Impact case study (REF3)

Institution: University of East Anglia	

Unit of Assessment: 2 - Public Health, Health Services and Primary Care

Title of case study: Enabling the NHS to meet diverse needs across England by creating a new evidence base for the burden of death, disability and inequality, which underpinned priorities in the NHS Long Term Plan (2019-2024)

Period when the underpinning research was undertaken: March 2016 to October 2018

Details of staff conducting the underpinning research from the submitting unit:

Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Nicholas Steel	Professor of Public Health	2004 to present
John Ford	NIHR Academic Doctoral Fellow	Nov 2014 to Oct 2018
Alice Dalton	Senior Research Associate	Nov 2010 to present

Period when the claimed impact occurred: 1 July 2018 to 31 December 2020

Is this case study continued from a case study submitted in 2014? No

1. Summary of the impact

Robust evidence about changing patterns of disease in England was needed to inform national priorities for healthcare and funding. The Global Burden of Disease Study (GBD) quantifies death and disability comparably across time and place, and the University of East Anglia (UEA) collaboration with Public Health England and GBD innovatively extended GBD to 150 localities across England, incorporating information on deprivation.

The NHS Long Term Plan used the new epidemiological evidence UEA provided to set priorities for tackling the major causes of death and disease in England. These new priorities led to more equitable allocation of GBP4,500,000,000 extra NHS funding and improved care in key areas including mental health, cancer and musculoskeletal conditions.

2. Underpinning research

Setting fair priorities to improve people's heath requires accurate, timely, and credible evidence about the burden of disease. Who gets sick and dies, from what conditions, why, and where? The Global Burden of Disease (GBD) study based at the Institute for Health Metrics and Evaluation (IHME) in Seattle quantifies the burden of disease from diseases, injuries and risk factors globally. GBD metrics are years of life lost due to premature mortality (YLLs), years lived with disability (YLDs), and disability-adjusted life-years (DALYs). DALYs combine YLLs and YLDs to give the total burden from deaths and disability.

Public Health England (PHE) and IHME estimated burden of disease for each of the 9 English government regions in 2015, but directors of public health told PHE that more localised estimates of disease burden that documented health inequalities were needed to plan local services. To do this, PHE needed a GBD Fellow with an understanding of United Kingdom (UK) health data at local level, local public health teams, changing geographic administrative boundaries, and complex GBD methods, to be based at IHME. Professor Nicholas Steel, Professor of Public Health at UEA, was appointed through a competitive process in 2016.

Steel identified Upper Tier Local Authorities (UTLA) as the most promising areas to map burden of disease onto. Data on causes of death and disability from mortality statistics, publications, surveys, registries, and surveillance were identified. IHME modelled and rescaled cause of death estimates so that the sum of all cause-specific deaths equalled the total number of deaths in each age, sex, location, and year category. Bayesian meta-regression estimated YLDs whilst ensuring consistency between prevalence and death rates for each condition. A global model was passed down through geographical levels to UTLAs. Estimates for locations with few data were generated by borrowing information (for example on prevalence) from other locations and using covariates. This was the first time that comparable estimates of burden of disease had been generated for these small geographic areas, where they are needed by policy makers.

Steel and the UEA team collaborated with IHME and PHE to understand local health care contexts in order to appropriately apply and present the model outputs in figures, tables and maps. They integrated globally comparable GBD estimates with English indices of deprivation for small areas that were familiar to local policy makers. This was a key innovation that allowed direct meaningful comparison of disease burden with deprivation across 150 UTLAs for the first time. The emerging results were reviewed by the collaborating UK disease experts in an iterative process that led to checking of data sources and rerunning the statistical models as required.

Key findings of the research were [Output 1]:

- Non-fatal conditions contribute an increasing share of the overall burden of disease, compared to death. The DALY rate was higher for low back and neck pain (1,820) than for ischaemic heart disease (1,139), and similar for depression (664) and lung cancer (633). As death rates decrease, people live with long-term conditions, and the consequent demand for health care rises. Mitigating this rising burden due to non-fatal conditions will be key to the provision of sustainable services.
- More than twice as many years of life were lost in the most deprived local authority (Blackpool, 14,274 per 100,000 people) than in the least deprived (Wokingham, 6,888).
- The top seven risk factors for premature death were smoking, poor diet, high blood pressure, obesity, alcohol and drug use, air pollution and lack of exercise. These risks are preventable, but present significant challenges in areas of multiple deprivation. This research showed for the first time that some UTLAs with high levels of both deprivation and risk factors (for example in London) lost fewer lives than expected, whereas others (for example in the North West) did worse than expected. This new finding offers direction for preventive services.

3. References to the research

Key research output [output 1]:
Changes in health in the countries of the UK and 150 English Local Authority areas 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016.
Steel, N., *et al.*
The Lancet, **2018**, 392(10158), 1647-1661. DOI: 10.1016/S0140-6736(18)32207-4

This output consists of the main paper and supplementary material on the Lancet website.

Key research grants:
1. **Project: 'Global Burden of Disease Fellow'**. (PI) Steel, N.
   Funder: Public Health England. (addendum to honorary contract)
   Amount: GBP23,500. Dates: February 2016 – August 2017.
2. **Project: 'Forward work on the England Burden of Disease programme'**. (PI) Steel, N.
   Funder: Public Health England.
   Amount: GBP33,857. Dates: June 2017 – May 2019.

4. Details of the impact

Creating a new evidence base for priority setting in the new NHS Long Term Plan
The chief executive (CE) of NHS England (NHSE) met the CE of PHE in 2018 about the developing Long Term Plan (LTP) for the NHS from 2019-24. NHSE needed robust evidence on the burden of different conditions across England, and the PHE chief executive recommended the pre-publication Lancet paper from the UEA/PHE/GBD collaboration as evidence [Output 1]. The paper was shared in advance with the NHSE CE (S1i) and followed up on release. The PHE Director of Health Improvement emailed that NHSE colleagues were impressed and wanted the NHSE CE and 200 senior NHS executives to be briefed (S1ii). The NHSE CE's senior adviser emailed Steel regarding the pre-publication of output 1 saying: '*Thank you so much. It's really excellent work, and timing couldn't be better*' (S1iii). MPs and Peers discussed the LTP and UEA paper in a meeting chaired by The Health and Social Care Committee chair, and the NHSE CE requested further details (S1iv). The Chair of NHSE emailed: '*Your data were referred to several times through the day as we worked through the complex strands of the long term plan - many thanks…*' (S1v). The PHE CE wrote in 'Public Health Matters' that: '*…this GBD data … provides a solid foundation for the forthcoming vision document from Secretary of State Matt Hancock on the importance of prevention, placing good health at the heart of all policy making, and of course*

the opportunities of the NHS Long Term Plan' (S1vi). 'Public Health Matters' also commented: '*The work is a partnership between PHE, the University of Washington, the University of East Anglia and many colleagues. This study is incredibly timely, providing a detailed and comprehensive picture of the health of people in the UK just at the time when it can be used to shape the forthcoming NHS long term plan*' (S1vii).

The resulting NHS LTP (S2), published in January 2019, is a landmark policy document. UEA's Lancet publication [Output 1] was the major evidence source underpinning the plan's priorities (cited eight times, S2). This touches the lives of everyone in the UK, but especially in areas of multiple deprivation. The UEA research quantified the top risk factors for deaths in England. The LTP (citing Output1), states that: '*These priorities [smoking, poor diet, high blood pressure, obesity, and alcohol and drug use] guide our renewed NHS prevention programme*' (p33, S2).

The research identified depression as a major contributor to the burden of morbidity and quantified its relationship with deprivation. It clearly identified locations, including Blackpool, as deprived areas with particularly high disease burdens. Citing UEA research [Output 1], the LTP states that '*Premature mortality in Blackpool, the most deprived part of the country, is twice as high as in the most affluent areas.*' It goes on to say that '*NHS England will introduce from April 2019 more accurate assessment of need for community health and mental health services, as well as ensuring the allocations formulae are more responsive to the greatest health inequalities and unmet need in areas such as Blackpool*' (p.39-40, S2).

The PHE Director of Health Improvement wrote that: '*The analysis presented burden of ill health attributable to individual risk factors in each locality and therefore provided very direct evidence of the potential benefit of addressing those problems in those areas. The paper was therefore an ideal input to the planning and implementation of the NHS Long Term Plan, and it was recognised as such by Simon Stevens the Chief Executive of NHS England… It is probably the clearest example I have ever seen of a single paper directly influencing a planning process, leading to substantial change in services and investment in prevention*'(S3i). Referring to clinical priorities set out in output 1 such as cancer, mental health and stroke, the Kings Fund commented: '*Perhaps the most striking commitments in the plan relate to a group of clinical priorities, chosen for their impact on the population's health … These commitments will save lives and improve the lives of patients*' (p4-5, S3ii) and referred to the guiding role of Steel's research in identifying the top five risk factors as a focus for the renewed NHS Prevention programme (p19, S3ii). The CE of PHE wrote that '*Professor Steel and the team at UEA were able to develop an analysis of GBD that was innovative and informative … the resulting paper had a considerable impact on public health practice nationally. It also clearly spoke to local audiences because of the nature of the analyses and the bespoke local messages within the data. We are certain it has helped local Councils set their priorities and make the case for spending on prevention*' (S3iii).

Changes to resource allocations and impact on patients and practice
UEA research enabled the NHS, for the first time, to assess health problems across England in a comparable way, thereby enabling more precise targeting of funds and resources. The Chief Medical Officer (CMO) wrote that: '*The research into burden of disease led by Professor Steel and colleagues at UEA and the associated Lancet publication played a vital and unique role in the development of the NHS Long Term Plan by Sir Simon Stevens and NHS England. It provided the evidence base for the overall strategic priorities and the redistribution of resources to areas identified as being in high need, such as mental health in inner cities. The LTP is a key living policy document for the NHS, and as Chief Medical Officer at the time I saw how the priorities that it set out, informed by this burden of disease research, have had and continue to have a lasting impact across the NHS. Examples of the impact range from reducing inequalities in funding for mental health, to raising the profile of musculoskeletal conditions, to renewing the focus on prevention of heart disease and cancer, which remain the biggest causes of death in England*' (S4).

Financial allocations for Clinical Commissioning Groups (CCGs) changed in 2019 to support the LTP implementation in line with the findings from UEA research, particularly around mental health and health inequalities (S5i). For example, to target funding to small areas with extreme inequality, The Advisory Committee on Resource Allocation (ACRA) changed how the standardised mortality ratio is aggregated to an overall CCG weighting. For example, this increased Blackpool CCG's allocation by 5.13%, or GBP16,000,000 (S5i). To tackle needs relating to mental health, in January

2019 the NHS England Board agreed to meet the LTP commitment to increase mental health spending to GBP2,300,000,000 a year by 2023/24 (S5ii). ACRA improved its estimation of need, leading to increased CCG mental health resource allocations from 2019 in some coastal areas and urban centres with younger deprived populations. This additional resource has already started to increase capacity in practices and benefit patients. For example, in Kent, the NHS used the additional funding to provide new mother and infant mental health care and launch two new street triage services in Thanet and Medway (S6i). Oxfordshire has implemented third sector partnerships to support young people who are hard to engage with traditional services. One family commented: '*since we have had the help from RAW [the new service], [name of son] has changed for the better and it's a pleasure to see him smiling and chatting about his sessions*' (S6ii).

UEA research also identified cancer as a leading cause of premature mortality, and the LTP directly referenced Steel's finding that that the slower improvement since 2010 in years-of-life-lost is '*mainly driven by distinct condition-specific trends, predominantly in cardiovascular diseases and some cancers*' (p56, S2). The LTP stated that '*We have therefore used these GBD findings to help frame the improvement priorities in the Long Term Plan*' (p56, S2). For cancer, the LTP committed to diagnosing 75% of cancers at stage 1 or 2 by 2028, and to rolling out Rapid Diagnostic Centres (RDCs). In response the York RDC launched in 2020 and has assessed patients through the COVID-19 pandemic. Cancer Nurse Specialist Jo Clark said: '*The RDC pathway is personalised, reduces unnecessary appointments and tests and improves delays in diagnosis. I have seen the effects that waiting for tests and results can have on patients so improving this part of the patient's journey is such a positive step*' (S7i). The new GBP70,000,000 'Targeted Lung Health Checks' programme will fund 10 projects in the areas with the highest death rates from lung cancer (S7ii).

The LTP stated that its improvement priorities for the '*biggest killers and disablers of our population*' used '*the latest epidemiological evidence*', citing Steel *et al*. It estimated the following impacts:

- preventing 150,000 more heart attacks, strokes and dementia cases (p63, S2)
- 55,000 more people each year will survive their cancer for at least five years (p57, S2).

Policy impact beyond the NHS Long Term Plan:
UEA research has fed directly into healthcare policy beyond the NHS LTP. For example, changes to strategy and indicators relating to musculoskeletal and mental health have been called for. In a report that cited Steel *et al* [Output 1] several times, the Kings Fund called for '*a new strategy on health inequalities …. to reflect evidence about the growing importance of morbidity as well as mortality – especially musculoskeletal morbidity and mental health*' (p51, S8i). The Public Health Outcomes Framework (PHOF) is used to monitor the effects of NHS and public health services on population health. Public Health England's consultation (p21, S8ii) cited Steel *et al* showing that back and neck pain was the leading cause of disability, and therefore proposed a new indicator of the '*Percentage reporting a long-term musculoskeletal (MSK) problem*' to increase recognition and treatment. This indicator is now in PHOF 2019-2022 (C27, S8iii). The CMO wrote that: '*The methodological approach of combining robust comparable burden of disease estimates based on UK data, with England-specific measures of deprivation in small geographic areas is likely to remain central to future NHS Planning, and to be a key tool in providing an evidence base for the recovery from the COVID-19 pandemic*' (S4).

Developing international impact
Professor Steel was invited to describe this UEA research as an example of national policy impact at the World Health Organisation European Burden of Disease Network and also at workshops organised by the European Commission Joint Action on Health Information, which streamlines health information across Europe, where 40 partners in 28 countries have collaborated to share learning from this UEA research.

5. Sources to corroborate the impact

S1 **Emails and online sources corroborating the early interest from NHS England in using the UEA research to inform the NHS LTP**:
   i) PHE Director of Health Improvement 'lancet prepublication' email 20.9.18
   ii) PHE Director of Health Improvement 'HSJ and NHSE' email 26.10.18

iii) Senior Adviser (NHS Performance) 'excellent work' email 24.10.18
iv) PHE Director of Health Improvement 'MPs discussion' email 24.10.18
v) NHSE Chair 'data used for LTP' email 24.10.18
vi) Public Health Matters: Duncan Selbie's Friday message - 26 October 2018 (webpage accessed 07.02.21)
vii) Public Health Matters: How local Global Burden of Disease data can help shift the focus for the NHS. 25 Oct 2018 (webpage accessed 07.02.21)

S2 **The NHS Long Term Plan. NHS England, January 2019**

S3 **The importance of priorities set out in the LTP and corroboration that they were based on the UEA research**:
i) Letter from the Public Health England Director of Health Improvement, 17.2.21.
ii) The Long Term Plan explained. The Kings Fund 23 January 2019 (webpage accessed 03.03.21)
iii) Letter from the Chief Executive of Public Health England, 26.2.21.

S4 **Letter from Chief Medical Officer and Master of Trinity College Cambridge, 24.2.21**

S5 **Changes to resource allocations**:
i) Allocation of resources to NHS England and the commissioning sector for 2019/20 to 2023/24. NHS England, 2019. Board Paper: PB.31.01.2019/04.
ii) NHS Mental Health Dashboard (webpage accessed 03.03.21)

S6 **Evidence on downstream impact on practice and patients - mental health**:
i) Mental health is as important as physical health and we need to do more to join up services. NHS Kent and Medway, 2020 (webpage last accessed January 2021).
ii) Oxfordshire CAMHS Transformation Plan 2019-20 Refresh – An Update on Progress. Oxfordshire Clinical Commissioning Group, October 2019

S7 **Improvements to cancer screening and care**:
i) New Rapid Diagnostic Centre continues to assess patients during Covid-19 pandemic. Cancer Alliance, 27 May, 2020 (webpage accessed 26.10.20)
ii) NHS to rollout lung cancer scanning trucks across the country, 8 February 2019 (webpage accessed 08.03.21)

S8 **Musculoskeletal and mental health – changes in policy**:
i) A vision for population health: towards a brighter future.
Buck D, Baylis A, Dougall D, Robertson R. The King's Fund, 2018
ii) Proposed changes to the Public Health Outcomes Framework from 2019/20: a consultation. Public Health England, 2019
iii) Public Health Outcomes Framework 2019–2022. Public Health England