



STATISTICS DIRECTORATE

National Accounts and Financial Statistics Division

OECD Handbook 'Measuring Education and Health Volume Output'

Draft chapter 1 - Terminology and Concepts

This document will be presented under item 1.2 of the draft agenda and has been prepared by Paul Schreyer and François Lequiller, OECD

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CHAPTER 1. TERMINOLOGY AND CONCEPTS

1. The National Accounts of each country must reflect the production of all producers, market and non-market. Non-market production takes place when goods and services are provided to recipients at prices that are “not economically significant”. By implication, market production takes place when goods or services are transacted at economically significant prices. Because prices and markets are the links between producers and consumers, market prices not only reflect costs and profits by producers, they also reflect consumer valuation of products.

2. Education and health services play an important part in the life of citizens, whether provided by market or by non-market producers, and they account for a very important part of Gross Domestic Product (GDP) in OECD countries. Measuring them well is therefore an important issue.

3. This Handbook focuses on the measure of the *volume* output and consumption of education and health services. It does not repeat the detailed guidance contained in the System of National Accounts that applies to production and consumption. For instance, the Handbook does not cover in detail the basis of valuation to be used in the National Accounts (see SNA paragraphs 6.204 to 6.217), or the timing of recording transactions (SNA paragraph 2.63). The production boundary (SNA paragraph 1.20) is discussed to the extent that it plays a role in the definition of health and education services but for most rules pertaining to the national accounts, the reader is referred to the 1993 SNA or to the 1995 ESA. However, some discussion of how national accounts go about measuring the values, volumes and prices of goods or services is in place to provide the necessary context to the discussion of health and education services. This chapter is about these basic concepts.

1.1. Production and consumption of education and health at current prices

4. An important aim of the National Accounts is to value, within certain boundaries, the production in every sector of the economy and in the economy as a whole. Production is the transformation of inputs such as labour or capital into outputs in the form of goods and services. The most important part of production consists of goods and services delivered to other units: for example, a pupil in a school or a patient in a hospital are consuming the production of education and health services. A producer can be a corporate enterprise (a private school, a private hospital) or it can be a non-profit institution or a part of government. The task of measuring production therefore begins with identifying all the units which produce the goods or services in question. Next, one needs to consider which of the transactions of these producers need to be identified in measuring production in the National Accounts. Then the data on these transactions need to be obtained and aggregated.

5. In the case of measuring the value of production of producers of education and health services, the distinction between market and non-market output is important. Market output is output that is sold at prices that are economically significant. Thus, for market services of education and health, there is a market price and the value of output in current prices can therefore be measured by the value of sales of these services.

6. However, education and health services are the most common examples of government provision free of charge or at prices which are not economically significant and thus constitute non-market output. A price which is not economically significant is deliberately fixed well below the equilibrium price that would clear the market. The SNA defines it as a price

- which does not influence how much the producer is willing to supply (the producer having already decided to meet all the demand which might exist at that price), and
- has only a marginal impact on the quantities supplied (with very few users being discouraged by this price).

7. In the European Union, and for practical purposes, national accountants consider that the price is not economically significant if it covers less than half of the costs of the service. In these circumstances, the price paid cannot therefore be the basis for valuing it (as would be the case with market goods and services). Its valuation for the National Accounts is the sum of the costs incurred in its production. That is the sum of:

- Intermediate consumption (the goods and services used up in producing the service)
- Compensation of employees (costs of teachers, doctors, nurses, etc...)
- Consumption of fixed capital¹ (depreciation of school and hospital buildings, of medical equipment)
- Other taxes, less subsidies, on production

8. Education and health services are the production of the education and health industries, whether provided on a market or a non-market basis. As happens in other industries, producers purchase intermediate inputs (goods and services) from other industries; they employ personnel and they use capital to transform these inputs into services which are then delivered to final consumers such as pupils or patients. The incomes generated in this transformation are the value added of these industries and their contribution to GDP. In addition, market and non-market education and health services feature also as a component part of *aggregate final expenditure*.

9. There is here a first complication. In their traditional framework for final expenditures, the national accounts distinguish final consumption expenditures of households, final consumption expenditures of non profit institutions serving households (NPISH) and final consumption expenditures of general government. The important word in this sentence is *expenditure*. This classification is based on *who pays* or more precisely, who incurs the direct expenditure? If households (pupils and patients) pay then it is classified as final expenditures of *households*, if it is the government (which includes social security) then it is classified as final expenditure of *government*. This classification is not adapted to analyse the consumption of education and health services where the important thing is not “who pays?” but “who consumes?” Free or quasi-free education and health is paid for by the government on behalf of households, but is consumed by households. Reimbursements by social security of medical services may be classified as final consumption expenditures of government, but medicines, in fact, are consumed by households. The national accounts framework includes therefore another aggregate, called *actual*

¹ The cost of capital comprises more than depreciation. In particular, there are financing costs and there may be costs from revaluation of assets. However, by convention, the national accounts only recognise depreciation as the cost element for capital held by non-market producers. For a discussion see OECD (2007).

individual consumption, which is the sum of the expenditures made directly by households plus those made by the government on behalf of households. Actual consumption is the aggregate that we will often have in mind in this handbook when we will discuss the “consumption” of education and health services.

10. This brings us to the question of how production and consumption transactions are presented in the statistical tables of the National Accounts and where in those presentations the non-market education and health components appear. In showing the composition of an economy’s Gross Domestic Product, producers are classified to the industries and the institutional sectors in which they operate. There are also classifications of household consumption and of government expenditures. These numerous classifications complicate the picture. The classification by industry and product, and its related “supply and use table” is probably the most interesting for this handbook as it gives a global and also a detailed picture of the production of education and health services, whether market or non market, whether paid for directly by households or directly by government. Other classifications are discussed in the Annex 1.

11. A supply and use table shows, for a product or a group of products, the amount supplied by producers of this product (whether non market or market) and the amounts consumed by households. This table of national accounts is the most relevant to analyse the output and, at the same time, the consumption of education and health services.

12. The production estimates describe what producers do: they are presented using a classification which reflects either the different product types produced or the different industries into which the producers fall. These two categories – products and industries - are linked as the products produced determine the industry allocation and any calculation of volume and price for an industry needs a break down in products. In the National Accounts, *producers* are allocated to *industries* according to a classification system of industries twinned with a classification system of products. The classification systems most commonly in use are based on the International Standard Industrial Classification (ISIC), linked with the Central Product Classification (CPC). The classes of ISIC rev 4² which are within the areas covered by this Handbook are Education (Division 85) and Human Health Activities (Division 86). Full definitions of these two categories are in Annex 2. Note that data may, in practice, be published at the highest levels – Divisions 85 and 86 – but the classification guidelines serve to list those activities are included in any one category (and hence to make it clearer what is not included). This Handbook focuses on formal education (classes 851-853) and human health (division 86), but its guidance may be relevant for other activities, such as “other education” or “residential care”.

² See <http://unstats.un.org/unsd/cr/registry/isic-4.asp>

Table 1: Health and education in the industry classification industries (extract)

<u>Education (Division 85)</u>	
851	Pre-primary and primary education
852	Secondary education
8521	General secondary
8522	Technical and vocational secondary
853	Higher secondary
854	Other education
855	Educational support activities
<u>Human Health (Division 86).</u>	
861	Hospital services
862	Medical and dental practices
863	Other human health
<u>Residential Care (Division 87).</u>	
871	Residential nursing care facilities
872	Residential care activities for mental retardation, mental health and substance abuse
873	Residential care activities for the elderly and disabled
879	Other residential care activities

Source: International Standard Industrial Classification, rev 4 (see annex 2 for more details)

1.2. Production and consumption of education and health in volume

13. Although much effort is spent on measuring the value of GDP at current prices, an even more important objective of the National Accounts is to derive a measure of the growth of GDP and its components *in volume*. Growth in volume excludes from the picture the changes in price levels between two periods. International comparisons of GDP should also be made excluding differences in the price level between countries. Only elements of the National Accounts that can be disaggregated in terms of prices and volumes are useful in analysing economic growth, productivity and inflation. It is indeed the main objective of this handbook to deliver recommendations of the measurement of the *volume* of output (equal by definition to the volume of consumption) of health and education services. For complex services such as education and health, and moreover, in a context where there are no economically significant prices, this is a difficult task. Previous methodologies have relied on measuring the volumes or the prices of inputs to obtain a measure of the volume or price of outputs, but such input-based methods suffer from the fact that they cannot capture any productivity change in the production of health and education services. Productivity growth exists when more or better output can be produced with the same resources. As there is much evidence of changing quality of output in health and education services, ignoring productivity changes means foregoing important information for analysts and policy makers and measuring volume growth inaccurately.

14. To foreshadow various chapters in the Handbook, three main issues that are intimately related to the measurement of volumes or prices, will underlie most of the discussions: (1) identification of homogeneous goods and services, (2) the aggregation of quantities of these goods and services, (3) the treatment of new products.

1.2.1 Identification of products

15. Volume is associated with quantities. Thus, first, to express a flow in volume terms, each of the goods and services which are the counterparts of the money spent must, in principle, be identified. This is because quantities are additive only for a single homogeneous product: if a hospital carries out 100 (expensive) knee replacement operations and 300 (inexpensive) varicose vein treatments, it is not informative in economic terms to add these together and say that 400 treatments were carried out. Clearly there is a vast number of different goods and services of varying specifications so our search for items to quantify has to be limited in practice and this imposes limitations on how the results are interpreted. But the lack of a detailed specification for each and every item produced or consumed is not a sufficient reason to invalidate this approach: it just has to be applied with caution and a good understanding of what is being measured.

1.2.2 Aggregation of products

16. National accounts are about constructing macroeconomic aggregates. Inevitably, the question therefore arises of how to add together the quantities of the very detailed homogeneous products that were identified in the previous paragraph. To use the same example, how can we intelligently add the 100 knee replacement operations and the 300 varicose treatments? This question will arise for all the thousands of goods and services that populate the global concept of education and health services. As will be seen, the answer traditionally draws on the knowledge that the relative prices of the different goods and services bought and sold reflect both their relative utilities to purchasers and their relative costs for the producers. However, is this relevant in particular for non market services where, by definition, there is no market price that reflects the interaction of consumers and producers? This issue is discussed in section 1.5 of the present chapter.

1.2.3 New products and quality change

17. One of the major difficulties in calculating volume indices (and also price indices) is the appearance of new products and quality change of existing products. This is crucial in health services, where new treatments and new drugs constantly appear. How can we compare the quantity of health services produced in a given year with those produced in the preceding year, if some services did not exist in the previous year? This is discussed in section 1.4 of this chapter.

1.3. Inputs, Output and Utility

18. The following sections will draw up a framework for the measurement of health and education services that aims at being applicable to price and volume measures, whether provided by market or non-market producers and whether used in a temporary or spatial context.

19. The discussion starts with a simple market model of producers and consumers. On one side of the market, there are producers who supply products – goods or services – that are the result of a production process. In the production process, labour, capital and intermediate *inputs* are combined with a certain technology to produce *outputs*, the products that are traded on the market. For the moment, we take it that outputs are well-defined and transactions of these outputs on the market are observable. When there is competition on the market, producers will supply outputs to the point where the price that they achieve on the market equals the marginal cost of producing an extra unit of this output. A standard way of presenting this is by $\delta C/\delta y^i = P^i$ where C is the minimum cost that producers have to incur to supply a given set of outputs (y^1, y^2, \dots, y^N) and where P^i is the market price for the i^{th} good or service supplied.

20. On the demand side, consumers purchase the goods and services supplied. Standard economic theory attributes a utility function $U=U(y^1, y^2, \dots, y^N)$ to consumers where *utility* depends on the quantity of goods and services consumed. The utility function indicates how the consumer appreciates (in unobserved ‘utils’) the quantity of products purchased. It is well-known that utility is difficult to measure because it is a subjective concept and utility is not directly observable. However, for the purpose at hand, utility is useful in at least two ways.

- First, the utility perspective has implications for the statistician who has to classify goods and services into categories when measuring price and volume developments: price and volume indices, even at the most disaggregated level, nearly always reflect several individual goods or services (‘items’) that are grouped together as ‘a product’. The grouping of items should be performed in such a way that each one satisfies the same or similar consumer needs: this may or may not coincide with production processes. For example, in health services, it may be better to group treatments by type of disease (‘treatment of heart attacks’) rather than by type of treatment (‘medication’, or ‘operation’). The advantage of this approach is that it compares individual items that are substitutable for each other from the consumer perspective and this has implications for the resulting measure of output, more of which below.
- Second, the utility perspective helps us to model consumer behaviour and to conceptualise price and volume indices. One example of such a concept is the *cost of living index*, described as the extra expenditure that a consumer – in the presence of price changes - has to incur from one period to the next if s/he wants to keep utility constant. Not every consumer price index is a cost of living index but if a price index is designed to reflect changes in the cost of living this will normally have implications for the measurement of health and education price and volume indices.

21. In the simple market situation taken here, a price index can be used to deflate the value of goods that has been transacted on the market, and this yields a volume measure of the goods or services transacted. In a competitive market, consumers and producers interact until a market price is established, and for every pair of market prices, the ratio of marginal costs for producers will just be equal to the ratio of marginal utilities as perceived by consumers. The equilibrium price times the transacted quantity equals the value of the goods transacted on the market – a value that reflects both consumer preferences and producers’ costs. Instead of deflating values with a price index, one could also set up an index of volumes or quantities produced and consumed directly. Price and volume indices of the Laspeyres³ type are, respectively:

$$(1) \quad P^{L,t} = \sum^N \left(\frac{p_i^{t-1} Y_i^{t-1}}{\sum^N p_i^{t-1} Y_i^{t-1}} \right) \frac{P_i^t}{P_i^{t-1}}$$

$$(2) \quad Y^{L,t} = \sum^N \left(\frac{p_i^{t-1} Y_i^{t-1}}{\sum^N p_i^{t-1} Y_i^{t-1}} \right) \frac{Y_i^t}{Y_i^{t-1}}$$

22. Three things are worth noting about these indices.

³ The Laspeyres-type formula is shown here because it is the most commonly used index number formula. For a discussion of index number formulae for consumer and producer prices, see ILO et al. (2001) and IMF et al. (2001).

- First, prices or quantities of the products are weighted with expenditure shares and these expenditure shares – measured by market observation – reflect the joint, equilibrium valuation of each product by consumers and producers. This link between producer and consumer is particularly apparent in the case of services when the act of consumption coincides with the act of production. Thus, market prices and quantities reveal the interaction of consumer preferences and producer costs.
- Second, *in the simple model at hand*, changes in quantities Y_i^t/Y_i^{t-1} and in prices P_i^t/P_i^{t-1} are simply measured by comparing them between periods – implying that the units of measurement for Y_i^t are the same as the units of measurement for Y_i^{t-1} and that the set of products is stable – product i has to exist in both periods to be compared. A volume index of goods could thus be constructed as a weighted average of the number of goods transacted and a volume index of services could be constructed as the weighted average of the number of actions or activities transacted in the two periods. The same is true for a price index, which could be constructed as a weighted average of the price changes between two periods. No further reference is needed to notions of utility or outcome and this corresponds to the general guidance given in the System of National Accounts. The picture changes when there is quality change and when new products appear. Matters are further complicated when it comes to the specific areas of health and education services because prices may not represent an equilibrium valuation and in some cases, no price or an economically insignificant price is charged.
- Third, the simple presentation here also makes the implicit assumption that there is exactly one measured unit of quantity that constitutes Y_i or one measured price that constitutes P_i . It was already mentioned earlier that in practice, this is not the case. The P_i 's are un-weighted averages of individual items which constitute an elementary price index. Similarly, the Y_i 's for a volume index are actually un-weighted averages of quantities of individual products. How individual products ('items') are grouped is a question that has to be answered with respect to the purpose of the price or volume index. Above, it was mentioned that a useful criterion for grouping individual items is that they potentially satisfy the same or similar consumer needs or that they are substitutes from a consumer perspective. Conversely, if different items are not interchangeable from a consumer perspective, they should be treated as different products. In the presence of quality change or new and disappearing items, the question of grouping items becomes important. This is further discussed below.
- **Conclusion 1:** *If there is no quality change, and if the set of products produced by the health and education service industry is stable*, the rate of change of output is a weighted average of the rate of change of service activities. In this simple case, teaching services would be captured by measures of teaching activity such as pupil hours suitably differentiated by level of teaching. Health care services would be captured by measures of health care activities such as completed treatments, suitably differentiated by type of treatment.
- **Comment:** this output measure is different from an *input-based* measure where the volume of production of health and education services would be approximated by the volume change of labour, capital and intermediate inputs employed by the health and education industry.

23. Everything that has been said above could also be expressed by way of a price index. When there is no quality change, the price index for health and education services is a weighted average of the price indices of suitably chosen teaching and health care service activities. This price index can then be used to obtain a volume measure of output by deflation.

1.4. Quality change, new and disappearing products

24. An unrealistic assumption in the model above is the unchanged set of products between two periods. In reality, the quality of products changes over time, certain products disappear from the market and new products emerge. These changes constitute not only a major practical challenge for statisticians; they also have consequences for theoretical considerations about output and utility. We shall ignore here the distinction between new products and quality change⁴ but note a few general points about quality adjustment⁵ of prices or quantities.

25. One technique to deal with quality change in products is to restrict comparisons of prices or quantities to those products that do not change between two periods, i.e., to *match* products. While matching ensures that only prices or quantities of products of the same quality are compared between periods, it also relies on an important assumption: to show a price or quantity movement that is representative of a product group, the price or quantity movements of those products that *are* matched have to be a good indicator of the price or quantity movements of those products that *are not* matched – in particular products that are newly entering the market. Also, all other price or quantity changes that arise outside the sample of matched products are ignored.

⁴ For a discussion see for example IMF et al. (2004).

⁵ For an in-depth treatment of quality adjustment in price measurement see Triplett (2006).

Box 1. Why narrow specifications of products may not always be sufficient to capture quality change

A straight forward technique of dealing with quality change in a price or in a volume index is to match models, i.e., to compare only prices or quantities of products that are tightly specified. The more specific the characteristics of a particular product, the less likely it is that a modification of the product goes unnoticed and that a change in quality is not recognised as such. Such implicit quality-adjustment is perfectly adapted when the set of products observed is stable and when it is representative for the universe of products. It may, however, be insufficient, when products change and when there are substitution processes between them. This is best illustrated by way of an example. We use a quantity index here but the same points could also be made by way of a price index that is subsequently used to deflate values.

Suppose there are two treatments for a disease, traditional surgery and laser treatment, and assume that laser treatment is introduced in period 1. In addition, as may well be the case, the unit cost of laser treatment is lower than the unit cost of traditional surgery. The total number of interventions remains the same.

	Traditional surgery			Laser surgery		
	Period 0	Period 1	Period 2	Period 0	Period 1	Period 2
Unit cost	100	100	100	-	90	90
Number of interventions	50	40	5	0	10	45
Total cost	5000	4000	500	0	900	4050

Now consider a *matched-model approach* towards calculating a volume change from period 0 to period 1. In the simplest case, the volume index is given by the quantity changes in the two treatments, each weighted by the cost share it occupies in period 0. As laser surgery does not yet exist in period 0, it receives a zero weight so that the volume index of treatments is simply the change in the number of traditional surgery, or $(40/50-1)=-20\%$. Between periods 1 and 2, the corresponding volume index equals $[s_T(5/40)+s_L(45/10)]-1=-7.1\%$ where $s_T=82\%$ and $s_L=18\%$ are the period 1 cost shares of the traditional and of the laser treatment respectively. This approach treats the two treatment as different products and the sharp drop in the total volume index in period 1 reflects the ‘new goods’ problem that arises when new products enter the sample that cannot be compared with quantities in the base period. Note also the assumption implicit in this model: consumer valuation of the two products is captured by the relative unit costs, so if laser surgery is cheaper than traditional surgery, this method implicitly quality-adjusts *downward* the quantity of laser surgery when it is combined with traditional surgery.

A different result arises when it is considered that the two treatments are perfect substitutes, i.e., that they are in fact the same product. In this case, no cost weighting is applied between the two treatments – and the number of treatments is simply added up. As there are 50 interventions in every period, the result is a volume index that shows zero growth and a declining price index, reflecting the drop in average unit costs of treatment.

The previous method is justified if it is plausible that consumers are indifferent about the two treatments. If this is not the case, and they prefer laser over traditional surgery because the former is less intrusive or requires fewer days of recovery, an explicit quality-adjustment is needed. Such an adjustment can be applied to the quantity measures, either by scaling up the quantity of laser treatments or by scaling down the quantity of traditional treatments. Whichever way this is done, the implication is always that one treatment is expressed in equivalents of the other treatment, and the ratio should in some way reflect consumer preferences. Alternatively, prices or unit costs could be rescaled before constructing a price index. Suppose the adjustment factor is 1.1 – each laser treatment is the equivalent of 1.1 traditional treatments. Then, expressed in ‘traditional surgery-equivalents’, the number of treatments is 50 in period 0, $40+10*1.1=51$ in period 1 and $5+45*1.1=54.5$ in period 2. The resulting volume index is +2% in period 1 and +6.9% in period 2. Obviously, the difficulty lies in determining the adjustment factor which should (i) reflect consumer preferences; (ii) be uni-dimensional. Much of the present *Handbook* is actually devoted to the identification and measurement of such adjustment factors.

26. If matching is insufficient, other, explicit, techniques have to be invoked to account for quality change. In general, the quality of a product can be expressed by the quantity of its characteristics. Quality change can then be captured by the change in characteristics. Similarly, price changes in products can be attributed to pure price changes and to those price changes that reflect changes in product characteristics. This is the approach followed by hedonic price indices⁶ that are now well established among statistical agencies.

⁶ See Griliches (1988) for an introduction and Triplett (2006) for a comprehensive discussion.

27. Quality adjustments require the identification of a set of characteristics such as the speed, engine size or equipment for a car or the processor speed for a computer. Berndt et al. (2001) use patient characteristics, information on different types of depression, variables on medication and the like to estimate a hedonic price model for the treatment of depression; the idea being to isolate those price changes that are due to changes in characteristics from those price changes that constitute 'inflation'. An important result of the hedonic model is that it allows the identification of characteristics and provides a market valuation of each one⁷. Market valuation, in turn, is a convenient way of aggregating across characteristics because everything is expressed in a single monetary unit.

28. While hedonic regression techniques can help to value characteristics and permit a composite value of the change of characteristics to be computed, there are situations when there are no market prices or when there are good reasons to believe that market prices do not reflect consumer preferences or costs for producers. The first case may arise when services are provided by non-market producers, i.e., at prices which do not cover costs of production. The second case may arise when consumers and producers interact only indirectly. For example, individuals take out health insurance. Then, the price of a medical intervention is not a signal that is directly relevant to consumers although it will be a relevant signal to insurers and to health providers. The implication is that such prices may not be useful in revealing consumer preferences.

29. What remains true, however, independently of whether or not goods or services are transacted on a functioning market, is that when products undergo quality change, when some products disappear and others emerge, it is always necessary to identify characteristics of products. We note in passing that typically, there is more than one quality characteristic to a product. If there are no market signals to identify relevant product characteristics, the statistician has to rely on expert advice to identify the characteristics that consumers and/or producers value. Health and education experts have indeed produced sets of characteristics that they consider as quality attributes of health care or of education services. But even a well-defined and well-measured set of characteristics leaves the problem of aggregation across the quantities of characteristics which are, by their very nature, expressed in very different physical units. If there is a need to produce a single number for quality adjustment, and if there is no market information to value characteristics, measurement has to proceed differently. Enter the notion of *outcome*.

30. Consumers attach utility to a good or to a service because it affects *outcome*, i.e., a particular state that they value and which can be measured. We could also say that outcome is an intermediate step between consumption and utility and this is indeed the way it has been treated in the literature. For example, Berndt et al. (1998) distinguish between medical care ('output' in our terminology), the state of health ('outcome' in our terminology) and utility. They envisage a relationship whereby utility depends, among other variables, on the state of health and where the state of health is itself dependent on health care services, on the environment, lifestyle etc.). Thus, a health activity with a higher composite quality than another health care activity could be identified as such if it contributes more to health outcome than the alternative activity⁸.

⁷ Rosen (1974) demonstrated that in general, those characteristics of a product will show up in the function that are valued by consumers *and* that have cost implications for producers. Triplett (2006) writes on this: "It is well-established – but still not sufficiently understood – that the functional form of [the hedonic equation] cannot be derived from the form of the utility function or of the production function. Neither does [the hedonic equation] represent a 'reduced form' of supply and demand functions derived from [the utility and the production functions] as the term is conventionally used. Establishing these results requires consideration of buyer and seller behaviour towards characteristics]" (page 231).

⁸ Things are more complicated in concept and in practice. First, as Berndt et al. (1998) point out, there is an issue of lags: the state of health may be affected by medical care and by other factors with a lag so that

31. Thus, one possibility to deal with the aggregation problem is to subsume several characteristics into a single indicator that reflects the *contribution of the product to outcome*. For example, in the case of price indices for health care, Triplett (1998) suggests quality-adjusted life years (QALYs) as a single dimensional measure that could be used for the quality-adjustment of different treatments within a product group. The point is to derive a single indicator that serves as a reasonable summary of a true, multi-dimensional set of quality characteristics valued by consumers when purchasing health or education services. Careful judgement needs to be applied in the choice of such a measure. In particular,

- it should not be affected by any other factors that influence consumer outcome (e.g., socio-economic background of students or lifestyle of patients) and
- it should reflect as closely as possible the normal, or average or expected effect of the activity on the state of health or the state of knowledge of the consumer. ‘Normal’, ‘average’ or ‘expected’ has been added here to signal that to the extent possible, measures of service production should not be influenced by the individual capacity of the consumer to make use of these services. For example, the same teaching activity performed on a different group of students, should be measured as the same quantity of teaching services. Or the same treatment, applied to two different persons with the same disease should be measured as equal quantities of medical services.

32. In conclusion of this section on quality adjustment: it is necessary to qualify the earlier statement that to measure the quantity or the price change of a single product (P_L^t , or Y_L^t), one does not have to recur to considerations of utility or of outcome and this leads to

- **Conclusion 2:** For the process of quality adjustment of the quantities or prices of output it is necessary to invoke utility and outcome, because characteristics that matter for consumers have also to be identified for quality adjustment. Thus, it is necessary to glance over the national accounts production boundary if one wants to deal with quality change in health and education services. This does not mean that the production boundary is shifted but it indicates that the quality of services cannot be identified without considering indicators falling outside the production boundary.
- **Conclusion 3:** In general, quality is multi-dimensional. For certain market health or education services, it may be possible to construct hedonic price indices that permit combining quality attributes into a single monetary measure. In many instances, this will not be possible and explicit quality adjustment has to be based on a single quality characteristic, which is directly linked to the impact on the “outcome”. The choice and measurement of this characteristic is key in the process and needs careful consideration.
- **Comment:** if quality adjustment is one-dimensional and based on health and education outcome, the above definition of output amounts to saying that the volume of output is measured as the contribution of production to outcome. When compared to more traditional approaches of explicit quality adjustment, such as hedonic techniques, the following points emerge. With hedonic techniques, several utility-enhancing characteristics are revealed *a posteriori* by examining observed market prices. The characteristics are compared and weighted on a monetary scale. In

utility derived from the state of health occurs at a different date from when medical services are provided. Second, there may also be a trade-off between immediate utility derived from consumption (say a fatty diet) and long-term disutility from reduced health status. This complicates formalisation of consumer behaviour but is secondary to the issue at hand, namely the measurement of health services.

the case of outcome-based quality adjustment, a single utility-enhancing characteristic is determined *a priori* and is measured on a non-monetary scale.

- **Conclusion 4:** with the above remarks on quality adjustment in mind, volume measures of output could generally be defined as the quality-adjusted counts of activities. Activities should be classified by consumer-relevant categories such as the completed treatment for a particular diseases or the level of education provided. These general definitions will be more elaborated in the relevant chapters.

Box 2. The meanings of ‘outcome’

Outcome has been used in different ways in the relevant literature on health services. Two usages are common:

In the health care literature, ‘outcome’ is typically defined as the resulting change in health status that is directly attributable to the health care received. Triplett (2001) indicates this usage in the cost-effectiveness literature and quotes Gold et al. (1996) who define a health outcome as the end result of a medical intervention, or the change in health status associated with the intervention over some evaluation period or over the patient’s lifetime. Employed in this sense, some authors suggest that the ‘output’ of the health care industry be measured by ‘outcome’.

Among national accountants, ‘outcome’ is typically used to describe a state that consumers value, for example the health status without necessarily relating the change in this state to the medical intervention. For example, Eurostat (2001) gives as examples of “outcome indicators” the level of education of the population, life expectancy, or the level of crime. Atkinson (2005) has the same usage of the word. Understood in this sense, outcome in itself cannot be a useful way to measure output or the effectiveness of the health or education system. In terms of national accounts semantics, the ‘marginal contribution of the health care industry to outcome’ is the equivalent to the notion of ‘outcome’ as used in the health care literature.

As long as a particular definition is used consistently, the substance of the argument is of course unaffected and the only question is the usefulness of definition or the other. As the present handbook follows in the line of Eurostat (2001) and the Atkinson Review (2005), it also employs the term ‘outcome’ in the sense of the national accounts literature.

33. Table 2 provides examples of measures of inputs, outputs, outcome and utility for a ‘traditional’ good (a car), a ‘traditional’ service (car repair), and health and education services. There is much common ground between the various measures for these products. Inputs are always made up of different types of labour, capital and intermediate inputs. Output can generally be considered as counts of actions or activities (in the case of services), and as counts of units (in the case of goods), each suitable differentiated to reflect quality differences. Outcome is the change in states that is valued by consumers – transportation services, a functioning car, health improvements etc. The production boundary as defined in the national accounts lies between output and outcome. However, as has been argued above, there may be a need to bring considerations of outcome into the measurement of output when it comes to quality adjustment. Such a blur of the borderline towards outcome is apparent in, although in no way unique to, the case of health and education services.

Table 2. Examples of inputs, outputs, outcome and utility

Good or service	Input	Output	Outcome	Utility
Car	<i>Labour</i> (hours of machine operators, managers, ...) <i>Capital</i> (hours of assembly robots, computers,...) <i>Intermediate inputs</i> (steel, tires, ...)	Number of cars with specified bundle of characteristics (e.g., engine power, type of safety equipment, type of upholstery)	Transportation services derived from using the car	Satisfaction from transportation services and from the car as such
Health services	<i>Labour</i> (hours of nurses, doctors, ...) <i>Capital</i> (hours of medical instruments, hospital buildings,...) <i>Intermediate inputs</i> (pharmaceuticals in hospitals, ...)	Number of quality-adjusted, complete treatments differentiated by type of disease	Change in the state of health	Satisfaction from improved quality and length of life
Education services	<i>Labour</i> (hours of teachers, ...) <i>Capital</i> (school buildings, ...) <i>Intermediate inputs</i> (food for pupils, ...)	Number of quality-adjusted pupil hours differentiated by educational level	Change in the state of knowledge and skills	Satisfaction from knowledge, and increased earnings capacity, change in discounted life earnings
Car repair services	<i>Labour</i> (mechanic's hours, ...) <i>Capital</i> (garage ...) <i>Intermediate inputs</i> (oil, brake pads ...)	Number of quality-adjusted, completed repairs differentiated by type of repair	Change in the stock of functioning cars	Satisfaction from transportation services and from the car as such

1.5. Cost and value weights

34. The considerations above already allude to the fact that in a non-market context, prices for goods or services are not in general observable. It could be argued that this may also be the case for market services where a price mechanism is observable but not necessarily a price per unit of output. For example, if health services are defined as completed cycles of treatment, the price for a particular completed treatment may not be directly observable, even under privately supplied health services because the observable pricing mechanism may be geared to individual activities rather than to a complete treatment. In other words, for both market and non-market services it may at times be difficult to observe prices that correspond to a conceptually satisfactory unit of output. There is also the issue of insurance: prices that are observed in some markets, in particular the market of health services, may not be indicative of consumers' willingness to pay if these are covered by health insurance. This leads us to conclude that differences in measurement between 'market' and 'non-market' provision of health and education services may be less pronounced than is sometimes assumed.

35. Whatever the precise difference between market and non-market set-ups in the health and education sectors, it is evident that volume or price indices of the kind shown in equations (1) and (2) necessitate a weighting system and for many products that are transacted on a market, observed revenue or expenditure shares constitute the obvious choice for such weights. However, in the absence of market prices or in the absence of prices that constitute signals to market participants, the relative valuation of a product by the consumer may differ from the relative costs of producing it. There are several ways of dealing with this situation:

- *Assume* that, on average, the relative valuation by the consumer equals the relative cost incurred by producers. For government producers, the argument is that in a democracy, and via the electoral process, consumers exert some influence over the production decision of governments so that the provision of non-market services is socially optimal, at least over longer periods. In this case, the equality between relative costs and relative utility or willingness to pay holds approximately and all that one needs to do is look for the empirical measurement of one of the

elements. Nearly always, costs will be easier to come by and so constitute the first choice from a practical perspective.

- *Impute* some value for the *relative valuation by the consumer* to generate aggregation weights. The imputation of consumers' valuations of certain medical or educational services implies embracing a fully developed consumer or welfare perspective in the estimation of the volumes of health and education services. This may be controversial from a national accounts perspective if it implies that the total value of health or education services is different from the total expenditure for these services, or if the construction of weights entails delicate questions such as the necessity to put a monetary value on human life⁹.

36. Which approach is preferable? On purely conceptual grounds, there is no easy answer. On the one hand, it can be argued that for purposes of constructing a volume index of non-market output, it is preferable to stick with the supply side and use weights that are based on costs rather than on consumer valuation. On the other hand, there is also a consumption component to government output (incidentally, 'government output' and 'government consumption' are often used interchangeably) which would suggest looking for weights that reflect consumer valuation.

37. In the absence of strong conceptual reasons to come down on one or the other side of valuation, it may be best to adopt a pragmatic approach and use cost weights and assume that equality of cost and utility shares holds at least approximately. Cost shares have the significant advantage of greater measurability than utility-based weights. In addition, using the cost shares as an imputation for the revenue shares of non-market output implies that the equality of total costs and total revenues at current prices is kept during every accounting period. This is in line with a principle of national accounts for the measurement of non-market output that stipulates that the value of non-market production equals the value of its inputs. If a different valuation of outputs were used, the total value of non-market production would not in general equal total costs. While this may not be a problem as such – in particular when non-market production is viewed from a pure welfare perspective – it poses a practical issue of dealing with an additional item in the national accounts ('social surplus' or 'social loss' arising from non-market production).

38. Another argument rests on the fact that if statisticians attempt to attach full-scale user values to changes in product characteristics for health and education services, this may introduce a bias with regard to the treatment of other products in the accounts. For example, the reduction in mortality and the associated gain in lifetime income that arise from the introduction of airbags in cars are not normally taken into account in the process of quality-adjusting car prices.

- **Conclusion 5:** when there are no or inadequate market prices, there is no guarantee that relative consumer valuation and relative costs for producers of a product coincide. Value weights and cost weights will therefore yield different results. However, in the absence of strong conceptual reasons against cost weights and in the presence of many practical reasons in favour, cost weights emerge as the best way towards implementation.

⁹ Using value weights for a price or quantity index does not necessarily imply putting a monetary value on a year of life. This may be required for cost-effectiveness studies (see Triplett 1999). However, basing weights on consumer valuation implies at a minimum, that indicators of outcome, for example QALYs in the case of health care, are compared across health service products.

1.6. Times series and cross-section analysis

39. The exposition has so far centred on measuring the volume output of education and health in a time series setting: this measures output growth between two time periods while holding the unit covered constant. In other words, it measures output growth in one country or part of a country *over time*. The principles set out earlier in this chapter can also be used to do the reverse of this: that is, to measure output over countries while holding time constant, that is carry out a “cross-country” comparisons. In other words, we can measure the volume output of several countries at one point in time. The aim should be that two countries producing the same number of identical items of a given quality would be measured as having the equivalent volume of output. The similarity with the method used for time series should be quite obvious: a time series comparison within a same country can easily be seen as comparing two countries: the old one and the new one. In other words, the method used to compare the UK in 1995 and the UK in 2005 should be consistent with the method used to compare the UK in 2005 with Turkey in 2005.

40. This similarity will be heavily used in this handbook: the quantity and quality indicators that are recommended for use in a time series analysis will be, at least conceptually, the same as the quantity and quality indicators to be used in cross-country comparisons, and vice-versa. For example, if we propose to follow the number of treatments by Diagnosis Related Groups (DRGs), adjusted for quality, to measure the growth of the volume of hospital services *over time* (i.e. for a given country), we will also propose to compare the volume of output of hospital services *of two countries* during the same year using an aggregate based on a comparison of numbers of identical treatments by DRG in each country. Vice-versa, if we propose to use an indicator of number of pupils together with a quality indicator based on an international assessment of scores (PISA) for comparing the education output in two different countries, we will also recommend using an indicator of number of pupils associated with a quality indicator based on scores in exams in order to measure the output of education in time within a single country. However, practice is more complicated than theory. For example, while PISA is a reasonable quality indicator for comparing the quality of countries’ education systems, it may be less adapted than national examinations to measure the change of the quality *over time* within a single country. It may therefore happen that, in practice, the recommendations differ between the time-series analysis and the cross-country comparison. This is why the time and spatial dimensions are in different sections in each of Chapters 2 and 3.

41. National accounts generally calculate volume time-series by deflating current price aggregates by adequate temporal price indices. Similarly national accounts use appropriate spatial price indices (“Purchasing Power Parities¹⁰”) to deflate current price aggregates (typically in different currencies) in order to compare the volume of output (or consumption) between countries. This handbook generally discusses quantity and quality indicators for health and education: number of treatments, QALYs, number of pupils, scores at exams. This may appear to be quite different from PPPs which, as explained, are price deflators, thus weighted price ratios. However, this difference is only presentational, because, as explained in the box of section 1.9, volume and price indices are reverse sides of the same coin. Indeed, comparing directly the number of treatments between two countries for a given DRG is exactly the same as deflating the cost associated with this DRG in the two countries by a PPP equal to the ratio of the unit cost of the given DRG treatment in each country. Thus the objective of this Handbook can equivalently be seen as constructing a set of PPPs for health and education *that correspond to an output based concept of volume*. Indeed, today, the PPPs that are used for the deflation of health and education non market services are input-based PPPs. They consist of *input cost ratios*, essentially labour cost ratios: in one, the costs of one hour of a doctor, nurse or teacher in each country are compared. The new PPPs that this handbook proposes are unit cost ratios for *outputs*: they are the ratio of the unit cost of a given DRG treatment or of a given year of education, where the quality of the treatment or of the year of education is controlled for.

¹⁰ See OECD (2006) for a description and interpretation of purchasing power parities.

1.7. Ensuring consistency between market and non-market measures

42. Having dealt with some of the conceptual issues in the previous section, the following discussion takes a look at measurement issues. More details on measurement of health and education services can be found in the relevant chapters of this Handbook.

43. Much of the discussion in this Handbook is about the measurement of *non market services*. But this should not hide the principle that the measure of the volume of education and health consumed by pupils and patients should not be affected *at all* by the status, whether market or non market, of the provider of the service. In other words, the measured volume of *non market services* should be the same as the one for measurement of the volume of *market services*, and vice-versa, as long as the services are the same. This has not been the practice in the past: there has been a tendency to create separate indices for market and non-market production. One objective of this Handbook is to encourage the compilation of consistent measures of health and education output, whether these services are provided by market or by non-market producers.

44. To achieve such convergence, an obvious first approach would be to simply apply the deflation method used for the market sector to the non market sector. Indeed, the existence of expenditure by households implies that there should be a Consumer Price Index calculated for these flows, and thus it seems there already exists an experience in calculating a volume/price split and the question arises whether this experience cannot be directly applied to the non market sector.

45. The response is yes, at least in general, even if in practice things are more complicated. In general terms, the volumes of *market services* are most commonly measured by deflating sales by an appropriate price index. The price index is calculated by weighting together price ratios, the amount spent on each service – a function of its quantity – providing the relative weights to aggregate the detailed price ratios. This method is deemed to function because we can observe prices and these prices are supposed to be representative of consumer preferences.

Box 3. Price index or volume index?

Before going further, it is important to understand that in principle, deflating sales to consumers by a consumer price index is equivalent to calculating directly a volume index by weighting together quantity indices which represent the volume of each homogeneous service; the amount spent on each service – a function of its price - providing the relative weights to aggregate these quantity indices. Index number issues aside, it makes thus little difference in concept whether one constructs a price index and then deflates sales or whether one constructs a volume index directly. However, statisticians generally think that, in practice, the sampling for a price index is easier to undertake than for a volume index, because prices are supposed to follow more similar trends than volumes. Even if this result is difficult to confirm scientifically, in practice, we see more volume indices in national accounts obtained through deflation by a price index than calculated directly.

In conclusion, this Handbook treats direct and indirect measurement of volumes symmetrically, to enhance consistency of treatment in the measurement of market and non-market services.

46. However, the extension from the market sector to the non market sector is more complicated. One first problem is that, in the non-market sector, we do not observe “market prices” but “unit costs” established in a non-market context (i.e. in a highly regulated context) and it is unclear how well unit costs reflect consumer preferences (see section 1.5 for a discussion). However, it is important to note that the classification of producers as ‘market producers’ or ‘non market producers’ does not necessarily mean that in one case they are facing pure market prices and in the other case there are no price signals whatsoever: prices may be regulated (and thus not entirely free) even if the sector is called ‘market’ in the national accounts. This may typically be the case for health services.

47. A second problem occurs because, in fact, the services provided by the market sector can be quite different from the one provided by the non market sector. Indeed, in some countries, the market sector in some domains such as hospital services or education is rather marginal and the type of service procured by this sector may be significantly different from the service procured by the non-market sector. In other words, the method to derive the volume of hospital services (or education) for the market sector may be not directly applicable to the non market sector simply because the types of services differ considerably. For example, the hospital market sector may be mainly dealing with small or standard interventions, for which it is easier to calculate a volume measure, while the public hospital services also cover much more complicated interventions, for which volume calculations are also more difficult. Thus, the market sector may not be representative for the entire sector.

48. The third reason is that, even for *market operators*, the principles for measuring prices and volumes of health and education services are not very well well-established. The existence of a CPI or PPI for market education or health services does not automatically imply that this CPI or PPI is a perfect price index. As explained earlier, there is as much difficulty in taking account of quality change in a price index as in a volume index. Price statisticians have long recognised these difficulties.

49. The United States are a case in point. A large part of expenditures on health in the US is directly attributed to household expenditure (see Box) and provided by “market producers”. These expenditures are therefore covered in the CPI. The volume of health services in the national accounts is then obtained by applying the relevant CPI deflator to health expenditure. However, the extensive literature on the difficulty of quality adjustment for health services in the US CPI shows that the basic problems with price indices are the same as with volume indices in other countries.

- **Conclusion 5:** the basic measurement methods used for the market and for the non-market sector should be consistent. Consistency concerns in particular the aggregation method, where the same type of weights should be used to combine quantities or prices of services into volume or price indices. The main issue is to ensure that the individual quantity changes measured in a volume index correspond to the price from which price indices are built up, whether in the market or the non market sector.

1.8. Measurement for different purposes: national accounts and performance indicators

50. This Handbook is limited to giving advice on the production of output measures which meet the requirements of the National Accounts and of education and health experts. These measures are founded on internationally-set classifications of activities and economic units. These rules are therefore set externally and not tied to managerial responsibilities within government units.

Box: Market/non market shares – some figures

In health and education services of OECD countries, governments intervene at different degrees and in different ways which makes it hard to produce and interpret simple shares of market versus non market production. The data issue is compounded by the fact that the country coverage of the OECD database on national accounts is incomplete at the level of detail needed for comparison. Also, different accounting practices between countries make international comparisons simply on the basis of national accounts difficult.

The first approach is to compare what is *expensed* by government and what is *expensed* by households. What is expensed by government is the final consumption expenditure of government (P13/S13) in the relevant COFOG positions (education: CG090, health: CG070). What is expensed by households is the final consumption expenditure of households (P31/S14) in the corresponding COICOP positions (education: CP100, health CP 060). This information can be used to compute the share of households in total expenditures on health or education.

Household shares in health and education expenditure, 2002
Percentage of household in total household and government expenditure

	Australia	Germany	Italy	Japan	Korea	UK	USA
Health	37	28	24	26	51	15	95
Of which hospitals*		7	4		12	3	40
Education	36	10	12	26	51	20	28

*The line for hospitals does not represent the share of private hospitals in total hospital expenditures, but the share of households' hospital payments over total health expenditures.

Source: OECD national accounts

In this table, the US appears very different from other countries regarding health: nearly all payments are deemed to be made by households. However, this may reflect a different convention in the national accounts rather than a real institutional difference with other countries: in the US national accounts, households are seen as paying the totality of medical goods and services and then are reimbursed by government (social security) in cash (D62). In other countries, reimbursements by government remain classified as payments made by government in kind (D6311). If one adjusts the number for the US, the share of households' expenditures becomes 57% from 95%.

It should also be noted that the table above cannot give an indication of the share of "market goods and services" compared to "non market good and services". Indeed, government expenditures include reimbursements made by government to market providers on behalf of households, such as reimbursements of medicine by social security to market providers of medicines. But the output of non-market goods and services can be approximated by the final consumption of general government (P3/S13) minus social benefits in kind via market producers (D631A)¹¹ in the corresponding COFOG positions (education: CG090, health: CG070). The output of market services can be approximated by the final consumption of households in the corresponding COICOP positions (education: CP100, health CP 060) plus these social benefits in kind subtracted above. Based on this approximation one obtains the following table.

Approximate share of market goods and services
Percentage share of household expenditures in total household and government expenditure on health or education, 2002

	Australia	Germany	Italy	Japan	Korea	UK	USA
Health	59	99	54	96	96	15	95
Education	38	10	12	26	52	20	28

Source: OECD national accounts

In the case of education, this table does not differ significantly from the preceding one. However, for health, the share of health market goods and services is much larger in most countries than the share of household expenditures. In Germany, Japan, Korea and USA, it is nearly 100%. In particular, hospitals are all apparently classified as market producers in these countries.

51. In addition to the ongoing production and development of the National Accounts, most governments and many international organisations are also working on a parallel agenda which aims to

¹¹ These social transfers in kind correspond to payments done by the government to *market producers* on behalf of households, in particular reimbursements of medicines and medical services. There is no specific code in the SNA for this sub-aggregate of D631, so I have called it D631A.

improve all aspects of efficiency in government, including education and health services.¹² This work takes the form of specific performance measurement exercises aimed at meeting efficiency targets set for different parts of government, often smaller than a whole ministry or local government unit. They can even be a hospital or a secondary school. These targets can be expressed in various quantitative forms, such as the number of people on waiting lists for treatment, how long they wait, the rate of hospital-acquired infections, success in exams, scores in academic inspections, etc...or may also be expressed in money terms or staff reductions. Their characteristic is that they are measurable. Such exercises have the potential to focus the minds of managers on improving efficiency. Their main purpose is to generate efficiencies in general and/or in money terms; measuring performance is usually a means of verifying this.

52. To check whether targets have been met, these exercises typically compare performance over two time periods. Successful measurement of this task therefore depends on comparing like with like so as to avoid errors or bias in the results. Changes in the internal structure and responsibilities of ministries or government units can make it difficult to achieve this. For instance, moving a particular responsibility from a ministry during this type of exercise would make any comparison invalid unless its effect could be quantified so that roughly similar responsibilities are being measured in both years. One common criticism of these performance indicators is that they may induce an incentive not to gain real efficiency, but to modify the work simply in order to meet the targets.

53. Despite these difficulties, the project of introducing performance indicators for government services is in line with the objective of measuring the output of non market services using output-based indicators. Often performance indicators are expressed in units that are correlated with the measure of consumer satisfaction (delay for hospital surgery, success to exams,...) and could be used as quality indicators. Some countries (such as Finland) have based their new estimates of government output in the national accounts directly on these performance indicators. Norway is also experimenting with this option. It is in fact more promising for other government services than education and health, for which quantity indicators are naturally available.

54. However there can be a significant difference between the two exercises related to the distinction between outputs and outcomes. Some performance indicators measure directly the status of the population and are not strictly limited to the contribution of the government service to this change in the status of the population. Thus the following two paragraphs of caution from Atkinson (2005) are fully applicable to the present handbook:

“The examination of the Public Service Agreement (PSA) targets of UK government departments shows that a number are concerned with total outcomes. In the case of Department of Health, for instance, PSA target 1 is to reduce substantially the mortality rates from the major killer diseases. This is a total outcome target. The same applies to PSA target 9 (reducing the under-18 conception rate) and PSA target 11 (reducing health inequalities). As we have already noted, national income measures the contribution of activities to outcomes, and these may be only part of the story. To give a specific example, the health status of the nation is affected by a range of factors – dietary and exercise habits, incidence of smoking and excessive alcohol consumption, as well as by the activities of the NHS (the UK government service for health). We would not want to conclude that the output of the NHS was worsening just because the other factors were showing an adverse trend.

¹² See, for instance a report on some work in the UK: The Efficiency Programme: A Second Review of Progress; http://www.nao.org.uk/publications/nao_reports/06-07/0607156es.pdf or the French “LOLF”, which sets performance indicators for all elements of the budget.

The construction of national accounts may make use of the same data sources as performance indicators, but the two activities are different. National accounts provide indicators of broad trends; to try to use them as microeconomic measures of public sector performance misunderstands their nature and limitations. National accounts are not a substitute for performance indicators, and there are risks in attempting to use them for such a purpose. At the same time, national accounts measures need to be coherent with the evidence from performance studies. The reasons for any differences should be understood, especially when the direction of change is different.”

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ANNEX 1: CLASSIFICATIONS USED IN NATIONAL ACCOUNTS

Classification by institutional sector

As regards institutional sectors, the main focus of this Handbook is non-market producers: these fall into the institutional sectors of central government, state government, local government, social security funds and non profit institutions serving households. Market sectors producing units relevant for education and health are classified within the corporation or the household sector. In the former, we will find private hospitals or some fully private profit making schools, in the latter will be classified in some countries, for example, general practitioners that operate without having a status of corporation.

Classification of consumption

As explained above, the most relevant aggregate for the analysis of consumption of education and health services is “actual individual consumption”. Non-market education and health services are produced for the benefit of households: they are consumed by individuals along with other goods and services from which they pay from their own pockets. The non-market services may be provided wholly or partly free of charge: in the latter case, both the contribution of the recipient and the value of the service provided free have to be included in the measure of consumption.

As in the industry approach, there is a standard classification system for presenting this comprehensive analysis of household consumption, called COICOP Classification of individual consumption by purpose. . The high level list of 10 categories is shown below, with the more detailed sub-categories being shown for Health and Education. This classification would have been very useful for the analysis of the consumption of health, (less of education which has no detailed breakdown in this classification) but, unfortunately it is, in practice, limited to the analysis of consumption *expenditures* and not actual individual consumption.

Insert a box round table text below

Classification of individual consumption by purpose (COICOP)

Individual consumption expenditure can apply in all categories

Social transfers in kind can apply in classes 3,5,6,8 and10.

1. Food, beverages and tobacco
2. Clothing and footwear
3. Housing, water, electricity and other fuels
4. Furnishings, household equipment and routine maintenance of the house
5. Health
 - 5.1. Medical and pharmaceutical products and therapeutic appliances and equipment
 - 5.2. Non-hospital medical and paramedical
 - 5.3. Hospital services
 - 5.4. Sickness and accident insurance services
6. Transport
7. Leisure, entertainment and culture
8. Education

- 8.1. Educational services
- 8.2. Educational materials
- 8.3. Ancillary educational services
- 9. Hotels, cafes and restaurants
- 10. Miscellaneous goods and services

Classification of public expenditures

An analysis of spending by government requires a different type of analysis: one which focuses more on the common purposes of government expenditure. The classification which is used in presenting statistical analyses of government expenditure is the Classification of total outlays of government by function (COFOG) [ref weblink to UN Classification page.] The high level details are shown in the box below.

Insert a box round table text below

Classification of total outlays of government by function

- 1 General public services
- 2 Defence
- 3 Public order and safety
- 4 Economic affairs
- 5 Environmental protection
- 6 Housing and community amenities
- 7 Health
- 8 Recreation, culture and religion
- 9 Education
- 10 Social protection

ANNEX 2: DETAILED EXTRACT OF ISIC REV 4

85 Education

See section P.

851 Pre-primary and primary education

See class 8510.

8510 Pre-primary and primary education

This class includes the provision of instruction designed primarily to introduce very young children to a school-type environment and instruction that gives students a sound basic education in reading, writing and mathematics along with an elementary understanding of other subjects such as history, geography, natural science, social science, art and music. Such education is generally provided for children, however the provision of literacy programmes within or outside the school system, which are similar in content to programmes in primary education but are intended for those considered too old to enter elementary schools, is also included. Also included is the provision of programmes at a similar level, suited to children with special needs education. Education can be provided in classrooms or through radio, television broadcast, Internet, correspondence or at home.

This class includes:

- pre-primary education
- primary education

This class also includes:

- special education for handicapped students at this level
- provision of literacy programmes for adults

This class excludes:

- adult education as defined in group 854
- child day-care activities, see 8890

852 Secondary education

This group includes the provision of general secondary and technical and vocational secondary education.

8521 General secondary education

This class includes provision of the type of education that lays the foundation for lifelong learning and human development and is capable of furthering education opportunities. Such units provide programmes that are usually on a more subject-oriented pattern using more specialized teachers, and more often employ several teachers conducting classes in their field of specialization. Education can be provided in classrooms or through radio, television broadcast, Internet, correspondence or at home. Subject specialization at this level often begins to have some influence even on the educational experience of those pursuing a general programme. Such programmes are designated to qualify students either for technical and vocational education or for entrance to higher education without any special subject prerequisite. This class includes:

- general school education in the first stage of the secondary level corresponding more or less to the period of compulsory school attendance
- general school education in the second stage of the secondary level giving, in principle, access to higher education

This class also includes:

- special education for handicapped students at this level

This class excludes:

- adult education as defined in group 854

8522 Technical and vocational secondary education

This class includes education typically emphasizing subject-matter specialization and instruction in both theoretical background and practical skills generally associated with present or prospective employment. The aim of a programme can vary from preparation for a general field of employment to a very specific job. Instruction may be provided in diverse settings, such as the unit's or client's training facilities, educational institutions, the workplace, or the home, and through correspondence, television, Internet, or other means.

This class includes:

- technical and vocational education below the level of higher education as defined in 853

This class also includes:

- instruction for tourist guides
- instruction for chefs, hoteliers and restaurateurs
- special education for handicapped students at this level
- cosmetology and barber schools
- computer repair training
- driving schools for occupational drivers e.g. of trucks, buses, coaches

This class excludes:

- technical and vocational education at post-secondary and university levels, see 8530
- adult education as defined in group 854
- performing art instruction for recreation, hobby and self-development purposes, see 8542
- automobile driving schools not intended for occupational drivers, see 8549
- job training forming part of social work activities without accommodation, see 8810, 8890

853 Higher education

See class 8530.

8530 Higher education

This class includes the provision of post-secondary non-tertiary and tertiary education, including granting of degrees at baccalaureate, graduate or post-graduate level. The requirement for admission is at least a high school diploma or equivalent general academic training. Education can be provided in classrooms or through radio, television broadcast, Internet or correspondence.

This class includes:

- post-secondary non-tertiary education
- first stage of tertiary education (not leading to an advanced research qualification)
- second stage of tertiary education (leading to an advanced research qualification)

This class also includes:

- performing arts schools providing higher education

This class excludes:

- adult education as defined in group 854

854 Other education

This group includes general continuing education and continuing vocational education and training for any profession. Instruction may be oral or written and may be provided in classrooms or by radio, television, Internet, correspondence or other means of communication. This group also includes the provision of instruction in athletic activities to groups or individuals, foreign language instruction, instruction in the arts, drama or music or other instruction or specialized training, not comparable to the education in groups 851 - 853.

This group excludes:

- provision of primary education, secondary education or higher education, see groups 851, 852, 853

8541 Sports and recreation education

This class includes the provision of instruction in athletic activities to groups or individuals, such as by camps and schools. Overnight and day sports instruction camps are also included. This class does not include activities of academic schools, colleges and universities. Instruction may be provided in diverse settings, such as the unit's or client's training facilities, educational institutions or by other means. Instruction provided in this class is formally organized.

This class includes:

- sports instruction (baseball, basketball, cricket, football, etc)
- camps, sports instruction
- cheerleading instruction
- gymnastics instruction
- riding instruction, academies or schools
- swimming instruction
- professional sports instructors, teachers, coaches
- martial arts instruction
- card game instruction (such as bridge)
- yoga instruction

This class excludes:

- cultural education, see 8542

8542 Cultural education

This class includes provision of instruction in the arts, drama and music. Units giving this type of instructions might be named "schools", "studios", "classes" etc. They provide formally organized instruction, mainly for hobby, recreational or self-development purposes, but such instruction does not lead to a professional diploma, baccalaureate or graduate degree.

This class includes:

- piano teachers and other music instruction
- art instruction
- dance instruction and dance studios
- drama schools (except academic)
- fine arts schools (except academic)
- performing arts schools (except academic)
- photography schools (except commercial)

8549 Other education n.e.c.

This class includes the provision of instruction and specialized training, generally for adults, not comparable to the general education in groups 851-853. This class does not include activities of academic schools, colleges, and universities. Instruction may be provided in diverse settings, such as the unit's or client's training facilities, educational institutions, the workplace, or the home, and through correspondence, radio, television, Internet, in classrooms or by other means. Such instruction does not lead to a high school diploma, baccalaureate or graduate degree.

This class includes:

- education that is not definable by level
- academic tutoring services
- college board preparation
- learning centres offering remedial courses
- professional examination review courses
- language instruction and conversational skills instruction
- speed reading instruction
- religious instruction

This class also includes:

- automobile driving schools
- flying schools
- lifeguard training
- survival training
- public speaking training
- computer training

This class excludes:

- adult literacy programmes see 8510
- general secondary education, see 8521
- driving schools for occupational drivers, see 8522
- higher education, see 8530
- cultural education, see 8542

855 Educational support activities

See class 8550.

8550 Educational support activities

This class includes:

- provision of non-instructional services that support educational processes or systems:
 - educational consulting
 - educational guidance counseling services
 - educational testing evaluation services
 - educational testing services
 - organization of student exchange programs

This class excludes:

- research and experimental development on social sciences and humanities, see 7220

86 Human health activities

This division includes activities of short- or long-term hospitals, general or specialty medical, surgical, psychiatric and substance abuse hospitals, sanatoria, preventoria, medical nursing homes, asylums, mental hospital institutions, rehabilitation centres, leprosaria and other human health institutions which have accommodation facilities and which engage in providing diagnostic and medical treatment to inpatients with any of a wide variety of medical conditions. It also includes medical consultation and treatment in the field of general and specialized medicine by general practitioners and medical specialists and surgeons. It includes dental practice activities of a general or specialized nature and orthodontic activities. Additionally, this division includes activities for human health not performed by hospitals or by practicing medical doctors but by paramedical practitioners legally recognized to treat patients.

861 Hospital activities

See class 8610.

8610 Hospital activities

This class includes:

- short- or long-term hospital activities, i.e. medical, diagnostic and treatment activities, of general hospitals (e.g. community and regional hospitals, hospitals of non-profit organizations, university hospitals, military-base and prison hospitals) and specialized hospitals (e.g. mental health and substance abuse hospitals, hospitals for infectious diseases, maternity hospitals, specialized sanatoriums)

The activities are chiefly directed to inpatients, are carried out under the direct supervision of medical doctors and include:

- services of medical and paramedical staff
- services of laboratory and technical facilities, including radiologic and anaesthesiologic services
- emergency room services
- provision of operating room services, pharmacy services, food and other hospital services
- services of family planning centres providing medical treatment such as sterilization and termination of pregnancy, with accommodation

This class excludes:

- laboratory testing and inspection of all types of materials and products, except medical, see 7120
- veterinary activities, see 7500
- health activities for military personnel in the field, see 8422
- dental practice activities of a general or specialized nature, e.g. dentistry, endodontic and pediatric dentistry; oral pathology, orthodontic activities, see 8620
- private consultants' services to inpatients, see 8620
- medical laboratory testing, see 8690
- ambulance transport activities, see 8690

862 Medical and dental practice activities

See class 8620.

8620 Medical and dental practice activities

This class includes:

- medical consultation and treatment in the field of general and specialized medicine by general practitioners and medical specialists and surgeons
- dental practice activities of a general or specialized nature, e.g. dentistry, endodontic and pediatric dentistry; oral pathology
- orthodontic activities
- family planning centres providing medical treatment such and sterilization and termination of pregnancy, without accommodation

These activities can be carried out in private practice, group practices and in hospital outpatient clinics, and in clinics such as those attached to firms, schools, homes for the aged, labour organizations and fraternal organizations, as well as in patients' homes.

This class also includes:

- dental activities in operating rooms
- private consultants' services to inpatients

This class excludes:

- production of artificial teeth, denture and prosthetic appliances by dental laboratories, see 3250
- inpatient hospital activities, see 8610
- paramedical activities such as those of midwives, nurses and physiotherapists, see 8690

869 Other human health activities

See class 8690.

8690 Other human health activities

This class includes:

- activities for human health not performed by hospitals or by medical doctors or dentists:
- activities of nurses, midwives, physiotherapists or other paramedical practitioners in the field of optometry, hydrotherapy, medical massage, occupational therapy, speech therapy, chiropody, homeopathy, chiropractic, acupuncture etc.

These activities may be carried out in health clinics such as those attached to firms, schools, homes for the aged, labour organizations and fraternal organizations and in residential health facilities other than hospitals, as well as in own consulting rooms, patients' homes or elsewhere. These activities do not involve medical treatment.

This class also includes:

- activities of dental paramedical personnel such as dental therapists, school dental nurses and dental hygienists, who may work remote from, but are periodically supervised by, the dentist
- activities of medical laboratories such as:
 - X-ray laboratories and other diagnostic imaging centres
 - blood analysis laboratories
- activities of blood banks, sperm banks, transplant organ banks etc.
- ambulance transport of patients by any mode of transport including airplanes. These services are often provided during a medical emergency.

This class excludes:

- production of artificial teeth, denture and prosthetic appliances by dental laboratories, see 3250
- transfer of patients, with neither equipment for lifesaving nor medical personnel, see divisions 49, 50, 51
- non-medical laboratory testing, see 7120
- testing activities in the field of food hygiene, see 7120
- hospital activities, see 8610
- medical and dental practice activities, see 8620
- nursing care facilities, see 8710

87 Residential care activities

This division includes the provision of residential care combined with either nursing, supervisory or other types of care as required by the residents. Facilities are a significant part of the production process and the care provided is a mix of health and social services with the health services being largely some level of nursing services.

871 Residential nursing care facilities

See class 8710.

8710 Residential nursing care facilities

This class includes:

- activities of:
 - homes for the elderly with nursing care
 - convalescent homes
 - rest homes with nursing care
 - nursing care facilities
 - nursing homes

This class excludes:

- in-home services provided by health care professionals, see division 86
- activities of homes for the elderly without or with minimal nursing care, see 8730
- social work activities with accommodation, such as orphanages, children's boarding homes and hostels, temporary homeless shelters, see 8790

872 Residential care activities for mental retardation, mental health and substance abuse

See class 8720.

8720 Residential care activities for mental retardation, mental health and substance abuse

This class includes the provision of residential care (but not licensed hospital care) to people with mental retardation, mental illness, or substance abuse problems. Facilities provide room, board, protective supervision and counseling and some health care. It also includes provision of residential care and treatment for patients with mental health and substance abuse illnesses.

This class includes:

- activities of:

- facilities for treatment of alcoholism and drug addiction
- psychiatric convalescent homes
- residential group homes for the emotionally disturbed
- mental retardation facilities
- mental health halfway houses

This class excludes:

- social work activities with accommodation, such as temporary homeless shelters, see 8790

873 Residential care activities for the elderly and disabled

See class 8730.

8730 Residential care activities for the elderly and disabled

This class includes the provision of residential and personal care services for the elderly and disabled who are unable to fully care for themselves and/or who do not desire to live independently. The care typically includes room, board, supervision, and assistance in daily living, such as housekeeping services. In some instances these units provide skilled nursing care for residents in separate on-site facilities.

This class includes:

- activities of:
 - assisted-living facilities
 - continuing care retirement communities
 - homes for the elderly with minimal nursing care
 - rest homes without nursing care

This class excludes:

- activities of homes for the elderly with nursing care, see 8710
- social work activities with accommodation where medical treatment or accommodation are not important elements, see 8790

879 Other residential care activities

See class 8790.

8790 Other residential care activities

This class includes the provision of residential and personal care services for persons, except the elderly and disabled, who are unable to fully care for themselves or who do not desire to live independently.

This class includes:

- activities provided on a round-the-clock basis directed to provide social assistance to children and special categories of persons with some limits on ability for self-care, but where medical treatment or education are not important elements:
 - orphanages
 - children's boarding homes and hostels
 - temporary homeless shelters
 - institutions that take care of unmarried mothers and their children

The activities may be carried out by public or private organizations.

This class also includes:

- activities of:
 - halfway group homes for persons with social or personal problems
 - halfway homes for delinquents and offenders
 - disciplinary camps

This class excludes:

- funding and administration of compulsory social security programmes, see 8430
- activities of nursing care facilities, see 8710
- residential care activities for mental retardation, mental health and substance abuse, see 8720
- residential care activities for the elderly or disabled, see 8730
- adoption activities, see 8890
- short-term shelter activities for disaster victims, see 8890