

**WHY RISK ADJUST HEALTH CARE RESOURCE ALLOCATIONS?
A CROSS COUNTRY REVIEW**

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Running Title

A Discussion of the Attempts to Neutralise Risk Selecting Activity, Promote Equity, and Contain Costs Through Use of a Risk Adjustment Mechanism in Germany, England and the Netherlands, Respectively.

Abstract

Many countries have attempted to implement free market reforms in health care over recent years. Competition among health care insurers can introduce incentives for risk selection. In an effort to neutralise risk selecting activity, a risk adjustment mechanism has been introduced in Germany. However, the objective for introducing risk adjustment depends on the health care system in operation, and does not always entirely focus on reducing the incentives for insurers to risk select. Therefore, in addition to describing the German experience, this article represents an attempt to explain how risk adjustment mechanisms have been introduced to promote both equity and cost containment in England and the Netherlands, respectively.

Introduction

In the past decade market orientated reform has been implemented in the health care systems of a number of countries [see, for example, Chinitz 1994; Nonneman and van Doorslaer 1994; Van de Ven *et al* 1994; Von der Schulenburg 1994; Beck and Zweifel 1996]. The main objective of these reforms has been to promote incentives for efficiency and cost containment [Van Barneveld *et al* 1998]. Concurrently, these reforms have provided financial incentives for insurers to select insureds on the basis of risk characteristics that give some indication of the individual's future demand for health care, potentially leaving the most vulnerable members of society with inadequate health care coverage. This problem is most apparent in prospective payment systems where the insurer is allowed to keep surpluses [Schokkaert *et al* 1998]. Consequently, many governments have been prompted into introducing mechanisms to neutralise realised and potential risk selecting activity, with the theory being that if an insurer receives compensation for the risk presented by a particular individual, aversion to insure will diminish [Van de Ven and van Vliet 1992].

These mechanisms vary in their level of sophistication. Both simplistic rules of thumb and complicated formulae have been employed to redistribute funds between insurers in an attempt to more appropriately allocate resources according to the varying risks presented by different populations of insureds. However, it is important to note that the concern when introducing resource allocation formulae is not always specifically concentrated on removing the incentives for risk selection. For example, blatant risk selection is illegal in the Netherlands and a resource allocation formula is used with equity and cost containment in mind [Luursema 1998], though this formula perhaps also acts to remove some of the more subtle forms of risk selection left uncaptured by legislation, such as targeted benefit packages and selective advertising [Van de Ven and van Vliet 1992; Newhouse 1996].

My objective here is to outline the main considerations of governments when risk adjusting health care resource allocations. I have taken as these considerations risk selection, equity and cost containment, though in practice these issues are likely to be highly inter-related. If cost containment was not an issue, for instance, there would be no incentive to risk select. For illustrative purposes, the discussion of each issue will be accompanied by a description of the system at work within a particular country, though no claim is made that an issue is specific to a country or vice versa. For example, I describe how risk adjustment in the Netherlands has been developed to promote cost containment even though equity enhancement was possibly a more fundamental reason for introducing the mechanism. Due to space restrictions, I have chosen to concentrate on Germany, England and the Netherlands, three European countries with a strong tradition of social solidarity and with risk adjustment systems that have been relatively well documented. An in depth discussion of the concept of health care need is beyond the scope of this article and so I shall simplistically define that a person is in need of health care if a state of health prevails that can be improved upon given an increase in health care resources.

Risk Selection

Incentives for risk selection arise in competitive health care markets with regulated prospective payment mechanisms, and attempts have been made to neutralise these incentives by adjusting payments according to the risk characteristics of insureds. However, risk adjustment is imperfect even in its most sophisticated forms. The incentives to risk select will always exist where the insurer holds more information regarding the likely influence that an individual's risk characteristics will have on medical expenditures than that incorporated in the risk adjustment mechanism. Moreover, Schokkaert *et al* have demonstrated that non-additive separability cannot be assumed between the factors that insurers can use to influence medical expenditures and the risk characteristics of insureds which lie beyond the control of insurers [Schokkaert *et al* 1998]. This essentially implies that a degree of trade off between cost efficiency and risk adjustment is unavoidable, even in the circumstance where all parties have perfect information regarding the factors that influence medical expenditure.

However, the paper by Schokkaert *et al* is largely theoretical. It has been empirically demonstrated that the factors typically incorporated in risk adjustment mechanisms are only able to explain a maximum of 20% of the variance in annual acute health care expenditures on an individual level [Newhouse *et al* 1989; Van de Ven and van Vliet 1992; Van Vliet and van de Ven 1992; Newhouse 1994]. Thus, the unpredictable component of this variance is large. This is significant because the component that is unpredictable for the risk adjuster is likely to include a variable element that is dependent upon how efficient the insurer is in such areas as negotiating contracts with providers. Therefore, even if we assume the development of a highly sophisticated risk adjustment mechanism that takes account of all known risk adjusters, the unpredictable component is likely to remain large, implying that efficiency improvements will continue to be possible in the face of a continued development of risk adjustment.

The German health insurance system constitutes four principal categories of insurer (sickness funds): territorially-based insurers, company-based insurers, guild-based insurers and so called substitute insurers which, prior to 1997, were primarily open to salaried employees. Each insurer is self funded and is responsible for collecting sufficient premium payments from its insureds to cover its costs. There is a regulated health insurance premium rate, which requires an insurer to set premiums at a percentage of individual income. The regulated premium is a consequence of the strong attachment to the solidarity principle, since a higher income results in a higher absolute contribution. Hence, the premium rate as a proportion of income for any given insurer is the same for all of its insureds irrespective of age, gender, number of dependants, state of health and income. However, the premium rate across insurers varies to reflect the fact that some insurers cover populations with relatively high health care needs. To illustrate, the premium rate across funds varied from 8.5% to 16.8% of income in 1993 [Files and Murray 1995]. This method of premium setting potentially offered incentives for the insurers to risk select high earners as part of a profit maximising strategy.

Further, prior to 1994, the territorially-based insurers acted as safety nets by covering those people who could not obtain coverage elsewhere, for example, the unemployed,

welfare recipients and other less advantaged groups [Jacobs 1998]. Therefore, the people captured by the safety net were often of low income and relatively high health care need, contributing to the situation whereby the relatively poor were often paying the highest premium rates, challenging the solidarity principle.

The 1993 Health Care Reform Act was introduced with the aim of reducing the difference between premium rates. For example, organisational reform provoked a period of quite dramatic merging among the insurers, with the number of territorially-based insurers (269 to 18), company-based insurers (803 to 497) and guild-based insurers (176 to 48) falling markedly between 1993 and 1998 (in the former West Germany the number of substitute funds fell from 15 to 13) [Jacobs 1998]. Also, as from 1997, many insurers opened up beyond their traditional membership and individuals were offered more choice concerning which insurer to join, with an estimated 80% of insureds being free to choose which insurer they belong to under the new system as compared to 50% in 1993 [Zipperer 1993; Files and Murray 1995]. By a process of spreading costs between high cost and low cost areas, it has been suggested that the freedom to choose insurer may place national insurers at a competitive advantage over high cost localised insurers, who remain legally required to draw their membership from the region in which they operate [Files and Murray 1995; Jacobs 1998]. Nevertheless, the increased freedom to choose will enable high risk individuals to gain access to insurers that have previously been denied them, which should further level premium rates. Also, the policy could stimulate better service from the insurers, who may in turn demand improved services from the providers [Jacobs 1998].

Perhaps more significantly, however, concerns about the potential effect of risk selection on social solidarity, combined with an underlying philosophy that no insurer should be financially disadvantaged due to factors beyond their control, prompted the government to introduce a risk adjustment mechanism in 1994 [Files and Murray 1995].

The risk adjustment process is characterised by a central health insurance fund that calculates and manages each insurer's risk adjusted net payments/receipts. Differences between insurers in terms of the total income derived from premiums are incorporated in the risk adjustment mechanism. As a result, an individual's income is no longer a direct basis for risk selection. The other risk characteristics that determine resource reallocations in this system are age, gender, number of dependants and number of disabled pensioners [for the raw mechanics of German risk adjustment see McCarthy *et al* 1995]. Moreover, the risk adjustment mechanism offers a slightly different profile between East and West Germany. Estimated costs for these two regions are based on a random sample drawn from each, with full integration planned to occur when income levels in the East reach 90% of those in the West. As from January 1999, the premium-derived income level adjustment will be undertaken for Germany as a whole, though adjustment on the basis of the other risk characteristics will remain specific to East and West [Jacobs 1998].

There has been criticisms of the mechanism in that it does not fully incorporate risk factors regarding health status, though the critics have themselves justified this drawback by acknowledging that health status data are unavailable in Germany, and

that the introduction of too many risk factors could undermine competition between funds [Files and Murray 1995; McCarthy *et al* 1995]. For reasons given earlier, this latter point is a mistaken perception. For an adjustment mechanism to successfully tackle risk selection it has to be a good predictor of the individual variance in health care expenditures, at least 80% of which cannot as yet be predicted by the planner [Van de Ven and van Vliet 1992]. Therefore, even if the German adjustment system included all known risk factors, there would remain ample opportunity for the insurers to compete with one another.

As a final point on the German system, it has been proposed that the insurers should calculate different premiums for urban regions than for rural regions, with the urban rate being set higher [Jacobs 1998]. The rationale for this is that since inter-regional differences in health care costs may primarily reflect historical developments in health care infrastructure rather than health care need, urban populations should fully pay for their relatively abundant local services. If this were undertaken, however, due consideration would have to be paid to the plight of the urban poor and to other possible influences on equity.

Equity

Any discussion of equity must first consider the question, equity of what? It is possible to argue that equity should require that insureds contribute a fixed fee regardless of their characteristics, that equity implies a premium rate that is set at a fixed proportion of income, or that equity constitutes actuarially fair payments. Attempts at promoting equity of health care utilisation may involve each individual being allocated an equal share of health care resources within the budget constraint, irrespective of their health care need. Alternatively, we could strive for equal health [Mooney 1983]. A related philosophical debate might be centred on whether we should arrange our health care systems in the classical utilitarian sense of attaining the greatest good for the greatest number [Mill 1861], in which case it may be that we refuse treatment to those with severe chronic illnesses if they should gain relatively little benefit from health care treatment, or whether we adopt a Rawlsian maximin approach and concentrate on alleviating the suffering of those with the most severe forms of illness [Rawls 1972].

Risk adjusting health care resources according to need characteristics is undertaken on the principle of equity of access. In insurance premium-based systems the mechanism serves to level premiums across insurers, which gives high risk individuals more opportunity of affording adequate coverage. In both premium-based and taxation-based systems insured populations with a relatively large proportion of high risk individuals are subsidised by populations with a lower proportion of high risk insureds. This feature offers the potential to remove some of the societal disparities in unmet need and enhances the possibility that any individual in society will receive a comparable intensity of treatment as any other individual, given severity of illness. In this sense, risk adjustment is more Rawlsian than utilitarian and is essentially advancing vertical equity - the unequal treatment of unequals [McGuire *et al* 1988].

In England, some form of risk adjustment formula has been used in resource allocation decisions since 1976, long before the concept of risk selection was so energetically discussed. Indeed, the avowed aim of the original Resource Allocation Working Party

(RAWP) formula was to improve geographical equity in terms of equal access for equal need [McGuire *et al* 1988]. Since its implementation, the resource allocation formula has undergone a series of developments in the ever changing National Health Service (NHS).

Hospital and Community Health Services (HCHS) accounted for approximately 77% of NHS funds in the 1992/93 financial year [Peacock and Smith 1995]. The one hundred health authorities (HAs) are positioned according to geographical area, and act as insurers of their respective populations, financing HCHS. The HCHS allocation to each authority is based on a risk adjustment that is most often referred to as weighted capitation, with allocations calculated by adjusting the unweighted population within the jurisdiction of each HA by its age structure, the local costs of delivering health care services, and a health care needs index, with the national average of each factor serving as the reference point [Carr-Hill *et al* 1994a; NHS Executive 1994; Peacock and Smith 1995]. It should be noted that these adjusted allocations are long run targets to which actual allocations may converge over time. Historically, the health care needs adjuster has been the most debated aspect of this mechanism [Carr-Hill *et al* 1994a].

The needs formula currently in operation was developed by a team of researchers at the University of York [Carr-Hill *et al* 1994a; Carr-Hill *et al* 1994b]. The formula in fact consists of two formulae, with one comprising acute needs variables and the other comprising psychiatric needs variables. The variables are outlined in Table 1. It has been stated that these variables probably capture all dimensions of health care need [Peacock and Smith 1995].

[Insert Table 1]

The DoH made the decision to allocate 64% of the budget according to the acute formula, 12% according to the psychiatric formula and 24% to which no needs index is attached since it was thought inappropriate to equate acute or psychiatric needs indices to services such as mental handicap care and general community services. This was in marked contrast to the system in operation prior to 1995 in which the fundamental characteristic was the application of the square root of the under 75 standardised mortality ratio to the entire HCHS budget [Royston *et al* 1992], a formula criticised for, among other things, implicitly assuming that health care utilisation was a proxy for need [Sheldon and Carr-Hill 1992]. There is some empirical evidence to suggest that compared to the pre-1995 formula, the York formula substantially redistributes resources from the shires to the inner cities, with the main thrust of this effect deriving from the psychiatric component [Peacock and Smith 1995]. More work is required to assess the extent to which the York formula accurately adjusts for need and promotes equity of access.

Since 1991 general practitioners (GPs) have been able to apply to manage their own budget covering staff salaries, prescription costs and selected hospital and community services. Fundholder budgets are allocated by the HAs, and by 1996 approximately 50% of GPs were fundholders (GPFHs) who accounted for in excess of 15% of HCHS expenditure [Audit Commission 1996; Martin *et al* 1998]. These budgets have been generally, though not mandatorily, linked to a risk adjustment formula that is based on

the characteristics of each GPFH's registered population. Specifically, GPFH allocations have often been decided following negotiations around a capitation benchmark, based on the age and gender construct of the GPFH list. Past activity and relevant local factors, such as price differentials, are also considered. There are many reasons why HAs make use of risk adjustment formulae in determining budget allocations to GPFHs [Martin *et al* 1998], prominent among them being the promotion of equity, both among GPFHs and between GPFHs and non-GPFHs [Matsaganis and Glennerster 1994].

The GPFHs are unusual in the sense that they are both insurers and providers of health care. Therefore, in theory, the prospective nature of their budget allocations and the fact that doctors, as insurers, are possibly in a better position to estimate the future health care expenditure on any individual than the HA, offers the potential for risk selecting activity. This is compounded by the fact that physicians are allowed to remove patients from their lists without offering an explanation. However, as yet, risk selecting by GPFHs has been observed to be negligible [O'Reilly *et al* 1998], possibly due to reasons such as medical ethics, retrospective payments to practices that experience deficits, and the fact that GPFHs are not responsible for procedures for an individual patient that exceed £6,000 in one year [Matsaganis and Glennerster 1994; McCarthy *et al* 1995].

The emphasis of risk adjustment on promoting equity rather than discouraging risk selection implies that greater focus is placed on accurately predicting the future health care expenditure of groups rather than individuals. Sheldon *et al* have argued that it is unclear which risk characteristics beyond age and sex indicate need for elective fundholding procedures [Sheldon *et al* 1994]. However, with sufficiently large populations, the law of large numbers implies that the low consumers of health care will balance the high consumers, enabling relatively unsophisticated risk adjustment mechanisms to predict per capita expenditure quite accurately. To illustrate, by using the York acute sector index, it has been estimated that whilst the probability of a +/- 10% deviation of predicted health care expenditure from actual health care expenditure in any one year is 1 in 3 for populations of 10,000, the probability is 1 in 400 for populations of 100,000 [Martin *et al* 1998]. A patient list size of just 7,000 is required for fundholding status, suggesting that there may be considerable scope for error in the formula presently used in calculating GPFH budgets and adding weight to the argument that formulae can at best complement pragmatic management [Weiner and Ferriss 1990; Martin *et al* 1998; Miller 1998].

Inaccurate GPFH resource allocations could theoretically lead to a prevalence of underspenders, who may consequently lessen their efforts for efficiency improvements, and overspenders, who may reduce their quality of care [Martin *et al* 1998]. One possible way of alleviating this problem would be to increase the size of patient groups for whom budgets are set. As from April 1999, primary care will be reorganised as part of the government's modernisation programme for the NHS. The GPFH system will be replaced by a system of Primary Care Groups (PCGs). A PCG will essentially comprise of all former GPFHs, non-GPFHs and community nurses situated within a geographical locality. Physicians within each group will be required to co-operate with each other and will receive a collective budget in much the same way as GPFHs for the purpose of providing and commissioning care for individuals within their catchment

area. The range of services for which PCGs will be responsible will extend over time, to the point, in theory, where HAs may become obsolete. There will be approximately 480 PCGs in England, with a typical PCG serving 100,000 people [Department of Health 1998]. Although the specifics of PCG budget setting are not yet entirely clear, the population covered by each group may be of sufficient size for group health care expenditures to be predicted with a reasonable degree of accuracy by using a formula similar to that in the York model. It is important to emphasise, however, that although risk selection has not been significantly apparent to date, monitoring for the possible emergence of such activity, and a high degree of PCG accountability, are paramount in a changing system. Accountability will also enable the HAs to monitor changes and disparities in efficiency within and between PCGs, an important undertaking in any sensible cost containment policy.

Cost Containment

As mentioned, market oriented reforms have been introduced in a variety of countries to enhance efficiency. Theoretically, improved efficiency preserves quality of care in the face of rising demand whilst containing costs. Risk adjustment has been widely introduced due to consequent equity concerns, though, in the case of England, risk adjustment existed prior to the introduction of the market reforms. As stated, the introduction of such mechanisms does not remove the possibility for efficiency improvements. However, insurers' perceptions of the consequences of risk adjustment affect the incentives to operate efficiently and this has meant that the introduction of such a measure is often politically sensitive. In the Netherlands, attempts have been made to introduce risk adjustment in a manner consistent with the promotion of efficiency.

Health care in the Netherlands is largely financed by premium based insurance coverage but, unlike Germany, all premium payments are gathered by a central sickness fund council that prospectively allocates resources to each insurer. Market oriented reforms enabled the insurers (sickness funds) to operate on a national, as opposed to a regional, basis and allowed them to contract selectively with providers. Moreover, competition is encouraged by giving insureds an annual opportunity to change their health plan [Van Barneveld *et al* 1998].

The system is divided into services provided under the Health Insurance Act (ZFW), including general practitioner services, dental care and short term hospital care, and services provided under the Exceptional Medical Expenses Act (AWBZ), including serious illness health care provision and long term disability expenditures. The ZFW provides mandatory insurance for individuals earning less than Dfl 62,200 (£18,960), or, for those over 65 years, Dfl 38,300 (£11,680) in 1998 [OECD 1997]. This, with the inclusion of the insureds' dependants, covers 63% of the population, with most of the remainder insuring themselves privately [Luursema 1998]. The ZFW is financed by a fixed 6.8% of individual income or benefits. This payment applies to the entire population. It is not possible to obtain private insurance for the long term health care provided under the AWBZ. Thus, the AWBZ provides a basic insurance package for everyone living in the Netherlands and is financed by a premium set at 9.6% of individual income or benefits up to a maximum income of approximately Dfl 47,000 (£14,330) per annum [OECD 1997].

Medical care under the AWBZ is fully retrospectively reimbursed. Budget allocations are therefore focused on ZFW expenditures. The budget allocations for hospital care consist of fixed and variable parts with the fixed part, accounting for approximately 70% of hospital care, based on historical cost calculations. The variable part consists of a risk adjusted allocation. From information concerning the health care expenditures on insureds provided by each insurer, the central sickness fund council is able to adjust allocations according to the age and gender mix of insureds. In addition, the allocations are adjusted by factors accounting for region and the percentage of insureds who are registered disabled. For health care services other than hospital care there is no fixed element and the allocations are subject solely to the risk adjustment mechanism. The prospective allocation is calculated to account for approximately 90% of the actual costs of each insurer. The remaining 10% is covered by a payment that individuals pay directly to their insurer. This payment is fixed within an insurer but can vary across insurers. The payment serves as a competitive tool by which to attract new insureds and thus provides an incentive for insurers to contain costs.

Due to some imperfections in the model, a series of retrospective corrections are undertaken. These include a full recalculation of the budget to account for any fluctuation in the insurers' membership since the time of prospective budget allocation. Also, it has been estimated that the model is only able to predict approximately 5% of the variance in individual annual health care expenditure [Van Barneveld *et al* 1998]. Lamers has empirically demonstrated that the predictive power of the model could be improved by introducing patient diagnosis as a risk factor, though this may provide incentives for inappropriate hospitalisation [Lamers 1998]. In an attempt to account for the limitations of the predictive power of the risk characteristics employed in the model, and to reduce the incentives for subtle risk selecting, 30% of insurer shortfalls or surpluses are redistributed. This settlement is undertaken by comparing the per capita shortfall within each insurer with the per capita shortfall across all insurers. Additions to or subtractions from each insurer's budget are then based on whether insurer per capita shortfall is greater or less than average per capita shortfall. It is important to note that this reallocation does not affect prospective budget allocations and, therefore, does not challenge cost containment.

With respect to any remaining deficits, the central sickness fund council reimburses 95% of fixed cost shortfalls under the rationale that these costs are beyond the influence of the insurers. However, efficiency incentives for the insurers in the purchasing of hospital care are not entirely removed since they will be directly responsible for much of the 30% of hospital costs under the ZFW that are classified as variable. Specifically, for the ZFW, only 25% of the variable cost and non hospital service deficits are reimbursed. A crucial element of the health financing system is that these retrospective reimbursements are being gradually reduced over time. For example, in 1994, before the split between fixed and variable costs was introduced, 75% of the shortfalls under the ZFW were reimbursed [McCarthy *et al* 1995]. This reduction is likely to continue, giving the insurers an increasing responsibility for the total variable cost and non hospital service deficits.

Fundamentally, risk adjustment was introduced to promote equity. At the time of its introduction budget shortfalls were largely retrospectively reimbursed, which provided

little incentive for the insurers to either risk select or improve efficiency. Without efficiency incentives, perceptions of the negative effect of risk adjustment on the potential to operate efficiently were not paramount. As insurers have had to take an increasing responsibility for their shortfalls, incentives to operate efficiently have come to the fore, since a larger deficit equates to a larger direct payment being demanded from insureds, reducing competitive edge. It has been argued that an effective prevention of risk selection will be necessary for a competitive health insurance market with a regulated premium structure to operate effectively [Van de Ven and van Vliet 1992]. The presence of risk adjustment reduces the possibility for the Dutch insurers to use some of the more subtle forms of risk selection in attempting to reduce their own costs, and places greater pressure on them to seek genuinely efficient practice, for example, through the negotiation of better contracts with providers. However, with the increasing emphasis on insurer financial responsibility, an improvement in the risk adjustment mechanism may be necessary in the face of increased incentives to risk select, and a better mechanism may further promote efficient practice. Nevertheless, the existing mechanism has possibly helped to contain health care costs, an indication of which is that health care expenditure remained at approximately 9.5% of gross domestic product (GDP) between 1994 and 1998 [Luursema 1998].

Conclusion

The main conclusion to be drawn is that the motivation for risk adjusting resource allocations does not focus on one specific issue. However, in the further refinement of risk adjustment mechanisms, it can be argued that reducing the incentives to risk select will take general precedence, since, assuming sufficient population size, it is likely that a satisfactory standard of equity can be achieved in England with relatively few risk characteristics, and efficiency improvements as a proxy for cost containment are achieved in the Netherlands by reducing the insurers' ability to risk select. In accordance with this, van de Ven and van Vliet have stated that risk adjustment formulae should be refined to the point where the costs of risk selecting to the insurer exceed the profits attained by risk selecting [Van de Ven and van Vliet 1992].

It is not possible to comment with any degree of scientific accuracy on the level of success achieved by the risk adjustment mechanisms introduced thus far. In Germany, it is likely that high risk individuals can obtain adequate health care coverage at a lower premium than might have been the case in the absence of risk adjustment, and that the insurers' incentive to select those with a higher income has been largely removed. In England, rural areas may well have subsidised the higher health care use in the inner cities, implying that, generally, equity of access for equal need has been promoted, though some uncertainty remains regarding the definition of the concept of need. In the Netherlands, health care costs as a proportion of GDP have been contained in an era of rising demand.

Therefore, it can be argued that risk adjustment has been better than no risk adjustment, though the development of more refined outcome measures for these mechanisms would be a useful area of research. Whether more refined outcome measures are developed or not, it is important that a high degree of accountability is demanded from health care insurers and providers for the purpose of managing the complex and often conflicting concerns of risk selection, equity and cost containment.

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Table 1: The York Model

Acute Needs Variables:

Standardised mortality ratio (under 75)
Proportion of pensionable age living alone
Proportion of dependants in single carer households
Proportion of economically active who are unemployed
Standardised limiting long standing illness ratio (under 75)

Psychiatric needs variables:

Standardised mortality ratio (under 75)
Proportion of pensionable age living alone
Proportion of dependants with no carer
Proportion of adult population permanently sick
Proportion of persons in lone parent families
Proportion born in New Commonwealth

Source: Carr-Hill *et al* 1994a