

# Social inequalities in health expectancy and the contribution of mortality and morbidity: the case of Irish Travellers

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## ABSTRACT

**Background** The health expectancy of Irish Travellers, a disadvantaged indigenous minority group in Ireland has not been previously estimated. This study aimed to examine health expectancy inequalities between Irish Travellers and the general population.

**Methods** We used Sullivan's life table method to construct healthy life expectancy (HLE) and disability-free life expectancy (DFLE). The All-Ireland Traveller Health Study provided Irish Traveller population's mortality and health data. Vital registration, census and comparable national survey health data were used for the general population. We calculated the absolute and relative life expectancy, HLE and DFLE gaps between Irish Travellers and the general population and decomposed the HLE and DFLE gaps into mortality and morbidity contributions.

**Results** Irish Travellers had consistently lower HLE and DFLE than the general population. The health expectancy gap displayed notable age and gender variations and was wider than the life expectancy gap. Mortality contributed more than morbidity to the health expectancy gap in men but not in women.

**Conclusions** This study illustrated the true extent of health inequalities experienced by an indigenous minority in Europe, clarifying the importance of reducing the burden of non-fatal disabling conditions for addressing these inequalities. The health expectancy measure used has application for other similar indigenous minorities elsewhere.

**Keywords** health intelligence, morbidity and mortality, social determinants

## Introduction

The poor health of disadvantaged indigenous minority groups has been documented in many countries, and is attributable to adverse socio-economic and environmental circumstances, marginalization and discrimination, unfavourable lifestyle factors and inadequate access to good quality health services.<sup>1,2</sup>

Irish Travellers are one such indigenous minority group in Ireland, who share a distinctive history, value system, language and customs. They represent ~1% of the population of Ireland and have the typical profile of a disadvantaged group, with lower employment and educational achievement.<sup>3</sup> Routine national data do not capture ethnic or cultural group status, but two major national studies in 1987 and again in 2010 showed that despite absolute improvements in their survivorship over two decades, Irish

Travellers continue to fare poorly in terms of infant mortality and life expectancy, compared with the general population.<sup>4,5</sup>

Commitment to reduce these inequalities is reflected in the national policy target of narrowing the life expectancy gap between Travellers and the general population.<sup>6</sup> However, using only life expectancy to track health inequalities overlooks inequalities in non-fatal health outcomes. Health expectancy, a measure widely used to assess health status and health inequalities in various settings,<sup>7–10</sup> adjusts

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life expectancy for time lived in less than perfect health, so that health expectancy at a particular age is the average time expected to be lived further in perfect health by an individual who reaches that age.

Studying the health expectancy of Irish Travellers presents a comprehensive yet concise baseline view of health inequalities related to this group. While health expectancy of the general population in Ireland is regularly measured by the European Health Expectancy Monitoring Unit,<sup>11</sup> the health expectancy of Irish Travellers has not been estimated before. This paper aimed to fill this gap by using health expectancy to examine health inequalities affecting Irish Travellers in the Republic of Ireland in 2007–2008. Specifically, we sought to answer the following questions:

- What is the health expectancy of Irish Travellers in the Republic of Ireland?
- What is the magnitude of inequalities in health expectancy between Irish Travellers and the general population and how does it compare with inequalities in life expectancy?
- What is the contribution of mortality and morbidity to inequalities in health expectancy?

## Methods

Health expectancy is a generic term encompassing a wide range of measures that vary by the underlying definition of health used in their construction. In this study, which was a secondary analysis and synthesis of existing mortality and cross-sectional survey data, we used Sullivan's prevalence-based life table method to construct healthy life expectancy (HLE) at age 15 and at age 65, based on poor self-reported perceived general health, and disability-free-life-expectancy (DFLE) at age 15 and at age 65, based on disability, for male and female Irish Travellers in the Republic of Ireland. A comparable set was constructed for the Irish general population. Life expectancy estimates were included for comparison. Using Sullivan's method required population data, mortality data and cross-sectional health data for each group.<sup>12</sup>

## Data

### Irish traveller data

*Population and mortality data.* We used the Traveller population count by age and gender from the All-Ireland Traveller Health Study (AITHS). The study included a census of Irish Travellers and an assessment of their health status and mortality experience. The methodology of the study was

published in a series of technical reports.<sup>5,13</sup> A Traveller was defined as a person identified by themselves and others as a member of the Traveller community, in keeping with the definition of the Traveller community in the Equal Status Act in Ireland.<sup>14</sup> The census interviews had a response rate of 78% of Traveller families in the Republic of Ireland. All families completed the core census section and a health status interview for a randomly selected child aged 5, 9 or 14 years, or in childless households, a health status or health service utilization interview for a randomly selected adult. AITHS received ethical approval from University College Dublin Research Ethics Committee. A written consent to participate was obtained from the respondents.

The mortality sub-study of AITHS provided the number of deaths over the year preceding the census. Traveller deaths were mainly reported by census respondents, with additional reports from Public Health Nurses. After the elimination of duplicate reports, a final list of Traveller deaths was matched with the official database of death records maintained by the General Registrar Office, using reported name, age, gender and place of death. 63% of the 166 identified deaths were successfully matched, and during the process, a researcher who was experienced in working with Travellers identified 22 further Traveller deaths that were not reported by the other sources, but had typical attributes of Travellers, e.g. trailer halting site for address or tinsmith for occupation. Those were confirmed by local study coordinators and Traveller peer researchers working with Travellers in the area where the deceased resided. More than 90% of the reported ages for those successfully matched were within a 5 years' range of the ages in the official death record. Thus, for this study we included deaths identified from all sources, using the age and gender of the official record for the matched deaths and the reported age and gender for the unmatched deaths, excluding four males and two females lacking age data.

*Perceived general health and disability data.* We used perceived general health data and disability data from the health status survey of Irish Travellers aged 15 years and over in private households, conducted in 2008 as part of AITHS.<sup>15</sup> The survey had two components: a core component that included the perceived general health item, with a sample size of 5288 (2574 men and 2689 women) and a detailed component that included the disability item, with a sample size of 1663 (702 men and 961 women). These questions were selected from national instruments for comparability purposes, and conveyed to Traveller respondents in a culturally compatible manner (Table 1).

**Table 1** Perceived general health and disability questions used in the AITHS adult health status survey and in the SLAN 2007

Perceived general health <sup>a</sup> :						
In general, would you say your health is:						
Mark from 1 to 5 where 1 is poor and 5 is excellent:						
Poor	Fair	Good	Very good	Excellent	Don't know	Refused
1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]	[ ]	[ ]
Disability:						
Is your daily activity limited by a long-term illness, health problem or disability? <sup>b</sup>						
Yes [ ]	No [ ]	Do not have any of the above [ ]			Don't know [ ]	Refused [ ]

<sup>a</sup>For the purpose of this study, poor health was taken as general health reported to be fair or poor in general.

<sup>b</sup>The culturally compatible harmonized form of the question administered to Traveller respondents was: 'Have you any long-term medical problem or disability that stops you doing your daily work?'

## General population data

*Population and mortality data.* For the general population, we used the number of deaths in 2007 by age and gender,<sup>16</sup> and the total population enumerated at census 2006.<sup>17</sup>

*Perceived general health and disability data.* The publicly available Survey of Lifestyle, Attitude and Nutrition (SLAN) 2007 data set included comparable perceived general health and disability questions (Table 1) for the general population in Ireland.<sup>18</sup> The survey included adults in private households aged 18 years and over and had a sample size of 10 364.

## Analysis

### Calculation of health expectancy

Using the survey data from the Travellers and the general population, we estimated the age–gender specific prevalence of poor health and the age–gender specific prevalence of disability. As the Traveller survey was limited to those aged 15 years and over, and SLAN was limited to those aged 18 years and over, we used 5-year age groups starting from 15 years, assuming that the general population prevalence in those aged 18–19 years applied to those aged 15–19 years. SLAN data were available in 5-year age groups ending in the group 75 years and over, which was thus the final open-ended group for the analysis of both the SLAN and Traveller survey data.

For each gender, we constructed abridged life tables in 5-year age intervals, starting from the age of 15 and ending with an open-ended interval of 85 years and over. We used age-specific mortality rates to calculate the person-time contributed by a hypothetical cohort to each age interval, using Chiang's method.<sup>19</sup> Summing the person-time further to the age of 15 years and to the age of 65 years and dividing by the number of hypothetical survivors at the ages of 15 and 65 years, respectively, gave the life expectancy at those ages.

For each gender group, and according to Sullivan's method,<sup>12</sup> we used the prevalence of poor health in each age interval to divide the person-time lived in that interval into person-time lived in poor health and person-time lived in good health. We constructed HLE at age 15 and at age 65, by summing the person-time in good health further to ages 15 and 65, respectively, and dividing by the number of hypothetical survivors at those ages. We applied the same approach to construct DFLE at age 15 and at age 65 using disability prevalence.

95% confidence intervals for life expectancy were computed using Chiang's method.<sup>19</sup> 95% confidence intervals for HLE and DFLE were calculated according to Mathers (1991),<sup>12,20</sup> by quantifying and summing the variance resulting from mortality rates and the variance resulting from the prevalence of poor health and disability, respectively, to obtain the total variance and the standard error.

### The gap between Travellers and the general population

We calculated absolute life expectancy, HLE and DFLE gaps as the difference between Traveller and the general population estimates. The standard error of the difference was the square root of the sum of the variance of Traveller and the general population estimates and was used to calculate 95% confidence intervals for the gap. The gap was statistically significant if the intervals did not include zero. To facilitate the comparisons of the gap across different indicators, ages and gender groups, it was also expressed in relative terms as a percentage of the general population estimates.

### Mortality and morbidity contributions to the health expectancy gap

We performed a decomposition analysis to quantify the separate contribution of mortality and morbidity to the gap in

HLE and DFLE at age 15 using the method described by Nusselder *et al.*<sup>21</sup> For HLE, the mortality contribution was the difference in person-years in good health due to the different mortality rates of the Travellers and the general population, assuming the same age-specific prevalence of poor health in both groups. The morbidity contribution was the difference in person-years in good health due to the difference in the prevalence of poor health, assuming the same age-specific mortality rates in both groups. The same applied for DFLE.

BM-SPSS statistics 18 (Release Version 18.0.2) was used for survey analysis, and Microsoft Excel (2007) spreadsheets were developed and used for health expectancy calculation and decomposition.

## Results

A comparison of the prevalence of poor health and disability between Irish Travellers and the general population is displayed in the online Supplementary data, appendix figure, and shows higher poor health and disability prevalence in

Irish Travellers. Table 2 compares HLE and DFLE between Travellers and the general population. Traveller men at the age of 15 were expected to live 36.5 further years in good health and those at the age of 65 were expected to live 6.3 further years in good health, which was less than the HLE of the general population. Similar differentials were observed for women, with HLE at age 15 among Travellers of 41.1 years and at age 65 of 5.7 years. Likewise, Travellers' DFLE was lower than that of the general population. Travellers also had lower healthy proportions and disability-free proportions of their life expectancy than the general population (Fig. 1).

The findings translated into statistically significant absolute gap between Irish Travellers and the general population in life expectancy, HLE and DFLE (Table 2). The gap was narrower at age 65 than at age 15. However, accounting for the lower health expectancy at age 65 revealed a wider relative gap in men (45 and 47% at age 65 compared with 32 and 31% at age 15 for HLE and DFLE, respectively) and women (59% and 51% at age 65 compared with 28% and 27% at age 15 for HLE and DFLE, respectively). The gap

**Table 2** LE, HLE and DFLE at age 15 and at age 65 (in years) in Irish Travellers and the general population, together with the absolute and relative gaps, Republic of Ireland, 2007–2008

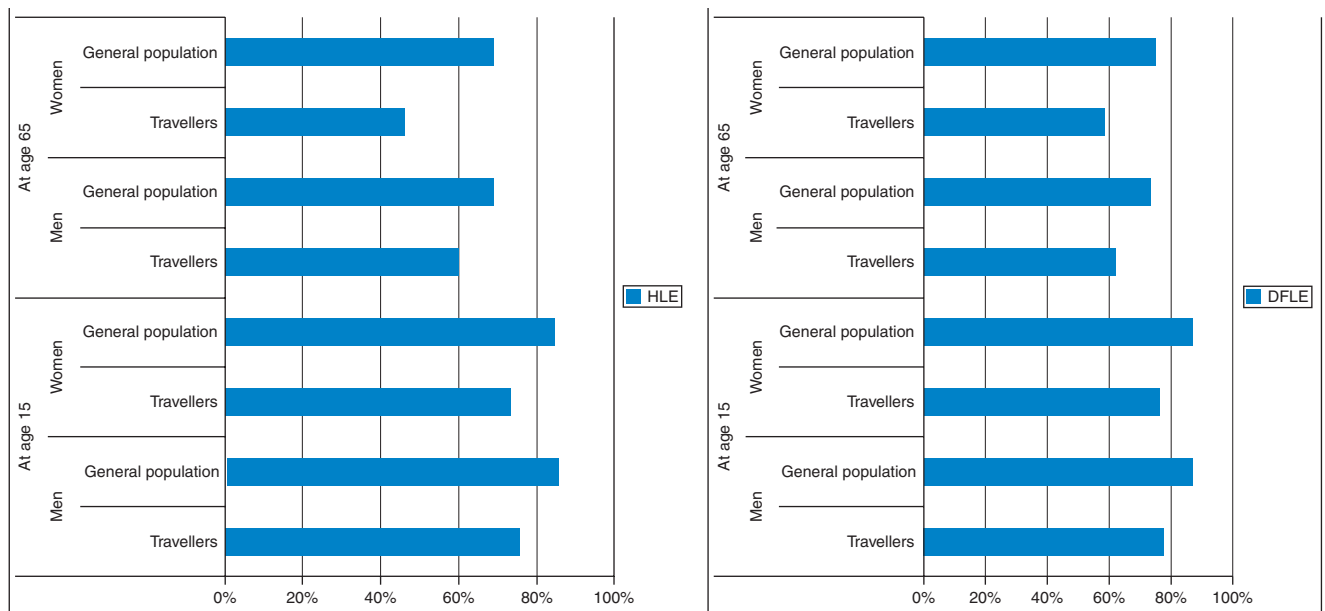
Gender	Population group	LE	95% CI	HLE	95% CI	DFLE	95%CI
At age 15							
Men	Travellers	48.1	45.6–50.6	36.5	34.5, 38.4	37.3	35.0, 39.7
	General population	62.5	62.4, 62.7	53.3	52.6, 53.9	54.3	53.7, 54.9
	Absolute gap <sup>a</sup>	14.5	(12.0–17.0) <sup>b</sup>	16.8	(14.7–18.9) <sup>b</sup>	17.0	(14.5–19.4) <sup>b</sup>
	Relative gap <sup>c</sup>	23%		32%		31%	
Women	Travellers	55.9	53.3, 58.6	41.1	39.3, 43.0	42.6	40.1, 45.0
	General population	67.2	67.0, 67.3	57.0	56.3, 57.6	58.3	58.1, 58.5
	Absolute gap <sup>a</sup>	11.2	(8.6–13.8) <sup>b</sup>	15.8	(13.9–17.8) <sup>b</sup>	15.7	(13.2–18.3) <sup>b</sup>
	Relative gap <sup>c</sup>	17%		28%		27%	
At age 65							
Men	Travellers	10.6	8.8, 12.3	6.3	4.9, 7.8	6.5	4.7, 8.4
	General population	16.9	16.7, 17.0	11.6	11.1, 12.2	12.3	11.8, 12.9
	Absolute gap <sup>a</sup>	6.3	(4.5–8.1) <sup>b</sup>	5.3	(3.8–6.8) <sup>b</sup>	5.8	(3.9–7.7) <sup>b</sup>
	Relative gap <sup>c</sup>	37%		45%		47%	
Women	Travellers	12.3	10.0, 14.7	5.7	4.2, 7.2	7.2	5.2, 9.2
	General population	19.9	19.8, 20.0	13.7	13.1, 14.3	14.8	14.7, 15.0
	Absolute gap <sup>a</sup>	7.5	(5.2–9.9) <sup>b</sup>	8.0	(6.4–9.6) <sup>b</sup>	7.6	(5.6–9.7) <sup>b</sup>
	Relative gap <sup>c</sup>	38%		59%		51%	

CI, confidence interval; DFLE, disability-free life expectancy; HLE, healthy life expectancy; LE, life expectancy.

<sup>a</sup>Absolute gap is in years and is based on subtracting the Irish Traveller estimate from the corresponding general population estimate. Figures differ slightly from differences calculated directly from the values in the table due to rounding.

<sup>b</sup>Statistically significant at the 0.05 level.

<sup>c</sup>Relative gap is the absolute gap expressed as a percentage of the general population estimate.



**Fig. 1** HLE and DFLE as a percentage of life expectancy, Republic of Ireland 2007–2008. The percentage of HLE and DFLE out of life expectancy is presented in horizontal bars, with the x-axis representing the percentage and the y-axis representing gender (men and women) and population group (Irish Travellers and the general population) categories. In both men and women, Travellers had lower percentage HLE at age 15 than that of the general population. Similar patterns were exhibited by HLE at age 65 and by DFLE at age 15 and at age 65.

in HLE and DFLE at age 15 was wider in men than in women, but wider at age 65 in women than in men. The relative gaps were consistently wider with HLE and DFLE than with life expectancy where the latter showed gaps of 23% in men and 17% in women at the age of 15 and 37% in men and 38% in women at the age of 65.

Mortality made a larger contribution to the gap in HLE at age 15 and DFLE at age 15 (9.6 and 10.1 years, respectively) than poor health (7.2 and 6.9 years, respectively) in men (Fig. 2). In women, poor health contributed more to HLE at age 15 (9.1 years) than mortality (6.7 years), while disability also made a slightly higher contribution to DFLE at age 15 (8.2 years) than mortality (7.5 years).

## Discussion

### Main findings of this study

Irish Travellers had lower health expectancy than the general population and are expected to spend a higher proportion of their life expectancy in poor health and with disability. The health expectancy gap between Travellers and the general population was wider in women than in men in older ages. Its relative form was invariably wider than the life expectancy gap, with higher contribution of mortality among men at the age of 15 and significant contribution of morbidity particularly in women where it exceeded that of mortality.

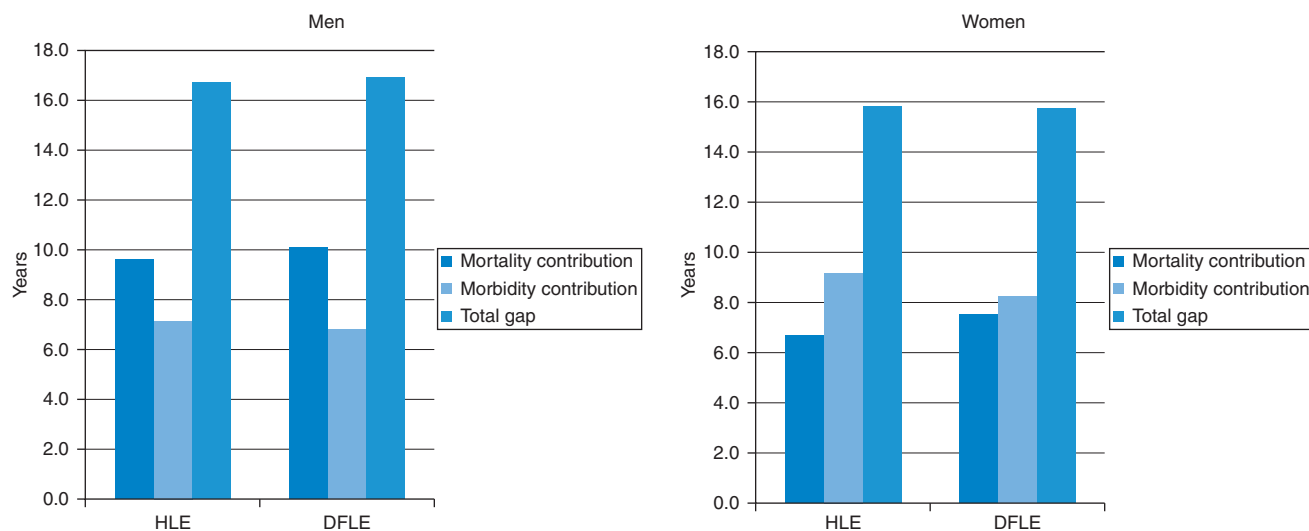
### What is already known on this topic

At a local level, Irish travellers have historically had an unfavourable mortality profile compared with the general population in Ireland.<sup>4,15</sup> Internationally, inequalities in health expectancy have previously been documented in the USA between African Americans and Whites,<sup>22,23</sup> in Belgium between the population of the Walloon region and the culturally distinct population of the Flemish region<sup>24</sup> and in New Zealand between the Maori and the Non-Maori population.<sup>25,26</sup> Almost all those studies reported wider gaps based on health expectancy compared with life expectancy, and a wider gap in older ages compared with younger ones was evident in health expectancy comparisons between Black and White ethnicities in the USA.<sup>23</sup> To the best of our knowledge, no other studies have so far reported on the contribution of mortality and morbidity to this gap, although a study in Belgium revealed a predominant contribution of disability to the socio-economic gap in DFLE in both men and women.<sup>27</sup>

### What this study adds

Our results extend beyond the previously published life expectancy findings for Irish Travellers, by incorporating non-fatal health outcomes. They present a health expectancy profile for Irish Travellers that is typical of disadvantaged indigenous minorities, with an even wider gap, although variations in the data collection methodologies and data





**Fig. 2** Contribution of mortality and morbidity (in years) to the absolute gap in HLE and DFLE at age 15 between Irish Traveller and the general population, Ireland 2007–2008. Vertical bar charts display the contribution in years of the mortality and morbidity components of the gap in HLE and DFLE to the total absolute gap in men and women separately. The total absolute gap is based on subtracting the Irish Traveller estimates from the estimates for their general population counterparts. Mortality made a greater contribution to the gap in HLE and DFLE in men than morbidity, while in women, morbidity contributed more to the gap in HLE and slightly more to the gap in DFLE than mortality.

completeness may partly explain the difference. Such profile is in line with the adverse patterns among Irish Travellers of the well-recognized array of social, structural and behavioural risk factors that influence their health, such as their high prevalence of diabetes, smoking and physical inactivity.<sup>13,28,29</sup>

Our findings of age–gender variations in health expectancy offer a depiction of health inequalities that sums the effect of selective survivorship and cumulative effects of adverse life circumstances known to influence the magnitude of health inequalities in later life,<sup>30</sup> a picture that would not be as clear if only mortality was considered. Traveller women have always had better survival than Traveller men,<sup>4,5</sup> leaving space for life time disadvantage to manifest as a widening gap in poor health and disability in older surviving cohorts. Unhealthy Traveller men selectively die earlier, leaving relatively healthy older cohorts, with a narrower gap compared with women.

The finding of wider health expectancy gap than life expectancy gap confirms that health inequalities would be underestimated if based only on life expectancy. This implies that due attention needs to be paid to the contribution of non-fatal disabling conditions, which could require different interventions than those required for preventing primarily fatal conditions. Our decomposition results have further clarified that this is particularly important in women, where the contribution of morbidity exceeded that of mortality. The commonest reported morbidities among both Travellers and the general population, apart from acute

infections, were back conditions and arthritis,<sup>13</sup> the former being considerably more common among Travellers, and both capable of significantly limiting their functional capacity and reducing their quality of life.

The results confirm the need for tailored policies and inter-sectoral action to interrupt the Travellers' life trajectories of disadvantage, in order to reduce the burden of both fatal and non-fatal conditions and improve Travellers' quality of life. Such efforts need to be coupled with the adoption of the health expectancy measure to effectively track progress in this regard, which is as relevant to other disadvantaged indigenous minorities where this is not yet the case. Our study has for the first time clearly illustrated the true extent and components of health inequalities in a disadvantaged indigenous minority group in Europe using novel methods, adding to the growing body of international evidence on health expectancy inequalities.

### Limitations of this study

A number of limitations need to be noted regarding our findings. Basing the study on self-reported health status could have affected the comparability of the health expectancy measures between Travellers and the general population, as different groups tend to use different health status levels as cut-off points for the range of survey item responses available. This is due to different health expectations and different semantics attached to survey items and response levels.<sup>31</sup> Such reporting differences were illustrated

in surveys utilizing anchoring vignettes.<sup>32</sup> Also Beam *et al.*<sup>33</sup> found that lack of adjustment for reporting differences led to the underestimation of racial/ethnic inequalities in self-reported health in the USA. A similar process could have biased the Travellers' prevalence of poor health and disability downwards, implying that the gap between Travellers and the general population could even be wider. Also, despite both SLAN and Traveller surveys being interview surveys, with the health status questions having more or less similar locations in the questionnaires, different sampling designs and non-response could have affected their comparability. Using harmonized survey items was the most we could do to maximize the comparability of the health expectancy estimates.

Retrospective identification of Traveller deaths could have led to under-reporting, although this would have been minimized by the use of multiple sources. Limitations associated with Sullivan's method include the use of the currently observed prevalence reflecting past morbidity patterns, and the implicit assumption that there is no recovery from morbidity.<sup>34</sup> However, as we used the same method for both comparison groups, and given the stark differentials in current mortality, we expect our estimates to correctly represent the direction of differentials in HLE and DFLE.

## Supplementary data

Supplementary data are available at the *Journal of Public Health* online.

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