Institution: University of Plymouth

Unit of Assessment: UoA20

Title of case study: Redesigning Public Services Funding Allocation Formulae to Maximise Social Benefit

Period when the underpinning research was undertaken: 01.01.2000 – 30.11.2020

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:
Professor Sheena Asthana	Professor	1995 – present
Dr Alex Gibson	Senior Research Fellow	2005 – present

Period when the claimed impact occurred: 01.08.2013 – 31.12.2020

Is this case study continued from a case study submitted in 2014? N

1. Summary of the impact (indicative maximum 100 words)

Research undertaken by Asthana and Gibson has challenged longstanding and taken-for-granted assumptions around health funding which has resulted in a major redistribution of NHS funding. They found that coastal and rural areas received less funding (per capita) for health and local government services. Yet, because they have older populations and have experienced recent economic and social decline, they are grappling with higher burdens of illness and disability. Through working with government, their research has influenced the formula used to allocate 78 billion GBP annually to Clinical Commissioning Groups (CCGs) since April 2019, been the basis for the commissioned new English Children's Social Services Funding Formula (10 billion GBP annually) and is being used by the Chief Medical Officer in understanding and developing public health strategies.

2. Underpinning research (indicative maximum 500 words)

The research programme, led by University of Plymouth, dates from 2000 to the present and rests on a philosophical critique of the mainstream approach to formula funding [3.1, 3.2, 3.3], as well as methodological and technical innovation in the analysis and linkage of large data sets in order to refine resource allocation and increase the fairness of these models [3.4, 3.5]. Asthana and Gibson's fundamental critique is that the econometric (typically regression) modelling which has been used to identify 'needs' variables from factors associated with historic service use in areas inevitably introduces circularity due to difficulties of adjusting for unmet need and/or unjustified supply. The methodological alternatives they have spearheaded include the analysis of large survey data to develop needs estimates that are not biased by historic use; the development of sophisticated microsimulation techniques that aggregate the range of factors associated with individual risk to the area level [3.4]; and the development of 'person-based' as opposed to area-based allocation models [3.5].

Asthana and Gibson's work had its origins in an ESRC-funded project that developed practice-level estimates of coronary heart disease in the UK and compared these estimates to activity data. It found that hospitalisation and surgical intervention rates were higher in urban practices and lower in rural areas than would be expected from practice-level estimates [3.6]. The findings led the team to question the implicit assumption that, because urban deprived (but young) populations suffer profound health inequalities, they have greater needs for curative care. At the time, the possibility that demographically ageing rural and/or coastal areas might have a legitimate need for more resources was rarely given serious consideration.

With co-applicants from the Universities of Exeter (Professor Trevor Bailey), Southampton (Professor Graham Moon), Edinburgh (Professor Chris Dibben) and Plymouth (Dr Paul Hewson), Asthana and Gibson have refined their approach to synthetic estimation [3.4]. Funded by NIHR, they produced a suite of cardiovascular (n=24) and mental health (n=41) estimates (*the Plymouth Prevalence Estimates)* at a range of spatial scales (Lower-Layer Super Output Areas (LSOAs), Middle Layer Super Output Areas (MSOA), general practice (GP), Primary Care Trust (PCT)/Clinical Commissioning Group (CCG), local authority (LA) (2016)). They used these to explore equity of utilisation of cardiovascular care and mental health services in England. Key findings related to the importance of relative mix of care (higher levels of presentation and primary management being associated with lower levels of hospital admission); the persistence of ethnic variations after controlling for age and deprivation; and the role of systematic factors (such as rurality/coastal deprivation) in shaping patterns of utilisation.

One consistent finding of their research is that, because peripheral coastal and rural areas have been less deprived on average, they have received less funding (per capita) for health and local government services. Yet, because they have older populations and have experienced recent economic and social decline, they are grappling with higher crude burdens of illness and disability. This mismatch has led to inequalities in care and organisational stress [3.6]. At the same time, recent shifts in the distribution of children in poverty are driving higher service needs for younger, deprived people in the periphery. The multiple problems facing coastal communities have been difficult to analyse due to a lack of coastal definition and difficulties in linking data at different scales. As a short-term solution (and in response to a request from the Chief Medical Officer), Asthana and Gibson developed algorithms to map, at LSOA level, disease prevalence and the distribution of key health risk factors.

3. References to the research (indicative maximum of six references)

3.1 Asthana, S., Gibson, A., Moon, G., Dicker, J. and Brigham, P. (2004). The pursuit of equity in NHS resource allocation: should morbidity replace utilisation as the basis for setting health care capitations? *Social Science and Medicine*, 58(3):539-551.

3.2 Asthana, S. and Gibson, A. (2008). Health care equity, health equity and resource allocation: towards a normative approach to achieving the core principles of the NHS *Radical Statistics* 96:6-26.

3.3 Asthana, S. Gibson, A., Halliday, J. (2012) The medicalisation of health inequalities and the English NHS: the role of resource allocation. *Health Economics, Policy and Law* 8(2): 167-83.

3.4 Asthana, S., Gibson, A, Bailey, T, Moon, G., Hewson, P., Dibben, C. (2016). Equity of utilisation of cardiovascular care and mental health services in England: a cohort-based cross-sectional study using small area estimation. *Journal of Health Services Research & Policy* 4(14). https://doi.org/10.3310/hsdr04140

3.5 Asthana, S., Gibson, A. (2011) Setting healthcare capitations through diagnosis-based risk adjustments. A suitable model for the NHS? *Health Policy 101 (133-139)*

This research has been supported by over £1,000,000 of grant funding, with key grants including:

RG1: S. Asthana, G. Moon, J. Dicker and A. Gibson. *Inequalities in Health Service Utilization at the General Practice Level.* Economic and Social Research Council, 1999-2001 £81,481

RG2: S. Asthana, A. Gibson, G. Moon, P. Brigham and J. Halliday. *Health Resource Allocation: What Case can be made for Rurality*? Rural Health Allocations Forum, £59,214. 2001-2002.

RG3: S. Asthana, A. Gibson, T. Bailey, C. Dibbens. *The feasibility of developing an approach to Person Based Resource Allocation (PBRA) based on epidemiological data.* NIHR (Policy Research Programme), £121,269, 2007

RG4: S. Asthana, A. Gibson, T. Bailey, C. Dibbens. *Developing a resource allocation formula at General Practice level based on individual patient characteristics (Person-Based Resource Allocation): Mental Health.* NIHR (Policy Research Programme), £191,216, 2008

RG5: S. Asthana, A. Gibson, T. Bailey, P. Hewson, C. Dibben, G. Moon. *Equity of Access to Cardiac and Mental Health Services in England*. NIHR (Health Services Research Programme), £236,527, 2011-2014.
RG6: S. Asthana, A. Gibson, P. Hewson. *Fair funding for rural policing*. National Rural Crime Network, £30,931, 2016
RG7: LG Futures. *The Provision of the Children's Services Research Project*, MHCLG/DfE, £373,800 (Contract Reference: CCMK17A05).

4. Details of the impact (indicative maximum 750 words)

Since 1976, health care equity has been an explicit goal of resource allocation within the NHS. However, a strong policy emphasis on the need to reduce both health inequalities and unmet need in deprived areas has resulted in the substantial redistribution of English NHS funding towards deprived areas. The underlying driver was that those areas suffering from urban deprivation were assumed to have a greater claim to NHS resources. However, the legitimate healthcare demands of, in particular, ageing populations in rural and coastal areas were not being given appropriate weight within the allocation formulae used to distribute NHS resources. Asthana and Gibson's research identified this systematic bias in health funding and found that primary care trusts (PCTs) in rural areas are significantly more likely to be in deficit than their urban counterparts. This work has been instrumental in shifting the approaches taken to allocating funding to English public services, including 78 billion GBP annually through the NHS to Clinical Commissioning Groups (CCGs). It has been the basis for the commissioned new English Children's Social Services Funding Formula (10 Billion GBP annually) and is being used by the Chief Medical Officer in understanding and developing public health strategies.

Shaping the NHS approach and formulae for allocating 78 billion GBP of funding
Asthana and Gibson's research findings have resulted in a profound redistribution of NHS funding. As a member of the Technical Advisory Group (TAG) of the Advisory Committee on Resource Allocation (ACRA) from 2014-2017, of ACRA itself from 2017 to present, and of NHS England's Task and Finish group on Health Inequalities (from 2020), Asthana was instrumental in ACRA gaining a greater conceptual understanding of the conflicts between health care and health inequalities. Chris Bentley, Chair of TAG said; *"your research…has been hugely valuable in raising my own and the Committee's awareness of shifting patterns of deprivation and morbidity from inner cities to the periphery and the extent to which coastal areas appear to be particularly affected with respect to higher disease prevalence…and poor health outcomes for children and young people."* [5.1]
ACRA is the independent, expert body that makes recommendations on the geographical distribution of over 100 billion GBP (per annum) of funding for health services in England to the Secretary of State for Health and Social Care and the Chief Executive of NHS England. Through her membership of TAG and ACRA, Asthana has also been instrumental in establishing new approaches to funding allocations within the NHS. She contributed a conceptual understanding of the distinction between health inequality and unmet need and its analysis. For example, in 2017, the *Plymouth Prevalence Estimates* (as outlined in section 2, above) were selected by NHS England Analytical Services for a two-year internal programme of work to model unmet need because the committee found them to be the most sophisticated and representative estimates available. Through using the *Plymouth Prevalence Estimates*, the NHS were able to develop alternative methodological approaches and new insights [5.1]. "*[Asthana and Gibson's] research has been invaluable in raising Government Department's understanding of the limitations of utilisation-based funding models and of evidence that rural and peripheral areas have been systematically under-funded relative to underlying need…. there has been a shift in the response to the situation from local authorities… your body of research has played a critical role here."* Jenny Owens, Lead Statistician, Society of County Treasurers [5.2].
Subsequently, through her role on ACRA, Asthana has a direct impact on the financial allocations to CCGs nationally. Asthana challenged the way that the relationship between age and deprivation and the need for community services was represented in the general hospital and community services formula. This directly led to ACRA changing the formula used to calculate allocations to CCGs throughout England and altered how funding was distributed

around the country. These changes were implemented in April 2019. "*[Asthana] provided critical and constructive challenge to the work of NHS England on the overall methodological approach to allocations…[this] resulted in significant changes to allocations to some coastal and rural areas, within the overall core allocation of £78 billion to CCGs"* Anna Everton, NHS England [5.3].

Creating a new English Children's Social Services Funding Formula
Funded by the Department of Education and the Ministry of Housing, Communities and Local Government (MHCLG), Gibson has been the technical lead on the development of a new Children's Social Services formula. Drawing on Asthana and Gibson's research on how to identify and control for needs variables with historic data to avoid circularity, Gibson has introduced, for the first time in Local Government, a 'person-based' approach to funding in this sector through the modelling of individual data (3.5 million children aged 6-17 in receipt of children's services in 16,5050 LSOAs within 71 local authorities). By linking these data to LSOA and LA characteristics, Gibson has been able to control for the impact of local policy and practice (itself an outcome of differential funding), which had been a real problem in previous area-based formulae. His formulae have publicly been described by the MHCLG's Deputy Director of Local Government Finance as "*ground-breaking"* [5.4]. Once implemented, this formula will inform the distribution of 10 billion GBP of public funding and, compared to the previous funding formula, focuses resources more strongly on highly deprived (again including coastal) areas. Gibson's work has enabled the DfE to gain access to highly sensitive child level data sets that were key to the individual-led approach. The formula is now being used to support an analytical programme of work within DfE to improve their understanding of the drivers of activity for children's social care and the factors contributing to variation across local authorities to inform their policy making. *"Dr Gibson has worked with us and the MHCLG in advising how best to analyse these data to disaggregate 'need' from 'service use' and from local policy and practice. This has also led the Department to adopt this approach in our own internal analysis of need… Myself and the teams here appreciate the quality and impact Dr Gibson has had on our work in understanding better demand for services for some of the most vulnerable children and families as well as the instrumental role he has had in the development of a new children's service RNF."* Rachel Merritt, Department for Education [5.5].

Influencing the national policy mental map of service need
There has been a longstanding tendency for mental maps to associate social disadvantage with inner city living. Many of the funding formulae for English public services have reflected these mental maps, perhaps forgetting that cities also historically received higher funding allocations and consequently that these were reflected in future allocations. Since the 2000s, Asthana and Gibson have been creating prevalence maps that suggest that the highest prevalence of, e.g., coronary heart disease, cancer and depression are in the most peripheral areas, demonstrating that the 'levelling up' agenda is not one of North-South divide, but of peripherality (e.g., with cities such as Sunderland suffering the same challenges as Plymouth).

Asthana and Gibson have been working with policymakers at a national level to affect understanding around these issues of peripherality, and to shape policy making processes at a national level. For example, from September 2020, Gibson and Asthana have had regular meetings with both Chief Medical Officer, Chris Whitty, and his researcher (Bethan Loveless) to: (a) outline the factors contributing to poor coastal outcomes and the role of funding formulae in exacerbating variation, and (b) provide a range of LSOA level maps of disease prevalence and variations in health service use relative to need to demonstrate the strong peripheral pattern in needs variables.

Asthana has also provided written and oral evidence on mental health in rural and coastal areas to the All-Party Parliamentary Group (Rural Services) Enquiry on Rural Health and Social Care (2020). Anne Marie Morris MP, Member of Parliament for Newton Abbot & Chair of the All-Party Parliamentary Group (APPG) on Rural Health & Social Care testifies: *"Professor Asthana has provided evidence as part of the inquiry, sharing critical insight into the challenges facing the provision of mental health services in rural and coastal areas and the health inequalities that*

exist. The fantastic contribution shaped aspects of later inquiry sessions, enabling us to focus on specific areas of interest. The APPG's work has been recognised by both the Secretary of State for Health and the Chief Medical Officer as contributing to an area that needs further consideration at Government level. This marks the work undertaken by Professor Asthana and her colleagues as extremely relevant to current and future policy decisions" [5.6].

5. Sources to corroborate the impact (indicative maximum of 10 references)

5.1 Testimonial from Chris Bentley, Chair of TAG

5.2 Testimonial from Jenny Owens, Lead Statistician, Society of County Treasurers (the Society of County Treasurers represents the chief financial officers of the twenty-seven county councils in England).

5.3 Testimonial from Anna Everton, NHS England and NHS Improvement

5.4 Testimonial from Jude Ranasinghe, LG Futures

5.5 Testimonial from Rachel Merritt, Policy Lead, Children's Social Care, Department for Education

5.6 Testimonial from Anne-Marie Morris MP, Member of Parliament for Newton Abbot & Chair of the All-Party Parliamentary Group (APPG) on Rural Health & Social Care