Chapter 3: A review of the health resource allocation formulae and their relevance to the Welsh situation

General features of weighted capitation formulae in the UK

Capitation (or risk adjustment) systems are widely used throughout the developed world (see the review by Rice and Smith in ACRA (1999) 09) and the driving force behind most of them is the need to control expenditure. Their general purpose is to devolve health care responsibilities from a central funder (national government in the UK) to health care 'plans' organised geographically (as in the UK), or as sickness funds (*eg* Germany) or as insurance pools (*eg* USA). Each 'plan' is intended to provide for the needs of the population it serves within a pre-set budget for a given time period.

Capitation methods are used for equity and efficiency reasons, although it is equity which is prominent in public health systems controlled by central governments. Thus, all UK resource allocation formulae operate on the principle of fairness or equity. They have the objective of equalising access to health care for equal need. As the health care system in the UK is geographically based, this means that 'health areas' in equal need of health care should receive equal resource allocations. Following the Acheson Report (1998), a new, additional objective for resource allocation, to contribute to the reduction in avoidable health inequalities, was introduced by the English government in 1998 and by the National Assembly for Wales in 2000. Research is being undertaken to determine how this new objective can best be met (see: ACRA papers; Sutton and Lock, 2000).

Capitation methods are centrally concerned with how to allocate limited resources between health care 'plans' (*eg* health authorities and local health groups). The weighted capitation formulae used in the UK typically address most, if not all, of the following:

- Population estimates
- Age-gender weights, reflecting the resource costs of (or numbers) utilising health services
- Additional health needs over and above those related to age and gender
- Unavoidable extra costs of healthcare provision, particularly those due to:
    - providing services to sparse and/or remote populations
    - market forces factors (that is, variations in staff, land, building and equipment costs)
    - other unavoidable costs (*eg*. in the English formula, due to ethnic minorities with English language difficulties and to the extra costs of treating rough sleepers)
- Special allocations for specific services (*eg.* for drug misuse; HIV prevention)

The Welsh, English, Scottish and Northern Irish formulae all rely on health service utilisation data and proxy socio-economic and/or mortality indicators to estimate health needs *indirectly*. Thus, they may all be criticised for not accurately reflecting true need and for assuming that past utilisation is an adequate guide to future requirements, including unmet need. The best available statistical methods have, however, been used in England, Northern Ireland and Scotland (but not Wales) to try to disentangle demand, supply and needs effects on utilisation.

Deficiencies of the Welsh Formula

The essential features of the Welsh Resource Allocation Formula, as applied in 2000/1, are summarised in Figure 3.1.

The Welsh formula fails substantially to reflect what is considered as 'best current practice' in England, Scotland and Northern Ireland for the following reasons:

- *Weak evidence base*
  The under-75 SMR is the sole proxy indicator of additional health needs and is widely viewed as an inadequate measure. For example, it is inappropriate (and thus not used) to reflect the additional needs for mental health services. Moreover, this SMR indicator has not been validated and weighted against any health service utilisation data. Rather, it has been assumed to have a weighting of one.

- *Use of out-of-date information*
  (i) The age-gender weights and sparsity cost adjustments for community health services are based on data from 1982/3.

  (ii) The expenditure shares (%s) used to combine resource estimates for each health sector (in-patient, out-patient, community health, ambulance and mental illness) are based on expenditures in 1990/1.

- *No control of supply effects when using utilisation data*
  Health service utilisation data will reflect not only needs but also the differential availability of supply. Statistical methods used to separate out these need and supply influences on utilisation have not been used in the construction of the Welsh formula.

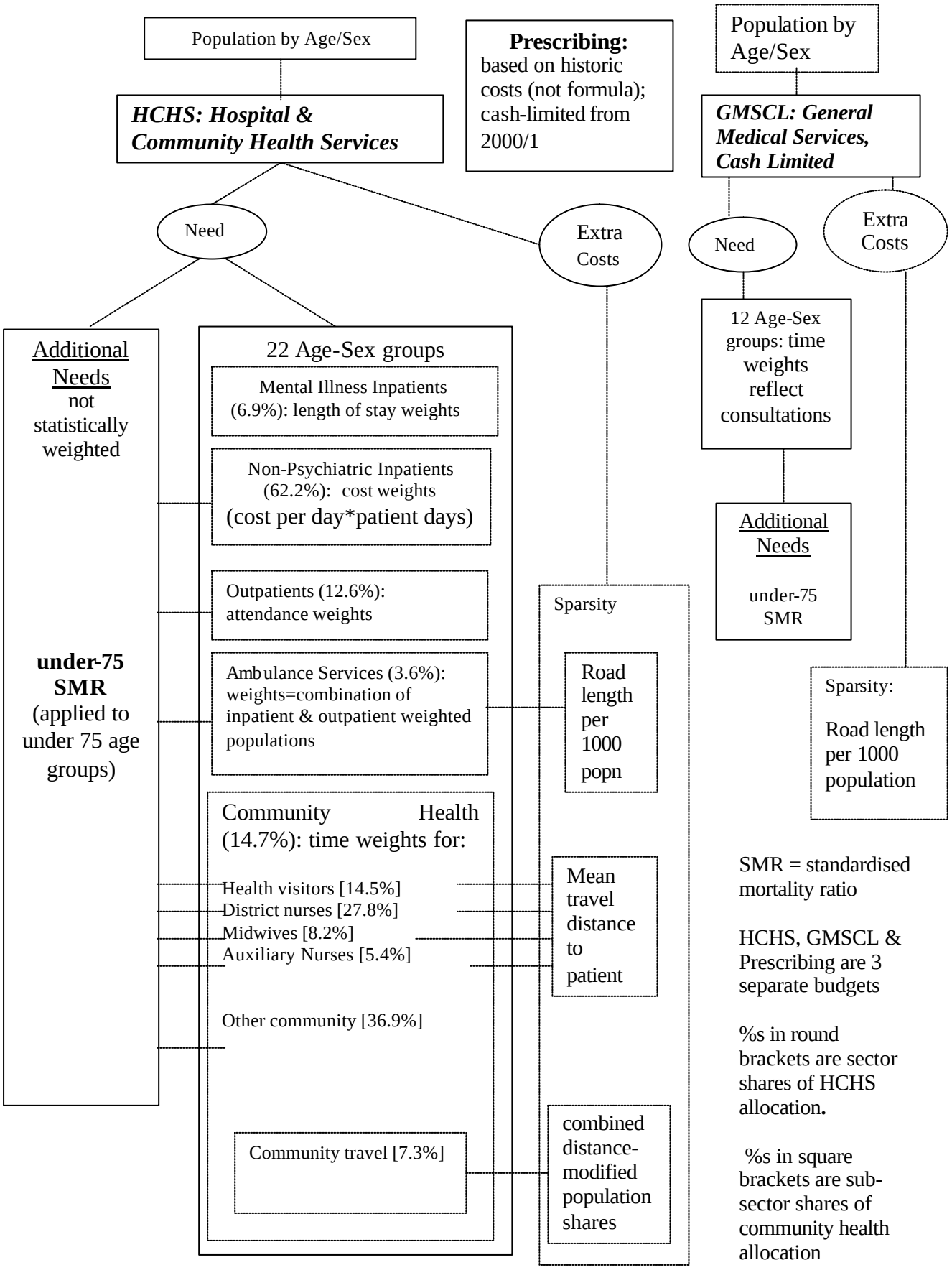
The Welsh Office/NHS RAWG (1998) review of the Welsh formula made the following recommendations (which were not implemented):

(a) Include socio-economic indicators of need used in the English formula with weightings modified using Welsh expenditure.

(b) Despite lack of hard evidence, replace the current sparsity factors for community health and ambulance services with a Rural Cost Premium.

(c) That, on the basis of wage differentials, no benefit was to be had from developing a Market Forces Factor (MFF). However, it was noted that a Capital Charges Working Group (CCWG) would consider the valuation of land and buildings. The CCWG subsequently recommended the use of a land MFF.

Figure 3.1: Welsh resource allocation



Lessons for Wales from Scotland

The essential features of the Scottish Resource Allocation Formula are summarised in Figure 3.2 (see also SEHD, 1999a; 1999b; 2000).

1. *Overall Approach*. It represents current best practice for constructing a resource allocation formula using *indirect evidence of health needs*. However, the approach is very data demanding, requires the use of complex statistical analyses (which hinder transparency and comprehensibility) and took two and a half years to complete. It should be noted that the Scottish NHS has a better range and quality of health service utilisation data available than the Welsh NHS. Moreover, the availability of Census data by postcode sector facilitated the Scottish use of postcoded patient data. Some of the Scottish findings on the costs of health provision and on population estimates (see below) are of relevance to both direct and indirect approaches to resource allocation.

2. *Coverage of health services*. Arbuthnott developed formulas for GP prescribing and both Cash-Limited and Non-Cash Limited General Medical Services (GMSCL and GMSNCL). The unified budget in Scotland (and England) includes HCHS (Hospitals and Community Health Services), prescribing and GMSCL. There are currently three separate budgets in Wales and prescribing is based on historic costs rather than a formula. Historic cost approaches emphasise past patterns of utilisation and supply and are thus less responsive to changing needs.

3. *Extent and testing of evidence on health needs.* Premature mortality and a wide range of socio-economic and demographic ('indirect') measures of health needs, as well as limiting long-term illness, have been rigorously examined to establish (statistically) their influence on the utilisation of health services (SEHD, 1999a; 1999b). However, use of a large number of proxy need indicators led to instability between care programmes and adjacent years in the significant influences identified.

4. *Identification of the most important (and updateable) needs indicators.* To avoid instability, a restricted number of the more important need indicators have been identified and combined into the composite 'Arbuthnott' index. This also helps to make the construction of a formula more transparent, more comprehensible and less time-consuming. Additionally, three of the indicators chosen can be updated between Censuses (they are; under 65 SMR; the unemployment rate; the proportion of elderly on income support). The other indicators can be updated when the 2001 Census results become available in 2003. These latter indicators are: unemployed or permanently sick head of household; low socio-economic group; overcrowding; large households; lone parent families; all-elderly households. If an indirect approach is required in Wales, the Scottish and Northern Ireland studies suggest key indicator data that will be needed.

5. *In-patient treatment costs.* Arbuthnott recommended more transparent and accurate costing of hospital episodes using fixed treatment and variable length-of-stay costs. Medical, theatre and laboratory costs were treated as fixed per episode, while other costs were taken as related to length of stay. While such cost data are available in Scotland, this split of costs does *not* appear to be routinely available for Wales. However, it is recommended that the product of numbers of births and costs per birth be used for maternity services in Wales, rather than the current (and rather obscure) practice of absorbing such costs into the age weights of females in the childbearing age groups. In Scotland, maternity costs are available by age of mother.

6. *Excess costs in rural/remote areas.* The findings on the delivery of health services to rural and remote areas in mainland Scotland (but not the islands) may be of some relevance in Wales, especially for community services. Several rural, mainland health boards in Scotland are estimated to need up to 10% additional resources per head to cover additional costs of hospital services, and up to 23% for GMS costs (SEHD, 1999a; 1999b). For both hospital and general medical services, population densities and the proportion of the population living in settlements of various sizes were shown to be (statistically) related to health boards' hospital expenditures (total and disaggregated by sector) and GMS costs (SEHD, 1999b). In the final report (SEHD, 2000), road kilometres per thousand population was the sole preferred remoteness indicator for estimating the extra costs of (total) hospital services. The GMS formula in the final report was developed using data for over one thousand practices (rather than health boards), and controlled for age/gender characteristics of practice patients, health board policy, list inflation and deprivation (GMS Working Group, 2000). Additionally, the proportion of practice populations qualifying as 'road mileage' patients was included as an additional significant influence. For travel-intensive community health services in Scotland, consultants (NERA, 1999) took account of settlement location and size in developing an excess cost index for district nursing and health visiting to reflect provision, travel times and the employment of higher-grade nurses.

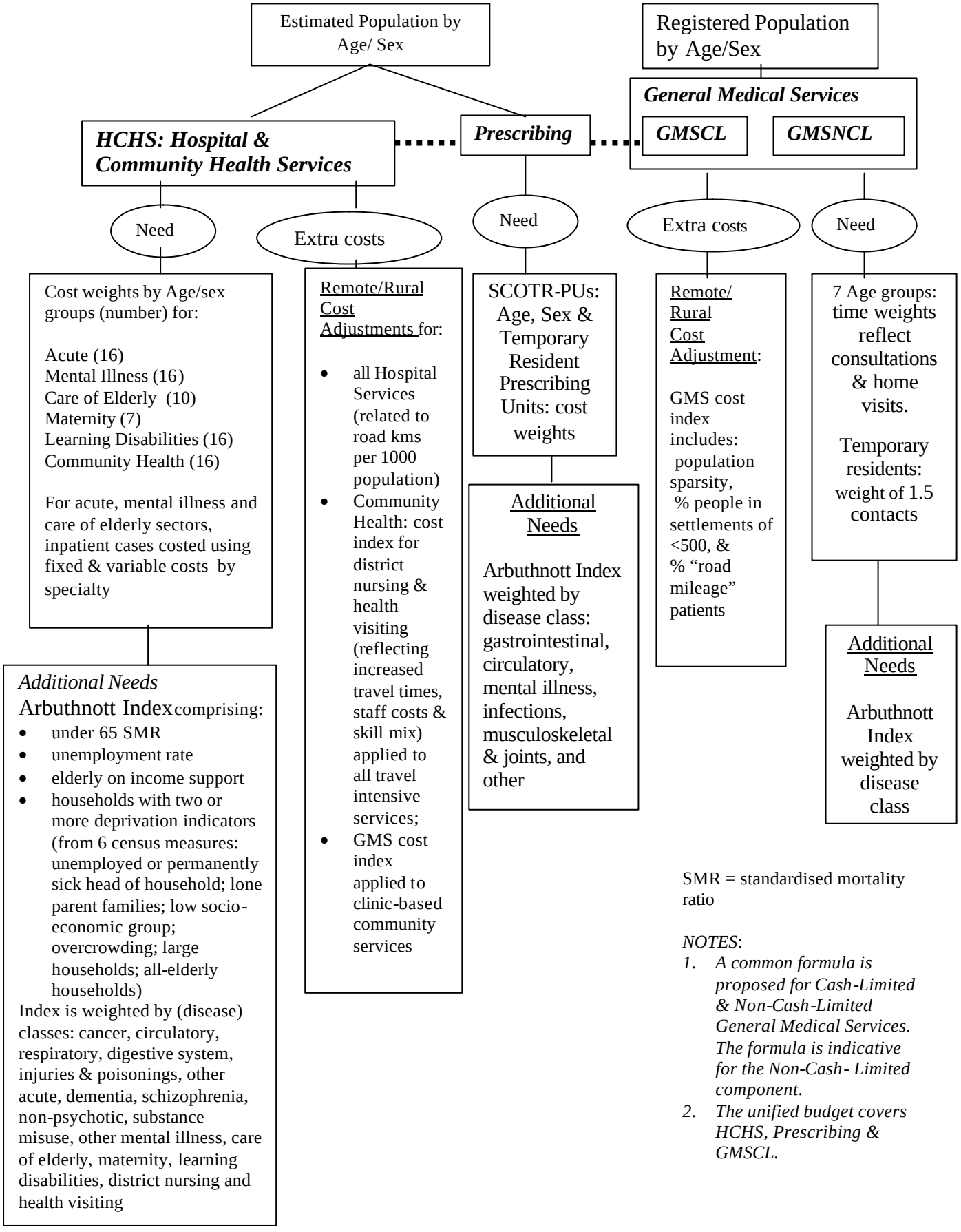
   The Scottish remoteness formulas for hospital expenditure and GMS costs have now been exemplified for Wales (Senior and Rigby, 2001) and some appropriate caveats mentioned. For example, it is not clear that the Highland health board in Scotland, which attracts the largest remoteness adjustments of the mainland boards, is closely comparable with any health authority in Wales. Preferably, the costs of rurality/remoteness should be examined using Welsh data, rather than transferring formulas calibrated on Scottish evidence.

7. *Market Forces Factors (staff, land and building costs).* It was concluded that there was no evidence to support the use of a staff market forces factor and that a land/buildings factor would make little difference. This aspect of resource allocation should probably not be a priority for Wales, especially if staff grade inflation is built into a rural cost adjustment.

8. *Population statistics.* The Arbuthnott reports (SEHD, 1999a; 2000) provided evidence that mid-year population estimates are significantly more reliable than population projections. Thus, mid-year estimates should continue to be used in Wales. However, as GPs are paid according to their registered patients, the use of registered populations for the General Medical Services part of the resource allocation was recommended (SEHD, 2000).

9. *Unmet need and health inequalities.* The Arbuthnott consultation report (SEHD, 1999a), although presenting some evidence on inequalities in health care, did not recommend an immediate adjustment to the resource allocation formula. Instead, it argued for further research. On-going research in Scotland on these issues (*eg* Sutton and Lock, 2000) is attracting wider attention (*eg* by ACRA in England) and should be kept under review.

Figure 3.2: Scottish "Fair Shares" resource allocation formulas



SMR = standardised mortality ratio

NOTES:

1. *A common formula is proposed for Cash-Limited & Non-Cash-Limited General Medical Services. The formula is indicative for the Non-Cash- Limited component.*
2. *The unified budget covers HCHS, Prescribing & GMSCL.*

Lessons for Wales from Northern Ireland

The essential features of Northern Ireland's Resource Allocation Formula are summarised in Figure 3.3.

1. *Social Services.* Resource allocation in Northern Ireland covers Social Services, not just Health, so care must be taken in drawing lessons, especially from the elderly care programme.

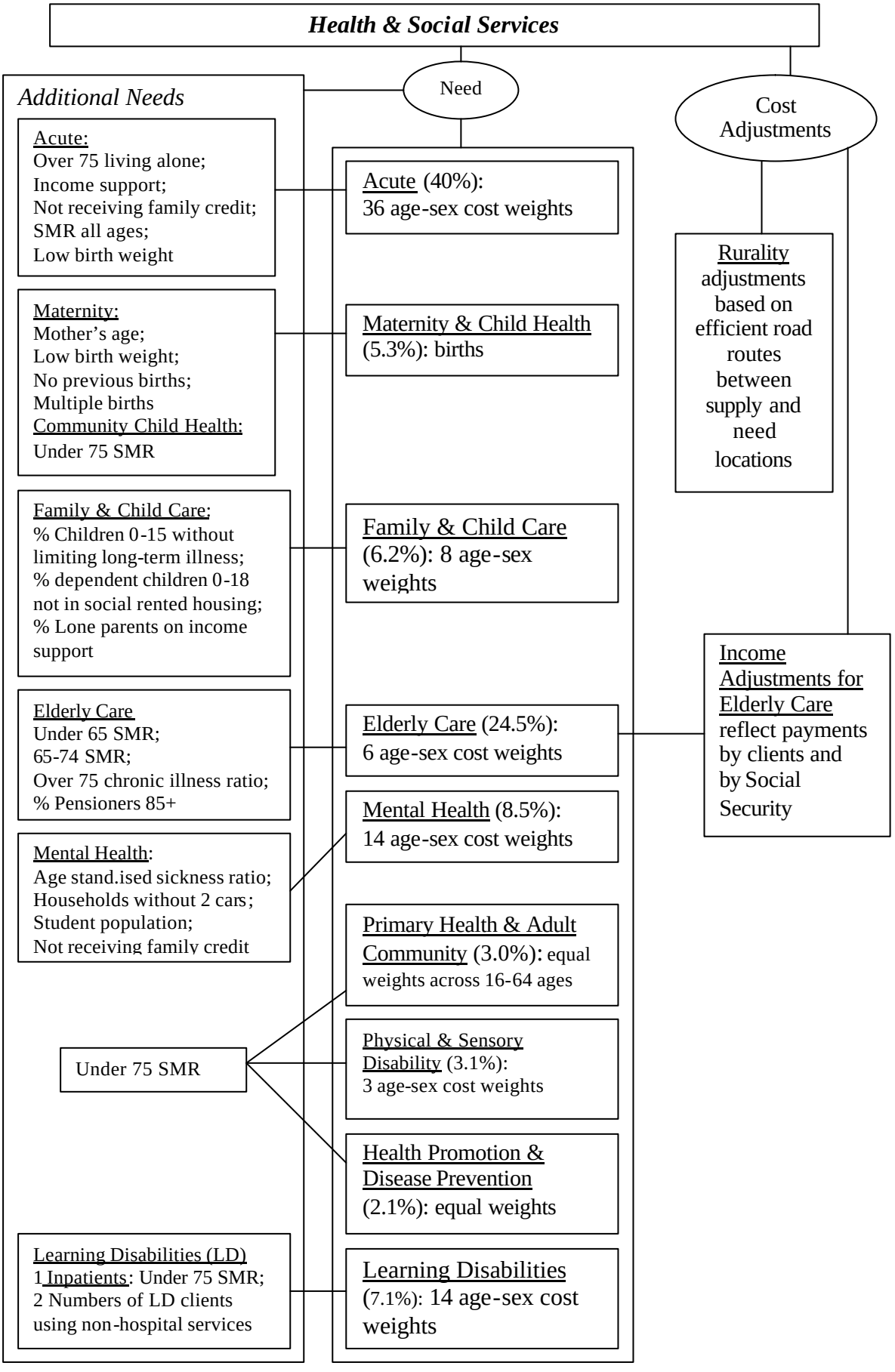
2. *Formula review and development.* The formula has been developed incrementally since the mid-1990s (as in England) under the auspices of the Capitation Formula Review Group. Hence, best practice research is incorporated as the formula is developed.

   Members of the National Assembly for Wales may therefore wish to consider setting up a small review group in Wales to monitor the operation of the new formula, to suggest fine-tuning of it and to recommend improvements. There are arguments about not changing the new formula in the short-term in the interests of promoting stability (and allocations for three years might be preferable to annual ones). However, there are counter-arguments that a formula should not be allowed to become outdated as that might require more abrupt and disruptive changes in the medium to longer term. Commenting on this issue in the Scottish review, the Arbuthnott consultation report (SEHD, 1999a, p179) stated: "*In order for Scotland not to fall behind again the Steering Group is agreed that it would be beneficial to mount more regular reviews of the method of allocating resources*".

3. *Additional needs indicators.* A number of distinctive additional needs indicators are used in Northern Ireland, notably receipt of family credit and, for maternity services, no previous births and multiple births. The availability of these in Wales should be investigated.

4. *Rural cost adjustment.* The analysis of digital road networks to find efficient routes for delivering health services in rural areas is worthy of further scrutiny, especially in relation to the approach of NERA (1999) for Scotland.

Figure 3.3: Northern Ireland: proposals (October 2000)



Lessons for Wales from England

The essential features of the English Resource Allocation Formula, as applied in 2000/1, are summarised in Figure 3.4.

1. *Formula review and development.* The English formula has been subject to continual development and improvement and it has influenced substantially the reviews in Scotland and Northern Ireland. It was substantially revised in the mid-1990s following analyses using 1991 Census data by the University of York's Centre for Health Economics. Subsequent work by the Universities of Kent and Plymouth (1996) led to revisions of the formulas for community health. Additionally, a study of the costs of providing health services in rural areas (MHA and Operational Research in Health Ltd, 1997) has informed the introduction of an Emergency Ambulance Cost Adjustment (EACA) in 1998 and the prescribing formula has recently been revised and implemented (Rice *et al*, 1999). In recent years, the resource allocation formula has been kept under almost permanent review, first by the Resource Allocation Group and then, since September 1997, by the Advisory Committee on Resource Allocation (ACRA). There has been a freeze on further changes to the English formula since November 1998, pending a wide-ranging review, under the auspices of ACRA, of the possibilities of reducing health inequalities.

   This experience further reinforces the recommendation to consider setting up a formula review group in Wales (see under Northern Ireland above).

2. *Additional needs indicators*. While a wide range of indicators have been validated and weighted for the English formula, most are from the Census and thus not readily updated between Censuses. For this reason, the RAWG proposals in Wales (Welsh Office/NHS RAWG, 1998) to adopt a modified English formula would be unwise, especially as the English formula is due for major review.

3. *Market forces factors*. England has the most sophisticated treatment of such factors, especially for staff costs. However, its relevance to Wales is questionable, especially as Wales does not appear to have the equivalent of a 'London and South East' effect, particularly on wages and salaries (see Welsh Office/NHS RAWG, 1998). On the other hand, given the recommendation of the Capital Charges Working Group in favour of including land values, the English treatment of land values for NHS Trusts should be of interest in Wales.

4. *Population figures.* The English use of population projections instead of mid-year estimates is <u>not</u> recommended for Wales because of evidence from Scotland that the latter are more accurate. However, the intention to move as soon as possible to registered populations in England serves as a reminder that the problem of GP list inflation should be remedied quickly.

5. *In-patient treatment costs.* Consultants (Mallendar Hancock Associates, 1998) were commissioned to derive the fixed and variable costs associated with 12 specialties. Unless the results of such work can be adapted for the Welsh context, then this more transparent and accurate treatment of in-patient costs cannot be implemented in Wales.

6. *Prescribing*. The English resource allocation was the first to move to a formula-based, rather than historic costs approach, to prescribing, and to incorporate the latter in an unified budget. Scotland and Northern Ireland (Rice, 1999) have followed suit. Wales

still uses a historic costs approach, which runs the risk of being insufficiently sensitive to needs. The formula-based approach includes a weight for temporary residents, which is particularly relevant to those areas of Wales attracting tourists.

7. *Rurality and the emergency ambulance cost adjustment (EACA).* Specially commissioned research (Mallendar Hancock Associates and Operational Research in Health Ltd, 1997) examined the effects of rurality on the costs of providing:

   - emergency ambulance services
   - patient transport services
   - Accident and Emergency (A&E) services.

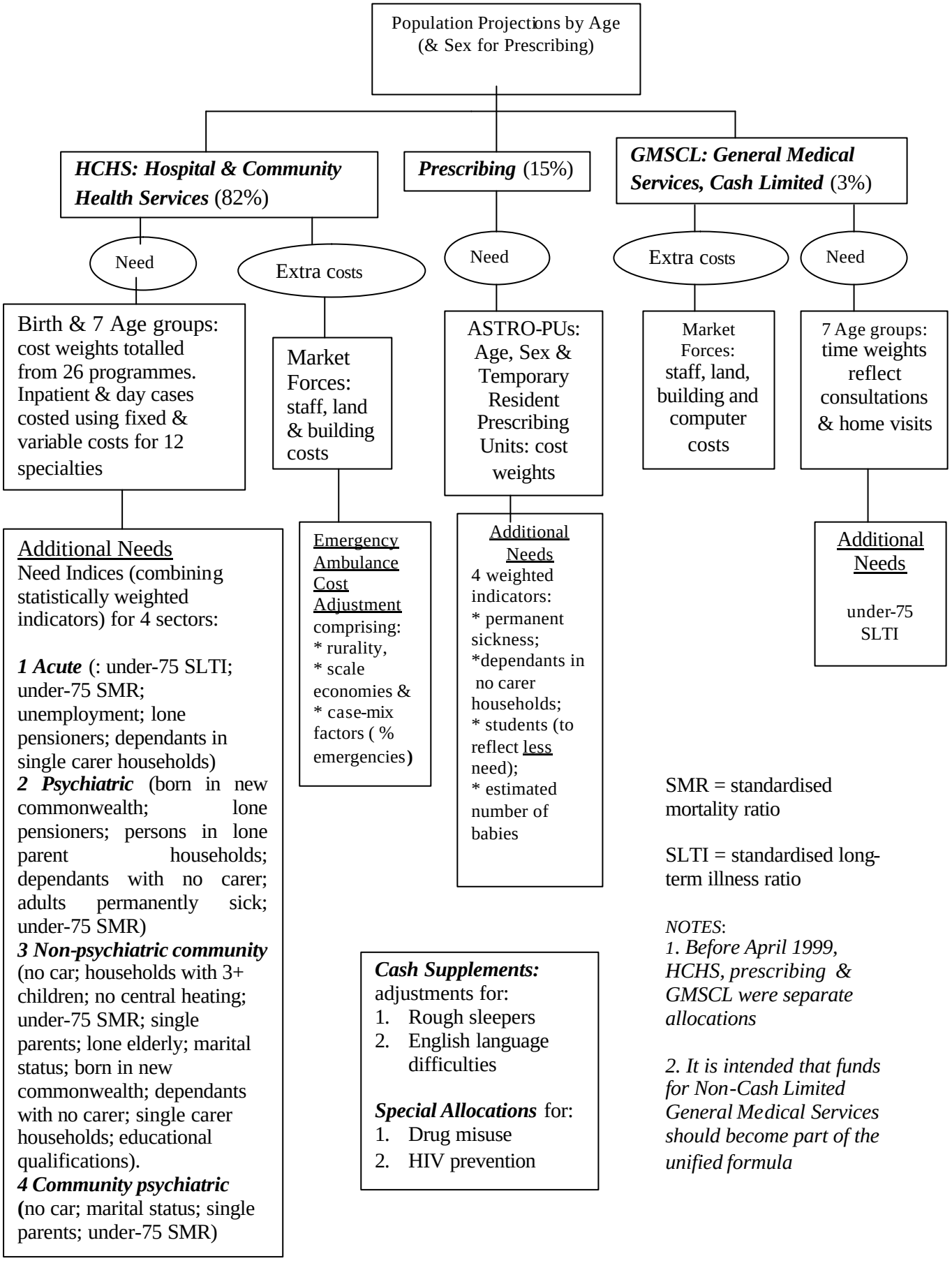
   No convincing evidence was found that rurality led to extra costs of providing patient transport services. Although a greater requirement for smaller (and less efficient) A&E departments in rural rather than urban areas was suggested, there were compensating diseconomies of more specialities in larger, urban A&E facilities. Thus, there was no clear relationship between Health Authority expenditure on A&E and rurality.

   However, unit costs for emergency ambulance services were found to be significantly related to a rurality index but also to scale economies (that is, the number of journeys) and to case-mix (the proportion of journeys classed as emergencies). A variety of population density measures were used to reflect rurality. The preferred one was population weighted geometric mean density, built up for each health authority from ward-level data. It was argued that this geometric measure captures both differences in population density and relative differences in population clustering or dispersion between health authorities.

8. *Unavoidable costs of ethnicity.* Research by the University of Warwick (CRER and CHESS, 1998; CHESS and CRER, 1998) has examined the need for, and use of, interpreter, advocacy and translation (IAT) services for ethnic minority patients who have difficulties with the English language. A statistical relationship was developed relating IAT costs and the estimated proportions (based on country of birth) of Health Authorities' populations with such language problems. A cash supplement reflecting these IAT is paid to qualifying English Health Authorities. ACRA expressed concern about the materiality of this addition to the formula but it was considered important to respond to this ethnic minority issue. In principle, the English IAT formula could be applied in Wales, although it would allocate only a tiny level of resources (about £30 per resident with English language difficulties in 1999/2000).

9. *Non-cash-limited General Medical Services.* There are plans in England to bring the currently separate non-cash-limited GMS resources within the unified budget. ACRA has been charged with developing a methodology for this (see ACRA paper (2000) 11).

Figure 3.4: English resource allocation: the unified formula



ACRA and inequalities in health in England

ACRA (Advisory Committee on Resource Allocation) has been particularly concerned with the new resource allocation objective of contributing to the reduction in avoidable health inequalities. ACRA's view is that much of the NHS functions as a sickness service largely unrelated to addressing health inequalities. Consequently, resource allocation for these core services should *not* seek to meet the new inequalities objective but continue to be based on a traditional utilisation approach, which is now in need of updating in England. To make progress on the inequalities objective a separate budget should be established, underpinned by a new methodology.

This advice from ACRA has now been accepted by English Ministers, who have announced a new health inequalities budget (and Wales, but not yet Scotland, has followed suit). ACRA are suggesting an interim 'top-down' approach, using aggregate area-based measures, to allocating these health inequalities resources. Research has focussed on cardiovascular diseases and cancers (especially of the lung and stomach), because they: (i) have well defined health inequality gradients; (ii) are known to be leading causes of premature death and morbidity; and (iii) are preventable by effective and timely health service interventions. Attention has focussed on 'Years of Life Lost' as an indicator of need for health inequalities resources.

In the longer-term, ACRA would like to see a 'bottom-up' approach informing the allocation of both core and health inequality resources. This would be based on individual level data, and the Swedish system is often held up as a good example. Essentially a capitation matrix, involving a cross-classification of person attributes and health needs/service utilisation would be developed, with a 'bounty' placed on each person-treatment category. There are many problems with developing a 'bottom-up' approach, so it is only likely to be usable in the long term.

ACRA notes that resource allocation is only an enabling device for tackling health inequalities. How the resources are used is the key issue. Thus, performance management will be essential and Ministers are keen to build performance rewards into the allocations.

International comparisons

Rice and Smith (1999) (ACRA paper (1999) 09) have undertaken a broad international survey of approaches to capitation in health systems. They have categorised health 'plans' into those that are geographically based (as in the UK) and those that are sickness funds or insurance schemes. They have further classified the factors used in deriving capitations into individual-level, plan-level and others. Their findings are summarised in Tables 3.1 and 3.2.

Virtually all the schemes they have examined rely heavily on empirical evidence, although political judgement may figure prominently (*eg* in Norway). With the exception of New Zealand, adjustments are not normally made for under-utilisation (unmet need) of health services. Supply-induced demand is of concern and its effects are sometimes eliminated from the calculations (*eg* in Belgium). Similarly, standard or national costs are often used so as not to reward inefficiencies in service delivery. However, unavoidable cost variations are recognised, such as the higher costs in rural or remote areas (*eg* in Canada, Finland, New South Wales and New Zealand).

Two main approaches to setting capitations are employed. One is the 'index' approach, which uses aggregate measures (*eg* from censuses) to indicate relative needs (as in Belgium). The other is the 'matrix' approach, such as that used in Sweden, which has already been mentioned above (see the section on ACRA). The systems in the UK can be regarded as mixed approaches, as population data are cross-classified by age and sex, but not by other dimensions of socio-economic variation, which are handled in an aggregate manner. The specific factors used in the formulae are summarised in Tables 3.1 and 3.2 (derived from Rice and Smith, 1999).

On the basis of their survey, Rice and Smith make the following recommendations:

- The scope for using (a) individual data, (b) data on prior (non-discretionary) use of health care, and (c) information on certain (high expenditure) patients should be examined.

- Variations in the costs of providing standard levels of health care should be more rigorously researched.

- The tendency to develop formulas for increasingly disaggregated categories of service should be reviewed, as the possibility of substitution of treatments between sectors may be missed.

- Some formulas may have become too complex (notably in the UK). A thorough review is needed of the materiality of the adjustments made.

Table 3.1: Geographically-based health resource allocation schemes

Country	Scheme	Plans	Individual Level	Plan Level	Other Factors
Australia	New South Wales Resource Distribution Formula	17 Area Health Services	Age; Sex; Ethnic Group; Homelessness	Mortality; Education level; Rurality	Private utilisation; Cross-boundary flows; Cost variation
Canada	Alberta Population Based Funding Model	17 Regional Health Authorities	Age; Sex; Ethnicity Welfare status	Remoteness	Cross-boundary flows; Funding loss protection; Cost variations
Finland	State Subsidy System	452 Municipalities	Age Disability	Archipelago Remoteness	Tax base
France	Regional Resource Allocation	25 Regions	Age		Phased implementation
Italy	Regional Financing Scheme	21 Regional Governments	Age Sex	Mortality	Damping mechanism
New Zealand	Health Funding Agency Population Based Funding Formulae	4 Regional Health Authorities	Age; Sex; Welfare status; Ethnicity	Rurality	Phased implementation
Norway	Local Government Finance System	19 County Governments	Age Sex	Mortality; Elderly living alone; Marital status	Tax base
Spain	Regional resource allocation system	7 regions			Cross-boundary flows Declining population adjustment
Sweden	Stockholm County Hospital resource allocation formula	26 county councils	Age; Living alone Employment status; Housing tenure; Previous in-patient diagnosis		Phased implementation
USA	Veterans Equitable Resource Allocation	22 Veterans Integrated Service Networks	Dependency (x2)	Labour costs	Phased implementation

Table 3.2: Non geographically-based health resource allocation schemes

Country	Scheme	Plans	Individual Level	Plan Level	Other Factors
Belgium	National Institute for Sickness and Disability Insurance Risk Adjustment Scheme	100 sickness funds		Age; Sex; Disability; Unemployment; Mortality; Urbanisation	
Germany	Federal Insurance Office Risk Adjustment Scheme	sickness funds	Age; Sex		Income base
Israel	National Risk Adjustment Scheme	4 sickness funds	Age		
Netherlands	Central Sickness Fund Board Risk Adjustment Scheme	26 sickness funds	Age; Sex: Welfare/Disability status	Urbanisation	Retrospective adjustments; Income base
Switzerland	Federal Association of Sickness Funds Risk Adjustment Scheme	sickness funds	Age; Sex; Region		Income base
USA	Medicare + Choice (from 2000)	Healthcare Maintenance Organisations	Age; Sex; Disability; Welfare status; Previous in-patient diagnosis; county of residence		

Characteristics and requirements of an indirect approach to building a health resource allocation formula (with particular reference to the Scottish "Fair Shares" model)

The National Steering Group requires that both direct and indirect approaches to resource allocation should be investigated. This section uses the review of resource allocation formulae elsewhere in the United Kingdom, particularly in Scotland, to identify the features of current best practice for the indirect approach. It identifies the broad data and analytical requirements of such an approach and seeks to inform the discussion and planning of an indirect approach.

The components of an indirect approach

The resources required by a health authority are taken to be proportional to:

Population by age/sex multiplied by:

(1) cost or volume weights by age/sex group
(2) index of additional needs
(3) index of unavoidable excess costs of service provision

Both the direct and indirect approaches require similar (national) costs of treatment data and both should account for unavoidable excess costs of providing health services. Their major difference relates to health care needs. The direct approach uses morbidity data to measure such needs. The indirect approach relies on health service *utilisation* data by sector to measure those needs in two stages: basic needs by age and sex (1); and additional needs due to influences (*eg* deprivation) over and above the age/sex effects (2).

Stage (1): Needs by age and sex

Health service utilisation data typically required are:

- hospital episodes by specialty and length of stay, and births for maternity services
- visits by community health service type
- GP consultations
- dispensed prescriptions

Hospital episodes and prescriptions are costed by age and sex group. Hospital episodes have traditionally been costed on a bed day basis but the English and Scottish formulas now use more accurate and transparent treatment and length of stay costs. Maternity costs in Scotland are costs per birth, with variations by age of mother.

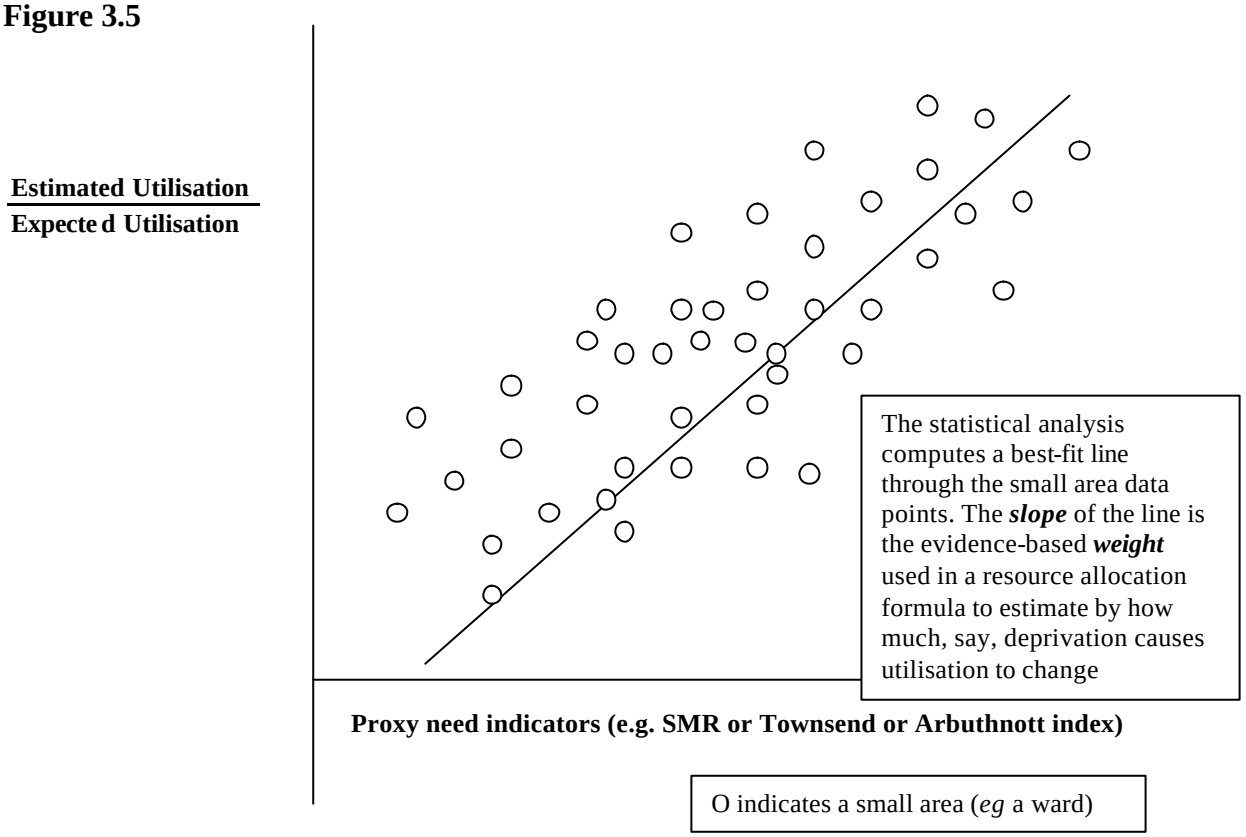
For Community Health and General Medical Services (GMS) in Scotland, volume measures (numbers of visits and consultations) by patients' age and sex are used as weights without any attached costing. In England, community health expenditure is allocated in proportion to activity by age group and GMS weights are consultation times, including home visits.

National age-sex weights are calculated by summing these costed and volume utilisation figures to give total health sector resources consumed by each age-sex group. An average cost/volume per head by age-sex group is obtained by dividing by the population in each group.

Stage (2): Additional needs

Additional needs are estimated statistically by relating utilisation of health services to proxy need measures, usually reflecting the socio-economic and, possibly, premature mortality and morbidity, characteristics of the population. The following diagram presents a simplified picture of this process.

Figure 3.5



As the concern is with *additional* needs (that is, over and above those caused by age and sex), utilisation of health services is expressed as the following age-sex standardised ratio (compare the calculation of SMRs):

$$\frac{\text{(Estimated cost or volume of utilisation by small area)}}{\text{(Expected cost or volume of utilisation when national age-sex utilisation rates are applied to the small area population)}}$$

The national age-sex utilisation rates are those calculated at stage 1 above.

Ideally, the relationships between utilisation and socio-economic and/or mortality factors would be investigated using data on individual patients. Given the lack of socio-economic information at this level, small area analyses are seen as the next best

alternative. Areas should not be too large to avoid substantial intra-area variations in socio-economic conditions being hidden.

Best practice analysis for estimating additional needs

One of the drawbacks of the indirect approach is the lack of transparency and comprehensibility of the statistical analysis required to derive the additional needs part of a resource allocation formula. ACRA (1999) have recognised these problems in their evaluation criteria for such formulae, which state:

> *"Transparency*
>
> *In general the formula should be simple to understand although the detail may be more complex. Analytical techniques should normally be capable of objective quality assessment, such as is provided by tests of statistical significance. Ideally, although this is difficult to quantify, the outcome of the process should command a wide degree of acceptance, ie "felt to be fair" on the ground.*
>
> *Comprehensibility to non-specialists*
>
> *The formula, and the means by which it has been arrived at, should be capable of common sense justification to non-specialists. This means that the substantive effect of analytical techniques should be capable of explanation in plain English, even if the process of calculation is understood only by specialists".*

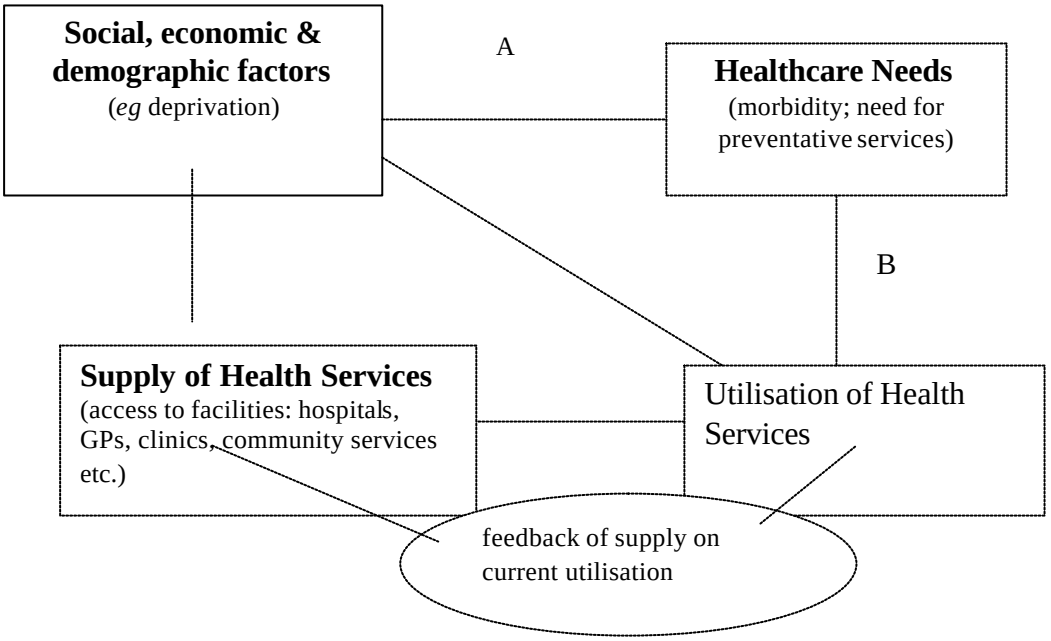
The complex analyses used in the English and Scottish formulas are based on the following more readily understandable conceptual framework (Figure 3.6).

In the absence of adequate direct needs data, the main problem is to separate out the effects of true need on utilisation (links A and B in Figure 3.6) from the effects of existing supply and demand. Resources should only be allocated to try to meet needs and neither in relation to past patterns of supply nor in response to differential levels of demand for the same underlying needs. The Arbuthnott report in Scotland (SEHD, 1999b, p33) uses statistical techniques to *"disentangle supply and need"* and makes *"a judgement about whether some of the indicators of morbidity and life circumstances reflect need or demand"*. Essentially, the analysis examines two relationships:

Current utilisation is influenced by:

1. Needs
2. Supply of services
3. Socio-economic factors

Figure 3.6


Social, economic & demographic factors
(eg deprivation)
A
Healthcare Needs
(morbidity; need for preventative services)
B
Supply of Health Services
(access to facilities: hospitals, GPs, clinics, community services etc.)
Utilisation of Health Services
feedback of supply on current utilisation

Supply of services has been influenced by:

1. Previous utilisation
2. Socio-economic factors

Service supply is 'endogenous' meaning that it both influences utilisation and is itself influenced by previous utilisation. If this is not recognised in the statistical analyses (through the use of 'instrumental variable' techniques), biased weights on the proxy need indicators of health needs (like SMR or the Townsend or Arbuthott indexes) will result. If reference is made back to Figure 3.5, a biased weight means that the slope of the line has been mis-estimated as either too steep or too gentle.

A further complication is the effect on utilisation of variations in policies between health authorities (*eg* possibly greater use of community services for post-operative care in some authorities than others). Health Authority effects should be built into the statistical analyses to allow for such policy influences. For GP prescribing, additional supply characteristics (such as number of partners in the practice; practice's dispensing and training status) which have been identified as affecting prescribing costs are typically included in the statistical analyses (Rice *et al*, 1999). Again, biased weights on health needs indicators can occur if these policy and supply effects are ignored in the analyses.

The indirect approach for Wales: data and analytical requirements

- The indirect approach is very demanding in data and analytical terms and this has implications for the time and cost commitments that have to be devoted to developing a formula.

- Obtaining and processing utilisation data is likely to be (much) more problematic than assembling social, economic and demographic data as proxies for health care needs.

- The NHS in Scotland has relatively good data compared with Wales.

- Post coded utilisation data are automatically allocated to postcode sectors for small area analyses in Scotland, whereas in Wales (and England) procedures must be used to locate patients by wards or electoral divisions using either a Geographical Information System (GIS) or a postcode/area look-up table.

- Various short-cuts need to be evaluated for acceptability in pursuing the indirect approach in Wales.

Utilisation data will be required for:

1. Hospital patient episodes by age, sex, specialty, diagnosis, postcode and length of stay. The Patient Episode Database for Wales (PEDW) can be used.

2. Births and abortions by age of mother, length of stay and postcode. Obstetric episodes from PEDW can be used.

3. Number of visits by community health service type and by each patient's age, sex and postcode. Data on duration of visits would be preferable to just numbers. In Scotland, data were available from four Community Trusts and, in England, activity data were obtained from the Korner returns.

4. GP consultations and home visits by each patient's age, (possibly sex), diagnosis and postcode. As for community health services, duration of consultations and visits would be more informative. In Scotland, the Continuous Morbidity Recording project, covering 11% of the registered population, was the source of information. In England, use is made of the Morbidity Statistics from General Practice (MSGP4). In Wales, the GP Morbidity Database, covering just over 10% of the population, could be used. It includes data on consultations and prescribing.

Cost data are required for:

5. Hospital episodes by specialty. Only national average costs are required and these have already been obtained by Diagnostically Related Group (DRG) for the direct approach.

6. Prescribing expenditure by practice, preferably by main BNF (British National Formulary) chapters. Additionally, to standardise these expenditures, age-sex and temporary resident cost weights are required. Sample data from priced prescription forms will thus be needed, unless the English or Scottish weights are used.

Demographic and socio-economic (deprivation) data:

7 Mid-year population estimates by age and sex for Health Authorities and local health groups are readily available.

8 It would seem unnecessary, given the Scottish experience, to examine a large number of social, economic and mortality indicators of need, especially as the 1991 Census was the source of many of them. Moreover, the 2001 Census data by small areas will not be available until 2003 and so cannot be used for formula development in the short-term. It would be preferable to test indicators (such as unemployment) which can be updated between Censuses. It has already been recommended that the indicators in the Arbuthnott index, now used in Scotland, be assembled for small areas in Wales. These indicators are:

- the under 65 SMR;
- the unemployment rate;
- the proportion of elderly on income support; and
- households with two or more deprivation indicators (chosen from six Census measures: unemployed or permanently sick head of household; low socio-economic group; overcrowding; large households; lone parent families; all-elderly households).

Recommendations

1. *Population.* Mid-year estimates should continue to be used until such time as registered population databases have been purged of list inflation.

2. *Costs.* Hospital cost data needs to be improved, particularly to identify separately fixed treatment costs and variable length of stay costs by age, gender and, preferably, socio-economic status. This is important to reflect the longer average lengths of stay of the elderly and deprived patients. Similarly, maternity costs should preferably be identified by mother's age.

3. *Community health.* There are serious data deficiencies for this sector which ought to be rectified as a priority. The Scottish practice of using data from community trusts should be examined in Wales.

4. *Deprivation.* Should an indirect approach to resource allocation be required, the Scottish experience of using a limited range of largely updateable indicators should be followed. Testing an excessive number of deprivation indicators can lead to unjustifiable differences in significant variables between care programmes and years. The English practice of relying very heavily on Census data should be avoided for indicators that cannot be updated between Censuses.

5. *Rurality and transferring formulas from elsewhere.* Exemplification of Scottish remoteness formulas for Wales has produced highly contestable results. This should serve as a warning about transferring any component of a resource allocation formula from another country; hence the RAWG suggestion of borrowing from England is very questionable too. Welsh evidence is required, although the methodologies used in Scotland, England and Northern Ireland offer various possibilities for assessing that evidence.

6. *Market forces factors.* The evidence from Scotland and RAWG suggests no adjustments for these factors are required, with the possible exception of land costs.

7. *Prescribing.* A direct or indirect needs-based formula should replace the present historic costs approach to allocating prescribing resources. Temporary residents should be included in the formula.

8. *General Medical Services.* The inclusion of non-cash-limited GMS resources in a formula should be considered, given developments in England and Scotland.

9. *Health Inequalities.* On-going research in England and particularly Scotland should be kept under review.

10. *Formula Stability and Review.* A move from annual to, say three year allocations, might be considered, especially if the Welsh Health Survey was to be undertaken on a regular three year cycle. However, whatever the form of a new resource allocation formula, it should not be allowed to become outdated, so a review after five or six years would seem appropriate.