MEASURES OF CHILD POVERTY PROJECT

Child Poverty in South Africa: A Money Metric Approach using the Community Survey 2007

Helen Barnes

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1 Introduction

Large numbers of children worldwide live in poverty and it is universally recognised to be a major problem. In South Africa, the legacy of apartheid has left a large proportion of the population, particularly children, in severe poverty.

Many governments, including that of South Africa, have committed themselves to tackling child poverty. This contributes to a wider development strategy by improving the future life chances of today's children and thus the future of the country (White et al., 2002). However, childhood is also important in its own right and so child poverty is not only unacceptable because of its long-term implications but also because of the present experienced reality of poverty (UNICEF, 2004). Such a position can be seen in the then President Nelson Mandela's speech at the launch of the National Programme of Action for Children in 1996:

> *Our children are our nation's future. Prospects for development are seriously undermined by the kind of large-scale deprivation of children that South Africa has experienced. On the other hand investing in their health, nutrition and education not only improves our children's quality of life - the gains reverberate into future generations. […] Children can be our spearhead for attacking poverty, reinforcing human rights, and accelerating economic growth and development. Such a programme will also help alleviate the urgent plight of the children of today, the principal victims of yesterday's neglect of the majority of South Africa's people.* (Mandela, 1996)

Since 1994 the South African government has committed itself to protecting child rights and reducing child poverty through initiatives such as the National Programme of Action for Children and the Office on the Rights of the Child, national legislation such as the *Constitution of the Republic of South Africa* (Act 108 of 1996) and the *Children's Act* (38 of 2005), international commitments such as the *Convention on the Rights of the Child* (United Nations, 1990) and the *African Charter on the Rights and Welfare of the Child* (Organisation of African Unity, 1999), and the provision of social assistance in the form of three grants for children: the child support grant (CSG), the foster care grant and the care dependency grant. Since its introduction in 1998, the CSG has been a key element of the government's approach to tackling child poverty and over eight million children are currently in receipt of the grant (SASSA, 2008; Skweyiya, 2007b). The recent change to the means test threshold and extension of the grant to children under 15 years of age means that more children will benefit from the grant.

Nevertheless, as remarked by Dr Zola Skweyiya, Minister for Social Development, on the occasion of a child poverty symposium, poverty is still experienced by large numbers of children in the country:

> *…despite Government's commitment to the long-term objective of transforming the country into a non-racial, non-sexist, democratic nation, children remain on the periphery of social transformation. Children continue to be hard hit by poverty in various parts of the country.* (Skweyiya, 2007a)

The budget vote speech delivered by the Minister in May 2007 therefore asserted 'a renewal of our pledge to a national partnership to fight child poverty, social exclusion and to promote social cohesion and improve service delivery' (Skweyiya, 2007b).

This research project speaks directly to the government's renewed commitment to tackle child poverty. It aims to provide detailed analysis of the current levels of child poverty in South Africa, in order to provide an evidence-base for policies to tackle child poverty. The project involves exploration of different concepts, definitions, and subsequent measurements[1], of child poverty.

This report provides an analysis of child poverty based on the income levels of the households in which children live using the Community Survey 2007 (CS 2007). Money metric definitions and measurements of child poverty have been criticised for the fact that they are not child specific and do not take into account intra household allocation of resources (Adelman et al., 2000; Gordon et al., 2003; White et al., 2002). Furthermore, it has been argued that:

> *…poverty line measurements drawing on income-consumption criteria do not give us any information about the multitude of other aspects of deprivation impacting children's lives, such as access to water, shelter, health services, education or transport.* (Feeny and Boyden, 2003: 8)

However, it is still important to include money metric definitions and measurements in a multi-dimensional framework of child poverty. Other definitions and measurements of child poverty will be presented in subsequent reports as part of this project.

Chapter 2 examines previous research on child poverty in South Africa, in the context of international studies of child poverty. Chapter 3 focuses on definitions of child poverty and Chapter 4 focuses on the measurement of child poverty using these definitions. Much of the technical detail relevant to the measurement of the money metric definitions is presented in the Technical Appendix.

[1] Concepts of poverty are 'the theoretical framework out of which definitions are developed' (Noble et al., 2007: 54). Definitions of poverty distinguish the poor from the non poor, and measurements of poverty are the ways in which definitions of poverty are operationalised, enabling the poor to be identified and counted, and the depth of poverty gauged (Lister, 2004).

2 Previous research on child poverty in South Africa

Historical studies of poverty in South Africa have to a large extent ignored child poverty and there have been few systematic accounts of the situation of all children. The Carnegie Inquiry into white poverty was conducted in 1928. The focus on children was on the health and educational circumstances of white children living in poverty only; the situation of impoverished black children was not examined (Bray and Dawes, 2007)[2]. The second Carnegie Inquiry in the mid 1980s focused on poverty dynamics, but did not have a significant child component. As the apartheid era drew to a close, the National Children's Rights Committee worked with UNICEF to carry out research into the situation of women and children in South Africa (UNICEF, 1993a; UNICEF, 1993b). These documents stimulated discussion between the government and NGOs, culminating in the *Thembisa Declaration*, a document outlining action towards improving the lives of South African children (Bray and Dawes, 2007).

Given the lack of historical studies of child poverty, the following review of child poverty studies in South Africa focuses on the post 1994 period[3]. Also reviewed are international approaches in order to provide some context for the South African studies. South Africa has largely followed a money metric tradition in measuring child poverty, and both absolute and relative concepts and definitions have been applied. Absolute poverty is based solely on the needs of the poor and not on the needs of the non poor, that is, it purportedly exists independently of any reference group and does not depend on the living standards of society. It is concerned with survival, subsistence or meeting basic needs, and the minimum resources needed to achieve this. Relative poverty on the other hand is based on a comparison of the standard of living of the poor and the non poor. People are considered to be poor if they lack the resources required for full participation in society, or, in other words, for participating in activities that are customary in the society in which they live.

2.1 Absolute approaches

The World Bank's $1 a day approach is used in the State of the World's Children reports (see UNICEF, 2008 for the latest report) as one of many measures of child poverty or well being. In South Africa, Dieden and Gustafson (2003) used the $1 a day definition of poverty, referring to children meeting the definition as 'extremely poor'. They used the October Household Survey (OHS) 1995 and Income and Expenditure Survey (IES) 1995 to measure the rate of child poverty.

[2] These children were largely from Afrikaner families displaced from their land by the South African War at the turn of the century and who had become more impoverished by the Great Depression (Bray and Dawes, 2007).
[3] South Africa's first democratic elections, following the end of apartheid, took place in 1994.

The $1 a day line is a very minimalist definition and gives the lowest proportion of children in poverty of all the poverty lines used previously in South Africa. Dieden and Gustafson recognise this and also propose a relative poverty line (see Section 2.2).

Many countries instead set their own money metric poverty lines, usually based on the amount of money needed to purchase a defined basket of goods and services. Rarely are the poverty lines used for measuring child poverty based on a specific assessment of the needs of children however. Each poverty line is relevant only in the specific country context, and therefore the poverty lines used in South African child poverty research are most relevant to this study.

First, Haarmann (1999) looked at the living conditions of South Africa's children and defined as poor any child with an equivalised expenditure of less than R 319 per month. This was taken from Potgieter's research on the subsistence level required for a person living in Cape Town. The Project for Statistics on Living Standards and Development (PSLSD) data collected in 1993 was used.

Second, Woolard (2002, cited in Streak, 2002) was commissioned by the Children's Budget Unit (CBU) at IDASA to produce estimates of child poverty. This was carried out on both the OHS 1995 and OHS 1999, the former because of concerns that income had been under-reported in the OHS 1999. Two poverty lines of R 200 and R 400 per month per capita (in 1999 prices) were used. The R 400 poverty line was the threshold for an absolute poverty line recommended in the Taylor Committee report into a comprehensive social security system for South Africa (Taylor Committee, 2002)[4].

Third, Woolard (2003, cited in Streak, 2004) was again commissioned by the CBU to produce a money metric measure of child poverty for a report on monitoring child socio-economic rights. Poverty lines of R 215 and R 430 per month per capita[5] were selected to calculate child poverty rates using the IES 2000.

Finally, the Children's Institute at the University of Cape Town used General Household Survey (GHS) data from 2002 to 2006 and identified as poor children living in households that have an expenditure of less than R 1,200 per month for all the people in the household (Proudlock et al., 2008). The poverty line is based on a threshold of R1,100 used by the Treasury and the Department of Provincial and Local Government to determine funding for poverty alleviation programmes.

While most of the South African studies discussed here do carry out some form of equivalisation[6], albeit usually only taking into account household size

[4] It is assumed that an adjustment was made for price change for 1995, but this is not made explicit and the poverty lines for 1995 are reported as R 400 and R 200 per month per capita.
[5] Presumably the R 400 and R 200 lines translated to 2000 prices.
[6] Equivalisation is explained in more detail in Section 3.4.

and employing a per capita equivalence scale, the Children's Institute analysis, does not use any equivalence scale, ignoring variations in household size as well as composition and economies of scale. As the authors themselves note, the threshold was not adjusted for price change over the five years. The R 1,200 threshold would therefore be reduced in real terms, meaning the poverty line is actually lower year on year. However, as the programme threshold has not changed over these years in line with price changes, it would have been inappropriate to alter the poverty line to take into account price change. Nevertheless, care has to be taken when interpreting the results.

2.2 Relative approaches

Most OECD countries use poverty lines that are set at a given percentage of mean or median national income, and therefore change as income in a given country changes. Examples of child poverty studies using this approach include two reports by UNICEF (UNICEF, 2005; UNICEF, 2007). One of the measures of material well-being is a relative income poverty component which measures the percentage of children living in homes with equivalent incomes below 50 per cent of the national median. The most common percentages used are 40, 50 and 60 per cent. This has not been particularly widely used in South Africa, although a few examples can be found.

First, in addition to the $1 a day poverty line, Dieden and Gustafson (2003) also produced two relative poverty lines for comparison: 50 per cent of median per capita income and 50 per cent of median per capita income adjusted for economies of scale. The median may be inappropriate in the South African context as incomes are very heavily skewed towards the lower end of the distribution. Thus any poverty line set at a percentage of median income would be very minimal indeed. This may explain why Dieden and Gustafson's estimates of child poverty are lower than in the other studies using a relative poverty approach.

Second, one of the indicators used in the 2001 Census based South African Index of Multiple Deprivation for Children (SAIMDC) 2001[7] (Barnes et al., 2007) is income deprivation, using a relative approach: the percentage of children living in a household that has an equivalised household income below 40 per cent of the mean equivalent household income. The 40 per cent mean was derived from the income distribution of the IES 2000, initially for the Provincial Indices of Multiple Deprivation (PIMD) 2001 (Noble et al., 2006a; Noble et al., 2006b), and inflated to 2001[8].

Also used in some countries are poverty lines which define the bottom X per cent of the income or expenditure distribution as poor. Such an approach has

[7] A ranking of all municipalities in South Africa in terms of various aspects of deprivation specifically focused on children, constructed from the 2001 Census.
[8] The Census income variable is banded and so cannot be used to derive thresholds based on mean or median income. Therefore the threshold had to be externally derived.

been common in South Africa. Six studies (May, 1998; NIEP/UNICEF, 1996; Streak et al., 2008; Woolard, 2001; Woolard, 2008; World Bank, 1995) looked at children living in the bottom 40 per cent of households. The IES 1995 and 2005/06, PSLSD, OHS 1999 and GHS 2006 were variously used. A child was counted as poor if s/he resides in a household in the bottom 40 per cent of households when households are ranked according to income per adult equivalent. Such an approach is less appealing than a percentage of mean or median income approach, as there will always be a bottom 40 (or any other) per cent in any society and so poverty, using this definition, could never be eradicated, except in an unlikely situation of equal incomes. That said, the percentage of mean or median income is problematic in that the poverty threshold will rise in periods of economic growth and so people will still be identified as poor even though they are better off. However, with this approach it is still possible to reduce or eradicate poverty through distributional changes. The selection of poverty lines using either type of relative approach is arbitrary and does not give any indication of the standard of living that can be achieved.

The previous definitions of child poverty and the national child poverty rates they produce are shown in Table 1[9].

[9] The Woolard (2008) study does not report a national rate of child poverty and so is not included in the table.

Table 1: Poverty rates from previous studies of child poverty in South Africa

Source: author (date)	Data source	Poverty line	Equivalisation	Monetary resource measure	Percentage of children in poverty	
					%	Age
Absolute						
Dieden & Gustafsson (2003)	IES/OHS 1995	R 122.56 per month	per capita	income	28.4	0-14
Woolard (2002)	OHS 1995	R 200 per month [a]	per capita	income	38.9	0-17
Woolard (2003)	IES 2000	R 215 per month	per capita	income	54.3	0-17
Woolard (2002)	OHS 1999	R 200 per month	per capita	income	58.1	0-17
Woolard (2002)	OHS 1999	R 400 per month	per capita	income	64.7	0-17
Proudlock et al. (2008)	GHS 2006	R 1200 per month	none [b]	expenditure	68.0	0-17
Haarmann (1999)	PSLSD 1993	R 319 per month	(household size)$^{0.9}$	expenditure	72.0	0-6
Woolard (2003)	IES 2000	R 430 per month	per capita	income	74.9	0-17
Woolard (2002)	OHS 1995	R 400 per month [a]	per capita	income	75.8	0-17
Relative						
Dieden & Gustafsson (2003)	IES/OHS 1995	50% of median	per capita adjusted for	income	44.8	0-14
Dieden & Gustafsson (2003)	IES/OHS 1995	50% of median	per capita	income	49.2	0-14
Woolard (2001)	OHS 1999	Bottom 40% of households	(adults + 0.6 children) $^{0.9}$	income	59.3	0-6
World Bank (1995)	PSLSD 1993	Bottom 40% of households	adult equivalents [d]	expenditure	60.0	0-5
NIEP/UNICEF (1996)	PSLSD 1993	Bottom 40% of households	adult equivalents [e]	expenditure	60.0	0-5
May (1998)	IES 1995	Bottom 40% of households	(adults + 0.5 children)$^{0.9}$	expenditure	60.0	?
Streak et al. (2008)	IES 2005/06	Bottom 40% of households	per capita	income	65.5	0-17
Barnes et al. (2007)	Census 2001	40% of mean	modified OECD	income	78.7	0-17

Notes: Year of poverty estimate is the same as the data source. Table ordered by poverty rate (within absolute and relative categories).
[a] The poverty line is reported in 1999 Rand as child poverty was calculated on the OHS 1995 at the same time as on the OHS 1999.
[b] Total household income used.
[c] Exact adjustment not reported.
[d] Reported as 'total consumption was divided by the number of "adult equivalents" (which was calculated using the consumption requirements of children and adults) and adjusted to take into account economies of scale' (World Bank, 1995: 5).
[e] The World Bank (1995) analysis was used in this study.

3 Definitions of child poverty

There are various issues that have to be resolved when defining child poverty in a money metric way. Taking as an example the SAIMDC definition of child poverty - children living in a household that has a household income (adjusted using the OECD modified equivalence scale) that is below 40 per cent of the mean equivalent household income - it is clear that there are five parts to a definition of child poverty. First, it is necessary to decide on an absolute or relative approach, which stems from the conceptual framework adopted. Second, a decision on whether to use individual or household monetary resources has to be made. Third, the notion of monetary resources has to be defined, either as income or expenditure. Fourth, where household monetary resources are used, it is important to take into account variations in household size and composition and so an equivalence scale has to be selected. Finally, the actual poverty line has to be set.

A sixth strand could also be added: deciding whether to look at the number of poor households with children or the number of children in poor households. Recent studies on child poverty highlight the need for child-focused definitions of poverty (Feeny and Boyden, 2003; Noble et al., 2006c), which requires data that focuses on children and not just the household. Poverty measurements that treat children as elements of the household or family rather than a unit of observation in themselves can be misleading, as Feeny and Boyden point out:

> *…information on the number of poor households with children (rather than the number of poor children in households) has distorted the distribution of poverty and concealed the fact that in most cases, the percentage of children under the poverty line is higher than the corresponding percentage for families.* (Feeny and Boyden, 2003: 8)

Therefore, as far as possible, this study is child-focused, in-line with recent calls in South Africa for such an approach (Coetzee and Streak, 2004; Dawes et al., 2007; Guthrie et al., 2003; Noble et al., 2006c; Streak, 2005).

3.1 Absolute or relative?

In the South African context, in order to address basic needs that large proportions of the population are without, as well as the constitutional imperative for full citizenship and participation in society, a combination of absolute and relative approaches would seem to be a suitable way forward. This approach has recently been presented in the form of a multi-dimensional model of child poverty for South Africa:

> *Given the fact that a significant number of children do not have the basic needs of food, housing, education, safety, and health provision met, there is no doubt that an absolute and multidimensional measurement of child*

poverty is essential for South Africa. However, there is also a pressing need for a carefully thought out relative concept of poverty to address the extreme inequalities and exclusion experienced by children beyond the failure to meet their basic needs. (Noble et al., 2006c: 44)

3.2 Individual or household monetary resources?

While some researchers would argue that poverty should be measured at an individual rather than household level, data constraints often mean that this is not possible. Furthermore, when measuring child poverty, the measurement of individual resources is inappropriate as children rarely have monetary resources of their own, and are instead reliant on the sharing of resources within a household. In general, any individual living in a household with other people is able to share a number of costs, which a measure of individual resources fails to take into account.

A distinction is made between the family (usually head of household, spouse and dependent children)[10] and the household. Alcock claims that:

Unlike households, families consist of people with a more or less explicit commitment to joint living and sharing based on emotional, as well as empirical, interdependency […] The expectation is that members of families will pool and share resources and will expect, and welcome, interdependency. (Alcock, 2006: 86)

Bradbury and Jäntii (1999) argue that the assumption of sharing may be too optimistic for large households of unrelated individuals or multi-generation households, as it implies that children are reliant on the benevolence of adults other than their custodians. Nolan and Whelan (1996) suggest, however, that the assumption that income is shared fully within a family unit but not at all between two or more families living in the same household may be unrealistic. In the South African context there is evidence that household resources, particularly income from social grants, are frequently pooled (Case and Deaton, 1998; May, 2003). It therefore makes sense to discuss household resources, and besides, data is often only available at the household level.

The use of household resources assumes that they are shared equally within households, irrespective of who receives them, and so every person in the household is defined as having the same income and the same poverty status. Research in the UK has however shown that parents often sacrifice their own needs for those of their children, and so while a household may be defined as poor, within that household, the children are not poor but the parents are poor (Middleton et al., 1997). There is limited information on the extent to which this occurs in South Africa and no clear way of making an adjustment for such a situation. Therefore it is assumed that resources are shared evenly among all members of the household, and children therefore have the same poverty status as adults.

[10] Sometimes referred to as a tax/benefit unit.

3.3 Defining monetary resources

Both income and expenditure have been used to measure poverty and it has been widely debated which is the more appropriate. Poverty measurement in more developed countries has tended to use income, while expenditure has commonly been used in less developed countries.

It is often argued that income should be used to measure poverty because it represents the resource flow from which individuals can choose to consume or save (Bradbury and Jäntii, 1999). However, an accurate estimate of income is difficult to achieve because of under-reporting, either deliberately (e.g. by richer individuals not wishing to disclose their true income) or unintentionally (e.g. because of insufficient knowledge about assets and their returns or the respondent being ill-informed about the incomes of other household members). There can be both unit non-response (i.e. no information is provided by an individual or household) and item non-response (i.e. failure to report or accurately report certain items of income or expenditure) (Deaton, 2003). Surveys frequently reveal dissaving by poor people, and as it is more likely that expenditure is underestimated than overestimated, it seems likely that income estimates in surveys are too low (Woolard and Leibbrandt, 2006). Income also fluctuates over time, especially in developing countries where agricultural work brings seasonal fluctuations in income.

Thus some researchers have preferred to use expenditure as a more reliable measure of income and a better proxy for living standards. This has frequently been the case in South Africa. According to Woolard and Leibbrandt:

> *Current consumption reflects a household's ability to buffer its standard of living through saving and borrowing, despite income fluctuations. Consumption thus can be thought of as a smoothed outcome of income flows which exhibits less variation than income.* (Woolard and Leibbrandt, 2006: 4)

In developing countries, expenditure is often a better reflection of living standards of low income households which are engaged in informal work and agricultural production. However, as with income, there is also the issue of under-reporting. In addition to the problems outlined above for income, it can be a difficult task for people to record everything they have spent, especially in poorer households where spending is irregular, and few households are able to give estimates for an extended recall period (Woolard and Leibbrandt, 2006). There is a trade off between accuracy of memory, which necessitates a short recall period, and accuracy of information on expenditure, which is generally better if averaged over a long period of time (Deaton, 2003) - expenditure can be problematic because of its 'lumpy nature' caused by occasional large purchases (Lister, 2004: 40).

With both measures, there is the issue of people receiving and using goods in kind that are not generally perceived as income or expenditure (SPII, 2007).

In developing countries, wages may be paid in kind, or subsistence production means a household does not have an income, and consumes, in the main, home produced goods. Ignoring such situations can lead to the underestimation of income or expenditure (Woolard and Leibbrandt, 2006).

In terms of measuring child poverty, Bradbury and Jäntii (1999) argue that expenditure is probably more appropriate. If a family chooses to save, its current consumption will be reduced, and thus the current standard of living of all family members, including children, will be reduced. It is parents, rather than children, who make this decision, and it is likely to be the parents who benefit most from the saving in old age. Income would not reflect this situation. However, Bradbury and Jäntii then go on to use income to measure child poverty in industrialised nations because of the availability of data.

The choice of whether to use income or expenditure is therefore often based on the availability of high quality data. Thus the available data has to be examined and a decision made on the best variable to use. This is discussed further in the Technical Appendix where various potential datasets for measuring child poverty are examined. The CS 2007 was eventually selected as the best source of data and this contains income information only.

3.4 Equivalisation

The living standard of an individual depends not only on their own resources, but also on the resources of others in the household. Since households vary by size and demographic composition, simply using total household resources to make comparisons between households would produce misleading results. Consequently it has become customary to use some form of adjustment to take into account variations in household size and/or composition. It is argued that the needs of a household increase with each additional member, but not in a proportional way due to economies of scale. In order to enjoy a comparable standard of living, a household with several adults will need greater resources than a single person living alone. However, the needs of a household with three members, for example, will not be three times higher than those of a single person.

There is little consensus about economies of scale, nor about how much children need in relation to adults, although some attempts have been made in the UK to specifically estimate child costs or needs (Bradshaw et al., 2008; Gordon et al., 2000). A child-focused equivalence scale was developed for the Poverty and Social Exclusion survey (Gordon et al., 2000), because it was felt that the McClements scale, widely used in the UK at that time, did not assign sufficient weight to children, particularly young children. The scale is based on household budgets created by the Family Budget Unit at the University of York. The recent Minimum Income Standard (MIS) for Britain project (Bradshaw et al., 2008) establishes what families of different compositions need to reach a reasonable basic standard of living, through the consensus of ordinary people and supported by expert judgement. Bradshaw et al. (2008: 40) argue that the standard equivalence scales (e.g. McClements, the OECD

scales and square root of household size) 'are not based on evidence of what families of different sizes and compositions need to obtain equivalent living standards; or if they once had some link to needs, it has been lost through the passage of time'. One of the objectives of the MIS project therefore was to derive a set of equivalence scales for families with children[11].

Unfortunately both these scales are derived from UK budget standards work and therefore are not directly applicable to the South African context. In South Africa there are various costs relating to children which for the most part do not exist in the UK. An obvious example is school fees, which are charged by most public schools in South Africa, whereas education is free in state schools in the UK[12]. Such a situation might mean that the cost of children relative to adults in South Africa is actually higher than in the UK. In the absence of similar empirically derived and up-to-date scales in South Africa[13], an alternative has to be found. A variety of equivalence scales are used worldwide, which have been developed using a number of methodologies. There is, however, little agreement about the best method to produce equivalence scales or which are the most appropriate for different countries.

The simplest type of adjustment entails dividing total household income by household size to produce a per capita measure. However, while this takes into account household size, it does not adjust for structure, thus assigning equal values for adults and children alike. Needs are also assumed to increase linearly with household size.

More complex equivalence scales assign values to each household in proportion to its needs, taking into account both size of the household and the age of its members (number of adults and children). Equivalence scales conventionally take a couple as the reference point and assign an equivalence value of one. The process then increases relatively the income of single person households and reduces relatively the incomes of households with more than one person. Examples include the OECD and modified OECD scales. Recent OECD publications which make cross country comparisons of poverty and inequality have used a scale which divides household resources by the square root of household size. Thus, for example, a household of four people has needs twice as large as a single person household. This scale is very similar to the modified OECD scale.

Table 2 compares how needs change as household size and composition change using different equivalence scales (rescaled to first adult/head of household=1). The assumption made is that, for example, using the modified

[11] The needs of pensioners are also taken into account but are not discussed here.
[12] Rather confusingly, private (independent) schools are referred to as public schools in the UK. Non-private schools are referred to as state schools.
[13] Potgieter calculated the food and clothing costs of children and adults in different age-sex groups (as well as household costs) for the bi-annual Household Subsistence Level (HSL) measure of a minimum standard of living in South Africa (e.g. Potgieter, 2000). The HSL is no longer produced, and crucially has no allowance for educational expenditure, which is a significant child-specific cost that must be taken into account when producing equivalence scales that accurately reflect the costs of children.

OECD scale, a couple needs resources 1.5 times that of a single adult, and a couple with three children needs resources 2.4 times that of a single adult.

Table 2: Change in needs as household size and composition changes (rescaled to first adult=1)

Household	Per capita	'Old' OECD	Modified OECD	Square root	No equiv-alisation
1 adult	1.00	1.00	1.00	1.00	1.00
Couple	2.00	1.70	1.50	1.41	1.00
Couple, 1 child*	3.00	2.20	1.80	1.73	1.00
Couple, 2 children**	4.00	2.70	2.10	2.00	1.00
Couple, 3 children***	5.00	3.20	2.40	2.24	1.00

Source: http://www.oecd.org/dataoecd/61/52/35411111.pdf.
Notes: * The OECD scales define a child as 0-13 years.

To give an example of how these different equivalence scales play out in practice, consider a single adult, a couple, and a couple with one, two and three children. All have an unadjusted household income of R100. The equivalised incomes produced by the process of equivalisation are shown in Table 3. If we disregard the final column (included for information only), the lowest equivalised income for a couple and three children is given by the per capita scale and the highest by the square root scale.

Table 3: Equivalised incomes when unadjusted household income is R100 (rescaled to first adult=1)

Household	Per capita	'Old' OECD	Modified OECD	Square root	No equiv-alisation
1 adult	100	100	100	100	100
Couple	50	59	67	71	100
Couple, 1 child	33	45	56	58	100
Couple, 2 children	25	37	48	50	100
Couple, 3 children	20	31	42	45	100

Since there are a wide variety of possible equivalence scales, the selection of a particular one is based upon a set of assumptions about economies of scale and value judgements about the priority of the differential needs of individuals (children versus adults). The choice of equivalence scale is very important and can give quite different results. Arguably the only relevant scales for measuring child poverty are those that differentiate between adults and children, as they make an assessment of the needs of children rather than treating them as the same as adults.

Equivalence scales are sometimes expressed in the following way[14]:

$$E = (A + \alpha K)^{\theta}$$

where A is the number of adults, α is a constant reflecting the resource cost of a child relative to an adult (i.e. the child fraction or adjustment for age), K is the number of children and θ measures the economies of scale within a household. When α = 1 children count as adults (e.g. in a per capita scale) but typically α < 1. When θ = 0 needs are considered to be unaffected by household size, but when θ = 1 needs are assumed to increase linearly with total size (i.e. there are no economies of scale).

Although common, not all studies of child poverty in South Africa have used a per capita equivalisation. Other equivalence scales that have been used include α = 0.5 and θ = 0.9 (May, 1998)[15], α = 1 and θ = 0.9 (Haarmann, 1999), α = 0.6 and θ = 0.9 (Woolard, 2001)[16] and modified OECD scale (Barnes et al., 2007).

The choice of equivalence scale was debated for the PIMD 2001 (Noble et al., 2006a; Noble et al., 2006b). The modified OECD equivalence scale, the old OECD equivalence scale, the square root scale and two per capita measures were tested. The modified OECD scale was eventually selected because it is widely used internationally, although the use of different equivalence scales did not appear to have much impact on the overall domain score (a combination of indicators of income and material deprivation) and relative ranking of areas. Woolard and Leibbrandt (2006) have similarly found that there is little difference in the poverty profile when different assumptions are made about child costs and economies of scale. Using the 1995 IES and OHS, a range of parameters of α and θ were tested. The percentage of poor children ranged from 45.5 to 48.6 per cent. They concluded that a per capita scale is as appropriate as any other, and its simplicity makes it quite appealing. More recently, Streak et al. (2008) also tested the impact on child poverty of a range of equivalence scales (various parameters of α and θ, as well as the old OECD and modified OECD scales), concluding that while the choice does affect the poverty headcount (58.3 to 65.5 per cent), it does not have much impact on the composition of child poverty in terms of age, racial group, sex or area. They therefore support the use of a per capita method.

Deaton and Paxson (1997) state that the use of per capita expenditure as a welfare measure will most likely overstate the incidence of poverty among children. It is clear for example, that the overall needs of a young child are less than those of an adult, certainly in terms of food consumption. On the

[14] These scales are frequently used in the economics literature on poverty.
[15] For a reference household of a couple and 2 children, this gives an equivalence factor of 2.69, which is very similar to the 'old' OECD equivalence factor of 2.70 for the same reference household. According to Woolard and Leibbrandt (2006), these values were suggested simply as plausible values by Angus Deaton in a lecture given in South Africa in 1993, but were subsequently adopted by a number of poverty researchers in South Africa.
[16] For a reference household of a couple and 2 children, this gives an equivalence factor of 2.85.

other hand, it may be argued that the costs of a teenager are greater than those of an adult. Given this uncertainty, it seems inappropriate to only use a per capita scale, and therefore a variety of equivalence scales are tested here, before deciding which to use to measure child poverty.

Streak et al. (2008) find that there is less consistency in identification of poor households between the OECD and the other type of scales, but this is unsurprising as the equivalence scales take quite different forms and are not directly comparable. It is tautologous to suggest that the OECD scales are the least consistent with other scales because 'OECD countries have very different conditions from the typical household structure and costs of a developing country population' (Streak et al., 2008: pages not numbered). The modified OECD scale performs least well against the per capita scale because it treats a child as having resource costs a third of an adult (taking into account economies of scale), instead of the same costs. The closer the OECD scale is to the other scales, the more consistency there is. Indeed the old OECD scale, which is more generous to children, performs better against the per capita scale than two of the other scales tested. Therefore the variation is a function of the specification of child costs relative to adults and of economies of scale, and not the composition and consumption of households in South Africa versus OECD countries.

The two OECD scales are more straightforward to interpret than those that vary the parameters of α and θ. The role of economies of scale in the OECD scales is made more transparent by having different values for second and subsequent adults, as well as children. In addition South Africa is one of the OECD's enhanced engagement countries, which means it has a view to possible membership.

To test some of these equivalence scales prior to deciding which one(s) to use, sensitivity testing was carried out using the IES 2000[17]. The equivalence scales tested were the old OECD, modified OECD, square root of household size and per capita. A relative poverty line of 50 per cent of mean equivalised household income was used[18]. The results of this sensitivity testing are shown in Table 4.

[17] The IES 2005/06 could not be used because the age information in the publicly available data is in five year bands and so there is no way of identifying children aged 0-17 (the definition of a child used in this study) nor of calculating equivalised household income using equivalence scales that take into account the number of adults and children in the household.
[18] This can be easily compared to Woolard and Leibbrandt's analysis on the IES 2000 where a similar poverty line was tested for the total - rather than child - population (Woolard and Leibbrandt, 2006). Identical results were achieved: a national poverty rate of 68.1 per cent.

Table 4: Sensitivity testing of equivalence scales on IES 2000

Equivalence scale	Poverty line (2000 Rand per month per adult equivalent)	Number of children 0-17 years in poverty	Number of children 0-17 years	Child poverty rate
Square root	726.14	11294480	16675441	67.7
Modified OECD	985.16	11848340	16675441	71.1
Old OECD	564.58	12338293	16675441	74.0
Per capita	465.41	13011445	16675441	78.0

Source: Own analysis on IES 2000.

The results show that the choice of equivalence scale does matter. The overall child poverty rates vary by 10 percentage points from 68 per cent using the square root of household size scale to 78 per cent using the per capita scale. The square root scale is probably inappropriate because, as mentioned above, the scales that are most relevant are those which attempt to differentiate between the needs of adults and children. Of the remaining equivalence scales, the per capita scale is the most generous, treating a child as equivalent to an adult, which, as discussed, may have the effect of overestimating the incidence of child poverty. The modified OECD scale is the least generous to children.

The per capita scale and modified OECD scale represent two extremes, and it could be argued that the true extent of child poverty lies somewhere between the two (an upper and lower bound). There is clearly a need for further research to be undertaken to improve the evidence base for determining equivalence scales. For the purposes of this project, however, both the per capita and modified OECD scales will be used to measure the relative poverty lines.

3.5 Possible poverty lines

There are two main ways of setting a money metric poverty line: first, by determining the value (the cost) of a selection of goods or services identified as necessary; and second, by selecting a fraction of the income or expenditure distribution within a society (SPII, 2007).

A national poverty line for South Africa has recently been released for consultation (Stats SA and National Treasury, 2007). This approach begins by costing the daily energy requirement recommended by the South African Medical Research Council (2261 kilocalories per person) and then, drawing from the IES 2000 data, Stats SA estimated that R211 (in 2000 prices) is the amount necessary to purchase enough food to meet the basic daily food-energy requirements for the average person over one month. In order to take into account other goods and services required to meet basic needs, Stats SA estimated, using the IES, the non-food component of a poverty line, by observing the non-food expenditure of households that spend roughly R211

per capita per month in total. This is based on the assumption that these non-food items are essential as such households are substituting them for food. The cost of such essential non-food items amounts to R111 per capita per month. Adding these figures together (R211 and R111) gives an estimate of the minimum cost of essential food and non-food consumption per capita per month: a poverty line of R322 per capita per month (2000 prices).

Upper and lower thresholds have also been estimated in order to examine movements in and out of poverty and to capture households experiencing extreme poverty. The proposed upper threshold follows the method for the poverty line, but uses survey evidence of the average spending on non-food items of households with food expenditures of approximately R211 per capita per month. These households spent on average R382 on non-food items per capita per month (2000 prices) in addition to the R211 on food per capita per month. The upper threshold is therefore R593 per capita per month, in 2000-prices. According to Stats SA, 'as households in extreme poverty subsist in varying ways, it is difficult to construct a "scientific" basis for a lower poverty threshold' (Stats SA and National Treasury, 2007: 9). Therefore the US $2 a day definition is proposed to measure people in extreme poverty. This equates to R162 per capita per month (2000 prices), which is roughly half the proposed poverty line.

The proposed national poverty line is not particularly appealing, based as it is on the profile of those who have to (or choose to) spend less money on food than the amount regarded as the minimum necessary for healthy living in order to spend on non-food items, and thus producing a quite minimalist poverty line. The upper bound is therefore preferable as it allows the full amount to be spent on food and adds on expenditure on other items.

The proposed lower threshold (the $2 a day definition) was also justified by Stats SA in terms of its advantages for international comparability. Similarly, the $1 a day at purchasing power parity (PPP)[19] definition has been widely used and would be useful to measure for comparative purposes[20]. Beyond that neither is particularly appropriate as they are very minimalist, based as they are on poverty lines from low-income countries, and do not relate to a country-specific basket of goods meaning it is difficult to know what goods or items such an income would allow an individual to buy (SPII, 2007).

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[19] The conversion rate for a given currency into a reference currency (invariably the US dollar) with the aim of assuring parity in purchasing power over commodities.

[20] This was first developed in 1990 using 1985 data and was chosen as being representative of the poverty lines in use in low-income countries (Ravallion et al., 1991). The poverty line was $1.02 a day at 1985 PPP which was rounded off and labelled as the $1 a day line. The poverty line was updated in 1993 using an expanded set of PPP price comparisons and gave an estimate of the number of people living in poverty in 1993 which was almost identical to the estimate for 1985 (Chen and Ravallion, 2001). The poverty line was $1.08 a day at 1993 PPP and still labelled as $1 a day. The line has recently been revised again due to biases in previous rounds of the price surveys that were used to estimate the PPP exchange rates for currency conversions (essentially the cost of living in poor countries had been underestimated). The PPPs were revised using data for 2005, and a new set of national poverty lines for low and middle income countries were used to give a new international poverty line of $1.25 in 2005 prices (Chen and Ravallion, 2008). A $2 a day line (actually $2.15 a day) has also been used instead of, or in addition to, the $1 a day line.

Furthermore, as Ravallion (2008) notes with reference to the revised $1 a day poverty line:

> *The international measure is not intended to replace national poverty lines. When measuring poverty and discussing appropriate policies in a specific country one should naturally use a poverty line considered appropriate to that country, which need not accord with our international poverty line.*

With regard to definitions relating to fractions of the income or expenditure distribution, an approach looking at children in households below a certain percentage of the mean or median national income or expenditure is preferred over an approach looking at children in the bottom 20 or 40 per cent (or any other fraction) of households. The latter approach is problematic, because as discussed above, there will always be a bottom fraction and so poverty defined in this way could never be eradicated.

Using mean equivalent income is transparent, but sensitive to very high and very low incomes which surveys rarely measure accurately (Nolan and Whelan, 1996). Often median equivalent income has been used in international research, but as already discussed, this may not be suitable in the South African context as the distribution is skewed towards the lower end, resulting in a low median and fairly minimal percentage of median poverty line. Using the IES 2000 again, mean per capita expenditure is R 1,080 compared to median per capita expenditure of R 413. For income, the mean is R 934 and the median is R 335[21]. The median values are considerably lower than the mean values, so for example, a poverty line of 50 per cent of median income is R 167.5, which is very similar to Stats SA's lower threshold of R 162 ($2 a day in 2000 prices) and far lower than Stats SA's poverty line (R 322 in 2000 prices). Therefore a percentage of mean income or expenditure would seem more appropriate.

Noble et al. (2006a; 2006b) explored various fractions (20, 30 and 40 per cent) of mean equivalised income for the measure of income deprivation in the PIMD 2001. These thresholds captured 56, 66 and 72 per cent of the population respectively, but it was concluded that the use of different income thresholds had little impact on the overall domain score and relative ranking of areas. The 40 per cent threshold was used because it is one of the most commonly used thresholds internationally. The other internationally recognised thresholds - 50 and 60 per cent - would have captured too great a proportion of the population in some wards and so would not have been sufficiently discriminating. The threshold was subsequently used to measure income deprivation for children in the SAIMDC 2001 (Barnes et al., 2007). However, the purpose of the current study is not to rank small areas, but rather to estimate child poverty. While the PIMD found the income threshold had little impact on the relative ranking of wards, unsurprisingly it did have an impact on the proportion deprived. Therefore the choice of income threshold is likely to have an effect on the estimates of children in poverty. Given that a

[21] The IES 2005/06 gives similar results, in terms of the ratio of mean to median per capita household incomes: a mean per capita household income of R 1,794 and a median of R 569.

50 per cent threshold has also been used previously in South Africa (Dieden and Gustafsson, 2003; Woolard and Leibbrandt, 2006), both a 40 and 50 per cent threshold will be considered here.

3.6 Child poverty definitions

This section sets out clearly and explicitly the different definitions of child poverty that will be explored, taking into account the five aspects of a money metric poverty definition set out at the beginning of the chapter and the discussion that followed, as well as some of the issues raised in Chapter 2 about the previous studies undertaken in South Africa.

Arguments were put forward for examining both absolute and relative approaches and for using household resources (income in this instance). A variety of equivalence scales that explicitly take into account the needs of children were tested and it was demonstrated that there is some variation in poverty estimates depending on the scale chosen. The per capita and modified OECD scales were recommended as upper and lower bounds for measuring child poverty. Various possible poverty lines were discussed and it was concluded that several would be tested, including the proposed absolute poverty lines for South Africa (which use a per capita equivalence scale) and two relative poverty lines of 40 and 50 per cent of mean (preferred to median) equivalised household income. Based on the above discussion, the various definitions of child poverty that will be explored in the next chapter are shown in Table 5 (along with their value in February 2007 Rand). These definitions of child poverty will be measured using the CS 2007.

Table 5: Child poverty definitions to be tested

Definition of child poverty (the poverty line)	Value in Feb 2007 Rand per month
Stats SA lower bound ($2 a day at PPP)*	245
Stats SA poverty line (R322 in 2000 prices)**	444
Stats SA upper bound (R593 in 2000 prices)**	818
40 per cent mean per capita***	802
50 per cent mean per capita***	1151
40 per cent mean modified OECD***	1003
50 per cent mean modified OECD***	1439

Notes: The original estimate of $2 a day (actually $2.15 a day), based on 1993 prices was adjusted for accumulated price inflation since 1993: $_{current}PPP = {}_{1993}PPP * (CPI_{current}/CPI_{1993})$. The ${}_{1993}PPP$ is 1.66. The CPI for metropolitan areas (all items) was used as this is the only figure available for 1993: CPI for 1993 = 61.2 (2000 = 100)
CPI for Feb 2007 = 138.0 (2000 = 100)
This was then multiplied by 2.15 to give an amount per day. This was then multiplied by 365.25 to give an amount per annum and divided by 12 to give an amount per month. See Woolard and Leibbrandt (2006).
** The poverty lines in 2000 prices were inflated to February 2007 using the CPI value above (i.e. multiply by 1.38).
*** Imputation was carried out on the income variable to produce ten versions of the variable. The value of the poverty lines is the average of calculations on the ten imputed income variables (see Technical Appendix).

4 The extent of child poverty in South Africa

There are three commonly used indicators of income poverty: the incidence of poverty (the poverty rate or headcount index), the depth of poverty (the poverty gap) and the severity of poverty (the squared poverty gap). These are the first three of the Foster-Greer-Thorbecke class of poverty measures (Foster et al., 1984).

The poverty rate is a measure of the proportion of the child population whose welfare (measured in terms of income in this study) falls below the poverty line. The poverty gap provides information about how far households or individuals are from the poverty line and is a measure of the poverty deficit of the entire population. It is obtained by adding up the shortfall in the income of each poor person/household from the poverty line (the non poor have a shortfall of zero) and dividing by the total population[22]. By squaring the poverty gap for each individual/household, the squared poverty gap indicator gives greater weight to those observations that fall far below the poverty line than those that are closer to it. Therefore this indicator takes into account not only the distance separating the poor from the poverty line, but also inequality among the poor.

It is important to use the poverty gap or the squared poverty gap in addition to the poverty rate as they measure different aspects of income poverty[23]. Therefore all three measures are reported in the following analysis, which examines child poverty at a national and provincial level, and then by population group, and to a lesser extent, age and sex groups. As well as the child poverty rates for different groups, the distribution of poverty is also explored by identifying the groups which comprise the largest percentage of the poor (the poverty share).

All poverty estimates relate to 2007 and are for children aged 0-17 years.

4.1 National

Nationally, 66 per cent of children are in poverty when the rate is measured using Stats SA's poverty line[24]. The lower threshold gives a child poverty rate of 40 per cent[25] and the upper threshold gives a rate of 81 per cent[26].

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[22] Another way of looking at the poverty gap is the total resources needed to bring all the poor to the level of the poverty line (divided by the number of individuals in the population), and therefore it is often used as a measure of the minimum amount of resources necessary to eradicate poverty under a situation of perfectly targeted cash transfers.

[23] It is recognised that the CS 2007 is not ideal for calculating depth and severity of poverty because the incomes are artificially created. However, they are important measures and it is possible to obtain an indication of the broad patterns when they are calculated on the CS.

[24] R 444 per month in 2007 prices.

[25] This is the $2 a day line (R 245 per month in 2007 prices) - for completeness, the $1 a day poverty line gives a child poverty rate of 16 per cent (pre 2008 revision to the PPPs).

[26] R 818 per month in 2007 prices.

As discussed in the previous chapter, this report will consider the modified OECD scale (which can be considered as a lower bound equivalence scale) and a per capita scale (which can be considered as an upper bound equivalence scale). Using a poverty line of 40 per cent of mean equivalised income, the national child poverty rate is 75 per cent using the modified OECD scale, and 81 per cent using the per capita scale. Using a poverty line of 50 per cent of mean equivalised income, the national child poverty rates are 80 and 84 per cent respectively.

The 40 per cent of mean per capita income poverty line gives a poverty rate that is almost identical to that given by the upper threshold proposed by Stats SA, while the 50 per cent of mean child poverty rates using the modified OECD scale and the per capita scale straddle the child poverty rate given by the Stats SA upper threshold. The child poverty rates are shown in Table 6 for each of the poverty lines, alongside the number of poor children.[27]

The depth and severity of poverty are shown in Table 6 for each of the poverty lines. Unsurprisingly, the depth and severity of poverty are both greater at higher poverty lines, as there is both a greater shortfall in the incomes for the very poorest and these children are given greatest weight.

[27] It was possible to externally derive a poverty line for the percentage of mean per capita income, by using the IES 2005/06, which has a continuous income distribution. This could not be done for the modified OECD equivalisation because the age information (to distinguish adults from children) is unavailable in the IES 2005/06. For both the 40 and 50 per cent of mean per capita income where the line is derived from the IES, the child poverty rate is lower than that from the internally derived line. The 40 per cent poverty lines are R 802 from the CS 2007 and R 754 from the IES 2005/06 (inflated to February 2007) and the 50 per cent poverty lines are R 1151 and R 943 respectively. The child poverty rates using the IES derived poverty line will not be further reported.

Table 6: Child poverty rate, depth and severity

Poverty line	Poverty line (2007 Rand)	Poverty rate	Number of poor children	Poverty depth	Poverty severity
Stats SA lower threshold*	245	40.2	7248421	0.18	0.11
Stats SA poverty line*	444	65.5	11807957	0.34	0.22
Stats SA upper threshold*	818	81.0	14592393	0.53	0.39
40% mean income (per capita)	802	80.8	14557651	0.52	0.38
40% mean income (modified OECD)	1151	75.1	13531636	0.43	0.29
50% mean income (per capita)	1003	83.9	15117577	0.58	0.45
50% mean income (modified OECD)	1439	79.8	14376837	0.50	0.35

Source: Own analysis on CS 2007 post SRMI, institution cases deleted.
Notes: *These poverty lines use a per capita equivalence scale.
All reported values are the average of the calculations on the ten imputed datasets. See Chapter 3 for more details about the poverty lines and equivalence scales.

It is difficult to compare these estimates of child poverty rates to other estimates that have been made (see Table 1 in Chapter 1) as, with the exception of the 40 per cent of mean modified OECD line used on the 2001 Census for the SAIMDC (Barnes et al., 2007)[28], none of these lines have been used previously to measure child poverty. The child poverty rates for the SAIMDC and this study are quite similar, and even show a slight reduction between 2001 and 2007: 79 per cent compared to 75 per cent.

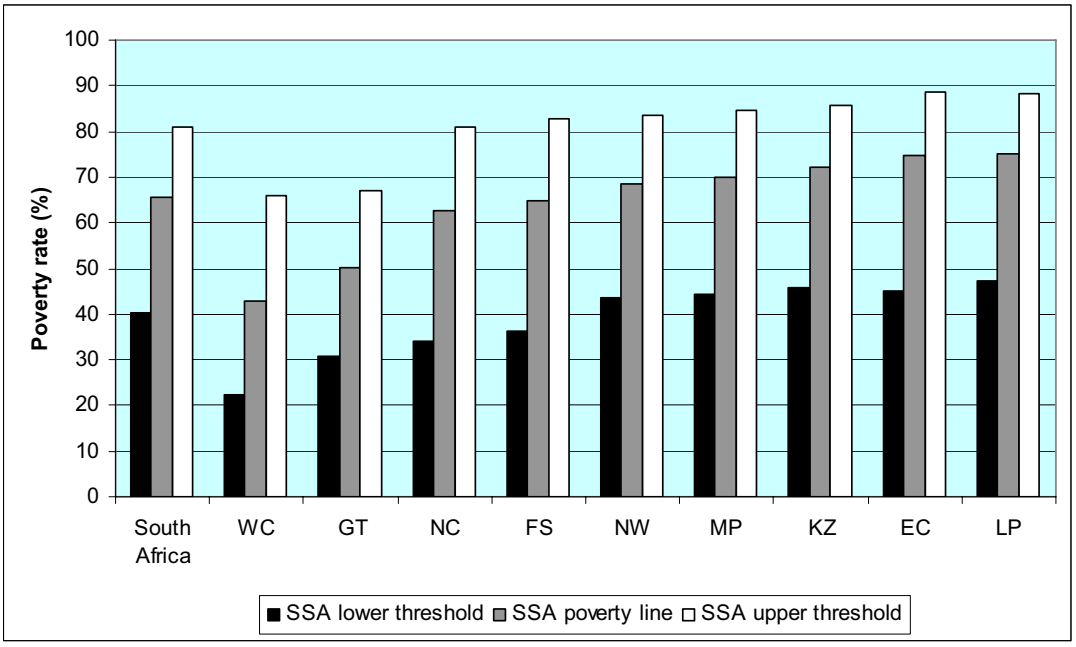
4.2 Provincial

The child poverty rates by province for the three Stats SA poverty lines are given in Figure 1. The provinces are ordered according to the poverty rate given by the main Stats SA poverty line (the grey column), and it appears at first glance that the rank order is the same for all three poverty lines. Indeed, the Western Cape has the lowest child poverty rate for the three poverty lines (22, 43 and 66 per cent respectively), and Gauteng the second lowest for all three. Limpopo has the highest rate for the lower threshold and poverty line (47 and 75 per cent respectively), but not the upper threshold where the Eastern Cape has the highest rate (89 per cent). This is consistent with previous findings which put the Western Cape and Gauteng at the least poor end of the spectrum and either the Eastern Cape or Limpopo as the poorest province. For the lower threshold KwaZulu-Natal is second poorest but for the other poverty lines it is third poorest. This was also found by Streak et al. (2008) where KwaZulu-Natal features more prominently amongst the poorest provinces using lower poverty thresholds.

[28] The 40 per cent of mean threshold was externally derived from the 2000 IES (and inflated to 2001) for the 2001 Census estimate.

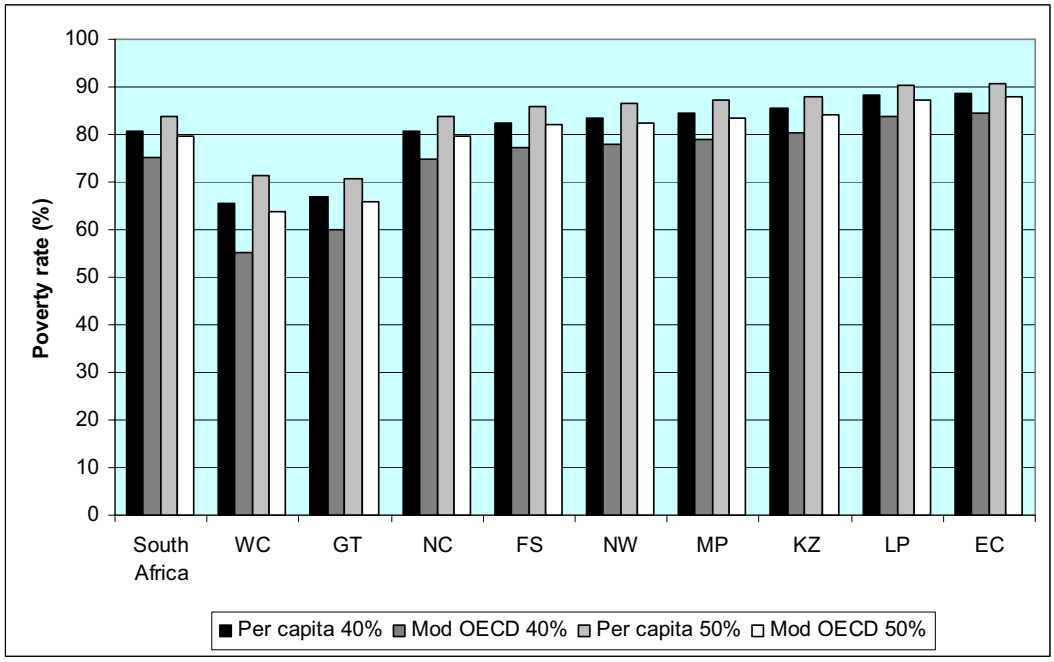
A fairly similar picture is presented by the relative poverty lines (Figure 2), although the Eastern Cape is the poorest on all four poverty lines. However, the differences in child poverty rates between the Eastern Cape and Limpopo are minimal (e.g. 88.5 per cent for the Eastern Cape compared to 88.2 per cent for Limpopo on the 40 per cent of mean per capita income poverty line) and for the per capita equivalised lines, the 95 per cent confidence intervals overlap.

Figure 1: Child poverty rates by province using Stats SA's poverty lines



Source: Own analysis on CS 2007 post SRMI, institution cases deleted.
Note: All reported values are the average of the calculations on the ten imputed datasets. The poverty lines in 2007 Rand per month are: Stats SA lower threshold - 245, Stats SA poverty line - 444 and Stats SA upper threshold - 818.

Figure 2: Child poverty rates by province using relative poverty lines



Source: Own analysis on CS 2007 post SRMI, institution cases deleted.
Note: All reported values are the average of the calculations on the ten imputed datasets. The poverty lines in 2007 Rand per month are: 40 per cent mean equivalised (per capita) income - 802, 50 per cent mean equivalised (modified OECD) income - 1151, 50 per cent mean equivalised (per capita) income - 1003, 50 per cent mean equivalised (modified OECD) income - 1439.

The depth and severity of poverty give a further indication of the disparity in poverty levels across the country (see Table 7). Although Gauteng's child poverty rates are not dissimilar to those of the Western Cape, the depth of poverty is greater in Gauteng (0.34 compared to 0.28 using a 40 per cent of mean modified OECD equivalised income poverty line[29]), and also the severity (0.24 compared to 0.18). At the other end of the spectrum there is again little to distinguish between the Eastern Cape and Limpopo. The depth and severity of poverty are almost identical (although the 95 per cent confidence intervals do not overlap): 0.48 compared to 0.49 and 0.32 compared to 0.34 respectively.

[29] What this actually means is that a perfectly targeted cash transfer would need to be at least 34 per cent of the poverty line in order to lift each poor child in Gauteng out of poverty, compared to 28 per cent of the poverty line in the Western Cape. The actual level of income required to lift children out of poverty is not of interest here (and indeed cannot be precisely calculated because of the nature of the income variable), but rather the relative position of each province in terms of the poverty deficit.

Table 7: Depth and severity of child poverty by province using 40 per cent of mean modified OECD equivalised income poverty line

Province	Depth	Severity
Western Cape	0.28	0.18
Eastern Cape	0.48	0.32
Northern Cape	0.40	0.26
Free State	0.42	0.28
KwaZulu-Natal	0.47	0.32
North West	0.46	0.32
Gauteng	0.34	0.24
Mpumalanga	0.46	0.31
Limpopo	0.49	0.34

Source: Own analysis on CS 2007 post SRMI, institution cases deleted.
Note: All reported values are the average of the calculations on the ten imputed datasets.

Figure 3 shows that the distribution of poverty across the provinces is more or less the same for each of the Stats SA poverty lines. The same is true of the relative poverty lines (not shown). On all poverty lines, KwaZulu-Natal has the largest share of poor children (approximately 25 per cent on average), followed by the Eastern Cape (approximately 17 per cent on average). These are provinces that have a large population and are also amongst the poorest provinces on the headcount index. The Northern Cape has the lowest share of poverty on all poverty lines (approximately 2 per cent on average), which is not at all surprising as the province has such a small population (only approximately 2 per cent of the child population lives in the Northern Cape according to the CS 2007).

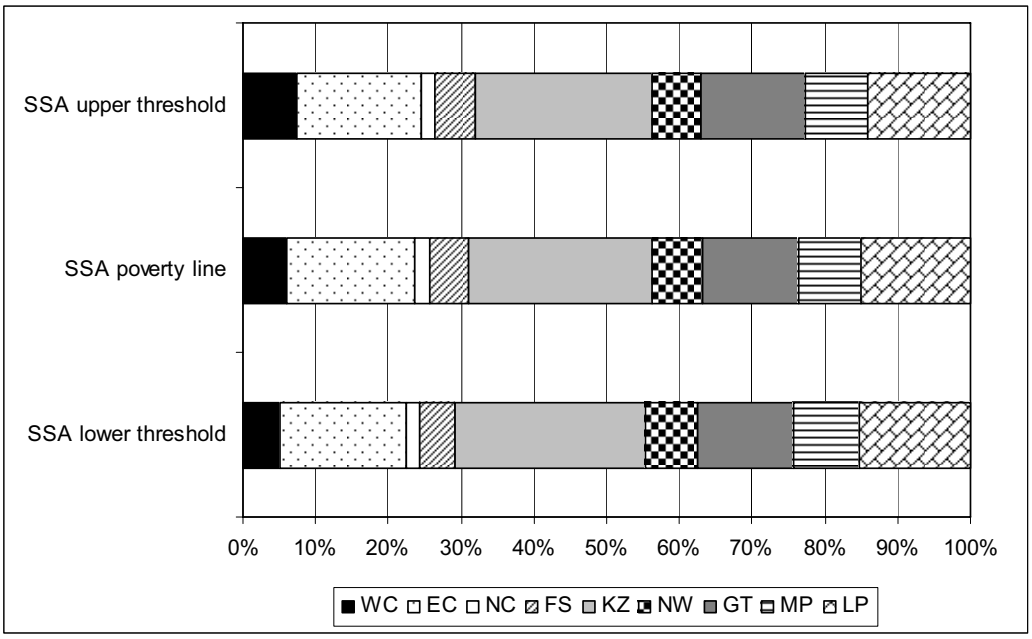
Although KwaZulu-Natal has the largest share of poverty, as we have seen, this does not mean it has the highest poverty rate. Using the 40 per cent of mean modified OECD equivalised income poverty line, KwaZulu-Natal has only the third highest rate. Conversely, Gauteng has the fourth largest share of poverty, yet the second lowest poverty rate, and the Western Cape has the lowest poverty rate, yet only the third lowest share of poverty. The poverty rates and shares are shown together in Figure 4 for the 40 per cent of mean modified OECD equivalised income poverty line. Table 8 presents the same information and additionally the number of poor children in each province. Over 3.3 million children in KwaZulu-Natal are poor, with almost 2.4 million in the Eastern Cape, 2.0 million in Limpopo and 1.9 million in Gauteng.

This finding on low child poverty rates, yet high numbers of children in poverty, has been reported previously (Barnes et al., 2008; Noble and Barnes, 2008). It was found that the numbers of children who are deprived on the various domains of deprivation is very high in the metropolitan municipalities[30]

[30] Metros 'are conurbations featuring high population density; intense movement of people, goods and services; extensive development; and multiple business districts and industrial areas. Other features include a complex and diverse economy, a single area where integrated development is desirable, and strong interdependent social and economic linkages between its constituent units' (Stats SA, 2004).

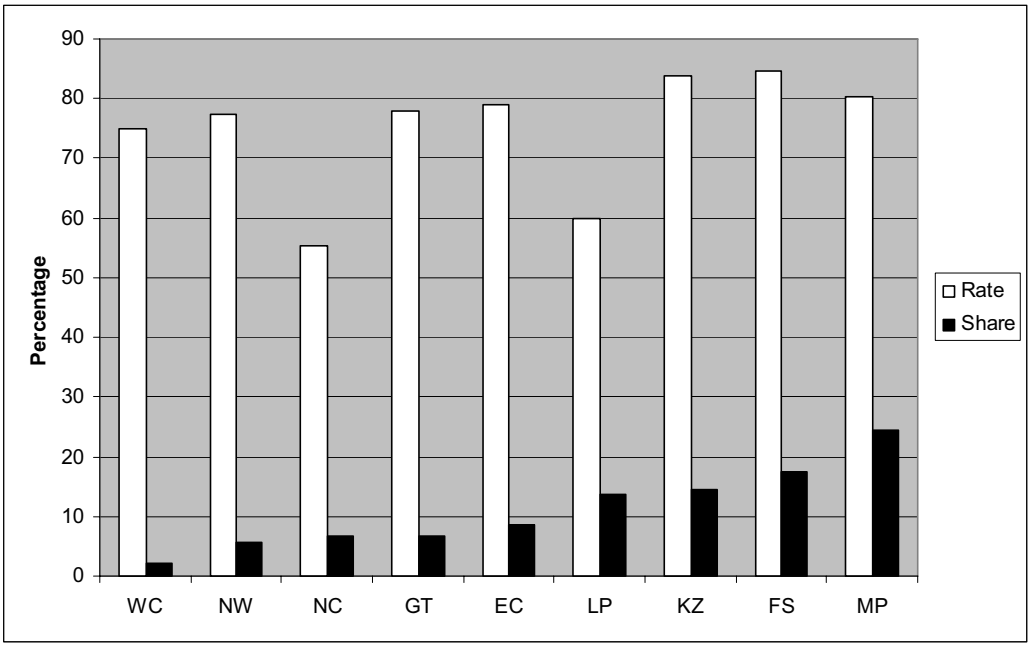
in particular, but also for large municipalities, where the high population density and therefore sheer number of children means the municipality may still contain higher numbers of deprived children than in a smaller municipality that is classified as more deprived. The Noble and Barnes (2008) report focused on the City of Johannesburg Metro, which is located in Gauteng, and although it is ranked as relatively non deprived with respect to child deprivation at the municipality level across the country, the numbers of children who are deprived on the various domains of deprivation are very high. Gauteng in fact contains two other metros, Ekurhuleni and City of Tshwane, and therefore it is unsurprising that the province has a relatively large share of poor children. Nevertheless, Gauteng's share of poverty is perhaps a little higher in this than other studies, perhaps the result of having a slightly higher share of the total population than found in other datasets (see Technical Appendix).

Figure 3: Share of child poverty by province using Stats SA's poverty lines



Source: Own analysis on CS 2007 post SRMI, institution cases deleted.
Note: All reported values are the average of the calculations on the ten imputed datasets.

Figure 4: Rate and share of child poverty by province using 40 per cent of mean modified OECD equivalised income poverty line



Source: Own analysis on CS 2007 post SRMI, institution cases deleted.
Note: All reported values are the average of the calculations on the ten imputed datasets.

Table 8: Rate and share of child poverty and number of poor children by province using 40 per cent of mean modified OECD equivalised income poverty line

Province	Poverty rate	Poverty share	Number of poor children
Western Cape	55.2	6.7	910148
Eastern Cape	84.6	17.5	2371245
Northern Cape	75.0	2.0	274604
Free State	77.3	5.6	752545
KwaZulu-Natal	80.3	24.5	3316931
North West	77.9	6.8	920877
Gauteng	59.8	13.7	1856581
Mpumalanga	79.0	8.6	1161144
Limpopo	83.8	14.5	1967562

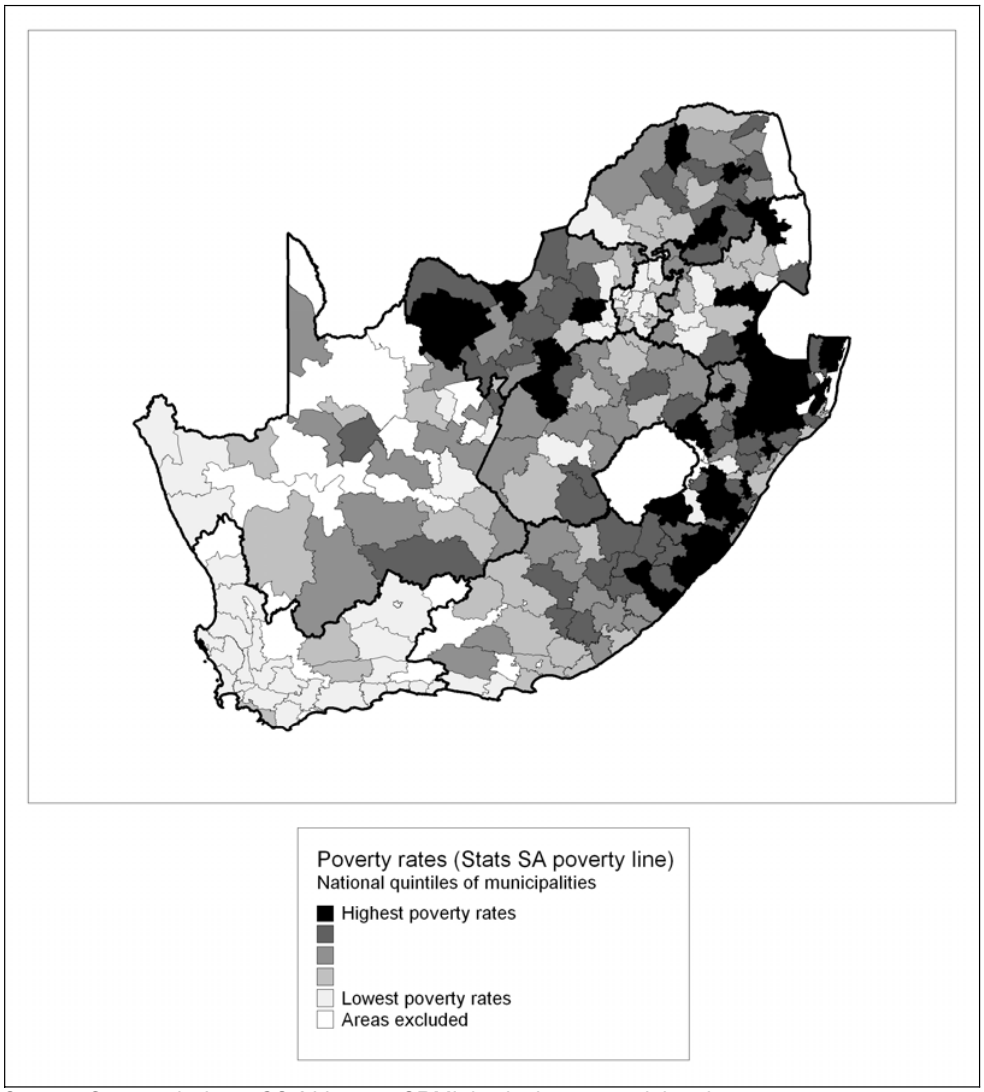
Source: Own analysis on CS 2007 post SRMI, institution cases deleted.
Note: All reported values are the average of the calculations on the ten imputed datasets.

4.3 Municipal

One advantage of using the CS 2007 is that it allows child poverty estimates to be produced at municipality level. Figure 5 shows the pattern of child poverty across South Africa. The municipalities were divided into quintiles

according to their child poverty rate. The strongest shading indicates the highest child poverty rates and the faintest shading the lowest rates. The thin black lines are the municipality boundaries and the thick black lines are the province boundaries. The lowest levels of child poverty are found in municipalities in the Western Cape (the province containing Cape Town) and Gauteng (the province containing Johannesburg and Pretoria). The highest levels of child poverty are found in municipalities in the Eastern Cape, KwaZulu-Natal, North West and Limpopo provinces. These are areas containing the former homeland areas. Indeed, the areas with the highest poverty rates map very closely onto the former homeland areas. A similar picture is presented in the SAIMDC 2001 (Barnes et al., 2007) and a comparison of the SAIMDC 2001 with the former homelands is given in Barnes et al. (2008).

Figure 5: Poverty rates by municipality (Stats SA poverty line)



Source: Own analysis on CS 2007 post SRMI, institution cases deleted.
Note: All reported values are the average of the calculations on the ten imputed datasets.

The ten municipalities with the highest child poverty rates are shown in Table 9. Seven of the ten poorest municipalities are in KwaZulu-Natal, so although KwaZulu-Natal is only the third poorest province using this poverty line, there are a number of very poor areas or 'poverty pockets'. Other provinces featuring in the list of the ten poorest municipalities are North West, Limpopo and the Northern Cape. Interestingly, the Eastern Cape does not feature in the poorest ten municipalities, but of the poorest 25 per cent of municipalities, approximately 20 per cent are located in the Eastern Cape. This is the second highest percentage, behind KwaZulu-Natal (49 per cent).

Table 9: The ten municipalities with the highest rates of child poverty using Stats SA's poverty line

Municipality code	Municipality name	Province	Child poverty rate
534	The Big Five False Bay Local Municipality	KZ	90.3
520	Nquthu Local Municipality	KZ	88.9
606	Ratlou Local Municipality	NW	88.9
551	Ubuhlebezwe Local Municipality	KZ	88.7
552	Umzimkhulu Local Municipality	KZ	88.2
547	Ingwe Local Municipality	KZ	88.2
909	Blouberg Local Municipality	LP	88.1
535	Hlabisa Local Municipality	KZ	87.6
518	Imbabazane Local Municipality	KZ	87.3
325	Moshaweng Local Municipality	NC	87.3

Source: Own analysis on CS 2007 post SRMI, institution cases deleted.
Note: All reported values are the average of the calculations on the ten imputed datasets.

4.4 Population group

The child poverty rates by population group are given in Table 10. Using the 50 per cent of mean per capita income poverty line, almost 90 per cent of black African children are in poverty. A high percentage of coloured children are also poor on this poverty line (73 per cent). Even with the minimalist lower threshold proposed by Stats SA, 45 per cent of black African children are poor.

Table 10: Child poverty rate by population group

Population group	Stats SA lower threshold	Stats SA poverty line	Stats SA upper threshold	Per capita 40% mean income	Mod OECD 40% mean income	Per capita 50% mean income	Mod OECD 50% mean income
Black African	44.5	71.8	87.1	86.9	81.4	89.7	86.0
Coloured	22.2	43.3	66.8	66.2	56.1	72.6	64.1
Indian	13.9	25.1	39.1	38.6	33.4	44.5	37.5
White	9.4	15.5	21.2	21.1	19.3	23.0	20.8

Source: Own analysis on CS 2007 post SRMI, institution cases deleted.
Note: All reported values are the average of the calculations on the ten imputed datasets.

For each poverty line, over 90 per cent of the poor children are black African, with only between 5 and 7 per cent coloured, between 1 and 1.5 per cent white and less than 1 per cent Indian. According to the CS 2007, 84 per cent of the child population is black African and so black African children are disproportionately in poverty. Coloured, white and Indian children are therefore under-represented amongst the poor.

Similar findings have been reported in previous studies and reflect the historical legacy of the apartheid era. The depth and severity of poverty also differs significantly by population group (see Table 11). Although poor children have been identified in all population groups, the depth and severity of poverty is much greater for black Africans. For example, using Stats SA's poverty line, the depth of poverty is 0.38 for black Africans compared to 0.20 for the coloured population, and as low as 0.08 for the white population. This indicates that far greater numbers of poor black African children are a long way below the poverty line than for other population groups. These are perhaps not surprising facts, but they have rarely been reported in previous studies of child poverty in South Africa (Streak et al., 2008 is the exception and the results are similar, although both depth and severity are lower for the Indian and white groups than found here).

Table 11: Depth and severity of poverty by population group using Stats SA's poverty line

Population group	Depth	Severity
Black African	0.38	0.25
Coloured	0.20	0.13
Indian	0.13	0.08
White	0.08	0.06

Source: Own analysis on CS 2007 post SRMI, institution cases deleted.
Note: All reported values are the average of the calculations on the ten imputed datasets.

4.5 Other characteristics

It would be useful to explore differences in poverty for children living in urban compared to rural areas, but unfortunately there is not any information on urban-rural location in the CS 2007. Previous work has however found much higher incidence and greater depth and severity in rural compared to urban areas.

Few differences were found in terms of the age and sex of the children. With regard to sex, the rate, share, depth and severity of child poverty for males and females are almost identical.

The age group poverty rates are very similar, with generally only a 2 to 3 percentage point decrease from the youngest (0-4 years) to oldest (15-17 years) age groups. Again, this is a finding reported previously (Streak et al.,

2008). Excluding the oldest age group which is smaller in size than the others, the share of poverty is very similar across ages. There does not appear to be any clear pattern in terms of depth and severity, other than the 5-9 age group consistently coming out as least poor on these measures.

4.6 Discussion

This chapter has measured child poverty using the CS 2007 and a number of different absolute and relative income poverty lines. Although it would have been preferable to have calculated the poverty estimates on the IES 2005/06 where the income data is not banded, this was not possible because although the publicly released IES 2005/06 contains unbanded income, the age groups have been banded which meant that the analysis undertaken for this report could not be undertaken using that dataset. Nevertheless, the findings produced using the CS 2007 are similar to those generated using a non-publicly available copy of the IES which contains single year of age (Streak et al., 2008). However, the caveats noted in the Technical Appendix, particularly the discrepancies in population estimates, should be kept in mind when looking at these results.

The choice of poverty line is clearly important, not only for the obvious fact that the percentage of poor children varies quite considerably (from 40 to 84 per cent, on the basis of the poverty lines examined here, which are only seven of numerous possible lines), but also because it can affect the ranking of different groups. For example, at a provincial level, KwaZulu-Natal is second poorest on Stats SA's lower threshold, but third poorest on all other poverty lines, and the Eastern Cape is poorest on the relative poverty lines and Stats SA's upper threshold, whereas Limpopo is poorest on the other poverty lines.

However, any threshold is arbitrary and therefore what is of most interest is perhaps not the absolute level of poverty - although this would be important for monitoring progress in reducing child poverty over time - but rather the other indicators of poverty provided. The variations in share, depth and severity of poverty for different groups may interest policy makers and shape policy responses. Of particular note are the following observations:

1. KwaZulu-Natal is not the poorest province on any poverty line, but nevertheless has a large number of children in poverty and consequently the largest share of poverty - a quarter of all poor children in South Africa. Such a finding is reported by Streak et al. (2008) who note that 'there is a danger of underestimating KwaZulu-Natal's child poverty share when focusing on the headcount rate'.
2. KwaZulu-Natal has a high percentage of the poorest municipalities. These poverty pockets are masked at the provincial level.
3. Gauteng has the second lowest rate of poverty yet a relatively large share of poor children.
4. Not only are black Africans disproportionately represented amongst the poor, but the poverty they experience is also more severe.

5 Conclusion

This report has presented a review of previous studies of child poverty in South Africa and a discussion of issues relating to the definition and measurement of child poverty.

In terms of the definition process, six issues were highlighted and discussed in Chapter 3: choosing between an absolute or relative approach (or, as is the case in this study, exploring both approaches); deciding whether to use individual or household monetary resources; defining monetary resources as either income or expenditure, a choice which is often dependent on the data (discussed further in the Technical Appendix); selecting an equivalence scale to take into account variations in household size and composition; setting the level of the poverty line; and deciding whether to look at the number of poor children or the number of poor households with children.

The publicly available CS 2007 was used to measure child poverty using seven poverty lines (definitions of child poverty) in Chapter 4 (with methodological details provided in the Technical Appendix). Results for the different poverty lines were presented at national, provincial and municipal level, as well as for population group, for a range of measures of poverty (headcount, share, depth and severity), each of which contributes an important element to the profile of child poverty in South Africa.

This analysis shows that there is still a long way to go to reduce child poverty in South Africa, in each province and in every municipality. As the income from grants such as the CSG was taken into account in the calculations of poverty, these findings show that even though approximately 8 million children are receiving the CSG, the grant does not eliminate child poverty. There are still unacceptably high levels of child poverty, and it remains racialised (black African children are disproportionately represented among the poor and suffer more severe poverty) and spatially unequal (the highest rates of child poverty occur in the provinces containing the former homeland areas).

This report, and other recent studies using a money metric approach, provide a base from which to further develop the definition and measurement of child poverty in South Africa. Useful future work could include the development of South Africa specific equivalence scales that reflect the needs of children relative to adults, and exploration of intra-household, and inter-household, income sharing in the South African context. There is scope for further analysis of child poverty using the IES 2005/06, but this requires the data to be released with an unbanded age variable. The forthcoming National Income Dynamics Study and the Living Conditions Survey will also be useful datasets for examining child poverty. Also important is the regular monitoring of child poverty, for which annual surveys such as the GHS would be useful, although more detailed exploration of the robustness of the income and/or expenditure variables would be necessary (see Meth, 2006c for further discussion on this point).

The next report will explore the definition and measurement of child poverty using a socially perceived necessities approach. Using the South African Social Attitudes Survey 2007, the adult population is surveyed to find out which goods and services they consider to be necessary for children to have an acceptable standard of living. This definition of child poverty is then applied to find out the extent to which children are living without the items deemed necessary for children by the adult population.

Technical appendix

The measurement of income poverty requires two main components: a threshold below which people are considered poor (a 'definition' in the terminology adopted here) and an estimate of the income available in a household to compare to that threshold (Citro and Michael, 1995). The first component was discussed in Chapter 3 and a range of thresholds to be subjected to sensitivity testing were proposed. The second component is discussed below in relation to the CS 2007 data used to operationalise the definitions of income poverty.

Data

Definitions constructed by reference to the income or expenditure distribution necessarily use income and/or expenditure surveys or a general household survey as the data to operationalise the definition. The CS 2007 was selected as the best option after an examination of possible datasets (see below). Furthermore, data for 2007 was the most recent available at the time of analysis and so the estimates of child poverty made using the CS 2007 are the most up-to-date possible.

The CS 2007 is a nationally representative, large-scale household survey conducted in February 2007 by Stats SA. The survey was undertaken in order to bridge the gap between censuses following a decision to move from a five year census interval (the next would have been in 2006) to a decennial census (the next will be in 2011). The questions are almost identical to those asked in the 2001 Census. The main objectives of the survey were to provide demographic and socio-economic data at lower geographical levels than existing household surveys; to build capacity for conducting the 2011 Census and to establish a primary base for mid-year population projection[31]. A two-stage stratified random sampling methodology was used. Each municipality was considered a stratum and enumeration areas (EA) were selected using a systematic simple random sample[32]. In each EA, 10 per cent of all dwelling units were selected. The survey was completed by the fieldworker (self-enumeration was not allowed) and in most cases the respondent was the head or acting head of household. The response rate was 94 per cent. In total, there are data for 246,618 households and 949,100 persons. A detailed description of the survey methodology can be found in Stats SA (2007; 2008a).

Before commencing poverty measurement it is necessary to explore the dataset in detail to see how it compares to other published estimates in terms of population and income. This is important, as the poverty estimates may be

[31] The CS 2007 has so far not been used as the base population, but the fertitlity, mortality, and migration data from the survey have been used to adjust the 2008 mid-year population estimates and produce a revised set of projections (Stats SA, 2008b).
[32] The Census 2001 geography was used.

distorted if the population totals and distributions are inaccurate or if income has been significantly under-reported. There are two main sources of population estimates in South Africa: Stats SA's mid-year estimates (MYE) and the Actuarial Society of South Africa's (ASSA) AIDS and demographic estimates. Although the Stats SA estimates have, in the past, been criticised and ASSA estimates considered more reliable (for example Dorrington and Kramer, 2004), within government, the use of Stats SA's estimates is encouraged. The CS populations (both overall and the child population in particular) are therefore compared to both sets of estimates. A second common check on survey data is to compare income to the national accounts. In South Africa, these are published by the South African Reserve Bank (SARB).

As mentioned above, various datasets were considered for this analysis. A priori, the recent IES 2005/06 seemed to be the most appropriate dataset as the income and expenditure variables are continuous (rather than banded) and it is the most complete source of information on household resources available. Unfortunately, however, the age variable in the publicly available data is in five year bands and so there was no way of identifying children aged 0-17 (the definition of a child used in this study) nor of calculating equivalised household income using equivalence scales that take into account the number of adults and children in the household[33]. The GHS 2006 was also considered, but an examination of the data showed that both the income and expenditure variables would be problematic to use[34]. The income variable is not particularly useful, as it only asks about income from salary from the main job. Respondents (on behalf of all household members aged 15 and above) are asked about income in two ways, first as an exact amount in Rand, and then, for none, refuse or don't know responses to the first question, as an income category. Income can be given either weekly, monthly or annually. The income variable that results from combining the different information has a large number of missing values. Of the economically active population[35], 31 per cent have no income information. While it would be possible to impute the incomes in some way, there is little information on other sources of income (e.g. savings), although there is information on receipt of social grants. The expenditure variable was compared to the national accounts, and it was found that the total annual expenditure in the GHS 2006 (304,305 million) is only approximately 28 per cent of the reported national consumption expenditure (see SARB, 2008: S-110)[36]. It is well-known that surveys typically under-report both income and expenditure, and that national accounts typically

[33] Child poverty estimates have recently been produced on the IES 2005/06 (Streak et al., 2008), for which a special dataset was provided to the authors. Unfortunately this was not made publicly available and so could not be used for this study.
[34] The GHS 2007 was released after analysis had begun on the CS 2007. It was not considered for measuring child poverty under the assumption that there would be similar data problems to the GHS 2006.
[35] People aged 15-65 who are either employed or unemployed (official definition).
[36] The national accounts were also compared to the recent IES, in case it is the national accounts that are the source of error. The IES has a total expenditure of R 699,518 million compared to R 1,087,281 million in the national accounts, which is 64 per cent. It is known that the IES under-estimated food consumption though. The GHS total expenditure as a proportion of the IES total expenditure is 43 per cent which is still very low.

overstate expenditure (Deaton, 2003), but there is clearly a huge under-estimate in the GHS 2006, meaning it is inappropriate for the purpose of this study. Meth reports a similar finding for earlier GHSs, and states that 'confidence [in using the surveys to estimate poverty] is now thoroughly shaken' (Meth, 2006a: 406). The Labour Force Survey (LFS) has a similar income question to the GHS, but no information on other sources of income, including social grants, and there is not a household expenditure variable. For these two reasons, the LFS was also ruled out as a source of data for measuring child resource poverty.

So, how does the CS 2007 fare? The survey has only one question on monetary resources: 'What is the income that best describes the gross monthly or annual income of (the person) before deductions and including all sources of income?'. There are no details as to what the income includes either on the questionnaire (as guidance to the respondent) or in the metadata (except a note that social grants are included). How the respondents answered this question is, of course, unknown. Respondents are asked to choose one of 12 income bands.

To compare to the national accounts it is necessary to first assign a value to the banded income. Following Stats SA's method (Stats SA, 2008a), zero was assigned to band 1 (no income), two thirds of the upper bound to band 2 (R 1 - 4 800 per annum), the midpoint of the band to band 3 (R 4,801 – 9,600 per annum), the logarithmic mean expenditure to bands 4-11, and twice the lower bound to band 12 (R 2,457,601 or more), the highest income category. A weighted sum of incomes at national level was then calculated, giving a total of R 994,150 million. This estimate of total income from the CS 2007 is approximately 70 per cent of the national accounts income for 2007[37]. As a further comparison, the IES 2005/06 produced a national income of R 929,194 million. The CS 2007 result is in line with findings for other surveys, which capture between approximately 60 and 90 per cent of national account income (Meth, 2006a; Van der Berg et al., 2007). Simkins (2004) notes that the national accounts concept of personal income includes two items not usually asked for in surveys: employer contributions to funds (e.g. pensions and medical aid) and imputed rent (the implicit return on residential equity owned by occupiers). This is therefore one reason why the national accounts income is always likely to be higher than that found in surveys.

There are various ways in which incomes can be corrected to take into account under-reporting and there has been much debate on this issue recently (see the exchanges between van der Berg and Meth - 2006b; Meth, 2006c; 2007a; 2007b; Van der Berg et al., 2005; Van der Berg et al., 2007). Two options are raising survey incomes until the total income is consistent with the national accounts totals; and using expenditure to impute values where incomes are missing. The former is not recommended because, as noted above, there is a possibility that the national accounts are inaccurate (Deaton, 2003). Such a method assumes that under-reporting is uniform

[37] Consisting of compensation of employees, income from property, social benefits received and other current transfers received (SARB, 2008: S-128).

across all groups (e.g. income class, population group etc), yet this is unlikely to be the case. Unfortunately, there is no firm evidence as to which groups are more likely to under-report and therefore the correct adjustment by group can never be precisely determined. If, as has been suggested, under-reporting increases as income increases, a blanket correction of incomes will over-inflate those at the lower end of the distribution, resulting in an under-estimation of poverty, particularly if the national accounts have over-estimated income (2006b; Meth, 2006c; 2007a; 2007b). The second option is not possible using the CS 2007 as there is not an expenditure question with which to adjust the income values.

Ideally poverty would have been measured using both income and expenditure and the results compared, but the two datasets which would have allowed this were not satisfactory. To improve the quality of the income variable, a number of cleaning steps were carried out and these are detailed in the next section.

In terms of the population estimated by the survey, overall, the CS has a total of 48,502,063 people[38]. Stats SA produces three MYEs, high, medium and low, which are 48,642,078, 48,287,324 and 47,481,452 respectively. The CS estimate is therefore very close to the Stats SA estimates, lying between the high and medium values[39]. The CS population is higher than the ASSA estimate of 46,752,079 (a difference of approximately 1.7 million or 3.6 per cent), but is nevertheless close enough. The CS estimate of children (18,175,527) is lower than the Stats SA MYE, but higher than the ASSA estimate (see Table I).

There is a good deal of variation by province with a consistent over-estimate (i.e. the CS is greater than both Stats SA and ASSA) for KwaZulu-Natal (between 0.5 and 10.1 per cent), and consistent under-estimate for North West and Limpopo (between 8.2 and 10.6 per cent and 1 to 8.6 per cent respectively). For the other provinces, the differences between the three estimates vary (see Table I).

For population group (see Table II), the CS over-estimates compared to ASSA, but under-estimates for all but the coloured population compared to Stats SA. It would seem that the coloured population has been over-estimated by between 1.6 and 4.2 per cent. There is also a large discrepancy for the white population: a 4 per cent under-estimate in the CS compared to Stats SA and a 21 per cent over-estimate compared to ASSA.

Finally, in terms of age group (see Table III), the CS over-estimates compared to ASSA, while it slightly under-estimates compared to Stats SA, except for

[38] This includes the institution population approximated from the 2001 Census. Collective living quarters and some households in EAs classified as recreational areas or institutions were regarded as out of scope, but an approximation of the population was added to the final CS 2007 results.

[39] Henceforth only the medium estimate (which for children is actually greater than the high estimate) will be reported.

the oldest age group, where, as with ASSA, there is an overestimate (between 1.8 and 6.3 per cent)[40].

It is difficult to know how to interpret these somewhat inconsistent results or what, if anything, to do to adjust the data. Overall, the CS population sits neatly between the Stats SA and ASSA estimates, and the potential difference - a 3.4 per cent underestimate or a 2.7 per cent over-estimate - is not large. However, the magnitude of the differences in the estimates varies greatly for certain provinces, population groups and age groups, and depends whether the CS population is compared to the ASSA or Stats SA population estimates. Therefore the poverty results should be treated with caution, bearing in mind the above findings.

Table I: Child population estimate comparison by province

	Stats SA MYE	ASSA	CS	Population difference		Percentage difference	
				CS-Stats SA	CS-ASSA	CS-Stats SA	CS-ASSA
WC	1794136	1620933	1672374	-121762	51441	-6.79	3.17
EC	2782641	2843424	2824846	42205	-18578	1.52	-0.65
NC	433888.6	296698	373525	-60363	76828	-13.91	25.89
FS	1073377	920397	985005	-88372	64608	-8.23	7.02
KZN	4135699	3779292	4158997	23298	379705	0.56	10.05
NW	1298280	1331422	1191289	-106990	-140132	-8.24	-10.53
GP	3371587	3027163	3125175	-246412	98012	-7.31	3.24
MP	1524050	1297203	1477859	-46190	180656	-3.03	13.93
LP	2392592	2588447	2366457	-26135	-221990	-1.09	-8.58
Total SA	18806250	17704978	18175527	-630722	470549	-3.35	2.66

Sources: Own analysis on CS 2007 weighted values, Statistics South Africa mid-year estimates 2007 and the Actuarial Society of South Africa AIDS and Demographic Model 2003.

Table II: Child population estimate comparison by population group

	Stats SA MYE	ASSA	CS	Population difference		Percentage difference	
				CS-Stats SA	CS-ASSA	CS-Stats SA	CS-ASSA
BA	15908309	15092150	15312587	-595722	220437	-3.74	1.46
C	1503036	1466957	1528446	25410	61489	1.69	4.19
I	355320	323893	339448	-15872	15555	-4.47	4.80
W	1039583	821978	995048	-44534	173070	-4.28	21.06
Total SA	18806248	17704978	18175529	-630719	470551	-3.35	2.66

Sources: Own analysis on CS 2007 weighted values, Statistics South Africa mid-year estimates 2007 and the Actuarial Society of South Africa AIDS and Demographic Model 2003.

[40] Although this could be to do with the way in which the 15-17 population was estimated from the 15-19 age band (i.e. by dividing the 15-19 band by five to give the population in single years of age and multiplying by three to give the population for the three years of interest).

Table III: Child population estimate comparison by age group

	Stats SA MYE	ASSA	CS	Population difference		Percentage difference	
				CS-Stats SA	CS-ASSA	CS-Stats SA	CS-ASSA
0-4 years	5197817	4982413	4985176	-212641	2764	-4.09	0.06
5-9 years	5266681	4927032	5116814	-149867	189783	-2.85	3.85
10-14 years	5272253	4852400	4947002	-325251	94602	-6.17	1.95
15-17	3069497	2943134	3126536	57039	183402	1.86	6.23
Total SA	18806248	17704978	18175529	-630719	470551	-3.35	2.66

Sources: Own analysis on CS 2007 weighted values, Statistics South Africa mid-year estimates 2007 and the Actuarial Society of South Africa AIDS and Demographic Model.
Note: *An estimate calculated by dividing the 15-19 band by five to give the population in single years of age and multiplying by three to give the population for the three years of interest.

Data preparation

Missing and implausible values[41]

In the CS 2007, Stats SA used imputation to allocate values for unavailable, unknown, incorrect or inconsistent responses through a combination of logical imputation and dynamic imputation (hot deck) techniques. In logical imputation, inconsistencies are resolved by looking at other characteristics of the household. If this was unsuccessful, then a value was imputed from another person or household with similar characteristics (dynamic imputation). The Stats SA imputations for most variables will be retained for this analysis as for the variables that are required, the imputations are mainly logical, for example, a person missing information for population group would presumably be assigned the population group of other members of the household, while the date of birth variable would presumably be used to provide a value for those missing an age. This seems a reasonable approach to take to the missing data problem.

Of particular concern, however, is the income variable. There are a number of missing incomes in the survey. It is often argued that those with high incomes are more likely not to answer the question on income. To a certain extent this seems to be true as, for example, a higher percentage of individuals in employment (and in higher occupations) and/or with higher levels of education and/or in the richer provinces of the Western Cape and Gauteng did not give a response for the income question (see Table IV for a selection of characteristics). However, non-response is not restricted to those with higher incomes: Table IV also shows that individuals who are likely to have lower incomes have also not reported income.

[41] The analysis in this section refers to unweighted values. Institution cases have been deleted.

Table IV: Rates of missing income data by characteristic

Characteristic	Number of cases with missing income data	Percentage of category with missing income data
Age		
0-9 years	8487	4.38
10-19 years	9601	4.63
20-29 years	10804	6.39
30-39 years	8485	6.58
40-49 years	6997	6.72
50-59 years	4682	6.58
60-69 years	1946	4.60
70+ years	1118	3.48
Population group		
Black African	32148	4.24
Coloured	8551	8.60
Indian	2047	9.87
White	9374	13.14
*Employment status**		
Employed	20756	8.77
Unemployed	5307	4.45
Not economically active	9745	4.13
Occupation (for employed only)		
Legislators/senior officials/managers	2548	13.38
Professionals	2335	9.94
Technicians/associate professionals	1425	11.65
Clerks	1796	10.79
Service/shop/market sales workers	1848	8.72
Skilled agricultural/fishery workers	672	5.33
Craft/related trades workers	2303	8.46
Plant & machine operators/assemblers	1450	7.77
Elementary occupations	2507	5.24
*Level of education***		
No schooling	2454	2.98
Grade 0-7 (primary)	11878	3.91
Grade 8-11	17866	5.69
Grade 12	11079	9.11
Higher	2521	12.13
Province		
Western Cape	9738	9.83
Eastern Cape	6899	4.73
Northern Cape	3025	6.58
Free State	1141	2.21
KwaZulu-Natal	8381	4.21
North West	2158	3.36
Gauteng	17092	9.40
Mpumalanga	1768	2.66
Limpopo	1918	2.02

Source: Own analysis on CS 2007, unweighted values, institution cases deleted.
Notes: These are the values for all those cases with code 13 (response not given). This includes the original cases coded 13 plus those missing values which were imputed as code 13 by Stats SA.
* Not applicable for individuals under 15 and over 65 years old.
** Not applicable for children under 5 years old.

The pattern of non response suggests that the data is not missing completely at random (i.e. where the missing data depends on neither the observed nor unobserved data) and so estimates of poverty that exclude the individuals with missing data may be biased[42]. It is therefore wise to adjust for non-response in order to reduce the bias and imputation is one way of doing so.

A cautionary note included with the CS data reports that 'the income includes unreasonably high income for children due to presumably misinterpretation of the question, e.g. listing parent's income for the child'. The percentages of children in each income category are given in Table V. Almost 92 per cent have no income or very low income (i.e. band 2 - less than R400 per month), which seems reasonable. Another 4 per cent have no value, either because a response was not given, or Stats SA's logical imputations gave the code for no response. This leaves approximately 4 per cent of cases where the income could be regarded as 'unreasonably high', although where to draw the threshold is debatable, and could depend on the age of the child (i.e. older children might have a part-time job but very young children are unlikely to be carrying out any income-earning activities).

Table V: Incomes of children (aged 0-17 years) in the CS 2007

Band		Frequency	Percentage
1	No income	192822	53.30
2	R1–R400	139225	38.48
3	R401–R800	6863	1.90
4	R801–R1600	4805	1.33
5	R1601–R3200	303	0.08
6	R3201–R6400	235	0.06
7	R6401–R12800	819	0.23
8	R12801–R25600	295	0.08
9	R25601–R51200	96	0.03
10	R51201–R102400	88	0.02
11	R102401–R204800	116	0.03
12	R204801 or more	76	0.02
13	Response not given*	16035	4.43
Total		361778	100.00

Source: Own analysis on CS 2007, unweighted values, institution cases deleted.
Note: * 15,153 of these cases were set to code 13 by the Stats SA logical imputations process, the majority (98 per cent) from blank.

The Stats SA imputations for income were performed on 3.09 per cent of the cases only. The imputations were all logical (rather than dynamic) and for all cases, the imputation was set to code 13, 'response not given'. This is not particularly helpful, contributing to the 5.5 per cent of cases (individuals) for which the income information is missing. These require further imputation,

[42] Ignoring cases with missing data implicitly assumes that the discarded cases are a simple random sample.

along with those cases with an implausible income value, defined as those younger than 15[43] with recorded income greater than R400 per month, and those recorded as being employed but with zero income. The imputation procedure used allows values reclassified as missing to be imputed back into the data as the original value if the data support such an imputation. Table VI shows the percentages in each of the four categories of missing data.

Table VI: Missing and implausible values in the CS 2007

Case	Percentage
Original 'response not given' (code 13)	2.40
Incomes imputed as 'response not given' (code 13) by Stats SA	3.09
Individual younger than 15 with income greater than R400	1.12
Employed individual with zero income	1.64
Total missing cases	8.26

Source: Own analysis on CS 2007, unweighted values, institution cases deleted.

In order to deal with the missing and implausible values in the CS 2007, the technique of sequential regression multiple imputation (SRMI) developed by Raghunathan et al. (2001) was applied to the datasets. Such a technique has been used on the 2001 Census (Ardington et al., 2005; Barnes et al., 2006) and the LFS (Vermaak, 2008). The software used in the imputation procedure was IVEware, which was developed to perform SRMI imputations[44].

Multiple imputation methods are preferred to single imputation methods such as the hotdeck procedure employed by Stats SA (Little and Rubin, 2000). Imputed values are obviously more uncertain than observed values, and a single imputation method will understate the variance of any poverty – or other - estimate because only the standard error for the single estimate is known (the within-imputation variance). Multiple imputation methods, on the other hand, produce a number of imputed values (and subsequently poverty estimates) allowing the full uncertainty due to imputation to be calculated (both the within-imputation and between-imputation variance). The hotdeck method, where missing values are replaced by values from similar responding sampling units, is particularly vulnerable to poorly measured variables, as there is a chance that a respondent with inaccurate data on a particular variable (or accurate but quite different to otherwise similar cases) will be selected as the 'donor' for the respondent with missing information. The impact of these outliers is lessened in a multivariate regression imputation which takes into account all observed variables in the dataset. Averaging over multiple imputations to obtain the final estimate of poverty also further reduces the problem of poorly measured variables.

SRMI is a procedure that can handle very complex data structures (e.g. count, binary, continuous and categorical variables) that other imputation methods

[43] The economically active population is defined as those aged 15 to 65.
[44] IVEware was developed by the Survey Methodology Program at the University of Michigan's Survey Research Center, Institute for Social Research and is available to download from http://www.isr.umich.edu/src/smp/ive/.

find problematic. Imputation is undertaken on a variable by variable basis but conditions on all observed variables. SRMI imputes values through a sequence of multivariate regressions, varying the model by the type of variable being imputed. Covariates include all other variables observed and imputed from previous rounds for a particular individual. The sequence of imputing missing values takes place in a cyclical manner, each time overwriting previous values. Multiple imputations are generated by taking the *n*th imputed set of values in the cycle (i.e. after every *n*th cycle an imputed data set will be created). Studies show that about ten cycles are sufficient for most imputations (Raghunathan et al., 2001), and this is the number used in the CS imputation procedure.

Generally, the greater the number of variables included in the imputation process, the more efficient the prediction of missing values (Raghunathan and Siscovick, 1996). However, the size of the datasets and available computational capacity often limit the number of variables that can be included. In this instance, the main focus is on imputation of income, rather than aiming to make a complete dataset, and therefore only the best predictors of income were included. The variables used in the imputation process and the percentage of missing values on the variables are given in Table VII.

Table VII: Variables used in imputation of CS 2007

Variable	Question number	Recoding steps	Missing (N)	Missing (%)
Income	P52	response not given (code 13), under 15s with income greater than R400 per month and employed with zero income recoded to missing	78376	8.26
Level of education	P29	5 categories: 1 - no schooling (code 24); 2 - compulsory schooling (codes 0-9); 3 - FET less than matric (codes 10, 11, 12, 15 and 16); 4 - matric (codes 13, 14, 17 and 18); 5 - university (codes 19-23); unspecified (code 99) recoded to missing; not applicable (children under 5 years - code 98) not included in imputation	72514	7.64
Type of work	P37	don't know and unspecified (codes 3 and 9) recoded to missing; not applicable	22008	2.32

		(children under 15 years and adults over 65 years) not included in imputation		
Employment status	Derived variable (DER01_Veso)	unspecified (code 9) recoded to missing; not applicable (children under 15 years and adults over 65 years) not included in imputation	12414	1.31
Age	P03	/	0	0.00
Population group	P10	/	0	0.00
Sex	P04	/	0	0.00
Province	Prv2005_Code	/	0	0.00

Note: Stats SA's logical imputations retained for age, population group and sex.

The literature suggests that between three and ten imputations are required (Rubin, 1987). In the CS imputation process, ten complete datasets with ten equally plausible complete income variables were produced. The overall income distribution (i.e. imputed and non-imputed cases combined) is almost identical for each of the ten imputations and very similar to the Stats SA version.

Table VIII shows the percentage imputed into each band for the four different categories of missing data given in Table VI. The majority of children with high incomes were imputed into bands 1 and 2 (no income and R1 to R400 per month). Some children were still imputed to higher income bands, but a smaller percentage than in the original data and none in the highest bands. Over 70 per cent of the employed with zero income were imputed into band 2 and 21 per cent into band 4, with only 0.01 per cent remaining in the no income band. The imputation process put the majority of cases where the income was recorded as 'response not given' (either originally or imputed by Stats SA) into the lower income bands, although there is a difference in the way the two different kinds of missing are treated. A number of the latter kind of missing value are children and so the high percentage (almost 90 per cent) in the lowest two bands is not surprising. Overall, the imputation process seems to have performed in a coherent manner and the final income variable is reasonably robust.

Table VIII: Imputed income by category of missing data

Imputed income band	Under 15s with high income	Employed with zero income	Original 'response not given'	Imputed as 'response not given' by Stats SA
1	58.74	0.01	5.49	45.05
2	39.88	71.94	56.35	43.63
3	0.51	6.31	7.17	2.48
4	0.86	21.1	30.07	8.59
5	0.01	0.49	0.71	0.18
6	0	0.11	0.18	0.06
7	0	0.03	0.04	0.01
8	0	0	0	0.01

Source: Own analysis on SRMI post imputation, unweighted values, institution cases deleted.
Note: Values for imputation 1 only as the ten imputations produced very similar results.

Banded income

The CS 2007 income data is banded. In order to estimate poverty, it is necessary to assign a value to the bands and then calculate household income by summing the individual incomes (as assigned) of all people in the household. The Stats SA methodology was applied, as detailed above[45]. Different options were considered for the top band, including deriving a value from another dataset such as the IES[46], but it is actually largely immaterial what value is given to the top band, as for the purposes of poverty estimation, people in this band - or people living in households with people in this band - are unlikely to be poor. It only really matters for calculating a percentage of mean income.

To calculate the relative poverty lines, a continuous income distribution is ideally required. Therefore the IES was used to calculate percentages of equivalised household income for the per capita scale (inflated to the relevant time point using the CPI) to compare to those obtained from the CS 2007. Unfortunately it was not possible to do this for the modified OECD equivalence scale which distinguishes between adults and children because the IES does not contain information on individual ages. These were therefore calculated on the CS only. All the relative poverty lines in this report should be used with the caveat that the distribution of income in the CS is not continuous and the highest income does not necessarily reflect the true maximum.

[45] Applying logarithmic means of the top and bottom of the given interval is standard practice within Stats SA and was therefore selected as the method for this study. Alternatives are to use midpoints or to derive values from another data source with a continuous income distribution, such as the IES (see for example Ardington et al., 2005).
[46] An attempt was made to calculate the midpoint of incomes above the lower bound of the band (R 204,801 per month for the CS) from the IES 2005/06 (incomes were inflated to the relevant time point). There were only three cases that were above the threshold. Unfortunately, the top 10 salaries in the IES were combined for confidentiality purposes and an average salary was given to each person in that group, which created an artificial income distribution and may have taken some below the threshold. There would still have been too few cases to give a robust point income though.

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