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## Systems thinking and complexity science methods and the policy process in non-communicable disease prevention: a systematic scoping review protocol

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| Complete List of Authors:     | Clifford Astbury, Chloe; York University Faculty of Health, School of Global Health<br>McGill, Elizabeth; London School of Hygiene & Tropical Medicine, Health Services Research and Policy<br>Egan, Matt; LSHTM, SEHR<br>Penney, Tarra; York University Faculty of Health, School of Global Health |
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4 1 **Systems thinking and complexity science methods and the policy process in non-**  
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6 2 **communicable disease prevention: a systematic scoping review protocol**

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8  
9 3 Chloe Clifford Astbury, School of Global Health, York University, 4700 Keele St. Toronto ON  
10  
11 4 Canada M3J 1P3 [castbury@yorku.ca](mailto:castbury@yorku.ca) (corresponding author)

12  
13  
14 5 Elizabeth McGill, Department of Health Services Research and Policy, London School of  
15  
16 6 Hygiene and Tropical Medicine, [elizabeth.mcgill@lshtm.ac.uk](mailto:elizabeth.mcgill@lshtm.ac.uk)

17  
18  
19 7 Matt Egan, Department of Health Services Research and Policy, London School of Hygiene  
20  
21 8 and Tropical Medicine, [matt.egan@lshtm.ac.uk](mailto:matt.egan@lshtm.ac.uk)

22  
23  
24 9 Tarra L. Penney, School of Global Health, York University, Toronto, [tpenney@yorku.ca](mailto:tpenney@yorku.ca)

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29 11 **Abstract**

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32 12 *Introduction*

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35 13 Given the complex causal origins of many non-communicable diseases (NCDs), and the  
36  
37 14 complex landscapes in which policies designed to tackle them are made and unfold, the need  
38  
39 15 for systems thinking and complexity science (STCS) in developing effective policy solutions  
40  
41 16 has been emphasised. While numerous methods informed by STCS have been applied to the  
42  
43 17 policy process in NCD prevention, these applications have not been systematically catalogued.  
44  
45 18 The aim of this review is to identify existing applications of methods informed by STCS to the  
46  
47 19 policy process for NCD prevention, documenting which domains of the policy process they  
48  
49 20 have been applied to.

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52 21 *Methods and analysis*

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54  
55 22 A systematic scoping review methodology will be used. Identification: We will search  
56  
57 23 Medline, SCOPUS, Embase and Web of Science using search terms combining STCS, NCD  
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1 prevention and the policy process. All records published in English will be eligible for  
2 inclusion, regardless of study design. Selection: We will screen titles and abstracts and extract  
3 data according to published guidelines for scoping reviews. In order to determine the quality  
4 of the included studies, we will use the approach developed by Dixon-Woods and colleagues,  
5 excluding studies identified as fatally flawed, and determining the credibility and contribution  
6 of included studies. Synthesis: We will summarise key data from each study, mapping  
7 applications of methods informed by STCS to different parts of the policy process. This scoping  
8 review will identify existing applications of methods informed by STCS to the policy process.  
9 Review findings will provide a useful reference for policymakers, outlining which domains of  
10 the policy process different methods have been applied to.

#### 11 *Ethics and dissemination*

12 Formal ethical approval is not required, as the study does not involve primary data collection.  
13 The findings of this study will be disseminated through a peer-reviewed publication,  
14 presentations, and summaries for key stakeholders.

#### 15 *Strengths and limitations of this study*

- 16 • This scoping review protocol outlines the first piece of work to systematically identify and review how  
17 methods informed by systems thinking and complexity science (STCS) have been applied to NCD  
18 prevention policy.
- 19 • We use the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocol checklist  
20 (PRISMA-P 2015) in reporting the systematic identification, screening, eligibility of included literature.
- 21 • This study will search journals from multiple disciplines to provide a more comprehensive picture of  
22 how STCS methods have been applied.
- 23 • This scoping review may miss studies that do not self-identify or use the language of methods  
24 informed by STCS.

## 1 Introduction

2 Given the complex and inter-related causes of many non-communicable diseases (NCDs), and  
3 the complex realities in which policies designed to tackle them are made and unfold, the need  
4 for a ‘whole-systems’ approach to NCD prevention which encompasses complexity is  
5 increasingly recognised (1). Systems thinking and complexity science (STCS) represent a  
6 multi-disciplinary field of established and emergent theories and methods (2) which may be  
7 usefully applied to NCD prevention. While some approaches to STCS can be expensive and  
8 require a high level of technical expertise, others may have value for local and national actors  
9 with limited time and resource. It does not need to be costly to think about policies and  
10 interventions from a systems perspective. However, there is a need for practical guidance to  
11 support such use.

12 While a distinction has been drawn between systems thinking and complexity science as  
13 distinct traditions (3), STCS ideas and methods are broadly characterised by the idea that real-  
14 world phenomena exist within systems composed of dynamic actors, including people,  
15 organisations and other structures, which evolve in response to each other and their contexts  
16 (2). Health systems can be understood in this way, as can other systems with direct health  
17 impacts such as transport systems and food systems.

18 *How are systems thinking and complexity science used in public health and health policy?*

19 Acknowledging that phenomena are part of complex systems has repercussions for methods  
20 and practice. Methods informed by STCS have been applied to various processes and by varied  
21 disciplines, and health researchers have explored their utility in solving seemingly intractable  
22 public health issues. These applications are growing rapidly, with as many as 90% of published  
23 examples appearing in the past decade (4).

1 A number of reviews have documented existing approaches to applying STCS to methods and  
2 practice in public health and health policy, with most commenting on the relative paucity of  
3 studies documenting practical applications of such methods (2,5–7). In the discipline of public  
4 health, methods informed by STCS, including systems dynamics modelling, agent-based  
5 modelling, soft systems modelling, causal loop diagrams and social network analysis, have  
6 been applied (2,7).

7 While examples of practical applications are limited, where methods informed by STCS have  
8 been applied to health policy a number of benefits have been highlighted. A 2015 review  
9 focused on the application of a specific method, system dynamics modelling, in support of  
10 health policy at any level of government reported that one of the methods key strengths was  
11 facilitating consensus-building among stakeholders (5). This was achieved by inviting their  
12 participation in developing a model, resulting in agreement over the optimal policy strategy to  
13 tackle a given health problem (5).

14 A 2019 review focusing on how complex systems approaches had been applied in the field of  
15 mental health found that research and application in this area was more limited than in other  
16 fields of health (6). However, the authors commented on the potential applications of such  
17 methods to mental health policy, stating that they might be particularly useful in two processes:  
18 first, determining the potential impacts of ‘distal’ policies, where the policy was removed from  
19 its potential impacts in terms of time or causality; and second, assessing what conditions might  
20 be necessary for a policy to be successful (6).

### 21 *Applying systems thinking and complexity science to the policy process*

22 While there has been substantial discussion and theoretical development relating to STCS in  
23 the policy process, well-documented examples of how STCS approaches can be applied to this  
24 arena, particularly at the national level and in a global context, are less common. Although

1 some examples have been identified, these either do not result from a comprehensive and  
2 systematic review of the literature (4,8), or are restricted to a specific method (5).

3 Further, a gap exists in determining which of these methods are useful and practical for  
4 practitioners with different needs and levels of resource, and in making these distinctions  
5 legible to potential users. Scholars of complex systems have previously emphasised the  
6 importance of increasing the use of methods informed by STCS in public policy processes, and  
7 the responsibility held by researchers to effectively translate their knowledge and methods to  
8 encourage their adoption in the policy process (8,9). A review of existing practice which  
9 documents clear examples of how these methods can be applied in this context, as well as under  
10 what conditions a certain approach might be most useful, is an important part of this process  
11 of translation.

12 For this review to be useful to its intended audience, it is important that it takes into  
13 consideration the resources available to policymakers in generating evidence, as well as the  
14 ways in which evidence is applied in the policy process. Ghaffarzadegan and colleagues  
15 highlight that methods used in the policy process must not only lend themselves well to insight  
16 generation, but also to being communicated, as decisions in the policy world must often be  
17 justified to stakeholders (8). They argue that some STCS-informed methods might lend  
18 themselves more easily to this communication process than others, such as group model  
19 building, which supports diverse stakeholders in reaching a consensus, or a small systems  
20 dynamics model limited to a smaller number of components, making it easier to interpret (8).

21 Despite the emphasis on evidence-based policy in public health (10), the role of evidence in  
22 policymaking remains relatively limited (11), with policymakers often differing with  
23 researchers around what sort of evidence is 'good' and 'useful' (12). Further, evidence  
24 generated by researchers may only be inputted at particular points in the policy process, with  
25 many parts of this process being a complex series of negotiations between different



1 perspectives and interests. Given that policymakers already operate in a complex and dynamic  
2 space, methods informed by STCS which they may apply to different domains of their work  
3 may support them in bringing greater rigour and transparency to the process in its entirety,  
4 potentially bringing them closer to policies which may be deemed evidence-based. While many  
5 working in policy have expressed an interests in the insights yielded by STCS methods, a recent  
6 study of policy evaluators concluded that the methods were in limited use, and that the  
7 pragmatic framing of these methods should be seen as a priority to ensure their greater  
8 penetration into the process (13).

9 With this in mind, the aim of this work will be to conduct a scoping review to identify examples  
10 of methods informed by STCS being applied to the policy process in the field of NCD  
11 prevention.

12

### 13 **Methods and analysis**

14 We will conduct a systematic scoping review of peer-reviewed literature documenting the  
15 application of methods informed by STCS to the policy process in NCD prevention. The  
16 scoping review will be conducted in line with guidelines published by Arksey and O'Malley  
17 and refined by Levac and colleagues (14–16), which emphasise an iterative approach suited to  
18 an exploratory research question.

19 In line with these guidelines, this review will be conducted in the following domains (14):

- 20 1. Identifying the research question
- 21 2. Identifying relevant studies
- 22 3. Study selection
- 23 4. Charting the data
- 24 5. Collating, summarising and reporting the results

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3 1 *Stage 1: Identifying the research question*  
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6 2 The aim of this review is to identify and describe applications of methods informed by STCS  
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8 3 to the policy process in NCD prevention, providing insight into how these methods have been  
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10 4 and can be applied in this context. Informed by this aim, our central research question is:

- 11  
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13 5 • How have methods informed by STCS been applied in the policy process in NCD  
14  
15 6 prevention?

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18 7 Our sub-research questions are:

- 19  
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21 8 1. Which domains of the policy process and areas of NCD prevention policy have methods  
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23 9 informed by STCS been applied to?  
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25 10 2. Which methods have been applied by policymakers with different needs and resources?  
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29 11 By policy we refer to *public* policy, defined as ‘a set of interrelated decisions taken by a  
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31 12 political actor or group of actors concerning the selection of goals and the means of achieving  
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33 13 them within a specified situation where those decisions should, in principle, be within the  
34  
35 14 power of those actors to achieve’ (17). We understand policy as being ultimately in the hands  
36  
37 15 of government, although we recognise that a number of limitations constrain the policy options  
38  
39 16 available to government, including other domestic and international actors (17,18). For the  
40  
41 17 purposes of this review, we extend the definition of government to include supranational  
42  
43 18 governing bodies.  
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47 19 After Howlett and Cashore, we characterise the policy process as one which moves from  
48  
49 20 broader ‘goals’ to concrete ‘means’: specific, on-the ground policy measures designed to  
50  
51 21 achieve the stated goals (18). We use the definition of the domains of the policy process  
52  
53 22 developed by the Centers for Disease Control and prevention (CDC) (see Table 1) (19).  
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1 Table 1: The domains of the policy process, from *Overview of CDC's policy process (19)*

| Domain                          | Description  |
|---------------------------------|--|
| Problem identification          | Clarify and frame the problem or issue in terms of the effect on population health   |
| Policy analysis                 | Identify different policy options to address the problem/issue and use quantitative and qualitative methods to evaluate policy options to determine the most effective, efficient, and feasible option |
| Strategy and policy development | Identify the strategy for getting the policy adopted and how the policy will operate   |
| Policy enactment                | Follow internal or external procedures for getting policy enacted or passed  |
| Policy implementation           | Translate the enacted policy into action, monitor uptake, and ensure full implementation   |

2

3 *Stage 2: Identifying relevant studies*

4 We will systematically search electronic databases (Medline, Scopus, Web of Science,  
 5 EMBASE). The search strategy will be informed by the main concepts in our research question  
 6 using the Population Concept Context (PCC) Framework recommended by the Joanna Briggs  
 7 Institute for use in scoping reviews (20) (see Table 2).

8

9 Table 2: Concepts from the research question used in developing the search strategy  
 10 according to the PCC Framework

|                   |  |
|-------------------|--|
| <b>Population</b> | Whole population approach to NCD prevention                                |
| <b>Concept</b>    | Methods and approaches informed by systems thinking and complexity science |

|                |   |
|----------------|---|
| <b>Context</b> | Policymaking and different domains of the policy process at different levels of government, including local, national and supranational |
|----------------|---|

1

### 2 *Stage 3: Study selection*

3 Records identified through the searches will be collated and double screened using the online  
4 platform Covidence (21). Studies will be included where they meet all of the following criteria:

- 5 1. Primary study from any country or region, available in English;
- 6 2. Self-identify as taking an approach informed by STCS;
- 7 3. Report empirical findings from a piece of research done during a specific point in the  
8 policy process (problem identification, policy analysis, strategy and policy  
9 development, policy enactment, policy implementation, evaluation, stakeholder  
10 engagement and education); and
- 11 4. Focus on a subject related to NCD prevention.

12 For academic records, titles and abstracts will initially be screened, following by full-text  
13 screening. Full-text screening will be undertaken by two independent researchers.

14 In line with published guidelines, the approach to study selection may be refined iteratively  
15 when reviewing articles for inclusion (14–16).

### 16 *Stage 4: Charting the data*

17 Data charting will be conducted using a data charting form designed to identify the information  
18 required to answer the research question and sub-research questions (see Table 3). As  
19 recommended, the data charting form will be piloted with five to ten records to ensure that it  
20 is consistent with the research question, and the data charting form will be revised iteratively  
21 in order to ensure the purpose of the research is being met (14–16). Where the required

1 information is not included in a report, we will follow up with named contacts for additional  
 2 information.

3

4 Table 3: Data charting form

|                    |   |
|--------------------|---|
| <b>Record</b>      | Title   |
|                    | Authors/Organisation  |
|                    | Year  |
| <b>Application</b> | Policy process (problem identification, policy analysis, strategy and policy development, policy enactment, policy implementation) (22) |
|                    | Rationale for using STCS (if stated)  |
|                    | Area of NCD prevention (health outcome or risk factor)  |
|                    | Policy level (local, national, regional, global)  |
|                    | Stakeholders involved, if any (government, academic, professional, industry, community)   |
|                    | Project (state if publication was part of a larger project)   |
|                    | World region  |
| <b>Method</b>      | Name  |
|                    | Tool used (if any: software, kit)   |
|                    | Aim/research question (if stated)   |

5

6 *Stage 5: Collating, summarising and reporting the results*

7 We will undertake quality assessment of the including studies using the approach developed  
 8 by Dixon-Woods and colleagues, excluding studies identified as ‘fatally flawed’ in the first  
 9 instance, and determining the credibility and contribution of included studies as part of the  
 10 synthesis of the evidence (23).

11 We will analyse the extracted data, presenting a numerical summary of the included studies in  
 12 table form, allowing us to identify intersections between STCS methods, domains of the policy

1 process and areas of NCD prevention policy. We will also conduct a thematic analysis of the  
2 contents of the included articles in order to identify, if possible, what needs these methods have  
3 met and the resources they require, and what challenges were encountered in applying the  
4 methods.

#### 5 *Patient and public involvement*

6 Patients or the public were not involved in the design, or conduct, or reporting, or  
7 dissemination plans of our research.

#### 8 **Strengths and weaknesses of the study**

9 This review will only identify examples of methods which have previously been applied in the  
10 policy domain, and where this application has been documented. We hope this will increase  
11 the value of our findings for practitioners, but as a result, methods that have not been applied,  
12 or only applied in other fields, will not be identified in this review.

13 Further, studies that do not 'self-define' as using methods informed by STCS will not be  
14 included. Anzola and colleagues highlight the existence of 'analogical' uses of terms relating  
15 to complexity, where central characteristics of STCS are employed or implicitly referred to  
16 without being explicitly linked to the relevant theory and methods (24). In the absence of shared  
17 terminology, such usage may be difficult to systematically identify in the literature. However,  
18 given that the aim of this review is to identify the applications of specific methods, we hope  
19 this will not result in the exclusion of a large number of relevant studies.

20 Finally, this review will focus on peer-reviewed literature in order to identify the range of  
21 specific and distinct methods that are in use. As a result, applications of methods informed by  
22 STCS which are documented in the grey literature will not be identified.

#### 23 **Ethics and dissemination**

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2  
3 1 Formal ethical approval is not required, as the study does not involve primary data collection.  
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5  
6 2 The further involvement of methods informed by STCS in the policy process will support  
7  
8 3 policymakers in developing evidence-based solutions to complex problems that arise in  
9  
10 4 tackling NCDs. This scoping review will identify existing applications of methods informed  
11  
12 5 by STCS to the policy process. Review findings will provide a useful reference for  
13  
14 6 policymakers, outlining which domains of the policy process different methods have been  
15  
16 7 applied to, and highlighting the resources they require and the problems they have addressed.  
17  
18 8 The findings of this study will be disseminated through a peer-reviewed publication,  
19  
20 9 presentations, and summaries for key stakeholders.  
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## 25 10 **List of abbreviations**

26  
27  
28 11 STCS: Systems thinking and complexity science  
29

30 12 NCD: Non-communicable disease  
31  
32

## 33 13 **Declarations**

34  
35  
36  
37 14 *Ethics approval and consent to participate*  
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39  
40 15 Not required.  
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43 16 *Patient consent for publication*  
44

45  
46 17 Not required.  
47  
48

49 18 *Availability of data and material*  
50

51 19 Data sharing not applicable to this article as no datasets were generated or analysed during  
52  
53 20 the current study.  
54

55  
56 21 *Competing interests*  
57

58  
59 22 The authors declare that they have no competing interests.  
60

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4  
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18

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20  
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22  
23 10 manuscript.  
24

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## 14 **Appendix**

### 16 *Academic database search strings*

17 We will systematically search electronic databases (Medline, Scopus, Web of Science,  
18 EMBASE). The search strategy will be built around four themes representative of the  
19 boundaries of the scoping review: methods informed by STCS; different types of policy;  
20 domains of the policy process; and NCD prevention. Due to the large numbers of irrelevant  
21 records returned by incorporating regulation and related words in the search strategy, the search  
22 strategy also sought to exclude records related to genetics. Specific terms used were as follows:  
23  
23 Block 1 – Systems thinking and complexity science

1 "system theory" OR "system thinking" OR "system science" OR "complex system" OR  
 2 "system model" OR "system dynamics" OR "system approach" OR "system lens" OR  
 3 "system perspective" OR complexity OR "complexity theory" OR "complexity science"  
 4 OR "adaptive system" OR "soft system" OR "agent-based model" OR "group model  
 5 building" OR "concept mapping" OR "system dynamic" OR "network analysis" OR "partial  
 6 model testing" OR "system heuristics" OR "causal loop diagram" OR "scenario technique"  
 7 OR cynefin OR "solution focus" OR behavior-over-time OR "discrete event modelling"  
 8 Block 2 – Types of policy  
 9 policy OR law OR legal OR legislative OR regulation OR regulate OR regulatory OR tariff  
 10 OR subsidy OR tax OR ban OR "voluntary agreement" OR incentive OR fiscal OR  
 11 guidelines OR government  
 12 Block 3 – Domains of the policy process  
 13 Evaluation OR implementation OR facilitation OR "policy development" OR policymaking  
 14 OR "case study" OR "problem identification" OR "decision-making" OR strategy OR  
 15 "policy enactment" OR "policy analysis" OR "stakeholder engagement"  
 16 Block 4 – NCD prevention  
 17 "public health" OR "health promotion" OR "health inequality" OR "health inequity" OR  
 18 "health behavior" OR "well being" OR wellbeing OR nutrition OR diet OR obesity OR "fast  
 19 food" OR "junk food" OR sugar OR salt OR tobacco OR smoking OR cigarette OR alcohol  
 20 OR "illegal drug\*" OR "illicit drug" OR "recreational drug" OR "social determinant" OR  
 21 "physical activity" OR exercise OR "non-communicable disease" OR "noncommunicable  
 22 disease" OR "chronic disease" OR "sedentary behaviour" OR NCD  
 23 NOT Block 5 – Genetics  
 24 Gene OR genetic OR transcript OR transcription OR cell OR nucleus OR mouse OR mice

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## PRISMA-P 2015 Checklist

This checklist has been adapted for use with systematic review protocol submissions to BioMed Central journals from Table 3 in Moher D et al: Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews* 2015 4:1

An Editorial from the Editors-in-Chief of *Systematic Reviews* details why this checklist was adapted – Moher D, Stewart L & Shekelle P: Implementing PRISMA-P: recommendations for prospective authors. *Systematic Reviews* 2016 5:15

| Section/topic                     | #  | Checklist item  | Information reported                |                                     | Line number(s)           |
|-----------------------------------|----|---|-------------------------------------|-------------------------------------|--------------------------|
|                                   |    |   | Yes                                 | No                                  |                          |
| <b>ADMINISTRATIVE INFORMATION</b> |    |   |                                     |                                     |                          |
| <b>Title</b>                      |    |   |                                     |                                     |                          |
| Identification                    | 1a | Identify the report as a protocol of a systematic review  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.1 l.1-2                |
| Update                            | 1b | If the protocol is for an update of a previous systematic review, identify as such  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | N/A                      |
| <b>Registration</b>               | 2  | If registered, provide the name of the registry (e.g., PROSPERO) and registration number in the Abstract  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | N/A                      |
| <b>Authors</b>                    |    |   |                                     |                                     |                          |
| Contact                           | 3a | Provide name, institutional affiliation, and e-mail address of all protocol authors; provide physical mailing address of corresponding author   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.1 l.3-10               |
| Contributions                     | 3b | Describe contributions of protocol authors and identify the guarantor of the review   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.17 l.1-3               |
| <b>Amendments</b>                 | 4  | If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | N/A                      |
| <b>Support</b>                    |    |   |                                     |                                     |                          |
| Sources                           | 5a | Indicate sources of financial or other support for the review   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.16 l.11-16             |
| Sponsor                           | 5b | Provide name for the review funder and/or sponsor   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | N/A – no project funding |
| Role of sponsor/funder            | 5c | Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | N/A                      |
| <b>INTRODUCTION</b>               |    |   |                                     |                                     |                          |
| <b>Rationale</b>                  | 6  | Describe the rationale for the review in the context of what is already known   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.5 l.1-24, p.6 l.1-20   |

| Section/topic                      | #   | Checklist item  | Information reported                |                                     | Line number(s)   |
|------------------------------------|-----|---|-------------------------------------|-------------------------------------|--|
|                                    |     |   | Yes                                 | No                                  |  |
| Objectives                         | 7   | Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.7 l.14-22  |
| <b>METHODS</b>                     |     |   |                                     |                                     |  |
| Eligibility criteria               | 8   | Specify the study characteristics (e.g., PICO, study design, setting, time frame) and report characteristics (e.g., years considered, language, publication status) to be used as criteria for eligibility for the review                   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.11 l.6-13  |
| Information sources                | 9   | Describe all intended information sources (e.g., electronic databases, contact with study authors, trial registers, or other grey literature sources) with planned dates of coverage  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.10 l.1-11  |
| Search strategy                    | 10  | Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.21-23  |
| <b>STUDY RECORDS</b>               |     |   |                                     |                                     |  |
| Data management                    | 11a | Describe the mechanism(s) that will be used to manage records and data throughout the review  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.11 l.5-6   |
| Selection process                  | 11b | State the process that will be used for selecting studies (e.g., two independent reviewers) through each phase of the review (i.e., screening, eligibility, and inclusion in meta-analysis)   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.12 l.2-7   |
| Data collection process            | 11c | Describe planned method of extracting data from reports (e.g., piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.12 l.8-15  |
| Data items                         | 12  | List and define all variables for which data will be sought (e.g., PICO items, funding sources), any pre-planned data assumptions and simplifications   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.13   |
| Outcomes and prioritization        | 13  | List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | N/A – scoping review of application of different methods |
| Risk of bias in individual studies | 14  | Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis                        | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.13 l.3-6   |
| <b>DATA</b>                        |     |   |                                     |                                     |  |
| Synthesis                          | 15a | Describe criteria under which study data will be quantitatively synthesized   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.12 l.8-15, p.13  |
|                                    | 15b | If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data, and methods of combining data from studies, including any planned exploration of consistency (e.g., $I^2$ , Kendall's tau) | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | N/A  |

| Section/topic                            | #   | Checklist item  | Information reported                |                                     | Line number(s)       |
|--|-----|---|-------------------------------------|-------------------------------------|----------------------|
|  |     |   | Yes                                 | No                                  |                      |
|  | 15c | Describe any proposed additional analyses (e.g., sensitivity or subgroup analyses, meta-regression)                         | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | N/A                  |
|  | 15d | If quantitative synthesis is not appropriate, describe the type of summary planned  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.14 l.2-12          |
| <b>Meta-bias(es)</b>                     | 16  | Specify any planned assessment of meta-bias(es) (e.g., publication bias across studies, selective reporting within studies) | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | N/A – scoping review |
| <b>Confidence in cumulative evidence</b> | 17  | Describe how the strength of the body of evidence will be assessed (e.g., GRADE)  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | N/A – scoping review |

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# BMJ Open

## Systems thinking and complexity science methods and the policy process in non-communicable disease prevention: a systematic scoping review protocol

|                                 |   |
|---------------------------------|---|
| Journal:                        | <i>BMJ Open</i>   |
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| Complete List of Authors:       | Clifford Astbury, Chloe; York University Faculty of Health, School of Global Health<br>McGill, Elizabeth; London School of Hygiene & Tropical Medicine, Health Services Research and Policy<br>Egan, Matt; LSHTM, SEHR<br>Penney, Tarra; York University Faculty of Health, School of Global Health |
| <b>Primary Subject Heading</b>: | Health policy   |
| Secondary Subject Heading:      | Research methods, Public health   |
| Keywords:                       | PUBLIC HEALTH, STATISTICS & RESEARCH METHODS, Health policy < HEALTH SERVICES ADMINISTRATION & MANAGEMENT   |
|                                 |   |

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4 1 **Systems thinking and complexity science methods and the policy process in non-**  
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6 2 **communicable disease prevention: a systematic scoping review protocol**

7  
8  
9 3 Chloe Clifford Astbury, Global Food Systems and Policy Research, School of Global Health,  
10  
11 4 York University, Toronto, [castbury@yorku.ca](mailto:castbury@yorku.ca)

12  
13  
14 5 Elizabeth McGill, Department of Health Services Research and Policy, London School of  
15  
16 6 Hygiene and Tropical Medicine, [elizabeth.mcgill@lshtm.ac.uk](mailto:elizabeth.mcgill@lshtm.ac.uk)

17  
18  
19 7 Matt Egan, Department of Health Services Research and Policy, London School of Hygiene  
20  
21 8 and Tropical Medicine, [matt.egan@lshtm.ac.uk](mailto:matt.egan@lshtm.ac.uk)

22  
23  
24 9 Tarra L. Penney, Global Food Systems and Policy Research, School of Global Health, York  
25  
26 10 University, 4700 Keele St. Toronto ON Canada M3J 1P3, [tpenney@yorku.ca](mailto:tpenney@yorku.ca) (corresponding  
27  
28 11 author)

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34 13 **Abstract**

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37 14 *Introduction*

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40 15 Given the complex causal origins of many non-communicable diseases (NCDs), and the  
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42 16 complex landscapes in which policies designed to tackle them are made and unfold, the need  
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44 17 for systems thinking and complexity science (STCS) in developing effective policy solutions  
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46 18 has been emphasised. While numerous methods informed by STCS have been applied to the  
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48 19 policy process in NCD prevention, these applications have not been systematically catalogued.  
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50 20 The aim of this scoping review is to identify existing applications of methods informed by  
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52 21 STCS to the policy process for NCD prevention, documenting which domains of the policy  
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54 22 process they have been applied to.

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58 23 *Methods and analysis*

1 A systematic scoping review methodology will be used. Identification: We will search  
2 Medline, SCOPUS, Embase and Web of Science using search terms combining STCS, NCD  
3 prevention and the policy process. All records published in English will be eligible for  
4 inclusion, regardless of study design. Selection: We will screen titles and abstracts and extract  
5 data according to published guidelines for scoping reviews. In order to determine the quality  
6 of the included studies, we will use the approach developed by Dixon-Woods and colleagues,  
7 excluding studies identified as fatally flawed, and determining the credibility and contribution  
8 of included studies. Synthesis: We will identify relevant studies, summarising key data from  
9 each study and mapping applications of methods informed by STCS to different parts of the  
10 policy process. Review findings will provide a useful reference for policymakers, outlining  
11 which domains of the policy process different methods have been applied to.

### 12 *Ethics and dissemination*

13 Formal ethical approval is not required, as the study does not involve primary data collection.  
14 The findings of this study will be disseminated through a peer-reviewed publication,  
15 presentations, and summaries for key stakeholders.

### 16 *Strengths and limitations of this study*

- 17 • This scoping review protocol outlines the first piece of work to systematically identify and review how  
18 methods informed by systems thinking and complexity science (STCS) have been applied to NCD  
19 prevention policy.
- 20 • We use the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocol checklist  
21 (PRISMA-P 2015) in reporting the systematic identification, screening, eligibility of included literature.
- 22 • This study will search journals from multiple disciplines to provide a more comprehensive picture of  
23 how STCS methods have been applied.
- 24 • This scoping review may miss studies that do not self-identify or use the language of methods  
25 informed by STCS.

## 1 Introduction

2 Given the complex and inter-related causes of many non-communicable diseases (NCDs), and  
3 the complex realities in which policies designed to tackle them are made and unfold, the need  
4 for a 'system-level' approach to NCD prevention which encompasses complexity is  
5 increasingly recognised (1). Systems thinking and complexity science (STCS) represent a  
6 multi-disciplinary field of established and emergent theories and methods (2) which may be  
7 applied to NCD prevention. While a contrast has been drawn between systems thinking and  
8 complexity science as distinct traditions (3), STCS approaches and methods are broadly  
9 characterised by the idea that real-world phenomena exist within systems composed of  
10 dynamic actors, including people, organisations and other structures, which evolve in response  
11 to each other and their contexts (2).

12 *What role can systems thinking and complexity science play in public health and health policy?*

13 Methods informed by STCS have been applied to various phenomenon of interest by a range  
14 of disciplines, and health researchers have explored their utility in solving seemingly  
15 intractable public health issues. These applications in public health are growing rapidly, with  
16 as many as 90% of published examples appearing in the past decade (4). Several reviews have  
17 documented existing approaches to applying STCS to methods and practice in public health.  
18 These reviews have made a number of contributions to clarifying terminology and theoretical  
19 framing of STCS in public health, including developing frameworks to assess and strengthen  
20 complex systems for chronic disease prevention (5) and outlining the range of STCS ideas  
21 referred to be public health researchers (2). However, most reviews have commented on the  
22 relative paucity of studies documenting practical applications of such methods (2,6–8).

23 Theoretical discussions around how STCS can be usefully applied to understanding and  
24 facilitating the policy process have highlighted the existence of a complex 'policy-making

1 system', where networks of individuals, organisations and interests interact to produce  
2 emergent systemic behaviours (9,10). Characteristics of complexity can be identified  
3 throughout the policy process: policy decisions are difficult to predict using deterministic  
4 models; policy decisions, once taken, may be implemented in dynamic ways adapted to local  
5 contexts by different actors; and implemented policies may have different impacts in different  
6 contexts (9). However, discussions of STCS and the policy process have also questioned the  
7 extent to which STCS presents policymakers with a 'new' way of approaching their work,  
8 given that policymakers may already operate with an implicit awareness of the notion of  
9 'complexity', independently of STCS theory (10).

10 However, STCS-informed methods may have the added value of bringing more robustness to  
11 how policymakers engage with the complexity of the policy process, and providing more  
12 opportunities to incorporate research evidence. Despite the emphasis on evidence-based policy  
13 in public health (11), the role of research evidence in policymaking remains relatively limited  
14 (12), with policymakers often differing with researchers around what sort of evidence is 'good'  
15 and 'useful' (13). Further, evidence generated by researchers may only be inputted at particular  
16 points in the policy process, with many parts of this process being a dynamic series of  
17 negotiations between different perspectives and interests. Given that policymakers already  
18 operate in a continually evolving space, methods informed by STCS applied to different  
19 domains of their work may bring greater rigour and transparency to the process, and ultimately  
20 the utilization of evidence to inform policy. While many working in policy have expressed an  
21 interest in the promise of STCS methods to enhance policy, a recent study of policy evaluators  
22 concluded that the methods were in limited use, and that the pragmatic framing of these  
23 methods should be seen as a priority to ensure their greater penetration into the process (14).

24 While examples of practical applications are limited, studies have demonstrated the benefits of  
25 applying methods informed by STCS to the health policy domain. A 2015 review of system

1 dynamics modelling in support of health policy at any level of government reported that the  
2 method's key strengths included facilitating consensus-building among stakeholders and  
3 providing policymakers with dynamic, targeted tools to inform their decisions (6). This review  
4 also highlighted ways forward for system dynamics modelling in health policy, including more  
5 user-friendly software; better communication of the advantages of system dynamics modelling  
6 to policymakers; building capacity to enable more widespread use of this type of modelling;  
7 and evaluative evidence to illustrate the benefits of the method (6). A 2019 review of system  
8 dynamics and agent-based modelling in mental health research, while identifying a limited  
9 number of empirical examples, commented on the potential applications of such methods to  
10 mental health policy, stating that they might be particularly useful in two processes: first,  
11 modelling the impacts of 'distal' policies, where the policy was removed from its potential  
12 impacts in terms of time or causality; and second, assessing what conditions might be necessary  
13 for a policy to be successful (7). Finally, Johnston et al. developed an STCS-informed  
14 framework which they used to assess a number of North American obesity policy documents  
15 (15). This framework used the concept of 'leverage points' within systems, which identify  
16 different system components as having the potential to create more or less substantial change  
17 (16). This analysis highlighted that many recommendations made in obesity policy focus on  
18 leverage points with limited potential to provoke substantial, systems-level change (15).

### 19 *Aims and scope*

20 While there has been substantive discussion and theoretical development relating to STCS in  
21 the policy process, well-documented examples of how STCS approaches can be applied in  
22 policymaking for NCD prevention are less common. STCS methods may be usefully applied  
23 in other areas of public health characterised by complex interactions between multiple  
24 stakeholders and domains, as well as other disciplines more broadly. However, policymaking  
25 for NCD prevention has characteristics which may make STCS methods particularly useful.

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2  
3 1 First, there are commercial actors and interests involved in NCD-related policy, including the  
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5 2 tobacco, alcohol, and food and beverage industries. This adds additional complexity to the  
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7 3 policy process and makes a case for transparent approaches to incorporating multiple  
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9 4 perspectives and forms of evidence in making policy decisions. Second, despite concerted  
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11 5 policy efforts to reduce the burden of NCDs, in many contexts progress has been limited,  
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13 6 suggesting that a novel approach that encompasses complexity may be useful (17,18).  
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17 7 Although some relevant examples of STCS methods in the policy process have been identified,  
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19 8 these either do not result from a comprehensive and systematic review of the literature (4,19),  
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21 9 or are restricted to a specific method (6). Other systematic reviews of STCS in public health  
22  
23 10 do not focus specifically on policymaking (2,5,8), which is a specific context and process in  
24  
25 11 which STCS-informed methods may have particular uses and important strengths and  
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27 12 limitations.  
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31 13 Further, a gap exists in determining which of these methods are useful and practical for  
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33 14 practitioners with different needs and levels of resource, and in making these distinctions  
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35 15 accessible to potential users. Scholars of complex systems have previously emphasised the  
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37 16 importance of increasing the use of methods informed by STCS in public policy processes, and  
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39 17 the responsibility held by researchers to effectively translate their knowledge and methods to  
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41 18 encourage their adoption in the policy process (19,20). A review of existing practice which  
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43 19 documents clear examples of how these methods can be applied in this context, as well as under  
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45 20 what conditions a certain approach might be most useful, is an important part of this process  
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47 21 of translation.  
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51  
52 22 While STCS-informed approaches to understanding policy-making have emphasised its non-  
53  
54 23 linearity, linear or cyclical models of the policy process remain in frequent use by policymakers  
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56 24 and practitioners (21,22). In order to facilitate the practical use of review findings, we will use  
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58 25 a cyclical model of the policy process (developed by the Centers for Disease Control (CDC)  
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(21)) to structure the process and results of this review. After Howlett and Cashore, we characterise the policy process as one which moves from broader ‘goals’ to concrete ‘means’: specific, on-the ground policy measures designed to achieve the stated goals (23). We use the definition of the domains of the policy process developed by the CDC (see Table 1) (21).

Table 1: The domains of the policy process, from *Overview of CDC’s policy process* (21)

| Domain                          | Description  |
|---------------------------------|--|
| Problem identification          | Clarify and frame the problem or issue in terms of the effect on population health   |
| Policy analysis                 | Identify different policy options to address the problem/issue and use quantitative and qualitative methods to evaluate policy options to determine the most effective, efficient, and feasible option |
| Strategy and policy development | Identify the strategy for getting the policy adopted and how the policy will operate   |
| Policy enactment                | Follow internal or external procedures for getting policy enacted or passed  |
| Policy implementation           | Translate the enacted policy into action, monitor uptake, and ensure full implementation   |

Further, for this review to be useful to its intended audience, it is important that it takes into consideration the resources available to policymakers in generating evidence, as well as the ways in which evidence is applied in the policy process. Ghaffarzadegan and colleagues highlight that methods used in the policy process must not only lend themselves well to insight generation, but also to being communicated, as decisions in the policy world must often be justified to stakeholders (19). They argue that some STCS-informed methods might lend themselves more easily to this communication process than others, such as group model building, which supports diverse stakeholders in reaching a consensus, or a small systems dynamics model limited to a smaller number of components, making it easier to interpret (19).

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2  
3 1 Therefore, the objective of this review will be to systematically identify and summarise existing  
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5 2 applications of STCS-informed methods in NCD prevention policy, documenting key  
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7 3 methodological elements and identifying which domains of the policy process they have been  
8  
9 4 applied to.  
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### 13 **Methods and analysis**

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16 6 We will conduct a systematic scoping review of peer-reviewed literature documenting the  
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18 7 application of methods informed by STCS to the policy process in NCD prevention. The  
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20 8 scoping review will be conducted in line with guidelines published by Arksey and O'Malley  
21  
22 9 and refined by Levac and colleagues (24–26), which emphasise an iterative approach suited to  
23  
24  
25 10 an exploratory research question.  
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27

28 11 In line with these guidelines, this review will be conducted in the following domains (24):  
29

- 30 12 1. Identifying the research question
- 31  
32  
33 13 2. Identifying relevant studies
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35  
36 14 3. Study selection
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39 15 4. Charting the data
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41  
42 16 5. Collating, summarising and reporting the results
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#### 44 *Stage 1: Identifying the research question*

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46  
47 18 Informed by our study objective, our central research questions are:  
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49

- 50 19 1. How have methods informed by STCS been applied in the policy process in NCD  
51  
52 20 prevention? Which domains of the policy process and areas of NCD prevention policy  
53  
54 21 have methods informed by STCS been applied to?
- 55  
56  
57 22 2. What practical considerations, such as advantages, limitations, barriers and facilitators,  
58  
59 23 have been described in applying STCS-informed methods to NCD prevention policy?

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3 1 By policy we refer to *public* policy, defined as ‘a set of interrelated decisions taken by a  
4  
5 2 political actor or group of actors concerning the selection of goals and the means of achieving  
6  
7 3 them within a specified situation where those decisions should, in principle, be within the  
8  
9 4 power of those actors to achieve’ (27). We understand policy as being ultimately in the hands  
10  
11 5 of government, although we recognise that a number of limitations constrain the policy options  
12  
13 6 available to government, including other domestic and international actors (23,27). For the  
14  
15 7 purposes of this review, we extend the definition of government to include supranational  
16  
17 8 governing bodies.

### 9 *Stage 2: Identifying relevant studies*

10 We will systematically search electronic databases for peer-reviewed literature (Medline,  
11  
12 Scopus, Web of Science, EMBASE). This review will focus on peer-reviewed literature in  
13  
14 order to identify the range of specific and distinct methods that are in use. As a result,  
15  
16 applications of methods informed by STCS which are documented in the grey literature will  
17  
18 not be identified.

19 The search strategy will be informed by the main concepts in our research question using the  
20  
21 Population Concept Context (PCC) Framework recommended by the Joanna Briggs Institute  
22  
23 for use in scoping reviews (28) (see Table 2; see Supplementary File 1 for detailed search  
24  
25 strategy). Search strategies will be developed iteratively, informed by existing systematic  
26  
27 reviews focused on related concepts (5,6,29–31) and indicator papers meeting inclusion criteria  
28  
29 of which the authors are aware. As initial searches generated numerous records relating to  
30  
31 genetics (due to the inclusion of the term ‘regulation’ along with health-related terms), a block  
32  
33 of NOT terms will be added to the search strategy.

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56 Table 2: Concepts from the research question used in developing the search strategy  
57  
58 according to the PCC Framework  
59  
60

|                   |   |
|-------------------|---|
| <b>Population</b> | Whole population approach to NCD prevention   |
| <b>Concept</b>    | Methods and approaches informed by systems thinking and complexity science  |
| <b>Context</b>    | Policymaking and different domains of the policy process at different levels of government, including local, national and supranational |

1

2 *Stage 3: Study selection*

3 Records identified through the searches will be collated and double screened using the online  
4 platform Covidence (32). Studies will be included where they meet all of the following criteria:

- 5 1. Primary study from any country or region, available in English;
- 6 2. Self-identify as taking an approach informed by STCS;
- 7 3. Report empirical findings from a piece of research done during a specific point in the  
8 policy process (problem identification, policy analysis, strategy and policy  
9 development, policy enactment, policy implementation, evaluation, stakeholder  
10 engagement and education); and
- 11 4. Focus on a subject related to NCD prevention.

12 For academic records, titles and abstracts will initially be screened, followed by full-text  
13 screening. Full-text screening will be undertaken by two independent researchers, one of whom  
14 will have extensive experience in the area of STCS and NCD prevention (TLP or EM, who  
15 have previously authored reviews on related topics (29,33)). In order to facilitate the  
16 identification of methods which may not have been identified as STCS methods by previous  
17 reviews of the public health literature (2,8,29), but which authors have identified as STCS

1 methods, title-abstract screening will take an inclusive approach, and full texts will be screened  
 2 to identify STCS language used to describe methods. Papers which focus on healthcare or  
 3 clinical services rather than primary prevention will be excluded. Papers which concern  
 4 potential risk factors for NCDs but focus on non-NCD outcomes (such as alcohol consumption  
 5 as a risk factor for road traffic accidents or inter-personal violence) will also be excluded.

6 In line with published guidelines, the approach to study selection may be refined iteratively  
 7 when reviewing articles for inclusion (24–26).

#### 8 *Stage 4: Charting the data*

9 Data charting will be conducted using a data charting form designed to identify the information  
 10 required to answer the research question and sub-research questions (see Table 3). As  
 11 recommended, the data charting form will be piloted with five to ten records to ensure that it  
 12 is consistent with the research question, and the data charting form will be revised iteratively  
 13 in order to ensure the purpose of the research is being met (24–26). Where the required  
 14 information is not included in a report, we will follow up with named contacts for additional  
 15 information.

16  
 17 Table 3: Data charting form

|                    |   |
|--------------------|---|
| <b>Record</b>      | Title   |
|                    | Authors/Organisation  |
|                    | Year  |
| <b>Application</b> | Policy process (problem identification, policy analysis, strategy and policy development, policy enactment, policy implementation) (34) |
|                    | Rationale for using STCS (if stated)  |
|                    | Area of NCD prevention (health outcome or risk factor)  |
|                    | Policy level (local, national, regional, global)  |

|               |   |
|---------------|---|
|               | Stakeholders involved, if any (government, academic, professional, industry, community) |
|               | Project (state if publication was part of a larger project)                             |
|               | World region  |
| <b>Method</b> | Name  |
|               | Tool used (if any: software, kit)   |
|               | Aim/research question (if stated)   |

1

### 2 *Stage 5: Collating, summarising and reporting the results*

3 We will undertake quality assessment of the including studies using the approach developed  
 4 by Dixon-Woods and colleagues, excluding studies identified as ‘fatally flawed’ in the first  
 5 instance, and determining the credibility and contribution of included studies as part of the  
 6 synthesis of the evidence (35).

7 We will analyse the extracted data, presenting a numerical summary of the included studies in  
 8 table form, allowing us to identify intersections between STCS methods, domains of the policy  
 9 process and areas of NCD prevention policy. We will also conduct a thematic analysis of the  
 10 contents of the included articles in order to identify, if possible, what needs these methods have  
 11 met and the resources they require, and what challenges were encountered in applying the  
 12 methods.

### 13 *Patient and public involvement*

14 Patients or the public were not involved in the design, or conduct, or reporting, or  
 15 dissemination plans of our research.

### 16 **Strengths and weaknesses of the study**

17 This review will only identify examples of methods which have previously been applied in the  
 18 policy domain, and where this application has been documented. We hope this will increase

1 the value of our findings for practitioners, but as a result, methods that have not been applied,  
2 or only applied in other fields, will not be identified in this review.

3 Further, studies that do not 'self-define' as using methods informed by STCS will not be  
4 included. Anzola and colleagues highlight the existence of 'analogical' uses of terms relating  
5 to complexity, where central characteristics of STCS are employed or implicitly referred to  
6 without being explicitly linked to the relevant theory and methods (36). Narrative reviews have  
7 previously identified implicit complexity concepts in the policy literature (9). However, in the  
8 absence of shared terminology, such usage may be difficult to systematically identify in the  
9 literature given the reliance of the systematic review method on identifying key words and  
10 phrases. In order to include as many relevant examples as possible, we will conduct title-  
11 abstract screening in an inclusive way, progressing records to full-text screening if there is any  
12 uncertainty. Further, our search strategy has been designed to be relatively inclusive, including  
13 broad terms related to STCS, such as complexity and system lens or perspective, as well as  
14 specific methods previously identified in systematic reviews.

### 15 **Ethics and dissemination**

16 Formal ethical approval is not required, as the study does not involve primary data collection.  
17 The further involvement of methods informed by STCS in the policy process will support  
18 policymakers in developing evidence-based solutions to complex problems that arise in  
19 tackling NCDs. This scoping review will identify existing applications of methods informed  
20 by STCS to the policy process. Review findings will provide a useful reference for  
21 policymakers, outlining which domains of the policy process different methods have been  
22 applied to, and highlighting the resources they require and the problems they have addressed.  
23 The findings of this study will be disseminated through a peer-reviewed publication,  
24 presentations, and summaries for key stakeholders.

1  
2  
3 **1 List of abbreviations**  
4

5  
6 2 STCS: Systems thinking and complexity science  
7

8  
9 3 NCD: Non-communicable disease  
10

11  
12 **4 Declarations**  
13

14  
15 5 *Ethics approval and consent to participate*  
16

17  
18 6 Not required.  
19

20  
21 7 *Patient consent for publication*  
22

23  
24 8 Not required.  
25

26  
27 9 *Availability of data and material*  
28

29  
30 10 Data sharing not applicable to this article as no datasets were generated or analysed during  
31 the current study.  
32

33  
34 12 *Competing interests*  
35

36  
37 13 The authors declare that they have no competing interests.  
38

39  
40 14 *Funding*  
41

42  
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47 those of the author(s) and not necessarily those of the NIHR or the Department of Health and  
48 Social Care.  
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58 21 *Contributors*  
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1  
2  
3 1 CCA and TLP conceived and designed the study. CCA drafted the manuscript. TLP, EM and  
4  
5 2 ME provided critical input on the manuscript and methods, and have read and approved the  
6  
7 3 final manuscript.  
8

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10  
11  
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13  
14 6 of the proposed review by members of the WHO European Office for Prevention and Control  
15  
16 7 of Noncommunicable Diseases.  
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## Supplementary file 1

### Academic database search strings

We will systematically search electronic databases (Medline, Scopus, Web of Science, EMBASE). The search strategy will be built around four themes representative of the boundaries of the scoping review: methods informed by STCS; different types of policy; domains of the policy process; and NCD prevention. Due to the large numbers of irrelevant records returned by incorporating regulation and related words in the search strategy, the search strategy also sought to exclude records related to genetics. Specific terms used were as follows:

#### Block 1 – Systems thinking and complexity science

"system theory" OR "system thinking" OR "system science" OR "complex system" OR "system model" OR "system dynamics" OR "system approach" OR "system lens" OR "system perspective" OR complexity OR "complexity theory" OR "complexity science" OR "adaptive system" OR "soft system" OR "agent-based model" OR "group model building" OR "concept mapping" OR "system dynamic" OR "network analysis" OR "partial model testing" OR "system heuristics" OR "causal loop diagram" OR "scenario technique" OR cynefin OR "solution focus" OR behavior-over-time OR "discrete event modelling"

#### Block 2 – Types of policy

policy OR law OR legal OR legislative OR regulation OR regulate OR regulatory OR tariff OR subsidy OR tax OR ban OR "voluntary agreement" OR incentive OR fiscal OR guidelines OR government

#### Block 3 – Domains of the policy process

Evaluation OR implementation OR facilitation OR "policy development" OR policymaking OR "case study" OR "problem identification" OR "decision-making" OR strategy OR "policy enactment" OR "policy analysis" OR "stakeholder engagement"

#### Block 4 – NCD prevention

1  
2  
3  
4 “public health” OR “health promotion” OR “health inequality” OR “health inequity” OR  
5  
6 “health behavior” OR “well being” OR wellbeing OR nutrition OR diet OR obesity OR “fast  
7  
8 food” OR “junk food” OR sugar OR salt OR tobacco OR smoking OR cigarette OR alcohol  
9  
10 OR “illegal drug\*” OR “illicit drug” OR “recreational drug” OR “social determinant” OR  
11  
12 “physical activity” OR exercise OR “non-communicable disease” OR “noncommunicable  
13  
14 disease” OR “chronic disease” OR “sedentary behaviour” OR NCD  
15

16 NOT Block 5 – Genetics

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18  
19 Gene OR genetic OR transcript OR transcription OR cell OR nucleus OR mouse OR mice  
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## PRISMA-P 2015 Checklist

This checklist has been adapted for use with systematic review protocol submissions to BioMed Central journals from Table 3 in Moher D et al: Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews* 2015 4:1

An Editorial from the Editors-in-Chief of *Systematic Reviews* details why this checklist was adapted – Moher D, Stewart L & Shekelle P: Implementing PRISMA-P: recommendations for prospective authors. *Systematic Reviews* 2016 5:15

| Section/topic                     | #  | Checklist item  | Information reported                |                                     | Line number(s)           |
|-----------------------------------|----|---|-------------------------------------|-------------------------------------|--------------------------|
|                                   |    |   | Yes                                 | No                                  |                          |
| <b>ADMINISTRATIVE INFORMATION</b> |    |   |                                     |                                     |                          |
| <b>Title</b>                      |    |   |                                     |                                     |                          |
| Identification                    | 1a | Identify the report as a protocol of a systematic review  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.1 l.1-2                |
| Update                            | 1b | If the protocol is for an update of a previous systematic review, identify as such  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | N/A                      |
| <b>Registration</b>               | 2  | If registered, provide the name of the registry (e.g., PROSPERO) and registration number in the Abstract  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | N/A                      |
| <b>Authors</b>                    |    |   |                                     |                                     |                          |
| Contact                           | 3a | Provide name, institutional affiliation, and e-mail address of all protocol authors; provide physical mailing address of corresponding author   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.1 l.3-11               |
| Contributions                     | 3b | Describe contributions of protocol authors and identify the guarantor of the review   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.14 l. 21-p.15 l.3      |
| <b>Amendments</b>                 | 4  | If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | N/A                      |
| <b>Support</b>                    |    |   |                                     |                                     |                          |
| Sources                           | 5a | Indicate sources of financial or other support for the review   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.14 l.14-20             |
| Sponsor                           | 5b | Provide name for the review funder and/or sponsor   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | N/A – no project funding |
| Role of sponsor/funder            | 5c | Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | N/A                      |
| <b>INTRODUCTION</b>               |    |   |                                     |                                     |                          |
| <b>Rationale</b>                  | 6  | Describe the rationale for the review in the context of what is already known   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.5 l.19-25, pp. 6-7     |

| Section/topic                      | #   | Checklist item  | Information reported                |                                     | Line number(s)   |
|------------------------------------|-----|---|-------------------------------------|-------------------------------------|--|
|                                    |     |   | Yes                                 | No                                  |  |
| Objectives                         | 7   | Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.8 l.17-23  |
| <b>METHODS</b>                     |     |   |                                     |                                     |  |
| Eligibility criteria               | 8   | Specify the study characteristics (e.g., PICO, study design, setting, time frame) and report characteristics (e.g., years considered, language, publication status) to be used as criteria for eligibility for the review                   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.10, p.11 l.1-7   |
| Information sources                | 9   | Describe all intended information sources (e.g., electronic databases, contact with study authors, trial registers, or other grey literature sources) with planned dates of coverage  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.9 l.10-14  |
| Search strategy                    | 10  | Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.17-18  |
| <b>STUDY RECORDS</b>               |     |   |                                     |                                     |  |
| Data management                    | 11a | Describe the mechanism(s) that will be used to manage records and data throughout the review  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.10 l.3-4   |
| Selection process                  | 11b | State the process that will be used for selecting studies (e.g., two independent reviewers) through each phase of the review (i.e., screening, eligibility, and inclusion in meta-analysis)   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.10 l.12-17,<br>p.11 l.1-7                              |
| Data collection process            | 11c | Describe planned method of extracting data from reports (e.g., piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.11 l.8-17  |
| Data items                         | 12  | List and define all variables for which data will be sought (e.g., PICO items, funding sources), any pre-planned data assumptions and simplifications   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.11 (table)   |
| Outcomes and prioritization        | 13  | List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | N/A – scoping review of application of different methods |
| Risk of bias in individual studies | 14  | Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis                        | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.12 l.3-6   |
| <b>DATA</b>                        |     |   |                                     |                                     |  |
| Synthesis                          | 15a | Describe criteria under which study data will be quantitatively synthesized   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.12 l.7-12  |
|                                    | 15b | If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data, and methods of combining data from studies, including any planned exploration of consistency (e.g., $I^2$ , Kendall's tau) | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | N/A  |
|                                    | 15c | Describe any proposed additional analyses (e.g., sensitivity or subgroup analyses, meta-regression)   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | N/A  |

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| Section/topic                            | #   | Checklist item  | Information reported                |                                     | Line number(s)       |
|--|-----|---|-------------------------------------|-------------------------------------|----------------------|
|  |     |   | Yes                                 | No                                  |                      |
|  | 15d | If quantitative synthesis is not appropriate, describe the type of summary planned  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | p.12 l.7-12          |
| <b>Meta-bias(es)</b>                     | 16  | Specify any planned assessment of meta-bias(es) (e.g., publication bias across studies, selective reporting within studies) | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | N/A – scoping review |
| <b>Confidence in cumulative evidence</b> | 17  | Describe how the strength of the body of evidence will be assessed (e.g., GRADE)  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | N/A – scoping review |

For peer review only