-old out-of-school children in the participating countries and suggests initial guidance on tackling some of the issues identified. The section concentrates on two main issues: defining 15-year-olds that are out-of-school; and finding these particular young people.

### What counts as being out-of-school

In this exercise, the focus is on the current status of the 15-year-old vis-à-vis school – or any recognised equivalent in each country (see below) – in order to interview and eventually test them, so we have to be careful in defining what counts as being 'out-of-school', because the label can itself have consequences for the 15-year-old; and attention has to be paid to the national context and definitions of being in- or out-of school.

### Data sources

The estimates provided in most of the tables in this paper come from multiple sources: national, international and multi-national routine data; and national household surveys, international household surveys and education specific multi-national surveys. In particular:

- national administrative sources, including national census data and administrative data on school enrolment compared to estimates of age-specific populations
- international administrative routine data, including reports from national governments to international organisation such as UNESCO and UNICEF, reports of the International Bureau of Education), and estimates made by those organisations based on those and other sources
- multi-national routine data sources including Integrated Public Use Micro data Series (IPUMS)
- national household surveys, such as employment surveys, household and expenditure surveys
- international household surveys, including the Demographic and Health Surveys (DHS) and the education specific household surveys carried out under the EdData programme,
- Multiple Indicator Cluster Surveys (MICS) and the Living Standard Measurement Surveys (LSMS)
- education specific surveys including those carried out by the Latin American Laboratory for Assessment of the Quality of Education (LLECE), *Programme d'Analyse des Systèmes Educatifs de la CONFEMEN* (PASEC), Southern and Eastern African Consortium to Measure Educational Quality (SACMEQ).

It is generally agreed that there are many problems with national administrative routine data on school enrolment/ attendance, in particular issues around coverage, accuracy, and timeliness. One response has been an increasing tendency to treat household survey data as more reliable than routine census or administrative data both in richer developed countries (Valente, 2010) and the poorer developing countries (Munoz and Scott, 2004). There are problems with this presumption but for the purposes of this initial presentation, we rely on household surveys, because they have the merit of being comparable.

**Current definitions of out-of-school**

There have been two theoretical approaches to identifying the out-of-school and describing their characteristics. The first, developed by the CREATE team at the University of Sussex defined 6 zones of exclusion from Primary and Lower Secondary grades, and conceived being out-of-school as a process involving several factors rather than as an event with a single cause. "Knowing the 'why' without the 'how', places the emphasis on a distinct event/opportunity, where evidences suggests it is an interplay of factors which pushes children out of school" (Hunt, 2013). The second approach, developed jointly by UIS and UNICEF (2005) defines 5 Dimensions of Exclusion based on age rather than grade: the OOSCI definition of out-of-school children is "any children of primary or lower-secondary school age who are not enrolled in education." It does not matter whether primary and/or lower secondary is compulsory or not.

Both approaches provide powerful tools for profiling the characteristics of different groups that are excluded, and analysing the barriers and bottlenecks, although most of the studies by the CREATE team are of the processes that lead to dropout (or never entering school?), rather than the current status vis-a-vis school. While studies following the UIS/UNICEF OOSCI approach do provide a more detailed picture of out-of-school teenagers including but not specific to 15-year-olds (although some of the reports do provide breakdowns by single years of age), neither approach addresses the problem of defining current status vis-a-vis school in a study dedicated to finding, identifying and persuading specifically 15-year-old teenagers to take a test, which is our concern here.

Moreover, both the UNICEF/UIS initiative and the CREATE model are based on the rights of children to a basic education, and so are 'school-based', in the sense that the school defines whether or not the child is registered as enrolled, is currently attending sufficiently to be counted as not having 'dropped out'; and in some of the OOSCI country reports, there are country specific definitions for example of the difference between a child having dropped out or left school after completing a cycle. In contrast, the current survey questions in DHS and MICS leave the judgement as to whether the 15-year-old is currently attending to the respondent themselves. This can be rather subjective and it would be important, in this exercise, for the contextual questionnaire to probe more deeply (see section on "Surveying out-of-school 15-year-olds and delivering a test"). However, we should bear in mind that there will be limitations: the questionnaires can only be 30-35 minutes long at the maximum and it will be necessary to retain some comparability with the questionnaires delivered under Strand B.

The questions about educational status and whether or not currently attending school in the DHS and MICS standardised surveys have generated useful material for providing a broad description of the characteristics of out-of-school (compared to in-school) 15-year-olds. But, in addition to any other problems of completeness of standardised household surveys (see below, sub-section on "Groups omitted or systematically under-represented in survey data"), it is important to emphasise that DHS does not collect information on actual current attendance on the day or in the week of the survey. In fact, the percentages reported on in most surveys are based on the answer to the question as to whether the 15-year-old had attended school at some time during the year; and these questions have been asked of carers/parents in the context of omnibus household questionnaire surveys, where many topics are being covered.

Clearly, we need a more precise definition. The EdData approach, in line with the single question in the DHS surveys, is to treat anyone who has attended during the current school year as not being 'out-of-school'. That is a simple definition but not very satisfactory as the degree/ extent of 'out-of-schoolness' depends on when the survey is conducted relative to the school year; it could be anything between 1 and 9 months. The proposal here is that a 15-year-old should be considered as 'out-of-school' either if they have not attended at all in the current school year (if the survey is conducted within 3 months of the beginning of the school year) or if they have not been to school for three months. The only problem with that definition is that the 15-year-old may have been out-of-school for three months because of a serious illness and fully intends to return; but that will be a very small proportion.

*Alternative education programmes and religious education*

The project will require a decision on how to treat Accelerated Learning Programmes in respect of out-of-school status. These programmes include NGO-provided non formal education (NFE) and even apprenticeships and may be treated as forms of schooling. In which case, the contextual questionnaire for Strand C could include prompts for all the possible types of Non-Formal/School programmes available for 15-year-olds in each country; although, even if there is a clear definition of which programmes are included, information on these programmes may be incomplete. We suggest that apprenticeships are not included in this treatment.

**Table 1. Programmes available in potential target countries**

| | Cambodia | Ecuador* | Guatemala | Paraguay* | Senegal | Zambia |
|---|---|---|---|---|---|---|
| Primary equivalency | YES | | | | | YES (Open) |
| Functional Literacy | YES | | | | | YES |
| Community Learning Centres | YES (Voc) | | YES (CEMUCAF) | | | YES |
| Re-entry programmes | YES | | | | | |
| Radio-based or other distance Programmes | | | YES | | | |
| Projects especially for 15-year-olds | | | YES (PJC) | | | |
| Technical Centres / IGPs including Apprenticeships | | | | | YES (a dozen mainly in Dakar) | |
| NGO Programmes | | | | | | |

*Data not available

Notes: CEMUCAF *Centros Municpales de Capacitacion Formacion Humana*; ICBAE Integrated Community Based Adult Education; PJC *Proyecto Promotores Juveniles Comunitarios*; REFLECT Regenerated Education through Freirean Learning and Empowering Community Techniques.

Another issue, which may not be relevant for most of this first set of pilot countries, is how religious education should be treated; however, for example, there are a number of Islamic and Koranic schools in Senegal, which are mainly non-formal. It is difficult to make an international definition, although, following as per ISCED it would depend on the educational content and whether it provides an equivalent qualification (at the secondary level). Here it is instead suggested that whatever is recognised in national policy as a school equivalent institution should be treated as such by PISA for Development in accordance with PISA technical standards.

A challenge for the drafting of the contextual questionnaire is to be detailed and comprehensive and capture the whole range of NFE and religious education, and yet parsimonious and time contained.[2] A way forward might be for the national teams to identify at the earliest stage of the project one or two important NFE sites to use as location(s)/ testing site(s) to capture children who are out of 'official' school.

**Percentages out of school**

The first comprehensive analysis of out of school children was the UIS/UNICEF OOS report in 2005 referred to above. Since then, UIS and the EFA Global Monitoring Reports have included more data and analysis of out-of-school children in different age groups and sometimes specific single age groups.

The DHS and MICS surveys identify single years of age,[3] but, even with the large sample sizes of these surveys, it is not possible to break the data down by many classificatory variables. In particular, in the following table, we have not presented any breakdowns by regions within a country, partly because the author's lack of knowledge of the detailed social geography of the countries means that they could not be interpreted, although these will almost certainly be very useful at implementation stage. All of the prospective participants in PISA for Development have had relatively recent DHS surveys or their own national surveys.

**Table 2a. School attendance status for 15-year-olds in PISA for Development Countries and Brazil**

| | | **In school** | | | | | | | | | | **Out of school, of which:** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age | | | | | | By grade | | | | | | | | |
| 15 | | Total | N | Urban | Rural | Below 7 | 7 | 8 | 9 | 10 | Above 10 | Never been to school | Incomplete primary | Complete primary or higher |
| Brazil | 2011 PNAD | **92.0** | 6713 | 93.2 | 91.8 | **32.9** | 18.8 | 35.1 | 11.7 | 1.4 | 0.0 | 6.0 | 31.3 | 62.7 |
| Cambodia | 2010 DHS | **66.3** | 1685 | 78.7 | 64.1 | **24.3** | 23.7 | 27.6 | 18.4 | 5.7 | 0.3 | 6.5 | 46.9 | 46.6 |
| Ecuador | 2013 ENEMDU | **89.7** | 1742 | 93.0 | 81.3 | **2.6** | 4.2 | 8.4 | 20.8 | 63.3 | 0.7 | 9.0 | 7.7 | 83.3 |
| Guatemala | 2011 ENCOVI | **63.2** | 1708 | 75.7 | 52.6 | **40.3** | 20.5 | 30.2 | 8.9 | 0.1 | 0.0 | 15.6 | 39.4 | 45.0 |
| Senegal | 2010 DHS | **52.1** | 1449 | 66.6 | 38.4 | **24.8** | 19.6 | 24.3 | 20.9 | 8.2 | 2.2 | 69.5 | 25.7 | 4.8 |
| Zambia | 2007 DHS | **87.7** | 728 | 91.4 | 84.7 | **58.8** | 14.2 | 16.7 | 8.0 | 1.7 | 0.7 | 18.9 | 60.9 | 20.2 |

Source: EFA GMR Team.

[2] The MICS used to include an 'NFE' category in the education level question attended question, but dropped it due to low quality results. Carr-Hill and Ondijo (2012a) used a detailed question with pastoralists in Somalia and obtained a reasonable level of responses.

[3] In principle, one could estimate age in years and months, but because, in contrast to the MICS 4 and 5 schedules, the DHS interview schedule only obtains birthdate to the nearest month, there is a possible error of up to two months and so it seemed simpler to work with 15-year-olds.

**Table 2b. School attendance status for 14 -16 year-olds in PISA for Development Countries and Brazil**

| | | In school | | | | | | | | | | Out of school, of which: | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age | | | | | | By grade | | | | | | | | |
| 14-16 | | Total | N | Urban | Rural | Below 7 | 7 | 8 | 9 | 10 | Above 10 | Never been to school | Incomplete primary | Primary |
| Brazil | 2011 PNAD | **91.4** | 20085 | 91.5 | 91.0 | **35.8** | 22.7 | 22.3 | 15.6 | 3.5 | 0.1 | 5.2 | 28.5 | 66.3 |
| Cambodia | 2010 DHS | **66.4** | 5278 | 80.1 | 64.0 | **30.0** | 22.7 | 22.6 | 15.2 | 7.6 | 1.8 | 8.8 | 46.8 | 44.4 |
| Ecuador | 2013 ENEMDU | **89.5** | 5429 | 92.5 | 83.2 | **3.2** | 4.5 | 11.8 | 30.1 | 46.0 | 4.5 | 6.4 | 9.5 | 84.2 |
| Guatemala | 2011 ENCOVI | **65.0** | 5005 | 77.5 | 54.6 | **41.6** | 22.7 | 21.6 | 11.5 | 2.3 | 0.3 | 14.7 | 37.8 | 47.5 |
| Senegal | 2010 DHS | **49.0** | 4713 | 64.1 | 35.7 | **27.1** | 20.6 | 21.9 | 19.0 | 7.8 | 3.6 | 70.8 | 23.6 | 5.6 |
| Zambia | 2007 DHS | **85.4** | 2464 | 88.4 | 83.2 | **61.1** | 13.7 | 15.3 | 6.7 | 2.7 | 0.7 | 21.2 | 57.7 | 21.2 |

Source: EFA GMR Team.

The estimated percentages from DHS Surveys[4] of the educational status of 15-year-olds are given in Table 3 divided between Rural (R) and Urban (U), broken down between those who have never been to school, those who have some schooling but have dropped out and those who are still at school. Only a small proportion (less than 11%) had never been to school with the exception of Senegal (33%); but the percentage who have never been to school or who have some primary or secondary but who have dropped out is over 30% in Cambodia, Guatemala and Senegal; in contrast the percentage with some secondary and still in school is 50% in Cambodia. In all of the countries, those in rural areas are more likely than those in urban areas to be out-of-school, and in general girls are more likely than boys to be out-of-school.

In the following pages, two tables report, wherever available, the percentages of in- and out-of-school children for specific subgroups.

**Table 3a. DHS Estimates of percentages of 15-year-olds by schooling status: Cambodia**

| | Cambodia | | | | | |
|---|---|---|---|---|---|---|
| | Male | | Female | | Both | |
| | R | U | R | U | R | U |
| Never been to school | 51 | 8 | 45 | 8 | 96 | 16 |
| Incomplete primary | 362 | 74 | 321 | 48 | 683 | 122 |
| Completed primary but dropped out | 153 | 31 | 137 | 42 | 290 | 73 |
| In secondary school | 227 | 77 | 185 | 118 | 412 | 195 |
| All in sampling frame | 793 | 190 | 688 | 216 | 1481 | 406 |

[4] There are problems with using either DHS or MICS or similar standardised surveys in exploring the characteristics of marginalised groups (see next section), which will have to be addressed in designing the survey instrument. These figures should be treated as indicative estimates.

**Table 3b. DHS Estimates of percentages of 15-year-olds by schooling status: Senegal**

| | Senegal | | | | | |
|---|---|---|---|---|---|---|
| | Male | | Female | | Both | |
| | R | U | R | U | R | U |
| Never been to school | 144 | 32 | 123 | 32 | 267 | 64 |
| Incomplete primary | 90 | 40 | 79 | 38 | 169 | 78 |
| Completed primary but dropped out | 40 | 22 | 15 | 29 | 55 | 51 |
| In secondary school | 89 | 73 | 70 | 77 | 159 | 150 |
| All in sampling frame | 363 | 167 | 287 | 176 | 650 | 343 |

**Table 3c. DHS Estimates of percentages of 15-year-olds by schooling status: Zambia**

| | Zambia | | | | | |
|---|---|---|---|---|---|---|
| | Male | | Female | | Both | |
| | R | U | R | U | R | U |
| Never been to school | 2 | 0 | 11 | 5 | 13 | 5 |
| Incomplete primary | 146 | 55 | 139 | 70 | 285 | 125 |
| Completed primary but dropped out | 14 | 30 | 25 | 32 | 39 | 64 |
| In secondary school | 22 | 64 | 24 | 90 | 46 | 154 |
| All in sampling frame | 184 | 149 | 199 | 197 | 383 | 348 |

Table 4 presents comparisons of out-of-school (OOS) 15-year-olds and in-school 15-year-olds by sex. It reports the percentage in urban areas and in the poorest quintile of the wealth index in rural areas. The comparison of the percentages of the out-of-school populations in urban areas shows that, in all five countries, the percentages of out-of-school boys or girls in urban areas is less than the percentage in school; being out-of-school is more of a rural phenomenon for both boys and girls, although the percentages of OOS 15-year-old for boys is lower than that of girls in four of the five countries.

The comparison of the percentages in rural areas that are in the poorest quintile of households shows that the percentages in the poorest quintile of households is always larger than 20% - and sometimes considerably higher – and that the percentages for in-school 15-year-olds is always much closer to the expected 20%. Moreover the percentages in the poorest quintile in rural areas are usually higher for girls than for boys; being out-of school in rural areas is a characteristic of poor households and has more impact on girls.

**Table 4a. Percentages of 15-year-olds in- and out-of-school in urban areas; and percentages of 15-year-olds in- and out-of-school in bottom quintile in rural areas**

| | CAMBODIA | | | | GUATEMALA | | SENEGAL | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Urban | | Rural % poorest | | Urban | | Urban | | Rural % poorest | |
| | % of OOS | % of in-school | % of OOS | % of in-school | % of OOS | % of in-school | % of OOS | % of in-school | % of OOS | % of in-school |
| Boys | 15.1 | 30.0 | 36.5 | 19.1 | 18.8 | 44.1 | 21.8 | 39.2 | 43.7 | 26.1 |
| Girls | 20.7 | 32.2 | 39.6 | 19 | 18.7 | 46.2 | 23.4 | 50 | 43.8 | 21.3 |

**Table 4b. Percentages of 15-year-olds in- and out-of-school in urban areas; and percentages of 15-year-olds in- and out-of-school in bottom quintile in rural areas**

| | ZAMBIA | | | |
|---|---|---|---|---|
| | Urban | | Rural % poorest | |
| | % of OOS | % of in-school | % of OOS | % of in-school |
| Boys | 40 | 45.4 | 50 | 27.5 |
| Girls | 37.5 | 52.3 | 31.1 | 25.3 |

## Other disadvantaged groups

Our analysis would not be complete without consideration of other disadvantaged groups that make up a sizeable proportion of the out-of-school population in the participating countries. In particular, we need to consider the disabled and ethnic minority groups and religious groups.

*Disability*

This is an area where the project can break new ground in respect of main PISA. While there has been some work done in this area to adapt PISA for the disabled, it has not gone very far. It is an area that many countries already participating in PISA are keen to move forward with, but there is little agreement yet about how to do this. There are definitional problems: the World Bank notes that "The rate of disability found in household surveys and censuses varies dramatically. This variation results from differing measures of disability, different data collection techniques, and different reactions to survey questions by respondents."[5]

Disability is associated with an increased probability of falling in the two poorest quintiles, as well as with lower educational attainment based on 14 household surveys from 13 developing countries. Filmer (2008) reported that 6-17 year-olds with disabilities do not live in systematically wealthier or poorer households than their peers, but are significantly less likely to start school or to be enrolled at the time of the survey. The school participation deficit associated with disability is often larger than deficits related to other characteristics, such as gender, rural residence, or economic status differentials. PISA for Development cannot ignore this subpopulation and participating countries will need to agree on potential adaptations that will need to be codified and standardised so as to ensure the comparability of results internationally in due course. The difficulties in doing that are discussed in Section on "Design and development of instruments".

*Minority groups, languages and religions*

There are minority language groups in nearly all of the participating countries and the issue of language presents a considerable barrier to access for these. In particular, at least 10% of the populations of Cambodia and Ecuador and 40% of the population in Guatemala appear to belong to minority language groups with high levels of out-of-school populations. Breakdowns comparing those not currently attending school and those who have at least completed primary school are shown in Table 5 for Cambodia and Guatemala; there are sharp contrasts between those of the main religion(s) compared to those of other

[5] http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTSOCIALPROTECTION/EXTDISABILITY/0,,contentMDK:21249181~menuPK:282717~pagePK:148956~piPK:216618~theSitePK:282699,00.html

**Table 5. Educational attainment of all adults (15+) and educational status of 15-year-olds of those belonging to main and minority religions: Cambodia and Guatemala**

| Country | | % Completed primary schooling | | % 15-year-olds currently out-of-school | | % in two bottom quintiles | |
|---|---|---|---|---|---|---|---|
| | | Main Religion(s) | Other religions | Main Religion(s) | Other religions | Main Religion(s) | Other religions |
| Cambodia 2010 | Rural | 36% | 14% | 39% | 51% | 47% | 68% |
| | Urban | 64% | 39% | 27% | 22% | 6% | 0% |
| Guatemala 1998-99 | Rural | 29% | 25% | 29% | 75% | | |
| | Urban | 79% | 25% | 55% | 75% | | |

Note: In Cambodia, 95% were Buddhist and 5% other religions; in Guatemala, 52% Catholic, 29% Evangelist, 18% other.

Source: Author's analysis of corresponding DHS surveys.

In general, therefore, the OOS 15-year-olds in the participating countries are concentrated disproportionally in groups and areas defined by the intersections of the following characteristics:

- Rural
- Poverty
- Sex (female)
- Language minority
- Religious minority and
- Disability

**Summary and conclusions**

The ambiguities over what counts as school has been discussed and in general it is argued that all forms of organised NFE should be included in the definition of what counts as school but that apprenticeships should be excluded. It will be important for target pilot countries to develop a comprehensive catalogue of what outside-school programmes should be considered.

These statistics present a reasonably clear profile of who is out-of-school, mostly formal, public school. The sampling frames used to draw the samples for the household surveys are problematic and warrant further discussion.

Based on the available sources, we know that:

- In three of the six potential participants in PISA for Development, more than one third of 15-year-olds will not be in-school.
- Many of those 15-year-olds who are in school will be two, three and four years older than the expected grade for their age and will actually be in primary school, i.e. below grade 7.
- Out-of-school 15-year-olds are poorer, mainly rural, and with a disproportionate percentage in the poorest quintile; in general, the most disadvantaged are poorest rural girls.
- Those belonging to minority ethnic, linguistic or religious groups are also more likely to be out–of-school; but these categories are confounded with poverty.
- Based on Filmer's (2008) work, we expect that also in the participating countries disabled youth will be more likely to be out of school and be poorer when adult.

## COUNTING AND LOCATING THE OUT-OF-SCHOOL

The discussion presented below of counting and locating out-of-school (OOS) 15-year-olds is framed by the context of the long term aim of PISA for Development, which is to establish a measure of human capital (including those in school and out-of-school) towards the end of compulsory education that provides a leading indicator of human capital in the future.

### Basic demographics of 15-year-olds

Strand C of PISA for Development follows the same approach that PISA established which is to focus on a specific age group – 15-year-olds – with the added spice that they have to be found.[6] It is important to note that this is a very small proportion of the total population of a country. In Table 6, based on international demographic data, we show estimates of the percentage of all 15-year-olds in the population, the average number of households that would needed to be visited to find one 15-year-old and their density per square kilometre. Estimates have also been made, for comparison, based on the numbers of 15-year-olds in the latest DHS sample household surveys.

**Table 6. Estimates of numbers and density of 15-year-olds in the population**

| | Cambodia | Ecuador | Guatemala | Paraguay | Senegal | Zambia |
|---|---|---|---|---|---|---|
| Estimates from current routine statistical data | | | | | | |
| Total population (000s) | 14 365 | 15 001 | 14 342 | 6 687 | 12 951 | 13 217 |
| N of households (000s) | 2 842 | 3 572 | 3 586 | 1 484 | 1 076 | 2 636 |
| Average household size | 5.05 | 4.20 | 4 | 4.89 | 12.0 | 5.01 |
| 15-year-olds (000s) | 333 | 290 | 335 | 134 | 297 | 305 |
| Percent 15-year-olds | 2.3 | 1.9 | 2.3 | 2.0 | 2.3 | 2.3 |
| Land mass (000s sq. km) | 177 | 248 | 107 | 407 | 193 | 743 |
| Population density (pop/sqkm) | 81 | 60 | 134 | 16.4 | 67 | 18 |
| Density of 15-year-olds/ sqkm | 1.87 | 1.15 | 3.08 | 0.33 | 1.54 | 0.41 |
| N households / one 15-year-old | 8.5 | 12.3 | 10.7 | 11.1 | 3.6 | 8.6 |
| Latest DHS household survey estimates | | | | | | |
| N of households (‘000s) | 15.7 | n.a. | 5.6 | n.a. | 4.2 | 7.2 |
| 15-year-olds in sample | 979 | | 584 | | 949 | 638 |
| Estimate of 15-year-olds in population (‘000s) | 177 | | 374 | | 243 | 234 |
| N households / one 15-year-old | 15 | | 9.6 | | 4.4 | 11.3 |

Sources of Routine Statistical Data: Estimated Populations; http://esa.un.org/wpp/Excel-Data/Interpolated.htm.

Number of Households and Household Size: country censuses.

Land mass: http://data.worldbank.org/indicator/AG.LND.TOTL.K2.

Sources of DHS Estimates: Re-analysis of DHS Survey Data: Cambodia (2010), Guatemala (1998-99), Senegal (2012), Zambia (2007).

[66] Clearly this is not a problem for the main PISA for Development sample, because they are in school.

In most countries, with the exception of Senegal, a household based survey will involve visiting about 10 times as many households as the number of 15-year-olds in the population;[7] and, if an area approach is adopted, it will be rather like looking for a needle in a haystack. Moreover, in terms of the particular concern of this project – OOS 15-year-olds' – even these estimates of the accessibility of the target population are optimistic because of course they include 15-year-olds who are in school.

With the exception of Cambodia and Zambia, the DHS estimate is within 30% of the estimate from international routine data sources from different sources. Nevertheless, the differences are troubling, and the possible reasons for these discrepancies are considered in the following two sub-sections.

**Low birth registration and age heaping**

Estimates of age-specific populations in many of the participating countries are suspect, because the levels of birth registration are scandalously low (Powell, 1981; Setel et al., 2007). The consequence is that children are systematically undercounted (Buettner and Garland, Head of UN Pop Division, Presentation, 2008).

**Table 7. Percentage of children under five whose birth was registered at the moment of the survey**

(The numerator of this indicator includes children whose birth certificate was seen by the interviewer or whose mother or caretaker says that the birth has been registered.)

| | Brazil | Cambodia | Ecuador | Guatemala | Paraguay | Senegal | Zambia |
|---|---|---|---|---|---|---|---|
| **Rate%** | 93 | 62 | 90 | 97 | 76 | 75 | 14 |
| **Source** | IBGE | DHS | ENNA | ENSMI | UNICEF | DHS | DHS |
| **Year** | 2010 | 2010 | 2010 | 2008/09 | 2005-12 | 2010/11 | 2007 |

Notes: DHS: Demographic and Health Survey; ENNA: *Primera Encuesta Nacional de la Ninez y Adolescencia;* ENSMI: *Encuesta Nacional de Salud Materno Infantil* ; IBGE*: Instituto Brasileiro de Geografia e Estatística.*

Researchers and contractors involved in the Strand C of PISA for Development will need to consider whether and where there are comprehensive (>90%) records of birth registration and to what extent they available centrally or locally; in case of local availability, the issue would be whether or not those lists can be accessed.

Research practice has shown that both caregivers and respondents tend to reported ages to the nearest 5 or 10 years when reporting to an interviewer, and methods have been developed to 'smooth' age distributions (Bogue et al., 1993). The distribution of ages between 5 and 20 for three of the countries and between 15 and 20 for Guatemala and Senegal is shown in Table 8. The picture is confounded by mortality, but the most pronounced deviations from the expected pattern are at age 10 for Cambodia and Zambia, and at age 20 for Senegal. Although there is an effect in some countries at age 15, and it should perhaps be considered at the analysis stage,[8] it is small.

[7] The ASER 2012 survey in India interviewed 69,000 15 and 16 year olds in 340.000 households, i.e. there was a 15- or 16-year-old in just over 20% of households, which supports this estimate.

[8] In principle, the additional questions we shall be asking at the second stage – for example, the year and month of birth with the aid of a calendar of events – should eliminate any residual 'heaping'.

**Table 8. Distribution of children and teenagers by single years of reported age between 5 and 20**

| | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cambodia | 6.0 | 6.2 | 6.0 | 6.1 | 5.6 | 7.3 | 6.0 | 6.2 | 6.7 | 6.3 | 6.1 | 6.7 | 6.7 | 6.7 | 5.4 | 6.2 | 27 740 |
| Guatemala | | | | | | | | | | | 17.6 | 18.8 | 15.6 | 16.8 | 15.5 | 15.6 | 1 662 |
| Senegal | | | | | | | | | | | 16.0 | 15.4 | 16.7 | 18.1 | 13.4 | 20.5 | 2 606 |
| Zambia | 6.3 | 8.7 | 8.0 | 7.1 | 7.3 | 7.6 | 6.5 | 7.3 | 7.2 | 7.1 | 4.9 | 4.6 | 4.6 | 4.5 | 4.0 | 4.2 | 14 907 |

Source: DHS Surveys, author's calculations.

Given the unknown errors in age-specific population counts and the unreliability of enrolment data, we cannot count the numbers out-of-school at any age by subtraction of enrolment figures from population figures. For this reason, most estimates rely on surveys, despite the problems identified above.

**Groups omitted or systematically under-represented in survey data**

The PISA for Development assessment of out-of-school children will be based on a survey instrument. The standardised household surveys that we referred to in the previous sections have inherent weaknesses and specifically tend to generate biased samples for capturing information on the marginalised and the poorest (Carr-Hill, 2013). One major limitation of these assessments is that they use the national census as the basis for their sampling frame, and national censuses in these countries are often very out of date (e.g. the last census in the Democratic Republic of Congo was in 1984). Inadequate coverage of birth registration means that it is difficult to use administrative records as an additional check on statistically projected populations; but the alternative of exclusive reliance on a household sampling frame poses additional problems.

The problem with using household surveys to assess the absolute level of poverty or to sample the most vulnerable (such as those out-of-school) is that, in contrast to the view of Munoz and Scott (2004), they generate systematically biased undercounts of the poorest of the poor or of the vulnerable, especially in developing countries. This is because household surveys, with rare exceptions, typically omit by design:

- those not in households because they are homeless;
- those who are in institutions, including refugee camps; and
- mobile, nomadic or pastoralist populations.

In addition, in practice, because they are difficult to reach, household surveys will typically under-represent:

- those in fragile, disjointed or multiple occupancy households (because of the difficulty of identifying them);
- those in urban slums (because of the difficulty of identifying and interviewing);
- residents of certain areas of a country deemed to pose a security risk; and
- other adults or children in households who are at risk of being under-represented because of illegality (e.g. underpaid household servants in rich households) or stigma (children with disabilities).

If one wanted an empirical – as distinct from a theoretical – definition of the 'poorest of the poor', the above collection of seven population sub-groups could hardly be bettered. It is therefore important to adjust any estimates from household survey with estimates of the numbers involved in each of these categories (Carr-Hill, 2013). For these six countries, there is no consistent data on the number of homeless and the numbers in hospitals and prisons are relatively small, but there are data on the number of refugees and estimates for the number of rangeland pastoralists, together with the numbers in urban slums, and these are presented in Table 9.

The data in Table 9 suggests that these groups cannot be ignored, which poses difficulties for relying on the estimates from standard household surveys, because of the PISA standard of not knowingly excluding more than 5%. The slum populations are clearly the largest group in all six countries, but there are substantial minorities of rangeland pastoralists in Senegal and Zambia (and non-negligible percentages in Ecuador), whilst the number of official refugees is very small in Cambodia, Guatemala and Senegal and less than 1% in the other three countries. If we assume that only 10% of slum populations are 'missed' from sampling frames – which most (e.g. Davies, 2006) – would agree was a very low estimate), then the percentage estimated to be missed from sampling frames would only be less than 5% in Cambodia and Guatemala.

**Table 9. Marginal and vulnerable populations in participating countries**

| | Cambodia | Ecuador | Guatemala | Paraguay | Senegal | Zambia |
|---|---|---|---|---|---|---|
| Total population ('000s) | 14 365 | 15 001 | 14 342 | 6 687 | 12 951 | 13 217 |
| N rangeland pastoralists | 54 | 555 | 37 | 601 | 1 267 | 1 864 |
| % rangeland pastoralists | 0.38 | 3.7 | 0.26 | 9.0 | 9.8 | 14.1 |
| N refugees, etc. ('000s) | <0.1 | 136 | <0.2 | <0.2 | 17 | 52 |
| % refugees, etc. | <0.001 | 0.91 | <0.001 | <0.002 | 0.013 | 0.39 |
| Slum populations ('000s) | 2 385 | 1 786 | 2 660 | 454 | 2 048 | 2 633 |
| % slum populations | 16.6 | 11.9 | 18.5 | 6.8 | 15.8 | 19.9 |
| Total % marginal | 17.0 | 16.5 | 18.8 | 15.8 | 25.6 | 34.4 |
| Est'd numbers marginal | 2 442 | 2 475 | 2 696 | 1 057 | 3 315 | 4 547 |
| Estimated % 'missing' | 2.0 | 5.8 | 2.2 | 9.7 | 11.5 | 16.5 |

Sources: Total Population; World Population; % Rangeland Pastoralists estimated for 2010 (Thornton et al. 2003); Refugees and Populations of Concern 2011 (UNHCR, 2013); Slum Populations 2009, 2007 for Cambodia and 2005 for Ecuador (UN Habitat, 2011)

## Approaches to counting

To complement the approach of a standard household survey, so as to avoid the 5% floor, we need to search actively for the population sub-groups most likely to include OOS 15-year-olds. This may require supplementing household surveys with another element to capture the hard to reach groups, such as pastoralist populations, urban slum dwellers, children in facilities and street children.

It is most likely that important minorities of the marginalised – such as OOS 15-year-olds and their households - will be under-sampled in standard household surveys. This is because most of the marginalised in the participating countries will be found among the isolated rural poor and in informal settlements/ urban slums. Although, local city officials will, of course know where informal settlements and urban slums are, a local anthropologist/ demographer/ sociologist should be included in the country teams to concretise the estimates in this paper of the size and location of in terms of other groups that are marginalised and possibly missing from survey sampling frames.

Finally, a further issue concerns the concept of 'household', which is often defined in surveys in terms of eating together or 'sharing the same cooking pot'. But, in rural areas, several different families - each with a head that keeps her/his own children, buys clothing for the children, cares for the sickness of the family - may be eating together (Randall, Coast and Leone, 2011). This fluidity poses extreme challenges to the design and implementation of a contextual assessment for out-of school children, especially for those who come from the most marginalised sub-groups and live outside the predictable forms of social structure.

***Using household survey data to assess educational status of out-of-school 15-year-olds***

Many of the out-of-school 15-year-olds in urban areas will be from the poorer/ poorest parts of these areas, such as slums. An overall estimate in Carr-Hill (2013) of the percentage missing from urban slums (informal settlements) is between 10% and 20% and so a provisional estimate of 15% could be used. But OOS 15-year-olds are especially likely to be from uncounted households and so we have doubled that and used an estimate of 30% for the urban areas. For the rural populations in these countries where there are no or very few nomads or pastoralists, we have used an estimate of 10% (because of isolation, inter-censal migration or because of out-of-date population estimates). Numbers in each of these 'missing' categories can be estimated, by making assumptions about how the additional numbers derived from these inflation factors are divided between the out-of-school groups: the assumptions made here are as follows: 50% never been to school, 30% incomplete primary and 20% complete primary school.[9] Of course, all the percentages in this previous sentence are guesstimates but the purpose here is to provide some ball-park figures of the distribution of the different types of OOS 15-year-olds between boys and girls and between rural and urban areas.

The overwhelming conclusion from both the unadjusted and adjusted estimates is that we should look for the OOS 15-year-olds in rural areas, although the adjusted estimates suggest that there are significant minorities in urban areas, which are more accessible if sometimes insecure. More precise breakdowns can be carried out for each country in order to specify the rural areas with the most OOS 15-year-olds.

**Summary and conclusions**

The numbers of 15-year-olds in the populations of the participating countries is between 1.9% and 2.3%; in most countries nearly 10 households would have to be visited to identify one 15-year-old, let alone an OOS 15-year-old. The previous section concludes that in four of the six potential participants in PISA for Development, around one third of 15-year-old children will not be in-school. These facts present an important challenge for conducting a traditional household survey because OOS 15-year-olds will be a similarly small minority in any sampled location and therefore difficult to identify and locate.

Moreover, population estimates for single years of age are not very reliable, and in two of the countries, there are substantial differences from estimates based on DHS surveys. The first problem is that birth registration in many developing countries is very low. Even where there are comprehensive (>90 %) records of birth registration, the statistical infrastructure may not be sufficient to track emigration, immigration and internal migration. The second problem is the possible effect of age heaping or rounding by caregivers or respondents but this does not appear to be substantial in these countries, although this should be checked in-country.

Furthermore, household surveys that are increasingly the basis for much educational data tend to exclude fractions of the marginalised and vulnerable groups from their sampling frames; and, as shown in the earlier sections, the out-of-school are predominantly from the poorer sections of the population. This

[9] These are of course different from the percentage distributions between these categories of all 15-year-olds.

may have implications for international comparisons of out-of-school survey results, as the situation may differ across countries; and procedures are suggested for estimating the range of possible errors.

It is likely that many of the marginalised in the participating countries will be found among the isolated rural poor or informal settlements/ urban slums. It may be helpful to include a local anthropologist/ demographer/ sociologist in the country teams to assist with the estimates of the size and location of groups that may be missing from survey sampling.

Given the challenges of counting and locating a single year age group in developing country contexts and the basis of the target PISA population, being related to how much schooling 15-year-old students would be expected to have, and therefore their expected performance, the managers of PISA for Development may consider incorporating some flexibility in its approach to Strand C. PISA has been given to children of different ages and while it is designed for 15-year-olds, testing out-of-school children in a range of ages, say, from 14 to 16, may still yield valuable results.

## CONSTRUCTING A SAMPLING FRAME AND FINDING 15-YEAR-OLDS

This Strand of PISA for Development aims at developing and trialling methodologies and approaches for including out-of-school (OOS) 15-year-olds in the PISA assessment. In this context, the goal ultimately is to collect data on the out-of-school 15-year-olds that are representative for the population at large. To reach this goal the project needs to develop, trial and establish scientific rules for drawing a sample of out of school 15-year-olds that is representative for the population of OOS 15-year-olds at large.

The previous section documented the difficulties of counting and locating 15-year-olds and suggested purposive targeting of areas. That possibility is considered later in this section but first, we consider the problem of drawing a sample within an identified area. In fact, drawing a sample of out-of-school 15-year-olds *directly* is probably not very sensible or cost-effective because the initial approach of 'listing' or taking a 'mini-census' has to include two further sets of questions: (a) to confirm/cross-check that the teenager really is 15; and (b) to establish whether or not the 15-year-old really is out of school and these would require the presence of the 15-year-old, which of course cannot be guaranteed. It is therefore probably better to first identify ALL households reporting a 15-year-old in response to a simple question about the ages of household members; and then make an appointment to return when the 15-year-old will be asked to be there.

### Developing a random probability sample

Given the complexity of this exercise, it is unclear whether we would want to recommend a formal process of probability sampling of areas (perhaps weighted by poverty estimates). If we do, an illustration of the approach taken from the Zambia DHS 2007 study to draw a representative probability sample is given in the box below.

**Box 1. Extract from Zambia DHS 2007 Survey Report**

"A representative sample of 8 000 households was drawn for the 2007 ZDHS survey. The sample for ZDHS 2007 was a stratified sample selected in two stages from the CPH 2000 frame.

Stratification was achieved by separating every province into urban and rural areas. Therefore, the nine provinces were stratified into 18 sampling strata. Samples were selected independently in every stratum by a two-stage selection. Implicit stratifications and proportional allocation was achieved at each of the lower geographical/administrative levels by sorting the sampling frame according to the geographical/ administrative order and by using a probability proportional to size selection at the first stage sampling.

In the first stage, 320 Standard Enumeration Areas (SEAs) were selected with probability proportional to the SEA size. The household listing operation was conducted in all selected SEAs, with the resulting lists of households serving as the sampling frame for the selection of households in the second stage. Selected SEAs with more than 300 households were segmented, with only one segment selected for the survey with probability proportional to the segment size. Household listing was conducted only in the selected segment. Therefore, a ZDHS 2007 cluster is either an SEA or a segment of an SEA. In the second stage selection, an average number of 25 households were selected in every cluster, by equal probability systematic sampling. A complete listing of households and a mapping exercise was carried out for each cluster in August 2006. All private households were listed. The listing excluded people living in institutional households (army barracks, hospitals, police camps, boarding schools, etc.)."

Following this probability sampling procedure, standard errors can be calculated and adjusted for the Design Effect which is, effectively, the limited number of sampling points selected out of all the enumeration areas available and the possible clustering effect of respondents within the selected sampling points.[10] The Design Effect Coefficient (DEFT) coefficient indicates the ratio of the calculated standard

[10] Note that not all DHS reports specify probability proportional to size; but there has to be some probability algorithm used in order to compare selected EAs to all EAs in order to calculate the Design Effect

error to the standard error of a simple random probability sample of the same size without any stratification/ clustering.

*Using the probability approach in Strand C of PISA for Development*

For our purposes, the probability approach would have to be modified as follows:

- The country is divided into administrative (provincial or regional) units; and usually also into urban and rural areas to create strata; and this should be carried out in the same way in each country.
- Within each stratum, census or enumeration areas (EAs) – or each selected segment of an EA if the EAs are too large – are selected with probability proportional to size.
- Households within each selected EA or segment of an EA are listed together with the ages of household members.
- Households reporting a 15-year-old are the sample to be interviewed.

The classic sample designs of DHS/MICS are based on cluster sampling points; these points are defined based on census geographical areas (enumeration areas or census district) and their census population. The cluster areas are selected with probability proportional to size. An important remark is that even in non-nomadic societies there can be substantial movement between rural areas because of land degradation, and substantial movement between informal settlements because of urban redevelopment; as spelt out in the earlier section of this paper. The fundamental implication here is that those sampling frames may miss the poorest. But there is a further implication: although the DHS and MICS teams update any census-based list of households in the selected enumeration areas or parts of enumeration areas (EAs), there is no mention that the size of the re-listed EAs has been compared with their census-based size to assess the reliability of the sampling of those clusters, or that fragile or disjointed households were dealt differently within that re-listing exercise. These issues should be considered in interpreting results and make appropriate adjustments.

The problem, again, is the rarity of OOS 15-year-olds. Here is a mock calculation of sample size for a probabilistic sampling approach to the study of OOS 15-year-olds in PISA for Development. The size of a typical PISA in-school country sample is between 5,000 and 8,000. Taking the lower figure and assuming that in the same country another 30% of children are out-of-school, to obtain a proportionately sized out-of-school sample we would we need a target population of approximately 2,100 OOS 15-year-olds. Given an average of ten households are needed to find a 15-year-old, of whom only a third are out-of-school, this implies an initial mini-census 'sample size' of 63,000 households and 6,300 at the second stage (filtering, interviewing and testing). Samples of this size are clearly unrealistic, even with the use of citizen volunteers at the mini-census stage of finding households reporting a 15-year-old.

It probably helps that in PISA the minimum number of schools for each country is only 150 (PISA Technical Report, 2012). If the sampling for Strand C ran in parallel to Strands A and B, we could select from the 150 sampling points (with an average target OOS sample size at each sample point of fourteen OOS 15-year-olds) a proportion equivalent to the share of OOS 15-year-olds that are present in the country – an average of 30%. Such an approach may not be the most cost efficient sample design for a household survey, but it is worth considering.

**Alternative approaches**

We have two realistic possibilities for alternative approaches:

Option One: to choose fewer sampling points and fewer respondents than for the main PISA exercise with the following possible variations:

- A) by choosing fewer sampling points the cost would decrease proportionately to the reduction in the number of sampling points but the Design Effect would increase (i.e. make the estimates less precise); or
- B) by choosing fewer respondents within each sampling point and so decreasing the Design Effect (because the sample becomes 'nearer' to a simple random sample) but not reducing substantially the cost, because both the citizen volunteers and the professional interviewers would have to travel to the same number of points, the latter interviewing a very small number of households at each point. In order to realise a specific percentage reduction of budget, one would therefore have to reduce the number of respondents substantially, at each sampling point and a fortiori overall, which would almost certainly be a less cost efficient sample design

or

Option two: to target purposefully specific areas either through (national) local knowledge about low rates of enrolment or through specific targeting of vulnerable groups: for example, pastoralists in Zambia, and slum populations in all participating countries.

If the targeting procedure is adopted, the selection of areas for the survey should be oriented towards the likelihood of finding OOS 15-year-olds. It is clear from analyses in the previous sections that the focus should be on marginal and vulnerable groups. In the six PISA for Development countries, the main marginalised and vulnerable groups may well be minority ethnic, linguistic and religious groups; but they are not always easily localised. Instead, we have suggested that those groups are most likely to be found in poor rural areas (see above) and to a lesser extent in informal settlements/ urban slums; and methods of estimating the relative proportions can be provided.

Given the wide variation in country contexts, the suggestion is that the country teams include someone – possibly from their Central Statistical office – who can contribute to the creation of a poverty map or, if one does not exist, can describe the distribution of poor rural areas and of any pastoralist areas. Slums and informal settlements will be well-known to city officials (and are, in any case, identified in UN Habitat, 2012).

Assuming that a 'poverty map' can be made available, then samples in rural areas should not only be chosen proportionally to the population size of the areas but also be weighted according to poverty estimates in order to ensure that the sample is representative of the likely location of (missing sub-groups of the) OOS 15-year-olds. Samples in urban areas should also be based on estimates of the relative poverty of informal settlements and slums within the urban area; and the precise design of all these would in principle need to be developed by the contractor.

For the PISA for Development *pilot* project, however, the approach should be more straightforward; selecting a small number of the poorest rural areas and a smaller number of areas in informal settlements and urban slums.

**Direct approaches to finding and identifying 15-year-olds**

Whichever option is chosen and assuming that specific rural areas and urban slums have been selected, the next step would be to identify the 15-year-olds within the areas.

*In rural areas*

There will only be a small number of 15-year-olds in most villages (and even fewer OOS 15-year-olds). Nevertheless, despite their rarity, in some countries, it may be relatively easy to retrieve them because often in these contexts there is a headman of the village that will be able to identify households with 15-year-olds, without going through any prior enumeration procedures. Even if this is not possible, there are other options, such as working with non-governmental organisations (NGOs) that may be active in the area; identifying institutions, activities and locations that are likely to attract 15-year-olds that are out of school; or, possibly, going through sub-district levels of government administration, although they may not have the detailed on-the-ground knowledge required.

Where key informants are unavailable or cannot provide the information, the DHS and MICS approach of re-listing the households in the selected Enumeration Areas (EAs) should be adopted, with the modification that the listing includes the ages of household members, in order to generate an up-to-date sampling frame in each area.

Where there are substantial nomadic/pastoralist population sub-groups, such as in Senegal and Zambia, the approach suggested by Myer et al. (2009) to construct a supplementary sampling frame for pastoral areas, based on estimates of relative population sizes of the nomadic/pastoralist groups, should, if possible, be used. The approach, however, involves a reasonable description of the socio-economic characteristics of the different groups and their approximate representation in the population, so the local informants have to be well-informed in the first place. Otherwise, sampling will have to be based on local informants' best estimates of the location of the nomadic/ pastoralist groups.

*In urban areas*

In urban areas, there is unlikely to be the equivalent of a 'headman' and sub-district levels of government will be covering too large a population for any official to have any such detailed knowledge. If there are NGOs active in the area, however, they could still be helpful. But, in contrast to the situation in rural areas, there are other challenges: first, many of the vulnerable will be living in informal settlements/ slums which are notoriously difficult and costly to survey because of their lack of formal organisation and particularly for reasons of security; second, there is a wider variety of activities, varying from (mostly) girls working as (possibly unpaid) domestic servants to boys working in the family business

For non-slum areas, the most professional approach would be to carry out a listing of the ages of household members in a sub-location of that site (chosen after consultation with local informants) to identify 15-year-olds and then sample from among those (see next section).

The calculations in the Section on "Background" suggested that in order to identify one 15-year-old (whether or not in school), one would need to visit between 4 households in Senegal and 12 households in Ecuador; whilst relatively resource intensive, if one were to adopt the approach used by the Annual Status of Education Report (ASER) organisation in India and Uwezo[11] in East Africa of using citizen volunteers, it would be feasible financially and technically possible to organise in most of the participating countries. The exceptions might be in countries where parents are highly concerned with safety of children because of the prevalence of kidnapping (e.g. some - parts of - countries in Latin America), such that, even with citizen volunteers, the response rate to a mini-census that focuses only on the ages of their children, could be very low.

For slum areas, which are substantial in several of the participating countries (Table 8), with sufficient support from local community leaders, it might still be possible to carry out a mini-census but the country

[11] Uwezo means 'capability' in Kiswahili.

organisers would have to closely monitor the mini-census in order to ensure that there is as near complete coverage as possible. This author's experience of organising and carrying out similar mini-censuses in the slum areas of Lahore and Nairobi was that there was an apparently large percentage of 'empty' households which could in fact have been inhabited but where the doors were locked and there was no apparent sign of life; and, without any explanation, DHS surveys themselves record that about 4%-5% of households visited nationally are 'unoccupied' and do not include them in the sampling frame. In this exercise, if this occurs with mini-censuses in slum areas of the participating countries, judgements should be made about the likely percentage of apparently unoccupied households that actually include missing populations. We can also think of using several sources of information to inform our estimate, but the main point to keep in mind that it will only be an estimate. Of course, the better the estimate the better the sample, but it is important to bear in mind that in the main PISA exercise, for example, schools need not provide records, but actually just an estimate of how many 15-year-olds they have.

**Indirect approach based on the likely activities of 15-year-olds**

An alternative approach in urban areas - which would obviate the need for the two-stage process of listing and making appointments - is to search for working 15-year-olds in formal employment and interview them as per the STEP programme. The STEP programme targeted small, medium and large enterprises and national survey firms were asked to return between 300 and 1 000 employer interviews in which, in addition to soliciting information about the firm and the level of skills required at each level, interviewers were directed to interview one worker of each main occupational category (manager, professional or technicians; and clerical or service workers, plant and machine operators), and about training and compensation. But their response rates, for developing countries, were low (50%-60%, personal communication, STEP officials).

For the target countries, information on activities is available by single years of age in Labour Force Surveys (www.ilo.org/dyn/lfsurvey/lfsurveylist?/p_lang=en) or a Household Income and Expenditure Survey, and some simple measure of educational attainment but, as the raw data are not immediately available, similar analyses could not be carried out at this stage but should be possible at the country level at Implementation stage.

Meanwhile, the only possible source for breakdowns of activity patterns by school attendance status is a DHS / MICS survey.[12] For the participating countries, combining different DHS files allows analysis of who the respondent is working for (someone outside the household, for a family member or self-employed) according to whether or not they are currently attending school. Only the first working category (working for someone outside the household) could possibly be accessed by an approach through employers.

For 15-year-olds not currently attending school,[13] in the five countries, most males report that they are working (for Cambodia 89%; and for Zambia 73%) whilst there was much wider variation for females (Cambodia 82%; for Guatemala 35%; for Senegal 39%; and for Zambia 29%). But the percentages

[12] The MICS surveys do include such a question but there were no recent MICS surveys in these particular countries.

[13] The majority of both boys and girls in school are not working at all and, in most cases, the percentage is above 80%.

**Percentages of in-school 15-year-old children self-reporting that they are working**

| | Cambodia | | Guatemala | | Senegal | | Zambia | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Female | | Female | | Female | | Male | | Female | |
| | R | U | R | U | R | U | R | U | R | U |
| Not working | | | 56 | 49 | 75 | 108 | 82 | 109 | 120 | 147 |
| All 15-year-olds | | | 69 | 57 | 113 | 123 | 136 | 122 | 139 | 160 |
| % not working | | | 81.2 | 86.0 | 66.4 | 87.8 | 60.3 | 89.3 | 86.3 | 91.9 |

working for someone outside the household are much lower and, apart from females living in urban areas in Cambodia and Guatemala, are always lower than 20%.

**Table 10a. Activity patterns of out-of-school 15-year-olds in Cambodia, Guatemala and Senegal***

| | **Cambodia N = 396** | | | | **Guatemala** | | **Senegal** | |
|---|---|---|---|---|---|---|---|---|
| | **Male** | | **Female** | | **Female** | | **Female** | |
| | R | U | R | U | R | U | R | U |
| **Not working** | **8** | **3** | **41** | **13** | **92** | **16** | **84** | **27** |
| **Currently Working** | **79** | **7** | **194** | **51** | **40** | **18** | **53** | **17** |
| Worked for a family member | n/a | n/a | 76 | 13 | 10 | 3 | 41 | 5 |
| Worked for someone outside household | n/a | n/a/ | 64 | 32 | 24 | 15 | 6 | 9 |
| Self-employed | 68 | 3 | 54 | 6 | 6 | 0 | 6 | 3 |
| **All OOS 15-year-olds** | **87** | **10** | **235** | **64** | **132** | **34** | **137** | **44** |

*Data for Ecuador not available.

Source: Cambodia 2010, Guatemala 1998, Senegal 2012 DHS author's own calculations.

**Table 10b. Activity patterns of out-of-school 15-year-olds in Zambia**

| | **Zambia F = 70 M = 19** | | | |
|---|---|---|---|---|
| | **Women** | | **Men** | |
| | R | U | R | U |
| **Not working** | **31** | **21** | **2** | **2** |
| **Currently working** | **14** | **4** | **7** | **4** |
| Worked for a family member | 6 | 2 | 4 | 2 |
| Worked for someone outside home | 2 | 2 | 2 | 2 |
| Self-employed | 6 | 0 | 1 | 0 |
| **All OOS 15-year-olds** | **45** | **25** | **9** | **6** |

Source: Zambia DHS; author's own calculations

Thus, whilst many OOS 15-year-olds are indeed 'working', they are most likely to be with their family or un-contracted agricultural employees or market/ street sellers rather than in formal employment. If, however, it is thought to be worthwhile to carry out interviewing and testing with those 15-year-olds in formal employment then it would appear sensible to approach this in three stages:

- First compile a list of all businesses working in the area together with their telephone numbers.
- Second, ring up their personnel departments (if they have one) to find out their size and whether or not they have any teenagers working for them (probably better than asking for 15-year-olds because they will not know exact ages without referring to personnel files - if they keep them!).
- Third, if there are a sufficient number of such businesses, divide the reduced list of businesses into small, (medium), and large enterprises and sample from them proportional to size.

### Marginal groups in urban areas

*Non-household populations*

For those not in households in urban areas, there may well have to be additional samples drawn from those living on the street and in institutions. Research on street children has moved on since the original UNICEF (1988) estimates of 100 million, and is summarised in de Benitez (2011). Methods have been adapted from wild-life biology: capture-recapture methods, first used to estimate homeless populations in the 1990s, have been used to estimate numbers of street children in several places including Aracaju, Brazil (Gurgel et al., 2004), Guatemala (Odell, 2011), as well as the OOSCI surveys in the Congo (see Section 4.2.2). Quantitative surveys together with qualitative participant observation and focus groups/

semi-structured interviews with small stratified population samples are also used to count children on the streets (e.g. Apteker and Heineon (2003) in Kenya, Columbia and Ethiopia; Muntingh et al. (2006) in Zambia). Enumerating those in institutions is of course much more straightforward.

*Internally Displaced Persons*

Other Internally Displaced Persons and unofficial refugees may be very reluctant to take part in any (semi-) official exercise. Those in informal settlements /urban slums will be easier to find but more difficult to capture because they won't be 'at home' (for example, Kibera, Kenya).

| | **Rural** | **Isolated Rural** | **Non-slum Urban** | **Slums/ Informal Settlements** | **Non-Household Populations** | **IDPs/ Refugees** |
|---|---|---|---|---|---|---|
| Direct Approaches | Mini-census | Mini-census with adjustment | Mini-census | Possibly mini-census | | Listings |
| Indirect Approaches | n.a. | n.a. | Via Employer | n.a. | n.a | n.a. |
| Targeted Surveys | | | | | Facilities and Institutions | |

**Summary and conclusions**

Finding 15-year-olds may be relatively easier in rural areas because the numbers are smaller and key informants (headman, NGOs, institutions, sub-district officials) may have sufficient on-the-ground knowledge. If not, the DHS/MICS approach of relisting the households, with the modification of capturing the ages of household members should be adopted, although there may be a problem in the poorest rural areas in that, because of recurrent droughts, some of their populations may have relocated from their villages compared to the census positions. Where there are nomadic groups, so long as there is sufficient local information about their composition, there are possible approaches

Finding 15-year-olds in urban areas poses more of a problem, partly because many will be living in informal settlements and partly because of the fluidity of urban lifestyles, which could mean that they are unlikely to be at home. It was suggested that an approach through employers might be productive; however, examination of the activities of 15-year-olds in the participating countries suggests that whilst the majority of male and a substantial minority of female (out-of-school) 15-year-olds report that they are working; this usually means working for a family member. Where this is the case, the suggestion of interviewing at the workplace, via formal employers, is unlikely to be very productive.

Together, these imply that:

- In urban areas, the best strategy is probably to carry out a mini-census in chosen localities but this may encounter problems of parental reluctance to divulge ages of their children, and, in informal settlements/ slum areas, difficulties in identifying households.
- An alternative or complement is to carry out a survey of 15-year-olds in employment, and this should be carried out systematically.
- Special arrangements will have to be made for street children and those in institutions, and where relevant children of nomadic families.
- Other institutions or activities may be identified where 15-year-olds are likely to be found.

## SURVEYING OUT-OF-SCHOOL 15-YEAR-OLDS AND DELIVERING A TEST

This section outlines the issues that are going to have to be addressed by the project in surveying and assessing out-of-school (OOS) 15-year-olds.

### Experience of surveying out of school children

There is quite a lot of experience with surveying OOS children in several countries and these experiences are summarised below.

*The UNICEF and UIS Out of School Children Initiative*

Twenty-five countries from seven regions are engaged in the UNICEF/ UIS Initiative including two of the countries participating in PISA for Development: Cambodia and Zambia. Nearly all the country reports draw on administrative data and standard household surveys to report on the numbers and percentages of children falling within each dimension broken down by gender, place of residence (rural/urban); usually by the income level and other characteristics of the households; and some have analyses of the economic activity of the children. Several of the reports have analyses by single years of age (including 15-year-olds); and in the specific case of the DRC, complementary surveys were carried out to capture children not in households.

*Complementary survey experience in the Democratic Republic of Congo*

The survey in Congo was conducted within the framework of the UNICEF Out-of-School Initiative. The demographic context is that the last census in Congo was in 1984.[14] Population projections by both the UN and the National Institute of Statistics rely on those data. The civil registry worked quite well and was updated in the colonial period, whilst quite comprehensive in the colonial era (Ngondo, 2001) has now deteriorated and coverage is limited mainly to urban areas.

A standard large-scale household survey was used in Congo with a stratified and multi-stage cluster sampling based on the 1984 census; it is difficult to believe that the projections can be considered as proper estimates of population, especially of the relative size of different units (which is required for sampling proportional to size). The report of the survey says that the list of units was updated in 2010 for the purposes of MICS 2010; and only once a neighbourhood was selected was a count of households performed (in order to decide whether or not to select one or two segments of 30 households). They say that representativeness of 12-17 year-olds age groups could only be ensured at provincial level (p.20).

For children in childcare facilities, the list provided by the Ministry of Social Affairs, Humanitarian Action and National Solidarity were supplemented by interviews at the local level with organisations working in the field of childhood. This use of a survey supplemented by interviews at the local level may be a useful model for the project to consider in its approach to surveying. A total of 232 facilities were identified in 11 provinces with a total of 13 500 people, of whom 11 300 were 5-17 year-old children, so we could roughly estimate 1 000 15-year-olds.

[14] They estimate the population as between 64 and 68 million; it is surprising that they can produce such a tight estimate given that the last Census was 30 years ago.

For street children, information obtained at central level and from Civil Society Organisations (CSOs) was subsequently updated with local stakeholders. Street children tend to be scattered throughout urban areas to earn money for subsistence, so the decision was taken to interview at night. It is likely that interviewing in the evening is likely to be the most productive approach for PISA for development in terms of finding people in the household. A total of 212 living areas were identified, involving a total of 5 915 people of whom 4 365 were 5-17 year-old children, so one could estimate 15-year-olds as around 400.

The report compared the results for Kinshasa (2 450 people, including 1 580 children) in respect of children living on the streets with other sources of data. In 2006, REEJER (*Réseau des Éducateurs des Enfants et Jeunes de la Rue*) counted 18 100 children. The report is rather unconvincing in explaining away the nine-fold discrepancy.

The Congo report estimates that 29% of 5-17 year-olds are out-of-school; in the 14-17 year-old age group the children tend to come from the poorest households (60%) and those where the head has no education (51%); apart from gender inequalities, the other main determinants of 'exclusion' from school were whether or not both parents were alive, being a foster child; where the head of household has no education and household poverty. Vulnerable children are frequently out of school: 55% of children with a disability, 32% of orphans and 37% of children in the poorest households. It is important to note that the first two figures were not based on a household survey.

*East Africa Uwezo sampling methodology*

Sampling: The census forms the basis of all sampling. The district is the stratum, after which 20 enumeration areas (EAs) are sampled and 20 households (HH). A rotating panel is used: each year 10 EAs are dropped, and 10 new added. The HH are selected using simply listing and calculation of an nth to arrive at the sampled HH. The EAs are sampled by experts from the Bureau of statistics, who also provide the EA names. In the EA, specifically trained Village and District Coordinators do the HH sampling.

Training: Uwezo use a cascaded method to train, starting with Training of Trainers, and ending with volunteers being trained over a two day process at the district level. Trainer manuals and volunteer workbooks have been developed, which help to ensure similar processes across the region. The volunteers are trained in how to interpret and fill in the survey sheets, but also more broadly. Paper and pen are still used. Technology has mostly been exploited in payments (M-Pesa/M-Cash).

Process: After volunteers have been trained, they work in two's to visit one school in the sampled EA as well as the 20 sampled HH. Once in the HH, the volunteers go ahead to interview the head of HH, and administer the tests to each individual child, aged 6/7-16, whether in school or not.

*India ASER survey methodology*

The general approach to sampling is the same as for Uwezo. The ASER manual provides more detail of their approach within villages: it instructs on how to make a map and make sections within villages: "walk around the village first, talk to people; ask how many hamlets/ sections are there in the village; ask the children to take you around the village. Five households picked from each of 4 selected hamlets/ sections." The manual also includes advice on what to do if the household has multiple kitchens, household has no children, and house closed no response. All these guidelines are sensible and should be included for consideration by the PISA for Development project.

The ASER survey has, until recently, been in rural areas only. The managers of ASER reported that " ... in the case of urban India, populations are less stable, and therefore city-level 'master lists' of possible sampling units are often less reliable. For example, they may exclude unrecognised slums and homeless persons. This means that sampling may be biased and *may exclude the most marginalised populations* –

precisely those populations where children's learning is likely to be poorest" (this author's italics). The restriction to rural areas in the national surveys might be at least a partial explanation for the relatively smaller numbers of 15-16 year-olds (>20% less), compared to 6-14 year-olds surveyed in both the 2012 and 2013 surveys; it may be that some of the 15-6 year-olds have migrated to towns or cities, perhaps to live with relatives in order to go to a different school (or perhaps to work); in either case, the child would no longer count as being in the household. But it may also have been more difficult to find them. In fact, during 2010-11, ASER carried out surveys in one municipal ward, typically of mixed and low income, in Delhi, Hyderabad, Jaipur, Mysore and Patna; see www.asercentre.org/p/64.html.

*Young Lives Surveys*

Young Lives is an international cohort study, tracing the lives of 12 000 children across Ethiopia, India (Andhra Pradesh), Peru and Vietnam, in two cohorts since 2002. Designed initially as a household survey, data has been collected from the households of 1 000 'Older Cohort' children (born 1994-95), and 2 000 'Younger Cohort' children (born 2000-01) across 20 'sentinel sites' in each country. Four rounds of data have been collected so far (2002, 2006-7, 2009, 2013) with a final round planned for 2016. In addition to this household-level data collection, primary school surveys have been conducted in each country since 2010, capturing data from principals, teachers, classes and Young Lives pupils and their peers, sometimes at both the beginning and end of a single school year.

In each round of both the household and school surveys, assessments of children's cognitive outcomes have been collected. In the household this has included basic simple single indicators of reading, writing and numeracy, the PPVT (Peabody Picture Vocabulary Test), the CDA-Q (Cognitive Development Assessment – Quantity), the EGRA (Early Grade Reading Assessment), various mathematics assessments (including some items from international assessments, namely TIMMS), and reading comprehension assessments, administered at different survey rounds and to different cohorts, as appropriate for their age. Where appropriate assessment items have been replicated between cohorts and survey rounds to enable a linking of assessments using a common item approach. In the school surveys, assessment has focused on grade-specific curriculum-related domains of mathematics and reading comprehension. In school surveys in Ethiopia and Vietnam these assessments have been administered in two waves at both the beginning and end of a single school year and have included (but have not been limited to) common items between survey waves to enable an examination of 'value added.'

**Recommended approach to surveying and testing**

A listing of all households including ages of household members should be constructed for all identified locations; the next step is to interview all households reporting a 15-year-old, after making an appointment to ensure that the 15-year-old will be there. In most countries, with exception of Senegal, about three times as many households will be revisited as are 'necessary', but the alternative of asking about the status of the 15-year-olds vis-à-vis school at the listing stage does not guarantee their necessary presence; and it is unclear what the incentives would be for the mini-census/survey-taker (whether to maximise or minimise the number of households with an OOS 15-year-old).

The revisit would involve a three part instrument, where the first part is a filter to verify the reported age of the teenager and establish her/his precise status vis-à-vis school both with the caregivers and in her/his presence; the second part is the test; and the third part is the contextual questionnaire. This interview could be carried out by more professional interviewers; and the argument here is that this two-stage process would be more reliable and not much less resource intensive.

The first 'filter' part of the instrument is obviously crucial: first, it will be very important to cross-check the reported age perhaps using an event calendar; and second one has to be very careful about the

probable tendency for responses to any self-report questions about behaviours or situations that the respondent might believe are socially disapproved, to be biased. Thus, the reported levels of drinking alcohol in the UK in all the omnibus household surveys since 1970 have been between 48% and 52% of the amounts of alcohol consumed as recorded by the fiscal authorities (Carr-Hill, 2014a) – which means that the policy advice about the number of units that can be drunk is twice as strict as it needs to be; when there is an awareness-raising campaign about domestic violence, then the reported rates increase (Carr-Hill and Lango, 2014); and so on. There are even problems with self-reports about the level of education: for example, nearly half of the DHS surveys generate a counter-intuitive relationship between mother's level of education and reports of child morbidity (see Manesh et al., 2008), and it is unclear which variable (child morbidity or own level of education) is being misreported. It is therefore very important to cross-check both by asking the question about schooling status in different ways and by comparing any responses from then adolescent with those of the parent, if possible.

For non-household populations, when the different groups have been identified and their approximate sizes ascertained, then distinct samples should be drawn from each group, possibly on a quota basis so as to include sub-samples of those who have never been to school, those who went to school but dropped out before the end of primary, those who have completed primary and left, those who have been to secondary and dropped out (although there are unlikely to be many). Samples of official refugees will in principle be easy to draw; the complementary surveys of children in residential facilities and of street children carried out by the Democratic Republic of the Congo team are good examples (DRC, 2013); and there are systematic procedure from sampling pastoralist groups. Their results – and response rates - would then be combined with the main household survey according to the estimated group sizes.

The lessons from the experience of the surveys reviewed above should be incorporated at implementation stage; however, it should be emphasised that none of these other surveys has faced the problem of focussing on a specific single-year age-group. This might lead to additional problems at a community level, for example, whilst ASER/Uwezo selects households systematically (e.g. every 5$^{th}$ household) which is easy to explain to other community members, in this case neighbours would not understand why specific households are being targeted; and the interviewing team will have to be sensitive to this issue and will need a careful story. It also means that it is essential to obtain as high a response rate as possible.

***Ensuring the highest possible rate of response***

Taking part in an achievement test will not be at the top of the agenda of 15-year-olds out-of-school, especially as a significant proportion of the OOS 15-year-olds are likely to have recently been at school and may have a negative attitude towards school – this could be explored in the contextual questionnaire.[15]

*Caregivers*

Possible 'encouragements' to take the test are the other members of the household. The fact that large proportions of the 15-year-olds are working for or with family members (see Table 9) and that quite large proportions appear to be living in the household of their parents (see Table 10) definitely helps, although we won't know by how much until in-country pilot exercises are carried out!

For the four countries where these breakdowns were available, over 80% of those in Cambodia or Guatemala are/were a son or daughter of the head of household but the percentage is considerably lower, about half, in both Senegal and Zambia. In Cambodia, the next largest category is grand-children (5%); but

[15] This may also affect the attitude towards testing of 15-year-olds who are still in school but who are on their way out and thinking of their employment future rather than school-like activities such as testing.

in the other two countries, the next largest category is 'other relative' (26% in Senegal and 27% in Zambia).

**Table 11a. Relationship of out-of-school 15-year-olds to Head of Household (Cambodia and Guatemala)***

| | Cambodia 2010 CORRECT 2308 | | | | | | Guatemala CORRECT 2308 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Both | | Male | | Female | | Both | |
| | R | U | R | U | R | U | R | U | R | U | R | U |
| Son/daughter | 171 | 28 | 221 | 37 | 392 | 65 | 138 | 32 | 138 | 26 | 276 | 58 |
| Grandchild/ brother/sister | 7 | 2 | 14 | 5 | 21 | 7 | 10 | 1 | 9 | 1 | 19 | 2 |
| Other relative | 10 | 3 | 11 | 12 | 21 | 15 | 3 | 1 | 18 | 3 | 21 | 4 |
| Adopted or not related | 9 | 2 | 6 | 12 | 15 | 14 | 6 | 2 | 5 | 10 | 11 | 12 |
| All OOS 15-year-olds | 197 | 35 | 253 | 66 | 450 | 101 | *157* | *36* | *170* | *40* | *327* | *76* |
| *Percent son/daughter* | 86.8 | 80.0 | 87.4 | 56.1 | *87.1* | *64.4* | 87.9 | 88.9 | 81.2 | 65.0 | 84.4 | *76.3* |

*Data for Ecuador not available

**Table 11b. Relationship of out-of-school 15-year-olds to Head of Household (Senegal)**

| | Senegal CORRECT 2308 | | | | | |
|---|---|---|---|---|---|---|
| | Male | | Female | | Both | |
| | R | U | R | U | R | U |
| Son/daughter | 106 | 29 | 84 | 21 | 190 | 50 |
| Grandchild, Brother/sister | 28 | 4 | 14 | 7 | 42 | 11 |
| Other relative | 35 | 14 | 54 | 10 | 89 | 24 |
| Adopted or not related | 14 | 4 | 8 | 11 | 22 | 15 |
| All OOS 15-year-olds | 183 | 51 | 160 | 49 | 343 | 100 |
| *% Son/daughter* | *57.9* | *56.9* | *52.5* | *42.9* | *55.4* | *50.0* |

**Table 11c. Relationship of out-of-school 15-year-olds to Head of Household (Zambia)**

| | Zambia CORRECT 2308 | | | | | |
|---|---|---|---|---|---|---|
| | Male | | Female | | Both | |
| | R | U | R | U | R | U |
| Son/daughter | 6 | 4 | 26 | 11 | 32 | 15 |
| Grandchild/brother/sister | 3 | 1 | 3 | 2 | 6 | 3 |
| Other relative | 2 | 1 | 12 | 11 | 14 | 12 |
| Adopted or not related | 1 | 2 | 4 | 3 | 5 | 5 |
| All OOS15-year-olds | 12 | 8 | 45 | 27 | 57 | 35 |
| *% Son/daughter* | *50.0* | *50.0* | *57.8* | *40.7* | *56.1* | *42.9* |

Note: Senegal: In rural areas. 'other relative' includes a few cases (never more than 5) wife or husband.

*Role of incentives*

The problem remains whether caregivers and/or 15-year-olds will have to be given incentives to participate? Incentives are often used in developed countries: for example, they were used in most countries taking part in the PIAAC survey (23 out of 25), and 18 used a monetary incentive, ranging from 10 to 50 euros (see Table 10.18, PIAAC). They say, without providing any evidence that "Respondent incentives have been shown to be effective for improving response rates without affecting the respondent's performance" (para 14.8, p. 14).[16] In fact, "Specific attempts to use incentives to bring into the sample groups less disposed to respond because of lower topic interest have received only qualified support (Groves et al. 2006)"; and the use of incentives "is controversial in surveys in developing and transition countries, and they are discouraged in many countries" (Lepkowski, 2005, p. 165). The latest LAMP

[16] There is no mention of any incentives in any of the STEP documents (Full Literacy Assessment, Interviewers manual and team Supervisors Manual, Operations manual) and this was confirmed with a World Bank colleague.

update of progress (2011) says: "Giving a monetary compensation for participating in LAMP remains at each country's discretion since it has to be harmonised with country-level practices regarding official surveys."

Nevertheless, where only (out-of-school) 15-year-olds are being targeted, a refusal from such a selective sample will be problematic and so it will be important to maximise the response rate. Although none of the surveys discussed so far in developing countries (DHS, MICS, ASER, OOSCI nor the Uwezo) used monetary incentives (ASER distributed 'story cards'), the former pair (DHS/MICS) always obtain more than 95% response rate and the latter three (ASER, OOSCI, Uwezo) rely on peer pressure from the citizen volunteers carrying out the surveys. However, these surveys were interviewing all households originally sampled and the occasional refusal was not seen as a problem (and hardly mentioned in their reports, Kenya being an exception), although it is possible it was quite high in this age group in India (see above).

Incentives are problematic. We should avoid as much as possible including any monetary incentives in PISA for Development, particularly because we do not know how they affect responses and the potential for bad publicity. Incentives may also have all kinds of unintended consequences and may become quite expensive. The PISA experience is that schools can be rewarded for their participation with communal gifts, such as a library book, or a small fund for buying books; individuals only receive very small gifts, if at all. In some cases, students get a diploma. Schools may also get some information back about their performance on the test but fairly informally and making sure they cannot rank themselves against each other. That said, incentives should be one of the things explored in the field trial for Strand C.

If incentives are considered, Singer and Ye (2012) recommend the following approach:

- Offer small prepaid incentives to all sample members; this will increase sample size and help satisfy fairness criterion.
- Offer differential incentives to those who refuse (or a subsample) for bias-reduction reasons.

In the context of developing countries, there will be two other issues to be considered:

- Should the incentive be offered only to the 15-year-old or to the caregiver/ employer or to both?
- If citizen volunteers are used, it will be difficult not to give them an incentive as well.

**Interviewing and administering a test**

*Experiences of interviewing and testing*

The tests carried out by ASER, OOSCI and Uwezo on a broad age-range of children (e.g. 5-16 year-olds) were all administered by citizen volunteers, trained by professional trainers, in the children's households, with the exception of the special complementary surveys in institutions and of street children. The LAMP assessment was also household-based, but of all adults 15+. The demonstration in Section on "Counting and locating the out-of-school" that, in these countries, most 15-year-olds who were working were in fact working at their own home – and the experience of the STEP programme – reinforces the validity of this approach.

The ASER survey manual give specific advice in selecting older children: "Often older girls and boys (in the age group of 11 to 16 years) may not be thought of as children. Avoid saying "children". When selecting children, probe for all those who live in household to make sure that nobody in this age gets left out. Often older children who cannot read are very shy and hesitant about being tested. Be sensitive about this issue."

*Possible use of mobile devices*

Mobile phones have been used in two kinds of surveys in developing countries:

- To collect high-frequency panel data (Dillon, 2012; Hoogeveen et al. 2014); currently they are used extensively by World Bank economists, mainly in Latin America, where the intent is to collect repeated data on a very small number of topics in order to assess economic trends.
- To collect more traditional – i.e. covering a wider range of topics – household survey data (Tomlinson et al., 2009); this is another version of the more widely used PDAs in both developed and developing countries.

Some of the surveys in Round 5 of MICS, and some of the participating countries have used mobile technology to collect survey data; and there are several organisations specialising in using mobiles / tablets as the vehicle for collecting data.

**Suggested approach**

*The out-of-school 15-year-olds are not in a classroom!* However, some of the 15-year-olds interviewed at home may claim to be attending school (as in Section 1.4) and a decision will have to be taken as to whether they are considered to be in or out of school. Probing questions about the school (how far, name of school and of teacher) and about frequency of attendance will be needed.

*Place and Time of Testing*: Most will almost certainly NOT agree to come to a 'testing centre' (whatever it is called). One approach to identifying where 15-year-olds are likely to be – and possibly persuading them to take part - is to look at the relationship of the 15-year-old to the head of their household, on the ground that close blood relatives are more likely to be at home (and more likely to be influenced by the adults in the household) than more distant relatives or non-relatives. Fifteen-year-olds in households will probably have to be interviewed in the evening.

Most/all will therefore have to be interviewed/ tested in their households; and interviewers should, as usual, be aware of the possible influence of other members of the household. Street children may well also have to be interviewed in the evening as was the procedure followed in the Democratic Republic of Congo; but this can be a precarious and resource-intensive alternative. In a recent survey in Valparaiso, Chile among urban slum dwellers in Playa Ancha, interviewers were threatened with knives in the early evening; so we had to reorganise the interview schedules to be in daylight hours only.

*Recruitment, Selection, Training and Deployment of Interviewers*: Interviewers have to be from the localities and, given the target client group, they have to be of a very patient disposition, sensitive to the dispositions of teenagers!, and they have to be very flexible to accommodate the variety of circumstances/ situations they will meet.

Interviewers may have to work in pairs, especially in the evening. In the UK, when interviewers for large survey companies are sent to interview to the top floors of a tower block in a working class estate, where the lift is not working - compared to police(wo)men and social workers who go in twos - but interviewers don't, so they don't go. ASER citizen volunteers work in pairs.

*Mode of Testing*: it may be sensible to design the test so that it can be administered via the mobile phone or other mobile devices because that may be the medium most familiar to these 15-year-olds. That would have to be explored by the contractor (see below).

**Logistics and costing implications**

There will of course be costs for all preliminary work including questionnaire and instrument development, pre-testing and field trials, and revision of questionnaire and instruments. The issue here is the costs of full field work.

*Main field work*

We assume that the two stage approach is adopted– first to identify households reporting a 15-year-old with citizen volunteers and second to revisit those households with professional interviewers to establish precise age and status vis-à-vis school (or equivalent learning programme). At that stage, the contextual household questionnaire and the assessment instrument could be administered only to OOS 15-year-olds or to all 15-year-olds in the household. The latter is probably preferable, for three reasons: partly because it is very difficult to accurately assess attendance in a questionnaire; partly, to provide a check on whether testing at home yields different results from testing within school; and, pragmatically to make the task of explaining why specific households have been chosen much easier: 'we are here to interview 15-year-olds'. The same options and the same preference would pertain if it is decided to identify 14-16 year-olds. Assuming a final sample of 100 OOS 15-year-olds is required in each of ten geographically dispersed locations in each country, the following would need to be considered:

- Recruitment, (cascade) training and monitoring of citizen volunteers to identify 1 200 households reporting a 15-year-old during the mini-census stage, approximately 1 200 households in each of the ten locations.
- Professional interviewing of 120 households in each of ten locations, to administer the instruments to 100 of the identified OOS 15-year-olds; the alternative would involve interviewing all 15-year-olds, which would approximately double those interviewing costs (not triple because the interviewer is already in the household having carried out the filter sections of the procedure).
- Data capture, verification and analysis.
- Reporting.

*Additional specific costs for sampling non-household populations*

This will obviously vary according to the specific group being considered but, for example, for street children in an urban area:

- Identification of NGOs and other facilities/ institutions that organise reception centres or equivalent for the homeless.
- Visits to each of those facilities at appropriate – probably evening – times to identify and interview 15-year-olds and those responsible for the reception centre or equivalent.

**Summary and conclusions**

The experience of ASER, OOSCI and Uwezo in using citizen volunteers has been summarised; unfortunately, there is only limited information available on the level of non-response/ refusal and this may well have to be collected through pilots at country level. Equally, the issue of incentives will have to be considered on a country-by-country basis.

Ascertaining the true age and actual schooling status of a 15-year-old will require a series of probing questions.

The interview and test are, in most cases, probably best administered at home because that is where most of the OOS 15-year-olds will be working; street children and those in institutions others will have to be interviewed and tested where they can be found.

It is probably better to interview and test all 15-year-olds in the household (whether in- or out- of school), both to provide a check on whether testing yields different results at home from within school and, pragmatically to make the task of explaining why specific households have been chosen much easier: 'we are here to interview 15-year-olds'.

Great care will need to be taken in recruiting, selecting and training interviewers because teenagers are a notoriously difficult population sub-group to interview let alone test. In some circumstances, e.g. interviewing street children, it may be necessary for interviewers to work in pairs.

The possibility and costs of administering both the questionnaire and the test via the mobile phone or other mobile devices should be explored.

The logistics of identifying 15-year-olds raises a number of issues for costing which have been sketched out.

## DESIGN AND DEVELOPMENT OF INSTRUMENTS

### Cognitive instruments: What are we trying to measure?

Under Strands A and B the assessment of learning will be in accordance with PISA standards for the nationally representative sample of 15-year-old students attending educational institutions in grades 7 and higher. Given that it may be found in the participating countries that a significant proportion of 15-year-olds are in grades 6 or 5 and even lower grades, Strands A and B may also assess students that are in grades below 7 to better understand their capabilities. However, these results would not be included in the national results for the participating countries that are reported on the PISA scales.

Under Strand C there would, in addition to the work undertaken in Strands A and B, need to be a development of a set of assessments that measure the basic skills denoting the set of minimal abilities needed for further learning, work, and life, including numeracy and literacy and basic levels of behavioural skills such as perseverance, self-discipline, and self-confidence as well as other skills. It is possible to consider therefore that this set of assessments for Strand C might include:

- Assessments developed specifically under Strand C that are targeted on the out-of-school (OOS) 15-year-olds; these would be appropriate for those who have never been to school or who have dropped out after completing only lower grades.
- Assessments developed under Strands A and B for 15-year-olds that are in grades 6 or 5 and even lower grades that are part of a national component; these could be appropriate for those having dropped out after completing the corresponding grade levels.
- Assessments developed under Strands A and B for 15-year-old students attending educational institutions in grades 7 and higher that are comparable to main PISA; these could be appropriate for those who have completed primary or who have some secondary but have since dropped out.

In the expert paper on Strand A, Adams and Cresswell (2014) highlighted that:

- "Observation 13: The requirement of testing 15-year-olds who are not in school has major implications for the test design. It is likely that a separate test will be designed for these students. The possibility of delivering the test by computer can also be considered using a model similar to that used in the PIAAC project. In addition the level of the test will need to be carefully considered. The PISA Reading Components assessment may be more appropriate to administer to out-of-school students. This has the disadvantage of testing reading only and lacking a real link to PISA because only two countries have participated in this assessment."

We will need a set of instruments ranging from the PISA booklets, to the national component for students below grade 7, to some kind of basic assessment based on PASEC/SACMEQ items, to a basic literacy assessment such as an ASER-type or EGRA early years assessment, to even a pictorial/ verbal assessment. We also need some kind of filter that the interviewers can use to move through these assessments until they find the one that is most appropriate for the 15-year-old they have in front of them. A particular concern is not to make the labelled 'out-of-school' 15-year-old feel even further stigmatised because of the test that is administered

**Alternative assessment methods already in use**

Given the school grade reached by those OOS 15-year-olds who have had some schooling (see Table 12 below), the majority will not be able to answer the items in the standard PISA booklet. It will be important to explore alternative methods of assessment; and clearly any contractor should start with those already in use.

Six assessment methods are very briefly reviewed here. Two (ASER and Uwezo) are basic surveys of child literacy and numeracy; having been developed in and for developing countries and oriented to household-based interviewing, they are most likely to provide the basic material for the Strand C specific test of those who have never been to school or dropped out after only a few grades. Two others (PASEC and SACMEQ – only the latter is considered here) are used in Sub-Saharan Africa developing countries but they are school based and their material is more likely to be useful for that group which has completed primary (which is the concern of Strand A). Finally, the last three (LAMP, PIAAC, STEP) are oriented towards adults, and so are probably less relevant in general for the Strand C specific test that needs to be developed here – but there are some useful elements which should be considered by a contractor. Both LAMP and PIACC have specific items on Reading Components, and STEP has some items that might be useful to adapt for developing country contexts.

**Comparing the levels and categorisations of ASER, Uwezo and SACMEQ**

The ASER survey includes both the reading and arithmetic tests; both have 4 categories and ASER follows a similar procedure for categorising children in both reading and arithmetic.

Uwezo has 4 levels for reading and 5 for numeracy; whilst SACMEQ identifies eight levels of Literacy and Numeracy. As can be seen from the descriptions, the first four/five levels in ASER and Uwezo are quite similar; they mostly correspond to the lower levels on the SACMEQ scales (see Table 13).

**Table 12a. Comparing ASER/SACMEQ/Uwezo survey approaches to testing literacy**

| ASER | Uwezo | SACMEQ |
|---|---|---|
| *Levels and Categorisation* | *Levels and Categorisation* | *Levels* |
| Letters: Set of commonly used letters. | Recognise Letters | 1: *Pre-reading* |
| ■ Words: Common familiar words with 2 letters and 1 or 2 matras. | Read selected words | *2: Emergent Reading* |
| ■ Level 1 (Std 1) text: Set of 4 simple linked sentences, each having no more than 4-5 words.* | Read one of two paragraphs | *3: Basic Reading* |
| ■ Level 2 (Std 2) text: Short story with 7-10 sentences. Sentence construction is straightforward, words are common and the context is familiar to children.* | Read a story and answer 2 comprehension questions | *4: Reading for meaning* |
| *Procedure for Categorisation* | *Categorisation* | *5: Interpretive reading* |
| Children are offered a paragraph to read. If they can do either of those easily, they are then offered a story to read; and if they can do that easily they are rated at Story level; if not they are rated at Paragraph level. If they cannot read the Paragraph easily, then they are offered a word list. If they can answer 4 out of 5 items but not read the paragraph, they are rated at Word level. If they cannot read 4 out of the 5 chosen words then they are presented with a list of letters, from which they choose 5 items. If they can answer 4 out of 5 chosen items they are rated as at Letter level if they cannot, they are rated as at Beginner level. | Children are categorised according to the highest level attained. For example, if a child could read the words but not the paragraph, that child was ranked at word level | *6: Inferential Reading* |
| | Pass Levels | *7: Analytical Reading* |
| | A child "passed" the literacy test if he/she was able to read the story aloud and correctly answer the two comprehension questions | 8: Critical Reading |

* These words or their equivalent are in the Std 1 (for Level 1) or Std 2 (for Level 2) textbooks of the states.

**Table 12b. Comparing ASER/SACMEQ/Uwezo approaches to testing numeracy**

| ASER | Uwezo | SACMEQ |
|---|---|---|
| *Levels* | *Levels* | *Levels and Categories* |
| ■ Number recognition 1 to 9: Randomly chosen numbers between 1 to 9. | Recognise numbers | 1: *Pre-numeracy* |
| ■ Number recognition 10 to 99: Randomly chosen numbers between 10 to 99. | Count | *2: Emergent Numeracy* |
| | Addition | *3: Basic numeracy* |
| ■ Subtraction: 2 digit numerical problems with borrowing. | Subtraction | *4: Beginning Numeracy* |
| ■ Division: 3 digits by 1 digit numerical problems. | Multiplication | *5: Competent numeracy* |
| *Procedure for Categorisation* | *Categorisation* | *6: Mathematically skilled* |
| Children are offered a 2 digit subtraction problem. If they can do that easily, they are then offered a division problem; and if they can do that easily, they are rated at Division level respectively; if not they are rated at Subtraction level. If they cannot do the Subtraction problem easily, then they are offered a list of numbers from 10-99 from which they choose 5 items. If they can answer 4 out of 5 items but not do the subtraction problem, they are rated at Number recognition (10-99) level. If they cannot identify 4 out of 5 chosen numbers, then they are presented with a list of numbers from 1 to 9, from which they choose 5 it ems. If they can answer 4 out of 5 chosen items they are rated as at Number Recognition (1-9) level; if they cannot, they are rated as at Beginner level. | Children are categorised according to the highest level attained. For example, if a child could add but not subtract, that child was ranked at addition level. | 7: Concrete problem solving |
| | Pass levels | 8: *Abstract problem solving* |
| | A child "passed" the numeracy test if he/she was able to complete all of the tests up to multiplication level | |

**Useful elements in LAMP, PIAAC and STEP**

*LAMP*

The LAMP approach is more detailed: the chosen sampled respondents are first administered a filter / screening questionnaire with 17 items from the Prose, Documents and Numeracy sets of items. If the respondent can only answer 7 or less items, they are given the Reading Components questionnaire; if they answer 8 or more correctly, they are given either Booklets One or Two.

Reading components are on twelve levels:

- Vocabulary
- Digit naming
- Rapid digit naming
- Lowercase letter naming
- Uppercase letter naming
- Rapid letter naming (lowercase)
- Word recognition (high frequency words; lowercase)
- Rapid word recognition (same as previous)
- Decoding (rare words; non-words)
- Rapid decoding (same as previous)
- Sentence processing (oral reading; silent reading, timed)

- Passage fluency (oral reading; silent reading, timed)

Respondents are then profiled. For example:

- Non-readers are unable to identify one fifth of the letters in their alphabet.
- Incipient letter readers identify between 1/5 and ½ of the letters in their alphabet.
- Developing letter readers identify more than half of the letters in their alphabet.

*PIAAC*

The whole PIAAC package covers a range of adult skills but the useful part from the concern here to develop a basic test specific to Strand C is their approach to assessing the respondent's familiarity with the basic components of reading, viz. print vocabulary, sentence processing and passage comprehension. A few examples are given below:

- Print vocabulary: Items testing print vocabulary consist of a picture of an object and four printed words, one of which refers to the pictured object. Respondents are asked to circle the word that matches the picture.
- Sentence processing: The sentence-processing items require the respondent to assess whether a sentence makes sense in terms of the properties of the real world or the internal logic of the sentence. The respondent reads the sentence and circles YES if the sentence makes sense or NO if the sentence does not make sense.
- Passage comprehension: In items assessing passage comprehension, respondents are asked to read a passage in which they are required at certain points to select the word that makes sense from the two alternatives provided.

*STEP*

This survey programme is focussed on understanding the skills of those in employment.

The STEP test structure has two sections: Section A has a set of reading components, which are clearly very similar to the OECD Adult Skills Survey (Print Vocabulary, Sentence Processing and Passage Comprehension)

Section B has a set of 8 literacy items used to help sort the least literate from those with higher levels of skill. This set of eight items will be scored by the Interviewer. Respondents who fail Section B are done with the interview, whilst those who pass Section B will proceed to an Exercise Booklet

On the whole, the items in the ASER/Uwezo approaches seem most likely to be appropriate for the sub-group who have never been to school or have dropped out after completing only a few grades.

**Language issues**

First of all, it should be clear that the language of instruction for 15-year-olds in school (Khmer in Cambodia, Spanish in Ecuador and Guatemala, French in Senegal, and English at secondary level in Zambia) will be an inappropriate medium for testing some of the target group for Strand C. Here, we distinguish four sub-divisions of the target group:

- First, a small group which will have had some secondary and then dropped out.
- Second, a minority will have completed primary and then dropped out.

- Third, a significant minority will have dropped out before completing primary
- Fourth, a small minority (in most countries) will have never been to school (see Table 1).

The language of instruction will be appropriate for the first and usually the second categories, except where the entire primary cycle is conducted in a local language/mother tongue. Whilst the language of instruction is clearly not appropriate for the fourth category, it might also be appropriate for the third category depending on the medium of instruction used in the primary cycle and how many grades they have completed. The main languages (of instruction) and the mediums used in primary cycles are shown below.

**Table 13. Languages instruction**

| Country | Main Languages of Instruction | Other Language Mediums in Primary Cycle |
|---|---|---|
| Cambodia | *Khmer* (90%) | Pilot projects among 10% in Eastern Highlands |
| Ecuador | *Spanish.* Indian/ Afro languages | In 1989 the Confederation of Indigenous Nationalities of Ecuador (CONAIE) signed an agreement with the Ministry of Education that established a national program of bilingual, bicultural education designed and managed by CONAIE and its member organisations |
| Guatemala | *Spanish* (60%), Mayan languages | Between 1/3 and 1/2 of indigenous population have some teaching in their own language |
| Paraguay | *Spanish*, Guarani (90%) | Guaraní was recognized as an official language in 1992; and the New Educational Reform required the teaching of both Guaraní and Spanish in school. In 1994, the Bilingual Education Plan aims to "bilingualize" instead of "hispanicize" all the Paraguayan population between 15 and 35 years old by 2020. The General Education Law assured that students receive education in their mother tongue. Nonetheless, the national educational system is only partially bilingual and Spanish remains the predominant language of instruction. Teachers as well as parents continue to privilege and teach Spanish over Guaraní at school and home [Gillard (2004]). |
| Senegal | Wolof, Pulaar, *French* | First 3 or 4 grades in Wolof, Pulaar (or one of 5 others), then in French |
| Zambia | *English* | First 4 grades in one of 7 languages |

In principle, if the medium of instruction is the same in primary and secondary or if the assessment instrument is translated into the language of instruction in the first four grades of the primary cycle, then it should be possible for most of those who are in the last grade of, or who have finished, primary to complete the test, on the basis that it is thought that the first four years of schooling should be sufficient to learn to read in that language. But the recent GMR analysis (see Box 2) suggests otherwise: "in 12 of 41 countries analysed (including Senegal and Zambia), half of 15- to 24-year-olds left school after five or six years of primary education without becoming literate." (UNESCO, 2014, p. 223). In Table 14, we show the breakdown of 15-year-olds in these countries for those with incomplete primary, between those with less than grade 5 and those with 5th or 6th grade (or more).

**Box 2. Spending no more than four years in school can be a route to illiteracy**

It is commonly assumed that children need to spend at least four years in school to become literate, and to retain their literacy into adulthood. This assumption is confirmed by the new analysis: among young people who have spent four years or less in school, around 77% are not able to read all or part of a sentence. For most regions and countries, spending too little time in school is a key factor in not acquiring basic literacy. In 9 of the 41 countries analysed, more than half of young people have spent no more than four years in school, and almost all of them are not literate. Of those who have left within this period, only 2% gained literacy skills. Even in the other 32 countries, where fewer leave school before grade 4, those who do so are less likely to have learned the basics.

But there are exceptions. Almost half of young people had not spent more than four years in school in Rwanda in 2010, but more than 50% of these were able to read a sentence. This suggests that the quality of education in Rwanda in the early grades is helping to ensure that even those spending a limited time in the classroom are learning.

Source: GMR 2013-14, p.223.

**Table 14a. School grade reached by those currently out-of-school (Cambodia)**

| | Cambodia 2010 | | | | | |
|---|---|---|---|---|---|---|
| | Male | | Female | | Both | |
| | R | U | R | U | R | U |
| Never Been to School | 20 | 1 | 27 | 4 | 47 | 5 |
| Less than 5th grade | 118 | 21 | 149 | 43 | 267 | 64 |
| 5th or 6th grade | 59 | 13 | 77 | 19 | 136 | 32 |
| N Currently OOS | 197 | 35 | 253 | 66 | 450 | 101 |
| *Percent less than 5th* | *70.1* | *62.9* | *69.6* | *71.2* | *69.8* | *68.3* |

Note: At the time of the surveys, in both Cambodia and Ecuador, the primary cycle was only 6 years.

**Table 14b. School grade reached by those currently out-of-school (Guatemala and Senegal)**

| | Guatemala 1998-99 | | | | | | Senegal 2012 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Both | | Male | | Female | | Both | |
| | R | U | R | U | R | U | R | U | R | U | R | U |
| Never Been to School | 29 | 4 | 48 | 9 | 77 | 13 | 114 | 32 | 123 | 32 | 247 | 64 |
| Less than 5th grade | 77 | 17 | 86 | 23 | 163 | 40 | 26 | 10 | 26 | 11 | 73 | 26 |
| 5th or 6th grade | 51 | 15 | 36 | 7 | 87 | 22 | 9 | 7 | 9 | 6 | 31 | 9 |
| N Currently OOS | 157 | 36 | 170 | 39 | 327 | 75 | 149 | 49 | 158 | 49 | 351 | 99 |
| *Percent less than 5th* | *67.5* | *58.3* | *78.8* | *82.1* | *73.4* | *70.7* | *94.0* | *85.7* | *94.3* | *87.8* | *91.2* | *90.9* |

Note: At the time of the surveys, in both Guatemala and Senegal, the primary cycle was only 6 years.

**Table 14c. School grade reached by those currently out-of-school (Zambia)**

| | Zambia 2007 | | | | | |
|---|---|---|---|---|---|---|
| | Male | | Female | | Both | |
| | R | U | R | U | R | U |
| Never Been to School | 2 | 0 | 11 | 5 | 13 | 5 |
| Less than 5th grade | | | | | | |
| 5th or 6th grade | | | | | | |
| Complete primary + | | | | | | |
| N Currently OOS | | | | | | |
| *Percent less than 5th* | | | | | | |

### *What is the appropriate language*

Among those with less than 5th grade, there will also probably be a higher representation of minority ethnic and linguistic groups. Given Human Rights legislation, the issue is then what is the appropriate language to test them in? One possibility is the local language according to area/region of the country; but it is also likely that many of these 15-year-olds will have developed their own RAP text language (as have many young sub-cultural groups in developed countries). It some circumstances, it may be that their means of communication have to be accepted as a 'language' (see Box 3) and that the PISA definition of language of instruction, at least for this sub-group, will have to be changed to the language of communication.

**Box 3. Alternative definition of language**

Various definitions of language:

Language is a human system of communication that uses arbitrary signals, such as voice sounds, gestures, or written symbols.

Language is a purely human and non-instinctive method of communicating ideas, emotions and desires by means of voluntarily produced symbols (Sapir, 1921).

A language is a system of arbitrary vocal symbols by means of which a social group communicates (Bloch and Trager, 1942).

From now on, I consider a language to be a set (finite or infinite) of sentences, each finite in length and constructed out of a finite set of elements (Chomsky, 1957).

Language is a behaviour which utilises body parts: the vocal apparatus and auditory system for oral language; the brachial apparatus and the visual system for sign language …. Such body parts are controlled by none other than the brain for their functions (Peng, 2005).

A language consists of symbols that convey meaning, plus rules for combining these symbols, that can be used to generate an infinite variety of messages (Welten, 2007).

We can define language as a system of communication using sounds and symbols that enables us to express our feelings, thoughts, ideas and experiences (Goldstein, 2008).

### *Translation challenges*

It may prove particularly challenging for contractors to tackle the problem of translation of some of these minority languages as there is little experience internationally to do this. This author's experience of designing and carrying out surveys in Ivory Coast, Kenya, Mozambique, Nepal, Somalia, Tanzania, Uganda and Zambia is that local translators can be found to deliver the instruments in the language of the respondent: it is however obviously crucial not only to check the minority language version through back-translation, but also to institute a procedure of double checking a small proportion of the interviews using someone fluent in both the minority and majority languages.

## Inclusiveness

The *raison d'etre* of Strand C is to be as comprehensive and inclusive as possible of all 15-year-olds in the participating countries; and, in the initial discussions of the whole pilot project, there was a specific commitment to devise an adapted and appropriate testing instrument for the disabled. Given that the disabled are more likely to have dropped out or never entered ordinary school (Filmer, 2008), this could be an especially important consideration for Strand C. There are, however, several difficulties in taking disabilities seriously in the context of an assessment exercise:

- First, there are many different types of disability which would require different adaptations for example, for the blind, the deaf, those with learning disabilities and so on.
- Second, for each type of disability, there are different levels which would not only require items to be at different levels of difficulty, posing problems in test design, there would also have to be judgemental criteria for deciding which is appropriate for each individual and for deciding, at the less severe end of the spectrum for each type of disability, whether or not it would be appropriate for the individual to take the adapted test or the standard test.
- Third, for some of the disabilities, testing might have to take place in special centres or under special conditions with implications for budgeting and personnel.

Moreover, it is unclear what would be the policy purpose of including the disabled in an assessment exercise. Nevertheless, it would be interesting to see what adaptations could be made for the slightly disabled; and one could consider piloting a Special Needs module.

**Testing procedures/filters**

The most important filters are, of course, those confirming the precise age and status vis-à-vis school of the respondent: these points are described below.

Age Estimation: Given the central importance for PISA of estimating age accurately,[17] one would probably want to include a specific event calendar for interviewers to use; although there will still be strong incentives for interviewers to list anyone between 13/14 and 16/17 as being 15-years-old in order to reduce the time they have to spend finding 15-year-olds. It is difficult to see how that can be controlled other than by making statistical comparisons of the number of 'hits' of each interviewer compared to the expected number of 15-year-olds in that specific area; and using the two stage process described in Section on "Counting and locating the out-of-school".

Status vis-à-vis school: In addition to direct questions about current school attendance to the 15-year-old and their caregivers, questions need to be asked at this filter stage to both about the previous educational experiences (if any) of the 15-year-old, to ascertain their history of any other formal learning experiences. These could include Accelerated Learning Programmes, NGO-provided NFE and, although it may not be included in overall learning experiences, it would be appropriate to ask about apprenticeships. Questions will also be required, specifically of the parents on the reasons the 15-year-old is no longer in school or any other organised education programme recognised as school-equivalent, and of the education/schooling of other children in the household.

***Filters for delivering an appropriate test***

If order to carry out testing, interviewers and testers will have to ask filter questions; literacy in any particular vernacular cannot be assumed (Charpentier, 1999).

*Structure of 'test' for language*

An example of possible filters:

- Which language are you most comfortable with?
- Is this the most convenient place for you?

[17] This will not, in general, be problem for those in-school as the student's registration document will include age; but where this is not supported by a valid birth certificate, there could be problems.

- Do you have a mobile?
  - If YES, do you send text messages? or only talk?
  - If YES, which language do you use for texting?

One alternative approach might then be to ask them if you could see their latest text message and ask them to read it.

Otherwise are there some low level reading components in the current cognitive instrument, and these could be further developed.

*Structure of 'test' for mathematics*

OOS 15-year-olds will almost certainly understand numbers because of financial transactions, and they may well be able to read numbers but not words; so the test should start with the simplest item in the mathematics test. If the respondent is unable to answer that simplest item, they should be asked whether they can recognise any single digit numbers.

If the respondent is unable to answer the simplest item AND cannot recognise any single digit number, then the contractors will have to search for alternatives. There are possible alternatives to the standard text mathematics questions partly based on graphic representations, such as the patterns and shapes tests used to assess non-verbal reasoning or on the discipline of ethno-mathematics (D'Ambrosio, 1977; Clarkson and Presmeg, 2008), but both would have to be made 'equivalent' to the standard items in terms of their scalability.

There are no obvious alternatives for the Science test because, even though OOS 15-year-olds may well be quite technologically sophisticated, the items in the Science tests are based on the ways in which science is taught in school rather than on their technological applications.

Finally, given that the 15-year-old is helping us, but may not only be totally disinterested in the test also unable to answer any of the items, so that the whole experience may be quite unpleasant, it will be important to include one or two questions which would be relevant for her/him such as asking what are two things s/he thinks they are very good at, asking what s/he would like to learn to help her/him in the short-term and medium-term future, what are her/his ambitions.

*Linking results obtained from the specific Strand C instrument scale to main PISA scale*

The first step is to scale the responses from the OOS 15-year-olds both within each country and, assuming that the same items have been used in each country, across all seven countries, using the appropriate Rasch model or one or two parameter IRT models (using R, RUMM or Winsteps software). If the same items have been used in each country *and* if several of those items are the same as in the main PISA instrument, then the scales can be linked directly using the procedures outlined in the Data Analysis Manual (2013; pp. 90-91). If however, as seems likely, there is no or very little overlap with the main PISA instrument (and/or there are differences between the specific Strand C instrument developed in each country), then a more complex chained two- stage approach will have to be adopted, vis: linking the country-specific Strand C instrument to the national country-specific instrument for those in lower grades and then linking the national country-specific instrument to the main PISA instrument separately in each country – always assuming of course that there are sufficient common items in each linkage pair.

The easier tests for those in lower grades and for those out of school can be linked if they contain a sufficient number of the same items which function in the same way across the two groups of subjects (in terms of difficulty and discrimination in the 2 parameter model). To link to the main PISA scale using IRT there must be a sufficient number of items which are common to all three instruments and which function appropriately as the data would need to be scaled all together in a single exercise. If there are common items between the two national instruments and common items between the lower grade instrument and the main PISA instrument but no (or insufficient) items which are common to all three, two separate IRT scales can be created although these two scales will be incommensurable. This way there will be a national scale for out of school and lower grades and a PISA scale for lower grades and grade 7 pupils. The national instruments will need to be designed to contain the maximum number of PSA items which are appropriate in terms of difficulty to try to achieve this. Alternate (rotated) forms of tests can be used if appropriate to trial a larger number of items in pilots or in the main exercise to improve reliability when using shorter tests.

**Possible modifications to the contextual questionnaires**

Strand B of the PISA for Development project will enhance the PISA contextual questionnaires and data collection instruments to make them more relevant to some of the least economically developed countries in the world. It will operate under three major constraints:

- Maintaining and integrating existing PISA measures to collect reliable and valid data describing the educational and family contexts in low- and middle-income countries based on the current PISA frameworks.

- Developing meaningful constructs and indices that can be used cross-nationally while still being based on the PISA frameworks.

- Using these measures in analyses to address policy questions relevant to national and international policy questions.

The challenge in enhancing the existing student and school questionnaires for PISA for Development is to include the core PISA content, with individual measures extended where necessary, as well as content relevant to the specific educational policies in the partner countries.

When the focus shifts from in-school 15-year-olds to OOS 15-year-olds, a framework centred and conceptually located in school becomes less relevant. Thus Strand C of the PISA for Development project faces two challenges in respect of the contextual questionnaire: one is to decide on the extent to which to rely on and make use of the PISA framework, which is intrinsically built around the concepts of learning and schooling; and the other is to decide on the extent to which it is necessary to ensure the correspondence between the contextual assessment for OOS 15-year-olds with the instruments used for the in-school students. At the outset we have to recognise that, apart from defining them as being 'out-of-school', there is no reason to conceptualise the OOS 15-year-old in terms of school-based concepts; and it almost certainly confuses the development of modifications to the contextual questionnaire which will itself be developed under Strand B which should of course draw in large part on school-based concepts. The modifications for Strand C should therefore focus on the 15-year-olds' current status and the reasons for that status which may or may not include being excluded or 'pushed-out' of school. In addition, of course, there should be questions about the 15-year-olds' educational career including access and exit and about the educational experiences of other children being looked after by their caregiver.

On the other hand, there is no apparent reason why segments of the contextual questionnaires for students developed under Strand B should not be applicable to Strand C, although the specific school-

related questions will, of course, not be relevant. But there are some alternative sets of question/ topics that will have to be included for the OOS 15-year-old in his/her questionnaires and those of the parents/caregivers (and sometimes both); and specifically on the reasons for dropping out-of-school.

The only other modifications to the contextual questionnaire for Strand C required would be: on activity patterns; an alternative to the facility questionnaire; household characteristics; educational experiences; and socio-economic status. These are each discussed briefly below.

*Activity patterns*

One of the dominant themes pertaining to the 15-year-old's experiences out of school is participation in the labour force (e.g. child labour, hazardous labour conditions, and hours of labour per week). Therefore, additional questions should be included on current 'employment' status (and these should be asked of both those in-school and those out-of-school) and, given the analyses in the tables above, this should not be restricted to formal employment. For example, Willms and Tramonte (2014), discussing 'learning time' said:

- "The out-of school learning time is measured indirectly with questions about students' interest and involvement in reading practices."

*Facility questionnaire*

This would be relevant only for those children in facilities or being looked after on an occasional basis. It should include items on enabling a description of the physical and social caring environment of the facility.

*Household characteristics and educational experiences*

Questions about the processes and experience of access and exit from school can be one of the components of a contextual assessment, and literature about access, equity, and transitions could inform the design of the additional items/ module (although some of the in-school children might previously have dropped out before returning.

The lives of different types of out-of-school children can be described by basic structural features, by processes at the individual and aggregated level, and by external and internal assessment of school. These three areas are summarised below.

1. Structural features: gender, ethno/religious group, and urban/rural location

2. Processes at the individual, household, and community levels:

a) Financial and economic management of the household

   a. Income, income shocks

   b. Child work

   c. Migration

b) Household context, structure of power, and values

   a. Household size

b. Presence of parents

c. Parental education

d. Number of dependent children and birth order

e. Fostering

f. Parental values about school

g. Authority and decision making

c) Health:

a. Children's health

b. Health conditions of family members

c. Disability (child or family members)

d. Pregnancy

3. External and internal assessment of school

*For those whose 15-year-old has ever been to school and/or dropped out in the past*

- What was the main reason why you took your child out of school?

a. Distance

b. Expense

c. Needed at home

*For those whose 15-year-old has dropped out of school in the last 2 years*

a) The "cost" of school:

a. Fees

b. Indirect costs of transportation, accessibility, food, safety

b) The school in the community:

a. Credit availability

b. Job market assessment vis-a-vis choice of persistence in education

c) Personal experience with school:

a. Achievement and perceived learning

b. Engagement

c. Grade repetition

d. Teacher-student relationships

e. Violence and safety

f. Time in school (effective learning time and withdrawals)

g. Resources

h. Motivations

*Socio-Economic Status*

The PISA index of socio-economic status, referred to as the index of Economic, Social and Cultural Status (ESCS) is comprised of the occupation status of the parent with the highest occupational status, the number of years of education of the parent with the highest educational attainment and an index of home possessions that includes measure of wealth, educational possessions and cultural possessions (including the number of books at home (Willms and Tramonte, 2014).

Willms and Tramonte (2014) go on to discuss what modifications might need to be made to the contextual questionnaire to be developed under Strand B for PISA for Development. In particular, they focus on the possibility that there is a tipping point where the measures for SES that are relevant for those living in poverty are different from those that are relevant for those with low to moderate income but not in poverty; and on measurement invariance where the same indicator has different meanings for those in poverty and those not.

Thirty years ago, Carr-Hill and Lavers (1985) argued that a single 'SES' construct is not always useful: for example, recent surveys in Kenya, Tanzania and Zambia in vulnerable areas, separate dimensions/ factor scores were calculated for housing conditions, modern assets and agro-pastoral assets (Carr-Hill, 2014b). The correlation coefficients are shown in Table 15; with the single exception of the correlation between modern assets and household living conditions in the Zambia sample, the correlations are all low representing less than 10% of common variance

**Table 15. Person correlation coefficients between difference dimensions in Kenya, Tanzania and Zambia**

| | **KENYA** | | **ZAMBIA** | | **TANZANIA** | | |
|---|---|---|---|---|---|---|---|
| | **MA** | **AP** | **MA** | **AP** | | **FS** | **AP** |
| Housing Living Conditions | +.293 | +.287 | +.568 | +.093 | Housing Living area Conditions | +.292 | -.237 |
| Modern Assets (MA) | 1 | -.034 | 1 | +.175 | Food Security (FS) | 1 | -.222 |
| Agro-Pastoral Assets (AP) | | 1 | | 1 | Agro-Pastora l Assets (AP) | | 1 |

*Social and Environmental Indicators*

In developed countries, the environmental and social contexts of schools, although not equivalent, are not very different. This is not the case in developing countries. For this reason, in addition to questions to the household, in developing countries it is also important to understand the environmental and social context. For example, the reason why some children are out of school is simply because schools are not available or because the parents believe that access to the schools that are available is insecure especially for girls; so it would be useful to know about the accessibility of schools in the local area, which would

include lighting, roads and transport possibilities/ security. Equally, the community may or may not support education (for girls), so it is important to know the extent of community support for which proxy assessments can be obtained from village leaders.

Indeed, in general, given the limit of 30-35 minutes for the interview questionnaire, where possible the contracted designer for Strand B should assess whether any of the information required can be obtained through an observation checklist.

**A modular approach to the contextual assessment**

As it has been suggested for the cognitive component of Strand C, the contextual assessment might be composed of modular elements to adapt to the heterogeneity of OOS 15-year-olds. An adaptive contextual assessment might include:

- A core set of personal, socio cultural, and contextual characteristics and processes that pertain to all 15-year-olds in Strands B and C, based on the main PISA framework, the suggestions in Willms and Tramonte (2014) and developments by the contractor for Strand B

- A filtered subset of extra questions to assess the lifetime relationship of the currently OOS 15-year-old to school, or not, based on those developed by Ed-Data (see Annex I). These include some of the attitudinal questions suggested earlier as being important.

**Treating in analysis**

The data from any interviews or tests that are conducted under Strand C will be analysed separately; they are not being combined with the main PISA for Development samples of 15-year-old students attending educational institutions in grades 7 and higher that are comparable to main PISA. The analysis of the out-of-school 15-year-olds data will be internal within each country and will focus on the division between those who have never been to school, those who have incomplete primary and those who have completed primary but then dropped out; and between rural/urban and males/females. Internal analysis would also use information from contextual questionnaires.

Assuming that there is no intention to combine the results of the PISA for Development testing of 15-year-olds in school with those of testing OOS 15-year-olds, then there are at least two modifications one might want to make:

- First, to report the results for in-school 15-year-olds according to their school grade and the results for OOS 15-year-olds according to the highest grade level achieved (or attended).

- Second, some 15-year-olds may be registered in a school but not actually attending (at least on the day of an interview). Given the intention to have a clear distinction between those in and out of school, there will have to be an agreed set of criteria for deciding whether a 15-year-old being interviewed at home, who claims to be attending school, is ‘at school’ or ‘out-of-school’.

**Summary and conclusions**

The aim of measurement is the same as for the main PISA for Development exercise; and for the majority of the OOS 15-year-olds in most countries similar procedures can be followed.

For those who have dropped out after completing primary or even attended some secondary schooling, the same internationally agreed instrument can be used for those who have completed 5th grade or higher, the instrument that is developed for testing in-school 15-year-olds in those grades can be used.

It is only for those who have never been to school or for those who have had insufficient schooling to attempt either the international instrument or that developed for in school 15-year-olds in grades 5 or 6 that there will need to be a Strand C specific instrument.

Alternative assessment methods used by ASER, LAMP, PIAAC, SACMEQ, STEP, and Uwezo have been reviewed and the tentative conclusion is that the ASER/Uwezo approach is probably the best, but this should be explored by the contractor in conjunction with the national teams and the final decision should be taken at country level.

For this same group, there may also be distinctive problems in using the language of instruction:

- The definition of language is contested: the standard PISA definition of language of instruction is inappropriate for this particular group and should be changed to language of communication.

- The testing procedures will have to use several filters to establish the respondent's language of communication and familiarity with numbers.

The aim should be to elicit the best possible existing tool which could then be piloted among a small group of OOS 15-year-olds.

Finally, given that the 15-year-old is helping us, but may not only be totally disinterested in the test also unable to answer any of the items, so that the whole experience may be quite unpleasant, it will be important to include one or two questions which would be relevant for her/him such as asking what s/he would like to learn to help her/him in the short-term and medium-term future.

Strand C of the PISA for Development project faces two challenges in respect of the contextual questionnaire: one is to decide the extent to which to rely on and make use of the PISA framework, which is intrinsically built around the concepts of learning and schooling; and the other is to decide on the extent to which it is necessary to ensure the correspondence between the contextual assessment for OOS 15-year-olds with the instruments used for the in-school students.

At the analysis stage, we need to be aware:

- of the possibility of socially stratified bias in responses to self-report questions; and

- that the standard approach to socio-economic classification may not be appropriate for these particular sub-groups.

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## ANNEX I: ED-DATA QUESTIONS ON CHILDREN WHO HAVE DROPPED OUT OF FORMAL SCHOOL

How old were you when you stopped attending school?

There are many reasons why a child may have stopped attending school. I am going to ask you about some reasons people give for why children stop attending school. Please tell me if any of these reasons are important in explaining why you stopped attending school. Is the only reason why you stopped attending school because you were physically or mentally challenged and unable to attend school?

Did you stop attending school because you had been very sick for 3 months or longer?

Did you stop attending school because you were needed to do domestic work such as caring for younger children or sick relatives, cooking or cleaning, fetching water or wood, etc.?

Did you stop attending school because you were needed to work in the field, herd animals, sell in the market, or hawk in the streets?

Did you stop attending school because you were needed to work for an employer?

Did you stop attending school because there was not enough money to pay the costs of schooling?

What school cost(s) made it too hard for you to continue to attend school? PROBE: Anything else? RECORD ALL COSTS MENTIONED. Tuition Fees; Pta/Development Levies; Uniform Or Clothing; Books And Supplies; Transportation; All Costs; Other (Specify)

Did you stop attending school because the school offering the needed class was too far away?

Did you stop attending school because it is unsafe to travel to school?

Did you stop attending school because you failed examinations or had to repeat classes of schooling?

Did you stop attending school because of any of the following school quality related reasons?

a. Teachers did not perform well; b. Pupils were unsafe at school.

b. School buildings or facilities were poor or had problems.

c. Classrooms were too crowded.

Did you stop attending school because you no longer wanted to attend school?

Did you stop attending school because you had enough schooling?

Check 216 And 217: Highest Level Attended And Class Completed. Check One Box Below. Primary, Primary, Junior Secondary Class Completed < 6; Class Completed = 6; Or Higher

Was it because it was unlikely that you would be able to find a place at junior secondary school?

Was it because you did not find a place at junior secondary school?

Junior Secondary Class Completed < 3; Junior Secondary Class Completed = 3

Is it because you got engaged, got married, or made someone pregnant?

Is there (any/another) important reason that helps to explain why you stopped attending school?

(PISA DATA ANALYSIS MANUAL: SPSS® SECOND EDITION – ISBN 978-92-64-05626-8?, pp.90-91 Optimal Conditions for linking items)