Chapter 2

The concept and measurement of poverty

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TWO

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Introduction

Poverty is a widely used and meaningful concept in all countries in the world. In September 2000, the governments of 189 countries adopted the United Nations Millennium Declaration and resolved to "spare no effort to free our fellow men, women and children from the abject and dehumanizing conditions of extreme poverty"[1].

Although poverty is a universal concept, its definition is often contested. The term 'poverty' can be considered to have a cluster of different overlapping meanings depending on the subject area or discourse (Gordon and Spicker, 1999). In the Poverty and Social Exclusion (PSE) Survey both poverty and social exclusion have been measured using a range of different definitions and techniques so that the results can be usefully compared with other work and a better scientific consensus developed.

The purpose of this chapter is twofold: first, to describe how the concept of poverty is defined; and second, to show how poverty is measured in the PSE Survey. It is divided into two main sections: (i) the definition of poverty; and (ii) the measurement of poverty in the PSE Survey.

Definitions of poverty

Despite the UK government's repeated commitment to halve child poverty by 2010 and eradicate child poverty by 2020 (see Chapter Eleven in this volume), there is still no official definition of poverty in the UK. Indeed, in the past, ministers have often defined poverty by 'knowing it when they see it'.

The first of the annual *Opportunity for All* (OFA) reports in 1999 on tackling poverty and social exclusion defined poverty as follows:

> Poverty affects different aspects of people's lives, existing when people are denied opportunities to work, to learn, to live healthy and fulfilling lives, and to live out their retirement years in security. Lack of income, access to good-quality health, education and housing, and the quality of the local environment all affect people's well-being. Our view of poverty covers all these aspects.
>
> Low income is an important aspect of poverty. But short spells of low income may not damage an individual's well-being or their prospects in the longer term. Our strategy focuses on those who are, or are at risk of becoming trapped on low incomes for long periods, especially those who have limited opportunities to escape.
>
> The problem is not restricted to limited income. (DSS, 1999, p 23)

This statement is not really a definition of poverty but a discussion of the problems of poverty. However, it is clear that the UK government does not consider that short spells of low income constitute poverty unless they have negative consequences.

However, over the past 30 years, successive governments have signed a range of international treaties and agreements that have incorporated definitions of poverty. For example, in 1975, the European Council adopted a relative definition of poverty as "individuals or families whose resources are so small as to exclude them from the minimum acceptable way of life of the Member State in which they live" (Council Decision, 1975). The concept of 'resources' was defined as "goods, cash income, plus services from public and private resources" (EEC, 1981).

On 19 December 1984, the European Commission extended the definition as follows:

> the poor shall be taken to mean persons, families and groups of persons whose resources (material, cultural and social) are so limited as to exclude them from the minimum acceptable way of life in the Member State in which they live. (EEC, 1985)

This is the 'official' definition of poverty that is used in the European Union (EU) for all 25 member states.

After the World Summit for Social Development in Copenhagen in 1995, 117 countries (including the UK) adopted a declaration and programme of action that included commitments to eradicate 'absolute' and reduce 'overall' poverty, drawing up national poverty-alleviation plans as a priority (UN, 1995; see also Chapter Three in this volume).

The United Nations (UN) defined absolute poverty as "a condition characterised by severe deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health, shelter, education and information. It depends not only on income but also on access to services" (UN, 1995, p 57).

Overall poverty was considered to take various forms, including "lack of income and productive resources to ensure sustainable livelihoods; hunger and malnutrition; ill health; limited or lack of access to education and other basic services; increased morbidity and mortality from illness; homelessness and inadequate housing; unsafe environments and social discrimination and exclusion. It is also characterised by lack of participation in decision-making and in civil, social and cultural life. It occurs in all countries: as mass poverty in many developing countries, pockets of poverty amid wealth in developed countries, loss of livelihoods as a result of economic recession, sudden poverty as a result of disaster or conflict, the poverty of low-wage workers, and the utter destitution of people who fall outside family support systems, social institutions and safety nets." (UN, 1995, p 57)

These are clearly *relative* definitions of poverty in that they all refer to poverty not as some 'absolute basket of goods' but in terms of the minimum acceptable standard of living applicable to a certain member state and within a person's own society.

They are similar to the relative poverty definition devised by Peter Townsend who has defined poverty as "objectively and applied consistently only in terms of the concept of relative deprivation.... The term is understood objectively rather than subjectively. Individuals, families and groups in the population can be said to be in poverty when they lack the resources to obtain the types of diet, participate in the activities and have the living conditions and amenities which are customary, or at least widely encouraged or approved, in the society to which they belong" (Townsend, 1979, p 31).

However, they differ quite substantially from the definitions of poverty that were being used when the UK welfare state was first established. The 'subsistence' idea, used by Beveridge (1942), was based on the minimum standards to maintain physical efficiency. It developed from the work of researchers such as Rowntree (1901) in his famous study of poverty in York at the turn of the 20th century (see Bradshaw,

1993, and below). A minimum basket of goods was costed, for emergency use over a short period of time, with 6% extra added for inefficiencies in spending patterns, in order to draw up the national assistance rate[2]. Subsistence rates were designed to be an emergency level of income and were never designed to keep a person out of poverty for any length of time. However, these rates became enshrined in the social security legislation.

The 'modern' definitions of poverty are very different to those used when European welfare states were first being established, particularly in that they deliver much higher poverty lines. They are also concerned with participation and membership within a society and not just inadequate income. The meaning of the concept of poverty has changed and evolved over time in Britain.

Poverty controversies

It often seems that if you put five academics (or policy makers) in a room you would get at least six different definitions of poverty. The literature on poverty is full of controversies, implying that there are considerable differences of opinion on how poverty should be defined and measured. Many, possibly most, of these controversies arise from a misunderstanding of the difference between definition and measurement[3].

First, there is general agreement that poverty can be defined as having an 'insufficient command of resources over time'. A consequence of this lack of 'resources' is that a 'poor' person/household will eventually become deprived – they will be forced to live like the 'poor' – that is, they will not be able "to obtain the types of diet, participate in the activities and have the living conditions and amenities which are customary, or at least widely encouraged or approved, in the society to which they belong". Poverty is the lack of resources and deprivation is the consequence of poverty.

A key policy problem when measuring poverty is how to use scientific methods to find the correct level of resources (often measured as an income level) at which to separate the poor from the non-poor. Many poverty measures simply use an arbitrary threshold level of income as the 'poverty line', such as 60% of the median. Townsend and Gordon (1989) have argued that to set a scientific threshold level of income/resources in a cross-sectional (one point in time) survey, you need to measure both resources/income and deprivation/low standard of living. Both low income and low standard of living can

only be accurately measured relative to the norms of the person's or household's society.

Poverty surveys are usually measurements at one point in time (not over several points in time) and so the poor will be measured as those people/households that have both a low standard of living and a low income. They are 'not poor' if they have a low income and a reasonable standard of living or if they have a low standard of living but a high income. This does not mean that the definition of poverty has changed: the 'poor' still remain those with an 'inadequate command of resources over time', but cross-sectional scientific measurement of poverty requires that both resources and deprivation/low standard of living are measured in order to identify the 'correct' poverty threshold level. If high-quality longitudinal data were available, then the 'poor' would be those whose income/resources fall below the 'poverty threshold' and remain below it for a sufficient length of time for them to suffer the effects of deprivation as an enforced consequence of this low income. Poverty is and always has been a dynamic concept. Although some authors have sought to differentiate the concepts of 'poverty' and 'social exclusion' by claiming that 'poverty is a static concept and social exclusion a dynamic concept' (for example, see Berghman, 1995), this is a misunderstanding. For example, Townsend (1962, p 219) clearly explained that "poverty is a dynamic, not a static concept.... Our general theory, then, should be that individuals and families whose resources over time fall seriously short of the resources commanded by the average individual or family in the community in which they live . . . are in poverty".

The debate between Townsend and Ringen (1988) and Sen (1981) on 'direct' versus 'indirect' measures of poverty is not about the definition of poverty per se but about the ways of measuring poverty. Sen has argued that, in developing countries, poverty is best measured directly using indicators of standard of living rather than indirectly using income or consumption measures.

> In an obvious sense the direct method is superior to the income method ... it could be argued that only in the absence of direct information regarding the satisfaction of the specified needs can there be a case for bringing in the intermediary of income, so that the income method is at most a second best. (Sen, 1981, p 26)

There is little disagreement here. Even in industrialised countries like Britain it is much easier to accurately measure deprivation than income.

For example, it is easier to measure if someone has gone hungry or cannot afford adequate clothing than to calculate how much income should be imputed in lieu of rent among owner occupiers who have paid off their mortgages (see Canberra Group, 2001; Behrendt, 2002). Deprivation questions are generally simpler and easier to answer than questions about income. However, the controversy can be easily sidestepped, since it is clearly preferable and fairly straightforward to measure both income and deprivation. Indeed, Ringen (1988) has argued that poverty can be considered as a 'state of general deprivation [which] is characterised by both a low standard of consumption and a low level of income'.

A second 'poverty' controversy, which is found in many textbooks, is the debate between Townsend and Sen on absolute versus relative poverty. Sen (1983) has argued that "there is ... an irreducible absolutist core in the idea of poverty. If there is starvation and hunger then, no matter what the relative picture looks like – there clearly is poverty" (p 159). Examples of this absolutist core are the need "to meet nutritional requirements, to escape avoidable disease, to be sheltered, to be clothed, to be able to travel, to be educated ... to live without shame"[4] (pp 162-3).

Townsend (1985) responded that this absolutist core is itself relative to society. Nutritional requirements are dependent on the work roles of people at different points of history and in different cultures and on foods available in local markets. Avoidable disease is dependent on the level of medical technology. The idea of shelter is relative, not just to climate but also to what society may use shelter for. Shelter includes notions of privacy, space to cook, work and play and highly cultured notions of warmth, humidity and segregation of particular members of the family, as well as different functions of sleep, cooking, washing and excretion.

Much of this debate is largely a question of semantics. Sen (1985) argued that "the characteristic feature of absoluteness is neither constancy over time nor invariance between societies nor concentration on food and nutrition. It is an approach to judging a person's deprivation in absolute terms (in the case of a poverty study, in terms of certain specified minimum absolute levels), rather than in purely relative terms vis à vis the levels enjoyed by others in society" (p 673). This definition of absoluteness in non-constant terms is different from the notion of absolute poverty adopted by the Organisation for Economic Development (OECD) (OECD, 1976, p 69): "a level of minimum need, below which people are regarded as poor, for the

purpose of social and government concern, and which does not change over time".

From an operational point of view, Sen's concept of absolute poverty is effectively identical to the relative poverty concepts of Townsend and others (Townsend and Gordon, 1993). Indeed, Sen (1985) concluded that:

> There is no conflict between the irreducible absolutist element in the notion of poverty ... and the 'thoroughgoing relativity' to which Peter Townsend refers. (p 674)

The notion of absolute poverty as defined by Sen can be considered to be simply a more severe poverty threshold than that defined by Townsend. Both Townsend's 'relative' poverty threshold and Sen's 'absolute' poverty threshold can be measured in the same cross-sectional survey using the same methods of low income and low standard of living measurement – the 'absolute' poor will be those who suffer from worse/deeper poverty than the 'relative' poor. Indeed, the definitions of 'overall' and 'absolute' poverty agreed at the World Summit for Social Development (see above) make this distinction clear. Therefore the issue of absolute versus relative poverty can be considered to have been resolved by the World Summit agreements in 1995.

The scientific measurement of poverty

In the final draft of the major EU report on *Indicators for social inclusion in the European Union*, Atkinson and his colleagues (2001, p 102) argued that since poverty is relative, multi-dimensional and changed over time, "it is scientifically impossible to determine an accurate, uniquely valid poverty line: i.e. a financial threshold below which a person is defined as being poor". A similar argument could be made that it is 'scientifically impossible' to measure the motion of the planets in the solar system as their movement is also relative, multi-dimensional and changes over time. It is not easy to scientifically measure poverty or the motion of the planets, but it is not impossible.

Other commentators have gone even further and claimed that it is not just scientifically impossible to measure poverty but that it is also 'morally' wrong to attempt to do so:

> The term, 'poverty', carries with it an implication and a moral imperative that something should be done about it. The definition by an individual, or by society collectively,

> of what level represents 'poverty', will always be a value judgement. Social scientists have no business trying to pre-empt such judgements with 'scientific' prescriptions. (Piachaud, 1981, p 421)

These arguments misunderstand the nature of science as they imply that a scientific measurement of poverty would preclude 'value judgements' and ignore the 'moral imperative that something should be done'. First, many social phenomena carry 'an implication and a moral imperative that something should be done', for example, crime, violence, care of children or the infirm, and so on. A world in which science could not play a role in providing an evidence base for policy making would not be a more 'moral' world but one where policy decisions about people's lives were often made in a state of ignorance.

Second, all scientific observations/measurements are theory-dependent and all theories incorporate 'value judgements'. All measurement, whether it is the height of a person, the charge on an electron or the level of poverty, is dependent on a theory. There can be no objectively true value to those measurements that are independent of the theories used to measure them. As Albert Einstein famously stated, the theory tells you what you can observe (see Chalmers, 1978; Shapere, 1982; Medwar, 1984).

For a measurement of poverty to be 'scientific', the theory it is based on must also be 'scientific'. The theory must not only be logically internally consistent but also fulfil a number of strict criteria:

1. The theory must be falsifiable, that is, it must be capable of being shown to be untrue. The existence of a loving God and Freudian psychology are unfalsifiable theories and therefore unscientific.
2. The theory must be testable.
3. The theory must have predictive value.
4. The results of the theory must be reproducible. Other people using the same methods will reach the same results.

These criteria are known to philosophers as the Falsificationist view of science and are attributable to the work of Karl Popper (1968, 1972). They contain the idea of a logical asymmetry that a theory can never be proved only falsified. This work has been extended by Imre Lakatos (1974), who claimed that scientific research programmes must also:

5. Possess a degree of coherence that involves the mapping out of a definite programme for future research.
6. Lead to the discovery of novel phenomena, at least occasionally.

For the measurement of poverty to be scientific, the theory on which the measurement is based must fulfil the criteria of Popper and Lakatos. Gordon and Pantazis (1997) and Gordon (2000) have argued that both the relative and the consensual theories of poverty (used in the PSE Survey) meet these criteria and are therefore scientific theories. The 'consensual' measurement of poverty in the PSE survey is therefore a scientific measurement. However, it is important to note that this does not mean that the PSE Survey results are 'correct' or 'true', as at any given point in history, many, possibly most, scientific theories and measurements are 'wrong' and will eventually be superseded by subsequent theories and measures[5] .

The pre-history of scientific poverty measurement

Empirical and scientific investigations of poverty have a very long history in Britain, which predate the work of Charles Booth and Seebohm Rowntree by hundreds of years (see Chapter Four for a discussion of Booth and Rowntree's work). The use of scientific evidence to inform policy making about poverty in Britain dates back to the beginning of the 'scientific revolution' in the 17th and 18th centuries. Fisher (1938, p 14) has described the scientific role of statistics in that era:

> In the original sense of the word, 'Statistics' was the science of Statecraft: to the political arithmetician of the eighteenth century, its function was to be the eyes and ears of the central government.

The first detailed statistical research into the incomes and expenditure of both the 'poor' and other groups in English society was based on the analyses of tax records by Gregory King in 1696 and 1697 in his *Natural and political observations upon the state and conditions of England* (see Stone, 1997). Table 2.1 shows the incomes of 'cottagers and paupers' in 1688 compared with the rest of society. Similar analyses from 1803 (for England and Wales) and 1812 (for Britain and Ireland) by Patrick Colquhoun (*Treatise on indigence* and *Treatise on the wealth, power and resources of the British Empire*) are also shown in Table 2.1. These data are not taken from the original texts but from the amended tables

Table 2.1: Paupers' incomes, 1688-1812

	Population		Income per year		
	Families	People	Total income (£000s)	Income per family (£)	Income of a poor family as a % of average income
1688 – England					
Cottagers and paupers	400,000	1,300,000	1,950	5	**16**
All people	1,360,586	5,500,520	43,506	32	
1803 – England and Wales					
Paupers	260,179	1,040,716	6,868	26	**23**
All people	1,905,823	9,343,561	216,944	114	
1812 – Britain and Ireland					
Paupers	387,100	1,548,400	9,871	25	**21**
All people	3,501,781	17,096,803	425,310	121	

produced by Stone (1997), who corrected some minor errors in the original tables.

Table 2.1 shows that in 1688 there were about 1.3 million people classified as 'paupers' or 'cottagers' (the lowest feudal class of peasant) in England. They had an average family income of £5 per year, which was approximately equivalent to 16% of average family income. By 1803, the number of paupers had fallen to 1.04 million in England and Wales and the incomes of pauper families had increased in both absolute and relative terms – to £26 per family, which was approximately equivalent to 23% of average family income. The relatively comprehensive data for 1812 include Ireland (which had a population of around eight million before the famine of the 1840s) and show that there were 1.5 million people in pauper families with an average family income of £25 per year, which was approximately equivalent to 21% of average family income. Although there have been many advances in social statistics over the past 300 years, the current Households Below Average Income statistics do not provide much greater insight into poverty in the 21st century than the 17th and early 19th century research summarised in Table 2.1. Pre-nineteenth century scientific investigations of poverty in Britain were not just confined to investigations of income and expenditure; in 1797, Fredrick Morton Eden published the *State of the poor*, three immense volumes about the lives of paupers in England. Morton Eden used questionnaire methods to produce a study so detailed that even Karl Marx in *Das Kapital* commented that "Sir F.M. Eden is the only disciple of Adam Smith during the eighteenth century that produced a work of importance" (see Pyatt and Ward, 1999).

These early scientific investigations of poverty provided evidence for the radical republican thinkers of the 18th century that poverty was not inevitable and could be eradicated using universal benefits funded by progressive taxation. The French Enlightenment philosopher Marie Jean Antonine Nicolas de Caritat, Maquis de Condorcet argued in *Sketch for a historical picture of the progress of the human mind* (published in 1794) that poverty was not a result of natural laws or divine will but was caused by 'the present imperfections of the social arts' (quoted in Stedman Jones, 2004). He argued that poverty could be ended by the universal provision of pensions, grants to the young, sickness benefits and state education. Similar 'welfare state' solutions for poverty can also be found in Thomas Paine's *Agrarian justice* (1785) and *Rights of man* (1791), which argued for progressive taxation and death duties to fund child benefits, pensions and education (see Stedman Jones, 2004). The need to end poverty was seen as necessary to reduce social and economic polarisation, which, if allowed to persist, would undermine the stability and unity of the democratic republic.

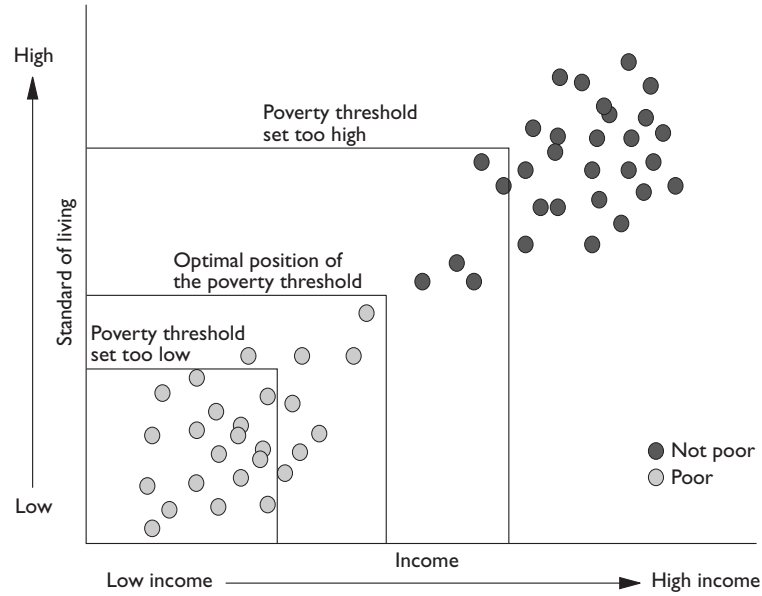
Scientific poverty measurement in the PSE Survey

In the PSE Survey the scientific measurement of poverty was based on a statistical model first developed by Townsend and Gordon (1989) and Gordon (1997) and a theoretical model developed by Gordon (1998) and Gordon (2000). In scientific terms, a person or household in Britain is 'poor' when they have both a low income *and* a low standard of living. They are 'not poor' if they have a low income and a reasonable standard of living or if they have a low standard of living but a high income. Both low income and low standard of living can only be accurately measured relative to the norms of the person's or household's society.

A low standard of living is often measured by using a deprivation index (high deprivation equals a low standard of living) or by consumption expenditure[6] (low consumption expenditure equals a low standard of living). Of these two methods, deprivation indices are more accurate since consumption expenditure is often only measured over a brief period and is obviously not independent of available income. Deprivation indices are broader measures because they reflect different aspects of living standards, including personal, physical and mental conditions, local and environmental facilities, social activities and customs. Figure 2.1 illustrates these concepts.

The 'objective' poverty line/threshold is shown in Figure 2.1. It can be defined as the point that maximises the differences *between* the two

Figure 2.1: Definition of poverty



groups ('poor' and 'not poor') and minimises the differences *within* the two groups ('poor' and 'not poor'). For scientific purposes, broad measures of both income and standard of living are desirable. Standard of living includes both the material and social conditions in which people live and their participation in the economic, social, cultural and political life of the country.

Income and standard of living are correlated, they are not orthogonal variables (at right angles – 90° – to each other) as shown in Figure 2.1. It is therefore statistically impossible to establish a perfect ordering for every person in the survey. There will always be some ambiguities near the margins about whether a person should be defined as 'poor' or not. Therefore it is better to conceive the poverty threshold as a band of low income and standard of living rather than as a hard fixed line (as shown in Figure 2.1)[7]. However, it must be stressed that this does not mean that poverty cannot be defined and measured scientifically. There are many scientific problems where the exact boundaries between two groups are hard to identify precisely. As Edmund Burke (1770, p 38) argued, "though no man can draw a stroke between the confines of day and night, yet light and darkness are upon the whole tolerably distinguishable".

There are a variety of scientific approaches that can be used to measure poverty. In this study we have used the consensual method,

devised by Joanna Mack and Stewart Lansley during the 1980s (Mack and Lansley, 1985; see also Chapter One in this volume).

Dynamics of poverty

From the definition above, it is clear that people/households with a high income and a high standard of living are not poor, whereas those with a low income and a low standard of living are poor. However, two other groups of people/households that are 'not poor' can also be identified in a cross-sectional (one point in time) survey, such as the PSE Survey.

- *People/households with a low income but a high standard of living*. This group is not currently poor but if their income remains low they will become poor – they are vulnerable to sinking into poverty. This situation often arises when income falls rapidly (due to job loss, for example) but people manage to maintain their lifestyle, for at least a few months, by drawing on their savings and using the assets accumulated when income was higher.
- *People/households with a high income but a low standard of living*. This group is 'not poor' and if their income remains high their standard of living will rise – they will rise out of poverty. This group is in the opposite situation to the previous group. This situation can arise when the income of someone who is poor suddenly increases (due to getting a job, for example). However, it takes time before they are able to buy the things that they need to increase their standard of living. Income can both rise and fall faster than standard of living.

A cross-sectional 'poverty' survey can provide some limited but useful information on the dynamics of poverty since it is possible not only to identify the 'poor' and the 'not poor' but also those likely to be sinking into poverty (that is, people/households with a low income but a high standard of living) and those escaping from poverty (that is, people/households with a high income but a low standard of living).

Living in poverty is, by definition, an extremely unpleasant situation so it is not surprising that people go to considerable lengths to avoid it and try very hard to escape from poverty once they have sunk into it. Therefore, a cross-sectional poverty survey ought to find that the group of households sinking into poverty is larger than the group escaping from poverty, since, when income falls, people will try to

delay the descent into poverty but, if the income of a poor person increases, they will quickly try to improve their standard of living.

Figure 2.2 illustrates this concept. Between time 0 and 1 the household has both a high standard of living (dotted line) and a high income (solid line): it is 'not poor'. At time 1, there is a rapid reduction in income (for example, due to job loss, the end of seasonal contract income, divorce or separation and so on). However, the household's standard of living does not fall immediately; it is not until time 2 that the household's standard of living has also fallen below the 'poverty' threshold. Therefore, between time 1 and time 2, the household is 'not poor' but is sinking into poverty (that is, it has a low income but a relatively high standard of living). At time 3, income begins to rise rapidly, although not as fast as it previously fell. This is because rapid income increases usually result from gaining employment but there is often a lag between starting work and getting paid. Standard of living also begins to rise after a brief period as the household spends its way out of poverty. However, this lag means that there is a short period when the household has a high income but a relatively low standard of living. By time 5, the household again has a high income and a high standard of living.

On the basis of this discussion, it is possible to update Figure 2.1 to give a more realistic picture of movements into and out of poverty. Figure 2.3 illustrates this.

Figure 2.2: Dynamics of poverty

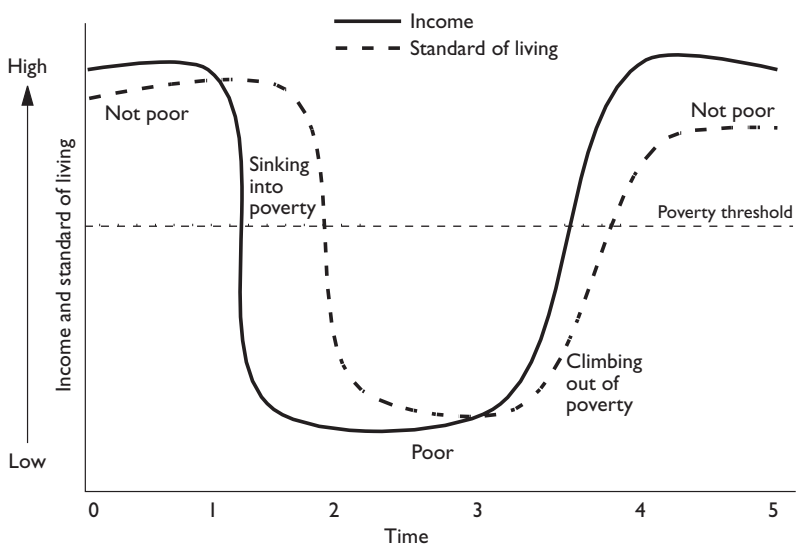
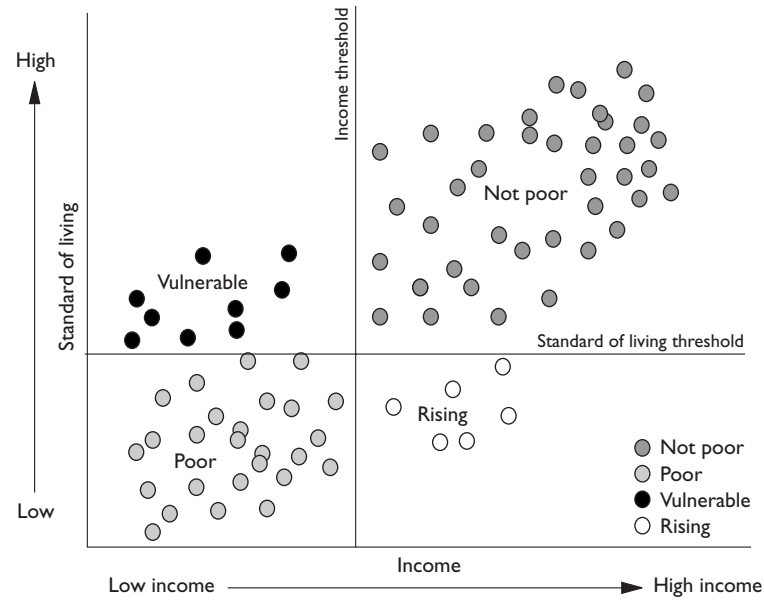


Figure 2.3: Revised definition of poverty



The proportion of the population in these four groups in the PSE Survey is shown in Table 2.2. Approximately a quarter of the population are living in poverty, 2% are rising out of poverty, 13% were potentially vulnerable to poverty because of their low incomes and 60% are relatively well off. These results and the theoretical model described above explain the findings of many authors that in cross-sectional (one point in time) surveys there is a relatively low correlation between low income and deprivation, but in longitudinal surveys the correlation increases (for example, see Tsakloglou and Papadopoulos, 2002; Berthoud et al, 2004).

In the PSE Survey the consensual method of measuring poverty was used to divide the population into the four groups shown in Table 2.2 and involved three steps. First, to establish what the public perceives as social necessities. Second, to identify those who suffer an enforced lack of the socially perceived necessities. Third, to determine at what levels of household income people run a greater risk of not being able to afford the socially defined necessities in a given national context (this identifies the poverty line or band).

Table 2.2: Population groups in the PSE Survey

Group	%
Poor	25
Rising	2
Vulnerable	13
Not poor	60
Total	100

The first step was taken by building up a long list of ordinary household goods and activities. Respondents were asked to indicate which items they thought were necessities that no household or family in Britain should be without (see Chapters One and Four). The second step was to ask people what items they already had or wanted but could not afford. Items defined as necessities by more than 50% of the population but that households lacked because of a shortage of money were then used to construct an initial deprivation index. The use of a democratic threshold (50%) to identify what items and activities are necessities provides both 'political' and face validity[8] for the deprivation index.

The third step, finding the poverty threshold, was taken by using multivariate methods to determine the income for each kind of household that maximised the differences between the 'poor' and 'not poor' and minimised the differences within the two groups ('poor' and 'not poor'). This is the 'objective' poverty line and households that have had to survive on this low level of income for any appreciable length of time are highly likely to suffer the effects of multiple deprivations. A more detailed description of the statistical methods used to determine the scientific poverty line can be can be found in Appendix 2.1.

Mack and Lansley's consensual approach has had a significant impact on modern poverty research (see Chapter One). Their original 1983 study was replicated: in Britain in 1990 (Gordon and Pantazis, 1997) and by the PSE Survey in 1999 (Gordon et al, 2000); in Wales in 1995 (Gordon, 1995); and in Northern Ireland in 2002 (Hillyard et al, 2003). Local authorities in London, Manchester, Liverpool, Greenwich and Kent have conducted similar surveys. The Office of Population, Censuses and Surveys used a similar set of questions to measure the standard of living of disabled adults and families with disabled children in Britain in 1985 (Martin and White, 1988; Smyth and Robus, 1989). Similarly, representative surveys were carried out by the PPRU among disabled people in Northern Ireland in 1990 and 1991 (Zarb and Maher, 1997). The European Statistical Office (Eurostat) has used a similar set of questions to measure standard of living in Britain and the other member states annually since 1994 as part of the European Community Household Panel Survey (Ramprakash, 1994; Vogel, 1997; Eurostat, 2000). This approach to measuring standard of living has also been adopted in Denmark (Mack and Lansley, 1985), Sweden (Halleröd, 1994, 1995a, 1995b, 1998), Ireland (Callan et al, 1993; Nolan and Whelan, 1996a), Belgium (van den Bosch, 1998), Holland (Muffels, 1993; Muffels and Vreins, 1991; Muffels et al, 1992), Finland (Kangas

and Ritakillio, 1998) and Germany (Andreß and Lipsmeir, 1995). In the less developed world the adapted versions of the consensual method to measure poverty have been used in Russia (Tchernina, 1996), Tanzania (Kaijage and Tibaijuka, 1996), Vietnam (Davies and Smith, 1998) and Yemen (Hashem, 1996).

Income poverty in the PSE Survey

It is clear from the previous discussion that reliable and valid measures of both 'command of resources over time' and 'standard of living' are needed in order to produce accurate scientific measurements of poverty. Given the relatively small scale and limited budget of the PSE Survey, usual net household income was used as a proxy measure of command of resources over time and deprivation measures were used as indicators of low standard of living.

In addition to the scientific poverty estimates discussed above and in Appendix 2.1, the PSE Survey data were also used to calculate a range of income poverty lines for comparative purposes with other poverty statistics produced by the UK government and the European Union. Table 2.3 shows the number of people living in households below the income poverty lines that have been most frequently used in Britain and Europe.

However, all poverty estimates that are solely based on income are less accurate and reliable than the consensual method estimate of poverty:

1. the income threshold used to define who is poor is arbitrary;
2. the equivalisation of income to adjust for different household sizes and compositions is also arbitrary (see discussion below);
3. the low income poverty thresholds used in Britain are really crude measures of inequality that have a number of undesirable mathematical properties, for example, if every household's income doubles or trebles (or falls by half), the same number of people will be defined as poor;
4. many households in Britain with zero or negative incomes also have high expenditures and do not consider themselves to be poor (Elam et al, 1999). Their very low incomes are often an artefact of the way the incomes of the self employed and students are measured.

The percentage of people defined as poor using low income thresholds ranges from 23.1% to 25.6% (Table 2.3), which is similar to the consensual method estimate of 25% of people living in poverty (see

Table 2.3: Income poverty rates in the PSE Survey

	% poor
HBAI half average income	23.5
HBAI 60% median income	23.1
Eurostat 60% median income	23.7
PSE half average income	25.6
PSE 60% median income	25

HBAI: Households Below Average Income.

Table 2.2). However, it must be stressed that the same people are not always identified as being poor using these different methods (see McCregor and Borooah, 1992; Callan et al, 1993; Kangas and Ritakallio, 1998; Bradshaw and Finch, 2003 for a discussion of the overlap between different methods of measuring poverty). The differences are the result of the different threshold levels of income used (that is, below half average income and below 60% of median income) and the different methods of adjusting income for household size and composition – equivalisation. The HBAI results use the McClements equivalisation scale, the Eurostat results use the modified OECD equivalisation scale and the PSE income poverty results use the PSE equivalisation scale, which is based on budget standards. The definition and measurement of income and equivalisation are explained below.

Definition of income

Income is a key concept in almost all definitions and studies of poverty; however, 'income' is an extremely difficult concept to define and measure. The term is sometimes used loosely to refer only to the main component of monetary income for most households – that is, wages and salaries or business income. Others use the term more widely to include all receipts including lump-sum receipts and receipts that draw on the household's capital. Much of the debate has centred on whether:

- income should include only receipts that are recurrent (that is, exclude large and unexpected, typically one-off, receipts);
- income should only include those components that contribute to current economic well-being, or extend also to those that contribute to future well-being;
- whether the measure of income should allow for the maintenance of the value of net worth (Canberra Group, 2001).

Classically, income has been defined as the sum of consumption and change in net worth (wealth) in a period. This is known as the Haig-

Simons approach (see Atkinson and Stiglitz, 1980, p 260). Unfortunately, this approach fails to distinguish between the day-to-day 'living well' and the broader 'getting rich' aspects of individual or household finances (in technical terms, it fails to distinguish between current and capital receipts).

There are a number of international organisations that have provided guidelines on defining and measuring income. The UN provides two frameworks: the 1993 System of National Accounts (UN, 1992) and guidelines on collecting micro-level data on the economic resources of households (UN, 1977, 1989). The International Labour Organization (ILO) has also produced guidelines on the collection of data on income of households, with particular emphasis on income from employment (ILO, 1971, 1992, 1993). In 1997, the Australian Bureau of Statistics (ABS) tried to get an international agreement on definitions of income, consumption, saving and wealth. It has proposed the following definition:

> income comprises those receipts accruing (in cash and in-kind) that are of a regular and recurring nature, and are received by the household or its members at annual or more frequent intervals. It includes regular receipts from employment, own business and from the lending of assets. It also includes transfer income from government, private institutions and other households. Income also includes the value of services provided from within the household via the use of an owner-occupied dwelling, other consumer durables owned by the household and unpaid household work. Income excludes capital receipts that are considered to be an addition to stocks, and receipts derived from the running down of assets or from the incurrence of a liability. It also excludes intra-household transfers. (ABS, 1995)

This initiative by the ABS led to the establishment of the United Nations Expert Group on Household Income Statistics (Canberra Group), which issued a series of recommendations on the definitions and components of household income in its final report[9] in 2001 (see Table 2.4).

Townsend (1979, 1993) has argued that broad definitions of income should be used, particularly if international comparisons are to be made. It is crucial, when comparing individual or household incomes of people in different countries, that account is taken of the value of government services in, for example, the fields of health, education

Table 2.4: Definitions of income (Canberra Group recommendations)

1 Employee income

Cash or near cash
1.1 Cash wages and salaries
1.2 Tips and bonuses
1.3 Profit sharing including stock options
1.4 Severance and termination pay
1.5 Allowances payable for working in remote locations etc, where part of conditions of employment

Cash value of 'fringe benefits'
1.6 Employers' social insurance contributions
1.7 Goods and services provided to employee as part of employment package

2 Income from self-employment

Cash or near cash
2.1 Profit/loss from unincorporated enterprise
2.2 Royalties

In-kind, imputed
2.3 Goods and services produced for barter, less cost of inputs
2.4 Goods produced for home consumption, less cost of inputs
2.5 Income less expenses from owner-occupied dwellings

3 Rentals
3.1 Income less expenses from rentals, except rent of land

4 Property income
4.1 Interest received, less interest paid
4.2 Dividends
4.3 Rent from land

5 Current transfers received
5.1 Social insurance benefits from employers' schemes
5.2 Social insurance benefits in cash from government schemes
5.3 Universal social assistance benefits in cash from government
5.4 Means-tested social assistance benefits in cash from government
5.5 Regular inter-household cash transfers received
5.6 Regular support received from non-profit making institutions such as charities

6 Total income *(sum of 1 to 5)*

7 Current transfers paid
7.1 Employers' social insurance contributions
7.2 Employees' social insurance contributions
7.3 Taxes on income
7.4 Regular taxes on wealth
7.5 Regular inter-household cash transfers
7.6 Regular cash transfers to charities

8 Disposable income *(6 less 7)*

9 Social transfers in kind (STIK) received

10 Adjusted disposable income *(8 plus 9)*

and transport (Evandrou et al, 1992). Unfortunately, attempts in Britain to measure income and wealth using broad definitions of these concepts have often ended in failure (Knight, 1980). The concept of resources can be considered to encompass elements of human capital and therefore can be wider than even a broad concept of income. A household's resources can be considered to include both financial resources and the human resources of time, abilities and energy of each household member (Andreß, 1998). However, in practice, most poverty surveys in industrialised nations only analyse poverty in terms of 'usual' income and use an 'arbitrary' threshold of income to identify the 'poor', for example, below half average income or below 60% of median income. Thus, income poverty lines define the 'poor' as those with a low income even if they have a high standard of living.

The income concept used in the PSE Survey is usual net weekly household income and is identical to that used in the General Household Survey (GHS). It is the sum of usual post-tax income for all adults in the household from earnings, benefits, pensions, dividends, interest and other regular payments. If the last pay packet/cheque was unusual, for example in including holiday pay in advance or a tax refund, the respondent is asked for usual pay (Bridgwood et al, 2000). The usual net weekly household incomes recorded in the 1998 GHS were adjusted to take account of household income changes (increases or decreases) between the 1998 GHS and 1999 PSE Survey.

Income equivalisation

Gordon and Pantazis (1997) have argued that equivalisation of income presents one of the major problems when determining the poverty line/threshold. It is self-evident that the larger the household the more income will be needed to maintain the same standard of living. It is also clear that economies of scale exist within a household, that is, it does not cost a family of four twice as much as a family of two to maintain the same standard of living. However, it is not self-evident how much extra larger households need to have the same standard of living as smaller households. Unfortunately, the UK government's calculations at the time of the PSE Survey (McClements equivalisation scale) assumes that, if a household gives birth to (or adopts) six babies under two, this will cost them *less* than if one additional adult joins the household – one additional adult costs more than six babies after allowing for housing costs (McClements, 1977, 1978). This is unlikely to be correct and it leads to perverse and incorrect policy conclusions, since the low-income statistics (HBAI) appear to show that there are

comparatively fewer problems of poverty and low income among families with young children than among families with older children. However the scientific evidence indicates that it is families with young children that are often most likely to suffer the effects of poverty as, by the time children have reached their teens, family finances are often more robust (see Chapter Eleven in this volume). Unsurprisingly, the McClements scale has been criticised for making unrealistic allowances for the costs of children (Muellbauer, 1979, 1980). It has also been criticised by Coulter et al (1992, p 1081), who argue that the McClements scale "provides lower estimates of inequality and poverty that do other scales". Banks and Johnson (1994) have argued that even lower poverty and inequality rates are possible with other equivalence scales, but it is clear that the McClements scale produces "lower estimates of poverty and inequality levels than most other scales" (Jenkins and Cowell, 1994, p 899).

Unfortunately, much of the economic theory underlying equivalence scales is adult-orientated and defines 'household welfare' in ways that obscure the needs of children (Nelson, 1993). Nelson argues that "if on the other hand, households (and policy makers?), really do consider the welfare of children directly when making consumption decisions, these models can hardly provide good guidelines" (pp 482-3) and concludes that "the search for one, true, definitive set of scales appears to be a chimera since no completely superior method exists for their estimation" (p 493).

This is problematic because the results obtained from a poverty study are sensitive to the equivalence scale used (Whiteford, 1985; Buhman et al, 1988; Bradbury, 1989; Weir, 1992; de Vos and Zaidi, 1997). Both the household composition of the 'poor' and the position of the poverty line can be influenced by equivalisation. For example, the surprising findings of Jorgenson (1998) that the long-run trend in poverty in the USA since the 1970s has been declining not slightly increasing as in the official Census reports is a result the equivalence scales used in the study (Triest, 1998).

As a result of these problems, one of the innovations introduced in the PSE Survey was the adoption of an equivalisation scale based on the latest available budget standards information to adjust income for household size and composition (the PSE equivalisation scale). This new scale was used to both help select the households for interview (Gordon et al, 2000) and to compare the incomes of households of different sizes and compositions in the study (see Table 2.5).

Equivalisation scales should be based on budget standards results so that they are socially meaningful[10]. In the PSE Survey, the equivalisation

Table 2.5: PSE equivalised income scale

Type of household member	Equivalence value
Head of household	0.70
Partner	0.30
Each additional adult (anyone over 16)	0.45
Add for first child	0.35
Add for each additional child	0.30
If head of household is a lone parent, add	0.10
If there is a person with a disability in the household, add	0.30

scale was based upon the simplified relativities in the low cost but acceptable (LCA) budgets for various 'idealised' household types (Bradshaw, 1993; Parker, 1998, 2000). These relativities were slightly modified to take account of more detailed budget standards results on the cost of children by age and gender (Oldfield and Yu, 1993) and the additional costs of disability (Berthoud et al, 1993; Dobson and Middleton, 1998).

The PSE equivalisation scale has now been used in a number of academic studies (for example, Hillyard et al, 2003; Adam and Brewer, 2004) and the UK government has decided to abandon the use of the McClements scale for measuring child poverty and has adopted the modified OECD scale used by Eurostat to compare poverty rates in European Union member states (DWP, 2003).

Throughout this book, the PSE equivalisation scale has been used to adjust income by household size and type. However, some tables also report income adjusted using the McClements and modified OECD equivalisation scales for comparative purposes. Similarly, a range of income poverty thresholds have been used for comparative purposes, particularly the below 60% median equivalised household income level used by Eurostat and the Department for Work and Pensions to measure poverty (see Table 2.3).

Subjective poverty in the PSE Survey

The final sets of method used to measure poverty in the PSE Survey are subjective measures – asking people if they think they are poor and how much income they would need to avoid poverty. This approach, to identifying poverty thresholds, is also known as the income proxy method (Veit-Wilson, 1987) consensual poverty lines (see Walker, 1987, Halleröd, 1995a) or sociovital minimum income level (SMIL) (Callan et al, 1989). Subjective poverty lines are estimations by populations (obtained through surveys) about the minimum income level at which people find it is still possible to live 'decently'. In the

PSE Survey this methodology has been used to obtain estimates of how much money would be needed to avoid absolute and overall poverty, as defined at the World Summit for Social Development (see Chapter Three in this volume).

The most important advantage of the subjective method is that the level of the poverty line is not fixed by experts but defined by society itself. The subjective method is therefore a socially realistic method.

All methods of estimating a subjective poverty line make use of a minimum income question (MIQ) designed to measure the smallest income required to avoid 'poverty', live 'decently' or 'adequately' or to 'get along'. However, the exact wording of the MIQ varies considerably in different studies (Bradbury, 1989; Callan and Nolan, 1991).

The simplest and arguably most democratic method of producing a 'subjective' poverty line is to use the average response to the MIQ from the population (survey sample) as a whole. This is a procedure that has been used in Britain (Townsend and Gordon, 1991; Townsend et al, 1996, 1997) and Australia (Saunders and Matheson, 1992). However, several other methods have been used in European countries (see Goedhart et al, 1977; van Praag et al, 1980; Deleeck et al, 1988).

Perceptual poverty lines have been measured in the PSE Survey by asking respondents if their income is 'a lot below' the income needed to avoid poverty and 'a lot below' the income needed to avoid 'absolute' and 'overall' poverty. Respondents were also asked if they considered themselves to be 'genuinely poor now – "all the time", "sometime" or "never"'. Table 2.6 shows the percentage of people who consider their household income to be either 'a lot' or 'a little' below the absolute, general and overall poverty threshold. It also shows the percentage of respondents who consider that they are genuinely poor now – 'all the time' or 'sometimes'.

The percentage of people defined as poor in Table 2.6 ranges from 17% to 26% depending on the definition of poverty presented to the respondent (see www.bris.ac.uk/poverty/pse/welcome.htm). The proportion of people who defined themselves as poor in answer to the overall poverty (25%) and genuine poverty (26%) questions are very similar to the scientific consensual poverty rates (25% – Table 2.2). Again, it must be stressed that the same people are not always identified as poor when using these different methods.

Table 2.6: Subjective poverty rates in the PSE Survey

	% poor
Absolute poverty	17
General poverty	20
Overall poverty	25
Genuinely poor	26

Conclusion

The PSE Survey contains a number of significant technical and theoretical advances in poverty measurement. It implemented a new theoretical model for scientific poverty measurement that has the power to explain the relatively low correlation between low income and deprivation in cross-sectional surveys. The PSE income poverty analyses and interview sample selection made use of a new socially realistic (budget standards based) equivalisation scale (the PSE equivalisation scale). The PSE Survey is the first in Britain to provide a comprehensive measurement of poverty using a range of different methods and definitions of poverty.

In summary, poverty has been measured in the PSE Survey using three different methods:

1. the consensual method, which defines people as poor who have both a low income and a low standard of living;
2. the income poverty method, which defines people as poor when their income falls below a relative income poverty threshold;
3. the subjective method, where people define themselves as poor in response to questions using different definitions of poverty.

The consensual method identified a quarter (25%) of the population as poor. An effectively identical poverty rate was also found using the income poverty method (25% and 26%) when the PSE equivalisation scale was used. Finally, effectively identical proportions of people (25% and 26%) said they were poor in answer to the overall and genuine subjective poverty questions. All three sets of poverty measurement methods used in the PSE Survey produce similar poverty rates. It seems clear that approximately a quarter of the population of Britain was living in poverty at the beginning of the millennium.

Notes

[1] http://daccessdds.un.org/doc/UNDOC/GEN/N00/559/51/PDF/N0055951.pdf?OpenElement

[2] Atkinson (1990, p 10) defines a subsistence standard of poverty by the formula:

$$(1 + h)\ p.x^{\star}$$

where:

$x^{\star}$ is a vector denoting a basket of goods,

p is the price of the basket, and
h is a provision for inefficient expenditure or waste.

[3] This is an old and common problem, which was described by Spinoza in the 17th century: "Many errors, in truth, consist merely in the application of the wrong names of things" (Spinoza, *The ethics*, 1677).

[4] This definition of absolute poverty by Sen goes some way beyond the conception of Keith Joseph, who argued that: "An absolute standard means one defined by reference to the actual needs of the poor and not by reference to the expenditure of those who are not poor. A family is poor if it cannot afford to eat" (Joseph and Sumption, 1979, pp 27-8).

[5] The claim that the PSE measurement of poverty is 'scientific' is not a rhetorical device designed to foreclose argument and prove the 'truth' and 'superiority' of our results. It simply means that the measurement and theory of poverty used in the PSE Survey conform to the requirements of the philosophy of science.

[6] The United Nations defines household final consumption expenditure as "the expenditure, including imputed expenditure, incurred by resident households on individual consumption goods and services, including those sold at prices that are not economically significant" (see http://unstats.un.org/unsd/cdb/cdb_dict_xrxx.asp?def_code= 165).

[7] I would like to thank the members of the United Nations Expert Group on Poverty Statistics (Rio Group), and in particular Ruben Suarez of the Pan American Health Organization, for their helpful discussions of this issue.

[8] Face validity is concerned with how likely to be 'true' a measure or procedure appears. Anastasi (1988) describes the concept of face validity as follows: "Content validity should not be confused with face validity. The latter is not validity in the technical sense; it refers, not to what the test actually measures, but to what it appears superficially to measure. Face validity pertains to whether the test 'looks valid' to the examinees who take it, the administrative personnel who decide on its use, and other technically untrained observers" (p 144).

[9] See www.lisproject.org/links/canberra/finalreport.pdf

[10] Budget standards are themselves not unproblematic. Bradshaw et al (1987) argued that: "It would be wrong to claim too much for budget standards methodology. There will be arguments about the components of a modern budget standard just as there were about Rowntree's standards. The quality of people's lives cannot be completely represented by the goods they consume. Budgets cannot represent fringe benefits, wealth and the consumption of unmarketed public and private services. Neither can a budget show how goods are consumed variously within households. However, budget standards are capable of incorporating elements concerned with social participation and can represent a measure of relative deprivation". However, despite these limitations, a budget standards-based income equivalisation scale is still preferable to an arbitary equivalisation scale such as the modified OECD scale.

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Appendix 2.1: How to identify the poor: scientific poverty measurement

This appendix describes the statistical methods used to determine the scientific poverty line and divide the population into four groups ('poor', 'rising', 'vulnerable' and 'not poor').

The first step was taken by building up a long list of ordinary household goods and activities. Respondents were asked to indicate which items and activities they thought were necessities that no person should have to do without in Britain (see Chapter One and Chapter Five). The second step was to ask people what items they already had or wanted but could not afford. Items defined as necessities by more than 50% of the population but were lacked because of a shortage of money were then used to construct an initial deprivation index. The use of a democratic threshold (50%) to identify what items and activities are necessities provides both 'political' and face validity for the deprivation index.

The deprivation index was then refined using standard scientific methods to ensure that all the components were valid, reliable and added up. The validity of each item in the index was tested by calculating the correlation (odds ratio) between the item and two health variables ('general health question' and 'limiting long-term illness') and four perception of poverty variables (genuinely poor now 'all the time', income 'a lot below' the poverty line, income 'a lot below' the absolute and overall poverty line). These variables are robust measures of criterion validity as there is considerable evidence that poverty causes ill health (Townsend and Davidson, 1988; Whitehead, 1988; Power et al, 1996; Acheson, 1998; Gordon et al, 1999; Shaw et al, 1999; Davey Smith and Gordon, 2000). It would also be expected that respondents who can objectively be defined as living in poverty are also more likely to perceive themselves as poor than their non-poor peers.

The reliability of each item in the index was then tested using a classical test theory model. A summary table (A2.1) of the reliability and validity results are shown below. Overall, the 35-item index had a Cronbach's Alpha of 0.8853, which is indicative of a highly reliable index.

The items that were not included in the index, as there was little evidence that they were either valid or reliable, were:

Table A2.1: Validity and reliability summary table

	Number of non-significant validity indicators	Level of reliability (bold = unreliable)
A television	5	**0.8859**
Medicines prescribed by doctor	4	0.8851
Refrigerator	3	**0.8859**
Beds and bedding for everyone	2	**0.8856**
A washing machine	2	**0.8854**
Telephone	2	0.8845
Deep freezer/fridge freezer	2	0.8848
Visits to friends or family	1	0.8835
Visits to school, eg sports day	1	**0.8858**
Collect children from school	1	**0.8856**
Appropriate clothes for job interviews	1	0.8814
Carpets in living rooms and bedrooms	1	0.8824
A dictionary	1	0.8843

- a television
- a fridge
- beds and bedding for everyone
- a washing machine.

Additivity and removing outliers

The components of any deprivation index should be additive, for example, a person or household with a deprivation score of 3 should be poorer than a person or household with a deprivation score of 2 (Gordon, 1995). It is necessary to check that all components of a deprivation index are additive[1]. This was done by examining both the main effects and all possible second-order interaction effects between the components of the deprivation index using equivalised income as the dependent variable. Income outliers had first been removed using standard robust exploratory data analysis techniques (for example, Boxplots). This resulted in all households with net incomes above £895 per week, which is the equivalent of an annual income after tax of over £46,500 per year and approximately £77,500 gross annual income, not being included in the final poverty threshold model. Examination of the second-order interactions showed that not being able to afford 'all medicines prescribed by a doctor' was not additive with 18 other deprivation items. Similarly, not being able to afford 'a deep freezer/fridge freezer' was not additive with seven other deprivation items, so both these items were not included in the final valid, reliable and additive deprivation index.

Finding the 'objective' poverty line

General linear models (both ANOVA and logistic regression) were used to determine the scientific poverty threshold, that is, the deprivation score that maximises the between-group differences and minimises the within-group differences (sum of squares). These techniques were applied to a succession of groups created by increasing the number of items that respondents did not have because they could not afford them. Thus, the first analysis was undertaken on groups defined by households lacking no items compared with households lacking one or more items (a deprivation score of 1 or more). Similarly, the second analysis was undertaken on a group comprised of households lacking one or no items against two or more items, and so forth.

The dependent variable in the ANOVA model was net household income and the independent variables were deprivation group (constructed as described above), number of adults in each household and number of children in each household. With the logistic regression models, the dependent variable was the deprivation group and the independent variables were net household income, number of adults and number of children. Both the ANOVA and logistic regression models yielded the same final result – that a score of two or more on the deprivation index was the optimum position for the poverty line. Summary results are shown in Table A2.2 and Figure A2.1.

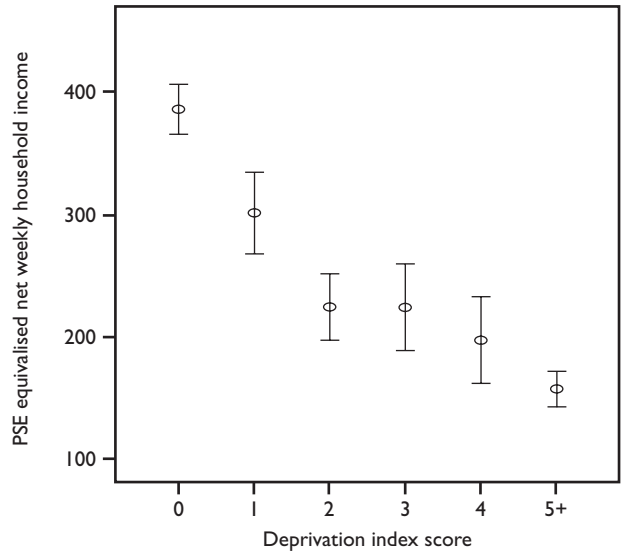
Identifying the rising and the vulnerable groups

In a cross-sectional survey there will probably be a few people who have recently 'risen out of poverty', that is those with a high deprivation score and a high income. Their incomes and/or 'standard of living' should have increased in the recent past. These few cases were identified

Table A2.2: Brief summary of ANOVA and logistic regression models of optimum position for the poverty threshold

Model	F statistic for corrected ANOVA model	Logistic regression model chi-square
Null model	26	
Deprivation score of 1 or more	45	145
Deprivation score of 2 or more	**51**	**223**
Deprivation score of 3 or more	45	205
Deprivation score of 4 or more	42	192
Deprivation score of 5 or more	36	170
Deprivation score of 6 or more	31	126

Figure A2.1: Average income by deprivation score (95% Confidence Intervals)



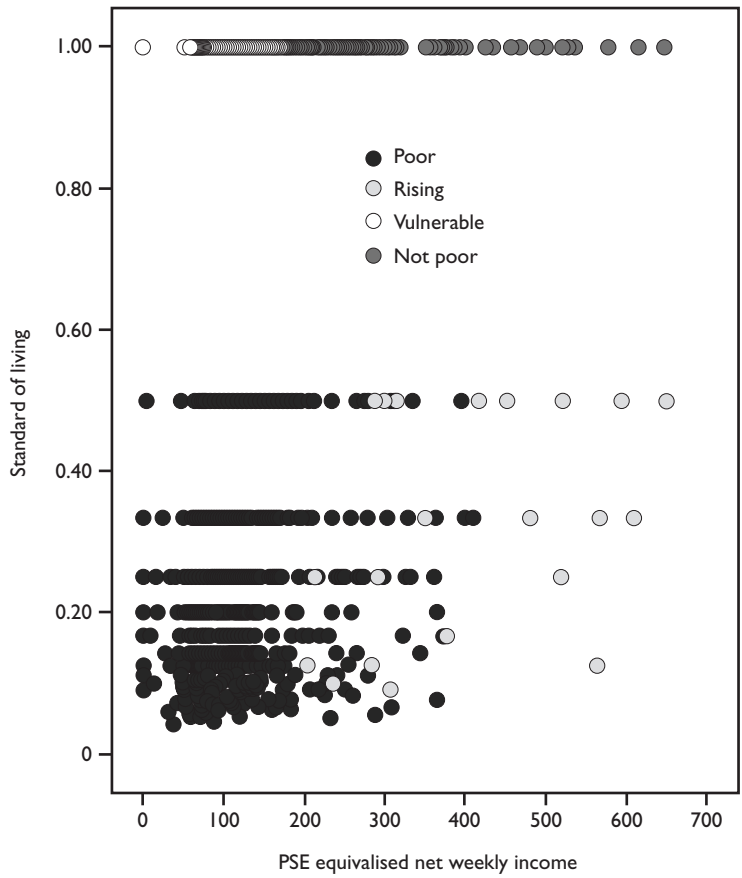
using boxplots of income by 'multiply deprived' group (that is, with a deprivation score of 2 or more) and controlling for household size/type. The outliers (with high incomes) in each household type should be those risen out of poverty.

There should also be a much larger group of households that have relatively low incomes but are not yet suffering the effects of multiple deprivation (that is, people in the vulnerable to poverty group who have incomes equivalent or less than the median incomes of the multiply deprived – 2 or more – group).

Figure A2.2 shows how the statistical procedure described above divides the sample into four groups: 'poor', 'rising', 'vulnerable' and 'not poor'. It should be noted that the model produces this division in multi-dimensional space (income, deprivation, household size and household composition), whereas the graph shows just two dimensions – equivalised income (to try to allow for household size and composition differences) and standard of living (the reciprocal of the deprivation index score).

Figure A2.2 shows that there appears to be a very clear separation on the standard of living dimension (y axis) between the 'poor' and 'not poor' groups. The 'vulnerable' and 'not poor' groups have also been clearly separated. However, the statistical model does not appear to be so efficient at distinguishing between the 'poor' and the 'rising'

Figure A2.2: Standard of living score by income with population groups



groups and there is some degree of overlap visible. This may either be a result of the PSE equivalisation scale being incorrect for some household situations (for example, households with a severely disabled member) and/or because of inefficiencies in the statistical model. Further research should be undertaken, ideally with longitudinal data.

Note

[1] Technically a 'good' index should be monotonic, one of the major problems encountered when using income to measure poverty is that in industrialised countries those people/households who have zero or negative incomes are often less 'poor' than those with slightly higher incomes. Income poverty measures can therefore violate the montonicity assumption of many linear statistical methods

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