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Linking the dimensions of policy-related research on obesity: a hybrid mapping with multicluster topics and interdisciplinarity maps

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Abstract

Mapping the intellectual structure and dynamics of complex, multidisciplinary domains has long been a challenging task for bibliometrics. Research subjects with outstanding social relevance are typically of this sort, being multifaceted and requiring a synthesis of various field-specific perspectives. Among such subjects, our work addresses policy-related research on obesity, and aims to uncover how this multilevel issue is represented in policy studies through its dense thematic interrelations, and at the interfaces of various research areas participating in the discourse. In doing so, we propose an analytic framework combining so-called hybrid methods of science mapping with the (traditional) use of alluvial diagrams, resulting in what we refer to as "multicluster topics" and "interdisciplinarity maps". Therefore, the contribution of this paper can be considered both at the subject and at the methodological level.

Keywords Science mapping · Hybrid methods · Research trends · Alluvial diagrams · Obesity · Public policy · Public health · Interdisciplinarity · Concept maps · IDR

Introduction

Mapping complex scientific domains in terms of cognitive or institutional structure, development and dynamics has been both a long-standing tradition and a flourishing area within the realm of bibliometrics. These studies usually contribute to the existing knowledge base both at the subject level, such as uncovering emergent, novel research directions or systematizing complex research domains, as well as on the methodological level, via proposing and experimenting with novel science mapping methods. Uncovering the patterns of multi- and interdisciplinarity of research is one of the dedicated tasks of these attempts, especially

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in relation to problems that require a multi-perspective approach by nature, which is typical of complex societal issues. The main aim of the work presented in this paper is to extend this line of inquiry. Our primary goal, at the subject level, is to provide an in-depth mapping of policy-related research on obesity, being a acute societal issue with multiple inter-related scientific aspects (clinical, psychological, environmental, demographic etc.), hence heavily addressed by various disciplines. In particular, as to the subject level, our study aims to meet the following two research questions:

(RQ1) How the multifaceted thematic or topical structure of obesity issues is being represented in the research on related policies (at any level of the issue where policies can be formulated)? How this thematic representation, and its structure has been developing over time? What are the major trends of this discourse?

(RQ2) Given its apparent multidisciplinarity, what research fields and areas interact in the "policy domain", and through which topics and conceptual frameworks? What are the key concepts or themes connecting research areas, and how their role is developing over time?

Beyond the subject level, our study also aims to provide a contribution at the methodological level, considered equally important as the subject level inquiry. One of the major challenges of science mapping approaches is the selection of indicators (references, citations, authorship, textual descriptors) and techniques (reference analyses, co-citation analysis, direct citation networks, co-authorship networks, text mining etc.) that are suitable to model the desired aspects of cognitive organization. Several studies focus on comparing these methods for "precision" (Boyack and Klavans 2010), others propose their combination in "hybrid methods" (Janssens et al. 2009; Liu et al. 2009). While our previous work aims at elaborating individual methods (such as improving bibliographic coupling techniques, cf. Soós 2014), here we joined the latter line for theoretical considerations outlined in the next section, and made an attempt to develop a version of hybrid approaches that best fitted our subject-level questions. The related objective can be formulated in a methodological research problem:

(RQ3) How can we combine existing mapping techniques (in a so-called hybrid method) that (1) grasp the topical structure and its interrelations from different perspectives (according to different techniques) and (2) connect these perspectives, while (3) allow for a meaningful interpretation with transparent dimensions, and (4) for intuitive visualization providing an overview on the different aspects and their connections?

To address this methodological issue, we combined reference-analytic and text mining approaches in a framework that utilizes a simple multivariate and visualization technique, namely, alluvial diagrams. An additional experiment was to arrive at a single visualization involving a dynamic and a structural view on how the domain is developing, without separating these into different plots and diagrams.

Related work on obesity

Obesity as a research topic has attracted great attention in the scientific literature both because its complex nature and growing societal relevance worldwide. This observation also applies to secondary research designs akin to our own approach inasmuch their

main objective is some synthesis or review of the domain. Various systematic reviews or metaanalyses (characteristic of the medical and health sciences fields) have been conducted on numerous aspects of obesity, even in the policy arena (such as interventions or prevention programmes). However, as our main interest was the bibliometric approach involving large-scale mapping of the discourse (as opposed to the systematic review design), we were screening the related literature for such contributions. In general, several bibliometric studies addressing the composition of obesity research (with the broadest scope of the term) and its development have been reported in field-specific venues. Khan et al. (2016) analyzed the growth of obesity literature and the collaboration patterns at the country level using the standard databases (PubMed, Google Scholar, Scopus, WoS). The growth and distributions of the research output over geographic areas, journals, research areas and languages indexed in PubMed was the subject of Vioque et al. (2010). Similar studies dealt with specific geographic regions, such as the Arab countries (Sweileh et al. 2014). These aspects were complemented with a more detailed analysis on co-author networks, journal citation networks and simple thematic maps, based on co-occurrences of frequent terms in Yao et al. (2018), also a study on a specific clinical aspect (the role of intestinal microbiota in obesity). The topical organization of (NHLBI-) funded projects and the productivity and impact of individual topics was the key issue for Nicastro et al. (2016). However, probably the most extensive approach, being also the most relevant to our present work, has been provided in a series of recent papers best exemplified by Cassi et al. (2017). The main objective of this work was a large-scale bibliometric mapping of the intellectual structure of obesity research in general, and contrasting it with the societal demands, also formalized into a topic map (based on European parliament questions) so that the concordances between the two maps could be analyzed. In other words, the relation between research questions and policy-related questions were investigated, creating close proximity to our research goals. Our work extends this line of inquiry in a different direction, focusing specifically on policy-related obesity research as a potential interface between science and public policy (as in decision making). This complementary role can also be claimed at the methodological level: the referred study used a well-known topic modelling technique (Latent Dirichlet Allocation, LDA), to cope with the complex and densely interrelated topical structure of obesity research. Here, we propose a different framework to handle thematic complexities, to accumulate further evidence on the fine-grained structure of the policy-centred subdomain.

Data and methods

To build a bibliographic database representing policy perspectives on obesity, we used the Web of Science database (WoS, Core Collection). The search strategy we employed was deliberately simple: the query targeted items containing both "obesity" and "policy" as subject terms, i.e. these terms occurring either in the title, abstract or among the keywords of document metadata (TS = "obesity" AND TS = "policy"). The reason for this simplicity in delineating the domain was to reach a core of the literature that has an explicit connection to our research goals. In particular, we wanted to cover that part of the related studies that specifically refer to *obesity* as a concept/phenomenon, and name some related policies. That is why other search term combinations (truncated words, variants etc.), such as *obese, obes** and the like were not applied. However, we conducted a test for this search strategy, and ran an alternative strategy, using

polic* instead of *policy* in the query. We then contrasted the retrieved set of additional documents with the results of our analysis on the original sample. This post hoc type trial is being detailed in the "Appendix" of this paper, and shows that the majority of additional documents fits into the thematic trends revealed upon the original sample, which also supports that the original sample represents some data saturation for our present purposes. To further sharpen the focus on policy-related works, some narrowing on the resulted set of Subject Categories has been applied, retaining any SCs (and its content) that presumably covered policy perspectives.

The main methodological motivation behind our study was to elaborate and explore a science mapping device that (1) allows for uncovering the complexities of our research domain, such as the relations between the thematic/topical and semantic organization of obesity policy research and its development over time, as considered from different perspectives, but (2) provides results that are transparent enough for interpretation. In other words, some ideal trade-off between the multidimensional representation and the meaningful one has been sought for. A tool called "alluvial diagram" has proven to be highly suitable to achieve this goal, and qualified as the central element used across our mapping exercises. Alluvial diagrams have already been used in bibliometric mappings. Their typical purpose is a visualization of how the topical organization of a given area of research is evolving over time, hence depicting the development of some cluster structure along the timeline, where the career and formation of individual clusters can be observed [splitting, merging, changes in size etc., cf. Bohlin et al. (2014) or Najmi et al. (2017)]. Our approach, however, utilizes alluvial diagrams in the original fashion. In a more traditional sense, alluvial diagrams can be conceived as a type of multivariate analysis, by means of which the joint distribution of cases along multiple (typically categorical) variables can be described and visualized. In other words, the unique associations of categories through multiple variables can be grasped, together with their relative frequencies in the sample. Therefore, it is a natural way of analyzing a set of publications along various dimensions using alluvial diagrams, showing the interrelations between the selected aspects of analysis. Moreover, if we select the time dimension as one of these variables (the year/period of publication for documents in the set), we can outline the time dynamics of the associations between the other selected variables, the latter covering, for instance, the different aspects of topical organization. In such a way, we can obtain a complex picture of how a research domain is evolving. Hence, the core of our mapping procedure was to construct alluvials that reveal the linkages between the timeline and the various interrelated characteristics of obesity policy research obtained from our analyses. These analyses are summarized in the next sections.

Alluvial diagrams as multicluster topic development

Leveraging on the virtue of alluvials to represent multiple characteristics and their interrelations "at a glance", we applied two different bibliometric document clustering methods to elicit the thematic structure of the research domain. The main idea was to model topical organization from different perspectives, and linking them together (and with the time dimension). As a way of "triangulation", we selected methods that rely on differing indicators of document content, and are simple enough in themselves to keep the formation of dimensions transparent for interpretation.

Clusterings used in the mapping procedure

We used classical bibliographic coupling (BC-clustering), as a link-based method, and a clustering over semantic similarities (Kw-clustering), as a text-based method. By virtue of this dual approach, our exercise could be viewed as utilizing a "hybrid method" for document clustering [where link-based and text-based methods are being combined for higher precision, cf. Boyack and Klavans (2010)], although with a significant alteration (see below). The two clustering procedures are detailed below.

Link-based method: Taking the classical bibliometric perspective on topical relatedness—that is, using citation relations as its indicator—we applied a form of bibliographic coupling (BC) on our corpus to obtain clusters of papers representing a research topic. According to the basic principle of bibliographic coupling, the degree of thematic similarity between documents is proportional to the amount of their shared references. Our version consisted of the following steps: (1) after processing the references of the ~4000 papers, a two-mode network representing the citing relation between documents and their references has been created. (2) Based on the common connections in the network, that is, the shared references between source documents, this two-mode graph was projected into a (weighted one-mode) document similarity network, where the weights of edges conveyed the degree of similarity between nodes (documents). In the projection process, the weights were calculated via the following similarity measure (Newman 2001):

$$w_{ij} = \sum_r \frac{1}{N_r - 1}$$

where w_{ij} is the similarity between documents i and j in terms of their cited references, r is the number of references (cited nodes) common to i and j, and N_r is the number of documents that share reference r, i.e. connected to it in the network. The measure counts common references through weighting them as to how specific a particular citation link between two papers is, via discounting the contribution of cited sources that are broadly cited through the whole corpus. In such a way, the measure favours links between papers that are more similar to each other in their common background, than to the rest of corpus. In this respect, this normalization procedure is analogous to the well-known "tf—idf" (term frequency—inverse document frequency) weighting scheme in text mining. (3) As the final step, the actual clustering of documents has been achieved by running a community detection algorithm on this similarity network constructed via bibliographic coupling, in order to delineate coherent groups of papers. The algorithm used was the "fast-greedy communities", implemented in the igraph R package (Csardi and Nepusz, 2006) that aims to find a cluster structure where the intra-cluster similarities are always higher than inter-cluster ones. Technically speaking, the algorithm is designed to find the cluster solution that maximizes network modularity in a computationally effective way, as proposed by Clauset et al. (2004).

Text-based method as a different perspective on the thematic structure of our domain, we applied a measure of textual similarity as well. To that end, we employed the keywords of documents attributed by authors (author keywords, the field labelled with "DE" in the WoS databases). Despite the well-known indexer effect as a major criticism of the use of author keywords, we were expecting an acceptable level of representation of the most relevant concepts in this domain, that is suitable for complementing the link-based results. The clustering procedure consisted of the following steps. (1) Author keywords have been retrieved from documents, and subjected to a standard normalization procedure (minimal

version of natural language processing) via word stemming. (2) Documents have been represented as vectors of these stemmed keywords, based on which their pairwise similarity was calculated. The measure applied in this case was Salton's cosine similarity, as a broadly used normalized indicator for comparing word vectors for their similarity in document clustering. (3) From the similarity matrix, a (textual) similarity (or proximity) network of documents was created, and the actual clustering exercise was identical to the one used for the link-based method: the fast-greedy algorithm has been run over the proximity network to gain coherent groups of papers (in terms of keyword usage).

Interpretation and labelling of clusters

A crucial point in our approach to link different thematic perspectives was the interpretation of the topical or semantic clusters obtained from the various classifications. As with the clusterings, we addressed this task from different angles: (1) we characterized the clusters with the most frequent title words occurring in the title of papers belonging to the cluster, and (2) obtained the most representative papers of clusters, using the so-called "core documents" methodology (see below).

As to the first method (1), for each group (BC-clusters and Kw-clusters) title words have been stemmed, and those pertaining to the (inverted) first quartile of the frequency distribution of words within the cluster were kept as eligible for labelling. Using title words provided the advantage to have a semantic descriptor for the groups independent of the descriptors underlying group formation (references, keywords), and commonly used for both clusterings.

For triangulation, (2) a second round of labelling was achieved by using the "core documents" methodology as proposed by Glänzel and Thijs (2012). According to their definition, core documents are those elements of the cluster that "have at least $n > 0$ links of at least a given strength $r \in (0, 1)$ according to the predefined similarity measure". That is, these are "similar enough" to most papers in the cluster, given the thresholds (n, r) being set properly. We determined these parameters clusterwise, so that a paper had to be similar to at least 40–60% of the cluster in order to belong to the core, with a similarity value above the third quartile of the distribution of similarities (upon which the clustering was achieved). The experimentation resulted in a reasonable number of core documents somewhat proportional to the cluster size (see "Results and discussion" section). To further sharpen the meaning of clusters, we coded the core documents for their characteristic terms (with the help of two field experts among the authors of this paper), and applied this term set in the labelling of clusters.

Based on the results of these two methods, labelling was done manually by outlining the most common theme unifying the cluster. The interpretation of the labels was validated by two field experts among the authors of the present work. In practice, the two aspects effectively complemented each other in identifying common topical dimensions.

Among the methodological advantages of this framework, we can consider the following. As is the case with hybrid methods, our approach sets out a multidimensional mapping of the domain, relying on multiple descriptors of publications. However, unlike the methods introduced so far, that combine the different types of link-based and textual similarities via a composite measure (Janssens et al. 2009), we connect different similarity structures by linking, instead of combining them together. Consequently, it does not yield a unique or "consensus" classification of publications into topics, but a multidimensional classification where the individual dimensions are linked and kept transparent. It might be more difficult to interpret, but,

in exchange, requires no subjective decision on, or experimentation with trade-offs in setting the weight of different similarities in the composite measure. Also, loss of information due to dimension reduction is much less an issue. Still, with the interrelations of perspectives coded by the joint distribution of papers over multiple category systems a well-defined classification can be drawn.

Another feature we consider valuable in this framework is its rich potential to express thematic relations. First of all, in aligning two types of classifications one can be used to validate the other (high concordance between classifications or semantic similarity). Also, a more granular classification can further stratify the results of a more robust one, introducing hierarchic relations into the thematic structure. What's more, the explicit categories yielded by the text-based method may be used as a semantic or conceptual characterization of the link-based categories, given their linkages. Perhaps more importantly, however, this kind of projection of the semantic dimension onto the link-based dimension allows for the discovery of several kinds of overlaps between topics. Although the individual clusterings does not handle topical overlaps, as popular topic detection techniques such as LDA, their interrelations do. A connection between two link-based cluster and a semantic cluster indicates their conceptual or thematic intersection, or, conversely, a conceptual system connecting differing research traditions (link-based clusters). On our account, the potential to reveal such complexities is an important strength of the alluvials-based approach.

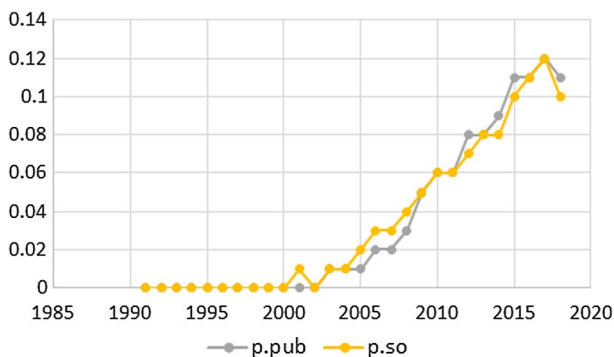## Alluvial diagrams as interdisciplinarity maps

For addressing (RQ2), we exploited the potential of alluvial diagrams in a further application. In order to analyze the interplay between research fields contributing to the discourse, and, more precisely, to reveal the interconnections between topics, concepts and fields over time, we created another type of three-way alluvial diagrams, that visualize the distribution of unique associations between WoS Subject Categories, a variable we call "key concepts", and Publication Years throughout the bibliographic sample. We considered key concepts those author keywords that fulfilled two criteria: (1) high frequency of occurrence, and, more importantly (2) connecting different fields, i.e. occurring at the intersection of at least two Subject Categories. For measuring the extent of mediating between categories, we used the Shannon entropy or diversity measure, often employed in IDR research:

$$-\sum_{i=1}^{Cat_F} p_i \log(p_i)$$

where Cat_F is the number of Subject Categories, and p_i is the relative frequency of the keyword in the i-th Category. The higher the value of this measure is, the more even is the distribution of the given keyword (in its occurrences) over the more categories, so the higher its connecting potential can be conceived. The final set of key concepts was delineated via setting some thresholds for these two indicators (frequency, diversity).

Table 1 Summary statistics of the publication output by time period

Period	Pubs		Journals	
	Average	SD	Average	SD
(1991, 1997]	2.17	1.60	2.00	1.26
(1997, 2002]	8.00	3.29	6.50	2.26
(2002, 2008]	60.00	34.87	35.60	19.07
(2008, 2013]	263.17	76.14	106.67	22.87
(2013, 2019]	400.00	199.83	150.00	75.78

Fig. 1 The growth of publication output and number of journals in the corpus (p.pub: share of number of papers, p.so: share of annual number of journals from the total number of papers and journals, respectively)
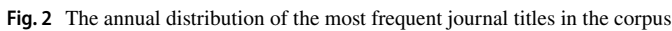
Results and discussion

Basic statistics of the bibliographic record

Our query targeting the thematic intersection of obesity and policy retrieved $n = 4340$ documents. Some of the basic statistics for this record are reported in Table 1, indicating the average annual number of publications and journals for consecutive, equal-length periods, along with the standard deviation of these frequency distributions. Striking is the fact that both the mean number of publications and publication venues (journals) goes through an exponential-like growth, with a sudden increase in the last decade, as these periods witness an order of magnitude higher amounts than the previous ones. This dynamics is also mirrored in plotting the annual percentage share from the total amounts against publication years (Fig. 1), where the rather steep slope from the 2000s on indicate this high growth rate both in publication output and journal composition.

Inspecting the "high end" of the journal distribution, i.e., the most frequent journals occurring in the (inverted) first quartile per year, 9 titles appear on the list (Table 2), with a main focus on public health and related areas (nutrition, environment, health promotion), preventive medicine and pediatrics. In a time perspective (Fig. 2), it is striking that in the decade between the early 2000s and 2010, *Public Health Nutrition* (PUHN) and the *American Journal of Preventive Medicine* (AJOPM) have been the leading venues, along with an increasing role of *Pediatrics* (PEDI), while from 2010 the *BMJ Journal of Public Health* (BMPH) became the most prominent publication venue, recently complemented with *Plos One* (PLOO) and the *International Journal of Environmental Research and Public Health* (IJOERAPH). So as to the volume of the output, despite the high and growing number of

Table 2 The most frequent journal titles with the total number of published papers

SO	FREQ	ABBREV
BMC PUBLIC HEALTH	264	BMPH
PUBLIC HEALTH NUTRITION	73	PUHN
AMERICAN JOURNAL OF PREVENTIVE MEDICINE	38	AJOPM
INTERNATIONAL JOURNAL OF ENVIRONMENTAL RESEARCH AND PUBLIC HEALTH	24	IJOERAPH
PLOS ONE	24	PLOO
PEDIATRICS	21	PEDI
HEALTH AFFAIRS	16	HEAA
AMERICAN JOURNAL OF HEALTH PROMOTION	6	AJOHP
FUTURE OF CHILDREN	6	FUOC

Fig. 2 The annual distribution of the most frequent journal titles in the corpus

journals, research seems to be concentrated in a few leading venues characteristic of consecutive periods. Also, some indication of the growing and broadening scientific interest is also visible, so far as more specialized journals (in nutrition or pediatrics) are being gradually complemented by generalist ones (such as Plos One).

The statistics on field composition (Table 3), narrowing the scope to the most frequent WoS Subject Categories in the usual first quartile, also conveys a high concentration in a dominant category (Public, Environmental and Occupational Health). A first impression on the theoretical frameworks can be gained through the dynamic view of this composition (Fig. 3). Aside from this dominant category (for better readability, we omitted this from the figure), some fields can be identified leading and almost "monotonically" increasing its role in the last decade: *Health Care Sciences and Services* (HCS&S)*, Business and Economics* (Bs&E) and *Nutrition and Dietetics* (Nt&D) are the most prominent ones, while *Pediatrics* (Pdtr) or *General and Internal Medicine* (G&IM), while significant on the whole, has been fluctuating as to its rank in the annual profiles. A similar fluctuation is

Table 3 The frequency of occurrence of Web of Science Subject Categories (type: $n \approx 240$) in the corpus

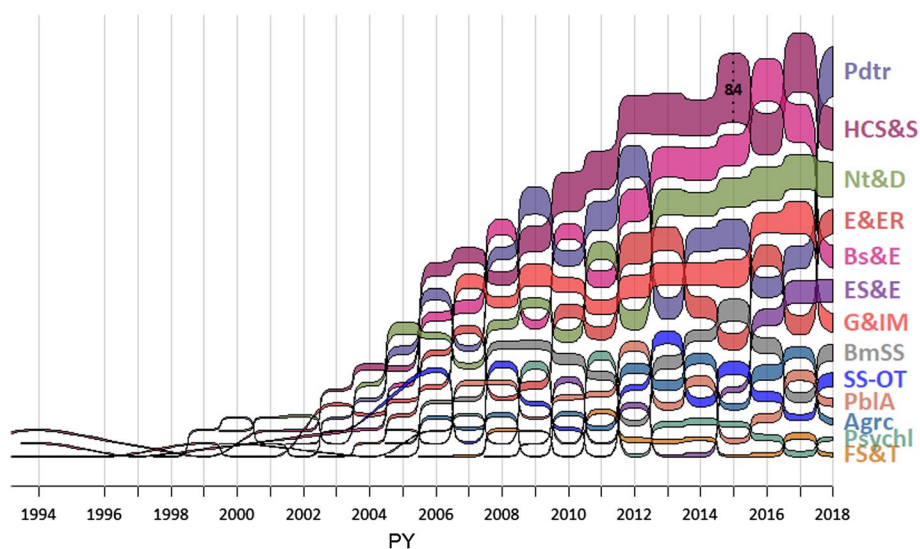| WoS SC	Freq	Abbrev
Public, Environmental & Occupational Health	7076	PE&OH
Health Care Sciences & Services	1417	HCS&S
Nutrition & Dietetics	1044	Nt&D
Pediatrics	959	Pdtr
Business & Economics	919	Bs&E
Education & Educational Research	710	E&ER
Biomedical Social Sciences	573	BmSS
General & Internal Medicine	524	G&IM
Environmental Sciences & Ecology	353	ES&E
Agriculture	316	Agrc
Social Sciences—Other Topics	254	SS-OT
Psychology	247	Psyc
Public Administration	241	PblA
Food Science & Technology	149	FS&T

Fig. 3 The development of the field composition within the discourse, and the weight of individual fields

present for *Agriculture* (Agrc) and *Food Science* (FS&T) or *Psychology* (Psychl) with low annual shares, while *Educational Research* (E&ER) is trending in recent years.

The multidimensional characterization of thematic development

The results from the two clustering methods are presented in Tables 4 and 5, for the BC- and the Kw-based classification of our documents, respectively. In the tables below, cluster IDs and labels are being reported, while in the "Appendix" it is complemented with (1) the most characteristic title words from the core documents of the cluster, i.e. "core

Table 4 Cluster IDs and labels of clusters resulted from the bibliographic coupling (BC; keyword profiles for the clusters are reported in the "Appendix")

Cluster ID	Cluster label
1	Economic implications of obesity (as a societal phenomenon)
2	Interventions and particular, community-based programmes (especially for childhood obesity)
3	Risk factors of childhood obesity
4	Economics of food policies (food policy, farm policy, taxation, public economic policy on consumption)
5	Food environment
6	Physical activity, health promotion means (environmental, and lifestyle-related)
7	Food marketing and communication policies, consumer behavior
8	School nutritional policies and instruments, competitive and healthy nutrition
9	Trade and globalization effects (disease, transition)
10	Ethnic/ratial factors of obesity (especially in children) and health disparities
11	Study of internet behavior in obesity research

Table 5 Cluster IDs and labels of clusters resulted from the semantic similarity network (Kw; keyword profiles for the clusters are reported in the "Appendix")

Cluster ID	Cluster label
1	Physical activity, built environment and active living
2	Public health policies and obesity prevention
3	Risk factors of overweight, children
4	Food environment in school nutrition
5	Childhood obesity prevention, active living and community-based instruments
6	Ethical aspects of obesity interventions and implications
7	Economic and social effects of (population-level) obesity
8	[*Heterogenous*]
9	Policy in general
10	Measurement of obesity

terms", and (2) the most frequent title words from the whole cluster (Tables 9 and 10 for the BC- and Kw-based clustering, respectively). In the case of core terms, the frequency of individual words and phrases are also shown, since it is not only the number of occurrences that qualifies a core term characteristic. For small clusters, all papers have been taken into account for interpretation (collected in the "Appendix", in "Data and methods" section.), so that no core documents and terms are being reported. For brevity and better visibility, cluster IDs are also used in the alluvials to name clusters.

The size distribution of clusters is given by the margins of Table 6 (a confusion matrix of the two classifications, see below), where cluster #0 contains the "unclassified" part of the corpus due to the lack of either references or author keywords in the database. It can be seen that both techniques resulted in a reasonably balanced structure in that most clusters consist of several hundreds of documents, while some small groups emerged from both procedures. Bibliographic coupling provided a much higher "coverage" over publications, i.e., a much fewer amount of unclassified cases, which in itself demonstrates the complementary roles of these techniques. Labelling the clusters demanded the joint interpretation

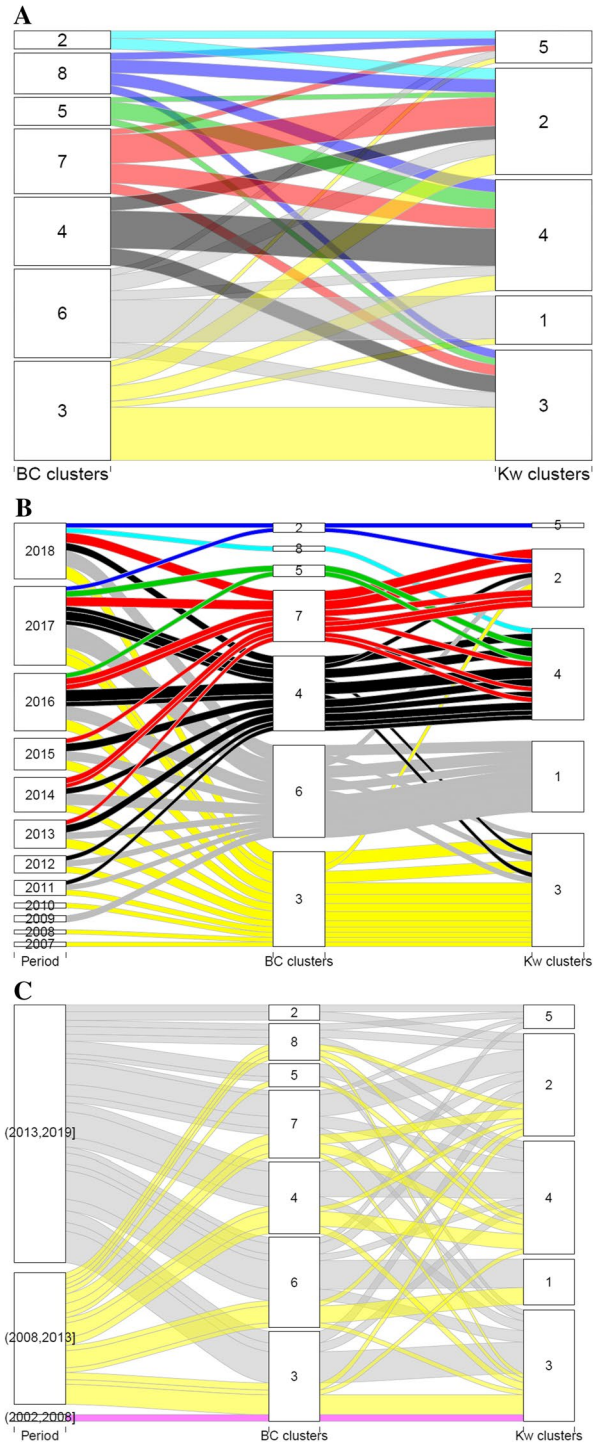**Table 6** Confusion matrix of the two clusterings (Kw vs. BC-clusters)

BC/KW	0	1	2	3	4	5	6	7	8	9	10	*SUM*
0	280	0	5	6	3	1	0	0	0	0	0	*295*
1	4	1	3	0	1	0	0	0	0	0	0	*9*
2	93	18	71	16	18	47	0	0	0	0	0	*263*
3	253	39	128	345	98	34	1	0	0	0	0	*898*
4	208	17	87	110	243	19	0	2	0	0	2	*688*
5	83	18	31	43	108	13	0	0	2	0	0	*298*
6	229	275	98	96	60	44	1	0	0	0	0	*803*
7	168	17	186	68	127	37	1	1	0	2	0	*607*
8	131	29	84	54	81	46	0	0	0	0	0	*425*
9	11	0	9	3	14	1	0	0	0	0	0	*38*
10	2	0	2	9	0	0	0	0	0	0	0	*13*
11	3	0	0	0	0	0	0	0	0	0	0	*3*
SUM	*1465*	*414*	*704*	*750*	*753*	*242*	*3*	*3*	*2*	*2*	*2*	*4340*

of textual profiles (frequent title words) and core terms, given the significant overlap in title word sets, that, to some extent, prognosticated the high thematic interrelatedness among clusters (see below). Also, title words in several cases much less characteristic of the main theme, than core terms and documents (cf. BC cluster #5). However, the most frequent title word(s) in most cases seemed congruent with the common topic characterized by core document titles (for the full list of core documents and small cluster items, cf. Tables 11, 12, 13 and 14 in the "Appendix").

Our primary question, (RQ1), is addressed by evaluating the joint distribution of publications along both clusterings plus the time dimension, using alluvials. The alluvial diagrams created for this purpose are being shown in Fig. 4. For a better readability, three versions of alluvials has been made: (A) the first one is the simplest, "two-way" diagram, that only shows the relationships between the two clusterings. Given only two dimensions, the joint distribution of publications can also be represented by a so-called confusion matrix, a cross-tabulation of the two clustering variables, where cell values contain the number of papers in the intersection of the corresponding clusters—for the first alluvial, this matrix is reported in Table 6, where the color code (shades of blue) highlights the strength of the relationship. (B) The second one is already of the "three-way" form proposed in this paper, incorporating the time dimension, that is, it shows the linkages between publication years and the two clusterings. (C) The third type of alluvials only differs from the second one in the granularity of the time variable, as publication years are being aggregated into approx. 5-year periods. The reason for this is to have a more robust picture on how topics are distributed along the timeline. Robustness was also the reason behind setting a constraint on which stripes (publication sets with a given publication year and cluster memberships) were left visible on the diagrams: a minimum of 10 papers per year was specified as a threshold. Beyond connections, block sizes also convey a useful information, as these are proportional to the frequency of category values (cluster sizes or weight of publication years). As to the terminology, a *topic* will be referred to as a connected set of BC- and Kw-clusters, i.e. a "multicluster", within which individual stripes are considered as subtopics. In order to improve the clarity of visualizations, we omitted the cluster #0 from both clusterings, that is, the cluster containing the unclassified cases in the respective grouping.

Quantitatively speaking, both the two-and three-way diagrams exhibit a relatively high concordance between BC and Kw clusters: the largest proportion of BC-clusters or

Fig. 4 Alluvial diagrams representing the relationship between the clusterings and the time dimension

research traditions (i.e. the widest, or the majority of stripes) is being classified under a single corresponding Kw-cluster or semantic class. The concordance of the two classifications is also reflected by the coloring of the confusion matrix (Table 6), conveying the overlap between BC- and Kw-clusters in document coverage. The majority of documents in most major (sizable) clusters is being concentrated in a single cell, indicating a basically (though not technically) one-to-one relationship between the respective clusters. In order to make this pattern more explicit, we constructed a two-mode similarity network of the two clusterings (Fig. 5), with two sets of nodes representing BC- and Kw-clusters, respectively, and edges showing an overlap between two such nodes. The width of an edge is proportional to the extent of the overlap (from the BC-perspective), and red links indicate that at least 40% of the papers in the BC-cluster is covered by the corresponding Kw-cluster. The visualization also reinforces the match between the clusterings, since red lines tend to exhibit a one-to-one assignment (BC_3 and Kw_3; BC_6 and Kw_1 etc.), as BC-clusters tend to strongly connect to one Kw-cluster. Kw-clusters, or "subtopics", on the other hand, seem to be more common, but, as to strong connections, still having an affinity to only one or two BC-groupings.

In order to provide an overall quantitative evidence for the concordance, we have calculated the Rand index between the two groupings. The Rand index (abbreviated here as R) is a statistical measure of the similarity between two clusterings of the same dataset (the technical definition is given in the "Appendix"), and its value ranges between [0, 1]. The
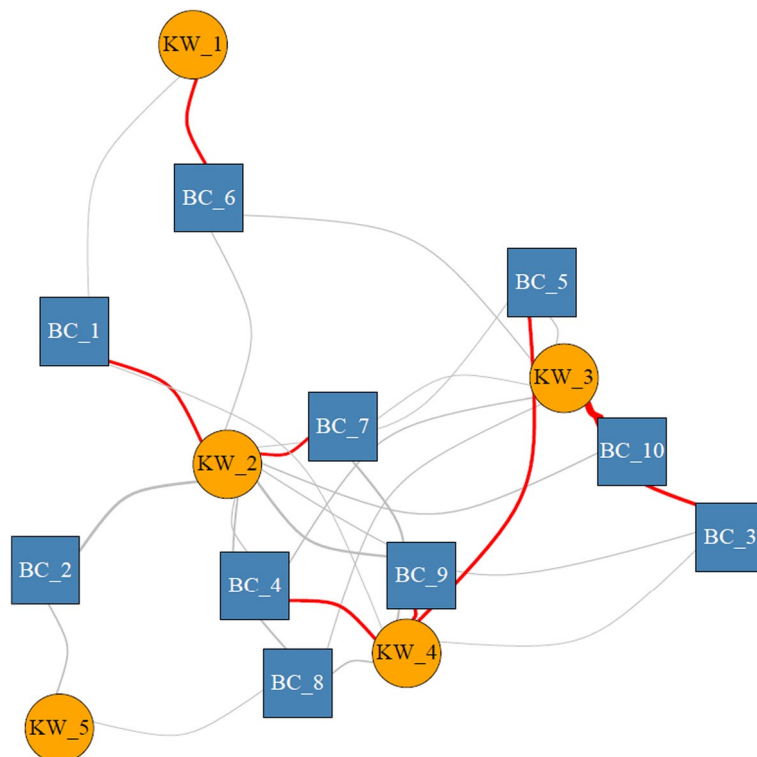

Fig. 5 Two-mode similarity network of BC and Kw clusters (see the text for details)

closer its value to the possible maximum, $R = 1$, the better the agreement between the two groupings. For our classifications, we obtained a value of $R = 0.7$ as the degree of similarity between the BC- and Kw-clustering, which, being close enough to unity, is generally considered to be a sign of good alignment.

Beyond the correspondence between the classifications, the next important observation (via the three-way diagrams) is that almost all topics are concentrated in the last 10-year period, and that almost all topics show an increase (in size) in the last 5 years, so that an upward trend emerges for the whole topical structure. This is very much in line with the rising curves obtained for publication numbers for this period, showing that this increase is multidirectional, covering a diverse and balanced thematic composition of this output.

Qualitatively, or content-wise, in order to elicit the thematic development of our domain, we follow the strategy of interpreting each multicluster topic relying on the inter-relations of BC and Kw clusters (i.e. interpreting the two-way alluvial diagram using the cluster labels), and then linking them to the time dimension (i.e. via the three-way alluvial diagrams). The most salient BC cluster, #3 on *risk factors of childhood obesity* is mostly linked to the Kw cluster #3 on *risk factors of overweight, children*, and, to a smaller extent, to Kw #2 on *public health policies and obesity prevention*. The topic is constantly present since 2007, but increases its weight in the last five decades. The second biggest BC cluster, #6 focusing on *physical activity and health promotion* has a similarly strong affiliation with a specific Kw cluster, #1 on *physical activity, built environment and active living*, but this topic is somewhat more stratified, as BC#6 is, to a letter extent, also connected to Kw#2 (*prevention*) and Kw#3 (*overweight*). This topic is also abundant in the last decade, but reaches a higher volume in the recent period (with all subtopics). This high level of concordance can also be observed between BC#4 on *economics of food policies (food policy, farm policy, taxation, public economic policy on consumption)* and Kw#4 on *food environment in school nutrition*, where smaller proportions of the BC cluster are again linked to two further Kw blocks (Kw#2 on *prevention* and Kw#3 on *overweight*). Its subtopics mostly pertain to the last 5-year period, while the first appearance of the major subtopic (food environment) is in the previous interval. Screening the diagrams further, BC#7 with *food marketing and communication policies, consumer behavior* tends to be divided between several Kw clusters,—resulting in a semantically multifaceted topic—including Kw#2 (*prevention*) and Kw#4 (*food environment*) as the more prevalent subtopics, as well as Kw#3 (*overweight*) and Kw#5 (*Childhood obesity prevention, active living and community-based instruments*), in smaller proportions. The rather complex topic is clearly a product of the last period, within which it is equally distributed between the consecutive years. Cluster BC#8 on *School nutritional policies and instruments, competitive and healthy nutrition* closely resembles BC#7 in its semantic composition, with an even more equal distribution among the same Kw clusters (Kw#2, Kw#4, Kw#5, Kw#3), and with its subtopics also concentrated in the most recent period, as a relatively new topic. The last two prominent BC clusters (similar in terms of size) constitute a topic with one or two Kw clusters: BC#5, *food environment*, is practically aligned with Kw#4 (*food environment in school nutrition*)—aside from some subtopics being classified under Kw#3 (*overweight*) and Kw#2 (*prevention*), whereas BC#2 on *interventions and particular, community-based programmes (especially for childhood obesity)* has weak connections to Kw#2 and Kw#5, that is, the cluster on *childhood obesity prevention, active living and community-based instruments*, respectively. Again, both topics, BC#5 and BC#2 expands in the last 5-year interval (being concentrated mostly in most recent 3-year period).

We might summarize the findings concerning the dominant topical structure of our domain and its development as follows (Table 7, dominant subtopics are written in bold)

Table 7 Dominant topical structure of the domain: summary of the semantic concordances between BC-clusters and Kw-clusters

Dominant period	Topic (BC-cluster)	Subtopic (Kw-cluster)
2007–2018	Risk factors of childhood obesity (2)	**Risk factors of overweight, children (3)**; public health policies and obesity prevention (2)
2008–2013, 2013–2018	Physical activity, health promotion (6)	**Physical activity, built environment and active living (1)**; public health policies and obesity prevention (2); risk factors of overweight, children (3)
2013–2018	Economics of food policies (food policy, farm policy, taxation, public economic policy on consumption) (4)	**Food environment in school nutrition (4)**; public health policies and obesity prevention (2); risk factors of overweight, children (3)
2013–2018	Food marketing and communication policies, consumer behavior (7)	**Food environment in school nutrition (4)**; public health policies and obesity prevention (2)
2013–2018	School nutritional policies and instruments, competitive and healthy nutrition (8)	**Food environment in school nutrition (4)**; public health policies and obesity prevention (2)
2013–2018	Food environment (5)	**Food environment in school nutrition (4)**; public health policies and obesity prevention (2); risk factors of overweight, children (3)
2013–2018	Interventions and particular, community-based programmes (especially for childhood obesity) (2)	Public health policies and obesity prevention (2); childhood obesity prevention, active living and community-based instruments (5)

Upon this overview of the resulted structure, several observations can be made. Firstly, the two clusterings (topics and subtopics) show a fairly coherent thematic picture, with subtopics fitting into, and elaborating on the meaning of general topics. Secondly, although the whole spectrum of factors and determinants of obesity, both at the individual (e.g. dietary patterns) and various community and economic levels (sociodemographic factors, schools, education, consumption etc.), can be seen as continuously trending, the dominant theme associated to most factors is that of food environment, and school-related issues. This two general theme seems to be the main focus of recent approaches to obesity form policy perspectives. These themes relating various BC-clusters also provides evidence that the topics are densely overlapping. This interrelatedness is further confirmed by the other (semantically defined) subtopics being common to many research directions (BC-clusters). Finally, some small BC- and Kw-clusters are underrepresented in the alluvials, showing scarce connections (under the thresholds set for stripes be visible), such as the quite coherent BC-theme on trade and globalization as a factor of obesity as a global disease (#9), or the very small but distinctive BC-cluster on internet behavior (#11). This fact underlies the role of the original clusterings to complement the "dominant" structure outlined by cluster interrelations.

Key concepts connecting research fields: interdisciplinarity and its development

In order to address (RQ2), another type of three-way alluvial diagrams has been applied. Similarly to the multicluster view, these diagrams connect the time dimension (in the aggregated form) with two further variables, key concepts and research fields (WoS Subject Categories) through their associations in the publication output under study. Since we are primarily interested in the patterns of interdisciplinarity, the role of key concepts in connecting research areas, we designed the alluvials to highlight these interconnections. As many concepts with high connecting potential are very much distributed among research fields, but would be suppressed in the alluvials by concepts with higher frequencies in the related categories, two types of diagrams have been created: the first one reports the main trends with concept occurrences above 10/category are made visible only (Fig. 6), and the other conveying latent trends where occurrences below this threshold are visible only (Fig. 7, "Appendix"). Concepts are sorted into different diagrams for better readability, only. Among the author keywords of the corpus about forty ($n=39$) key concepts were identified, according to the procedure described in the "Data and methods" section, with a diversity threshold $H > 1.5$ and a frequency threshold $F > 100$ (based on the distribution of both values). These key concepts are listed in Table 8 (in their stemmed version), along with the indicator values applied for their selection. Concepts in the table are being ordered by diversity/entropy (that is, their distribution over research fields), the leading concepts bearing the highest potential in connecting fields. For contrasting the connecting role and the weight of key concepts, their frequency of occurrence is plotted against the entropy measure in the table.

In what follows, we will interpret the alluvial diagrams starting with the concept group contributing most to the multidisciplinarity of our domain (highest diversity values), which is practically the first column of Table 8. Filtering out the general themes (*health, public health, nutrition, health policy* etc.) we are left, in approx. the order of frequencies, with "obesity indicators" (*body mass index, overweight*), children as distinguished target group (*childhood obesity, children, parent,* and we can assign to this thematic axis *adolescent* as well), food policies (*food policy, food, diet)*, and some prevalent factors and risks or regions of interest
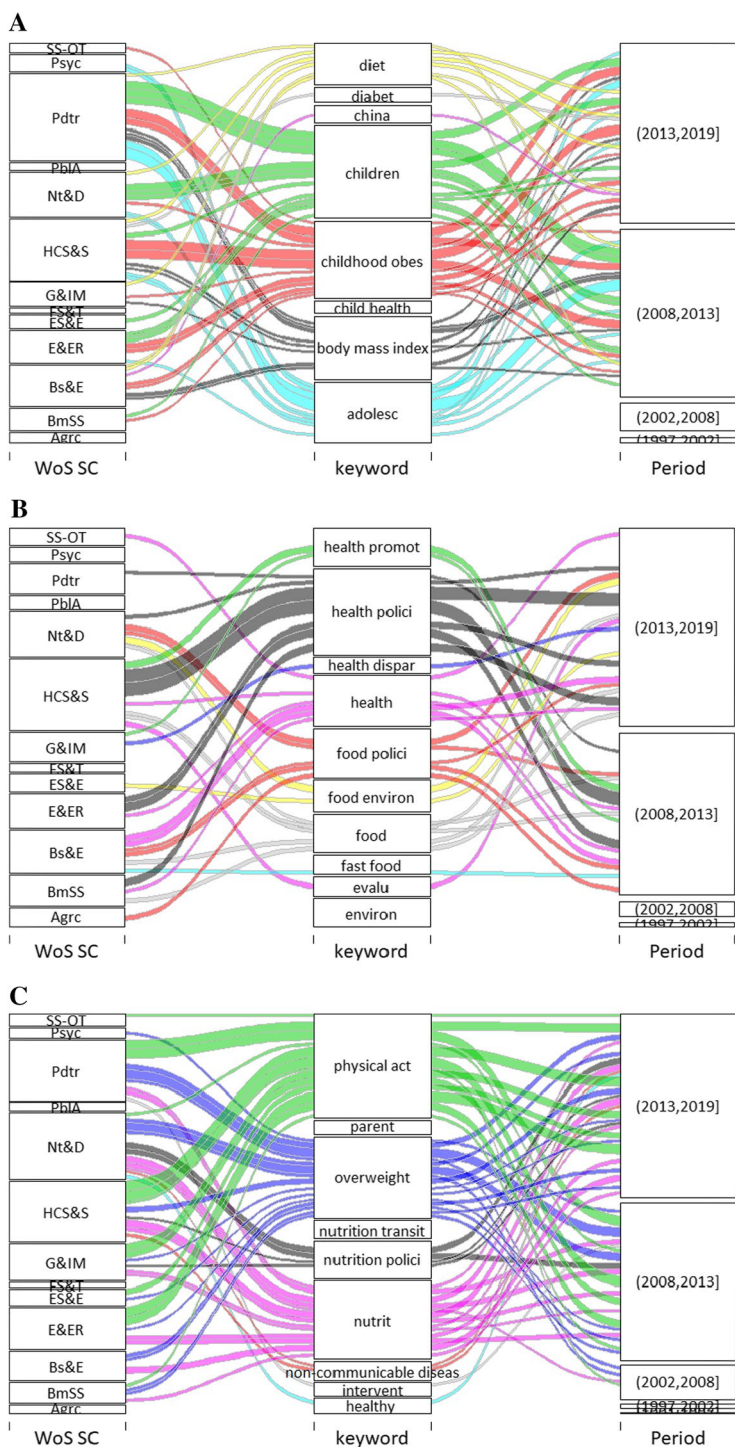
Fig. 6 Alluvial diagrams representing the interrelations between key concepts, research fields and the time dimension (interdisciplinarity maps): main trends (threshold for visible stripes > 10 occurrence per year)
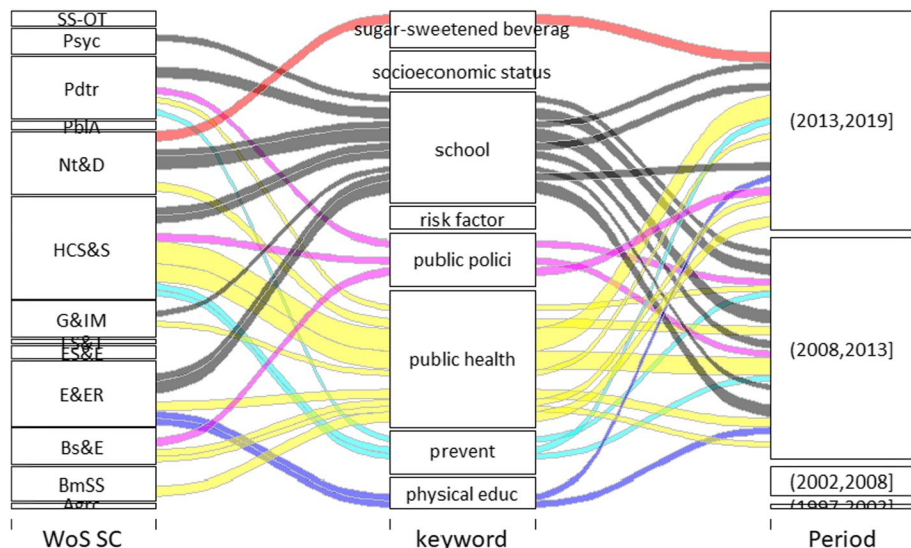
D

Fig. 6 (continued)

Table 8 The list and indicators of key concepts identified for the interdisciplinarity maps

stDE	Diversity	Frequency	stDE	Diversity	Frequency
health	2.58	137	nutrition transit	1.91	54
parent	2.38	52	bmi	1.9	75
body mass index	2.28	172	environ	1.88	99
food polici	2.27	104	physical educ	1.88	52
overweight	2.2	294	sugar-sweetened beverag	1.86	65
public health	2.19	259	child	1.85	90
socioeconomic status	2.15	59	non-communicable diseas	1.84	74
china	2.14	63	food environ	1.81	104
childhood obes	2.13	284	nutrition polici	1.8	136
nutrit	2.11	314	school	1.78	185
health polici	2.06	232	physical act	1.77	499
food	2.05	95	health dispar	1.74	69
public polici	2.05	88	child health	1.65	54
adolesc	2.04	212	risk factor	1.64	64
diet	1.97	161	prevent	1.62	113
diabet	1.96	73	evalu	1.62	64
children	1.95	253	fast food	1.62	58
			health promot	1.61	155
			intervent	1.56	82
			healthy	1.55	69

Note that some terms has been unified for the final analysis, such as 'child", "children", or "bmi" and "body mass index"

(*socioeconomic status, diabetes, China*, respectively). Concepts in the second column can be roughly assigned to these categories (see the detailed overview below), except *physical activity*, which is the most frequent key concept in the list, deserving a separate description.

Consulting the alluvials (Fig. 6), obesity indicators seem to serve as a common language among fields, connecting mainly Nutrition and Dietetics (through *overweight* but not the *BMI*, interestingly) and Pediatrics with Business and Economics and the Biomedical Social Sciences, but with stronger presence in the previous than in the most recent periods.

Childhood obesity and the related terms also link Business and Economics or Educational Sciences with Pediatrics, Nutrition and Health Care Sciences and Services with a constant prevalence in the last decade. The connecting role of *parent* is more extensive and latent, encompassing most areas with low frequencies per field, as shown in Fig. 7, but increasing its presence in the most recent period. On the other hand, *school*, while being a bridge between educational, clinical, nutritional and pediatric fields, mostly appears in between 2008 and 2013, which signals some shift of emphasis from institutional to family-related factors of childhood obesity.

Food policy as a term is rooted both in Business and economics and Agriculture, but seems more timely in connection with Nutrition and Dietetics, as the former stripes connect to only earlier periods. *Fast food* also appears as a less timely concept from mainly Business and Economics. *Food environment*, however, as a bridge between Education studies and Nutrition is a more recent framing of this perspective on obesity (linking to the latest period), while *diet* connects most fields (clinical, social and economic sciences) and concentrated in the last time interval. *Sugar-sweetened beverages*, as a specificity of this category generating much attention, is again a constant and highly multidisciplinary topic.

Physical activity is a prevalent concept in terms of size, and links the educational, clinical and health-related categories with pediatric issues. Its presence is continuous over time up to the very recent years. On the other hand, *physical education* is only attached to Educational Research (at least in the main trend diagram) with a similar distribution over the timeline.

Prevalent factors and risks of obesity exhibit a more subtle role in connecting areas, as the previous "massive" conceptual structures, in that many of them only expressed in the diagrams with latent connections (Fig. 7). *Socioeconomic status* as a key concept is equally present in all fields, and in the last decade, though with much lower frequency as per subject area. *Diabetes* behaves the same way, somewhat increasing its weight only within Nutrition in the last period. Distinctive in this respect is the concept of *health disparities*, at the intersection of Educational Research, Health Care Sciences, Nutrition and Pediatrics, as it connects these areas clearly in the most recent period. In contrast, *nutrition transition* and *environment* link most areas but in a less timely fashion. Finally, as a single concept signalling a joint attention on a geographic aspect of obesity policy, *China* has its related fields divided along the timeline, with an earlier contribution from Business and Economics, Agriculture and Biomedical Social Sciences, and with a most recent interest from clinical, health and nutritional sciences (G&IM, HCS&S, Nt&D).

Conclusions

In the present study we addressed the changing conceptualization of the complex and multilevel issue of obesity in policy-related research, uncovering its topical organization from different perspectives, and at the interfaces of the various research areas participating in the discourse. To this end, we proposed a science mapping framework utilizing hybrid

(text-based and link-based) techniques, and deploying alluvial diagrams in mapping the interrelations between the different thematic perspectives, key concepts, research areas and their development over time. The two mapping approaches, the detection of "multicluster" topics and key concepts connecting research areas yielded quite convergent results: the topical structure and conceptual focus in the last 10 years appears to remain highly balanced with almost all topics and concepts getting more and more attention. The rich semantic overlaps between topics and the key concepts connecting clinical, economic, social, agricultural etc. sciences provide evidence for the high interconnectedness and common focus within the domain. There is a clear agreement between the results of both mappings that it is the themes of *food environment* and *childhood obesity* that connect the most thematic blocks and field-specific approaches (though the multicluster view picture school-related issues as constantly on the surface, for key concepts there seems to be a shift of emphasis towards family-related factors, such as the role of parents). The topics emerged in our mapping are also comparable to those identified in Cassi et al. (2017) as "social issues"/"social environment", which is fairly acceptable for studies with a policy focus. On the other hand, there seems to be an increasing contribution from individual health-related fields, with closer proximity to the clinical sciences, viz. *nutrition and dietetics* to the policy discourse.

The usefulness of this dual mapping for understanding obesity-related policy research is mainly manifested in the insights gained into the latent thematic stratification of the domain. Obesity as a research topic has attracted great attention in the scientific literature both because its complex nature and growing societal relevance worldwide. It is a research subject with outstanding social relevance, being multifaceted, has various interacting social strata, and requires a synthesis of various field-specific perspectives. As such, it is especially difficult and challenging to tackle for policy-makers. To best address this challenge, the mapping reported here provides an overview of how the thematic and disciplinary structure of obesity issues is being represented in the research on related policies. It has been made explicit that, as the most general structure of the discourse, the central issue of childhood obesity is mainly contextualized, through its risk factors, at the local level of school nutrition, education, related interventions and local food environments, as well as at the national and global levels of food policies, food markets, health disparities, global deseases and food-related communication. The other pillar of this context is the issue of physical activity and health promotion, which is strongly linked, beyond health promotion means, to the interrelated topics of the built environment and lifestyles.

In terms of the proposed methodology, the alluvial-based framework, combined with a hybrid mapping, has proven to be efficient in relating different thematic classifications, as providing a mutual validation and stratification between them, expressing thematic overlaps, and their unfolding over time.

Appendix

1. Labels and keyword profiles of clusters resulted from the two clusterings (BC, Kw) (see Tables 9 and 10).
2. Core document titles for clusters and the document content of small clusters (see Tables 11, 12, 13 and 14).
3. Alluvial diagrams for latent trends (see Fig. 7).
4. Description and results of the test for the search strategy.

The alternative search strategy referred to in "Data and methods" section consisted of the following WoS query:

(TS = obesity AND TS = polic* NOT TS = policy) AND DOCUMENT TYPES: (Article)

Indexes = SCI-EXPANDED, SSCI, A&HCI Timespan = 1975–2018

The search retrieved $n = 247$ documents, that can be considered additional to the ~4000 titles obtained within the original sample. Of this set, $n = 124$ were deemed relevant to our research question, containing a topic-related term, namely, variants of "policymaker" (all other documents contained unrelated variants of the stem, such as "police", "policemen" etc.).

This 124 items were manually screened by two field experts among the authors of this paper, who could assign these additional items to corresponding clusters resulted from our analysis, namely:

Physical activity, health promotion (BC)—physical activity, built environment and active living (Kw);
Food environment (BC)—Food environment in school nutrition; public health policies and obesity prevention (Kw);
Risk factors of childhood obesity (BC)—risk factors of overweight, children; public health policies and obesity prevention (Kw).

Upon this post hoc exercise, the original data sample can be considered as having reached a reasonable information saturation to serve our research purposes.

5. Definition of the Rand Index.

Given two clusterings (partition) C1 and C2 of the same set of *S*, the Rand Index is the ratio of the number of pairs in *S* that are being classified similarly both in C1 and C2, to the number of all possible pairs in *S*:

$$\frac{|S| + |D|}{n(n-1)/2}$$

Table 9 Labels and keyword profiles of clusters resulted from the bibliographic coupling (BC)

Keywords of core documents in cluster	Prevalent title words in cluster
1	Economic implications of obesity (as a societal phenomenon)
childhood obesity: 1 | children's health: 1 | clinical characteristics: 1 | consumption: 1 | cooking: 1 | costs: 1 | demographic: 1 | home economics: 1 | insurance industrys: 1 | insurance risk -: 1 | media power: 1 | nutrition: 1 | nutrition education: 1 | obesity policies: 1 | physical activity: 1 | policies: 1 | population health: 1 | price sensitivity: 1 | schools: 1 | society: 1 | sugar-sweetened beverages: 1 | survey: 1	obes; health; nutrit; insur; school; educ; monitor; cluster; nsw; societi; indirect; survey; power; develop; patient-bas; clinic; home; death; central; demograph; adults:; dominican; physic; price; 2009–2010; sensit; sugar-sweeten; dead; beverag; america; canadian; industri; econom; indic; itali; activ; (spans); among; popul; consumpt; system; polici; prevent; use; survey; diagnosi; implic; associ; republ; pdm09; food; brazilian; describ; influenza; polici; investig; media; characterist; case; cook; childhood; state; risk; ambulatori; practic; studi; provinc; children; viewpoint; a(h1n1); medicin; cost; role
2	Interventions and particular, community-based programmes (especially for childhood obesity)
childhood obesity: 3 | assessment: 1 | communities: 1 | community-based: 1 | community action: 1 | epidemiology: 1 | evaluation: 1 | evidence-informed policy-making: 1 | healthy communities: 1 | healthy kids: 1 | knowledge-brokering strategy: 1 | mixed-methods: 1 | mixed methods: 1 | physical activity: 1 | school: 1	obes; communiti; health; prevent; polici; childhood; healthi; studi; research; evalu; intervent; program
3	Risk factors of childhood obesity
childhood overweight: 3 | risk factors: 3 | obesity in children: 2 | school children: 2 | adolescents: 1 | age: 1 | childhood obesity: 1 | children: 1 | children's adiposity: 1 | diet: 1 | environmental factors: 1 | family-based factors: 1 | gender: 1 | geographic: 1 | increases in overweight: 1 | life course approach: 1 | low-income families: 1 | nutritional transition in children: 1 | obesity epidemic: 1 | overweight: 1 | overweight in preschool children: 1 | policy reform: 1 | racial/ethnic: 1 | socio-economic: 1 | socioeconomic: 1 | socioeconomic gap: 1 | trends: 1	obes; health; children; studi; nutrit; risk; factor; childhood; overweight; associ; food; adolesc; preval; polici; adult; diseas
4	Economics of food policies (food policy, farm policy, taxation, public economic policy on consumption)
economics of obesity: 2 | behavioral economics: 1 | consumer behavior: 1 | economics of childhood obesity: 1 | economy of scales: 1 | fat taxes: 1 | food market transformation: 1 | food policies: 1 | food prices: 1 | government: 1 | healthy eating habits: 1 | impacts: 1 | obesity's economic causes: 1 | obesity prevention: 1 | policy implications: 1 | public health policies: 1 | subsidi: 1 | sugar-sweetened beverages: 1 | taxes: 1 | thin subsidies: 1	food; obes; polici; health; beverag; nutrit; effect; tax; sugar-sweeten; consumpt; impact; label; price; among; school; consum; public; evid; healthi; children
5	Food environment

Table 9 (continued)

Keywords of core documents in cluster	Prevalent title words in cluster
food environment: 4 | food deserts: 2 | food swamps: 2 | local food environments: 2 | urban food desert: 2 | 'local' food economy: 1 | access to healthy food: 1 | built environment: 1 | diabetes: 1 | disparities: 1 | distance to store: 1 | eating environments: 1 | fast food retailers: 1 | food outlets: 1 | food prices: 1 | food purchasing practices: 1 | food retailer practices: 1 | food store: 1 | food store intervention: 1 | food stores: 1 | geographic accessibility: 1 | government-subsidized supermarket: 1 | grocery store: 1 | health-related outcomes: 1 | healthy eating: 1 | healthy food access: 1 | healthy food shopping: 1 | healthy foods: 1 | household food availability: 1 | local food availability: 1 | neighborhood: 1 | neighborhood environments: 1 | nutritional health inequities: 1 | obesity risk: 1 | obesogenic: 1 | public health policy: 1 | rural communities: 1 | school-aged children: 1 | social dynamics: 1 | sociodemographic characteristics: 1 | store choice: 1 | supermarkets: 1 | supply of healthy foods: 1 | urban environment: 1 | urban food deserts: 1	food; environ; obes; health
6	physical activity, health promotion means (environmental, and lifestyle-related)
physical activity: 11 | children: 3 | active living: 2 | built environment: 2 | neighborhood environments: 2 | obesity epidemic: 2 | physical activity promotion: 2 | prevention: 2 | promote physical activity: 2 | action: 1 | active commuting: 1 | active living communities: 1 | active living research program: 1 | boston active school day policy: 1 | built environments: 1 | centers for disease control: 1 | childhood: 1 | cost-effectiveness: 1 | cost effectiveness: 1 | designing communities: 1 | food environments: 1 | getting society moving: 1 | high-income countries: 1 | light rail transit: 1 | national plan: 1 | neighborhood effects: 1 | neighborhood environment: 1 | neighborhood safety: 1 | neighborhoods: 1 | obesity prevention: 1 | parents: 1 | physical activity benefits: 1 | physical activity environments: 1 | physical activity interventions: 1 | physical activity policies: 1 | physical activity programs: 1 | physical education policy: 1 | programmatic approaches: 1 | public health infrastructure: 1 | public policy: 1 | school-based: 1 | school sport policy: 1 | sedentary behaviors: 1 | social and built environment: 1 | social cohesion: 1 | transport interventions: 1 | travel-related activity: 1 | weight management: 1 | youth advocacy: 1	physic; activ; polici; children; obes; school; health; studi
7	food marketing and communication policies, consumer behavior

Table 9 (continued)

Keywords of core documents in cluster	Prevalent title words in cluster
bariatric surgery: 1 | corporate political strategy: 1 | ethical evaluation: 1 | food advertising: 1 | healthy food environments: 1 | marketing communication: 1 | moral challenges: 1 | obesity policies: 1 | policy impact: 1 | policy process: 1 | prevention: 1 | prevention advocacy: 1 | product reformulation: 1 | public health campaigns: 1 | report card: 1 | statutory regulation: 1 | taste-engineering frame: 1 | unhealthy food: 1	health; obes; food; polici; public; children; studi; prevent
8	School nutritional policies and instruments, competitive and healthy nutrition

Table 9 (continued)

Keywords of core documents in cluster	Prevalent title words in cluster
schools: 5 | school: 4 | state: 4 | competitive: 2 | competitive food laws: 2 | competitive foods: 2 | district: 2 | food and beverage polici: 2 | healthy eating: 2 | school wellness polici: 2 | school wellness policies: 2 | snacks: 2 | state policies: 2 | beverages: 1 | child nutrition: 1 | childhood: 1 | childhood obesity: 1 | classroom: 1 | classroom reward: 1 | community: 1 | competitive beverage and food: 1 | competitive food and beverage: 1 | competitive food nutrition: 1 | competitive food quality: 1 | district polici: 1 | eating environment: 1 | elementary school: 1 | environments: 1 | evaluation: 1 | factors: 1 | food-service directors: 1 | food procurement policy: 1 | foods: 1 | fund-raising: 1 | geographic disparities: 1 | healthier generation: 1 | healthy food: 1 | healthy vending machine: 1 | high schools: 1 | junk food: 1 | local implementation: 1 | local wellness policies: 1 | low-calorie beverages: 1 | low-income: 1 | lunch consumption: 1 | national: 1 | neighborhood: 1 | nutrition standards: 1 | obesity prevention: 1 | physical activity: 1 | physical activity policies: 1 | policies: 1 | policies for calorie-dense foods: 1 | policy indicator checklist: 1 | policy initiative: 1 | policy instruments: 1 | promotion: 1 | public school nutrition policy: 1 | public school system: 1 | racial/ethnic differences: 1 | school-based intervention: 1 | school-reported nutrition practices: 1 | school administrators: 1 | school beverage environment: 1 | school environments: 1 | school food coordinators: 1 | school food environment: 1 | school food environment policies: 1 | school food environments: 1 | school health coordinators: 1 | school nutrition-related laws: 1 | school nutrition association: 1 | school nutrition environment: 1 | school nutrition laws: 1 | school nutrition policy: 1 | school nutrition services: 1 | school nutrition standards: 1 | school nutritional environment polici: 1 | school obesity prevention: 1 | school vending machines: 1 | society for nutrition education: 1 | socioeconomic: 1 | socioeconomic status: 1 | soda consumption: 1 | state policy: 1 | student health: 1 | students' beliefs: 1 | sugar-sweetened beverages: 1 | sweets: 1 | unhealthy foods: 1 | urban: 1 | value added index: 1 | vending machine: 1 | vending machine nutrition policy: 1 | wellness policies: 1 | wellness policy: 1	school; polici; food; health; obes; nutrit; healthi
9	Trade and globalization effects (disease, transition)

Table 9 (continued)

Keywords of core documents in cluster	Prevalent title words in cluster
trade: 3 | investment liberalization: 2 | beverages: 1 | cross-national: 1 | determinants of obesity: 1 | economy of risk: 1 | exporting: 1 | food systems change: 1 | globalisation: 1 | health impact: 1 | highly processed food: 1 | intercountry heterogeneity: 1 | investment agreements: 1 | low-income countries: 1 | market: 1 | middle-income countries: 1 | national: 1 | neoliberalism: 1 | noncommunicable disease: 1 | noncommunicable disease policies: 1 | soft-drink markets: 1 | spread: 1 | sugar-sweetened: 1 | sugar-sweetened beverages: 1 | trade agreement: 1 | trade liberalisation: 1 | trade liberalization: 1 | trade policy: 1 | trends in nutrition: 1	trade; health; polici; obes; food; nutrit; diseas; risk; invest; global; dietari; analysi; noncommunic; develop; health:; process; review
10	Ethnic/ratial factors of obesity (especially in children) and health disparities
black: 4 | families: 2 | risk: 2 | role: 2 | white: 2 | adulthood obesity: 1 | association: 1 | black children: 1 | blacks': 1 | depressive symptoms: 1 | ethnicity: 1 | family income: 1 | family structure: 1 | females: 1 | gender: 1 | health behaviours: 1 | health disparities: 1 | health insurance: 1 | health return: 1 | high school graduation: 1 | low family support: 1 | mechanisms: 1 | mental health: 1 | parental education: 1 | poverty status: 1 | predict: 1 | psychosocial stressors: 1 | socioeconomic status: 1 | white children: 1 | youth: 1	health; black; famili; white; obes; among; nation; children
11	study of internet behavior in obesity research
Small cluster, no core documents retrieved, full cluster content was used and listed in the Appendix	search; data; behavior; queri; risk; applic; popul; compar; web; health; trend; diet; diseas; month; guilt:; interest; chronic; energi; internet; public; activ; national-level; predict; usa; accur; gluttoni; change:; intak; monitor

Table 10 Labels and keyword profiles of clusters resulted from the semantic similarity network

Keywords of core documents in cluster	Prominent title words in cluster
1	Physical activity, built environment and active living
physical act: 27 | built environ: 24 | prevention research: 4 | active travel: 3 | physical educ: 3 | public health: 3 | children: 2 | nutrit: 2 | rural: 2 | school: 2 | youth: 2 | active liv: 1 | active transport: 1 | adolesc: 1 | childhood obes: 1 | content analysi: 1 | cultur: 1 | curriculum: 1 | elementary school: 1 | exercis: 1 | food environ: 1 | geographic loc: 1 | gis: 1 | govern: 1 | intervent: 1 | korea: 1 | land us: 1 | local polici: 1 | multilevel analysi: 1 | multilevel model: 1 | municipal govern: 1 | neighbourhood: 1 | obesogenic environ: 1 | pediatr: 1 | policy mak: 1 | preschool: 1 | prevent: 1 | public polici: 1 | school polici: 1 | sedentary behavior: 1 | social environ: 1 | tobacco control: 1 | transit: 1 | transport: 1 | walkabl: 1 | zone: 1	physic; activ; school; polici; environ; health; children
2	Public health policies and obesity prevention
public health: 31 | health polici: 22 | health promot: 15 | prevent: 4 | child and adolescent health: 3 | nutrit: 3 | diet: 2 | epidemiolog: 2 | evalu: 2 | nutrition and diet: 2 | policy mak: 2 | primary health car: 2 | risk factor: 2 | absente: 1 | account: 1 | adolescent health: 1 | burden of diseas: 1 | cancer: 1 | cardiovascular diseas: 1 | child health: 1 | child obes: 1 | childhood obes: 1 | chronic diseas: 1 | congenital anomali: 1 | diabet: 1 | dietary guidelin: 1 | disabl: 1 | economic evalu: 1 | electronic health record: 1 | energy consumpt: 1 | epidemiologic method: 1 | eurocat: 1 | europlan: 1 | fair: 1 | food and nutrit: 1 | food environ: 1 | food insecur: 1 | food label: 1 | germani: 1 | global health: 1 | health behaviour: 1 | health dispar: 1 | health econom: 1 | health educ: 1 | health servic: 1 | healthy : 1 | heart diseas: 1 | hospit: 1 | hypertens: 1 | inequ: 1 | justic: 1 | measur: 1 | mental health: 1 | neoplasm: 1 | nutrition polici: 1 | nutritional transit: 1 | obesity/prevention and control: 1 | overweight/obes: 1 | physical activity/exercis: 1 | policy analysi: 1 | preconception car: 1 | prevention research: 1 | primary prevent: 1 | public health practic: 1 | public polici: 1 | questionnair: 1 | regul: 1 | research: 1 | research design: 1 | return on invest: 1 | rural health: 1 | school: 1 | school nurs: 1 | school polici: 1 | social determin: 1 | state govern: 1 | student: 1 | systematic review: 1 | tax polici: 1 | thailand: 1 | tobacco control: 1 | trans fat: 1 | transport: 1 | well-b: 1 | worksite health promot: 1	health; obes; polici; food; public; school; prevent; nutrit; physic
3	risk factors of overweight, children

Table 10 (continued)

Keywords of core documents in cluster	Prominent title words in cluster
overweight: 18 | children: 15 | china: 4 | adolesc: 3 | body mass index: 3 | bmi: 2 | child: 2 | nutritional status: 2 | risk factor: 2 | school: 2 | usa: 2 | accid: 1 | adult: 1 | anthropometr: 1 | body weight: 1 | built environ: 1 | cross-sectional studi: 1 | determin: 1 | elementary school: 1 | focus group: 1 | food insecur: 1 | information system: 1 | intervent: 1 | korea: 1 | low incom: 1 | malnutrit: 1 | neighbourhood: 1 | occup: 1 | one child polici: 1 | parent: 1 | preval: 1 | puerto rico: 1 | safeti: 1 | socio-economic factor: 1 | socioeconomic posit: 1 | sugar-sweetened beverag: 1 | sweetened beverag: 1 | trend: 1 | weight: 1 | weight status: 1 | workplac: 1	obes; health; children; among; studi; food; overweight; associ; risk; weight; factor; bodi; physic; school; nutrit; adolesc; polici; childhood
4	food environment in school nutrition
nutrit: 40 | diet: 13 | school: 13 | food: 11 | health: 7 | children: 4 | adolesc: 3 | nutrition polici: 3 | beverag: 2 | canteen: 2 | child obes: 2 | environ: 2 | fast food: 2 | food choic: 2 | food environ: 2 | food polici: 2 | food servic: 2 | food suppli: 2 | implement: 2 | obesity prevent: 2 | overweight: 2 | public polici: 2 | regul: 2 | urban: 2 | vending machin: 2 | adapt: 1 | advertis: 1 | big food: 1 | calori: 1 | calorie label: 1 | carbonated beverag: 1 | child: 1 | child health: 1 | childhood obes: 1 | choice architectur: 1 | climate chang: 1 | cost-effect: 1 | egypt: 1 | evalu: 1 | family health: 1 | farm bil: 1 | food access: 1 | food advertis: 1 | food afford: 1 | food avail: 1 | food desert: 1 | food habit: 1 | food industri: 1 | food literaci: 1 | food market: 1 | food safeti: 1 | food secur: 1 | food subsidi: 1 | food system: 1 | fruit: 1 | functional food: 1 | health behavior: 1 | health dispar: 1 | health inequ: 1 | health promoting environ: 1 | healthy : 1 | income elast: 1 | inequ: 1 | market: 1 | menu label: 1 | micronutrient defici: 1 | monitor: 1 | neighbourhood: 1 | neoliber: 1 | norm: 1 | nudg: 1 | nutrition knowledg: 1 | obesity polici: 1 | packag: 1 | policy process: 1 | public health: 1 | reformul: 1 | residence characterist: 1 | scale: 1 | school lunch: 1 | school meal: 1 | school polici: 1 | snack: 1 | snap: 1 | social environ: 1 | social market: 1 | standard: 1 | sugar: 1 | survey: 1 | systematic review: 1 | trade: 1 | traffic light: 1 | us: 1 | usda: 1 | veget: 1 | well-b: 1	food; polici; obes; nutrit; health; school; healthi
5	Childhood obesity prevention, active living and community-based instruments

Table 10 (continued)

Keywords of core documents in cluster	Prominent title words in cluster
childhood obes: 7 | active liv: 5 | healthy : 5 | evalu: 2 | obesity prevent: 2 | childhood obesity prevent: 1 | community-based participatory research: 1 | community engag: 1 | disadvantag: 1 | evaluation method: 1 | famili: 1 | impact: 1 | implement: 1 | interview: 1 | method: 1 | migrant: 1 | obesity inequ: 1 | policy evalu: 1 | social determin: 1 | social factor: 1 | survey: 1 | systems think: 1 | theori: 1	obes; childhood; school; prevent; food; polici; health; communiti; healthi; studi; children; use; physic; intervent
6	ethical aspects of obesity interventions and implications
Small cluster, no core documents retrieved, full cluster content was used and listed in the Appendix	(or; pilot; tell); around; screen; fund; sleep; morbid; non-communic; ethic; us; apnea; polici; fertil; defin; tell; public; health; elig; criteria; diseases; obes; interven; vitro
7	economic and social effects of (population-level) obesity
Small cluster, no core documents retrieved, full cluster content was used and listed in the Appendix	obes; cost; us; new; econom; agricultur; relat; perspect; r&d; public; polici; social; preval; life-cycl; approach; effect; germany; consequ
8	[*Heterogenous*]
Small cluster, no core documents retrieved, full cluster content was used and listed in the Appendix	veget; consumpt; fruit; stakehold; perspect; shop; associ; environ; hbcu; program; farm-to-univers; implement; food; greater; percept
9	policy in general
Small cluster, no core documents retrieved, full cluster content was used and listed in the Appendix	polici; work; import; educ; health; concept; understand; embodi; appear
10	Measurement of obesity
Small cluster, no core documents retrieved, full cluster content was used and listed in the Appendix	obes; measur; standard; servic; age; outpati; class; elder; asthma; taiwan; gold; middl; util; absenc; risk

Table 11 Core document titles retrieved for the BC clusters

Cluster ID	Doc title	Journal title
1	A PATIENT-BASED SYSTEM FOR DESCRIBING AMBULATORY MEDICINE PRACTICES USING DIAGNOSIS CLUSTERS	JOURNAL OF GENERAL INTERNAL MEDICINE
1	SUGAR-SWEETENED BEVERAGES CONSUMPTION AND PRICE SENSITIVITY AMONG BRAZILIAN ADULTS: IMPLICATIONS FOR OBESITY POLICIES	VALUE IN HEALTH
1	Development of the indicator "policies to prevent childhood obesity" to monitor children's health	EPIDEMIOLOGY
1	Investigating the media power of a population health monitoring survey: case study of the NSW Schools Physical Activity and Nutrition Survey (SPANS)	AUSTRALIAN AND NEW ZEALAND JOURNAL OF PUBLIC HEALTH
1	Is cooking dead? The state of Home Economics Food and Nutrition education in a Canadian province	INTERNATIONAL JOURNAL OF CONSUMER STUDIES
1	Demographic and clinical characteristics of deaths associated with influenza A(H1N1) pdm09 in Central America and Dominican Republic 2009–2010	BMC PUBLIC HEALTH
1	THE INDIRECT COSTS OF OBESITY TO SOCIETY	PHARMACOECONOMICS
1	OBESITY AND INSURANCE RISK—THE INSURANCE INDUSTRYS VIEWPOINT	PHARMACOECONOMICS
1	School role in health education in Italy	INTERNATIONAL JOURNAL OF PEDIATRIC OBESITY
2	The Healthy Communities Study Its Rationale, Aims, and Approach	AMERICAN JOURNAL OF PREVENTIVE MEDICINE
2	Translating Epidemiology Into Policy to Prevent Childhood Obesity: The Case for Promoting Physical Activity in School Settings	ANNALS OF EPIDEMIOLOGY
2	Community Action To Prevent Childhood Obesity: Lessons from Three US Case Studies	CHILDHOOD OBESITY
2	Engaging Coalitions in Community-Based Childhood Obesity Prevention Interventions: A Mixed Methods Assessment	CHILDHOOD OBESITY
2	Applying a Mixed-Methods Evaluation to Healthy Kids, Healthy Communities	JOURNAL OF PUBLIC HEALTH MANAGEMENT AND PRACTICE
2	Participants' perceptions of a knowledge-brokering strategy to facilitate evidence-informed policy-making in Fiji	BMC PUBLIC HEALTH

Table 11 (continued)

Cluster ID	Doc title	Journal title
3	The impact of maternal employment on children's adiposity: Evidence from China's labor policy reform	HEALTH ECONOMICS
3	Risk Factors for Childhood Obesity in the First 1000 Days A Systematic Review	AMERICAN JOURNAL OF PREVENTIVE MEDICINE
3	A life course approach to diet, nutrition and the prevention of chronic diseases	PUBLIC HEALTH NUTRITION
3	Risk factors for overweight among Brazilian adolescents of low-income families: a case–control study	PUBLIC HEALTH NUTRITION
3	Worldwide trends in childhood overweight and obesity	INTERNATIONAL JOURNAL OF PEDIATRIC OBESITY
3	Marked increase in the prevalence of obesity in children of the Seychelles, a rapidly developing country, between 1998 and 2004	INTERNATIONAL JOURNAL OF PEDIATRIC OBESITY
3	A review of risk factors for overweight in preschool children: A policy perspective	INTERNATIONAL JOURNAL OF PEDIATRIC OBESITY
3	Childhood overweight, obesity, and the metabolic syndrome in developing countries	EPIDEMIOLOGIC REVIEWS
3	The obesity epidemic in the United States—Gender, age, socioeconomic, Racial/Ethnic, and geographic characteristics: A systematic review and meta-regression analysis	EPIDEMIOLOGIC REVIEWS
3	Family-based factors associated with overweight and obesity among Pakistani primary school children	BMC PEDIATRICS
3	Trends in overweight and obesity in Lebanon: evidence from two national cross-sectional surveys (1997 and 2009)	BMC PUBLIC HEALTH
3	Nutritional Transition in Children under Five Years and Women of Reproductive Age: A 15-Years Trend Analysis in Peru	PLOS ONE
3	Rapid Increases in Overweight and Obesity Among South African Adolescents: Comparison of Data From the South African National Youth Risk Behaviour Survey in 2002 and 2008	AMERICAN JOURNAL OF PUBLIC HEALTH
3	An Increasing Socioeconomic Gap in Childhood Overweight and Obesity in China	AMERICAN JOURNAL OF PUBLIC HEALTH

Table 11 (continued)

Cluster ID	Doc title	Journal title
3	Trends in overweight among school children and adolescents in seven Chinese Provinces, from 1991-2004	INTERNATIONAL JOURNAL OF PEDIATRIC OBESITY
3	Socio-Economic and Environmental Factors Associated with Overweight and Obesity in Children Aged 6–8 Years Living in Five Italian Cities (the MAPEC_LIFE Cohort)	INTERNATIONAL JOURNAL OF ENVIRONMENTAL RESEARCH AND PUBLIC HEALTH
3	Overweight and obesity in children and adolescents: The South African problem	SOUTH AFRICAN JOURNAL OF SCIENCE
4	An economy of scales: A selective review of obesity's economic causes, consequences, and solutions	JOURNAL OF HEALTH ECONOMICS
4	Using Behavioral Economics to Design More Effective Food Policies to Address Obesity	APPLIED ECONOMIC PERSPECTIVES AND POLICY
4	Food and consumer behavior: why the details matter	AGRICULTURAL ECONOMICS
4	Distributional Impacts of Fat Taxes and Thin Subsidies	ECONOMIC JOURNAL
4	THE CAUSES OF CHILDHOOD OBESITY: A SURVEY	JOURNAL OF ECONOMIC SURVEYS
4	Food Prices and Obesity: Evidence and Policy Implications for Taxes and Subsidies	MILBANK QUARTERLY
4	Policy insights from the nutritional food market transformation model: the case of obesity prevention	PATHS OF CONVERGENCE FOR AGRICULTURE, HEALTH, AND WEALTH
4	Sugar-Sweetened Beverages and Children's Health	ANNUAL REVIEW OF PUBLIC HEALTH, VOL 37
4	The Economics of Obesity and Related Policy	ANNUAL REVIEW OF RESOURCE ECONOMICS, VOL 8
4	The Economics Of Childhood Obesity	HEALTH AFFAIRS
4	Public health policies to encourage healthy eating habits: recent perspectives	JOURNAL OF HEALTHCARE LEADERSHIP
4	The Economics of Obesity and The Role of Government in Obesity Prevention: The Turkish Case	IKTISAT ISLETME VE FINANS
5	Neighborhood Environments Disparities in Access to Healthy Foods in the US	AMERICAN JOURNAL OF PREVENTIVE MEDICINE
5	Measures of the Food Environment A Compilation of the Literature, 1990-2007	AMERICAN JOURNAL OF PREVENTIVE MEDICINE

Table 11 (continued)

Cluster ID	Doc title	Journal title
5	Measuring the Food Environment State of the Science	AMERICAN JOURNAL OF PREVENTIVE MEDICINE
5	Distance to Store, Food Prices, and Obesity in Urban Food Deserts	AMERICAN JOURNAL OF PREVENTIVE MEDICINE
5	Obesity and diabetes, the built environment, and the 'local' food economy in the United States, 2007	ECONOMICS & HUMAN BIOLOGY
5	The role of local food availability in explaining obesity risk among young school-aged children	SOCIAL SCIENCE & MEDICINE
5	The social dynamics of healthy food shopping and store choice in an urban environment	SOCIAL SCIENCE & MEDICINE
5	Food deserts or food swamps?: A mixed-methods study of local food environments in a Mexican city	SOCIAL SCIENCE & MEDICINE
5	Obesogenic environments—aspects on measurement and indicators	PUBLIC HEALTH NUTRITION
5	Food retailer practices, attitudes and beliefs about the supply of healthy foods	PUBLIC HEALTH NUTRITION
5	Healthy food access for urban food desert residents: examination of the food environment, food purchasing practices, diet and BMI	PUBLIC HEALTH NUTRITION
5	Assessment of a government-subsidized supermarket in a high-need area on household food availability and children's dietary intakes	PUBLIC HEALTH NUTRITION
5	Health-related outcomes of new grocery store interventions: a systematic review	PUBLIC HEALTH NUTRITION
5	Exploring the influence of local food environments on food behaviours: a systematic review of qualitative literature	PUBLIC HEALTH NUTRITION
5	Overweight and obesity: Can we reconcile evidence about supermarkets and fast food retailers for public health policy?	JOURNAL OF PUBLIC HEALTH POLICY
5	Spatial–Temporal Modeling of Neighborhood Sociodemographic Characteristics and Food Stores	AMERICAN JOURNAL OF EPIDEMIOLOGY
5	Engaging Tribal Leaders in an American Indian Healthy Eating Project Through Modified Talking Circles	FAMILY & COMMUNITY HEALTH
5	Creating healthy food and eating environments: Policy and environmental approaches	ANNUAL REVIEW OF PUBLIC HEALTH

Table 11 (continued)

Cluster ID	Doc title	Journal title
5	A Natural Experiment Opportunity in Two Low-Income Urban Food Desert Communities: Research Design, Community Engagement Methods, and Baseline Results	HEALTH EDUCATION & BEHAVIOR
5	Food store owners' and managers' perspectives on the food environment: an exploratory mixed-methods study	BMC PUBLIC HEALTH
5	Developing an agenda for research about policies to improve access to healthy foods in rural communities: a concept mapping study	BMC PUBLIC HEALTH
5	Geographic Accessibility Of Food Outlets Not Associated With Body Mass Index Change Among Veterans, 2009-14	HEALTH AFFAIRS
5	The Good Food Junction: a Community-Based Food Store Intervention to Address Nutritional Health Inequities	JMIR RESEARCH PROTOCOLS
5	Food Swamps Predict Obesity Rates Better Than Food Deserts in the United States	INTERNATIONAL JOURNAL OF ENVIRONMENTAL RESEARCH AND PUBLIC HEALTH
6	Youth advocacy for obesity prevention: the next wave of social change for health	TRANSLATIONAL BEHAVIORAL MEDICINE
6	Creating a robust public health infrastructure for physical activity promotion	AMERICAN JOURNAL OF PREVENTIVE MEDICINE
6	The Active Living Research Program Six Years of Grantmaking	AMERICAN JOURNAL OF PREVENTIVE MEDICINE
6	Neighborhood Environment and Physical Activity Among Youth A Review	AMERICAN JOURNAL OF PREVENTIVE MEDICINE
6	Cost Effectiveness of an Elementary School Active School Physical Education Policy	AMERICAN JOURNAL OF PREVENTIVE MEDICINE
6	School sport policy and school-based physical activity environments and their association with observed physical activity in middle school children	HEALTH & PLACE
6	A systematic review of economic analyses of active transport interventions that include physical activity benefits	TRANSPORT POLICY
6	The meta-volition model: Organizational leadership is the key ingredient in getting society moving, literally!	PREVENTIVE MEDICINE
6	Using cost-effectiveness analysis to prioritize policy and programmatic approaches to physical activity promotion and obesity prevention in child-hood	PREVENTIVE MEDICINE

Table 11 (continued)

Cluster ID	Doc title	Journal title
6	Connecting Active Living Research and Public Policy: Transdisciplinary Research and Policy Interventions to Increase Physical Activity	JOURNAL OF PUBLIC HEALTH POLICY
6	A Framework for Physical Activity Programs Within School–Community Partnerships	QUEST
6	International conference on physical activity and obesity in children: Summary statement and recommendations	INTERNATIONAL JOURNAL OF PEDIATRIC OBESITY
6	Rural Active Living: A Call to Action	JOURNAL OF PUBLIC HEALTH MANAGEMENT AND PRACTICE
6	Physical Activity and Food Environments: Solutions to the Obesity Epidemic	MILBANK QUARTERLY
6	A review of early influences on physical activity and sedentary behaviors of preschool-age children in high-income countries	JOURNAL FOR SPECIALISTS IN PEDIATRIC NURSING
6	Does Parents' Social Cohesion Influence Their Perception of Neighborhood Safety and Their Children's Active Commuting to and From School?	JOURNAL OF PHYSICAL ACTIVITY & HEALTH
6	A National Plan for Physical Activity: The Enabling Role of the Built Environment	JOURNAL OF PHYSICAL ACTIVITY & HEALTH
6	The Response of the US Centers for Disease Control and Prevention to the Obesity Epidemic	ANNUAL REVIEW OF PUBLIC HEALTH, VOL 36
6	An ecological approach to creating active living communities	ANNUAL REVIEW OF PUBLIC HEALTH
6	Physical activity and weight management across the lifespan	ANNUAL REVIEW OF PUBLIC HEALTH
6	Understanding contextual barriers, supports, and opportunities for physical activity among Mexican-origin children in Texas border colonias: A descriptive study	BMC PUBLIC HEALTH
6	The Wisconsin Assessment of the Social and Built Environment (WASABE): a multi-dimensional objective audit instrument for examining neighborhood effects on health	BMC PUBLIC HEALTH
6	Implementation conditions for diet and physical activity interventions and policies: an umbrella review	BMC PUBLIC HEALTH
6	The role of built environments in physical activity, eating, and obesity in childhood	FUTURE OF CHILDREN

Table 11 (continued)

Cluster ID	Doc title	Journal title
6	The Built Environment: Designing Communities to Promote Physical Activity in Children	PEDIATRICS
6	Influences of Physical and Social Neighborhood Environments on Children's Physical Activity and Obesity	AMERICAN JOURNAL OF PUBLIC HEALTH
6	The Effect of Light Rail Transit on Physical Activity: Design and Methods of the Travel-Related Activity in Neighborhoods Study	FRONTIERS IN PUBLIC HEALTH
6	Impact of the Boston Active School Day Policy to Promote Physical Activity Among Children	AMERICAN JOURNAL OF HEALTH PROMOTION
6	Support for Physical Activity Policies and Perceptions of Work and Neighborhood Environments: Variance by BMI and Activity Status at the County and Individual Levels	AMERICAN JOURNAL OF HEALTH PROMOTION
7	Governing obesity policies from England, France, Germany and Scotland	SOCIAL SCIENCE & MEDICINE
7	Food and beverage product reformulation as a corporate political strategy	SOCIAL SCIENCE & MEDICINE
7	Development of a Report Card on Healthy Food Environments and Nutrition for Children in Canada	PREVENTIVE MEDICINE
7	Unhealthy food, integrated marketing communication and power: a critical analysis	CRITICAL PUBLIC HEALTH
7	Ethical Evaluation of a Proposed Statutory Regulation of Food Advertising Targeted at Minors in Spain	PUBLIC HEALTH ETHICS
7	Obesity prevention advocacy in Australia: an analysis of policy impact on autonomy	AUSTRALIAN AND NEW ZEALAND JOURNAL OF PUBLIC HEALTH
7	Public health campaigns and obesity—a critique	BMC PUBLIC HEALTH
7	Addressing the policy cacophony does not require more evidence: an argument for reframing obesity as caloric overconsumption	BMC PUBLIC HEALTH
7	Bariatric surgery for obese children and adolescents: a review of the moral challenges	BMC MEDICAL ETHICS
7	The application of theories of the policy process to obesity prevention: a systematic review and meta-synthesis	BMC PUBLIC HEALTH

Table 11 (continued)

Cluster ID	Doc title	Journal title
7	Weighing In: The Taste-Engineering Frame in Obesity Expert Discourse	AMERICAN JOURNAL OF PUBLIC HEALTH
8	Association Between District and State Policies and US Public Elementary School Competitive Food and Beverage Environments	JAMA PEDIATRICS
8	Potential Impact of National School Nutritional Environment Policies Cross-sectional Associations With US Secondary Student Overweight/Obesity, 2008–2012	JAMA PEDIATRICS
8	Association Between Competitive Food and Beverage Policies in Elementary Schools and Childhood Overweight/Obesity Trends Differences by Neighborhood Socioeconomic Resources	JAMA PEDIATRICS
8	Geographic Disparities in State and District Policies Targeting Youth Obesity	AMERICAN JOURNAL OF PREVENTIVE MEDICINE
8	School Wellness Policies Effects of Using Standard Templates	AMERICAN JOURNAL OF PREVENTIVE MEDICINE
8	School Wellness Policies and Foods and Beverages Available in Schools	AMERICAN JOURNAL OF PREVENTIVE MEDICINE
8	Assessment of the School Nutrition Environment A Study in Australian Primary School Canteens	AMERICAN JOURNAL OF PREVENTIVE MEDICINE
8	School Obesity Prevention Policies and Practices in Minnesota and Student Outcomes A Longitudinal Cohort Study	AMERICAN JOURNAL OF PREVENTIVE MEDICINE
8	A Multivariate Analysis of Federally Mandated School Wellness Policies on Adolescent Obesity	JOURNAL OF ADOLESCENT HEALTH
8	Leveraging the Public School System to Combat Adolescent Obesity: The Limits of Arkansas's Statewide Policy Initiative	JOURNAL OF ADOLESCENT HEALTH
8	Position of the American Dietetic Association, School Nutrition Association, and Society for Nutrition Education: Comprehensive School Nutrition Services	JOURNAL OF NUTRITION EDUCATION AND BEHAVIOR
8	Statewide Evaluation of Local Wellness Policies in Georgia: An Examination of Policy Compliance, Policy Strength, and Associated Factors	JOURNAL OF NUTRITION EDUCATION AND BEHAVIOR
8	Association between state school nutrition laws and subsequent child obesity	PREVENTIVE MEDICINE
8	Fundraising, celebrations and classroom rewards are substantial sources of unhealthy foods and beverages on public school campuses	PUBLIC HEALTH NUTRITION

Table 11 (continued)

Cluster ID	Doc title	Journal title
8	Do attitudes, intentions and actions of school food coordinators regarding public organic food procurement policy improve the eating environment at school? Results from the iPOPY study	PUBLIC HEALTH NUTRITION
8	Examining local-level factors shaping school nutrition policy implementation in Ontario, Canada	PUBLIC HEALTH NUTRITION
8	Students' beliefs and behaviour regarding low-calorie beverages, sweets or snacks: are they affected by lessons on healthy food and by changes to school vending machines?	PUBLIC HEALTH NUTRITION
8	How do we actually put smarter snacks in schools? NOURISH (Nutrition Opportunities to Understand Reforms Involving Student Health) conversations with food-service directors	PUBLIC HEALTH NUTRITION
8	Impact of competitive foods in public schools on child nutrition: effects on adolescent obesity in the United States an integrative systematic literature review	GLOBAL HEALTH ACTION
8	Policies and Practices of High-Performing Let's Go! Schools	AMERICAN JOURNAL OF HEALTH EDUCATION
8	Calories in the Classroom: Celebration Foods Offered and Consumed during Classroom Parties at an Elementary School in a Low-Income, Urban Community	CHILDHOOD OBESITY
8	Barriers and facilitators to the promotion of healthy eating lifestyles among adolescents at school: the views of school health coordinators	HEALTH EDUCATION RESEARCH
8	School district wellness policy quality and weight-related outcomes among high school students in Minnesota	HEALTH EDUCATION RESEARCH
8	Evaluating the Potential Health and Revenue Outcomes of a 100% Healthy Vending Machine Nutrition Policy at a Large Agency in Los Angeles County, 2013-2015	JOURNAL OF PUBLIC HEALTH MANAGEMENT AND PRACTICE
8	Schools and Obesity Prevention: Creating School Environments and Policies to Promote Healthy Eating and Physical Activity	MILBANK QUARTERLY
8	The Impact of School Socioeconomic Status on Student Lunch Consumption after Implementation of the Texas Public School Nutrition Policy	JOURNAL OF SCHOOL HEALTH

Table 11 (continued)

Cluster ID	Doc title	Journal title
8	Association and Diffusion of Nutrition and Physical Activity Policies on the State and District Level	JOURNAL OF SCHOOL HEALTH
8	Alliance for a Healthier Generation's Competitive Beverage and Food Guidelines: Do Elementary School Administrators Know About Them and Do They Report Implementing Them?	JOURNAL OF SCHOOL HEALTH
8	Targeting childhood obesity in schools: an examination of the stability and utility of the Value Added Index	PEDIATRIC OBESITY
8	Carrots and Sticks: Compliance Provisions in State Competitive Food Laws-Examples for State and Local Implementation of the Updated USDA Standards	JOURNAL OF SCHOOL HEALTH
8	Socioeconomic Differences in the Association Between Competitive Food Laws and the School Food Environment	JOURNAL OF SCHOOL HEALTH
8	Little Association Between Wellness Policies and School-Reported Nutrition Practices	HEALTH PROMOTION PRACTICE
8	Effectiveness of school food environment policies on children's dietary behaviors: A systematic review and meta-analysis	PLOS ONE
8	Are 'Competitive Foods' Sold At School Making Our Children Fat?	HEALTH AFFAIRS
8	'Competitive' Food And Beverage Policies: Are They Influencing Childhood Overweight Trends?	HEALTH AFFAIRS
8	Effects of a School-based Intervention on Middle School Children's Daily Food and Beverage Intake	HEALTH BEHAVIOR AND POLICY REVIEW
8	The Effect of School Wellness Policies on Childhood Obesity in Rural America	HEALTH BEHAVIOR AND POLICY REVIEW
8	Weight Status Among Adolescents in States That Govern Competitive Food Nutrition Content	PEDIATRICS
8	Lessons Learned From Evaluations of California's Statewide School Nutrition Standards	AMERICAN JOURNAL OF PUBLIC HEALTH
8	State Policies Targeting Junk Food in Schools: Racial/Ethnic Differences in the Effect of Policy Change on Soda Consumption	AMERICAN JOURNAL OF PUBLIC HEALTH

Table 11 (continued)

Cluster ID	Doc title	Journal title
8	Policy Instruments Used by States Seeking to Improve School Food Environments	AMERICAN JOURNAL OF PUBLIC HEALTH
8	Change in School Nutrition-Related Laws From 2003 to 2008: Evidence From the School Nutrition-Environment State Policy Classification System	AMERICAN JOURNAL OF PUBLIC HEALTH
8	Influence of School Beverage Environment on the Association of Beverage Consumption With Physical Education Participation Among US Adolescents	AMERICAN JOURNAL OF PUBLIC HEALTH
8	Development of the Policy Indicator Checklist: A Tool to Identify and Measure Policies for Calorie-Dense Foods and Sugar-Sweetened Beverages Across Multiple Settings	AMERICAN JOURNAL OF PUBLIC HEALTH
8	Impact of Nutrition Standards on Competitive Food Quality in Massachusetts Middle and High Schools	AMERICAN JOURNAL OF PUBLIC HEALTH
9	Globalisation and national trends in nutrition and health: A grouped fixed-effects approach to intercountry heterogeneity	HEALTH ECONOMICS
9	The double burden of neoliberalism? Noncommunicable disease policies and the global political economy of risk	HEALTH & PLACE
9	The double burden of neoliberalism? Noncommunicable disease policies and the global political economy of risk	HEALTH & PLACE
9	Is trade liberalisation a vector for the spread of sugar-sweetened beverages? A cross-national longitudinal analysis of 44 low- and middle-income countries	SOCIAL SCIENCE & MEDICINE
9	Determinants of obesity in Brazil: the effects of trade liberalization and socio-economic variables	APPLIED ECONOMICS
9	Protocol to monitor trade agreement food-related aspects: the Fiji case study	HEALTH PROMOTION INTERNATIONAL
9	Exporting obesity: US farm and trade policy and the transformation of the Mexican consumer food environment	INTERNATIONAL JOURNAL OF OCCUPATIONAL AND ENVIRONMENTAL HEALTH
9	The role of trade and investment liberalization in the sugar-sweetened carbonated beverages market: a natural experiment contrasting Vietnam and the Philippines	GLOBALIZATION AND HEALTH

Table 11 (continued)

Cluster ID	Doc title	Journal title
9	Trade and investment liberalization, food systems change and highly processed food consumption: a natural experiment contrasting the soft-drink markets of Peru and Bolivia	GLOBALIZATION AND HEALTH
9	The health impact of trade and investment agreements: a quantitative systematic review and network co-citation analysis	GLOBALIZATION AND HEALTH
10	Blacks' Diminished Health Return of Family Structure and Socioeconomic Status; 15 Years of Follow-up of a National Urban Sample of Youth	JOURNAL OF URBAN HEALTH-BULLETIN OF THE NEW YORK ACADEMY OF MEDICINE
10	Depressive Symptoms During Adolescence Predict Adulthood Obesity Among Black Females	JOURNAL OF RACIAL AND ETHNIC HEALTH DISPARITIES
10	Mechanisms linking high school graduation to health disparities in young adulthood: a longitudinal analysis of the role of health behaviours, psychosocial stressors, and health insurance	PUBLIC HEALTH
10	Association of Adiposity and Mental Health Functioning across the Lifespan: Findings from Understanding Society (The UK Household Longitudinal Study)	PLOS ONE
10	Low Family Support and Risk of Obesity among Black Youth: Role of Gender and Ethnicity	CHILDREN-BASEL
10	Family Income Reduces Risk of Obesity for White but Not Black Children	CHILDREN-BASEL
10	Parental Education Better Helps White than Black Families Escape Poverty: National Survey of Children's Health	ECONOMIES
10	Poverty Status and Childhood Asthma in White and Black Families: National Survey of Children's Health	HEALTHCARE

Table 12 Small BC clusters

BC cluster	Title	WoS SC
1	A PATIENT-BASED SYSTEM FOR DESCRIBING AMBULATORY MEDICINE PRACTICES USING DIAGNOSIS CLUSTERS	Health Care Sciences & Services; General & Internal Medicine
1	SUGAR-SWEETENED BEVERAGES CONSUMPTION AND PRICE SENSITIVITY AMONG BRAZILIAN ADULTS: IMPLICATIONS FOR OBESITY POLICIES	Business & Economics; Health Care Sciences & Services
1	Development of the indicator "policies to prevent childhood obesity" to monitor children's health	Public, Environmental & Occupational Health
1	Investigating the media power of a population health monitoring survey: case study of the NSW Schools Physical Activity and Nutrition Survey (SPANS)	Public, Environmental & Occupational Health
1	Is cooking dead? The state of Home Economics Food and Nutrition education in a Canadian province	Business & Economics
1	Demographic and clinical characteristics of deaths associated with influenza A(H1N1) pdm09 in Central America and Dominican Republic 2009–2010	Public, Environmental & Occupational Health
1	THE INDIRECT COSTS OF OBESITY TO SOCIETY	Business & Economics; Health Care Sciences & Services; Pharmacology & Pharmacy
1	OBESITY AND INSURANCE RISK—THE INSURANCE INDUSTRYS VIEWPOINT	Business & Economics; Health Care Sciences & Services; Pharmacology & Pharmacy
1	School role in health education in Italy	Pediatrics
11	Gluttony and guilt: monthly trends in internet search query data are comparable with national-level energy intake and dieting behavior	Social Sciences—Other Topics
11	Web search activity data accurately predict population chronic disease risk in the USA	Public, Environmental & Occupational Health
11	Search Query Data to Monitor Interest in Behavior Change: Application for Public Health	Science & Technology—Other Topics

Table 13 Core document titles retrieved for the Kw clusters

Cluster ID	Doc title	Journal title
1	School opportunities and physical activity frequency in nine year old children	INTERNATIONAL JOURNAL OF PUBLIC HEALTH
1	A multilevel examination of factors of the school environment and time spent in moderate to vigorous physical activity among a sample of secondary school students in grades 9-12 in Ontario, Canada	INTERNATIONAL JOURNAL OF PUBLIC HEALTH
1	Association between objectively measured built environments and adult physical activity in Gyeonggi province, Korea	INTERNATIONAL JOURNAL OF PUBLIC HEALTH
1	Independent and Joint Associations between Multiple Measures of the Built and Social Environment and Physical Activity in a Multi-Ethnic Urban Community	JOURNAL OF URBAN HEALTH-BULLETIN OF THE NEW YORK ACADEMY OF MEDICINE
1	A pilot study evaluating the effects of a youth advocacy program on youth readiness to advocate for environment and policy changes for obesity prevention	TRANSLATIONAL BEHAVIORAL MEDICINE
1	Journal of Transport & Health	JOURNAL OF TRANSPORT & HEALTH
1	Changing places: Policies to make a healthy choice the easy choice	PUBLIC HEALTH
1	Connecting Active Living Research and Public Policy: Transdisciplinary Research and Policy Interventions to Increase Physical Activity	JOURNAL OF PUBLIC HEALTH POLICY
1	Has the Alberta daily physical activity initiative been successfully implemented in Calgary schools?	PAEDIATRICS & CHILD HEALTH
1	Priorities of Municipal Policy Makers in Relation to Physical Activity and the Built Environment: A Latent Class Analysis	JOURNAL OF PUBLIC HEALTH MANAGEMENT AND PRACTICE
1	Relationship of objective street quality attributes with youth physical activity: findings from the Healthy Communities Study	PEDIATRIC OBESITY
1	Are Environmental Influences on Physical Activity Distinct for Urban, Suburban, and Rural Schools? A Multilevel Study Among Secondary School Students in Ontario, Canada	JOURNAL OF SCHOOL HEALTH
1	A Multisite Study of Environmental Correlates of Active Commuting to School in Mexican Children	JOURNAL OF PHYSICAL ACTIVITY & HEALTH

Table 13 (continued)

Cluster ID	Doc title	Journal title
1	Changes in Policy Maker Attitudes Toward Active Living Communities Issues in Hawaii, 2007–2013	JOURNAL OF PHYSICAL ACTIVITY & HEALTH
1	Facilitators and Barriers to Adopting Evidence-Based Physical Education in Elementary Schools	JOURNAL OF PHYSICAL ACTIVITY & HEALTH
1	Obesogenic environments: current evidence of the built and food environments	PERSPECTIVES IN PUBLIC HEALTH
1	A cross-sectional examination of school characteristics associated with overweight and obesity among grade 1 to 4 students	BMC PUBLIC HEALTH
1	Built environment interventions aimed at improving physical activity levels in rural Ontario health units: a descriptive qualitative study	BMC PUBLIC HEALTH
1	The unbuilt environment: culture moderates the built environment for physical activity	BMC PUBLIC HEALTH
1	School-based Obesity Prevention Programs in Adolescents: A Systematic Review of the Literature	HEALTH BEHAVIOR AND POLICY REVIEW
1	Communities on the Move: Pedestrain-Oriented Zoning as a Facilitator of Adult Active Travel to Work in the United States	FRONTIERS IN PUBLIC HEALTH
1	Does Pedestrian Danger Mediate the Relationship between Local Walkability and Active Travel to Work?	FRONTIERS IN PUBLIC HEALTH
1	The Effect of Light Rail Transit on Physical Activity: Design and Methods of the Travel-Related Activity in Neighborhoods Study	FRONTIERS IN PUBLIC HEALTH
1	Uses of Research Evidence in the State Legislative Process to Promote Active Environments in Minnesota	AMERICAN JOURNAL OF HEALTH PROMOTION
1	Childcare Outdoor Renovation as a Built Environment Health Promotion Strategy: Evaluating the Preventing Obesity by Design Intervention	AMERICAN JOURNAL OF HEALTH PROMOTION
1	Support for Physical Activity Policies and Perceptions of Work and Neighborhood Environments: Variance by BMI and Activity Status at the County and Individual Levels	AMERICAN JOURNAL OF HEALTH PROMOTION
1	Municipal Officials' Participation in Built Environment Policy Development in the United States	AMERICAN JOURNAL OF HEALTH PROMOTION

Table 13 (continued)

Cluster ID	Doc title	Journal title
2	A lifeSPANS approach: Addressing child obesity in Australia	HEALTH PROMOTION JOURNAL OF AUSTRALIA
2	Public health in Thailand: emerging focus on non-communicable diseases	INTERNATIONAL JOURNAL OF HEALTH PLANNING AND MANAGE-MENT
2	Investing in a healthy lifestyle strategy: is it worth it?	INTERNATIONAL JOURNAL OF PUBLIC HEALTH
2	Exacerbating Inequalities? Health Policy and the Behavioural Sciences	HEALTH CARE ANALYSIS
2	Translating Epidemiology Into Policy to Prevent Childhood Obesity: The Case for Promoting Physical Activity in School Settings	ANNALS OF EPIDEMIOLOGY
2	Measuring Healthy Lifestyle and Mental Health Indicators in South Asian-Women Using the "Your Health: Quality of Life and Well-Being" Question-naire	ANNALS OF GLOBAL HEALTH
2	Food and nutrition in primary care in Brazil	GACETA SANITARIA
2	Does Calorie Information Promote Lower Calorie Fast Food Choices Among College Students?	JOURNAL OF ADOLESCENT HEALTH
2	The availability of essential cancer medication: An analysis of national formu-laries	JOURNAL OF CANCER POLICY
2	A public health perspective on transport policy priorities	JOURNAL OF TRANSPORT GEOGRAPHY
2	An ethical framework for evaluation of public health plans: a systematic pro-cess for legitimate and fair decision-making	PUBLIC HEALTH
2	Adult obesity prevalence and state policymaking in the United States: Is prob-lem severity associated with more policies?	SOCIAL SCIENCE JOURNAL
2	Assessing the usefulness of systematic reviews for policymakers in public health: A case study of overweight and obesity prevention interventions	PREVENTIVE MEDICINE
2	Disease Prevention and Health Promotion in Germany: A Qualitative Analysis of the Federal Government's Coalition Agreement	GESUNDHEITSWESEN
2	The meaning of 'rural' in rural health: A review and case study from Brazil	GLOBAL PUBLIC HEALTH
2	Public health in New York City, 2002-2007: confronting epidemics of the modern era	INTERNATIONAL JOURNAL OF EPIDEMIOLOGY

Table 13 (continued)

Cluster ID	Doc title	Journal title
2	Changes in health promotion practice in hospitals across England: the National Health Promotion in Hospital Audit 2009 and 2011	JOURNAL OF PUBLIC HEALTH
2	An audit of health education services within UK hospitals	JOURNAL OF EVALUATION IN CLINICAL PRACTICE
2	Lessons learned while implementing a legislated school policy: Body mass index assessments among Arkansas's public school students	JOURNAL OF SCHOOL HEALTH
2	Factors Affecting Sugar-Sweetened Beverage Availability in Competitive Venues of US Secondary Schools	JOURNAL OF SCHOOL HEALTH
2	Positive School Climate Is Associated With Lower Body Mass Index Percentile Among Urban Preadolescents	JOURNAL OF SCHOOL HEALTH
2	Socioeconomic Differences in the Association Between Competitive Food Laws and the School Food Environment	JOURNAL OF SCHOOL HEALTH
2	A longitudinal study assessing childcare services' adoption of obesity prevention policies and practices	JOURNAL OF PAEDIATRICS AND CHILD HEALTH
2	Minisymposium on obesity: Overview and some strategic considerations	ANNUAL REVIEW OF PUBLIC HEALTH
2	Primary Prevention of Congenital Anomalies: Recommendable, Feasible and Achievable	PUBLIC HEALTH GENOMICS
2	Dietary Guidelines for the Asia Pacific Region: Report of the Asia Pacific Academic Consortium for Public Health Workshop 2016	ASIA–PACIFIC JOURNAL OF PUBLIC HEALTH
2	Making Healthy Behaviors the Easy Choice for Employees: A Review of the Literature on Environmental and Policy Changes in Worksite Health Promotion	HEALTH EDUCATION & BEHAVIOR
2	Evaluating Structural Change Approaches to Health Promotion: An Exploratory Scoping Review of a Decade of US Progress	HEALTH EDUCATION & BEHAVIOR
2	From "Healthy Eating" to a Holistic Approach to Current Food Environments	SAGE OPEN
2	Food, health, and complexity: towards a conceptual understanding to guide collaborative public health action	BMC PUBLIC HEALTH
2	Taxing sugar-sweetened beverages: impact on overweight and obesity in Germany	BMC PUBLIC HEALTH

Table 13 (continued)

Cluster ID	Doc title	Journal title
2	Does Anything Work to Reduce Obesity? (Yes, Modestly)	JOURNAL OF HEALTH POLITICS POLICY AND LAW
2	Social Participation as a Central Strategy of Community Nutrition to Face the Challenges Associated with the Nutritional Transition	REVISTA ESPANOLA DE SALUD PUBLICA
2	The impact of school policies and practices on students' diets, physical activity levels and body weights: A province-wide practicebased evaluation	CANADIAN JOURNAL OF PUBLIC HEALTH-REVUE CANADIENNE DE SANTE PUBLIQUE
2	Predicted National Productivity Implications of Calorie and Sodium Reductions in the American Diet	AMERICAN JOURNAL OF HEALTH PROMOTION
3	Built and socioeconomic neighbourhood environments and overweight in preschool aged children. A multilevel study to disentangle individual and contextual relationships	ENVIRONMENTAL RESEARCH
3	Food insecurity and gender are risk factors for obesity	JOURNAL OF NUTRITION EDUCATION AND BEHAVIOR
3	Sugar-Sweetened Beverages: Children's Perceptions, Factors of Influence, and Suggestions for Reducing Intake	JOURNAL OF NUTRITION EDUCATION AND BEHAVIOR
3	China's one-child policy and overweight children in the 1990s	SOCIAL SCIENCE & MEDICINE
3	Associations between the home and school environments and child body mass index	SOCIAL SCIENCE & MEDICINE
3	Does the sale of sweetened beverages at school affect children's weight?	SOCIAL SCIENCE & MEDICINE
3	Are single childrenmore likely to be overweight or obese than thosewith siblings? The influence of China's one-child policy on childhood obesity	PREVENTIVE MEDICINE
3	Overweight in urban, low-income, African American and Hispanic children attending Los Angeles elementary schools: research stimulating action	PUBLIC HEALTH NUTRITION
3	Association between body mass index and acute traumatic workplace injury in hourly manufacturing employees	AMERICAN JOURNAL OF EPIDEMIOLOGY
3	High prevalence of overweight and obesity among a representative sample of Puerto Rican children	BMC PUBLIC HEALTH
3	A cluster randomised trial testing an intervention to improve parents' recognition of their child's weight status: study protocol	BMC PUBLIC HEALTH

Table 13 (continued)

Cluster ID	Doc title	Journal title
3	Prevalence and stabilizing trends in overweight and obesity among children and adolescents in China, 2011–2015	BMC PUBLIC HEALTH
3	Nutritional status of children in Alagoas state cities according to SISVAN	MUNDO DA SAUDE
3	Factors associated with excess weight in Brazilian children under five years of age	CIENCIA & SAUDE COLETIVA
3	Some risk factors associated with overweight, stunting and wasting among children under 5 years old	JORNAL DE PEDIATRIA
3	Trends in overweight among school children and adolescents in seven Chinese Provinces, from 1991–2004	INTERNATIONAL JOURNAL OF PEDIATRIC OBESITY
3	Trends in obesity among Korean children using four different criteria	INTERNATIONAL JOURNAL OF PEDIATRIC OBESITY
3	Socio-Economic and Environmental Factors Associated with Overweight and Obesity in Children Aged 6-8 Years Living in Five Italian Cities (the MAPEC_LIFE Cohort)	INTERNATIONAL JOURNAL OF ENVIRONMENTAL RESEARCH AND PUBLIC HEALTH
4	Measuring the Food Environment: Shelf Space of Fruits, Vegetables, and Snack Foods in Stores	JOURNAL OF URBAN HEALTH-BULLETIN OF THE NEW YORK ACADEMY OF MEDICINE
4	KEEPING SODA IN SNAP: Understanding the Other Iron Triangle	SOCIETY
4	Intervention leads to improvements in the nutrient profile of snacks served in afterschool programs: a group randomized controlled trial	TRANSLATIONAL BEHAVIORAL MEDICINE
4	Micronutrient deficiency and the prevalence of mothers' overweight/obesity in Egypt	ECONOMICS & HUMAN BIOLOGY
4	Preliminary Healthy Eating Outcomes of SNaX, a Pilot Community-Based Intervention for Adolescents	JOURNAL OF ADOLESCENT HEALTH
4	Implications of fast food restaurant concentration for preschool-aged childhood obesity	JOURNAL OF BUSINESS RESEARCH
4	Slim by design: Redirecting the accidental drivers of mindless overeating	JOURNAL OF CONSUMER PSYCHOLOGY
4	Campus-Based Snack Food Vending Consumption	JOURNAL OF NUTRITION EDUCATION AND BEHAVIOR
4	Knowledge of Recommended Calorie Intake and Influence of Calories on Food Selection Among Canadians	JOURNAL OF NUTRITION EDUCATION AND BEHAVIOR

Table 13 (continued)

Cluster ID	Doc title	Journal title
4	The social dynamics of healthy food shopping and store choice in an urban environment	SOCIAL SCIENCE & MEDICINE
4	The neoliberal diet and inequality in the United States	SOCIAL SCIENCE & MEDICINE
4	Do school based food and nutrition policies improve diet and reduce obesity?	PREVENTIVE MEDICINE
4	Does where you shop or who you are predict what you eat?: The role of stores and individual characteristics in dietary intake	PREVENTIVE MEDICINE
4	Restaurant menu labeling laws and alcohol use	PREVENTIVE MEDICINE
4	Are soft drinks getting a burn rap? We don't think so	JOURNAL OF NUTRITION EDUCATION AND BEHAVIOR
4	Developing a timeline for evaluating public health nutrition policy interventions. What are the outcomes and when should we expect to see them?	PUBLIC HEALTH NUTRITION
4	The advertised diet: an examination of the extent and nature of food advertising on Australian television	HEALTH PROMOTION JOURNAL OF AUSTRALIA
4	Reformulation, fortification and functionalization: Big Food corporations' nutritional engineering and marketing strategies	JOURNAL OF PEASANT STUDIES
4	Child health in an urbanizing world	ACTA PAEDIATRICA
4	Construct Validation of 4 Food-Environment Assessment Methods: Adapting a Multitrait-Multimethod Matrix Approach for Environmental Measures	AMERICAN JOURNAL OF EPIDEMIOLOGY
4	Nutrition, obesity and health: policies and economic research challenges	EUROPEAN REVIEW OF AGRICULTURAL ECONOMICS
4	Measuring the 'obesogenic' food environment in New Zealand primary schools	HEALTH PROMOTION INTERNATIONAL
4	Food environment and policies in private schools in Kolkata, India	HEALTH PROMOTION INTERNATIONAL
4	Behavioral and lifestyle influences on reported calorie intake: a latent class model	JOURNAL OF CONSUMER MARKETING
4	Estimating nutrition-income elasticities in sub-Saharan Africa: implications on health	JOURNAL OF ECONOMIC STUDIES
4	Nutrition services and foods and beverages available at school: Results from the school health policies and programs study 2006	JOURNAL OF SCHOOL HEALTH

Table 13 (continued)

Cluster ID	Doc title	Journal title
4	Government food service policies and guidelines do not create healthy school canteens	AUSTRALIAN AND NEW ZEALAND JOURNAL OF PUBLIC HEALTH
4	The role of pulses in sustainable and healthy food systems	ANNALS OF THE NEW YORK ACADEMY OF SCIENCES
4	A Systematic Review on the Affordability of a Healthful Diet for Families in the United States	PUBLIC HEALTH NURSING
4	Assessing the feasibility and impact of federal childhood obesity policies	ANNALS OF THE AMERICAN ACADEMY OF POLITICAL AND SOCIAL SCIENCE
4	Traffic light food labelling in schools and beyond	HEALTH EDUCATION JOURNAL
4	Compliance with children's television food advertising regulations in Australia	BMC PUBLIC HEALTH
4	A survey of the reformulation of Australian child-oriented food products	BMC PUBLIC HEALTH
4	A qualitative study of independent fast food vendors near secondary schools in disadvantaged Scottish neighbourhoods	BMC PUBLIC HEALTH
4	The efficacy of nudge theory strategies in influencing adult dietary behaviour: a systematic review and meta-analysis	BMC PUBLIC HEALTH
4	The application of theories of the policy process to obesity prevention: a systematic review and meta-synthesis	BMC PUBLIC HEALTH
4	Scale up of a multi-strategic intervention to increase implementation of a school healthy canteen policy: findings of an intervention trial	BMC PUBLIC HEALTH
4	Multi-strategic intervention to enhance implementation of healthy canteen policy: a randomised controlled trial	IMPLEMENTATION SCIENCE
4	Climate Change and Food Security: Health Impacts in Developed Countries	ENVIRONMENTAL HEALTH PERSPECTIVES
4	From Nutrients to Nurturance: A Conceptual Introduction to Food Well-Being	JOURNAL OF PUBLIC POLICY & MARKETING
4	School food environments and policies in US public schools	PEDIATRICS
4	Regional trade and the nutrition transition: opportunities to strengthen NCD prevention policy in the Southern African Development Community	GLOBAL HEALTH ACTION
5	Reframing family-centred obesity prevention using the Family Ecological Model	PUBLIC HEALTH NUTRITION

Table 13 (continued)

Cluster ID	Doc title	Journal title
5	The Healthy Kids, Healthy Communities National Program	JOURNAL OF PUBLIC HEALTH MANAGEMENT AND PRACTICE
5	Using Group Model Building to Understand Factors That Influence Childhood Obesity in an Urban Environment	JOURNAL OF PUBLIC HEALTH MANAGEMENT AND PRACTICE
5	Applying a Mixed-Methods Evaluation to Healthy Kids, Healthy Communities	JOURNAL OF PUBLIC HEALTH MANAGEMENT AND PRACTICE
5	Systems Thinking in 49 Communities Related to Healthy Eating, Active Living, and Childhood Obesity	JOURNAL OF PUBLIC HEALTH MANAGEMENT AND PRACTICE
5	Evaluating the Implementation and Impact of Policy, Practice, and Environmental Changes to Prevent Childhood Obesity in 49 Diverse Communities	JOURNAL OF PUBLIC HEALTH MANAGEMENT AND PRACTICE
5	Barriers and facilitators to childhood obesity prevention among culturally and linguistically diverse (CALD) communities in Victoria, Australia	AUSTRALIAN AND NEW ZEALAND JOURNAL OF PUBLIC HEALTH

Table 14 Small Kw clusters

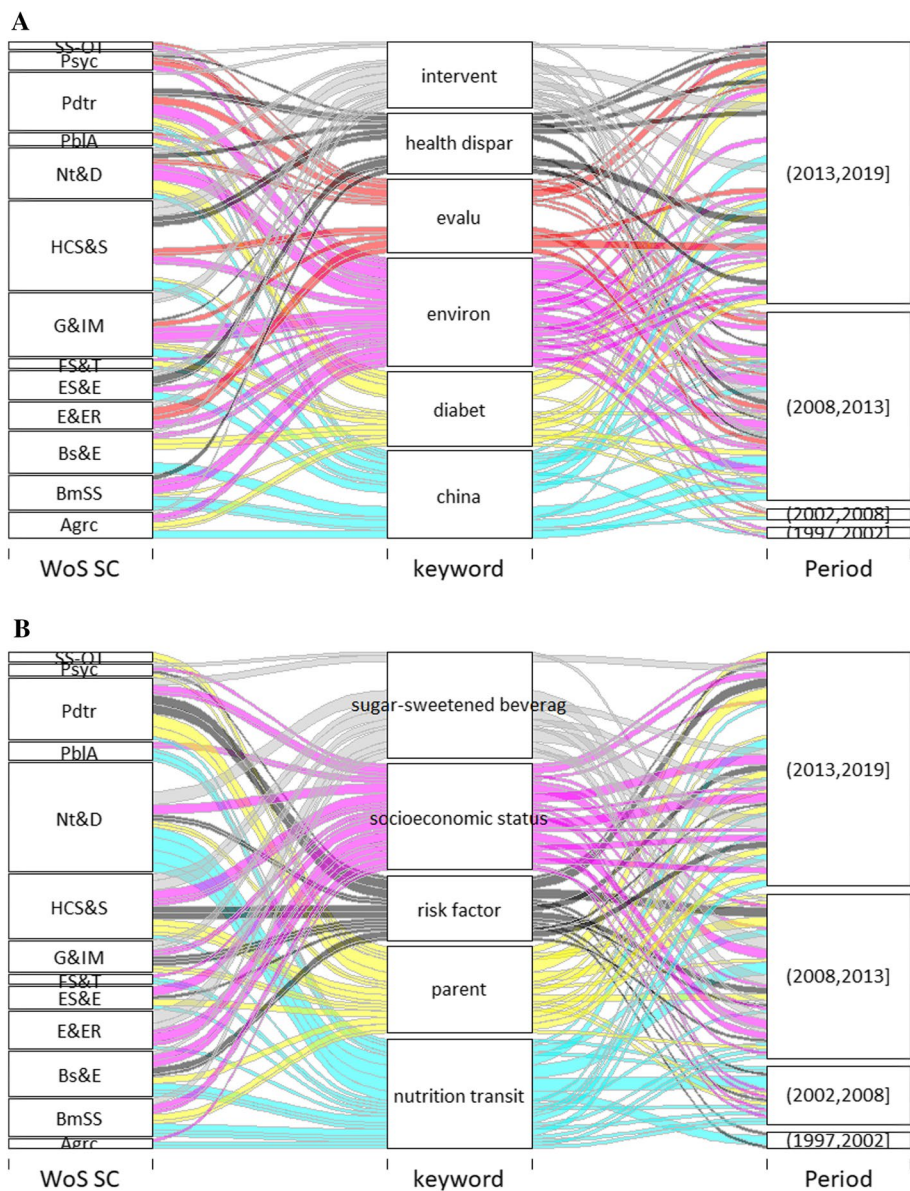| Kw cluster ID	Title	WoS SC
6	What Does Public Health Ethics Tell (Or Not Tell) Us About Intervening in Non-Communicable Diseases?	Social Sciences—Other Topics; Medical Ethics; Social Issues; Biomedical Social Sciences
6	DEFINING ELIGIBILITY CRITERIA FOR FUNDING POLICIES AROUND IN VITRO FERTILIZATION	Health Care Sciences & Services; Public, Environmental & Occupational Health; Medical Informatics
6	Screening for Sleep Apnea in Morbidly Obese Pilots	Biophysics; Public, Environmental & Occupational Health; Research & Experimental Medicine
7	The costs and consequences of obesity in Germany: a new approach from a prevalence and life-cycle perspective	Business & Economics; Health Care Sciences & Services
7	Effects of US Public Agricultural R&D on US Obesity and its Social Costs	Agriculture; Business & Economics
7	The Economics of Obesity and Related Policy	Agriculture; Business & Economics; Environmental Sciences & Ecology
8	Perceptions of the food shopping environment are associated with greater consumption of fruits and vegetables	Public, Environmental & Occupational Health; Nutrition & Dietetics
8	Perspectives of Stakeholders on Implementing a Farm-to-University Program at an HBCU	Public, Environmental & Occupational Health
9	Understanding policy: why health education policy is important and why it does not appear to work	Education & Educational Research
9	Embodying policy concepts	Education & Educational Research
10	Measuring obesity in the absence of a gold standard	Business & Economics; Public, Environmental & Occupational Health
10	Obesity risk class and asthma outpatient service utilization by the middle aged and elderly in Taiwan	Health Care Sciences & Services

A

B

Fig. 7 Alluvial diagrams representing the interrelations between key concepts, research fields and the time dimension (interdisciplinarity maps): latent trends (threshold for visible stripes < 10 occurrence per year)

where S = pairs classified into the same cluster in C1 and C2 respectively; D = pairs classified into different clusters in C1 and C2 respectively.

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