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Addressing inequalities in healthy life expectancy

Future of an ageing population: evidence review

Foresight, Government Office for Science

Addressing inequalities in healthy life expectancy

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Contents

Executive summary

- This review considers evidence on the patterning, prevention and mitigation of inequalities in life expectancy and healthy life expectancy, with a focus on later life.
- The primary focus is on socio-economic inequalities, for which there is a reasonable level of evidence, with briefer descriptions of inequalities in relation to ethnicity, gender and place.
- There is clear evidence of large inequalities in health and well-being in later life, which relate to dimensions of socio-economic position, ethnicity, gender and area.
- For example, the wealth differences in levels of frailty are stark. The trajectory of frailty for an individual in the richest tertile at age 80+ years is comparable to that for a 70–74 year old in the poorest tertile. Wealth-related inequalities in levels of frailty widened between 2002 and 2010. Among the poorest tertile more recent cohorts appear to have higher levels of frailty compared to earlier cohorts, while this is not the case for the wealthiest tertile. A key driver of this wealth-related cohort difference is the slower estimated growth rate of frailty for those in the richest tertile compared to the poorest tertile, a finding that is statistically significant.
- Similarly, in the age group 61–70, 34% of White English people report fair or bad health, compared with 63–69% of Indian, Pakistani and Caribbean people and 86% of Bangladeshi people.
- Women have a higher life expectancy than men. However, most of this higher life expectancy is a consequence of higher life expectancy spent with some disability.
- Area inequalities might impact particularly on older people, because of greater attachments to their neighbourhood that stem from living in an area longer, spending more time day-to-day within their neighbourhood and making more use of local services. After taking account of individual level characteristics (including education and wealth), average level of deprivation in the area relates to the health of older people. For example, an increase in area deprivation score of one standard deviation of the distribution results in an increase in the odds of depression of almost 10%.
- All of these dimensions of inequality merit thorough further investigation of their extent, changes over time, and causal processes and mechanisms in order to inform careful policy development and the evaluation of interventions.
- Despite the evidence on inequalities in health in later life, both specific interventions and broader policy work in relation to health inequalities have failed to consider older people and relevant processes operating in later life.
- It is likely that policies to address inequalities in health will ignore processes related to later life and will have minimal impact on existing inequalities among older people if they are based on evidence and recommendations that focus on other, younger, segments of the population.
- There is a small body of existing evidence suggesting that some health improvements in later life could be achieved from interventions focused on promoting valued social roles

and broader social inclusion, physical activity and exercise, falls prevention programmes, and housing quality, particularly heating. However, there is insufficient evidence to assess whether, if appropriately targeted, such interventions would reduce inequalities in health in later life.

- The limited range of interventions listed in the previous point reflects both a lack of more broadly focused interventions and a general lack of published evidence on interventions in later life.

- There may be value in interrogating existing (and future) data arising from evaluations of interventions for evidence on their impact on inequalities among older people, and perhaps doing this particularly for those interventions that are more complex, more ambitious and more wide-ranging, such as New Deal for Communities and the GoWell programmes.

- It is likely that progress in developing an evidence base can also be made by focusing on events/transitions that are particularly relevant for older people, including retirement, death of spouse and close friends, and the onset of illness and disability. How life is lived leading up to, through and beyond these transitions will depend on access to and mobilisation of resources that allow the development and maintenance of social connections, networks and rewarding and valued roles, and facilitate the protection of standards of living.

- Unequal access to such resources has important implications for health and well-being inequalities in later life. It is here that it is important to have a focus on social and economic structures, those that shape how transitions are experienced and provide (or not) resources to manage transitions and consequent states.

- Relevant social and economic structures include welfare, tax and pension reform, as well as area-related factors such as housing, green spaces and the provision of spaces for social and cultural engagement. Perhaps disappointing in this context is that where significant reform is occurring, such as in the case of pensions, little consideration is given to the question of impact on economic inequality. The ongoing policy work in relation to ageing populations could be used as an opportunity to include a focus on reducing inequalities.

- An additional issue with the existing body of evidence is that where health is considered it largely focuses on specific indicators of health, disease, mortality and health behaviours. These various dimensions should be brought together. This would allow an assessment of the impact on both improvements in life expectancy per se, and how far this is a consequence of additional years spent in good health in contrast to greater periods with illness and/or disability.

- There is also value in considering inequalities in well-being, an outcome that is particularly useful in later life, when levels of morbidity are high and there are inequalities in the distribution of morbidity. It may be that inequalities in the resources available to cope with chronic illness or disability lead to different well-being outcomes in later life. So, an important question is whether interventions can be developed to reduce inequalities in levels of well-being, as well as inequalities in health or life expectancy.

1. Introduction

This Evidence Review is a contribution to the Foresight *Future of an Ageing Population* project, which considers evidence in relation to the challenges and opportunities of an ageing society in order to inform policy development. Central to such challenges is the development and promotion of opportunities for those in later life to participate more fully in society. In this context, there is an obvious relevance of health as a resource, at both an individual and a societal level, for productive and rewarding participation. A focus on health, however, requires a shift from an interest in life expectancy to an interest in healthy life expectancy – not just how long people live, but also how long they remain healthy. Also relevant is how health, life expectancy and healthy life expectancy vary across the population and the implications of this for inequalities in the opportunity for productive and rewarding participation in society. A policy focus on promoting participation in society in later life should also pay attention to addressing inequalities in health.

This review is concerned with considering evidence on the patterning of, and prevention and mitigation of, inequalities in life expectancy and healthy life expectancy. After briefly discussing relevant health-related concepts, the review will go on to describe the patterning of inequalities in health in later life. The primary focus will be on socio-economic inequalities, for which there is a reasonable level of evidence, with briefer descriptions of inequalities in relation to ethnicity, gender and place. These descriptions are briefer mainly because of the extremely limited level of evidence for these domains on later life – including in relation to gender – and in part because these dimensions of inequality would merit a full review in their own right and one that involved the generation of necessary evidence.

The review then goes on to discuss causal mechanisms, summarising the framework offered by the most recent UK review of inequalities in health, *Fair Society, Healthy Lives* (The Marmot Review, 2011), and noting that the focus of that review is almost exclusively on interventions in early life, with almost no discussion of later life. It then goes on to develop a conceptual, although empirically informed, model that offers opportunities for interventions in later life.

Following this, a summary is provided of the extremely limited evidence on the effectiveness of interventions to address inequalities in health in later life. Both individually focused and population focused interventions are considered but, as noted, in all cases there are very few examples and very limited evidence.

The review concludes with a summary of evidence, a reconsideration of how we might conceptualise healthy life expectancy in the context of a policy focus on well-being, and points to the need to generate new evidence and to consider and develop both macro-social interventions and interventions focused on events and experiences occurring in later life.

2. Health, life expectancy and well-being

The focus of much research and policy work on health inequalities has been on mortality or morbidity, rather than the combination. While this captures important inequalities, mortality measures fail to capture differentials in the extent of morbidity in the lead-up to mortality, and morbidity measures are typically treated cross-sectionally, so inequalities in duration and consequence of morbidity are not examined. In addition, such approaches do not capture inequalities in the experience of good health and well-being.

Approaches to measuring healthy life expectancy address one dimension of this problem by providing us with an estimate of future years spent illness-free that can be used alongside the more traditional measure of life expectancy. However, in the context of the broad conception of health developed by the World Health Organization, i.e. both “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (Üstün and Jakob, 2005), there is also value in considering well-being, because this allows us to acknowledge the possibility that a happy and rewarding life can be lived even when experiencing illness and disability, and to consider how such broader inequalities might be addressed.

The following review will, where evidence is available, cover inequalities in relation to health, mortality and healthy life expectancy. The question of well-being will be revisited in the Conclusions and recommendations section.

3. The extent of health inequality in later life

How the relevant dimensions of inequality might be categorised and described depends, of course, on the purpose. In this context the focus might be on describing inequality, understanding the complex and multidimensional causal processes that lead to observed inequalities, and designing and implementing policy. The next section will consider causal processes, and a later section will consider interventions, so here the focus will be on illustrating the dimensions of inequality in health that have been described in the literature. The report focuses on four dimensions of inequality (socio-economic, ethnic, gender and geographical area) with, for reasons explained earlier, the greatest emphasis being on socio-economic inequalities.

3.1 Socio-economic inequalities

Socio-economic inequalities in health have been systematically studied in the UK and elsewhere. Over the past 40 years there have been three major national inquiries in the UK – the most recent being the *Fair Society, Healthy Lives* review of inequalities in health led by Professor Sir Michael Marmot (The Marmot Review, 2011) – as well as many smaller reviews. In the UK literature, socio-economic inequalities are typically described in relation to occupational class and unemployment, with implicit reference to processes related to social class. Such a focus has also led to a history of focusing primarily on men during working life, although this is now changing. Such inequalities have also been described in relation to education (with an implicit focus on the significance of early life) and income (with an implicit focus on material conditions). Within this large literature, and consequent inquiries, there has been limited focus on describing inequalities in later life in the UK. More recently this also has changed, however, and with this change has come the recognition that none of the factors of occupational class, income or education adequately captures the current economic position of those heading towards, or who are beyond, retirement age and that we should make greater use of measures of wealth to reflect economic inequalities in later life. In addition to current economic position, wealth also has the advantage of reflecting lifetime resources and elements of social standing.

There is now strong evidence on the relationship between socio-economic position and health in later life. Cross-sectional descriptions of the population aged 65 years and older show the inverse relationship between both wealth and occupational class and a range of markers of health (physical, psychological and overall frailty) (see, for example, Marmot *et al*., 2003; Banks *et al*., 2006; Nazroo *et al*., 2008). Although the strength of this relationship diminishes with age, this appears to be largely a consequence of higher mortality rates among the most vulnerable in lower socio-economic groups, with consequent reduced socio-economic differences among survivors (McMunn *et al*., 2009). Indeed, longitudinal evidence examining onset of illness and mortality among older people who were initially healthy shows marked increases in estimates of socio-economic inequalities, when mortality is considered as an outcome alongside morbidity (McMunn *et al*., 2009).

A concern related to these marked socio-economic inequalities is the important question of whether we are seeing improvements in levels of health alongside the well-documented increases in life expectancy. Recent evidence suggests that this is not the case. At best, at a given age in later life, more recent cohorts have the same levels of frailty as earlier cohorts (Marshall *et al*., 2015). Alongside this, there is evidence that for the poorer segments of the population levels of frailty are higher at a given age for younger cohorts than for older cohorts,

suggesting an expansion, rather than compression, of morbidity for those who are poorer (Marshall *et al*., 2015).

This is illustrated in Figure 1. Here, each line represents the change in the mean level of frailty for a 5-year cohort over an 8-year period, from 2002 until 2010 – a frailty trajectory. The analysis uses a measure of frailty known as the Frailty Index, which sums the number of symptoms a person has from among a large pre-specified list (Marshall *et al*., 2015). Frailty is argued to be a non-specific state reflecting age-related declines in multiple systems, which provides an indication of an individual's capacity for independent living and of the risk of suffering a future adverse event, such as falling, institutionalisation and death.

The analysis presented in Figure 1 is stratified by wealth (those in the richest tertile of the population being compared with those in the poorest tertile). As each line covers an 8-year period, the analysis allows levels of frailty at a given age to be compared across age cohorts (the point of overlap between lines). The wealth differences in levels of frailty are stark; the trajectory of frailty for an individual in the richest tertile at age 80+ is comparable to that for a 70–74 year old in the poorest tertile. The figure also suggests that inequalities in levels of frailty widened between 2002 and 2010, the gap between the frailty trajectories for the wealthiest and least wealthy categories being wider at younger compared with older ages. Perhaps more troubling is that among the poorest tertile, at particular overlapping ages, more recent cohorts appear to have higher levels of frailty compared to earlier cohorts. Take, for example, levels of frailty between the ages of 75 and 80 for the two cohorts that cross this age range. For the wealthiest there is little difference in frailty across cohorts. A key driver of this wealth-specific cohort difference is the slower estimated growth rate of frailty for those in the richest tertile compared to the poorest tertile, a finding that is statistically significant.

This phenomenon, that inequalities in health in later life appear to be increasing across cohorts and that healthy life expectancy might be worsening for poorer segments of the population, is a cause for concern. The reasons behind these changes are not clear. They could be a consequence of widening social inequalities, or a reflection of the success of medicine, with those in ill health living longer than they used to, or a consequence of higher levels of illness as a result of higher levels of obesity. They do, however, point to the need for thorough investigation, careful policy development and evaluation of interventions.

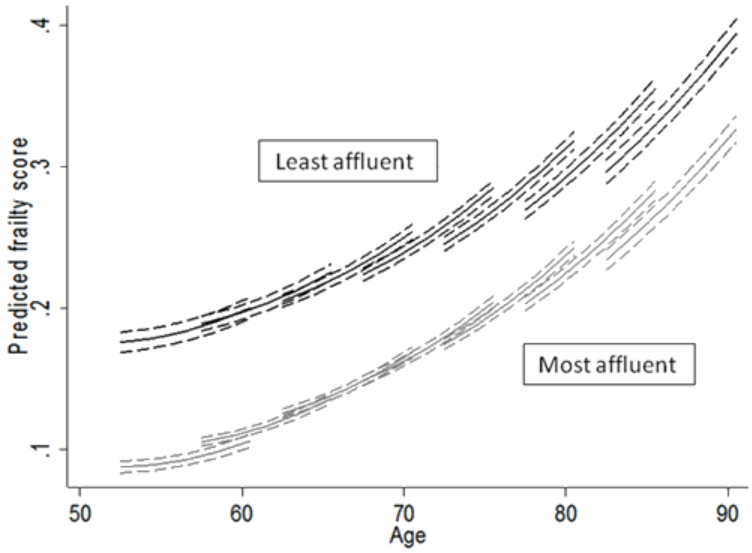

Figure 1: Growth in levels of frailty over an 8-year period stratified by age cohort and wealth (Marshall et al., 2015; data from English Longitudinal Study of Ageing)

3.2 Ethnic inequalities

In the UK there has been extensive work describing ethnic inequalities in health for the population as a whole, but very little work describing ethnic inequalities in later life. One of the few examples of quantitative work that is focused on older people is summarised in Figure 2, which illustrates the importance of this dimension of inequality. The figure shows for each ethnic category the proportion within each age group who report their health as fair or bad rather than good or excellent. It clearly indicates that the level of ethnic inequality increases dramatically across these age groups, resulting in substantial inequalities among those in later life. For example, the health (according to this measure) of White English people aged 61–70 is equivalent to that for Caribbean people in their late 40s/early 50s, Indian people in their early 40s, Pakistani people in their late 30s and Bangladeshi people in their late 20s/early 30s. Looking at the figure in another way indicates that in the age group 61–70, 34% of White English people report fair or bad health, compared with 63–69% of Indian, Pakistani and Caribbean people and 86% of Bangladeshi people.

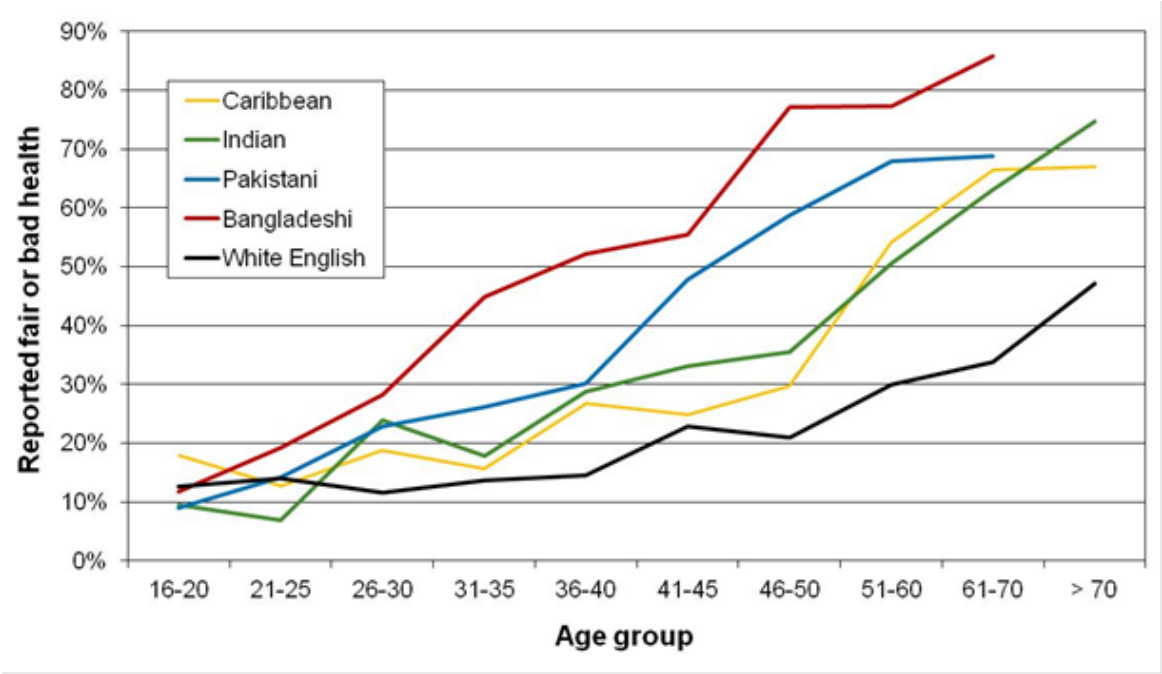

Figure 2: Patterning of ethnic inequalities in reported fair or bad health by age (adapted from Nazroo, 2006; data from Health Survey for England)

Such findings raise questions as to the drivers of ethnic inequalities in health and how these relate to this age patterning of inequalities. There is a large and robust body of evidence that points to the importance of social and economic inequalities in shaping the ethnic patterning of health, not just in the UK but also internationally (Nazroo, 2001, 2003; Nazroo and Williams, 2005). This evidence shows how closely related are experiences of poverty, unemployment and poor health, with health differences substantially reduced in statistical models when adjustments are made for differences in economic position. There is also a growing body of research that shows the significance of racism and discrimination to the life chances of ethnic minority people and that these experiences directly impact on health (Nazroo, 2003). Given this, it is not surprising that the pattern of inequalities in health shown in Figure 2 is also present for income inequalities (Nazroo, 2006), estimates of pension income (an indicator of accumulated wealth) provided by the Pensions Policy Institute (2003) and broader estimates of economic well-being in later life (Bajekal *et al*., 2004).

In terms of the patterning of ethnic inequalities in health by age, however, there are many potential explanations that are consistent with the likelihood that social and economic inequalities are key drivers. The age-related patterns could be a consequence of: (i) a differential experience of the ageing process as a result of differences across ethnic groups in the accumulation of exposures to social and economic risk over time; (ii) the generation-specific impact of migration on health (for example, the impact of pre-migration circumstances, or the process of migration and post-migration circumstances); or (iii) contextual/period effects that vary across both age cohorts and first and subsequent generations of migrants (such as economic opportunities, transformations in identities, and acceptance into and participation in social and civic life). Of these potential explanations, the very limited evidence that we have suggests that the accumulation of disadvantage across the life course is most important (Nazroo, 2006), with differences in the circumstances between age cohorts playing a smaller role, one that potentially operates in both directions. So, while we have some reduction in social inequalities for younger cohorts, these effects have been counteracted by reductions in protective health behaviours (Smith *et al*., 2009). While we have seen improvements in some markers of socio-economic position, such as education (Lymperopoulou and Parameshwaran, 2015), these have not translated into improvements in other markers of socio-economic position, such as employment (Kapadia *et al*., 2015).

An additional striking feature of the circumstances of ethnic minority people in the UK that is worth considering in terms of health is their concentration in quite specific locations. These locations are, as might be expected, primarily in areas that are rated very poorly according to statistics such as the Index of Deprivation (Department for Communities and Local Government, 2011; Jivraj and Kahn, 2015). This has a negative impact on the health of ethnic minority people. In direct contrast to such formal estimates of deprivation, however, older ethnic minority people rate the areas in which they live more highly than do white people in terms of the availability of amenities, and no worse in terms of crime and the physical environment (Bajekal *et al*., 2004). Interestingly, in-depth interviews with older people suggest that this ‘mismatch’ between respondents’ reported experiences and formal assessments may be a consequence of ethnic minority people settling in areas together and investing in developing the local infrastructure (appropriate places of worship, shops, clubs, etc.) to meet their needs – thereby both building community and generating community cohesion (Bécares and Nazroo, 2013). Such communities have thus offered opportunities for older ethnic minority people to engage in social and civic activities and to take up roles that they find rewarding, despite being more deprived. There is also evidence suggesting that such ethnic concentration reduces the risk of exposure to racism with consequent beneficial effects on health (Bécares *et al*., 2009).

Although the evidence summarised above helps to identify potentially important causal mechanisms, it is by no means comprehensive. There would be great value in examining the patterning of ethnic inequalities in health in later life more thoroughly, the drivers of this, and how this is changing over time and across age cohorts. While such reviews of the evidence exist in the USA (Anderson *et al*., 2004), there is nothing equivalent in the UK.

3.3 Gender inequalities

The focus of descriptive work on gender inequalities in health has been on the higher levels of morbidity experienced by women, which contrast strikingly with their lower risks of mortality. This contradiction is illustrated in Figure 3, which, for men and women and 5-year age bands (from age 50), decomposes expected life expectancy into that which is disability-free (the dark part of each bar) and that with disability (the pale part of each bar). The total height of each bar is total life expectancy, of course, and Figure 3 clearly shows that for each age group women

have a higher life expectancy than men. However, a comparison of the darker and paler part of each bar shows that most of this higher life expectancy is a consequence of that spent with some disability (the pale part of the bars compared with the dark part of the bars).

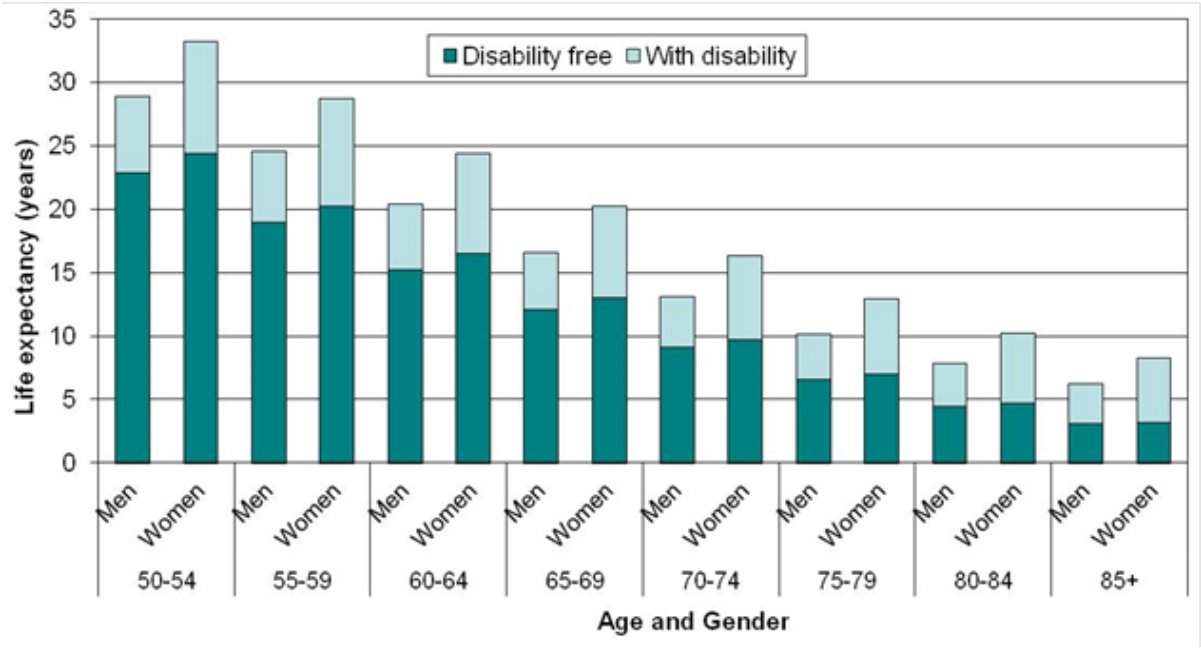

Figure 3: Life expectancy with and without disability by gender and age (adapted from Nazroo et al., 2008; data from English Longitudinal Study of Ageing)

This paradox and its persistence across age cohorts remain unexplained. It is reasonable to postulate that gender is related to key determinants of life expectancy and morbidity, be they considered from within a biological or socio-economic framework. There are, for example, important (although changing), gender differences in educational levels, occupational types and levels, pension wealth, domestic roles and health behaviours (Annandale and Hunt, 2000; Arber, 2006). It is possible that men are more likely to be exposed to hazards that result in mortality and women to hazards that result in morbidity. However, the role of these and other potentially important factors in explaining gender inequalities in life expectancy and healthy life expectancy, especially as they unfold in later life and change across age cohorts, are woefully under-researched (Arber and Cooper, 2000; Arber *et al*., 2007). There is a clear need for more thorough investigations of these issues.

3.4 Area-based inequalities

The focus on area-based, or geographical, inequality places an emphasis on the degree of average difference in health and life expectancies across areas. A crucial question here is how far the observed differences between areas might be a consequence of the characteristics of the individuals who live in the area, or of the areas themselves, with a typical focus on socio-economic characteristics at both levels.

A number of research papers have found an association between the physical and social aspects of a neighbourhood in which an individual lives and the physical and mental health of that individual (e.g. Duncan *et al*., 1995; Pickett and Pearl, 2001; Cummins *et al*., 2005; Diez Roux and Mair, 2010). Older people are thought to be particularly susceptible to area influences as a result of greater attachments to their neighbourhood that stem from living in an area longer, spending more time day-to-day within their neighbourhood (especially if retired or less mobile)

and making more use of local services compared with younger people (Bowling and Stafford, 2007; Beard *et al*., 2009; Stafford *et al*., 2011). Older people, however, have rarely been the focus of the investigation of such effects.

One recent paper provides an examination of area effects for older people with a focus on socio-economic conditions (Marshall *et al*., 2014). At a geographical scale of Middle Super Output Area (with an average population of 7,200), this shows that after taking account of individual level characteristics (including education and wealth), both average level of deprivation in the area and the extent of inequality within the area relate to risk of depression. For example, an increase in area deprivation score of one standard deviation of the distribution results in an increase in the odds of depression of almost 10%. However, the odds of depression are lower by around 20% in the most unequal area relative to the most equal area, suggesting that heterogeneous areas (more unequal in this case) are more protective, perhaps because of general benefits resulting from the presence of richer people in the area (Marshall *et al*., 2014).

As well as a focus on the socio-economic characteristics of areas, and people, there is also a concern that older people living in rural areas are particularly vulnerable. Here the focus is largely around the risk of isolation, perhaps as a result of geography, and perhaps as a result of children moving from rural areas, leaving their parents with less access to family supports (Stockdale, 2011). Evidence suggests that insofar as this greater vulnerability exists it does not play out in terms of health, perhaps because those in rural areas have on average better socio-economic circumstances as a result of selective migration into rural areas at, or around, retirement age (Stockdale, 2011). Indeed, there is also a concern about poorer older people living in deprived urban areas that are not conducive to supporting their independence, as picked up by the World Health Organization's support for developments around 'age-friendly cities', i.e. "supportive urban environments that encourage active ageing for a range of domains" (World Health Organization, 2007).

As for gender and ethnicity, while there is extensive work on area-based inequalities at a population level, there is very little exploring the patterning of such inequalities in later life and how this might relate to mechanisms and point to opportunities for the development of interventions.

3.5 Summary

The discussion of area-based inequality presented in Section 3.4 points to the interrelationships between these descriptive dimensions of inequality – socio-economic, ethnic, gender and area. For example, ethnic minority people are concentrated within particular places, which are often more deprived than the average, have varying family forms and gender roles, and have on average lower incomes, lower and more insecure occupational positions and lower levels of pension wealth. This suggests that there is a need to consider intersecting drivers of inequality in both research and policy work.

4. Relevant causal mechanisms

The report *Fair Society, Healthy Lives* from the 2010 review of inequalities in health led by Professor Sir Michael Marmot (The Marmot Review, 2011) emphasised a focus on the "causes of the causes" of health and inequalities in health. The claim is that inequalities in the conditions of daily life and the fundamental drivers that give rise to them (access to power, money and resources) underpin the determinants of health. Although this is a rather non-specific, over-arching claim about cause, the review builds on a substantial body of evidence that examines the underlying specific mechanisms driving inequalities in health. A closer examination of the review's focus on six policy areas gives a clearer sense of which of these mechanisms it considers to be important and worth considering in the development of policies targeting health inequality. These are briefly described in the bullet points below.

- Economic circumstances and how these:
    - shape maternal health and consequently child development, potentially through a 'foetal programming' mechanism that influences health into later life, and perhaps through an impact on cognitive function that influences life chances;
    - shape opportunities to make healthy purchases and the likelihood to engage in unhealthy behaviours;
    - influence housing quality (overcrowding, heating provision, damp, etc.); and
    - influence opportunities for social interaction and social status.
- Psychosocial stress, generated by economic, housing and employment conditions (and probably other factors as well).
- Quality of employment, with an emphasis on insecure employment and working conditions. This covers both psychosocial stress (generated by factors such as long or irregular working hours, shift work, insecure employment, workplace conflict, discrimination, and limited control over work activities) and material hazards (both summarised in the term 'stress and danger').
- Unemployment, with an emphasis on economic circumstances, stress, loss of a valued role and lowered social integration, with all accumulating over time.
- Area deprivation and how this relates to social and environmental characteristics that influence health, such as housing quality, crime rates, air quality, access to green spaces and traffic hazards.
- Social participation, social inclusion, community cohesion and having a valued role. The focus on valued roles includes employment and there is emphasis on how inequalities in childhood might lead to inequalities in those skills that, as well as cognitive ability, enable positive social engagements (application, self-regulation and empathy).

Some of these might be called distal determinants, with proximal determinants being the more current material circumstances and psychosocial stresses to which they relate. Also possibly important is the influence of these determinants on health behaviours. The Marmot Review does contain some reference to health behaviours, but largely in relation to how these are

socially patterned, including by economic circumstances and stress from factors such as unemployment.

As suggested by the discussion so far, the Marmot Review emphasised causal mechanisms relating to early life, with some emphasis on working life and the neighbourhood environment. In the discussion of social determinants, for example, the report does not consider later life at all. This is reflected in the discussion of policy objectives and recommendations, which contains no mention of later life (beyond reference to “flexibility in employment and retirement”). The lack of a consideration of circumstances in later life is also present in the six policy recommendations crystallised in the report.

- Give every child the best start in life.
- Enable all children, young people and adults to maximise their capabilities and have control over their lives.
- Create fair employment and good work for all.
- Ensure a healthy standard of living for all.
- Create and develop healthy and sustainable places and communities.
- Strengthen the role and impact of ill-health prevention.

Considering how health (and socio-economic) inequalities are shaped through the life course, the focus on early life is perhaps not unexpected. Successful interventions at this stage would deal with early life determinants and, more indirectly, those acting at critical periods across the life course, the accumulation of disadvantage, and adverse trajectories. This should serve to minimise inequality in later life.

Nevertheless, a focus on later life might point to additional opportunities for intervention for current adult and later life generations. For example, there is growing evidence on the possibility that events and circumstances occurring at and after retirement might be relevant to both the occurrence and maintenance of health inequalities in later life. Some of this relates to the persistence of material inequalities into later life (such as levels of wealth, quality of housing, etc.), some to differences in the ways in which transitions are experienced for different socio-economic groups (for example, forced retirement versus voluntary retirement), and some to the likelihood of a negative transition occurring (for example, the relative probability of a spouse becoming seriously ill or dying). Much of this might be conceptualised in terms of the economic, social and cultural resources that the older person has access to and how these relate to class position, a model strongly related to that implied by the Marmot Review. The possible mechanisms involved in this are summarised in the empirically based schematic presented in Figure 4.

Figure 4 is a conceptual model that proposes (with empirical testing) the relationship between resources in economic (wealth/pension, material circumstances, work and work quality), social (social connections, social roles and participation) and cultural (cultural practice and health behaviours) domains and inequalities in health, with social class and education proposed as distal determinants and social status as a mediator. The colours of the arrows in the diagram show the outcome of the empirical testing of this conceptual model using path analysis and longitudinal data (McGovern and Nazroo, 2015). This shows the importance of material

circumstances, employment quality, social and cultural participation, health behaviours, and the interrelationships between these factors, on change in health, and that in some circumstances these operate through perceived social status. Assuming we accept that such a diagrammatic representation can capture relevant causal pathways, we can use it to point to opportunities for intervention. Approaches to intervention, and evidence on the effectiveness of interventions, are discussed in the next two sections.

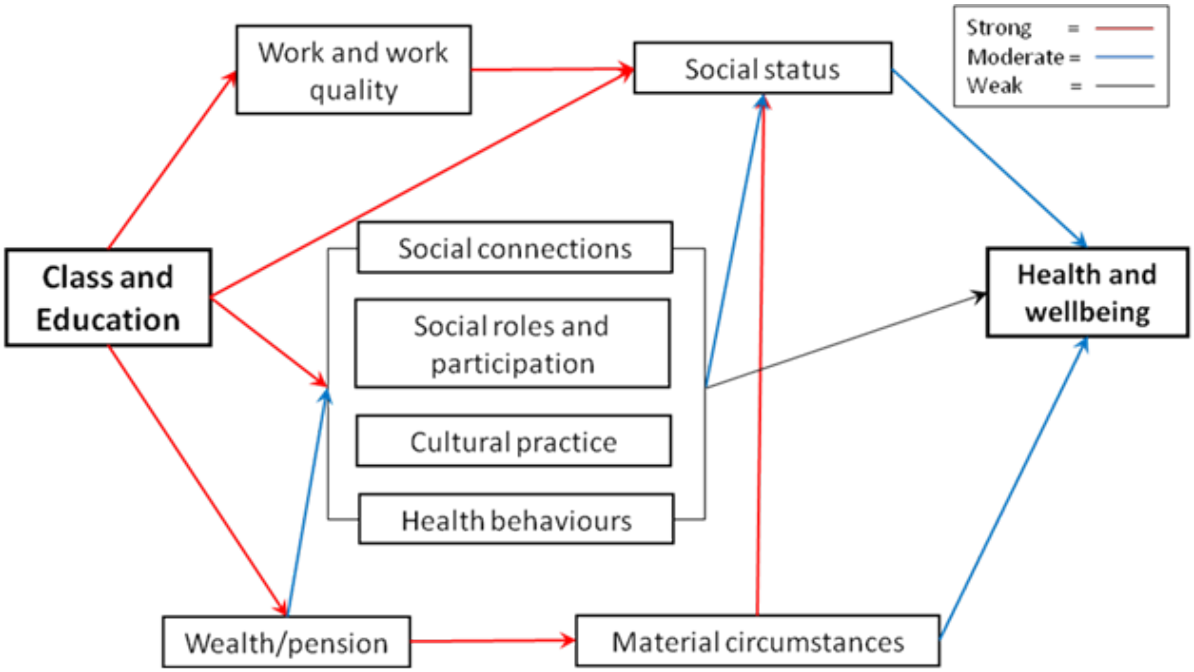

Figure 4: Causal mechanisms associating class with health in later life (adapted from McGovern and Nazroo, 2015; data from English Longitudinal Study of Ageing)

5. Approaches to intervention

Before reviewing the effectiveness of specific interventions and the more general lessons that might be drawn from such a review, it is worth providing a framework to categorise types of, or approaches to, intervention. In the context of inequalities in later life it is worth considering six dimensions that cut across each other.

- Area-based or individual focus.
- Complex interventions with a focus on a range of causal processes and outcomes, or those with a focus on a specific outcome or process.
- Interventions targeted directly at health outcomes, those targeted at proximal determinants (health behaviours) and those targeted at distal determinants (with a focus on changing influencing contexts and social structures).
- A focus on the general population, or one or more vulnerable groups within the population (including perhaps on a particular transition/event, such as retirement or widow(er)hood), or on older people/later life.
- A focus specifically to address inequalities, or a more general focus on improving health per se.
- Short versus long duration interventions.

Although this classification is wide-ranging, it doesn't specifically include healthy life expectancy. This is largely because healthy life expectancy has not been an explicit focus of interventions, even though most should have some implication for it. It is also worth highlighting that many interventions are only evaluated within a short time frame, so little can be said about longer-term impacts that may be more important, particularly in relation to healthy life expectancy.

Most important, though, is to note that there is very little evidence of implementation or evaluation of interventions in relation to later life. This is discussed further in the next section.

6. Effectiveness of interventions

Although the previous section sets up the possibility of a wide range and variety of interventions targeted at inequalities in later life, a literature review reveals a distinct lack of interventions with such a focus. Of course, interventions without such a focus might well have an impact on inequalities in later life, but not surprisingly outcomes for older people are not evaluated for such interventions. There are, however, some interventions that are specifically targeted at addressing social and, to a more limited degree, economic inequalities in later life. These are the wider determinants of health inequalities, or the 'causes of the causes'. This review therefore begins with those. It then focuses on interventions targeted at vulnerable older people and transitions occurring in later life, and then on interventions aimed at improving health behaviours. Finally, it examines those that involve complex area-based interventions located in deprived areas.

6.1 Interventions focused on social roles and social inequalities in later life

Heaven *et al*. (2013) carried out a systematic review of interventions intended to promote meaningful social roles over the transition into retirement. The review was quite wide-ranging, defining social roles as "participatory activities related to a particular position in a social network, which may provide a sense of purpose, worth, identity, or structure to life" (p. 224). Within this, contributory activities such as grandparenting, volunteering and paid work were included, as well as activities contributing to personal development, such as education and training. Examples of specific interventions include: library work/reading with children (Glass *et al*., 2004; Fujiwara *et al*., 2009); grandparenting roles, such as foster programmes (Gray and Kasteler, 1970); mentoring programmes (Stevens-Roseman, 2009); and volunteering (Crawford, 1976) or volunteering/paid work programmes (Soumerai and Avorn, 1983).

Findings indicated that involvement in such activities increased access to social support, increased levels of physical activity, decreased sedentary activities (such as TV watching) and increased life satisfaction, cognitive function, self-assessed health and, in some cases, physical health. It is worth noting that the number of studies with no, or an adverse, impact was very small. However, it is clear that in some cases the interventions were not adequately implemented, indicating the difficulty of efficient and effective designs (Kocken and Voorham, 1998). It is also worth noting that while the interventions examined in these studies did have 'control' groups, they did not include a strong element of randomisation. This means that those in the intervention group may well have had different characteristics to those in the control group that relate to both the intervention and the outcome. So biases resulting from selection into the treatment group could not be ruled out.

A recent small study, based in the Philippines, evaluated the impact of "community-based third-age learning programs" (covering 'wellness', physical activity and livelihood training) in an experimental setting (but not a full randomised controlled trial – RCT) and identified improvements in life satisfaction, self-esteem and depression in comparison with the control group (Escolar Chua and de Guzman, 2014).

Other interventions have focused on environmental improvements, such as improving housing quality and, in particular, heating. Platt *et al*. (2007) report on a trial-based evaluation of the impact of the Scottish Executive Central Heating Programme, focused on providing central

heating for older people (age 60 or older) living in privately rented accommodation, or anybody living in social housing. Findings revealed a significant and meaningful impact on heart disease, although smaller or no effects on other health outcomes. Another programme, based in Bradford, set out to improve access to home repairs alongside providing health-related advice and support for poor owner-occupiers (Allen, 2005). (Note that some younger people were included in this intervention.) Although participants in the study felt very positive about the home improvements that were delivered, overall there were neutral effects of this intervention on health and well-being outcomes.

Allen (2005) also commented on the difficulties of implementing a complex, multi-agency intervention. This is a general problem in a field where both the immediate focus of an intervention is broad (such as volunteering), where several agencies are involved, and where the relationship with the intended outcome could be mediated through a number of pathways.

6.2 Interventions focused on vulnerable older people and transitions in later life

6.2.1 Falls, exercise and frailty

Reducing the risk of falls has been a primary focus of numerous interventions around the world. This is in part because of the adverse consequences of a fall, in part because having a fall is the best predictor of future falls, and in part because falling is indicative of physiological decline and greater vulnerability. Many of these interventions have been evaluated, and some quite robustly. Chang *et al*. (2004) provide a recent systematic review of the evaluation of such interventions, including 40 trials. They identify quite large positive effects – a 12% reduction in the risk of falling and a 20% reduction in the rate of falling. Multifactorial falls risk assessments with tailored interventions and exercise programmes appeared to be particularly effective, while environmental modification and education programmes did not appear to have beneficial effects. More general conclusions are drawn from the earlier review reported by Frost *et al*. (2010), who find that exercise promotion reduces the risk and rate of falling, that the type of exercise being promoted is not important – although improving balance may be, and that multifactorial assessments followed by targeted interventions may be particularly beneficial.

Frost *et al*. (2010) also review the more general impact of interventions designed to promote physical exercise. They conclude that there is strong and consistent evidence on the positive impact of such interventions on strength, balance, physical function and well-being, with some suggestion that impacts operate at a physiological level (improvements in aerobic functioning).

Although there have been some interventions around frailty, there have been few studies evaluating their impact – perhaps not surprising given that frailty is considered to occur close to the end of life. Frost *et al*. (2010), in their review of interventions in primary care and community settings, suggest some broad conclusions in relation to frailty. They identify the possibility of small improvements from multidimensional interventions. In particular they recommend comprehensive approaches using a range of interventions that address multi-morbidity, health promotion, mental health and environmental issues, although also point out that evidence is not conclusive. More specific interventions, such as those targeted at nutrition (reviewed in Daniels *et al*., 2008), suggest no or minimal effects. One evaluation worth providing more detail on was an RCT implemented for community residents aged 70 years or older in Australia who had significant levels of frailty (Cameron *et al*., 2013). The intervention was a 12-month multifactorial treatment programme that lowered levels of frailty by close to 15%, stabilised declines in

mobility, but had no impact on the distal outcomes of mortality, hospital admissions and admission to residential care (over the 12-month period).

6.2.2 Retirement transitions

There is little evidence on the impact of pre-retirement planning for those heading towards retirement on social, health and well-being outcomes post-retirement, although what there is suggests minimal impact (Yeung, 2013). Of course, longer-term retirement planning could well be important for financial and well-being outcomes. A relatively recent review of broader interventions to improve mental health around the retirement transition identified very little evidence (Lancaster *et al*., 2011), although it is probably reasonable to say that, although the complexity of the retirement transition is frequently noted, it is rarely addressed in empirical investigations.

6.2.3 Bereavement

Nseir and Larkey (2013) reviewed studies focusing on interventions intended to minimise grief/depression among surviving spouses aged 50 or older. Only seven such interventions were identified and these were evaluated in nine studies. Although some interventions showed no improvements for the treatment compared with control groups, studies that appeared to have a more detailed counselling focus achieved positive outcomes.

6.3 Interventions targeted at health behaviours

Hobbs *et al*. (2013) conducted a systematic review of RCTs to promote physical activity among those aged 55 to 70. Overall there was a positive impact on objective measures (pedometer measures of step counts) and some effect on self-reported physical activity in the short term, but not long term. Interventions seemed to be more effective if tailored to the individual and if they were home-based. The study by McMurdo *et al*. (2010) is worth reporting in a little more detail, because it trialled a complex behaviour change intervention (alongside the use of a pedometer) involving goal setting, planning and self-monitoring of change – effectively a self-monitored individualised activity plan. Findings demonstrated the positive effects of the complex behaviour change intervention on physical activity compared with controls, although there were no effects on assessments of physical and mental health.

Lara *et al*. (2014) conducted a systematic review of RCTs to improve diet for those aged 54–70, with a particular focus on uptake of the ‘Mediterranean diet’. On the whole interventions on diet were successful in moderately increasing fruit and vegetable consumption (jointly by a little under 100 g per day), with very small differences (in the hoped for direction) in fish and meat consumption. Interventions that involved face-to-face and frequent contact appeared to be more successful, suggesting the value of individually tailored interventions; however duration of intervention did not seem to be important. These broadly neutral findings are reflected in findings from reviews of interventions targeted at low socio-economic groups of all ages (Everson-Hock *et al*., 2013) and in Frost *et al*.’s (2010) review of dietary/nutritional interventions more broadly.

6.4 Complex area-based interventions targeted at all residents

Two interventions targeted at deprived populations within deprived areas are worth highlighting here – New Deal for Communities (NDC) (operating in 39 areas within England between 2001 and 2010) and GoWell (a 10-year programme running from 2005 to 2015 in 14 deprived areas in Glasgow). Both programmes involve locally tailored multidimensional activities intended to improve the built environment (housing and green spaces), employment opportunities, education, health behaviours, and community and social engagement. It is worth noting that neither of these interventions have a particular focus on older people, and neither report findings with respect to older people.

For the NDC intervention, Lawless *et al*. (2010) identify some small improvements in general health measures and health behaviours (smoking and exercise) in NDC areas compared with both the national average and selected 'comparator' areas. Walthery *et al*. (2015) show no difference between NDC areas and 'comparator' areas in overall effects, but suggest that there are modest improvements in the level of inequality for mental health *within* NDC areas compared with those *within* comparator areas. Stafford *et al*. (2014) compare change over a 6-year period (2002–2008) in a range of outcomes for NDC areas compared with the 'comparator' areas and areas across England stratified into low, medium and high deprivation. They show an increase in inequality between non-NDC high and low deprivation areas for self-assessed health and some socio-economic markers (employment, housing and education), but that this growth in inequality is not shared when comparing NDC areas with non-NDC low deprivation areas, suggesting the NDC intervention mitigated a growth in inequality.

The GoWell intervention is still under way, so it is premature to draw broader conclusions. But initial findings suggest small, at best, improvements in health; however, comparisons are not drawn with non-intervention areas (Egan *et al*., 2013).

The point on duration might be made also for the NDC intervention – this programme has only recently finished and the effects of such complex interventions in complex contexts might take some time to evolve. The evaluation of the effects of such interventions also faces a number of additional issues. There is a difficulty, both theoretically and empirically, in dealing with population change occurring over time within the area, particularly as population change may be a direct consequence of the intervention. Also, when changes are identified, there is a difficulty in identifying the relevant causal driver, because of the multidimensional and varied (across time and sites of intervention) nature of a complex intervention developed in context. It could be that it is the context-specific nature of the intervention that is important, or that a particular dimension (such as housing improvements) is driving observed effects, or that effects emerge from the general ethos of the intervention which might vary across contexts (for example a focus on improving local environment versus a focus on economic development).

6.5 Summary

This review points to the very limited evidence base that we have on interventions to reduce inequalities in health in later life. Very few studies have been conducted, and only a handful of these have an explicit focus on inequalities rather than health per se. Most of the studies that do exist focus very much on interventions targeted at individuals, and mainly on behaviour change, with very little focus on the environments that shape individual experiences. Also, the two interventions that are targeted at environments (New Deal for Communities and GoWell) have a focus on the neighbourhood rather than broader social and economic resources that influence

opportunities at a neighbourhood level. This means that such an evidence base can provide little insight for the development of interventions targeted at macro-social influences, such as welfare, taxation and pension reform.

7. Conclusions and recommendations

This review shows clear evidence on the large inequalities in health in later life, across dimensions of socio-economic position, ethnicity, gender and area. Some of these dimensions have more limited evidence than others, but all would merit additional investigation of causal processes and mechanisms.

Despite this evidence, both interventions and broader policy work (including the Marmot Review, 2011) have ignored older people and relevant processes operating in later life. Insofar as interventions focus on other segments of the population and draw on evidence and recommendations provided by existing policy work, it is likely that they will ignore processes related to later life and have minimal impact on existing inequalities among older people.

There are, nevertheless, some conclusions that can be drawn from the small body of existing evidence. This evidence suggests that there is some success with interventions that are focused on promoting valued social roles and broader social inclusion, physical activity and exercise, falls prevention programmes more generally, and housing quality, particularly heating. Although these seem to improve outcomes for those who receive the interventions, there is insufficient evidence to assess whether, if appropriately targeted, such interventions would reduce inequalities in health in later life. In addition, the limited range of interventions listed here reflects both a lack of more broadly focused interventions and a general lack of published evidence on adequately evaluated interventions. One possibility is that there may be value in interrogating existing (and future) data arising from evaluations for evidence on the impact of interventions on inequalities among older people, and perhaps doing this particularly for those interventions that are more complex, more ambitious and more wide-ranging, such as New Deal for Communities and the GoWell programmes.

It is likely that progress in developing an evidence base can also be made by focusing on events/transitions that are particularly relevant for older people, including retirement, death of spouse and close friends, and the onset of illness and disability. How life is lived leading up to, through and beyond these transitions will depend on access to and mobilisation of resources that allow the development and maintenance of social connections, networks and rewarding and valued roles, and facilitate the protection of standards of living. Unequal access to such resources has important implications for health and well-being inequalities in later life. It is here that it is important to have a focus on macro-social structures, those that shape how transitions are experienced and provide (or not) resources to manage transitions and consequent states.

This is partially reflected in the conceptual model presented in Figure 4, which points to the role of broader, macro, social and economic structures and inequalities in shaping people's experiences. A consideration of this suggests a need for policy development to focus on addressing social and economic inequalities in later life, pointing to the need to focus on social welfare, tax and pension reform, as well as considering area-related factors such as housing, green spaces and the provision of spaces for social and cultural engagement. Perhaps disappointing in this context is that where significant reform is occurring, such as in the case of pensions, little consideration is given to the question of impact on economic inequality. The ongoing policy work in relation to ageing populations could, rather, be used as an opportunity to include a focus on reducing inequalities.

An additional issue with the existing body of evidence is that where health is considered it largely focuses on specific indicators of health, disease, mortality and health behaviours. There

is a clear need for evidence that brings these various dimensions together and allows an examination of the impact of interventions on healthy life expectancy. This would allow an assessment of impact on both improvements in life expectancy per se, and how far this is a consequence of additional years spent in good health in contrast to greater periods with illness and/or disability.

More broadly, there is also value in introducing well-being into the evidence base. Within the policy field well-being has received increasing attention. On an international level, the Organisation for Economic Co-operation and Development has included subjective well-being measures in its statistics since the Declaration of Istanbul in 2007. Similarly, the EU Commission and Eurostat have launched initiatives to capture subjective components of well-being (Beyond GDP Conference in 2007). These developments on the international level led to regional and national initiatives, including the 2009 French Commission on the Measurement of Economic Performance and Social Progress and the more recent effort of the UK Office for National Statistics to measure well-being.

Despite this progress in the policy field, well-being remains a contested concept. The classic Greek hedonic school of thought framed well-being within the proposal that pleasure should be maximised and suffering minimised, an argument also offered by utilitarians such as Bentham and Mill. In contrast, Aristotle argued that human flourishing, or eudemonic well-being, flows from the development of one's capabilities, rather than from the simple fulfilment of basic needs. This idea of well-being comes very close to Maslow's hierarchy of needs.

In more empirically focused work, hedonic approaches emphasise the measurement of both positive (happiness) and negative (sadness and depression) mood, and the more cognitive dimension of life satisfaction (where the individual provides an evaluation of their life). While eudemonic approaches attempt to assess positive functioning, personal development and dimensions of self-actualisation, it is likely that there is value in considering each of these dimensions, because they may well be influenced by different factors.

This general policy interest in well-being is relevant to later life, particularly in the context of a time of life when levels of morbidity are high and there are inequalities in the distribution of morbidity. So, an important additional question is whether interventions can be developed to reduce inequalities in levels of well-being, as well as inequalities in health or life expectancy. The issue here is whether extended life expectancy is paralleled with more years with high well-being, regardless of whether additional years are healthy or not. It may be that inequalities in the resources available to cope with chronic illness or disability lead to different well-being outcomes in later life. The concern is whether those with poor physical health are enabled to spend their lives in ways that are enjoyable and rewarding.

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