Exploring the importance of evidence in local health and wellbeing strategies

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Abstract

As generators and synthesisers of evidence, we need to respond to the changes in the health delivery landscape if we are to continue to support public health decision-makers to make informed and judicious evidence-based choices. This study employs documentary analysis to (i) explore the extent of research evidence use in public health decision-making; (ii) to analyse occurrences of research evidence use in decision-making; and (iii) to ascertain whether patterns of evidence use overlap with other area characteristics. Health and Wellbeing Strategies constitute the main source of documentary evidence. Initial results highlight that local areas are undertaking their own programmes of research that are used to inform specific questions, although the methodological robustness of these studies is unknown. There are also commonalities with previous findings, particularly with regards to the underutilisation of qualitative research evidence and evidence on the effectiveness of interventions. Using Qualitative Comparative Analysis (QCA), this paper also highlights that underutilisation of more academic research evidence appears disproportionally weighted towards areas with some of the most complex needs but that are not receiving the highest level of spending to meet these challenges. These areas in particular may be those where knowledge brokerage activities may have the greatest impacts.

Introduction

Since the introduction of Health and Social Care Act (HSCA) in April 2013, the structure of the English NHS has changed and public health strategizing and decision-making has transferred to primarily involve Local Authorities (local government; LAs) as well as Health and Wellbeing Boards (HWBs). HWBs are intended to support local authorities to cope with new public health responsibilities (1) and along with Clinical Commissioning Groups (CCGs), HWBs are expected to produce a Joint Strategic Needs Assessment (JSNA) that identifies the needs of the population, and to create a Joint Health and Wellbeing Strategy (HWS) in response (2). HWSs should 'translate JSNA findings into clear outcomes the board wants to achieve, which will inform local commissioning – leading to locally led initiatives that meet those outcomes and address the needs' (2, p9). HWSs are expected to be grounded in local needs and to take into account local viewpoints and perspectives (2). As public documents, JSNAs and HWSs must be published (2), and a small number of other preceding studies have drawn on the content of HWSs to address different research questions (3-5). In the context of this study, HWSs are expected to 'show what evidence has been considered, and what priorities have been agreed and why' (2, p13), and are likely to give one of the most public-facing insights into evidence use patterns in public health and wellbeing decision-making.

Public health decision-making structures now differ markedly across the UK's devolved nations and this study is motivated by a need to introduce greater granularity in understanding the role of the evidence in English public health decision-making. Previous explorations of HWSs have illuminated differences between conceptualisations of 'evidence' among evidence users and generators (3). In this study we aim to build on these foundations through focussing less on the way in which the *term* evidence is used, but on the use of different *types* of evidence. The timing also allows us, in theory, to explore two sets of HWSs, given that HWBs were mandated to publish their first HWS in 2013/14 and many were expected to publish updated strategies between 2015 and 2017. Finally, our chosen synthesis methods also allow us to explore how the characteristics of HWB areas may overlap with different evidence use patterns.

Aims and Methods

Our core unit of analysis in this study are data extracted from HWSs. A list of HWBs was obtained (6), and a sample of one-third was drawn randomly using STATA (7). At least one HWS was obtained for each HWB and uploaded into EPPI-Reviewer (systematic review software (8)) and data extracted and coded. A pre-specified coding template was developed that included each strategy's duration; the priority issues identified; and a comprehensive list of different types of evidence that were used/referred to. Types of evidence were distinguished by source, methodology and coverage, and reflected sources and forms found to be frequently utilised in public health decision-making (definitions are provided in table 1 (9, 10)). Each HWS was read in full by either DK or ARG, and supporting information was entered for each code used. Double extraction took place during a piloting stage to ensure consistency of extraction, with an emphasis on recording instances of evidence use as opposed to frequency of occurrence.

Different synthesis methods were employed: (i), using the coding template, we provided a narrative account of the context in which evidence was used, focussing on key themes and their recurrence across strategies; (ii) we undertook further analyses through tabulations and charts; (iii) thirdly, we undertook Qualitative Comparative Analyses (QCA).

QCA has its basis in set-theoretic logic, and is well-placed in synthesising data from a small number of cases to uncover complex configurations of conditions observed to overlap with an outcome (11). QCA was used primarily to understand: (i) the HWB characteristics overlapping with evidence use; as well as (ii) exploring overlaps between evidence use patterns and HWB characteristics with LA public health spending allocations. We followed guidance provided elsewhere (11) in creating our QCA solution, and ran a series of diagnostic tests to ensure the quality of our solution (no contradictory configurations were detected and no contradictory simplifying assumptions were made in accounting for logical remainders (combinations of conditions not supported by observed cases)). We do not name HWBs and avoid disclosing their identity in our results; while HWSs are public documents, their inclusion in analyses may not have been foreseen by HWBs and it was not within the scope of this work to contact HWBs for further information or clarifications.

DEFINITIONS – TABLE 1 HERE

Results

1. The Health of Health and Wellbeing Strategies

From our sample of HWBs, we located a strategy published between 2012 and 2014 and an updated strategy published between 2015 and March 2017 for just under half of areas (25/51; see Table 3). One strategy alone was located for 26 HWBs (23 published 2012-2014 and three published 2015-2017). Almost a quarter of HWBs (23.5%) did not have a current strategy in March 2017, with strategies having either expired with no successor (10/12 HWBs) or having been published in 2013/14 with no expiry date (2/12 HWBs). Given that HWBs are required to publish HWSs to outline their long-term direction, this appears to compromise the significance of HWSs (table 2). The absence of a current strategy was not patterned by the characteristics of the HWB area (e.g. level of deprivation).

Typically, HWSs covered a period of 3-4 years, although some covered longer periods (12/76 strategies reviewed in total) of up to 5 years, 6 years (one) and ten years (one). A minority of updated strategies stated that the update was based on the previous strategy (Table 2: IDs 32, 36 and 41); while another ten mentioned the existence of a previous strategy. No instance was recorded where an in-depth evaluation of the previous HWS had taken place, and no decisions or priorities included in the updated HWSs appeared to be based upon an evaluation of the previous strategy.

TABLE 2 AROUND HERE

2. Frequency of different types of evidence use

A preference for statistical data

Of the 76 HWSs reviewed in total (published in 2013/14 and 2015/16), only one was informed by a single type of evidence; others were informed by up to 13 types. HWSs frequently drew upon statistical sources, mainly to demonstrate evidence of need (figure 1). As expected, the Joint Strategic Needs Assessment (JSNA(s)) informed the majority of HWSs, particularly among HWSs published in 2013/14 (47/48 HWSs (98%)). By the second wave of HWSs, their role appeared to attenuate slightly, although they remained the most frequently cited source of evidence (23/28 strategies (82%)). JNSAs appear to be fulfilling their intended role in clarifying the health needs and status of the local population. However, JSNAs typically represent a statistical compendium and it is perhaps unsurprising, given that JSNAs formed a bedrock of many HWSs, that no HWS presented evidence from existing qualitative research studies that had been

collected and analysed robustly. Alongside statistics from JSNAs, many HWSs used statistical data on local conditions that were unreferenced (27/48 in 2013/14 and 16/28 in 2015/16). Such data typically contained no source, no date, and sometimes were unclear on the scope and population. A typical example was 'although the trend in life expectancy is upward, there is a 2.5 year gap between males and females across [HWB], with more inequalities in disadvantaged communities' (HWS 14). Similar patterns were observed with unreferenced national-level statistics used to compare the HWB position with the national picture.

FIGURE 1 HERE

National statistics came from a number of sources including outcome framework statistics. Furthermore, a number of HWSs specifically included plans to use Public Health Outcomes Framework data to monitor the success and impact of the HWS, even if these were not directly used to directly inform the direction of the HWS (10 HWSs). A typical example included: 'we will measure our success by monitoring local progress against key indicators or measures from the three recently published national outcomes frameworks for Public Health, The NHS and Adult Social Care' (ID: 17). While the targets themselves were often left unspecified, many HWSs emphasised the need to monitor progress and how this could be done, even if this ambition was often left unfulfilled (see above).

Trusted academic sources

Academic research studies were frequently cited sources of evidence, although were often confined to a limited number of 'trusted' or accessible sources. Approximately half of HWSs included at least one source of academic research published within a peer-reviewed journal or published as a report by an academic institution. There was no apparent difference in the use of academic sources between HWSs published in 2013/14 and 2015/16. One of the most commonly used sources was the Marmot Review (Fair Society, Healthy Lives) (12) used in 23 HWSs. Along with Dahlgren and Whitehead's report (13) this was frequently used to justify a focus on health inequalities and social determinants of health. As was the case in previous explorations (3), NICE guidance and systematic reviews were rarely cited and there was no evidence that there had been any increase in usage over time. Inclusion of academic 'evidence' was not synonymous with presenting evidence that adhered to academic writing conventions. Typically this could include omitting the source and date of the evidence, for instance 'a recent study by the Wisconsin University showed the rankings of factors which determined the best health outcomes for a population' (ID: 43).

Local research and evidence gathering

While HWSs tended to rely more heavily on published statistical data than published qualitative data, there were indications that engagement activities were making a contribution. Almost half of HWSs included reference to specific local research (20/48 published in 2013/14 and 14/28 published in 2015/16); often this included consultation and engagement activities and involved taking a draft set of priorities for consultation; for example, 'we consulted widely on these proposals, listened to what people said, undertook an initial Equalities Impact Assessment and used this to inform the draft strategy' (ID: 13). Few HWSs that had conducted consultative exercises presented the findings alongside the HWSs. There was also indicative evidence that consultation exercises were a more frequent occurrence among HWSs published in 2015/16 (9/28 HWSs) than in 2013/14 (10/48 HWSs). This increase could be symptomatic of the trend towards increased local accountability and politicisation said to be occurring in public health decision-making (14).

3. Area characteristics, health priorities, patterns of evidence use

There was little evidence of systematic overlap between the characteristics of HWB areas – including their demographic characteristics (e.g. proportion of older people and proportion of black and ethnic minority residents), rurality, life expectancy and level of deprivation (based on the index of multiple deprivation) – and differential patterns of evidence use within the HWS. Similarly, there were no clear overlaps between different health priorities in an area and patterns of evidence use.

4. Area characteristics, patterns of evidence use and spending allocations

Funding for public health activities through ring-fenced public health allocations has been substantially reduced since the HSCA (15). Initial allocations principally reflected the degree to which local systems invested historically in preventive services, and the standardised mortality ratio for people aged 75 and under. The latter was intended to capture health inequalities as well as socioeconomic deprivation (15, 16). We explored the extent to which the differential use of robust sources of evidence (reflecting academic sources and NICE guidelines) were observed to overlap with high public health spending allocations per person (projected for 2017/18 (17)). Alongside robust evidence sources, we also explored the extent to which the HWS included evidence from specific local research and evidence and guidance produced by national level stakeholders (e.g. evidence from PHE, the LGA, among others), as well as area characteristics, and how these overlapped with spending allocations.

Because of the nature of the indicators we employed crisp-set QCA, converting each factor into a binary measure. Here we explore the extent to which evidence use and area characteristics (highest two quintiles of deprivation and highest quintile of male life expectancy) overlapped with being in the highest quintile of public health allocated spending; each quintile was calculated on the basis of national ranking and not the ranking within the sample. Because of their proximity to the outcome, we focussed only on HWSs published in 2015/16 in these analyses.

TABLE 3 AROUND HERE

Given that allocations have their basis in existing public health commitments as well as deprivation/inequality, it is not unsurprising that having above average levels of deprivation and/or low levels of life expectancy were frequently observed conditions among areas with high levels of public health spending allocations. However, deprived areas with high levels of public health spending allocations were also supported by HWSs informed by robust evidence sources (table 3). This indicates that areas with the highest public health challenge, and the highest budget allocations, were drawing on robust sources to inform health and wellbeing strategies; these configurations accounted for three-quarters of instances of high spending allocations observed. Areas with pre-existing (prior to HSCA 2012) large public health commitments may therefore have a more established culture of evidence use. Those areas with the highest quintile of public health spending allocations but that were not highly deprived did not draw upon 'robust' sources of evidence in the HWS. In deprived areas therefore, use of robust evidence sources was a sufficient condition overlapping with the highest quintile of public health spending; for those areas that did not have high levels of deprivation or low life expectancy; use of robust sources was not a sufficient condition. The truth table (table 3) also showed that a number of areas with relatively high levels of deprivation were not included within the highest quintile of public health spending allocations; crucially these same areas did not include robust sources within their HWSs, indicating a less developed

evidence use culture within those very areas likely facing the most substantial public health challenges and the fewest resources to tackle these.

Discussion and Conclusion

Summary and limitations

Evidence is clearly intended to be at the core of HWSs (2), and we found that HWSs often drew upon a diverse range of sources to justify priorities and actions. However, in line with previous explorations (3), the use of evidence is often not straightforward. Academic sources are frequently confined to a limited set of 'trusted' sources; local and national statistics are repeatedly used in ways that prevent verification, benchmarking or understanding trends over time; and the use of peer-reviewed qualitative research/evidence was found to be absent. Although there were indications that many HWSs were informed by consultative exercises, the full findings were not presented.

New HWSs were being published during periods of substantial cuts in public health spending (15), although key public health challenges remain substantial (18). QCA analyses suggested that areas with the largest public health challenges and the largest spending allocations were drawing on robust sources of evidence in their HWSs. In contrast, areas that did not have the largest spending allocation but were nevertheless facing substantial public health challenges were not drawing on robust sources in the HWS. Arguably, the judicious use of evidence becomes all the more important when resources are scarce (10), and the results suggest that an evidence use culture may be underdeveloped in many areas of higher deprivation that do not receive the greatest funding.

A number of caveats accompany the results including that double data extraction did not occur for the majority of the 76 HWSs reviewed (except for piloting), that area characteristics were based on broad indicators/quintiles; and that unreported or unreferenced sources may also have contributed to HWS development. This latter consideration is a particular disadvantage of documentary analysis, although HWSs are expected to demonstrate which evidence has been considered (2).

Implications

The results give a complex picture of evidence use in local public health decision-making and priority setting. While there is a thriving evidence use culture, this evidence tends to be drawn from a narrow pool of sources and is not used in the most transparent way. The exclusion of published qualitative literature is concerning as it suggests that gaining an understanding of the mechanisms driving health inequalities and how interventions to tackle these 'work' is not prioritised.

A recent review uncovered that research evidence often did not meet local authorities' requirements with respect to locality, political salience and economic focus (10). The results here suggest that where evidence meeting these needs is unavailable, this is often be supplemented by locally conducted research, the methodological quality of which remains unknown. This finding may partially explain why previous studies find that the word "evidence" in public health decision-making is not always synonymous with drawing upon a robust body of research evidence (19). Nevertheless, it is clear that improving the local salience of academic research evidence is central to enhancing its contribution to local decision-making. This may involve enhancing research capacity within LAs/HWBs, developing (statistical and other) methods of enhancing the generalisability of evidence to local areas, and/or improving knowledge translation practices. With respect to the latter, allied work being conducted by the authors with LA public

health teams suggests that continuous dialogue between evidence generators and decision-makers would facilitate more effective use of evidence. It is notable that the composition of HWBs usually does not include representation from knowledge brokers; the results here suggest that this absence may be felt more keenly among HWBs facing substantial public health challenges but who will not receive the greatest resources to meet these.

Acknowledgements

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Table 1: Definitions of evidence types used

Type	Working definition
Office for National Statistics (ONS) Statistics	Estimates of population size or population growth or population characteristics deriving from the census or other sources. All evidence on population size was classed under this code. Example: "The Office for National Statistics estimates the current population of xxxxx at 231,900"
Specified/referenced local statistics	Statistics about the local population that are either formally referenced or a source is named. For example "our residents' survey in 2014 showed that…"
Unspecified/unreferenced local statistics	Statistics about the local population that are not referenced in any way (either date or source). For example: "Significant parts of the housing stock in xxx are in poor condition, with an estimated xxxx properties non-decent".
National Institute for Health and Care Excellence (NICE) Guidance	NICE Guidance or other publication from NICE. For example "this strategy is aligned with NICE Guidelines on Anxiety and Depression". NICE Guidance is usually informed by systematic reviews on the issue and expert and stakeholder consultation.
Public Health England (PHE) Guidance or Strategy	PHE formal guidance or reports. Note instances of drawing upon the Public Health Outcomes Framework (PHOF) were cited as drawing on 'national statistics' (below) given that PHOF guidance was originally issued by the Department of Health. Many of the latter instances represented intended usage, as opposed to usage that informed the HWS itself.
Local Government Association (LGA)	LGA guidance or research; for example LGA guidance on the conduct and purpose of HWS.
King's Fund	King's fund guidance or research. For example: "These findings were reinforced in research by the King's Fund which looked at four key lifestyle behaviours"
Local Evaluation/existing service	A named evaluation of a service which may be formally referenced. For example: 'evaluation of Change 4 Life in xxxx showed that...'. Note where there is no reference to a service and there is no other reference, this should go as unreferenced local statistic.
External individual expert - not institutional	This refers to input of a local expert - e.g. the Local Police and Crime Commissioner views x as problematic. Where an institution is named - e.g. Hertfordshire police view x as problematic – the code below was used
External expertise - institutional	This includes institutional or academic expertise that is not otherwise disaggregated - e.g. academics from UCL tell us xxxx
Academic research study	Includes journal articles and reports produced by academic institutions - e.g. UCL produced reports - also are included here
Systematic review	Any systematic review (including meta-analyses) - also put in scoping review here
Joint Strategic Needs Assessment	Joint Strategic Needs Assessment
Specific Locally commissioned research	This includes any form of research that has not been captured elsewhere that is carried out locally (e.g. at LA level or lower geography) - interviews, consultations, surveys with open ended

	questions, surveys that may not be representative or weighted etc – this research is usually carried out by the LA/HWB or commissioned by the LA/HWB
Specified/referenced national statistics	National statistics that have a source - e.g. DWP figures show household income in the UK declined over the past decade.
Unspecified/unreferenced national statistics	National statistics not captured elsewhere - e.g. figures show wellbeing in the UK declined over the past decade.
National Policy or Reports from National Agencies (Not NICE/PHE)	This includes policy from DH, DCLG, or DfE. For example "Mental health (and emotional wellbeing) is everyone's business: individuals, families, employers, educators and communities all need to play their part. (No Health without Mental Health: A cross government mental health outcomes strategy for people of all ages. DH 2011)"
Specific commissioning tool	Specific commissioning tools. For example: "Early Help delivery tool, including the training and support to schools and lead professionals"
Other Local Policy or Strategy	References to other local strategies and plans that support the commissioning or policy-setting
Unspecified Research/Evidence	Evidence with otherwise no source or context e.g. "Evidence also suggests that there will be consequences of the economic downturn and the welfare reforms in relation to mental health such as: impact on individuals due to rise in unemployment causing mental health problems; shrinking economy, offering fewer job opportunities and exacerbating poverty and social exclusion; potential reductions in service provision."
Other	Other forms of evidence contributing to the HWS not captured elsewhere

Table 2: Descriptive Characteristics of Health and Wellbeing Board Areas and the presence of Health and Wellbeing Strategies

ID NUMBER	HWS DISCOVERED PUBLISHED 2013/14	HWS DISCOVERED PUBLISHED 2015/16	HWB HAS CURRENT HWS IN PLACE	QUINTILE OF INDEX OF MULTIPLE DEPRIVATION (1=LEST DEPRIVED)	QUINTILE PROPORTION OF OLDER PEOPLE AGED 65+ (1=FEWEST OLDER PEOPLE)	QUINTILE PROPORTION OF BLACK AND MINORITY PEOPE (1=FEWEST BME PEOPLE)	QUINTILE MALE LIFE EXOECTANCY (1=LOWEST LIFE EXPECTANCY)	QUINTILE FEMALE LIFE EXOECTANCY (1=LOWEST LIFE EXPECTANCY)	RURALITY
1	Y		No current HWS	1	3	4	5	5	Urban with Major Conurbation
2	Y	Y		1	5	1	5	5	Largely Rural (rural including hub towns 50-79%)
3	Y			1	5	2	4	5	Urban with Significant Rural (rural including hub towns 26-49%)
4	Y	Y		1	2	5	5	5	Urban with Major Conurbation
5		Y	No current HWS	1	1	5	5	5	Urban with Major Conurbation
6	Y	Y		1	5	1	4	4	Largely Rural (rural including hub towns 50-79%)
7	Y	Y		1	5	2	5	5	Mainly Rural (rural including hub towns >=80%)
8	Y		No current HWS	1	3	2	5	5	Urban with City and Town
9	Y	Y		1	3	3	3	4	Urban with City and Town
10	Y	Y		2	2	5	5	5	Urban with Major Conurbation
11	Y		No current HWS	2	3	4	4	4	Urban with Significant Rural (rural including hub towns 26-49%)
12	Y		No current HWS	2	3	4	5	4	Urban with Major Conurbation

#									
13	Y	Y		2	5	2	4	4	Urban with Significant Rural (rural including hub towns 26-49%)
14	Y			2	4	3	4	4	Urban with Significant Rural (rural including hub towns 26-49%)
15	Y	Y		2	4	3	4	4	Urban with Major Conurbation
16	Y			2	4	3	4	4	Urban with Significant Rural (rural including hub towns 26-49%)
17	Y	Y		2	1	4	3	3	Urban with City and Town
18	Y			2	.	.	.	.	
19	Y	Y		2	4	3	3	3	Urban with Major Conurbation
20	Y		No current HWS	2	3	4	4	3	Urban with Major Conurbation
21	Y	Y		2	3	1	1	2	Urban with City and Town
22	Y			3	3	3	2	2	Urban with Major Conurbation
23	Y	Y		3	1	5	5	5	Urban with Major Conurbation
24	Y	Y		3	5	1	3	3	Largely Rural (rural including hub towns 50-79%)
25	Y		No current HWS	3	4	2	2	2	Urban with City and Town
26	Y	Y		3	1	5	4	4	Urban with Major Conurbation
27		Y		3	1	5	2	3	Urban with Major Conurbation
28	Y	Y		3	5	2	3	3	Mainly Rural (rural including hub towns >=80%)
29	Y			3	2	4	2	3	Urban with Major Conurbation
30	Y			3	4	2	3	2	Urban with Significant Rural (rural including hub towns 26-49%)
31	Y		No current HWS	3	5	1	2	3	Largely Rural (rural including hub towns 50-79%)
32	Y	Y		3	1	4	3	3	Urban with Major Conurbation
33	Y			3	5	1	.	.	Mainly Rural (rural including hub towns >=80%)
34	Y		No current HWS	3	3	1	1	1	Urban with Major Conurbation
35	Y	Y		4	4	1	2	2	Urban with Minor Conurbation
36		Y		4	1	5	2	2	Urban with City and Town
37	Y	Y		4	2	4	2	2	Urban with City and Town
38	Y		No current HWS	4	3	2	2	2	Urban with City and Town
39	Y			4	2	3	2	2	Urban with City and Town
40	Y		No current HWS	4	2	4	3	2	Urban with City and Town
41	Y	Y		4	1	5	4	3	Urban with Major Conurbation
42	Y	Y		5	1	5	1	1	Urban with City and Town
43	Y	Y		5	5	2	1	1	Urban with City and Town
44	Y			5	2	1	1	1	Urban with City and Town
45	Y			5	4	1	1	1	Urban with City and Town
46	Y	Y		5	2	3	1	1	Urban with City and Town
47	Y	Y		5	1	5	1	1	Urban with Major Conurbation
48	Y	Y		5	2	4	1	1	Urban with Major Conurbation
49	Y		No current HWS	5	2	3	1	1	Urban with Major Conurbation
50	Y	Y		5	3	3	1	1	Urban with City and Town
51	Y			5	4	2	2	2	Urban with Major Conurbation

Figure 1: Types of evidence used in Health and Wellbeing Strategies (% of strategies with at least one mention)

Types of evidence used by year of HWS publication
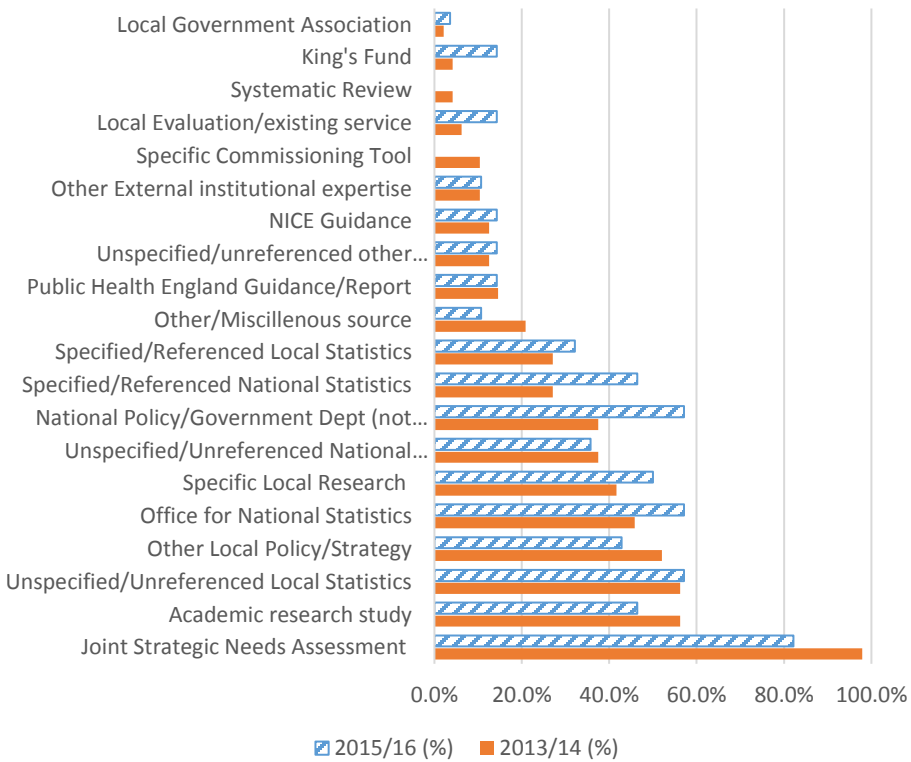

Legend: ▨ 2015/16 (%) ■ 2013/14 (%)

Table 3: Truth table and intermediate solution examining public health allocations

Truth table (Notes: the truth table here displays logical combinations of conditions observed in the data and the outcome; each row represents a combination of conditions)									
Conditions reflecting evidence use				Conditions reflecting local characteristics		Outcome	Number of HWSs with observed combination	Indicators of solution fit	
Robust evidence sources included in HWS (1=yes; 0=No)	Specific Local Research included in HWS (1=yes; 0=No)	Reference to JSNA included in HWS (1=yes; 0=No)	Reference to evidence/guidance from national stakeholders in HWS (1=yes; 0=No)	Most deprived 40% (Index of Multiple Deprivation) (1=yes; 0=No)	Male life expectancy in the lowest quintile (1=yes; 0=No)	Outcome (Top quintile of public health allocations per person) (1=yes; 0=No)	Number of HWs	Consistency score with sub-set relationship	Proportional Reduction in Inconsistency
1	0	1	1	1	1	1	2	1	1
1	1	1	1	1	1	1	2	1	1
0	0	1	1	0	0	1	1	1	1
0	1	0	1	0	0	1	1	1	1

1	1	0	0	1	1	1	1	1	1
1	1	1	1	1	0	1	1	1	1
0	1	1	1	0	0	0	3	0	0
1	1	1	1	0	0	0	3	0	0
0	0	1	0	1	0	0	2	0	0
0	1	1	0	0	0	0	2	0	0
1	0	1	1	0	0	0	2	0	0
0	0	0	0	0	0	0	1	0	0
0	0	0	1	0	0	0	1	0	0
0	0	1	0	0	0	0	1	0	0
0	0	1	0	1	1	0	1	0	0
0	0	1	1	1	0	0	1	0	0
1	0	0	0	0	0	0	1	0	0
1	0	1	0	0	0	0	1	0	0
1	1	1	1	0	1	0	1	0	0

Configuration	Intermediate Solution (Notes: represents simplification of truth table after Boolean minimization)	Consistency score with sub-set relationship	Proportional Reduction in Inconsistency	Raw coverage	Unique coverage	HWB ID
1	Specific local research*~ JSNA* National stakeholder evidence/guidance	1	1	0.125	0.125	1
2	Robust evidence * Specific local research *Highly deprived area* Low male life expectancy	1	1	0.375	0.125	2
3	Robust evidence * Specific local research * National stakeholder evidence/guidance * Highly deprived area	1	1	0.375	0.125	3
4	Robust evidence *JSNA * National stakeholder evidence/guidance * Highly deprived area * Low male life expectancy	1	1	0.5	0.25	4
5	~Robust evidence * ~ Specific local research * JSNA * National stakeholder evidence/guidance *~ Highly deprived area	1	1	0.125	0.125	5
	M1	1	1	1		

Key:
~ = absence of condition
* = logical 'AND'