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The utility of medically certified sickness absence data as an updatable indicator of population health

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We have access to annual mortality data and decennial census data on self-assessed health. Data on sickness absence, 'Incapacity Benefit' (IB), are regularly available and claimants are professionally diagnosed. Here we examine the potential of IB to be an annual small area indicator of population health.

The utility of medically certified sickness absence data as an updatable indicator of population health

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Abstract

Despite the availability of mortality data, a lack of annually accessible morbidity information for small geographical areas in England and Wales means that health studies are often restricted to using decennial self-reported Census measures. Whilst the dissemination of Census information has enabled much research, the self-assessment of health can be affected by subjective factors. Sickness absence information in the form of Incapacity Benefit (IB) data are more regularly available and claimants are professionally diagnosed. This source may have potential to be an annual small area indicator of population health.

Relationships in 2001 between IB, Census measures and mortality suggest that using IB as an indicator of population health will give similar results, especially for those reporting themselves permanently sick or disabled. IB should be an objective measure as it is professionally diagnosed, but willingness to take time off work due to sickness, to consult a doctor or to claim benefits may be affected by cultural and socio-economic factors. Furthermore, strong relationships exist between poor health, mortality and unemployment. We recognise that IB may be hiding unemployment and have inferred an estimate using illogical responses to Census questions. On the other hand, IB may be an incomplete count of ill people because some may be unable to claim benefits.

On balance, IB is a useful indicator of relative health for small areas. The utility of Incapacity Benefit as an updatable indicator of population health requires the harmonisation of geographical and data detail inconsistencies over time and depends on the future of the sickness benefit system in view of pending reforms.

Keywords: Incapacity Benefit, sickness absence, LLTI, Census, mortality, morbidity

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Introduction

"There is a relation betwixt death and sickness: and to every death from every cause there is an average number of attacks of sickness, and a specific number of persons incapacitated for work" (Farr, 1875).

Annual data on mortality have been available from the Vital Statistics for a variety of geographical scales from national down to small area levels in the UK for many years, but this has not been the case for morbidity data, partly because information on illness is harder to collect and has to be assembled from a variety of sources (Borooah, 1999). Though it has been possible to derive somewhat unsatisfactory health data from economic activity questions, the 1991 Census was the first since 1911 to include a direct health-related question. The 'limiting long-term illness' (LLTI) question "does the person have any long-term illness, health problems or handicap which limits his/her daily activities or the work he/she can do?" was asked of all persons in households and communal establishments (OPCS/GROS, 1992: 31).

Answers to the LLTI question were found to provide valuable information about general levels of illness which correlated well with other data on general practitioner (GP) consultations and in- and out-patient visits to hospital (Dale, 1993). The dissemination of the 1991 Census information on self-reported LLTI enabled much health-based research at aggregate level (Boyle, Gatrell and Duke-Williams, 1999; Senior, 1998) and at individual level using the Sample of Anonymised Records (SARs) (Boyle, Duke-Williams and Gatrell, 2001; Boyle, Norman and Rees, 2002; Gould and Jones, 1996) and the Office for National Statistics (ONS) Longitudinal Study (LS) (Bartley and Plewis, 1997; Boyle, Norman and Rees, 2004; Harding, 2002; Norman, Boyle and Rees, 2005; Sloggett and Joshi, 1998; Wiggins, Joshi, Bartley, Gleave, Lynch and Cullis, 2002). Strong relationships between Census LLTI and all-cause mortality and circulatory disease mortality have been demonstrated at local level (Bentham, Eimermann, Haynes, Lovett and Brainard, 1995; Charlton, Wallace and White, 1994). Subsequently, many public health reports now contain LLTI levels as a major indicator in local health profiles (Jordan, Ong and Croft, 2000).

However, there are limitations as Census data are only available in the UK for one year in every ten and there tends to be a delay before they become available at small area level. The Census relies on self-reported health status which, despite a large body of work supporting its validity (Mitchell, 2005), is potentially affected by subjective factors (Bailis, Segall and Chipperfield, 2003; Gooberman-Hill, Ayis and Ebrahim, 2003; Senior, 1998) with reporting dependent on the perception of, recall of, and propensity to report, health problems (O'Reilly, Rosato and Patterson, 2005). The Census health questions are only about general health and offer no information on specific causes of morbidity. Therefore, regularly collated data on medically certified sickness absence have been suggested as supplementary measures of morbidity (Marmot, Feeney, Shipley, North and Syme, 1995; Kivimaki, Head, Ferrie, Shipley, Vahtera and Marmot, 2003; Vahtera, Pentti, and Kivimaki, 2004).

In the UK, Incapacity Benefit (IB) is the main social security cash benefit paid to people who are assessed by initially by a General Practitioner (GP) doctor, and after six months by a Benefits Agency doctor, as being incapable of work due to illness and who meet certain contribution conditions (DWP, 2005). IB is similar in remit to the long-term sickness and disability insurance schemes of other Western countries such as the USA's Social Security Disability Insurance and the disability pensions of Germany and Sweden (OECD, 2003). There are three rates of IB comprising two short-term rates: a lower rate (IBST-L) which is paid for the first 28 weeks of sickness and a higher rate (IBST-H) for weeks 29 to 52. The third, a long-term IB rate (IBLT), applies to people who have been sick for more than a year; this category comprises the largest number of claimants (McCormick, 2000; DWP, 2005). IB can be received up to pensionable age (60/65). At the end of May 2002, the number of IB claimants stood at 2.37 million. Although limited to the working age population, IB may therefore have some advantages over Census-derived variables: IB claimants are professionally diagnosed whereas the Census information is self-reported; IB diagnoses are cause specific; and IB data are available from the Department of Work and Pensions (DWP) at least annually so can potentially provide information on population health during inter- and post-censal periods.

Although initial findings suggested that IB is a useful source of health information, the data previously used were a 5% sample (Bambra and Norman, in press) and furthermore no account was taken of employment rates. The literature on IB suggests that some long-term unemployed persons may claim benefit but not be sick (McCormick, 2000). Indeed, the IB system has long been criticised as providing a means of people avoiding work, particularly in political debates about the reform of IB (Grieve-Smith, 2005; Wintour, 2005), and as a mechanism which can hide unemployment levels (Beatty and Fothergill, 1999; 2002; Fieldhouse and Hollywood, 1999; Beatty, Fothergill and Macmillan, 2000; McCormick, 2000; Fothergill, 2001). Here we assess in more detail the utility of information on IB claims by extending our analysis to a (now released) 100% IB data set. We examine IB as an indicator of population health at local government district and sub-district levels by investigating distributions and relationships between IB and other health measures from the Census and from mortality statistics. In the 2001 UK Census, the question about LLTI asked in 1991 was repeated (with a minor wording change) and was supplemented with an additional general health question: "Over the last twelve months would you say that your health has been: Good? Fairly Good?

Not Good?". We also use Census data on economic activity to explore the relationship between IB and employment rates as well as those reporting themselves to be permanently sick or disabled. A strong relationship between health and unemployment has regularly been demonstrated (Haynes, Gale, Lovett and Bentham, 1996; Mathers and Schofield, 1998) and we would also expect this to be the case for IB. However, there may be differences if IB includes persons whose unemployment is hidden.

Methods and data sources

Indirectly Standardised Illness Rates (SIRs) and Standardised Mortality Rates (SMRs) for the local government areas of local authority districts and unitary authorities (these will both be referred to as LAs) in England and Wales and for the more detailed sub-district electoral wards. Standard rates and expected events have been calculated using populations at risk from the Office for National Statistics (ONS) revised mid-year estimates (MYEs) for 2001.

- Event counts of Incapacity Benefit (IB) by LA district and wards were supplied by the Department for Work and Pensions (DWP, 2005). To avoid small number problems the total of all IB claimants (lower, higher and long-term) is used here. Outputs are rounded to the nearest 5.

- Event counts of all cause mortality have been obtained from the Vital Statistics tables VS3 (LAs) and VS4 (wards) disseminated by ONS.

- Event counts of LLTI, 'not good' health (NGH) and those reporting their economic activity as 'permanently sick or disabled' (PSD) and unemployed have been obtained from 2001 Census Area Statistics tables.

- SIRs and SMRs have been calculated for the working age population with age-groupings kept as consistent as possible between the different data sources. To reduce the impact of annual fluctuations, mortality and IB event counts are 2000-02 and 2001-02 averages, respectively. Since they have very small populations, results are not reported for the City of London and the Isles of Scilly.

Results

National level

Figure 1 shows that substantial numbers of both males and females were claiming Incapacity Benefit in England and Wales during 2001 and that there were marked differences with and between the various self-reported measures of health obtained from the 2001 Census. Males event counts exceed those for females for all measures, mainly because male retirement age is five years older, but there is a larger difference between numbers of male and female IB claimants than for the Census indicators. Figure 1 shows that for persons of working age death is a very rare event compared with any of these ill health measures. In Figures 2a and b, the curves of age-specific rates for both males and females are largely parallel, all rising with age. The highest rates for both sexes are for LLTI. Male IB rates are similar to the NGH and PSD rates, but rise markedly at ages 55-59 and 60-65. Female IB rates are closest to the Census NGH rates. The 5% sample data released by the DWP (2005) show that whilst male claims exceed female claims for most diagnosed reasons, the male excess is most pronounced for Diseases of the Circulatory System (ICD code I00 - I99). Note that in Figure 2, the age-specific mortality rates are per 1,000 persons, whereas the illness rates are per 100.

Figure 1: Event counts of various health conditions, working age persons, England and Wales, 2001

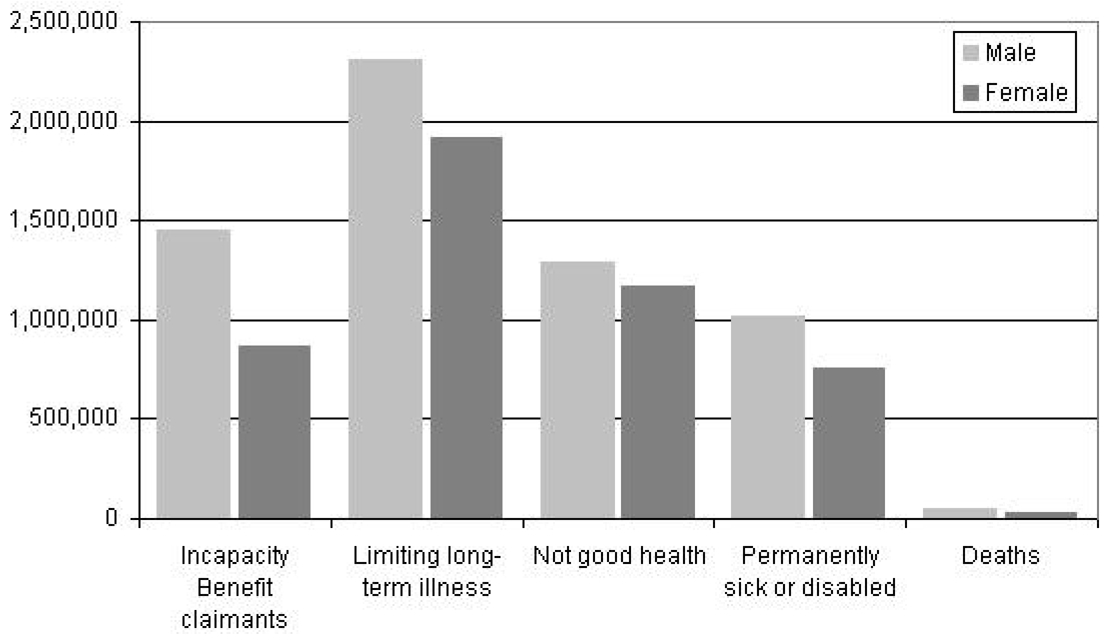
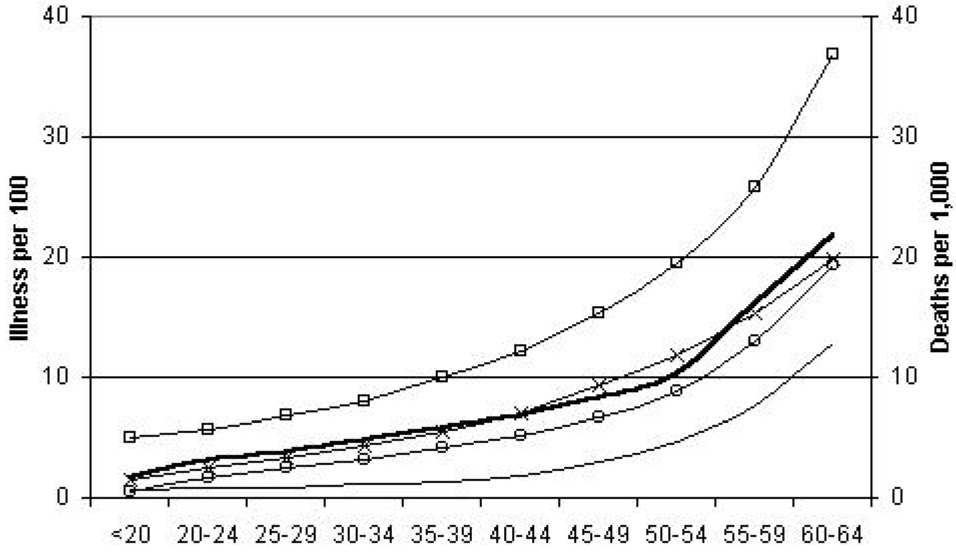
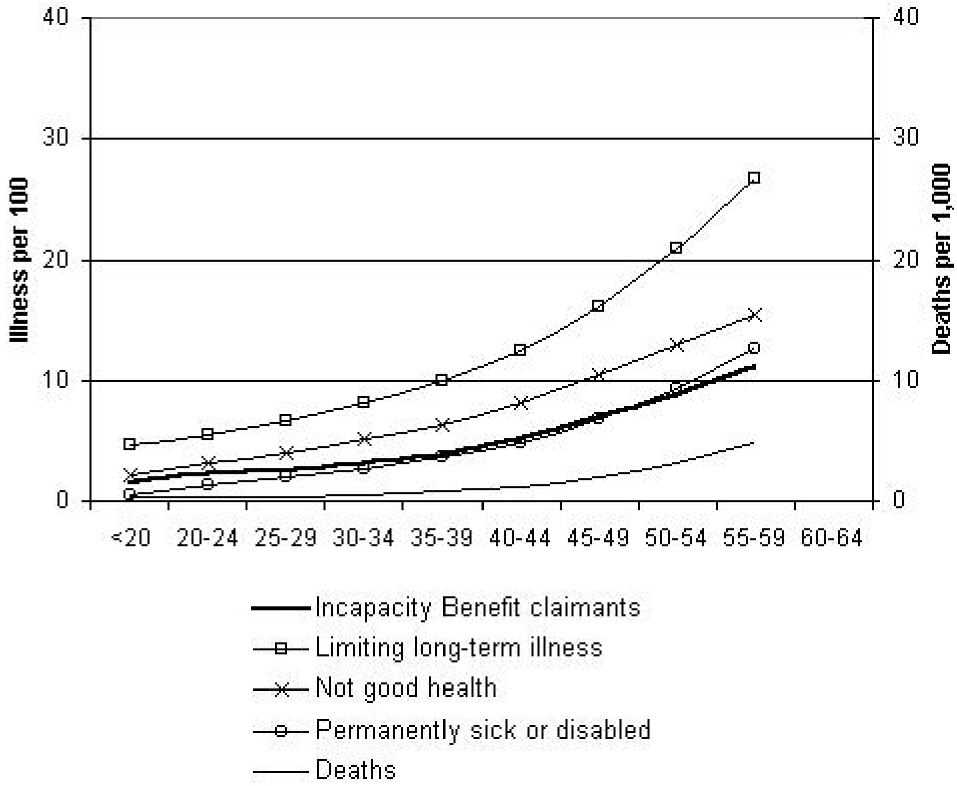


Figure 2: Age-specific illness and mortality rates, England and Wales, 2001

a.) Males



b.) Females



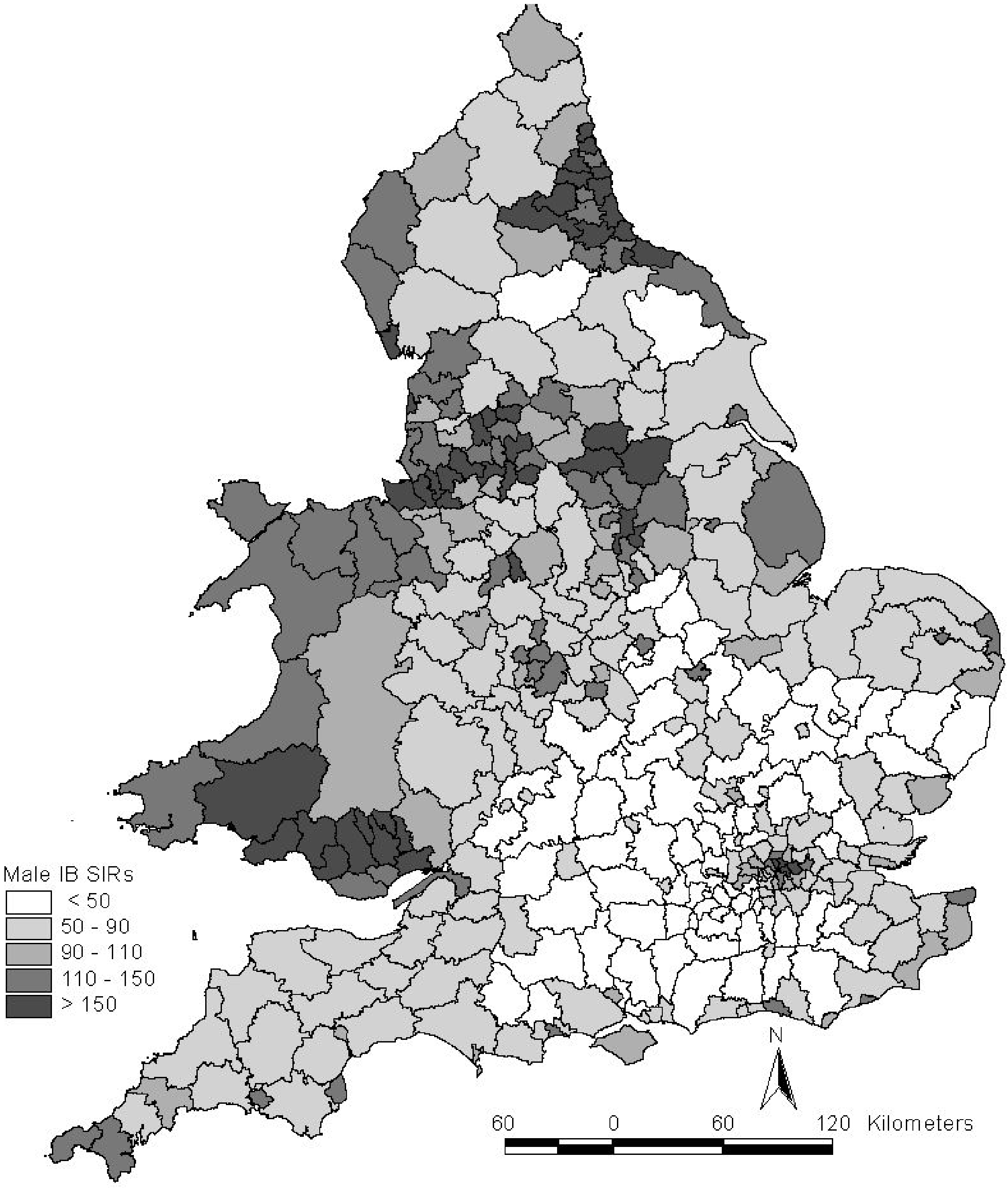
At national level, between 1995 (when IB was introduced) and 2001, rates of IB claims have risen at 5.5% per annum (pa) on average for males and 7% for females (although there were sharper increases in sickness claims during the previous few years, Beatty and Fothergill, 1999). Between the 1991 and 2001 Censuses the reporting of LLTI by working age increased similarly pa to IB: male rates rose by 5.1% pa and females by 7.6%. During the same period mortality fell by 1.54% pa for males and 1.27% for females. (Note we are using percentage change pa as we are comparing different length time periods.) Quite why illness rates are rising whilst mortality rates are falling is unclear (Mitchell, 2005), but evidently an increasing proportion of people are living with chronic conditions. Given that those born during the UK's 1955 to 1965 'baby boom' peak are now aged 40 to 50, we can probably expect the numbers of working age people with health problems to continue to rise.

Local authority level

Age standardised ratios of male IB are mapped in Figure 3. The lighter areas have the lowest levels of IB and the darker areas have the highest, in comparison with the national average of 100. The distribution shows remarkable similarity with previously published maps of age-sex standardised LLTI (Charlton *et al.,* 1994) with higher levels of claims in the north-east, north-west, south Yorkshire and south Wales and the lower levels in the south-east. Generally, rural areas have lower levels of IB claims than urban areas. The same broad patterns are found for female IB SIRs. Table 1 lists the 'best' and 'worst' 10 local authorities for male IB standardised ratios. The best LAs are mainly home counties semi-rural non-deprived commuter and 'stock-broker' belt areas. The worst LAs largely comprise old coal mining areas along with Liverpool and Manchester. Almost the same LAs are found to have the best and worst health using the census measures both for males and females.

At local authority level, Table 2 shows strong positive relationships between standardised IB ratios and unemployment rates and mortality. Still positive, the correlations are progressively stronger between IB and the 2001 Census measures of LLTI, NGH and PSD. Measured in this way, IB appears to more strongly relate to illness than to unemployment or to mortality. These correlations are all marginally stronger for males than for females.

Figure 3: Male Standardised Illness Ratios of Incapacity Benefit claims by local authority, England and Wales, 2001



100 = national average for England & Wales

Table 1: Local authorities with highest and lowest standardised ratios of male Incapacity Benefit claims

Highest	Government Office Region	Lowest	Government Office Region
Easington	North-East	Hart	South-East
Merthyr Tydfil	Wales	Wokingham	South-East
Blaenau Gwent	Wales	Surrey Heath	South-East
Liverpool	North-West	South Bucks	South-East
Rhondda, Cynon, Taff	Wales	Uttlesford	East
Neath Port Talbot	Wales	South Cambridgeshire	East
Knowsley	North-West	Rutland	East Midlands
Caerphilly	Wales	Tandridge	South-East
Manchester	North-West	Chiltern	South-East
Hartlepool	North-East	West Berkshire	South-East

Table 2: Correlations between Incapacity Benefit standardised ratios, other health measures and unemployment rate, local authorities in England and Wales, 2001

Male	Mortality	LLTI	NGH	PSD	Unemployed
IB	0.8205	0.9791	0.9869	0.9926	0.7942
Mortality		0.7884	0.8319	0.7958	0.8257
LLTI			0.9880	0.9876	0.7834
NGH				0.9848	0.8147
PSD					0.7809

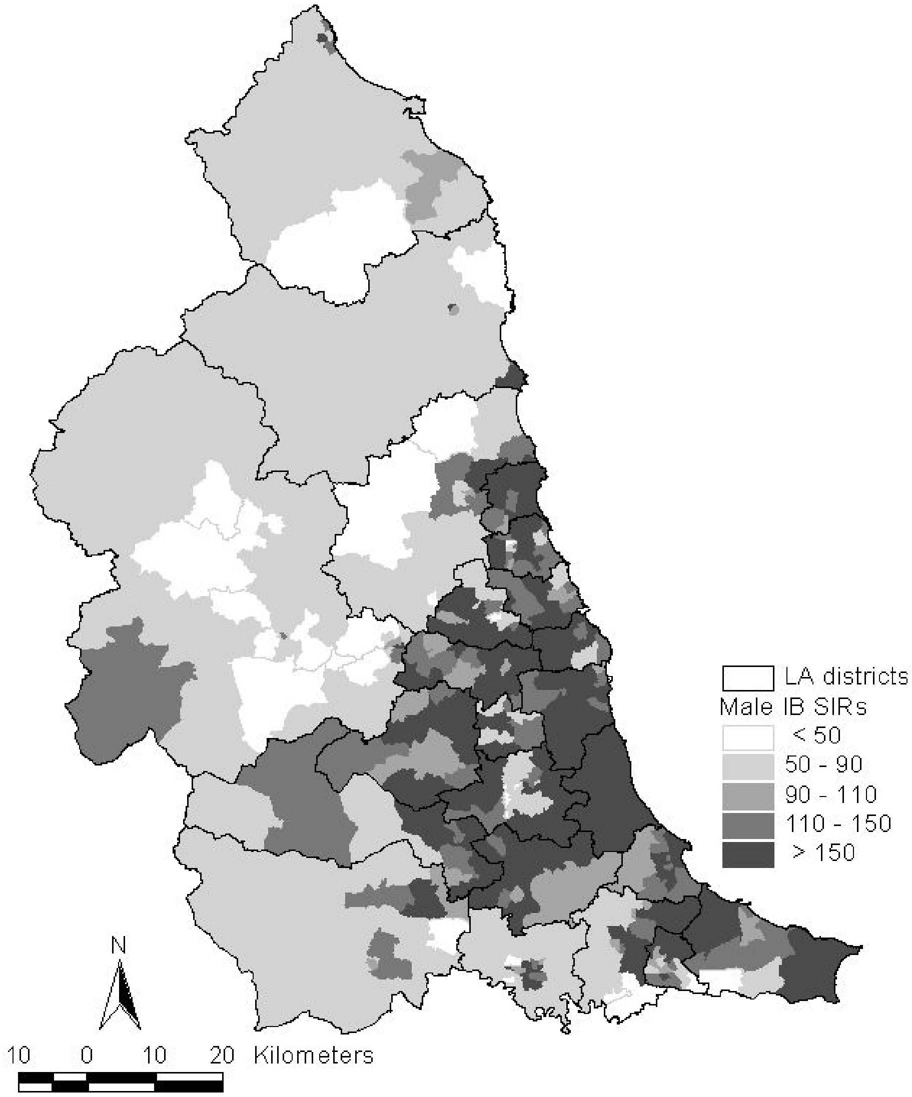
Female	Mortality	LLTI	NGH	PSD	Unemployed
IB	0.7859	0.9713	0.9664	0.9912	0.7237
Mortality		0.8199	0.8390	0.7983	0.7248
LLTI			0.9884	0.9834	0.7581
NGH				0.9706	0.7797
PSD					0.7221

All correlations are significant at the 0.01 level

Ward level

As an example, Figure 4 has a map of male standardised IB ratios for the wards in North-East government office region (GOR) in 2001. This confirms the broad pattern shown in Figure 3 for LAs but reveals sub-district variation. The more rural wards tend to have lower levels of IB than the urban wards which lie within the LAs of Newcastle, Gateshead, Sunderland, Easington, Hartlepool and Sedgefield. For all wards in England and Wales, the relationships of significant, positive correlations (Table 3) is the same pattern as found at LA level. IB has a modest relationship with mortality and a strong relationship with unemployment. Very strong positive relationships exist between IB and the Census-derived LLTI, NGH and PSD measures, the strongest being for the latter. Similarly to LAs, ward level male correlations are marginally stronger than those for females.

Figure 4: Male Standardised Illness Ratios of Incapacity Benefit claims by wards, North-East Government Office Region, 2001



100 = national average for England & Wales

Table 3: Correlations between Incapacity Benefit standardised ratios, other health measures and unemployment rate, wards in England and Wales, 2001

Male	Mortality	LLTI	NGH	PSD	Unemployed
IB	0.6420	0.9554	0.9580	0.9722	0.7928
Mortality		0.6153	0.6369	0.6044	0.6169
LLTI			0.9702	0.9709	0.7710
NGH				0.9647	0.7909
PSD					0.7641

Female	Mortality	LLTI	NGH	PSD	Unemployed
IB	0.5082	0.9351	0.9242	0.9485	0.6441
Mortality		0.5154	0.5153	0.4986	0.4181
LLTI			0.9657	0.9562	0.6712
NGH				0.9428	0.6838
PSD					0.6266

All correlations are significant at the 0.01 level

It is common in health studies to classify mortality and illness rates and ratios by quintile. If we use quintiles of age-sex standardised IB ratios, how consistent are these with quintiles of the other health measures? Table 4 has quintiles of male IB crosstabulated with the Census health measures and mortality. These quintiles are the 8,837 England and Wales wards in the study grouped into fifths of the ratio and rate distributions with equal numbers of wards in each quintile. Quintile 1 has the lowest levels of IB claims and the other measures, quintile 5 has the highest.

In Table 4 the leading diagonal of each matrix (the cells highlighted in grey) is where a ward falls into the same quintile for both IB and the health measure with which it is crosstabulated. Cells away from the leading diagonal are where the quintiles are different. Compared with the distribution of LLTI, most wards (73%) fall in the same quintile with only a very few wards being more than two quintiles different. For NGH, 72% of wards are on the leading diagonal, but more wards are only one quintile different. The quintile distribution of IB is closer still to the PSD distribution with 77% of quintiles the same and few wards more than one quintile different. The crosstabulation of IB with mortality quintiles shows more dispersal with only 38% of wards falling in the same quintile and substantial numbers of wards well away from the diagonal. With 49% of wards falling in the same quintile, there is fair equivalence between levels IB claims and rates of unemployment. The pattern for females is very similar, but with a slightly less strong correspondence. For quintiles of female IB, 66% for LLTI, 63% for NGH, 67% for PSD, 34% for mortality and 40% for unemployment of quintile combinations fall on the leading diagonal. It should be noted that these results are consistent when population-weighted quintiles are used with equal numbers of persons in each quintile.

Table 4: Quintiles of male incapacity benefit standardised ratios crosstabulated with other health and unemployment measures

a.) Limiting long-term illness

Incapacity Benefit	Q1	Q2	Q3	Q4	Q5
Q1	1402	352	12	1	0
Q2	334	1075	341	17	1
Q3	29	325	1109	303	1
Q4	1	15	295	1273	183
Q5	1	1	10	174	1582

b.) Not good health

	Q1	Q2	Q3	Q4	Q5
Q1	1367	369	31	0	0
Q2	359	1028	366	15	0
Q3	38	344	1089	295	1
Q4	3	25	273	1296	170
Q5	0	2	8	161	1597

c.) Permanently sick or disabled

	Q1	Q2	Q3	Q4	Q5
Q1	1461	296	10	0	0
Q2	290	1174	296	8	0
Q3	15	290	1212	248	2
Q4	1	8	242	1343	173
Q5	0	0	7	169	1592

d.) Mortality

	Q1	Q2	Q3	Q4	Q5
Q1	797	514	294	137	25
Q2	490	530	403	256	89
Q3	289	420	482	393	183
Q4	150	232	412	536	437
Q5	41	72	177	445	1033

e.) Unemployment

	Q1	Q2	Q3	Q4	Q5
Q1	1020	551	178	18	0
Q2	541	651	442	129	5
Q3	182	416	690	425	54
Q4	32	129	396	735	475
Q5	1	11	61	462	1233

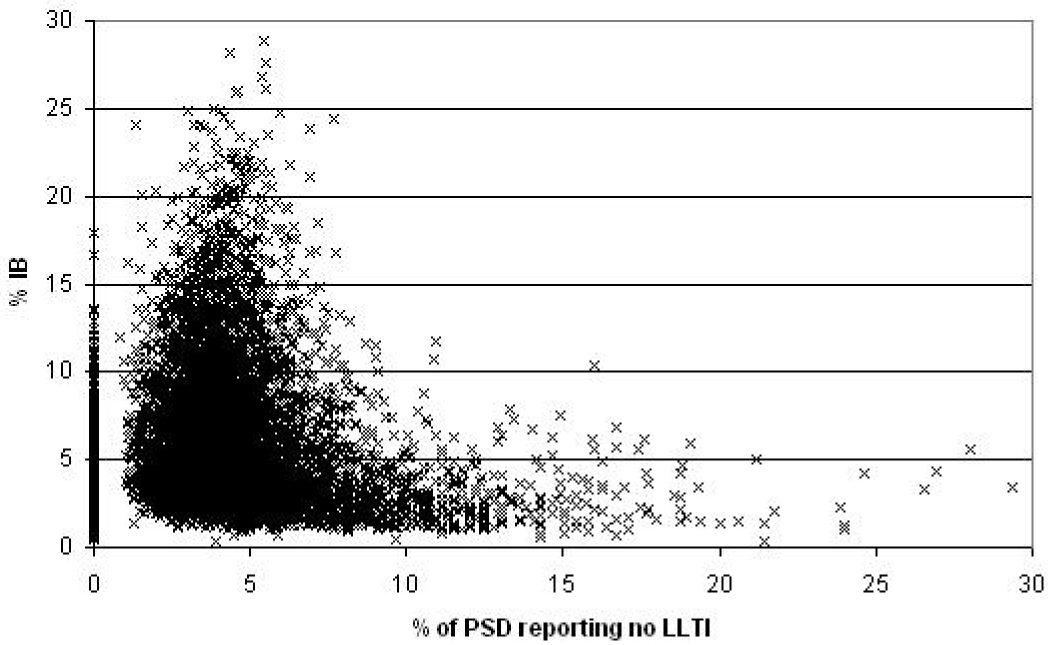
Q1 = best health, Q5 = worst health

Hidden unemployment

As noted in the introduction, it has been suggested that IB claims may hide unemployment levels. It is not possible to explore this issue using the IB data downloadable from the DWP, but inconsistencies in the way in which people have answered the Census health related questions are potential indicators of the extent of the problem. Census Areas Statistics Table CS021 on ‘Economic Activity by Sex and LLTI’ has counts of people who reported themselves as being permanently sick or disabled and who may or may not have a limiting long-term illness.

Nationally, of those who reported PSD, 3.4% of males and 4.9% of females did *not* report LLTI. Thus, over 80,000 people have indicated they are economically inactive due a *permanent* health condition, yet they have not reported a *long-term* limiting illness. Although it should be noted that some of the 80,000 incidents may have been due to mistakes in form filling or the fact that people give 'proxy' answers on behalf of others (Heady, Smith and Avery, 1994; Wiggins, 1993). For males and females combined, the ward percentage of those with PSD but no LLTI has a weak correlation (R = 0.062, p = 0.00) with unemployment rate but an even weaker relationship with IB rates (R = 0.007, p = 0.00) (Figure 5). Note that almost 1,600 wards have zero counts of people reporting PSD and no LLTI and that these results are not age-sex adjusted.

Figure 5: Relationship between percentage Permanently sick or disabled and no LLTI and percentage Incapacity Benefit claims

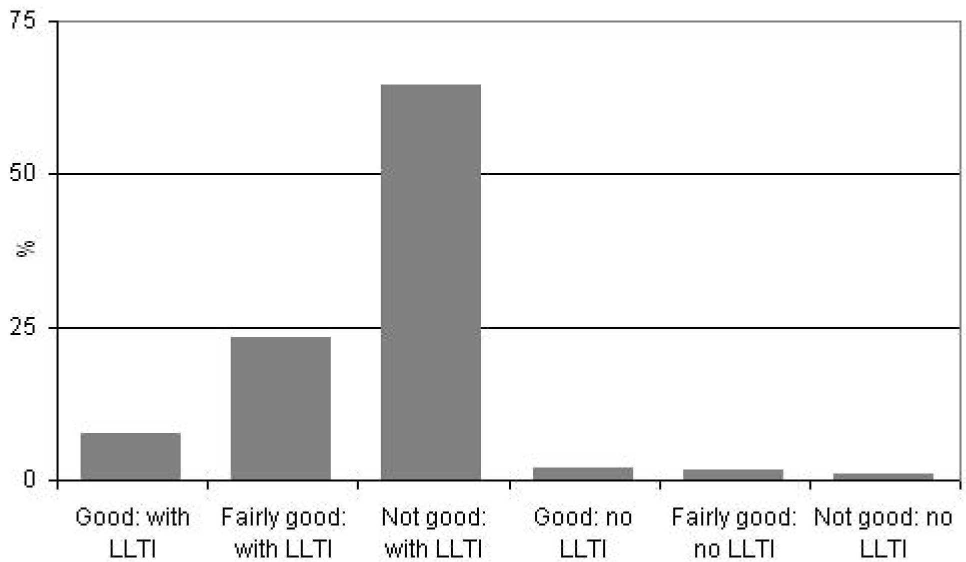


We can investigate further the responses people are giving on the Census questionnaire using the Sample of Anonymised Records (SARs). The 2001 Licensed Individual SAR is a 3% sample containing over 1.75 million microdata records which cover a full range of Census topics on individuals and summary information about households (CCSR, 2005). The SARs differ from traditional Census outputs as they are not aggregated into pre-determined tables. Since individual level data offer great flexibility we crosstabulated economic activity information (both those who are permanently sick or disabled and those who are unemployed) with answers to the limiting long-term illness and general health questions. The left three bars in Figure 6a show the coincidence of PSD and LLTI. Most people who report PSD also report LLTI and the percentage increases with less good general health as we would expect. The right three bars are persons with PSD but without LLTI and the total of these is consistent with the information from Census Table CS021 described above. Here though we can differentiate by level of general health. This shows a small percentage of persons report PSD and no LLTI, but that their health is 'not good'. However, marginally more report their health as fairly good and still more, the rather illogical combination of good general health, no LLTI, but being permanently sick or disabled. These people could be the 'hidden unemployed'. Here we have combined the data for males and females but the patterns are the same by sex.

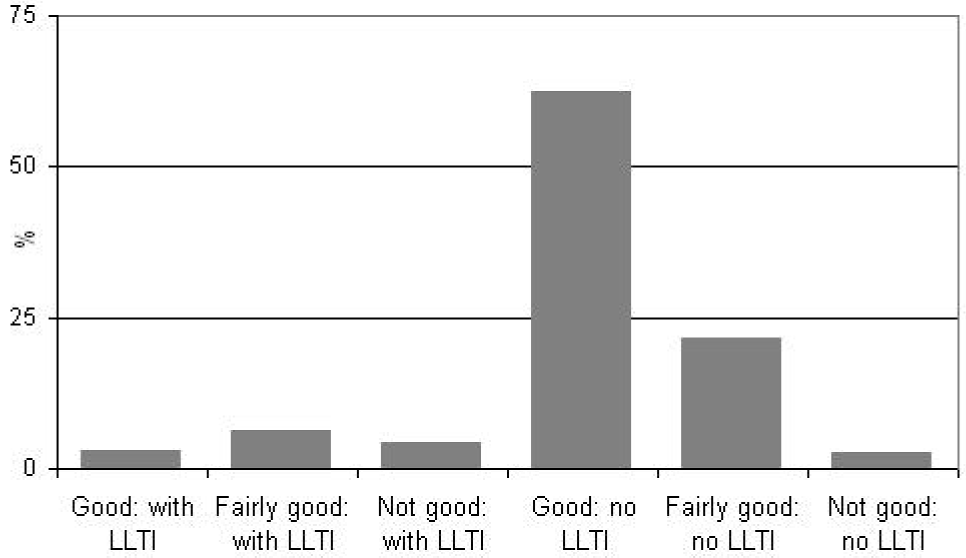
Figure 6b focuses on the unemployed. The three bars to the right of Figure 6b are percentages of the unemployed who have not reported LLTI. The largest proportion have good health with many having fairly good health. A minority of the unemployed without LLTI are reporting not good health. The three bars to the left of Figure 6b are percentages of those reporting themselves as unemployed who also ticked the 'yes' box on the Census form regarding LLTI. Whilst many report good or fairly good health as well as LLTI, over 4% of the unemployed have LLTI and regard their health as being 'not good'. Perhaps these people are 'hidden ill' as far as the benefits system is concerned, unable or unwilling to claim IB.

Figure 6: Economic activity and health

a.) Permanently sick or disabled: percentage reporting limiting long-term illness and general health



b.) Unemployed: percentage reporting limiting long-term illness and general health



Discussion

In England and Wales we have annually available area level mortality data but to date no easily accessible morbidity data except from the UK's decennial Census. Since population structure and characteristics are continually changing (Rees, Norman and Brown, 2004), a lack of frequently available area level health data limits the ongoing funding and service provision decisions made by policymakers and practitioners. The merits of Census and other self-reported measures and of mortality have been widely-reported. Studies of sickness benefit have tended towards national and individual level studies and have focused on whether the incapacity benefit system is hiding unemployment. Here we are considering the utility of IB as an indicator of population health from national down to local level.

The 1991 UK Census was the first for 80 years to include a direct question asking respondents to report on their health. Many public health reports now contain Census derived morbidity variables in local health profiles (Jordan, Ong and Croft, 2000) and a large body of work supports the validity of self-assessed health (Mitchell, 2005). However, the Census only provides a measure of general health with the data available just once every decade. The Census therefore cannot be used to analyse specific health conditions and how these might differ between places and over time during inter- and post-censal periods. Moreover, the self-reporting of health can be affected by subjective factors. Mortality data are available from the Vital Statistics for each calendar year by all causes and various specific causes of death. The VS mortality data are a high quality resource due to the legal requirement to register deaths. Whilst mortality rates are commonly used as a measure of population health, this is often criticised since death is an "extreme measure of ill health" (Kyffin *et al.*, 2005: 888). Census and mortality data are both available from national down to very local geographical levels.

Although strong relationships between LLTI and all-cause mortality have been demonstrated (Bentham *et al.,* 1995; Charlton *et al.,* 1994; Kyffin, 2005), O'Reilly, Rosato and Patterson (2005: 1) suggest that the self-reported nature of Census health measures may be an unreliable way of assessing an area's health needs. They propose that differences in distributions between self-assessed health and "more objective measures such as mortality may arise because the former is sensitive to conditions that are poorly reflected by mortality". They acknowledge though that, "mortality patterns may reflect the morbidity of previous decades while self-reported health reflects current morbidity." Patently the situation is complex since people may die without previously reporting LLTI whilst others survive for many years with a limiting condition. For instance, using the ONS Longitudinal Study (LS), Norman (2002) showed that of the LS members who died between 1991 and 1999, 51% of persons did *not* previously report LLTI in the 1991 Census and of the LS members who *did* report LLTI in 1991, only 37% died by 1999.

Our results indicate that at a population level IB data have the potential to provide an ongoing, at least annual, indicator of the relative level of area health. We have shown that IB is strongly related to the Census measures of NGH health and LLTI for men and women at national, local authority and ward level. The strongest relationships are between Incapacity Benefit and the Census economic activity variable on whether people report themselves as being permanently sick or disabled; a relationship that seems intuitively sound. In addition, IB claims do not rely solely on self-reported health status as they are professionally diagnosed. Data, albeit a 5% sample, are available by specific cause disaggregated by ICD 10 code (Bambra and Norman, in press; DWP, 2005). This could be particularly useful for area level measures of specific conditions, such as mental ill health, for which self-reported and other data, such as hospital admission statistics, have been shown to be less reliable (Cohen, Forbes and Garraway, 1995). IB data therefore compensates for some of the limitations of the Census. IB also exhibits a moderate to strong association with mortality from national down to ward geographic levels. We recognise, however, that willingness to take time off work due to sickness, to visit a doctor and to apply for benefits will each be affected by subjective factors which may vary by sex, socio-economic status and by cultural population sub-group.

At national level we have found a relative excess of male IB claims for ages above 55 and a relative overall undercount of female IB compared with the sex ratio of other health events. For males who are claiming IB, the return to work could be particularly problematic once a certain age is reached unless their health has improved significantly and employment is available for that age-group. For females, the undercount could relate to lower levels of female participation in the workforce and the fact that certain national insurance contribution thresholds must be reached to qualify for IB (McCormick, 2000).

Our results have indicated that at area level, IB is strongly associated with unemployment. In some ways this reinforces a popular view in the research literature and beyond (Grieve-Smith, 2005), that IB claims are, at least in part, a proxy for long-term unemployment. Authors such as Beatty and Fothergill (2004: 16-17) have claimed that between 44% and 52% of male IB claims constitute hidden unemployment (650,000 to 760,000 of the 1,470,000 male IB claimants in 2003). The implication here and in wider policy discussions about reforms to the benefits system (Wintour, 2005) being that IB is more about unemployment than health. Our examination of the Census measures of discrepancies between LLTI and PSD show that the extent of this problem may have been severely overstated with less than 5% of men (and women) who reported to be PSD not reporting an LLTI. Furthermore, even if a large proportion of people claiming IB were the 'hidden unemployed' this does not negate that they may also have a legitimate long-term health condition. Results we present in this paper are also consistent with research into relationships between various measures of area level health and area level unemployment. We have shown that at local authority and ward level, the Census measures of LLTI, NGH and PSD and VS data on all cause mortality are all strongly correlated with the Census measure of unemployment. Areas of poor health and high mortality are invariably areas with high unemployment, irrespective of causal relationships (Mathers and Scholfield, 1998).

Whilst we have identified relationships at the area level we cannot, of course, assume that it is the same people who are reporting their health in the Census, claiming IB or dying. To do so would be to risk the ecological fallacy since relationships identified for areas cannot be assumed to apply at individual level (Fieldhouse and Tye 1996). The Census, VS and IB data were collected over different, but overlapping time periods. The Census is an end of April 2001 snapshot with the health measures reported depending on a person's contemporary interpretation of their health and each question. It is reasonable to assume that somebody reporting a limiting long-term illness or being permanently sick or disabled will have had this condition for at least a year and that this is an ongoing situation. We can also assume that for somebody reporting their health as being 'not good' during the year before the Census, this will not be a trivial illness. As we use mortality for the 2000-02 period, some people will have died prior to the Census. Incapacity Benefit data relating to 2001-02 should largely contain persons who reported their health in the 2001 Census and it is likely that, at the time of the Census, IB claimants will have been suffering from the condition with which they have been professionally diagnosed. Migration between geographical areas will affect relationships between variables, especially as the migration process is health-selective (Boyle *et al.*, 2002; Norman *et al.,* 2005). People may answer a Census questionnaire when living in one location, move house and then claim IB. Subsequently they might die elsewhere. Our results only relate to the working age population but the relationships we find between Census health and unemployment data and mortality are consistent with studies utilising all ages.

We must consider the viability of incapacity benefit as an updatable data source. In the UK, it is notoriously difficult to analyse time-series of sociodemographic data. This is because subnational geographies are liable to change and variable/attribute information often varies from one time point to the next (Norman, Rees and Boyle, 2003; Norman, 2004). We must therefore examine the consistency of IB datasets over time. Table 5 summarises the availability of sickness benefit data during 1998 to 2004. In addition to IB, Severe Disablement Allowance (SDA) is referred to in this table. SDA is a supplementary cash benefit paid to people who have been medically assessed as over 80% disabled (Directgov, 2005). Prior to 2003, IB (from 1998) and SDA (from 1999) data are available separately by male and female total claimants. There is a discontinuity in the time-series though, as for 2003 and 2004, data are only released by male and female for IB and SDA combined.

Table 5: Time-series availability of benefits data relating to sickness

Year	Male IB	Female IB	Male SDA	Female SDA	Total IB	Total SDA	Geography definition	Geography hierarchy
1998	✓	✓	×	×	✓	×	1998	GOR-LA-Ward
1999	✓	✓	✓	✓	✓	✓	1998	GOR-LA-Ward
2000	✓	✓	✓	✓	✓	✓	1998	GOR-LA-Ward
2001	✓	✓	✓	✓	✓	✓	2003	GOR-LA-Ward
2002	✓	✓	✓	✓	✓	✓	2003	GOR-LA-Ward
	Male IB and SDA		**Female IB and SDA**					
2003	✓		✓		✓	✓	2003	GOR-LA-Ward
2004	✓		✓		✓	✓	2003	GOR-LA-Ward-SOA

For the 1998 to 2000 period the geographical definitions relate to the 1998 boundary system. From 2001, the 2003 boundaries are used. Thus there is also a discontinuity which would affect a ward level time-series analysis. The geographical hierarchy is consistent 1998-2004 down to ward level with, for the latest year, the addition of Super Output Areas (SOAs). SOAs are a geography designed to improve the reporting of small area statistics in England and Wales. They are intended to be more consistent in population size than wards and whose boundaries would not change over time (ONS, 2003). For analyses of sickness benefit, there is likely to be an ongoing choice of subnational geographies from Government Office Region (GOR) via LA district and ward scales and down to SOA level.

If these data are to be used on an annual basis, allowances must be made for the discontinuities noted above. Methods exist to adjust data in relation to the boundary changes (see Simpson, 2002; Norman *et al.*, 2003) and thereby enable health-related time-series analyses (Rees, Brown, Norman and Dorling, 2003). The inconsistencies relating to the combined release of IB and SDA from 2003 will present problems if a time-series by male and female is required. Since SDA is available by sex from 1999, an obvious solution is to back date the IB/SDA combination, assuming that the DWP are unwilling to reconsider the specification of the data being released.

Conclusion

Despite the availability of mortality data, a lack of annually accessible morbidity information for small geographical areas means that population health analyses are restricted to the use of decennial UK Census measures. Data on Incapacity Benefit are more regularly available and claimants are professionally diagnosed and thus this source has the potential to be a small area indicator of population health. Here we have compared age-sex standardised ratios of IB with three Census health measures as well as mortality and unemployment rates.

National levels of IB claims are reasonably consistent with the Census health indicators and in terms of age-specific rates. Following the introduction of IB in 1995, rates of annual increase are in line with inter-censal increases in the reporting of limiting long-term illness, but these increases are during a period when mortality rates have been falling. Excesses of male IB towards retirement age and a shortfall in overall female IB in comparison with the Census measures suggests that the benefits and employment systems may be acting to inhibit males getting back to work and to exclude females from claiming benefits.

Distributions and relationships between IB, Census measures and mortality at both local authority and ward levels reveal that using IB as an indicator of relative population health will give similar results, especially to those reporting themselves permanently sick or disabled in the Census. Our findings relate to the working age population. Answers to Census questionnaires are influenced by subjective factors. We recognise that whilst IB should be more objective since claimants are professionally examined, willingness to take time off work due to sickness, to consult a doctor or to claim benefits may each be affected by cultural and social factors.

Strong relationships exist between poor health, mortality and unemployment. Unemployment itself may directly lead to poor health, or it may be that unhealthy people are more likely to be unemployed or living in areas of high unemployment. In areas of high unemployment it may be particularly difficult for people claiming IB to get back to work. Beatty and Fothergill (1999) might interpret this circumstance as being one in which the number of IB claimants relates less to health and more to labour market conditions and the operation of the benefits system. In terms of hidden unemployment, however, they acknowledge the grey area between males being capable of work, but with limitations on what they are physically able to do. We have inferred an indication of hidden unemployment from illogical responses to Census questions, but have also found that there may be shortfalls in IB counts because some may be unable to claim benefits. There would be much merit in being able to tie in administrative data from DWP to individual level data using the Census SARs or the ONS Longitudinal Study.

The fact that all other health measures are strongly associated with unemployment rates, combined with our more conservative estimate of hidden unemployment within the permanently sick or disabled population, means that the association between unemployment and IB should not in itself undermine the use of IB as a measure of area level health. In this respect, IB data is no better and no worse than other area level health measures. We therefore suggest that whilst IB remains medically certified, it should be used to complement Census data and other health measures in the development of local health profiles and most importantly IB should act as an indicator of relative area level morbidity outside of the decennial Census years. Similarly to Kyffin *et al.* (2005: 888), if IB is flawed as a health measure, then it is flawed “in the same direction and to a similar extent” as Census and VS mortality data. The utility of Incapacity Benefit as an updatable indicator of population health depends on data availability regarding whether age-sex detail remains constant, the slight confusion created by the inclusion of Severe Disablement Allowance and what the future holds for the sickness benefit system in view of pending reforms.

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