

## Chapter 4: Developing an NHS resource allocation formula for Wales

In order to construct an adequate resource allocation formula that correctly assigns NHS monies on the basis of equal access for equal health needs, it is necessary to utilise a needs-based budgeting approach.

### Needs-based budgeting

This review is designed to identify the best method or methods for NHS resource allocation in order to both improve the overall health of the population and to reduce inequalities in health in Wales. These two aims will often but not always overlap. The most obvious method to fulfil these aims is a needs-based budgeting approach which requires two stages:

1. The overall budget must be apportioned between the various categories of service provision, *eg* a decision must be made that X% of the budget should be spent on providing services for mental health and that Y% of the budget on ambulance services, etc. Apportionment of a budget requires ‘political’ decisions to be made about priorities. It is important to ensure that significant changes in budget allocations between areas do not occur too rapidly. For the purposes of this review, the current apportionment between health care areas that is currently used by the five health authorities will be used.
2. Once the budget has been apportioned between different areas of activity, it can then be allocated between different health areas on the basis of the ‘objectively’ measured levels of need and inequality in each area. It is for this second stage that evidence-based research advice will be provided.

### Approaches to resource allocation in Wales

The amount of money an area should receive can be given by the following general formula:

$$\text{Area resource allocation} = \text{Amount of Health needs} * \text{Costs of meeting the health needs}$$

For example, if the population of an area of Wales contained 10,000 people with a health need and the average cost of meeting a health need was £100 per person then this area should receive £1,000,000 (*eg* 10,000\*100).

There are three different ways that this review could proceed to provide estimates of both health needs and costs:

1. Continue with the current Welsh formula of population weighted by age and sex utilisation rates, SMRs and some cost factors (the current Welsh formula is described in outline in Chapter 3);
2. Adopt an approach similar to that used in England and proposed for Scotland, *ie* statistically analyse the patterns of existing age-sex standardised utilisation

of health services to identify the best explanatory variables. Typically, these will be SMR or SIR (Standardised Illness Ratio) and socio-economic measures of deprivation which act as proxy indicators for health need;

3. Develop an alternative approach based on directly measuring health needs, possibly combined with information on the *epidemiology* of disease (that is, *the distribution of disease* in the population), using appropriate Welsh data sources.

Under all three options, the population base needs to be adjusted to reflect the responsibilities of health authorities for the registered population of local health groups (see Chapter 3).

### **Pros and cons of the options**

1. The existing formula would require no development work. However, it is generally regarded as out-of-date and failing to address concerns about deprivation and inequality. There is no obvious way in which it could be updated because it is fundamentally flawed - not being based on a repeatable statistical analysis but rather a on general consensus (originating with the English RAWP report in 1976) that SMR is an appropriate need factor, together with assessments of costs based on old data sources.
2. The proxy indicators approach requires extensive statistical testing and validation of data as discussed in Chapter 3. The research team has undertaken a feasibility study of the possibilities of constructing a resource allocation formula using the indirect method. There are a number of incompatibilities with the recording of health needs and costing data between the existing five Health Authorities in Wales (which have recently been abolished) and a number of authorities have experienced computer problems in the past. Health needs and cost data are not currently available in a form that can readily provide age and gender rates. The research team and the National Assembly have begun to collect the relevant data that would be needed to produce an indirect formula as requested by the NSG. However, it is very unlikely that all the necessary data will become available before 2003. It is therefore not possible to complete this work in the current review timetable. Although an indirect approach is to be used in Scotland and is used currently in England, reviews in both countries suggested a more direct measurement of need would be preferable if the data were available. Since indirect allocation formula are not transparent as variables which are not obviously related to health need may be included, *eg* the English formula uses variables such as car ownership.
3. The alternative direct approach relies heavily on data sources which are available in Wales (*eg* Vital Statistics, Hospital Episode Statistics, Cancer Registry, Welsh Health Survey, GP Morbidity Database, Notifiable Disease Statistics, etc.). The suitability of these data has to be proved. The major advantage of the direct approach is that it is potentially a far more accurate and fair method for resource allocation than the other two options. Therefore, this

is the option that the research team strongly recommends and it is discussed below in more detail.

### **Mortality and hospital utilisation data**

The current RAR formula in Wales, like health RAR formulas in other parts of the UK, uses mortality data as an indicator of health need and hospital usage data as an indicator of both health need and costs (see Chapter 3). There are obvious problems with this approach:

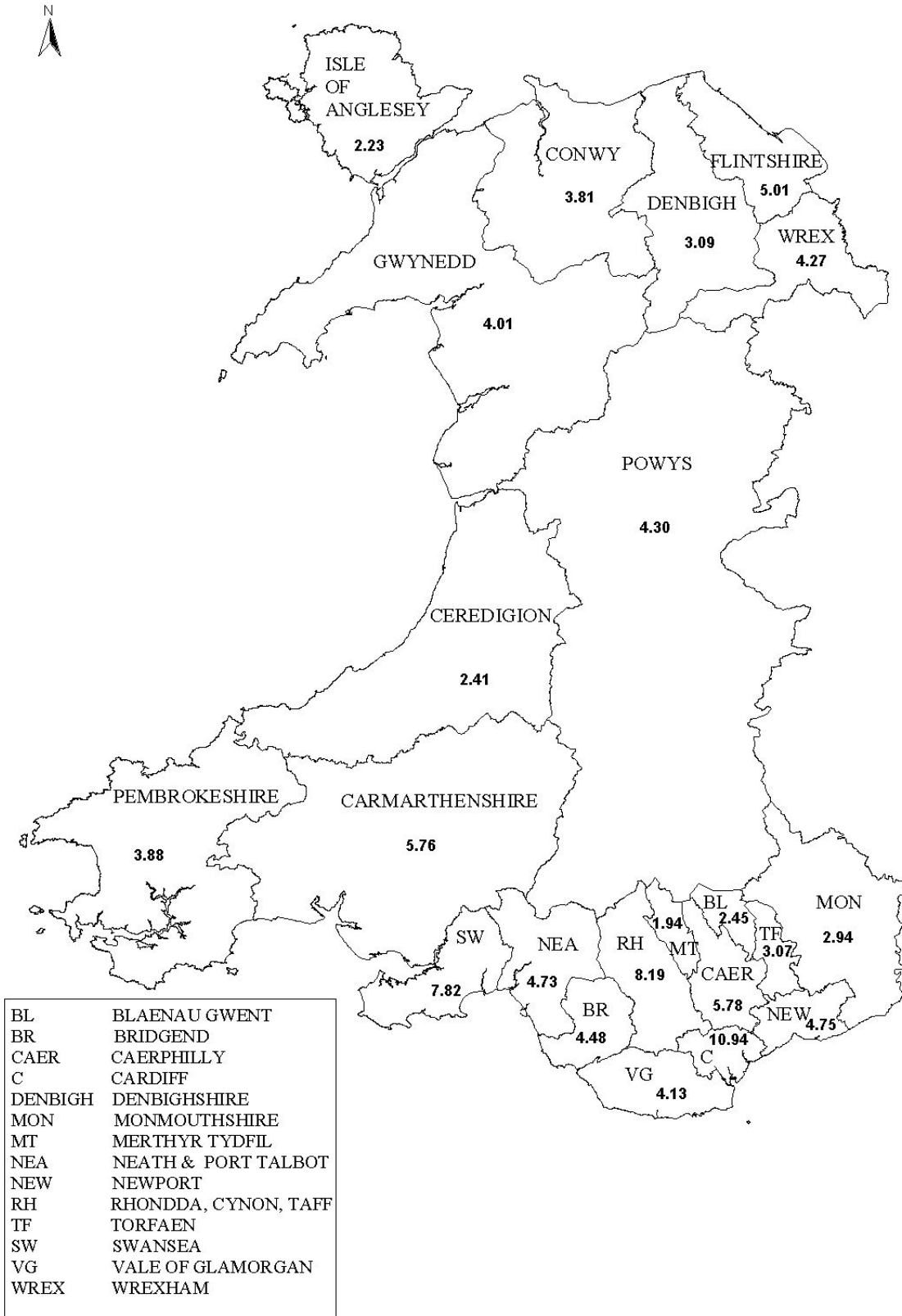
1. The NHS provides services for the living not the dead. In particular, it provides the bulk of its services for the 'sick' rather than the 'healthy'.
2. Hospital usage data is not, on its own, a comprehensive 'needs based indicator' of either costs or health need as it is not independent of the availability and location of hospitals. Nor does it provide a sensitive indicator of the need and cost of primary care services.

Mortality data have been collected in Britain since the 16<sup>th</sup> Century. In London, in the 1530s, the Parish Clerks were required to submit weekly reports on the number of plague deaths. These 'Bills of Mortality' were meant to tell the authorities when public health measures should be taken against epidemics. Although using SMRs as an indicator of health need is an advance on simple mortality rates, it should be possible to find a more valid and reliable indicator of health need in the 21<sup>st</sup> Century than was available in the 16<sup>th</sup> Century. Medical science has advanced a lot over the past 500 years, particularly in producing a reliable taxonomy of disease, and we should by now be able to make use of these scientific advances to produce a more accurate and precise area based resource allocation formula.

### **Resource distribution by area**

In order to measure health needs accurately, it is essential that the indicators used are relatively independent of the current level of service provided. One of the simplest (and crudest) methods of allocating health services budgets is on a *per capita* basis. This very simple (and simplistic) method would allocate money on the basis of the proportion of the Welsh population that lives in a given area. The map on the next page illustrates the percentage of health resources each Local Authority would receive if the allocation were based only on their current population levels *eg* Merthyr Tydfil would receive the least money (1.9%) since it has the smallest population and Cardiff the most money (10.9%) since it has the largest population.

## PER CAPITA ALLOCATION ( % )



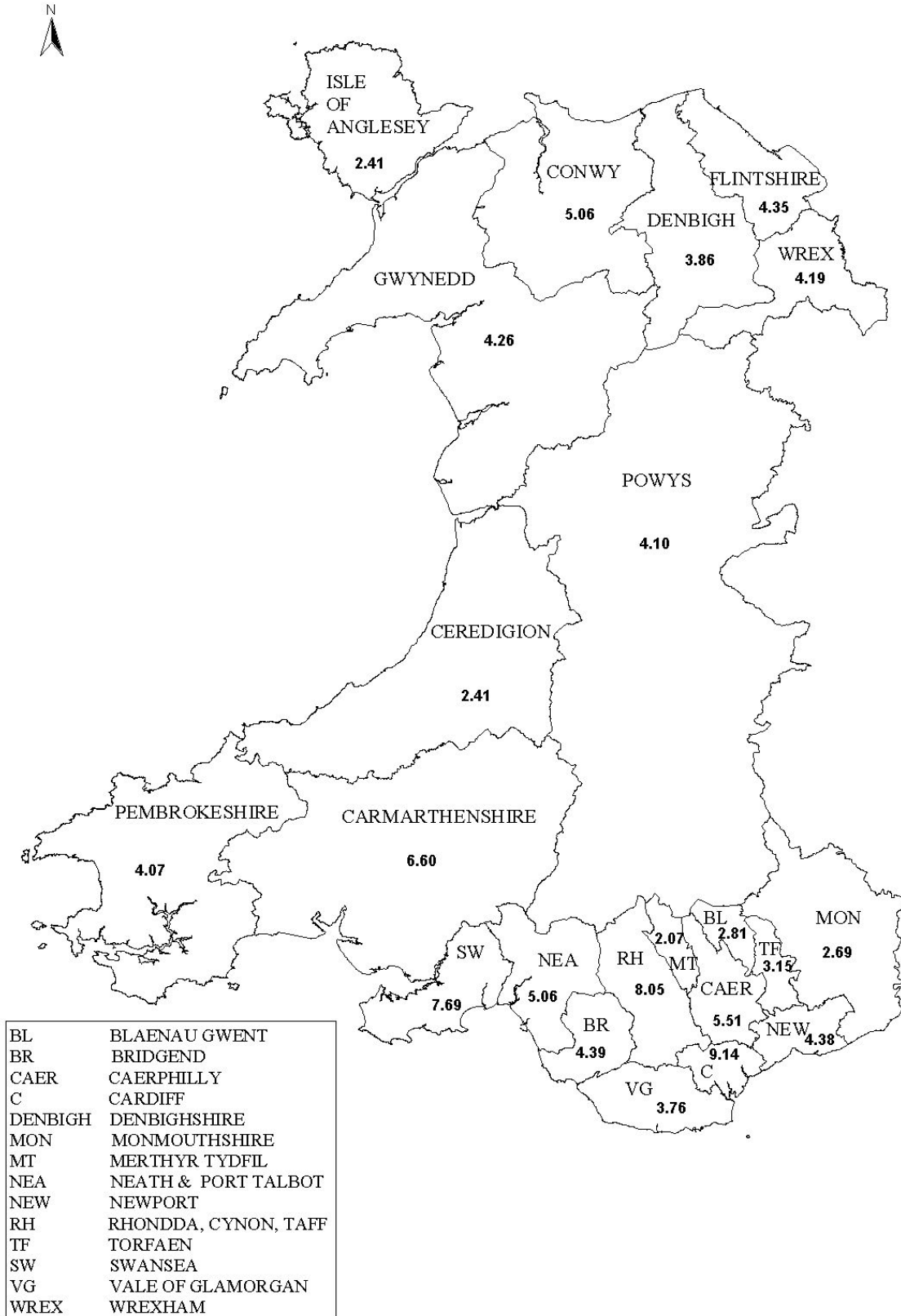
Most health resource allocation formulas, used in the UK and in other European countries, employ indirect measures of health need rather than direct measures because of the unavailability of high quality health data at small area level. Typically, the health needs of an area are estimated from its population characteristics *eg* its age and gender profiles and, in some cases, its social class or deprivation profiles (see Chapter 3). It is assumed that national prevalence rates of health need for each socio-demographic group can be applied to each local area.

The major problem with this approach is that it takes no account of the history of an area's population. Life course research on health has shown that a person's past, as well as present circumstances, can affect their health. For example, poverty in childhood can have long term health consequences. Similarly, the past history of an area's population can affect its present health needs. National prevalence rates of health need may not always be a good model at the local level.

Several studies have demonstrated that lifetime social circumstances are strongly related to morbidity and mortality in adulthood (Mare, 1990; Davey Smith *et al*, 1997; Lynch *et al*, 1997; Power *et al*, 1998). For example, Davey Smith *et al* (1997) demonstrated that cumulative social class (indexed by the number of occasions from childhood to adulthood an individual was in a manual social class location) together with the deprivation level of current area of residence are powerful predictors of mortality risk. Childhood and adult social circumstances make independent contributions to the risk of dying. Cumulative experience during adult life is also important. Individuals with average or higher income who experience fluctuating reductions to low income levels have higher mortality rates than those who remain on average or high incomes (McDonough, 1997). The highest mortality rates by a considerable degree are seen among those with persistently low incomes (see Davey Smith (1999) and Davey Smith and Gordon (2000) for discussion).

Nevertheless, most health resource allocation formulas have used this indirect approach to estimating the health needs of an area. The health indicator that is most widely used (including in the existing Welsh formula) is mortality rates. The first map overleaf illustrates how health resources would be allocated in Wales at Local Authority level if this was done solely on the basis of the number of deaths in each area; *eg* Merthyr Tydfil would receive the least money (2.1%) and Cardiff the most money (9.1%) since it has the greatest number of deaths.

## ALLOCATION BY MORTALITY ( % )



However, despite their widespread use, mortality data are acknowledged not to be the best indicators of health needs for resource allocation, since the NHS tends to deal mainly with ‘sick’ people and sickness and death have somewhat different geographical distributions. This fact is illustrated in Table 4.1 below which shows how health resources would be allocated at Local Authority level if this were solely based on the number of people reporting in the 1991 Census that they had a long term illness or disability that limits their activities (LLTI). On this basis, Rhondda, Cynon, Taff (with 49,016 ‘sick’ people) would receive 10.7% of all health resources and Anglesey (with 9,463 ‘sick’ people) would receive 2.1% of NHS resources. Therefore, Local Health Group/Unitary Authority areas would receive different amounts of money if health resources were allocated on the basis of limiting long term illness rather than on the basis of numbers of deaths or the size of the population.

**Table 4.1: Self-reported LLTI in the 1991 Census, distribution at Local Authority level**

<b>Local Authority</b>	<b>Number of people reporting a LLTI in the 1991 Census</b>	<b>Percentage Distribution of LLTI in Wales</b>	<b>Standardised Limiting Long Term Illness Ratio (SIR)</b>
Isle of Anglesey	9,463	2.1	106.7
Blaenau Gwent	15,291	3.3	169.1
Bridgend	22,716	5.0	145.2
Caerphilly	32,665	7.1	166.9
Cardiff	38,360	8.4	113.4
Carmarthenshire	30,326	6.6	131.8
Ceredigion	8,320	1.8	95.8
Conwy	16,140	3.5	102.7
Denbighshire	14,180	3.1	112.5
Flintshire	18,093	3.9	110.7
Gwynedd	15,522	3.4	102.2
Merthyr Tydfil	12,819	2.8	179.1
Monmouthshire	9,653	2.1	96.1
Neath Port Talbot	28,799	6.3	160.4
Newport	19,657	4.3	122.8
Pembrokeshire	15,239	3.3	107.1
Powys	15,523	3.4	97.8
Rhondda, Cynon, Taff	49,016	10.7	172.4
Swansea	37,951	8.3	132.9
Torfaen	15,535	3.4	145.2
The Vale of Glamorgan	14,886	3.3	105.9
Wrexham	17,868	3.9	122.2
<b>Total</b>	<b>458,022</b>	<b>100</b>	<b>100.0</b>

#### **Potential direct health needs indicators for Wales**

Although the 1991 Census did record the number of people who had a limiting long term illness or disability, these data are now almost ten years old and are no longer

ideal for current allocation purposes. The 2001 Census data, which should become available by 2003, will provide several direct measures of ill health which could be used for resource allocation (eg the General Health Question and Limiting Long Term Illness). However, a new health resource allocation formula is required in Wales before 2003 (see Appendix 1 for further discussion about 1991 Census health data).

Fortunately, there are more up-to-date high quality health need data available for Wales, down to Local Health Group/Unitary Authority level, which could be used to calculate a needs-based budget allocation formula. In particular, data are available from the Vital Statistics, Hospital Episode Statistics, Cancer Registry, British Association for the Study of Community Dentistry Surveys, Child Health System, GP Morbidity Database (GPMD), Notifiable Disease Statistics and the two Welsh Health Surveys (details are discussed below).

### **Children's health needs indicators**

There are a number of systems for monitoring children's health in Wales but not all of these will be available for use in this review - given the short time frame. The following four direct children's health needs indicators have been used:

1. *Birth weight.* The distribution of birth weight by Unitary Authority is available as a standard output (VS2) from ONS. This gives numbers under 1000g, 500g bands up to 4000g, and over 4000g. Low birth weight is a good proxy for poor child health as is the gradient in the distribution of birth weights (David Hands *per comm.*). However, reduction in low birth weight should not be used as a target for strategies for tackling deprivation, as the increase in low birth weight is in part a result of the increase in multiple births. Although there are no data to prove it, this increase is likely to be among people who can get access to ovarian stimulants and assisted conception (Alison Macfarlane *per comm.*) – see also Macfarlane and Mugford (2000).
2. *Educational Statements.* Health needs data is available from the schools collections in Wales, on the numbers of children in the following categories: Moderate Learning Difficulties, Severe Learning Difficulties, Profound and Multiple Difficulties, Specific Learning Difficulties, Physical Disabilities, Autism, Hearing Impairment, Visual Impairment, Hearing and Visual Impairment, Speech and Communication Difficulties, Emotional and Behavioural Difficulties, Other.
3. *Children's dental health.* There is information available, at Local Authority level, from sample surveys by the British Association for the Study of Community Dentistry (BASCD). Each year, one age group is studied: five year olds are surveyed alternate years and, in the intervening year, 12 and 14 year olds alternate. The measure available are the DMFT score - number of decayed, missing and filled teeth - and variations on it such as the percentage of children with some decayed, missing or filled teeth (DT>0).

It must be noted that the Child Health System records a considerable amount of additional information on the health of children in Wales (for example, developmental delay recorded by Health Visitors), however, some of these data may not be available



in comparative format for the whole of Wales at UA level. A number of additional sources of information are available on children's health needs, such as the National Congenital Anomaly System which monitors 23% of births in England and all births in Wales (Macfarlane *et al*, 2000; ONS, 2001). Recently proposed statistical advances will make this a potentially valuable data source in the future (see Botting and Abrahams, 2000 for discussion)

### **The Welsh Health Survey**

The Welsh Health Surveys (WHS) in 1995 and 1998 obtained detailed information on the health of approximately 1,000 adults in each Unitary Authority area. These two surveys are a unique resource for morbidity data which is available in Wales but not in other UK countries. The suggestion by the research team that some of the morbidity information collected in the WHS could be used as part of a resource allocation formula initially caused some controversy. Therefore, this section will firstly examine what data are available from WHS and what are the advantages and problems with using these data.

Analysis by the research team and the Office for National Statistics has established that the 1998 WHS data are accurate and reliable at Local Health Group/Unitary Authority level after suitable weighting factors have been applied (see Appendix 1). There appears to be no systematic biases in these data that would prevent their use for comparing relative rates of ill health at Unitary Authority level.

The two WHS contain a number of direct measures of ill health which have been used in combination in this report as health needs measures in a resource allocation formula. These include self-reported rates of (percentages in brackets are for Wales in 1998):

1. Heart Disease (21%)
  - a. Hypertension
  - b. Angina
  - c. Heart Attack
  - d. Heart Failure
  - e. Other
  
2. Cancer (5%)
  - a. Skin
  - b. Breast
  - c. Bowel
  - d. Lung
  - e. Other
  
3. Respiratory Illness (23%)
  - a. Asthma
  - b. Bronchitis
  - c. Emphysema
  - d. Pleurisy
  - e. Tuberculosis
  - f. Cystic Fibrosis

- g. Other
4. Mental Illness (14%)
    - a. Depression
    - b. Anxiety
    - c. Schizophrenia
    - d. Alzheimer's disease
    - e. Other
  5. Diabetes (4%)
    - a. Treated by tablets
    - b. Treated by diet only
    - c. Treated by injection
  6. Back Pain (30%)
  7. Arthritis (25%)
  8. Varicose veins (11%)
  9. Stroke (1%)
  10. Epilepsy (1%)
  11. Parkinson's disease (0.2%)
  12. Pressure sores (0.2%)
  13. Food Poisoning in UK (19%)
  14. Injury in Accidents (8%)
    - a. Break or fracture
    - b. Cut or puncture
    - c. Head injury
    - d. Burn
    - e. Poisoning
    - f. Other
  15. Dental Health – fewer than 20 teeth (31%)
  16. Visual Impairment (8%)
  17. Hearing Impairment (13%)

*Note: Respondents were asked if they had 'ever' had heart disease or cancer. However, they were asked if they had the rest of the diseases 'now'.*

The distribution of the major health need categories measured in the WHS are shown in Chapter 5 (Maps 13a to 13n). It is important to note that different diseases have different patterns of distribution at UA level *eg* back pain and food poisoning do not have identical distributions.

### **Summary measures of health**

The WHS data also contain three summary measures of general health and well-being. All these three measures have been widely used and validated. The SF-36 is a standard set of 36 health status questions which have been used to measure eight aspects of health and well-being:

1. Limiting Long Term Illness (34%)

2. International General Health Question (*eg* would you say your health is 'Excellent', 'Very Good', 'Good', 'Fair', 'Poor')
3. SF-36
  - a. Physical functioning
  - b. Role-physical
  - c. Bodily pain
  - d. General health
  - e. Vitality
  - f. Social functioning
  - g. Role-emotional
  - h. Mental health

These eight measures in the SF-36 can be combined into two summary measures of physical and mental health – the Physical Component Summary (PCS) and the Mental Component Summary (MCS).

The SF-36 was originally constructed in the USA to satisfy minimum psychometric standards necessary for group comparisons involving generic health concepts - that is, concepts that are not specific to any age, disease, or treatment group. The eight health measures (described above) were selected from 40 included in the Medical Outcomes Study (MOS) (Stewart and Ware, 1992) to represent those thought to most affected by disease and treatment (Ware *et al*, 1993; Ware, 1995).

### **Service use indicators**

The 1998 WHS measured the following health service usage in the past year:

#### *Primary care*

1. Family Doctor (GP)
  - a. In past 3 months (47%)
  - b. In past 12 months (78%)
2. Optician (46%)
3. Dentist (65%)
4. Chiropodist (11%)
5. Health Visitor or District Nurse (11%)
6. Home Help or family aid (2%)
7. Meals on wheels (1%)
8. Social worker or welfare officer (4%)
9. Mental health worker (3%)
10. Midwife (3%)
11. Alternative medical worker (3%)
12. Speech or occupational therapist (1%)
13. Physiotherapist (4%)

#### *Secondary care services*

1. Hospital in-patient
  - a. Past 3 months (5%)
  - b. Past 12 months (13%)
2. Hospital out-patient
  - a. Past 3 months (16%)

- b. Past 12 months (30%)
- 3. Visited casualty department
  - a. Past three months (7%)
  - b. Past 12 months (20%)

In addition, WHS respondents were asked if they had bought any medicines over the past four weeks and if they were on any regular medication prescribed by a doctor (regular meant for a year or more).

### **Measuring health needs using the Welsh Health Survey**

Although the WHS measured a wide range of health needs it should not be considered a universal panacea. Better data are available from other sources for some health needs. For example, the Vital Statistics provide a much more reliable and accurate measure of the number of births and the number of low birth weight babies born at UA level. Similarly, there are better information on food poisoning and cancer morbidity from the Notifiable Statistics and the Cancer Registry than is available from the WHS. Hospital Episode Statistics on admissions for myocardial infarction and unstable angina for heart disease may provide a better indicator for CHD than the information available in the WHS since these admissions are likely to be largely need driven and not subject to significant supply constraints (see Chapter 7). The resource allocation formula has use the best available health needs data at UA level whatever its source. Multiple sources of health needs and costings have been used to construct the resource allocation formula (see below and Appendix 2).

However, the WHS *does* record a range of information on morbidity and health need which is not available from other sources. The key question is therefore whether the WHS data are sufficiently robust to provide useful estimates on the relative rates of health need between UA areas for the morbidity variables that cannot be provided from other sources.

### **What is the ‘ideal’ health need information for use in resource allocation?**

Over the past hundred years, considerable efforts have been made by epidemiologists to develop instruments that reveal the ‘true’ level of disease in populations, *ie* the amount of disease that exists after allowing for the fact that some people in a population will think they are ill when in fact there is no objective evidence to support this *eg* a hypochondria effect. This epidemiological model has resulted in a number of significant advances in the health of the British population. However, it would not be appropriate to just use measures of the ‘true’ level of disease for resource allocation, as any population will always contain some people who think they are ill (even when they are not) and who will seek out and receive some medical care. If the NHS was funded solely on the basis of the cost of treating the ‘true’ level of ill health, then it would run out of money before the end of the financial year since it is impossible not to spend some NHS resources on providing health care for people who ‘feel’ ill, even in the absence of a known specific disease.

There is no way to prevent people from going to see their doctor when they think they are ill and it is people’s perception of their own health status rather than the ‘true’ level of disease that results in people seeking and receiving health care. Therefore, a

population's perceived level of health need, which results in health care expenditure, is a better measure for resource allocation purposes than epidemiological measures of the 'true' level of disease prevalence in a population.

The NHS is a 'health' service and it does more than just provide treatment for 'sick' people who have specific diseases. An adequate resource allocation formula should ideally move beyond a narrow 'disease' model of health which defines health need solely in terms of pathological abnormalities which are indicated by signs and symptoms. A broader 'social' model of health is required for resource allocation which acknowledges that people may legitimately require health services even when there is no disease currently detectable by medical science (Bowling, 1997). The need for a broader conception of health was acknowledged by the World Health Organisation (WHO) in its definition of health as "*a complete state of physical, mental and social well-being and not just the absence of disease and infirmity*" (WHO, 1974)

### **Postal surveys**

The WHS is a large postal survey and is therefore known to suffer from a number of problems that are inherent in surveys of this kind. In particular, the responses that people give to health questions in a postal questionnaire are known to sometimes differ from the responses they give to an interviewer or in a clinical study. In general, when people are answering a questionnaire on their own they sometimes claim to have a worse health state than, for example, when answering questions in a doctor's surgery or when faced with a 'friendly' interviewer. The perceived level of ill health recorded in a postal survey such as the WHS is often greater than the 'true' level of ill health measured in a clinical study. Because of this, many people consider that postal health status surveys only provide 'soft' information on health status in comparison with the 'hard' information gained in clinical surveys conducted by health professionals. However, as discussed above, it is precisely this 'soft' perceived level of health need that drives NHS expenditure, particularly GMS expenditure. Therefore, the information collected in the Welsh Health Survey provides a useful measure of health need for resource allocation purposes even though the WHS is of more limited value for epidemiological purposes. Soft measures of health need, such as limiting long term illness rates, are often better predictors of GP expenditure than 'hard' epidemiological measures of disease prevalence. Indeed, Limiting Long Term Illness and/or Permanent Sickness rate are used in the English, Scottish and Northern Ireland resource allocation formulas (see Chapter 3 for details).

Postal surveys like the WHS are also known to suffer from a number of systematic biases. In particular, they generally have lower response rates amongst:

- the very elderly
- the very sick
- the poorest and most deprived
- ethnic minority respondents (particularly where English is a second language)
- the functionally illiterate
- people with certain disabilities (*eg* learning, seeing, hearing)
- young single people (particularly young men)

These biases mean that the results from postal surveys need to be treated with caution if they are to be used to compare illness rates between socioeconomic and demographic *groups*. However, these systematic biases are not so problematic when comparing *areas*, since the postal survey bias is between groups and not between areas, *eg* poorer people are equally unlikely to respond to the questionnaire in both Anglesey and Cardiff (see Appendix 1). This means that, although the *absolute* rates of ill health recorded in the Welsh Health Survey at UA level may well be incorrect, the *relative* rates of ill health between areas are much more reliably measured. The resource allocation formula is designed to allocate money to each area on the basis of its relative health need, not its absolute health need, therefore the limitations of the WHS for measuring absolute health need are not problematic for resource allocation.

The research discussed in Appendix 1 demonstrates that there are no detectable systematic biases in the WHS data between UA areas, which would prevent the use of these data for resource allocation purposes.

### **A simplified worked example of how WHS data can be used for resource allocation**

The costs of in-patient and day-patient treatment in Wales are available by Diagnostically Related Group (DRG) code. These 800+ DRG codes can be grouped into 25 Major Diagnostic Categories (MDC), which are listed below:

MDC	MDC Description
1	Diseases & disorders of the nervous system
2	Diseases & disorders of the eye
3	Diseases & disorders of the ear, nose, mouth & throat
4	Diseases & disorders of the respiratory system
5	Diseases & disorders of the circulatory system
6	Diseases & disorders of the digestive system
7	Diseases & disorders of the hepatobiliary system & pancreas
8	Diseases & disorders of the musculoskeletal system & connective tissue
9	Diseases & disorders of the skin, subcutaneous tissue & breast
10	Endocrine, Nutritional and Metabolic diseases & disorders
11	Diseases & disorders of the kidney and urinary tract
12	Diseases & disorders of the male reproductive system
13	Diseases & disorders of the female reproductive system
14	Pregnancy, childbirth and the puerperium
15	Newborn and other neonates with conditions originating in the perinatal period
16	Diseases & dis.of the blood and blood forming organs and immunological disorders
17	Myeloproliferative Diseases & disorders, and poorly differentiated neoplasms
18	Infectious and parasitic diseases
19	Mental diseases & disorders
20	Alcohol/Drug use and alcohol/drug induced organic mental disorders
21	Injuries, poisonings & toxic effects of drugs
22	Burns
23	Factors influencing health status and other contacts with health services

- 24 Human immunodeficiency infections
- 25 Multiple significant trauma

As can be seen, MDC 5 includes the cost of treating hospital in-patient and day-patient diseases and disorders of the circulatory system. However, there are in total 31 major DRG sub-headings that deal with the treatment costs of heart and circulatory disease (eg the treatment costs of hypertension, angina, ischaemic heart disease, etc). The most up-to-date information on heart and circulatory disease in Wales for 1998/99 is summarised below:

**Table 4.2: DRG costing for Wales for heart and circulatory disease**

<b>Disease area</b>	<b>Total Wales (activity)</b>	<b>Total Wales (cost)</b>	<b>Outside Wales (activity)</b>	<b>Outside Wales (cost)</b>	<b>Total cost</b>	<b>Average cost per activity (in &amp; outside Wales)</b>
Heart & Circulatory Disease	76737	£98,532,532	1410	£1,774,015	£100,306,547	£1,284

Table 4.2 shows that a total of £98,532,532 was spent on hospital in-patient and day-patient care for heart and circulatory disease in Wales in 1998/99. Furthermore, an additional £1,774,015 was spent by the Welsh NHS on services for treating patients with heart and circulatory diseases outside Wales. This total comprised the treatment of 78,147 patients at an average cost of approximately £1,284 (eg 78,147\*£1,283.56p = £100,306,547).

The 1998 Welsh Health Survey measured the following heart and circulatory disease variables:

- 1) Heart Disease (21%)
  - a. Hypertension (15%)
  - b. Angina (6%)
  - c. Heart Attack (3%)
  - d. Heart Failure (1%)
  - e. Other (3%)

*Note: figures in brackets are for Wales, eg 21% of people have been treated for at least one type of heart disease.*

The distribution of heart disease at UA level recorded in the 1998 WHS is shown in Table 4.3 below:

**Table 4.3: Rates of heart disease recorded in the 1998 WHS by UA area**

Unitary Authority	Q28. Have you ever been treated for any of these heart diseases?		Total
	No Heart Disease	Heart Disease	
Anglesey	77.7%	22.3%	100%
Gwynedd	80.6%	19.4%	100%
Conwy	78.2%	21.8%	100%
Denbighshire	80.5%	19.5%	100%
Flintshire	81.1%	18.9%	100%
Wrexham	80.1%	19.9%	100%
Powys	80.3%	19.7%	100%
Ceredigion	80.9%	19.1%	100%
Pembrokeshire	77.3%	22.7%	100%
Carmarthenshire	76.9%	23.1%	100%
Swansea	80.9%	19.1%	100%
Neath & Port Talbot	76.6%	23.4%	100%
Bridgend	77.6%	22.4%	100%
Vale of Glamorgan	81.4%	18.6%	100%
Cardiff	81.9%	18.1%	100%
Rhondda, Cynon, Taff	77.6%	22.4%	100%
Merthyr Tydfil	76.3%	23.7%	100%
Caerphilly	76.8%	23.2%	100%
Blaenau Gwent	74.8%	25.2%	100%
Torfaen	76.9%	23.1%	100%
Monmouthshire	82.2%	17.8%	100%
Newport	80.4%	19.6%	100%
<b>Wales</b>	<b>79.2%</b>	<b>20.8%</b>	<b>100%</b>

Table 4.3 shows that, in Wales as a whole, nearly 21% of people reported that they had suffered from a heart condition in response to Q28 which asked “*Have you ever been treated for any of these Heart Diseases?*”. Respondents were asked to indicate all conditions that applied from the following list:

1. Yes, Angina,
2. Heart Attack (or coronary),
3. Heart Failure,
4. High Blood Pressure (or Hypertension),
5. Another heart Disease
6. No, have not had any Heart Disease.

The rate of self-reported heart disease varied considerably across Wales at UA level, from nearly 18% in Monmouthshire to just over 25% in Blaenau Gwent. This is not surprising given that a number of studies have shown that self-reported heart disease rates vary with the level of poverty in Britain.



Table 4.4 provides an illustration of how this 1998 WHS data can be used to apportion resources for the in-patient and day-patient treatment of heart disease across the UAs in order to meet health need more fairly.

**Table 4.4: Illustration of using the WHS to allocate hospital in-patient and day-patient resources for treatment of heart disease**

Unitary Authority	Q28. Have you ever been treated for any of these Heart Diseases?		Total % with a Heart Disease	Initial Needs Based Resource Allocation for Heart Disease	Final Resource Allocation adjusted to 1998/99 control total
	No Heart Disease	Heart Disease		£	£
Anglesey	499	143	2	£184,101	£2,419,180
Gwynedd	939	226	4	£290,474	£3,816,977
Conwy	882	246	4	£315,246	£4,142,492
Denbighshire	721	175	3	£224,496	£2,949,993
Flintshire	1,169	272	5	£348,965	£4,585,580
Wrexham	984	244	4	£313,325	£4,117,246
Powys	1,001	245	4	£314,476	£4,132,372
Ceredigion	588	139	2	£178,432	£2,344,693
Pembrokeshire	840	246	4	£315,872	£4,150,718
Carmarthenshire	1,297	389	7	£499,094	£6,558,350
Swansea	1,838	435	7	£558,963	£7,345,055
Neath & Port Talbot	1,036	316	5	£405,479	£5,328,206
Bridgend	989	285	5	£365,305	£4,800,296
Vale of Glamorgan	929	212	4	£272,193	£3,576,750
Cardiff	2,533	559	9	£717,068	£9,422,635
Rhondda, Cynon, Taff	1,807	521	9	£669,123	£8,792,618
Merthyr Tydfil	409	127	2	£163,497	£2,148,429
Caerphilly	1,258	379	6	£487,009	£6,399,547
Blaenau Gwent	524	177	3	£226,968	£2,982,475
Torfaen	670	201	3	£257,528	£3,384,055
Monmouthshire	711	154	3	£197,241	£2,591,842
Newport	1,053	256	4	£328,529	£4,317,037
<b>TOTAL for Wales</b>	<b>22,677</b>	<b>5,947</b>	<b>100</b>	<b>£7,633,384</b>	<b>£100,306,547</b>

The second column in Table 4.4 shows the weighted number of people who self-reported that they had ever suffered from a heart condition in the 1998 WHS. The third column shows the percentage distribution of heart disease in Wales at UA level, eg the 559 people who self-reported depressive illness in Cardiff represent 9% of all people in Wales self-reporting a heart condition. The next column in Table 4.4 shows the illustrative allocations of monies at UA level for the in-patient and day-patient treatment of Heart Disease, eg Cardiff gets £717,068 and Anglesey gets £184,101. However, the WHS only asked a sample of people in Wales about their health, so not everybody in Wales who has suffered from heart disease was included in the survey. For example, the 1998 WHS found 5,947 people who had suffered from heart disease whereas, during 1998/99, 78,141 Welsh people received hospital in-patient and day-patient treatment for heart disease (see Table 4.2). Therefore, the initial resource allocation needs to be increased so that it reflects the amount of money that was

actually spent by the Welsh NHS on treating heart disease in 1998/99. The final column in Table 4.4 shows this final allocation, *eg* Cardiff receives £9,422,635 and Anglesey receives £2,419,180.

It is important to note that Anglesey would receive this notional allocation in the RAR formula even if there were no facilities on Anglesey for the in-patient and day-patient treatment of heart disease, *ie* no hospital.

It is also important to note that average national costs of treatment have been used rather than local costs. This has been done to avoid unfairly penalising areas which are highly efficient (can provide high quality treatment at a low cost) and rewarding areas that are inefficient (provide treatment only at a high cost). Local cost data are currently unavailable for all areas due to computer and data problems experienced by some Health Authorities, however, even when they do become available their use should be avoided to ensure that perverse incentives are not built into the Resource Allocation Formula.

By using direct measures of health need, from a range of sources discussed above (including the WHS), a considerable amount of current NHS expenditure can be allocated at UA level. It seems preferable to allocate resources for the treatment of mental illness and other diseases on the basis of reliable measurements of morbidity rather than on the age, sex and social class distribution of the population, weighted by death rates.

### Health condition indicators

The health condition indicators used in the Welsh NHS resource allocation formula are shown below along with details of the source of the statistics and the sample size. Details of the resource allocation calculations are given in Appendix 2.

#### 1. Medical, surgical and other hospital in-patient and day-patient allocations excluding paediatrics and psychiatrics (Total 1998/99 expenditure = £691,026,391)

Health condition indicator	Data source	Number with health condition in sample
Heart Disease	WHS, 1998	5,947
Cancer	Cancer Registry (average 1995-1997)	15,009
Respiratory Illness	WHS, 1998	6,623
Arthritis	WHS, 1998	7,236
Back Pain	WHS, 1998	8,816
Epilepsy	WHS, 1998	255
Stroke	WHS, 1998	349
Diabetes	WHS, 1998	1,056
Varicose veins	WHS, 1998	3,141
Hearing Impairment	WHS, 1998	3,711
Injury in Accidents	WHS, 1998	2,187
Dental Health	WHS, 1998	8,828
Food Poisoning in UK	Notifiable Statistics (average 1997-2000)	21,796
<b>Total</b>		<b>83,899</b>

**2. Total children's health costs (Total 1998/99 expenditure =£83,584,614)**

<b>Health condition indicator</b>	<b>Data source</b>	<b>Number with health condition in sample</b>
Number of Births	Vital Statistics (Average 1994-1998)	41,407
Number of Low Birth Weight Babies	Vital Statistics (Average 1994-1998)	2,486
Physical and profound multiple disabilities	Welsh Schools, Jan 2000	1,797
Children with dt > 0 (ie some decayed, missing or filled teeth) 1998-9	BASCD, 1998-99	176,135
Number of Children Under 16	Population Statistics, 1998	599,100
<b>Total</b>		<b>820,925</b>

Note: despite the range of information collected on children's health needs, it proved impossible to relate many of these health needs to the relevant cost information. Therefore, the distribution of the child population under 16 from the 1998 mid-year population estimates was used to allocate some of the costs on a per capita basis, *eg* indirectly).

**3. Total maternity costs (Total 1998/99 expenditure = £68,572,443)**

<b>Health condition indicator</b>	<b>Data source</b>	<b>Number with health condition in sample</b>
Number of Births	Vital Statistics (Average 1994-1998)	41,407
Number of Low Birth Weight Babies	Vital Statistics (Average 1994-1998)	2,486
<b>Total</b>		<b>43,893</b>

**4. Total psychiatric costs (Total 1998/99 expenditure = £230,663,665)**

<b>Health condition indicator</b>	<b>Data source</b>	<b>Number with health condition in sample</b>
Mental or Nervous Illness	WHS, 1998	3,897
Learning Disabilities	Learning Disability Register, 1999	12,363
Children with Special Education needs	Welsh Schools, Jan 2000	16,984
<b>Total</b>		<b>33,244</b>

**5. Total Accident & Emergency costs (Total 1998/99 expenditure =£45,314,758)**

<b>Health condition indicator</b>	<b>Data source</b>	<b>Number with health condition in sample</b>
Injury in Accidents	WHS, 1998	2,187

<b>Total</b>		<b>2,187</b>
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**6. Medical, surgical and other specialities out-patients costs (Total 1998/99 expenditure = £170,548,870)**

<b>Health condition indicator</b>	<b>Data source</b>	<b>Number with health condition in sample</b>
Heart Disease	WHS, 1998	5,947
Cancer	WHS, 1998	1,479
Respiratory Illness	WHS, 1998	6,623
Arthritis	WHS, 1998	7,236
Back Pain	WHS, 1998	8,816
Epilepsy	WHS, 1998	255
Stroke	WHS, 1998	349
Diabetes	WHS, 1998	1,056
Varicose veins	WHS, 1998	3,141
Hearing Impairment	WHS, 1998	3,711
Seeing Impairment	WHS, 1998	2,343
Dental Health	WHS, 1998	8,828
Food Poisoning in UK	WHS, 1998	5,880
<b>Total</b>		<b>55,664</b>

Note: Out-patient attendance rates by health condition during the past 12 months are from the WHS.

**7. General Medical Service costs (Total 1998/99 expenditure = £186,934,000)**

<b>Health condition indicator</b>	<b>Data source</b>	<b>Number with health condition in sample</b>
Heart Disease	WHS, 1998	5,947
Cancer	WHS, 1998	1,479
Respiratory Illness	WHS, 1998	6,623
Arthritis	WHS, 1998	7,236
Back Pain	WHS, 1998	8,816
Epilepsy	WHS, 1998	255
Stroke	WHS, 1998	349
Diabetes	WHS, 1998	1,056
Varicose veins	WHS, 1998	3,141
Hearing Impairment	WHS, 1998	3,711
Seeing Impairment	WHS, 1998	2,343
Dental Health	WHS, 1998	8,828
Food Poisoning in UK	WHS, 1998	5,880
Mental Illness	WHS, 1998	2,187
Injury in Accidents	WHS, 1998	3,897
<b>Total</b>		<b>61,748</b>

Note: General Practice attendance rates by health condition are from the GP Morbidity Database and based on 33 practices across Wales covering approximately 300,000 people. These average national rates are multiplied through using the 15 health conditions in the WHS at LHG area level to yield a relative volume allocation, *eg* it is assumed that each consultation has the same GMS cost whatever the health condition.

**8. Community Nursing costs (Total 1998/99 expenditure = £59,353,168)**

<b>Health condition indicator</b>	<b>Data source</b>	<b>Number with health condition in sample</b>
Heart Disease	WHS, 1998	5,947
Cancer	WHS, 1998	1,479
Respiratory Illness	WHS, 1998	6,623
Arthritis	WHS, 1998	7,236
Back Pain	WHS, 1998	8,816
Epilepsy	WHS, 1998	255
Stroke	WHS, 1998	349
Diabetes	WHS, 1998	1,056
Varicose veins	WHS, 1998	3,141
Hearing Impairment	WHS, 1998	3,711
Seeing Impairment	WHS, 1998	2,343
Dental Health	WHS, 1998	8,828
Food Poisoning in UK	WHS, 1998	5,880
<b>Total</b>		<b>55,664</b>

Note: District Nurse and Health Visitor service rates by health condition during the past 12 months are from the WHS.

**9. Chiropody costs (Total 1998/99 expenditure = £6,754,612)**

<b>Health condition indicator</b>	<b>Data source</b>	<b>Number with health condition in sample</b>
Heart Disease	WHS, 1998	5,947
Cancer	WHS, 1998	1,479
Respiratory Illness	WHS, 1998	6,623
Arthritis	WHS, 1998	7,236
Back Pain	WHS, 1998	8,816
Epilepsy	WHS, 1998	255
Stroke	WHS, 1998	349
Diabetes	WHS, 1998	1,056
Varicose veins	WHS, 1998	3,141
Hearing Impairment	WHS, 1998	3,711
Seeing Impairment	WHS, 1998	2,343
Dental Health	WHS, 1998	8,828
Food Poisoning in UK	WHS, 1998	5,880
<b>Total</b>		<b>55,664</b>

Note: Chiropody service rates by health condition during the past 12 months are from the WHS.

As can be seen from the tables above, the Welsh NHS resource allocations are based on a wide range of statistical indicators of health need from a range of sources, including: 15 health condition indicators from the 1998 WHS, Cancer Registry Statistics, Notifiable Disease Statistics on food poisoning, Learning Disability Register statistics, Special Education Needs statistics from Welsh Schools, Vital Statistics on births and low birth weight babies and BASCD statistics on children's dental health. In addition, service utilisation data from the GP Morbidity Database and the WHS has been used as have the 1998 mid year population estimates for Unitary Authorities. Costings data has been drawn from the DRG hospital cost

system, the TRF2 financial returns and for GMS expenditure the purchase of primary healthcare statistics reported in Table 14.6 of *Health Statistics Wales 1999* (p194).

Additionally, prescribing rates for the 15 health conditions measured in the WHS by major British National Formulary (BNF) Category (01 Gastro-Intestinal System drugs to 13 Skin drugs) have been calculated from eight GP practices with the relevant computer systems that are participants in the GP Morbidity Database. These rates have been used to provide a notional resource allocation at Local Health Group level for prescription drugs. However, prescription drugs are demand-led so this allocation is illustrative and should not be used as a cash limit for prescribing. The majority of General Medical Service expenditure is also demand-led so the GMS allocation should also be viewed as illustrative only.

There is little direct cost data available for GMS, prescribing or community health services. Therefore, these allocations have had to be based upon a slightly different method from the hospital service allocations previously discussed (*eg* treatment of heart disease in hospitals – see above). A volume-based allocation has been used in these cases and an illustrative example is discussed below.

#### **A simplified worked example of a volume based notional resource allocation: prescribing of cardiovascular system drugs**

A wide range of drugs and preparations are used in Wales as part of medical treatments. These drugs have been grouped into 15 major categories in the BNF and aggregated financial information is available in this form. In 1998/99, for example, 9,074,212 prescriptions were issued for cardiovascular system drugs. These drugs cost, on average, £7.87p per prescription, giving a total cost of £71,437,818 for cardiovascular drugs for the whole of Wales during 1998/99 (see Appendix 2 for details).

Cardiovascular system drugs are often prescribed for the treatment of heart disease but they are also used in the treatment of a wide range of medical conditions. Cardiovascular system drugs include:

- 2.1 Positive inotropic drugs
- 2.2 Diuretics
- 2.3 Anti-arrhythmic drugs
- 2.4 Beta-adrenoceptor blocking drugs
- 2.5 Drugs affecting the reninangiotensin system
- 2.6 Nitrates, calcium-channel blockers, and potassium channel activators
- 2.7 Sympathomimetics
- 2.8 Anticoagulants and protamine
- 2.9 Antiplatelet drugs
- 2.10 Myocardial infraction and fibinolysis
- 2.11 Antifibrinolytic drugs
- 2.12 Lipid-regulating drugs
- 2.13 Local sclerosants

Information on the prescribing of drugs by BNF category is available from the General Practice Morbidity Database. This information has been collected from 33

GP practices across Wales which serve approximately 300,000 patients. Table 4.5 below shows the number of prescriptions for cardiovascular system drugs during 1998/99 in eight of these practices (with advanced computer records) by the health condition of the patient.

**Table 4.5 Prescriptions for cardiovascular system drugs by health condition**

<b>Health condition</b>	<b>Number of prescriptions for Cardiovascular System drugs</b>	<b>Percent of prescriptions for Cardiovascular System drugs</b>
Heart	3,230	44.1
Cancer	84	1.1
Respiratory	1,086	14.8
Arthritis	929	12.7
Back pain	462	6.3
Epilepsy	10	0.1
Stroke	52	0.7
Varicose veins	61	0.8
Diabetes	249	3.4
Food Poisoning	35	0.5
Hearing	41	0.6
Seeing	5	0.1
Teeth	86	1.2
Mental	609	8.3
Accident	383	5.2
<b>Total</b>	<b>7,322</b>	<b>100</b>

Unsurprisingly, Table 4.5 shows that the majority of cardiovascular system drugs were prescribed to patients with heart disease (3,230 prescriptions, representing 44.1% of total cardiovascular system prescriptions) or respiratory illness (1,084 prescriptions, 14.8% of the total). However, smaller numbers of cardiovascular system drugs were also prescribed for patients with a wide range of other health conditions. For example, there were 10 cardiovascular system prescriptions given to patients with epilepsy and 609 to patients with mental illness, which may illustrate the fact that some patients can have complex and multiple needs, *eg* ‘serious’ epilepsy and ‘minor’ heart disease.

The GPMD database contains too few GP practices to provide a reliable estimate of the number of prescriptions for cardiovascular system drugs at LHG area level. However, it can provide a reliable estimate of the distribution of cardiovascular system drug prescriptions by health condition at national level (*eg* for Wales as a whole). In order to produce an estimate of the number of cardiovascular system drug prescriptions at LHG level, it is necessary to use the distribution of disease measured by the 1998 WHS and make the assumption that people with heart disease in different areas (Gwynedd, Bridgend, Cardiff, etc.) are equally likely to require cardiovascular system drugs for treatment as people are in Wales as a whole. The rates of cardiovascular system drug prescriptions shown in the final column in Table 4.5 were applied to the prevalence rates of disease measured in the WHS. In order to then

obtain a notional resource allocation for each LHG area, it was assumed that all prescriptions for cardiovascular system drugs in every LHG area cost the same as the national average (*ie* £7.87p each).

Table 4.6 shows the notional resource allocation for cardiovascular system drugs at local health group area level by health condition. The allocation is notional as prescribing is demand-led and should not be subject to cash limits in a resource allocation formula.

**Table 4.6: Notional resource allocation for cardiovascular system drugs at Local Health Group (LHG) area level, by health condition**

Unitary Authority	Heart	Cancer	Respiratory	Arthritis	Back	Epilepsy	Stroke	Varicose
Isle of Anglesey	£760,046	£22,792	£231,267	£182,497	£96,731	£2,478	£15,392	£13,301
Gwynedd	£1,199,199	£32,794	£393,555	£339,252	£164,509	£1,441	£17,912	£25,581
Conwy	£1,301,468	£45,051	£381,008	£348,624	£174,216	£3,845	£17,902	£27,438
Denbighshire	£926,814	£30,177	£295,013	£285,257	£141,378	£3,284	£25,128	£19,017
Flintshire	£1,440,675	£36,373	£449,993	£404,501	£220,663	£4,358	£15,180	£28,446
Wrexham	£1,293,536	£31,561	£419,145	£371,313	£184,770	£4,927	£11,809	£24,823
Powys	£1,298,288	£29,092	£374,378	£318,102	£188,614	£4,699	£19,692	£28,126
Ceredigion	£736,644	£17,507	£239,204	£191,824	£108,893	£2,270	£7,613	£14,276
Pembrokeshire	£1,304,052	£38,484	£361,349	£333,706	£168,173	£2,425	£16,703	£24,487
Carmarthenshire	£2,060,470	£52,990	£617,810	£548,453	£268,712	£4,117	£39,115	£34,812
Swansea	£2,307,633	£62,897	£851,182	£741,703	£358,696	£5,854	£36,512	£47,761
Neath Port Talbot	£1,673,989	£38,205	£613,318	£502,203	£256,882	£5,471	£18,144	£32,543
Bridgend	£1,508,133	£29,850	£505,592	£411,895	£206,959	£3,154	£17,438	£25,867
Vale of Glamorgan	£1,123,726	£33,543	£363,956	£328,419	£174,441	£2,493	£22,081	£21,431
Cardiff	£2,960,357	£90,310	£1,101,604	£834,154	£415,904	£11,485	£65,480	£52,423
Rhondda, Cynon, Taff	£2,762,421	£60,458	£970,562	£854,484	£394,366	£10,277	£48,693	£46,079
Merthyr Tydfil	£674,983	£14,377	£258,701	£225,082	£96,446	£2,425	£13,915	£12,246
Caerphilly	£2,010,578	£50,699	£738,090	£626,473	£272,438	£4,895	£26,865	£35,921
Blaenau Gwent	£937,019	£17,921	£318,702	£275,082	£131,593	£4,137	£15,213	£15,891
Torfaen	£1,063,186	£21,355	£339,501	£278,725	£140,988	£3,660	£28,394	£19,740
Monmouthshire	£814,292	£24,994	£265,228	£221,538	£118,446	£2,749	£8,143	£19,582
Newport	£1,356,305	£38,123	£506,509	£440,596	£223,733	£7,123	£20,018	£25,361
<b>Wales</b>	<b>£31,513,815</b>	<b>£819,554</b>	<b>£10,595,666</b>	<b>£9,063,880</b>	<b>£4,507,549</b>	<b>£97,566</b>	<b>£507,343</b>	<b>£595,153</b>

Unitary Authority	Diabetes	Food	Hearing	Seeing	Teeth	Accident	Mental	Total
Isle of Anglesey	£43,676	£6,078	£8,587	£908	£17,621	£117,913	£60,261	<b>£1,579,548</b>
Gwynedd	£103,006	£11,616	£13,552	£1,614	£26,959	£246,680	£111,037	<b>£2,688,706</b>
Conwy	£106,201	£13,391	£13,617	£1,401	£35,625	£265,182	£139,852	<b>£2,874,820</b>
Denbighshire	£71,460	£9,674	£10,598	£1,280	£27,158	£152,081	£100,729	<b>£2,099,047</b>
Flintshire	£107,431	£16,170	£15,153	£1,929	£37,173	£319,344	£154,551	<b>£3,251,942</b>
Wrexham	£92,125	£16,223	£20,143	£2,037	£35,940	£239,931	£149,680	<b>£2,897,961</b>
Powys	£95,485	£12,767	£12,799	£1,463	£36,020	£197,832	£121,509	<b>£2,738,866</b>
Ceredigion	£32,671	£7,852	£7,148	£889	£20,140	£107,018	£85,801	<b>£1,579,752</b>
Pembrokeshire	£90,553	£11,714	£13,054	£1,807	£34,111	£208,596	£137,597	<b>£2,746,810</b>
Carmarthenshire	£164,202	£17,942	£25,476	£2,948	£56,372	£406,910	£219,498	<b>£4,519,828</b>
Swansea	£209,703	£28,302	£30,665	£3,567	£66,946	£463,201	£290,759	<b>£5,505,380</b>
Neath Port Talbot	£157,693	£16,421	£22,486	£3,037	£47,250	£303,782	£192,652	<b>£3,884,077</b>
Bridgend	£92,134	£16,265	£19,453	£2,623	£37,668	£248,943	£159,172	<b>£3,285,146</b>
Vale of Glamorgan	£62,703	£14,018	£13,787	£1,755	£28,891	£228,599	£114,782	<b>£2,534,625</b>
Cardiff	£220,885	£40,732	£36,852	£4,726	£69,758	£585,212	£411,772	<b>£6,901,654</b>
Rhondda, Cynon, Taff	£237,309	£29,260	£38,570	£5,195	£74,819	£566,577	£357,814	<b>£6,456,884</b>
Merthyr Tydfil	£54,422	£6,168	£11,473	£1,522	£18,593	£141,940	£111,086	<b>£1,643,380</b>
Caerphilly	£168,279	£19,979	£31,709	£3,524	£54,126	£371,235	£289,322	<b>£4,704,132</b>



Blaenau Gwent	£93,143	£9,591	£13,197	£1,765	£24,919	£159,671	£126,965	<b>£2,144,809</b>
Torfaen	£91,050	£12,194	£14,325	£1,503	£28,680	£226,242	£154,681	<b>£2,424,223</b>
Monmouthshire	£40,668	£8,289	£10,175	£1,312	£21,499	£120,007	£67,505	<b>£1,744,426</b>
Newport	£94,596	£16,835	£17,202	£1,982	£38,799	£264,871	£179,750	<b>£3,231,802</b>
<b>Wales</b>	<b>£2,429,393</b>	<b>£341,481</b>	<b>£400,021</b>	<b>£48,783</b>	<b>£839,068</b>	<b>£5,941,769</b>	<b>£3,736,777</b>	<b>£71,437,818</b>

The final column in Table 4.6 shows the notional resource allocation for cardiovascular system drug prescriptions. The Welsh NHS total expenditure on these types of drugs in 1998/99 was £71,437,818, of which Anglesey has been allocated £1,579,548 and Newport has been allocated £3,231,802.

In order to obtain a notional resource allocation for the whole prescribing budget, the procedure discussed above was repeated for each category of drug by major BNF grouping and the results then aggregated to produce a final total notional allocation by LHG area. This is shown in Table 4.8 below and in Appendix 2.

### Final resource allocations

Brief details of the stages of the resource allocation calculations are given in Appendix 2. The allocations are based upon the actual expenditure detailed in the TRF 2 financial returns for 1998/99. The TRF 2 returns are financial summaries by major expenditure category based on the NHS Trust Accounts.

**Table 4.7: TRF 2 Welsh NHS expenditure, by major financial category (£)**

<b>Expenditure category</b>	<b>1997/98</b>	<b>1998/99</b>	<b>1999/00</b>
Medical	372,341,436	412,909,684	448,698,089
Surgical	372,649,395	408,871,113	431,650,720
Maternity	54,794,366	58,606,228	65,168,221
Psychiatric	155,987,932	168,584,636	175,855,520
Other	93,229,036	92,162,258	99,860,549
Accident & Emergency	35,405,241	41,684,705	44,994,451
Day care	33,465,910	35,003,773	33,230,378
Community	213,014,057	230,075,103	282,928,467
<b>Total</b>	<b>1,330,887,373</b>	<b>1,447,897,501</b>	<b>1,582,386,395</b>

Table 4.7 gives summary details of the categories of the £1.447 billion of NHS expenditure in the 1998/99 financial year. The largest category of expenditure was on hospital medical services (£412 million) and the smallest category of expenditure was on day care (£35 million). The resource allocation formula assumes that the amount spent on these expenditure categories in 1998/99 was correct and allocates resources at Local Health Group level based upon this apportionment. There has been no redistribution between expenditure categories, for example, the formula allocates £168 million of psychiatric and £58 million of maternity expenditure to LHG level. It does NOT examine if more (or less) should have been spent on psychiatric or maternity services.

Table 4.8 (below) shows the final aggregate allocations for the TRF 2 NHS financial returns and also a notional allocation for prescribing and General Medical Service costs at LHG level, using the methods described above and in Appendix 2.

**Table 4.8: Final NHS resource and notional prescribing cost allocations at LHG level**

Unitary Authority	Total TRF 2 allocation (1998/99)	Total notional prescribing allocation	Total notional GMS allocation (1998/99)
Isle of Anglesey	£29,542,454	£6,901,757	£3,936,208
Gwynedd	£51,833,991	£12,067,735	£6,789,420
Conwy	£54,780,361	£12,787,157	£7,414,572
Denbighshire	£40,626,953	£9,415,417	£5,575,410
Flintshire	£61,282,841	£14,691,894	£8,424,861
Wrexham	£54,703,174	£13,131,548	£7,798,858
Powys	£52,557,501	£11,944,859	£7,138,658
Ceredigion	£30,075,936	£7,108,739	£4,123,668
Pembrokeshire	£51,114,325	£11,939,967	£7,009,582
Carmarthenshire	£84,642,402	£19,959,755	£11,511,956
Swansea	£107,119,168	£25,548,271	£14,749,173
Neath Port Talbot	£71,380,755	£17,825,225	£10,284,422
Bridgend	£60,637,817	£14,778,123	£8,532,037
Vale of Glamorgan	£48,860,650	£11,516,004	£6,695,806
Cardiff	£135,475,343	£32,140,475	£18,113,943
Rhondda, Cynon, Taff	£121,336,340	£29,584,802	£16,909,468
Merthyr Tydfil	£31,394,743	£7,672,425	£4,336,723
Caerphilly	£86,497,335	£21,686,942	£12,332,251
Blaenau Gwent	£39,554,102	£9,692,974	£5,640,124
Torfaen	£47,509,902	£10,925,042	£6,304,093
Monmouthshire	£32,483,953	£7,818,006	£4,645,291
Newport	£62,557,954	£15,135,604	£8,667,477
<b>Wales</b>	<b>£1,355,818,521</b>	<b>£324,272,720</b>	<b>£186,934,000</b>

Table 4.8 shows that £1.355 billion of NHS resources detailed in the TRF 2 financial return have been allocated by the formula. It has not been possible to allocate £92 million of expenditure using the formula. This unallocated expenditure is mainly for supra-regional and supra-district services (such as organ transplants) where a formula based allocation at LHG level would be unwarranted or for community health service expenditure (health promotion, other services, etc), where there is insufficient information to allow allocation at LHG level. The TRF 2 allocations in Table 4.8 range from £135 million for Cardiff to £30 million for Anglesey. The needs-based resource allocation formula has the effect of allocating more NHS resources to the more deprived LHG areas of Wales than would a *per capita* or mortality-based allocation. This is also true for the notional prescribing and GMS allocations where, in general, the more deprived districts receive a higher allocation and the wealthier districts a lower allocation than they would purely on a *per capita* basis (*ie* based on the size of their populations).

However, it must be emphasised that, even if a needs-based NHS resource allocation is implemented, this will not by itself reduce the current wide inequalities in health in Wales. In order for health inequalities to be reduced, specific resources need to be allocated for this purpose and health equity policies implemented. Chapters 5, 6 and 7 examine these issues.