

Knowledge Translation Framework for Ageing and Health

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Executive Summary

Knowledge derived from research and experience may be of little value unless it is put into practice. The need to ensure that research into older peoples' health is effectively translated to policy and practice is immediate and will increase as populations' age. Knowledge translation (KT) has emerged as a paradigm to address many of the challenges and start closing the “know-do” gap (1). KT is defined as “the synthesis, exchange, and application of knowledge by relevant stakeholders to accelerate the benefits of global and local innovation in strengthening health systems and improving people’s health.” (2). Given the large scope of this challenge, in general and specific to ageing and health, the World Health Organization’s Department of Ageing and Life Course is proposing a guiding framework for the application of KT in ageing and health.

Barriers and facilitators that influence the use of research evidence can be grouped into five categories: 1) consideration of the local climate and context, 2) poor relationships between researchers, policymakers, and stakeholders, 3) research production that is not timely or relevant, 4) the role of researchers and/or intermediary organizations that facilitate research transfer, and 5) the role of stakeholders and the health system that facilitate the pull of research into policymaking. The KT in Ageing and Health framework that is proposed is based on the work done by Lavis et al and is modified for the ageing and health agenda (3;4). The main elements of the proposed framework are:

- 1) A climate and/ or context for research use: The application of knowledge to the local context is essential. The climate needs to be conducive to linking research to action and there has to be the political will and desire of knowledge users to want to use research evidence.
- 2) Linkage and exchange efforts: Researchers and users need to have open relationships so that necessary information can be produced and flow as necessary.
- 3) Knowledge creation that supports the use of research in decision making: Creating relevant and timely knowledge and research are essential.
- 4) Push efforts: Researchers or intermediary groups can undertake push efforts to bring evidence about an issue to the attention of policymakers and inform the policy process.
- 5) Facilitating pull efforts: Efforts to facilitate “user pull” are usually aimed at making it easier for policymakers to identify and obtain relevant research evidence.
- 6) Pull efforts: Knowledge users undertake pull efforts in situations where they value the use of research and recognize the need to address an information gap.
- 7) Evaluation of efforts to link research to action: Rigorous evaluation is needed on the various activities that support linking research to inform future KT efforts.

This report brings together and advances the thinking of various bodies of knowledge in this area. Case studies are included that demonstrate the application of the KT elements of the proposed framework to policymaking. Knowledge translation models, strategies and processes have been developed and continue to be proposed, however research is needed to validate the models' key elements and to determine what works and in what contexts (5;6).

Introduction:

The world's population aged 60 and over will more than triple from 600 million to 2 billion between the years 2000 to 2050 (7). In most countries, the fastest growing age group is 60 and older. Majority of this increase is occurring in less developed countries where the number of people older than 60 will rise from 400 million in the year 2000 to 1.7 billion by the year 2050 (7). While these figures are not new and have been in the public domain for a while, many countries are not putting in place policies and programs to deal with the onset of this “grey tsunami”. Furthermore, low and middle income countries now face mortality rates from two components: one from the ‘traditional’ communicable disease but also from increased rates of, chronic, noncommunicable diseases (8). This demographic change has significant impact on the health, social, and economic sectors of all countries. Many countries can greatly benefit from having guidance on how to advance policy and system development to deal with this phenomenon. Whether it is maintaining healthy ageing societies, or dealing with growing chronic diseases, housing and other community and social elements of ageing, understanding how to make use of evidence to develop a national approach to the ageing agenda is essential.

Knowledge derived from research and experience may be of little value unless it is put into practice and its success monitored and regularly evaluated. The need to ensure that research into older peoples' health is effectively translated to policy and practice is immediate and will increase as populations' age. Ensuring the use of research and evidence in health system management, policy and decision making is an important challenge in this century (1). Health systems research and evidence is not always communicated effectively or in a timely manner, and health system managers, policy and decision makers¹ do not always have the skills, tools and capacity to find and use evidence (9;10).

Knowledge translation (KT) has emerged as a paradigm to address many of the challenges and start closing the “know-do” gap (1). A widely accepted definition of KT comes from the Canadian Institutes of Health Research (CIHR); “Knowledge translation is the exchange, synthesis and ethically-sound application of knowledge - within a complex system of interactions among researchers and users - to accelerate the capture of the benefits of research for Canadians through improved health, more effective services and products, and a strengthened health care system” (11). In 2005, the World Health Organization (WHO) adapted the definition to a more global context and developed the following definition: “The synthesis, exchange, and application of knowledge by relevant stakeholders to accelerate the benefits of global and local innovation in strengthening health systems and improving people’s health.” (2)

Initiatives and activities aimed at increasing the use of research evidence in management, decision and policy making have been referred to in many different ways such as knowledge transfer, knowledge translation, research utilization, evidence based decision making, knowledge uptake, research implementation, research uptake, and research transfer (2;12-14). For the purpose of this report we will use the term Knowledge translation (KT) and take it to generally encompass the previous mentioned terms.

Not much is known about how to best organize such a plethora of KT activities: numerous frameworks, theories, models and tools have been proposed to explain the role of research in policy making, however empirical evidence to support such ideas or testing of the frameworks is difficult

¹ The focus of this report is on the use of research evidence on policymaking, hence, from this point forward, while findings may refer to management, decision making and policymaking, only the term policymaking will be used.

to find (12;15). The evidence that does exist pertains to individual initiatives (not to a whole framework or process per se) and are usually based on case studies or interview studies, usually from high-income countries, however increasing numbers of case studies are emerging from low- and middle income countries.

WHO has a major role to play in enhancing KT and bridging the know-do gap (1). Given the large scope of this challenge, in general and specific to ageing in health, WHO has commissioned a report to provide an overview of selected perspectives, review and assess current theories and frameworks that have been discussed in the literature, and with the assistance of case studies, develop a guiding framework for the application of a KT framework in ageing and health. The objective of this framework is to assist policy and decision makers on integrating evidence based approaches to ageing in ongoing policy development processes, such as national health plans, specific policies or programmes addressing older population needs, or ageing within other health programmes such as HIV, reproductive health, chronic diseases etc. The recommended framework will then be applied and tested in a region identified by the WHO.

Background:

KT frameworks and theories are located in many disciplines and are not specific to a health discipline, however in the health discipline it has been most examined and can be found in all different areas of health research such as social sciences, nursing research, public health, health policy, and health promotion (12;16). KT for clinical practice has been tested empirically and there is an abundance of primary research and systematic reviews examining KT interventions at the clinical level. KT for management and policymaking has not reached the same state of maturity and development and although there are ongoing innovations, a comprehensive framework still does not exist to assist in better understanding the influences on evidence informed policymaking and KT (1). What does exist and what has been published extensively are the barriers to research use in policymaking and this section will review that literature for the purpose of determining the challenges associated with the use of research evidence in policymaking and system transformation.

There have been numerous studies examining barriers and facilitators to the use of research in policy decision making (2;17;18). One systematic review found that interactions between researchers and policymakers and timing and timeliness increased the prospects for research use, whereas individuals' negative attitudes toward research and their lack of skills decreased the prospects for research use (19;20).

The barriers and facilitators that influence the use of research evidence can be grouped into five main categories:

- Category 1: Climate and context are important factors to consider when looking at the utilization of research evidence as is highlighted in the reviews by things such as individuals' negative attitudes, stakeholders ownership of the research agenda, power struggles, and just an overall sense of political will and openness to the use of research evidence (20-22).
- Category 2: The underlying linkage and exchange between researchers and knowledge users, policymakers, and stakeholders can facilitate the increase of evidence informed policymaking. Barriers such as lack of personal contact and opportunities to discuss challenges and research opportunities between researchers and knowledge users impede the use of research in policymaking (9;20;23;24).
- Category 3: Research production and creation of new knowledge can influence evidence informed policymaking. The timeliness and relevance of the research as well as the local

applicability of the research were identified as factors that can influence the uptake of research evidence (9;20;25;26).

- Category 4: The role of researchers and/or intermediary organizations that facilitate the transfer of research can influence evidence informed policymaking. Barriers such as researchers having too narrow a view of their own role or poor communication and packaging of the research results negatively influence the use of research in policymaking (9;27;28).
- Category 5: The role of stakeholders, knowledge users and the health system can facilitate the use of research in policymaking by overcoming barriers such as individual's lack of skills and expertise and the systems' poor capacity to find and use research evidence (9;20;29).
- Category 6: The role of evaluation: Another category was added to the list which was not identified as a barrier but was deemed important and which was the evaluation of initiatives linking research to action. To date there has been limited rigorous evaluation of initiatives and had such evaluations been undertaken to date, we would have a much stronger research base from which to draw upon now (30). Therefore, the role of evaluation was classified as another important category to consider.

Methods:

Frameworks and tools:

The literature on KT is diversified and it includes frameworks, opinion papers, models, theories, and tools. This report is not intended to be a systematic review of any one aspect of KT; rather its purpose is to review some of the main frameworks, theories, models and tools. The term framework will be used to encompass any frameworks or models that were identified in the literature, whereas the term tools will be used to identify practical applicable tools that can be used to implement or facilitate the use of evidence in policymaking. The frameworks and models that were assessed were ones that were deemed to address macro-level efforts of knowledge translation and were selected from frequently cited literature. Nine different frameworks, models and tools were included in the review. All of these frameworks were developed for health care in general (with the exception of one that was targeted specifically to public health), and no KT framework for ageing and health was identified.

In this report an attempt is being made to organize the fragmented, dispersed literature into a single comprehensive framework. In doing so, the general KT literature was reviewed and leading frameworks were identified. High level summaries of these frameworks and general strengths and weaknesses of the frameworks are provided. Furthermore, in reviewing the barriers effecting evidence informed policymaking, five main categories (climate/creation of new knowledge/ role of researchers/ role of knowledge users/ linkage and exchange) were identified. These categories were then used to analyze the frameworks to assess if the frameworks offer solutions and assist in determining approaches to address the barriers. Within each category, multiple questions were posed:

- Does the framework address the category?
- Does the framework provide tools to assist in assessing capacity or the current state within each category?
- Does the framework provide examples of interventions or initiatives within the category?
- Does the framework provide tools to assist in interventions within the category?

The analysis of the frameworks and tools are provided in Tables 1-6. Following the analysis, a comprehensive framework and supporting tools are proposed.

WHO convened a panel of 16 experts in ageing and health to review, modify and validate the proposed framework. The panel reviewed and accepted the high-level framework and made numerous recommendations, contributions and suggestions as to how to improve on the framework, which have been integrated into this document. As a follow up to the meeting, individuals from the panel provided additional case studies to be included in this report.

Identification and selection of case studies:

Identification of case studies:

One of the purposes of this report was to examine and identify case studies that evaluated the effectiveness or implementation considerations of elements of the proposed KT framework. In the identification of the case studies, the purpose was to identify primary studies that address the KT elements in the framework either in whole or in part. The primary focus was to identify existing high quality case studies and examples where research has led to some kind of action (policy development, management, collective engagement etc.) on ageing and health. Where case studies on ageing and health were not available, high quality case studies from the broader health care field were referred to as examples where research has led to some kind of policy action.

Case studies were identified by:

- (a) Manually reviewing healthsystemsevidence.org, a continuously updated repository of syntheses of research evidence about governance, financial, and delivery arrangements within health systems and about implementation strategies that can support change in health systems;
- (b) Manually reviewing a database of studies used in a systematic review of the factors that influence the use of research evidence in public policy making;
- (c) Examining other studies or reports that the author was aware of that may be applicable to our scoping review
- (d) Contacting a few experts in the field and asking insights from them re: case studies that may have not been published or identified in the field

Inclusion/ exclusion criteria:

Case studies were included if they were empirical studies where at least two or more cases were examined. If the case was only used as an illustrative example and was not the main purpose of the study, then the case study was excluded. The search for case studies was focused on the dependent variable being a decision or the use of research evidence in a management or policy decision and the independent variable focused on the use of research as well as at least one, but ideally a cluster, of the variables identified in the proposed framework. As was mentioned in the proposed framework, when defining the use of research in policymaking, the framework does not define research as pure scientific literature and academic publications, rather numerous types of research use were included in the selection of case studies such as primary studies, reviews, systematic reviews, Cochrane reviews, meta-analysis, international databases, hospital or system level data, performance data, audit and feedback. Lastly, the search for case studies focused on health system or management level decisions on different organizational aspects such as how service is provided, types of services provided, and methods or models in providing services, as opposed to the implementation of changes to clinical practice, clinical practice guidelines and the like since these types of interventions focus primarily on the individual or micro level of analysis.

Review of Frameworks:

Several reviews of existing KT frameworks demonstrate that the frameworks span a wide spectrum of theories and that several of the frameworks have many concepts in common; however majority of them have not been empirically tested (18;31-33). Many of the frameworks stemmed from planned action theory, diffusion of innovation, change management theory, and decision making theories. The following frameworks and tools were identified:

1. Promoting Action on Research Implementation in Health Services (PARIHS) framework
2. Ottawa Model of Research Use (OMRU) framework
3. The Knowledge to Action (KTA) framework
4. Framework for Research Dissemination and Utilization (RD&U)
5. Consolidated Framework For Implementation Research (CFIR)
6. Research and Policy in Development (RAPID) model
7. Assessing country level efforts linking research to action (Linking RTA)
8. Canadian Health Services Research Foundation (CHSRF) Self-Assessment tool
9. Supporting Policy relevant Reviews and Trials (SUPPORT) tools

1) Promoting Action on Research Implementation in Health Services Framework (PARIHS)

Kitson and colleagues (34-36) developed the Promoting Action on Research in Health Services (PARIHS) framework. It is a conceptual framework of the application of research findings into practice. According to the framework, successful research implementation into practice occurs as a result of an interplay of three main elements: “the level and nature of the evidence, the context or environment into which the research is to be placed, and the method or way in which the process is facilitated” (Kitson 1998). Evidence refers to a combination of research, local data or information, and clinical and patient experiences. Context refers to the local environment where the setting is proposed to take place and focuses on the local culture, leadership, and evaluation. Facilitation is defined as a technique by which one person makes things easier for others, and focuses on three elements: purpose, roles, and skills and attributes. The elements are considered equally important until evidence demonstrates otherwise. The framework includes a three-dimensional matrix of the three elements, and each of these three elements is ranked on a low-to-high scale (see Figure 1). It suggests that the most successful implementation occurs when all elements are on the scale’s high end. There have been studies testing the framework and some reviews on the framework (37;38). This framework is flexible and somewhat intuitively appealing, but more demonstration of how the framework could be applied in an actual practice environment is needed (12;39). Furthermore, this framework is predominantly for the clinical setting and not for health systems in general.

Strengths:

1. One of the first frameworks to examine different dimensions of context on research use and to explicitly include facilitation as factor effecting research use.
2. One study reported the strengths of this framework to be its intuitive appeal, the expansive view of what ‘evidence’ should entail, and its flexibility (37).
3. The framework has been further revised through a concept analysis of each element (evidence, context, facilitation) through extracting various dimensions of the elements from extensive literature to form a comprehensive definition and scope (38).

Weaknesses:

1. This is a complex framework and it is uncertain how it can be used to guide research use in everyday settings, as opposed to a reflective assessment tool.

2. The framework does not provide specific tools to assist in the different levels of complexity or details about how variables can be measured.
3. The framework does not address research production or knowledge creation as an aspect of KT
4. The framework is focused more on clinical setting than health systems in general
5. No studies have used the PARIHS framework to design prospective implementation strategies; all studies were primarily retrospective (37).

Figure 1: Promoting Action on Research In Health Services framework (34) p151

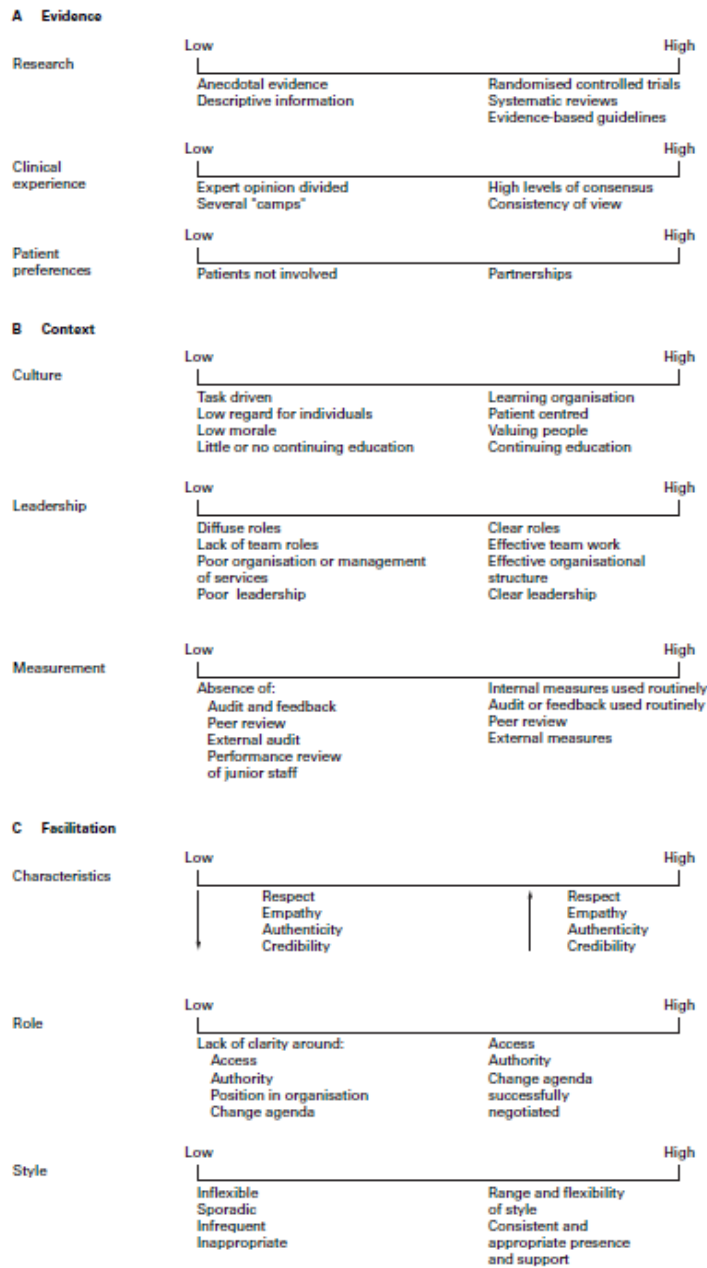


Figure 3 Conditions for evidence, context, and facilitation.

2) Ottawa Model of Research Use (OMRU)

The Ottawa Model of Research Use (OMRU) (40;41) was developed in response to the lack of research evidence being used in clinical practice. The model has gone through some revisions and the most recent version consists of six key elements: evidence-based innovation (e.g. a continuity of care innovation), potential adopters (those whose behaviours are intended to change), the practice environment (settings, sectors), implementation of interventions, adoption of the innovation, and outcomes resulting from implementation of the innovation (e.g. patient, practitioner, economic and system implications) (see Figure 2). The model claims to be applicable to all levels of the health system i.e. individual, professional, team, organization and the health system in general. Integral to the model is the assessment, monitoring and evaluation of each element prior to, during and after each stage of the KT process. Although the model is presented as linear, the authors claim that the process should not be viewed as unidirectional as all the elements influence and are influenced by each other, thus demonstrating the complexity of the KT process.

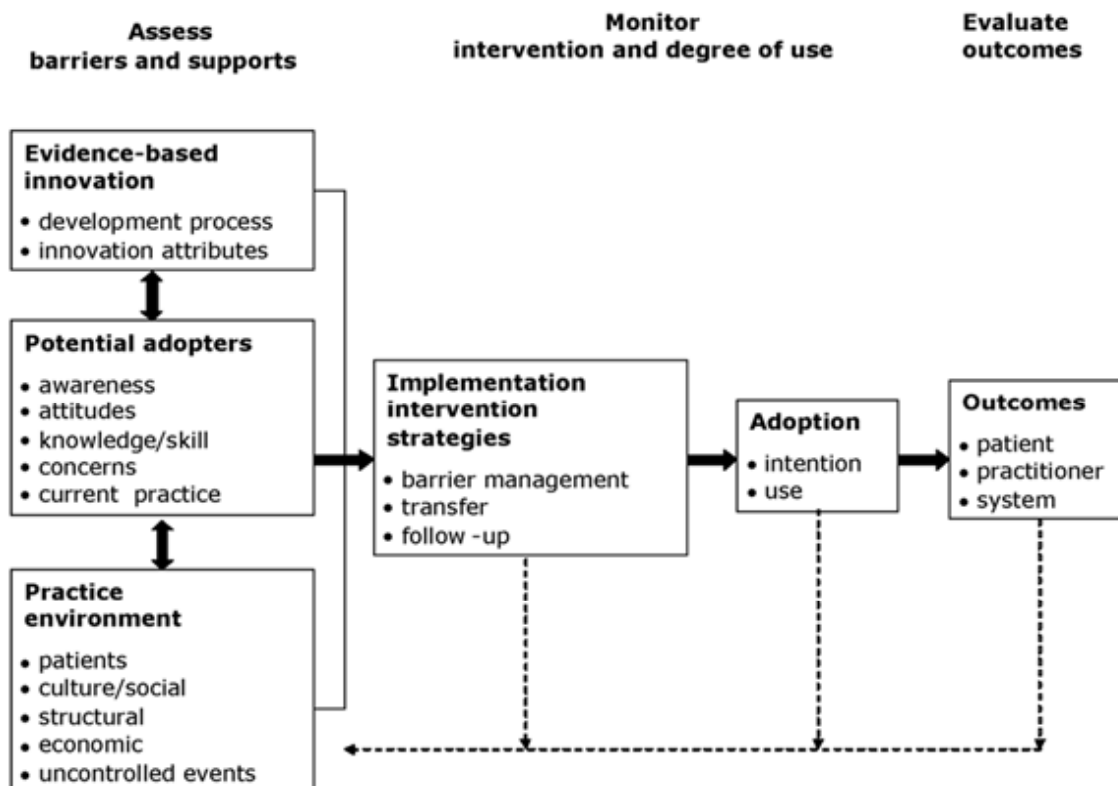
Strengths:

1. The model defines key elements in the process of research use (12).
2. The model is fairly easy to use and can be used prospectively.

Weaknesses:

1. The model focuses on the clinical practice setting as opposed to the health system in general.
2. The model requires further development and validated instruments to support the model (12).
3. Tools to assist in implementation are not provided in the model.
4. The model does not address research production or knowledge creation as part of KT.

Figure 2: Ottawa Model of Research Use (40) P229



3) The Knowledge-to-Action Process Framework:

The knowledge-to-action (KTA) framework has two components: (1) knowledge creation and (2) action, each of which contains several phases, as is demonstrated in Figure 3. Graham et al (13) conceptualized the KTA process to be complex and dynamic, with no definite boundaries between the two components and their phases; the phases may occur sequentially or simultaneously, and may influence each other. Knowledge creation consists of three phases reflecting different generations of knowledge: knowledge inquiry, knowledge synthesis, and knowledge tools/products. The authors claim that as knowledge moves through the knowledge creation funnel, it becomes more distilled, and thus more useful to stakeholders. The action cycle represents the activities needed for knowledge application and is a dynamic process i.e. all phases can influence one another and by the knowledge creation process. The action cycle contains problem identification, identifying appropriate knowledge, applying knowledge to the local context, assessing barriers to knowledge use, developing, tailoring and implementing interventions, monitoring the knowledge, evaluating the outcomes, and sustaining the knowledge use.

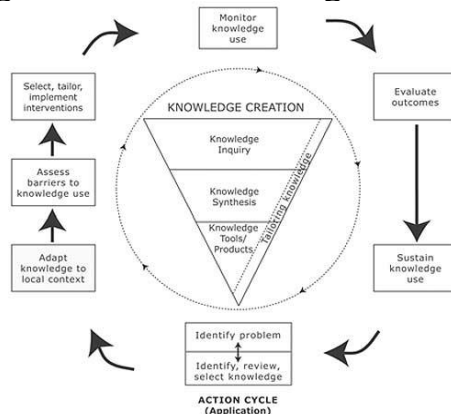
Strengths:

1. This framework presents a comprehensive picture of KT because it includes the knowledge creation process and tailoring the new knowledge for different user groups
2. This framework is dynamic in nature and illustrates the process in which organizations make decisions and implement knowledge.
3. This framework takes into account the importance of adapting knowledge to the local context.
4. This is an easy to use framework in understanding the overall process of research use in practice.

Weaknesses:

1. The framework is geared more towards the hospital and clinical setting and not the policy context. Examples or tools that were provided in further publications are geared primarily towards the clinical setting (42).
2. The framework represents a decision making process and builds on theories of planned action as opposed to addressing the supports or efforts that a health system or organization will need in order to support KT in general.
3. This framework does not portray the complexities that need to be considered when instituting a system change.

Figure 3: The Knowledge to Action Process (13) P19



4) Framework for Research Dissemination and Utilization (RD&U)

Dobbins et al developed a framework of research dissemination and utilization for health policy and clinical decision-making based on a thorough review of the literature and empirical studies (43). This framework was developed to address the need in public health units and to support public health practitioners. This framework illustrates the complex interrelationships that exist among Rogers' (44) five stages of innovation; knowledge, persuasion, decision, implementation and confirmation (see Figure 4). The framework takes into consideration the influence of characteristics associated with the innovation, organization, environment and individual. The framework portrays a progression from research dissemination to research utilization and provides examples of potential types of research dissemination, evidence based decision making, research utilization and outcomes. The use of research in decision making is portrayed as complex and influenced by four main factors; innovation, organization, environment and individual characteristics.

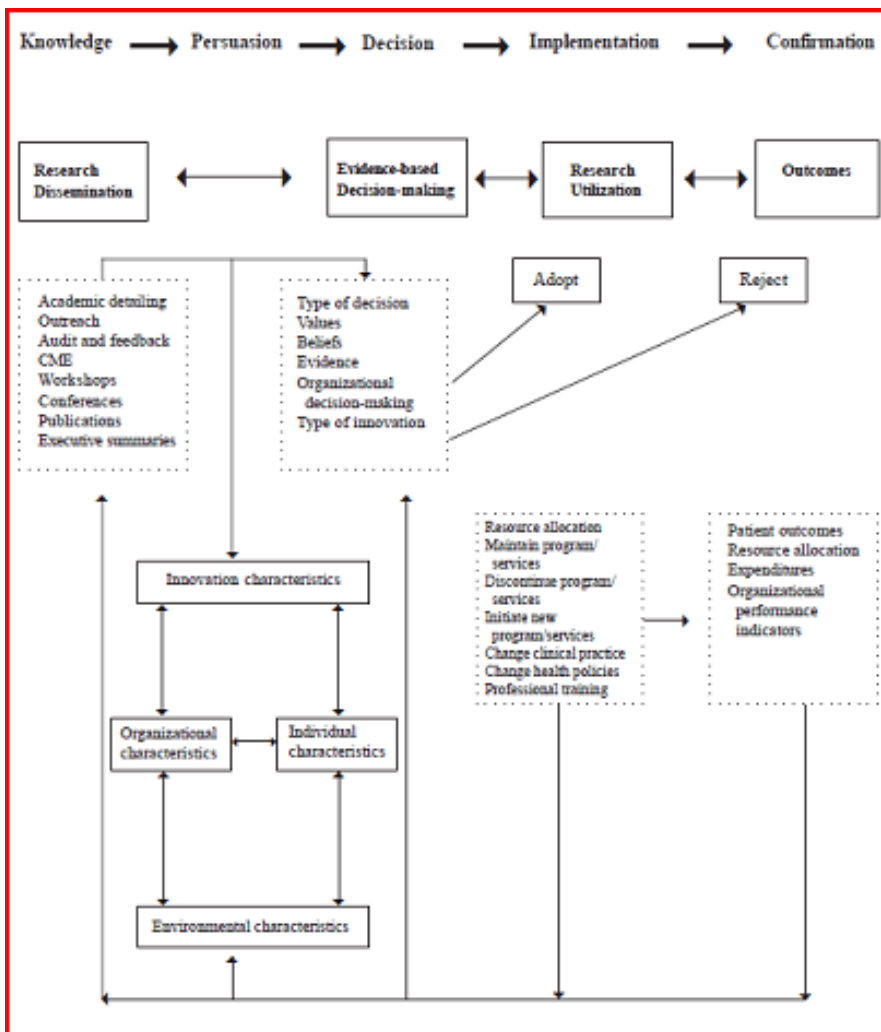
Strengths:

1. This framework is geared towards policymakers as well as clinicians.
2. This framework builds on a large body of literature.
3. This framework recognizes the influence of different characteristics on the use of research in decision making.
4. This framework includes the role of researchers and research dissemination.

Weaknesses:

1. This framework has not been empirically tested and relationships that have yet to be proven
2. A complicated framework with numerous factors and contingencies, and limited details provided on each, thus leading to a framework with limited ease of use.
3. This framework does not provide tools re: implementation or influence of use of research in decision making.

Figure 4: Framework for Research Dissemination and Utilization (45) P12



5) Consolidated Framework for Implementation Research (CFIR)

The Consolidated Framework for Implementation Research (CFIR) was developed to address the ineffective transfer of successful research interventions into practice (6). The CFIR, pictured in Figure 5, consists of five main domains:

- 1) Intervention characteristics: eight constructs were identified related to the intervention (i.e. evidence strength and quality) and relates to characteristics of the intervention being implemented into a particular organization and the appropriate adaptation of the intervention.
- 2) Outer setting: four constructs were found to be related to the outer setting (i.e. resources and patient needs). The outer setting includes the economic, political, and social context within which an organization resides.
- 3) Inner setting: twelve constructs were found to be included in the inner setting and it includes components like culture and leadership engagement.
- 4) Characteristics of the individuals involved: five constructs were found to be related to the individuals such as self-efficacy and knowledge and beliefs about the intervention itself.
- 5) The process of implementation: eight constructs were identified related to process such as plan, evaluate, and reflect.

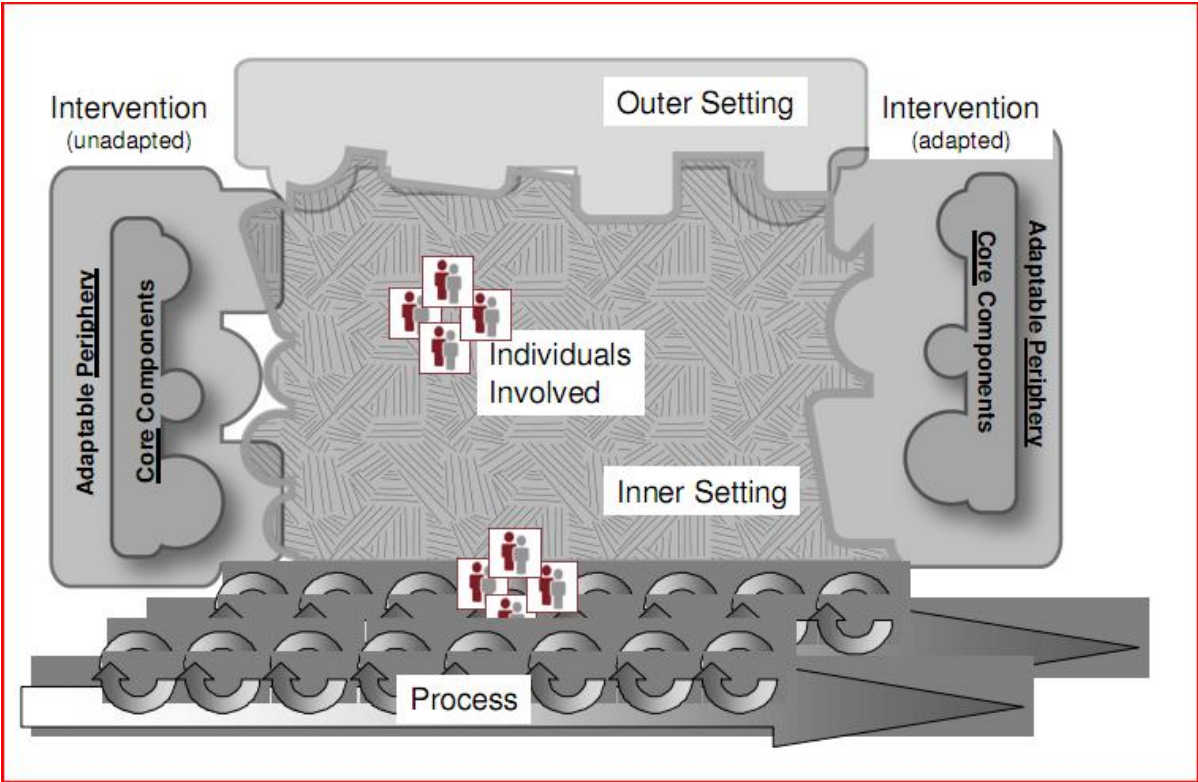
Strengths:

1. The framework addresses many different components and factors that can influence the use of research in decision making.
2. The framework is grounded in published theories that have been evaluated to identify constructs based on strength of conceptual or empirical support.
3. This framework provides explicit definitions for each construct.

Weaknesses:

1. This framework is very complex, with numerous constructs and sub constructs and the use of this framework to assist in progressive implementation of an innovation is not outlined.
2. This framework, while it consolidates findings from numerous theories, has not itself been tested or validated.
3. This framework addresses the implementation of innovations in general; it does not specifically focus on the use of research in decision making. It also focuses on implementation at the organizational level as opposed to the country level.
4. Tools to facilitate implementation and change are not provided.

Figure 5: Consolidated Framework for Implementation Research (6)



6) Research and Policy in Development (RAPID) model

The Overseas Development Institute (ODI) developed the Research and Policy in Development (RAPID) model (Figure 6) (16;46;47). This framework was developed to understand the dynamics of knowledge use and translation in the policy realm in developing countries. The RAPID model includes four aspects: 1) the political context, 2) characteristics of the evidence, 3) links between policy and research communities, and 4) external influences. The first component, the political context, greatly influences the link between research and policy. Factors to consider in the political context include the extent of civil and political freedoms, institutional pressures, vested interests, power relations, and attitudes and incentives among officials and their room for manoeuvre. Within the second component, the characteristics of the evidence, one needs to consider the quality of the research, the relevance of the topic, the operational usefulness of an idea, and the solutions or recommendations associated with the research. Furthermore, the messengers, communication, and packaging of the research are important to consider as well. The third component emphasises the importance of links between the two communities i.e. the research and policy communities through intermediary organizations or networks. Lastly, external influences on research uptake such as international policies as well as socio-economic and cultural influences are discussed. Further development of this model identified it as a useful analytical entry-point, but it is essential to use other tools to understand the knowledge translation framework (16). Many tools have been developed to support this model; the toolkits direct users to websites with further resources and information (46;48).

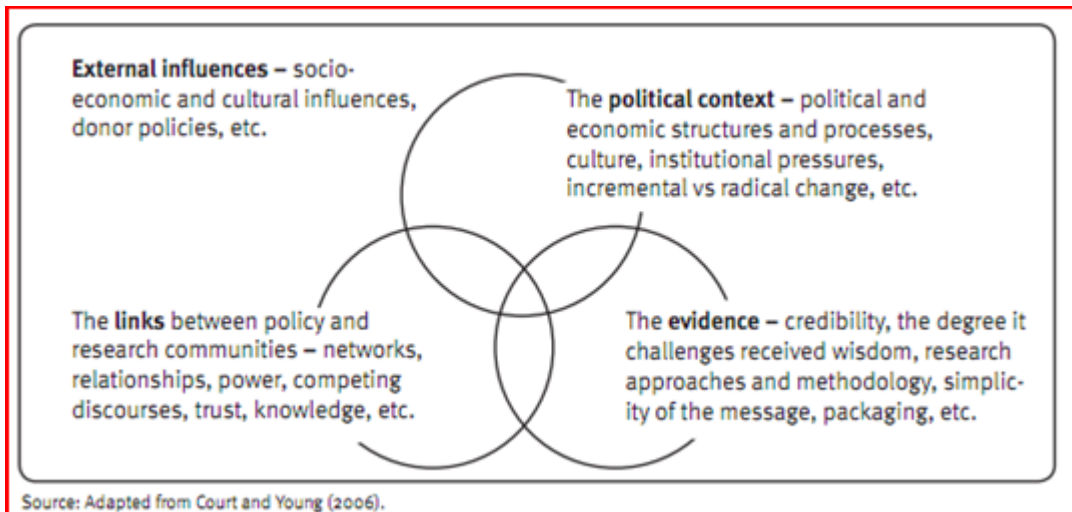
Strengths:

1. This is a very simple, easy to understand model that addresses many of the main points to consider when addressing the knowledge-action gap.
2. Examples and tools associated with this model have been developed (www.odi.org.uk/rapid).
3. This model focuses on country level efforts and not only organization or clinical level efforts to link research to action.
4. This model addresses all the barriers identified in the literature.
5. This model is used in other disciplines as well, not just health care.

Weaknesses:

1. While some of the tools on the ODI website are useful, others provide links to other websites which supply lists of extensive resources and it is quite difficult to navigate and search these resources.
2. This model and the supporting tools are primarily targeted to developing countries: a segment of the countries but the tools and materials need to have broader appeal to all types of contexts, climates, and countries.

Figure 6: The RAPID research to policy framework (16) P.3



7) Assessing country level efforts linking research to action (Linking RTA)

Lavis et al (49) developed a framework to assess country-level efforts to link research to action (Linking RTA) which provides a range of activities that can be considered when developing initiatives within organizations to support the use of research evidence to inform health policy decisions. The framework includes four elements: the climate for research use, the production of research and appropriate synthesis of research for policymakers, efforts used to link research to action, and evaluation. The third element, efforts to link research to action, has four sub elements, which are 1) push efforts (i.e. tailoring the messages by researchers for policymakers), 2) facilitating pull efforts (i.e. developing rapid-response units), 3) pull efforts (i.e. training policymakers how to access research evidence), and 4) linkage and exchange efforts (i.e. conducting deliberative dialogues) (19;50). Potential relationships and linkages between the different elements are proposed in Figure 7. This framework and initiatives within each cluster has been further developed and is currently being tested through semi-structured interviews and surveys with healthcare leaders across Canada and 41 countries (4;51).

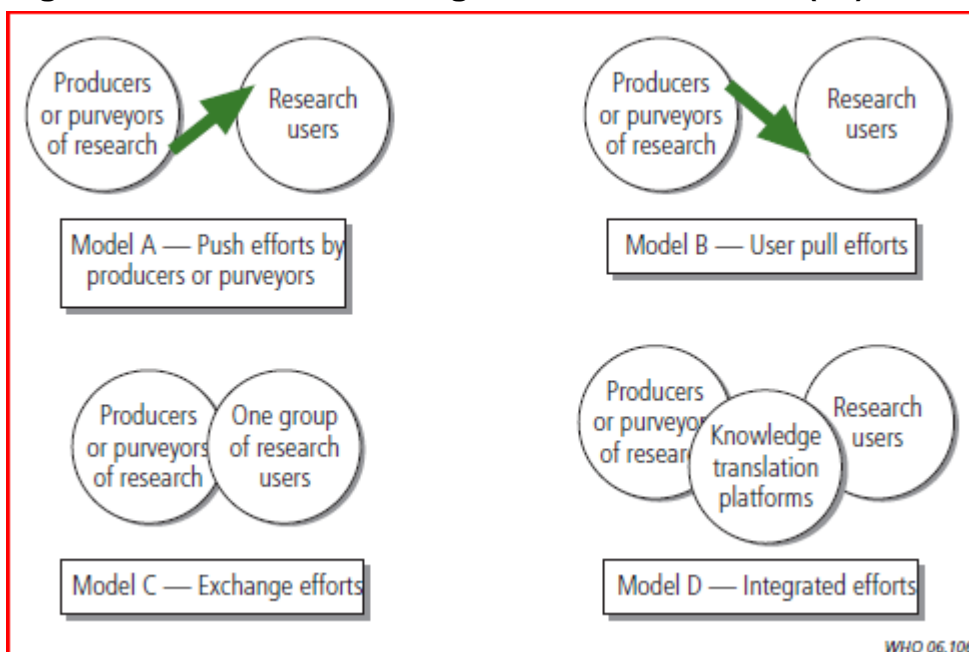
Strengths:

1. This framework takes a holistic view of the use of research evidence in policymaking and provides suggestions for interventions for the health systems as a whole
2. This framework is applicable to developed and developing countries and provides examples from all types of country settings and contexts.
3. This framework provides a plethora of potential interventions that managers, policy makers and decision makers in the health system can utilize to enhance the use of research in action.
4. This framework includes areas covered by the CHSRF tool (52) but expands it and includes other areas as well i.e. the support from the environment in linking research to action, research production, 'push' strategies, and 'user pull' factors (14).
5. This framework is easy to use since it provides a tool with an overall assessment that countries can self-assess and identify areas that need improvement.
6. This framework addresses all the components identified in the barriers to research use.

Weaknesses:

1. Empirical support for the framework as a whole is not available yet: it is only now being tested in 41 countries and therefore empirical support is only starting to become available (51).
2. The framework does not indicate which of the elements, and which initiatives within each element, provide the biggest influence on the use of research in management decision making.
3. The framework does not provide specific tools to assist in implementing interventions.

Figure 7: Models for Linking Research to Action (53) P.622



8) Canadian Health Services Research Foundation (CHSRF) Self-Assessment tool

The CHSRF developed a self-assessment tool that looks at organizational capacity for research use. CHSRF's Self-Assessment Tool was developed based on focus groups and assists in generating organizational discussions about how well they use research and identifying areas for potential for improvement. The four areas in the tool include 1) Acquiring evidence (i.e. can the organization find the necessary research evidence?), 2) Assessing evidence (i.e. can the organization assess if the research is reliable, high-quality, relevant, and applicable?), 3) Adapting its format (i.e. can the organization present the evidence to appropriate decision-makers in a useful format?), and 4) Applying it in decisions (i.e. does the organization have the skills, structures, processes and corporate culture to promote and use research evidence in decision-making?) (52;54).

Strengths:

1. The tool was validated and demonstrated good usability and strong response variability (55).
2. The tool provides a useful starting point for discussions in organizations about research use and relevant changes within different components of the tool (55).
3. The tool can serve as an overall guide re: utilizing research evidence in decision making.

Weaknesses:

1. The user testing of the tool identified that it was less useful in the government sector, which affects applicability to policymakers and health systems (55).
2. The tool is essentially, a tool, and does not provide interventions or methods for organizations to address the necessary gaps.

9) Supporting Policy relevant Reviews and Trials (SUPPORT) tool

This series of 19 articles was prepared as part of the SUPPORT (SUPporting POLicy relevant Reviews and Trials) project and each article includes a tool that can be used by individuals and organizations involved in finding and using research evidence to support evidence-informed health policymaking (14;56). Four broad areas are addressed in the series: 1) Supporting evidence-informed policymaking, 2) Identifying needs for research evidence (problem clarification, options framing, and implementation planning), 3) Finding and assessing systematic reviews and other types of evidence, and 4) Going from research evidence to decisions. The breakdown of the topics and associated articles are in Figure 8.

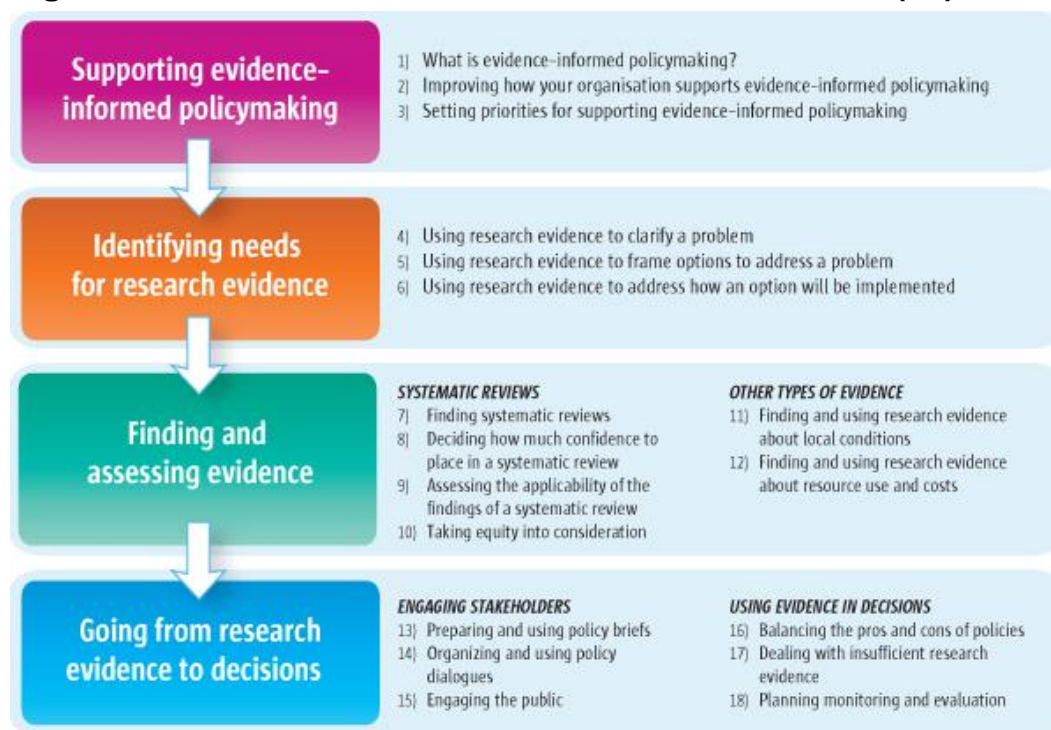
Strengths:

1. This set of articles provides an overall, holistic view for policymakers and those that support policymakers in using research evidence.
2. This set of articles provides practical tools to assess capacity in the different areas as well as tools to assist in the initiatives in addressing each area.
3. These tools enable those that are involved in finding and using research evidence to support evidence-informed health policymaking to determine where they need assistance, focus on that specific area with the assistance of the relevant article, and implement practical initiatives to address the necessary issue.
4. These tools are applicable to the organizational and health system levels in developed and developing countries.
5. These tools are straightforward, easy to use, clearly state their purpose and objective, and are simple to implement.

Weaknesses:

1. Empirical support for the tools is not available yet. While majority of the tools are in the process of being empirically tested in 41 countries and preliminary results are starting to become available, the effectiveness and transferability to different contexts has yet to be determined (51).

Figure 8: Overview of the SUPPORT series of articles (57) P.3



Summary of framework analysis:

This high level review demonstrates that numerous frameworks have been proposed as ways to bridge the ‘know-do’ gap and utilize researcher evidence. These frameworks have some overlapping purpose and concepts. Tables 1-6 demonstrate that majority of the frameworks do not address all the components that were identified as barriers in the background literature, and even fewer had tools to assist in assessing capacity or interventions, or examples of country level initiatives;

- **Category 1:** Climate/ Context: All of the frameworks address the importance of the local context or climate and some of them provide tools to assist in assessing the local context and/or climate, but very few of them provide tools to assist in interventions to improve the local context and/ or climate.
- **Category 2:** Role of linkage and exchange in KT: Only two frameworks and one set of tools explicitly state the importance of linkage and exchange: a minority of the other frameworks refer to the importance of linkage and exchange.
- **Category 3:** Creation of new Knowledge/ Research Production: Four of the frameworks discuss the importance of the creation of new knowledge, yet two of them focus primarily on the clinical level.
- **Category 4:** Role of Researchers and Research Organizations in KT: Most of the frameworks somewhat refer to the role of researchers or research organizations in KT but only three explicitly discuss their role and two provide specific examples of interventions.
- **Category 5:** Role of Knowledge Users in KT: Three frameworks somewhat refer to the role of the knowledge users, four of the frameworks explicitly discuss the role of knowledge users, and the two tools examined also discuss the role of the knowledge user.

- **Category 6:** Role of evaluation in KT: Many of the frameworks discuss the importance of evaluation in KT, and one set of tools is provided as well.

The traditional frameworks view the path of research from creation to utilization as a logical flow (18). While this is considered rational and mimics decision making processes, a holistic view of all the factors and elements that can influence and facilitate the use of research in policymaking is needed. Simple linear frameworks are conceptually appealing but they are poor reflections of the real world complexity of evidence informed policymaking, however the complex frameworks are difficult to apply in practice (18). Therefore, a holistic view of the elements, in alignment with appropriate tools, can help facilitate evidence informed policymaking.

Many of the frameworks look at the linking of research to action as a decision making process or problem to be solved i.e. problem identification, identification of research, application of knowledge (PARIHS, OMRU, and KTA), other frameworks adapt Rogers' diffusion of innovation theory (RD&U), and some frameworks examine the overall context and initiatives to address the issues in the system as a whole (RAPID, Linking RTA). Furthermore, the frameworks were developed for different contexts. The PARIHS, OMRU, KTA and CFIR frameworks focus more on the clinical or organizational setting, the RD&U framework focuses more on public health units, whereas the RAPID and Linking RTA frameworks are the two that really focus on country level efforts. Broad based approaches are likely to be most effective and therefore these last two frameworks are the most applicable for the purposes of this report. Within these two frameworks, the RAPID framework focuses primarily on developing countries whereas the Linking RTA framework focuses on all types of countries and provides examples from all settings and contexts.

Identifying barriers and proposing interventions are one important body of research, but guiding system change and transformation is challenging and practical tools are needed to assist in the process. In trying to identify tools, majority of the tools that have been developed and empirically examined are at the clinical level, which is not applicable in this report. Many of the frameworks assessed in this report do not provide specific examples of interventions or tools to assist in intervention or to assess capacity. Three sets of tools were identified 1) CHSRF, 2) RAPID, and 3) SUPPORT. All three tools assist in assessing organizational capacity, and the RAPID and SUPPORT tools assist in interventions for different components (see Tables 1-6). The RAPID tools though are primarily for developing countries and many of the toolkits provide links to websites with complicated and extensive resource lists as opposed to actual tools (58). Furthermore, some of the RAPID tools are very focused on researcher push, or on focussing on the overall process as opposed to focussing specifically on the use of evidence in policymaking. The SUPPORT tools, on the other hand, are simple and straightforward tools that can be used by individuals, organizations or health systems in developed and developing countries. The SUPPORT tools however do not address all elements of the proposed framework. Therefore, when developing the proposed framework and suggesting applicable tools, a combination of these three tools is incorporated.

The frameworks that have been proposed as ways to promote effective implementation and uptake of KT have considerable overlap yet many of the frameworks are missing one or more key constructs included in other theories. A comprehensive framework that includes a holistic view of the health system, the constructs found in the numerous frameworks, and also addresses the barriers discussed in the literature can assist in understanding the myriad of potentially relevant factors that can influence the use of evidence in health systems. As is demonstrated in Tables 1-6, and in the analysis, the Linking RTA framework is the most applicable and overarching framework and will therefore be used as the springboard for our new proposed framework which we will call the 'WHO Ageing and Health KT Framework'. The next section will describe our proposed new framework, its constituent elements and examples of tools for each element.

Table 1: Category 1: Climate/ Context for Research Use

	PARIHS	OMRU	KTA	RD&U	CFIR	RAPID	Linking RTA	CHSRF tool	SUPPORT
Does the framework address the local context or climate?	Yes: culture, leadership and measurement	Yes: the practice environment (structural, social, patients) (p231)	Yes: adapting the knowledge to local context (p20)	Yes: effects of the organization, environment and individuals.	Yes; within the construct of the inner setting	Yes: the political context as well as the external influences	Yes; examples of initiatives to establish a climate conducive to research use in decision making.	Yes (somewhat within the adaptation of research)	Yes: articles 2-3
-Does the framework provide tools to assist in assessing climate/ context?	Somewhat: there is a basic scale that one can look at and assess	No	No	No but it does provide different aspects of the context to consider	No	Somewhat: provides questions to consider	Yes, it provides a list of initiatives that a country can use to assess capacity (p624)	Yes	Yes: article 2
-Does the framework provide examples of specific initiatives in the context/climate to promote KT?	No	No	No	No but it lists characteristics associated with an increase in research use i.e. value on research, collaboration (p5-6)	No	Yes	Yes: the examples are interventions	No	Yes: article 2-3
-Does the framework provide tools in addressing the issues in the local context/climate?	No	No	No	No	No	Yes; throughout the website there are tools such as political context mapping, toolkits for policymakers...	No	No	Yes: articles 2-3

Table 2: Category 2: The Role of Linkage and Exchange in KT

	PARIHS	OMRU	KTA	RD&U	CFIR	RAPID	Linking RTA	CHSRF tool	SUPPORT
Does the framework address the role of linkage or exchange between the researchers and knowledge users in KT?	Somewhat: explores the role of facilitation	No	Briefly alluded to i.e. the knowledge creation and action cycles can be intertwined	No	Yes: in the inner circle the model discusses networks and communication	Yes: the links between the two communities	Yes: linkage and exchange efforts	No	Yes: articles 14-15
-Does the framework provide tools to assist in assessing capacity?	No	No	No	No	No	No	Yes, it provides a list of initiatives that a country can use to assess capacity (p624)	No	Yes: article 2
-Does the framework provide examples of initiatives of linkage and exchange?	No	No	No	No	No	Yes	Yes	No	Yes: articles 13-15
-Does the framework provide tools to assist in linkage and exchange between researchers and knowledge users?	No	No	No	No	No	Yes: under the 'networks and partnerships' and the 'policy engagement' tabs on the website.	No	No	Yes: articles 13-15

Table 3: Category 3: Creation of New Knowledge

	PARIHS	OMRU	KTA	RD&U	CFIR	RAPID	Linking RTA	CHSRF tool	SUPPORT
Does the framework address the creation of knowledge?	No but it does discuss different types of evidence	Yes: process of creating the innovation and of the innovation itself; and how those can affect uptake (p233)	Yes: Knowledge creation funnel (P18)	No: the model discusses “becoming aware” (p3) of an innovation and innovation characteristics, but not of the creation of new knowledge	No: the model discusses characteristics of the innovation overall	Yes: discusses the role of evidence	Yes: research production	No	No: article 13 discusses policy briefs but not new knowledge per se
-Does the framework provide tools to assist in assessing capacity?	No	No	No	No	No	No	Yes, it provides a list of initiatives that a country can use to assess capacity (p624)	No	No
-Does the framework provide examples of initiatives to address the creation of new knowledge?	No	Yes: research transfer strategies (p235)	Somewhat: the 3 rd generation includes initiatives (p19)	No	No	Yes	Yes	No	No
-Does the framework provide tools in addressing the creation of new knowledge?	No	No	No	No	No	Yes, under the ‘project management’ tab on the website	No	No	No

Table 4: Category 4: Role of Researchers and Research Organizations in KT

	PARIHS	OMRU	KTA	RD&U	CFIR	RAPID	Linking RTA	CHSRF tool	SUPPORT
Does the framework address the role of researchers or research organizations in KT?	Somewhat: discusses the role of facilitators which can be applied to research organizations	Somewhat	Yes: the role of researchers in creating new knowledge, links to the action cycle (P19)	Somewhat: a brief paragraph that discusses the applicability of the model to researchers and potential diffusion efforts (p7)	No	Yes	Yes: Push efforts focuses on the role of researchers or research based organizations	No	Somewhat: does not address researchers; does address the roles of organizations supporting policymakers
-Does it provide tools to assist in assessing capacity?	No	No	No	No	No	No	Yes	No	No
-Does it provide examples of initiatives re: the role of researchers or research organizations in promoting KT?	No	Yes: the model discusses research transfer strategies (p235)	No	No	No	Yes	Yes	No	No
-Does the framework provide tools in addressing the role of researchers or research organizations?	No	No	No	No	No	Yes: under the 'think tanks & policy research institutions' and the 'research communications & knowledge management tools' on the website.	No	No	Yes: developing policy briefs, article 13

Table 5: Category 5: The Role of Knowledge Users in KT

	PARIHS	OMRU	KTA	RD&U	CFIR	RAPID	Linking RTA	CHSRF tool	SUPPORT
Does the framework address the role of knowledge users in KT?	Overall the whole paper discusses the role of research but does not specifically focus on the user	Yes: discusses potential adopters (p232)	Yes: discusses planned action theory and different phases i.e. identifying a problem...(p20)	Somewhat: discusses the decision making process but not necessarily the active roles these organizations take in using research	Yes: discusses the role of individuals that need to uptake an intervention	Yes	Yes: facilitating pull and user pull efforts	Yes: their ability to acquire, assess, adapt and apply research	Yes
-Does the framework provide tools to assist in assessing capacity?	No	No	No	No	No	No	Yes, it provides a list of initiatives that a country can use to assess capacity (p624)	Yes: the overall tool	Yes: article 2
-Does the framework provide examples of initiatives regarding the role of knowledge users?	No	No	No	No	No	Yes	Yes	No	Yes: the articles assist in identifying skills and provide tools to assist in user pull.
-Does the framework provide tools in addressing the role of knowledge users in KT?	No	No	No	No	No	Yes: under the 'practical tools to improve skills and capabilities' tab on their website.	No	No	Yes: articles 2-12

Table 6: Category 6: The Role of Evaluation in KT

	PARIHS	OMRU	KTA	RD&U	CFIR	RAPID	Linking RTA	CHSRF tool	SUPPORT
Does the framework address the role of evaluation in KT?	Somewhat: within context, one aspect is the use of evaluation, yet not with respect to KT initiatives	Yes: The model discusses the importance of monitoring the research use (p236)	Yes	Yes: the final stage, confirmation, includes evaluation (p6)	Yes: within the construct of process	Yes	Yes	No	Yes: article 18
-Does the framework provide tools to assist in evaluation?	No	No	No	No	No	Yes: under the 'monitoring, evaluating and learning' link on their website	Yes, it provides some initiatives that a country can use to assess capacity (p624)	No	Yes: article 18
-Does the framework provide examples of initiatives regarding evaluation?	No	Somewhat: the framework provides examples of different evaluation outcomes (p238)	No	Somewhat: the framework provides examples of different evaluation outcomes and measures (p6)	No	Yes	Yes	No	Yes: article 18

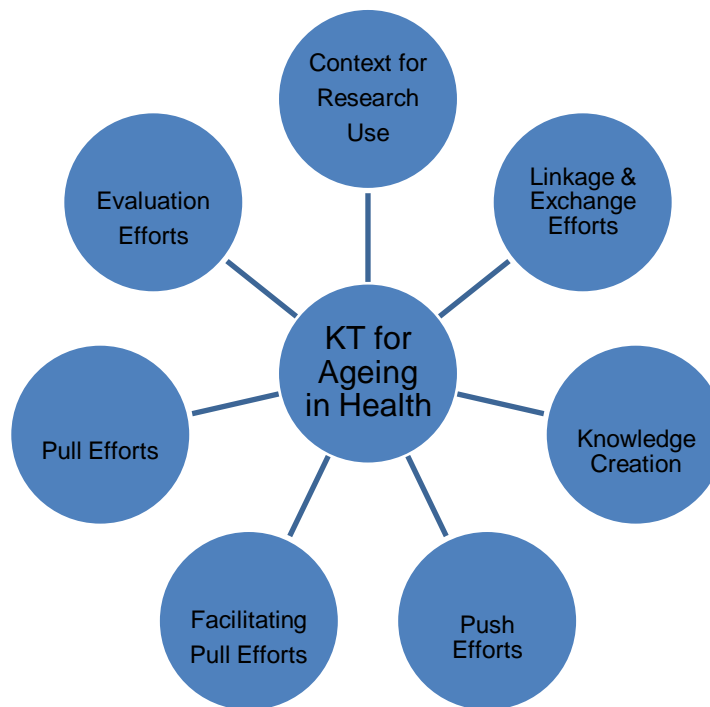
The WHO Ageing and Health KT Framework

The new framework we propose is based the work done by Lavis et al in the Linking RTA framework (4;59). This framework was modified to include other factors deemed important to the field of ageing and health (i.e. context), and to reflect the order of importance of the different elements with respect to facilitating the use of research evidence in policymaking in the area of ageing and health.

Furthermore, Lavis et al's framework was developed for health systems in general, and this report provides a modified version to include elements and examples of initiatives specific to the ageing and health field. There are certain contextual factors, relationships, and initiatives specific to ageing and health that have been included in this new KT in ageing and health framework.

The main elements of this proposed framework (figure 9) are: 1) a climate and/ or context for research use, 2) linkage and exchange efforts between researchers, stakeholders and knowledge users, 3) creation of new knowledge, 4) push efforts, 5) facilitating pull efforts, 6) pull efforts, and 7) evaluation of efforts to link research to action.

Figure 9: The seven key elements for knowledge translation on ageing and health



This framework can be used in high, low and middle income countries. This framework can be used in all health care contexts and is intended to be used at the health system or policymaking level, however it can be adapted to the organizational level as well (1). This framework provides different elements which can facilitate the use of evidence to inform policymaking. It is recommended that first and foremost, the intended health system analyzes its current context and climate with respect to ageing and knowledge translation. A context mapping exercise can assist in determining if a) the current health system climate is open to the use of research in policymaking i.e. knowledge translation, as well as b) the current context and support system with respect to ageing and health in general, and specific to policymaking is conducive to pursuing other initiatives. This first analysis can be facilitated by asking the questions identified in Table 8.

Depending on the results the health system receives after assessing their current context and climate, the health system can determine which efforts in the following elements would best suit their needs and would be most widely accepted. For example, some health systems may discover that there are no existing relationships between researchers and intermediary organizations that focus on ageing and the policymakers and decision makers that determine the policies related to ageing and health, and therefore that specific health system may wish to pursue initiatives within the ‘linkage and exchange’ element. Alternatively, a different health system may determine that their climate is very open and willing to use research to inform policy and that the relationships between knowledge users and producers is open and trusting, however the users do not have the skills or resources to obtain the necessary evidence, and therefore this health system might want to engage some ‘push efforts’ to get the necessary information to the attention and the forefront of the policymakers, or they may wish to implement some ‘pull efforts’ to ultimately enable the users to acquire, assess, adapt, and apply the evidence on their own.

Descriptions of the elements as well as examples of initiatives are provided below. Furthermore, policymakers need practical tools to deal with these elements; however as was noted above, a limited number of broad-based applicable tools have been developed. The tools that were developed are referenced below; yet more work needs to be done in this area. Numerous initiatives have been identified as potentially facilitating the use of evidence in contributing to evidence informed policymaking and a high level synopsis of these are captured in Table 7. The first section of the table consists of questions that a country can use to assess its current context and climate. After a health system determines their context and climate, the following sections of the table identify initiatives related to each cluster and should be matched appropriately. More detailed components of the table as well as related explanations follow.

Table 7: High level summary of the framework's elements²

Element	Questions to assess country-level context and climate
<p>Climate and context: <i>Consideration of the local context and climate (i.e. the characteristics, circumstances, and conditions), with respect to ageing and health, as well as KT activities.</i></p>	<p>Context and Climate for Ageing and Health</p> <ul style="list-style-type: none"> • Is there a willingness to accept ageing and health as an issue? Are there policies related to ageing and health or do existing health policies relate to ageing? Are they accessible? • Are there existing intermediary organizations on ageing and health? Is there a position or department in the government that supports ageing in general and ageing and health? <p>Context and Climate for Knowledge Translation</p> <ul style="list-style-type: none"> • Is there an appetite or an interest for the use of evidence in policymaking? Do researchers and users understand the importance of KT in ageing and health? • Do leaders within the health systems promote the use of evidence in policymaking? • Do funders within the health systems have a mandate to support efforts to link research to action and do they support these efforts in several ways?
Examples of initiatives	
<p>Linkage and Exchange Efforts: <i>Building relationships between users and researchers.</i></p>	<ul style="list-style-type: none"> • Researchers on ageing and health, knowledge users, funders, consumer groups, and professional bodies have open and positive relationships. • Health systems ensure the capacity to convene interactive workshops that bring together researchers and users in ageing and health, and organize “deliberative dialogues”.
<p>Knowledge Creation: <i>Creating new knowledge that is timely and relevant</i></p>	<ul style="list-style-type: none"> • Health systems ensure that gerontology and geriatrics research centres or research centres that carry out research on issues on ageing exist within the health system. • Health systems collect data on older people that can be disaggregated by age, and ensure the capacity to analyze and interpret data on older people. • Health systems participate in regular priority setting processes related to research on ageing and health.
<p>Push Efforts: <i>Pushing knowledge out to necessary groups in appropriate formats.</i></p>	<ul style="list-style-type: none"> • Researchers or intermediary organizations specifically package information for ageing and health and disseminate the necessary information to different user groups. • Researchers or intermediary groups develop media releases and use the mass media to disseminate applicable and relevant findings in ageing and health.
<p>Facilitating Pull Efforts: <i>Enabling policymakers to identify relevant research</i></p>	<ul style="list-style-type: none"> • Health systems ensure the ability to access a network of ageing and health experts. • Health systems implement a technical infrastructure or ‘one-stop websites’ to support research use and limit restrictions to online resources and journals that may contain relevant research evidence on ageing and health.
<p>Pull Efforts: <i>Pulling the relevant evidence into policy making by the users.</i></p>	<ul style="list-style-type: none"> • Health systems institute a national policy to ensure the use of evidence in policymaking. • Health systems develop and use rapid response units that have access to experts on ageing and health that can provide summaries about the best research in a timely manner. • Health systems engage knowledge brokers or opinion leaders in ageing and health to assist in acquiring, assessing, adapting and applying research in decision making.
<p>Evaluation Efforts <i>Monitoring and evaluating KT efforts</i></p>	<ul style="list-style-type: none"> • Health systems allocate resources and funding to monitor implementation and evaluate the impact of evidence informed decision making in ageing and health. • Funders, research and intermediary groups partner and participate in identifying criteria for success and conducting rigorous evaluations of efforts to link research to action.

² Some of the examples in this table come directly from Lavis et al’s framework and further reiterations of his framework.

1) Climate and context for research use:

While the climate and context are two different components, they are clustered into one aspect since they are both foundational elements in ensuring the use of research in decision making and are often used interchangeably in the literature. All the frameworks addressed some component of climate or context. In some frameworks, context includes culture and climate (34) and vice versa (6), hence the grouping of them together.

The context and the application of knowledge to the local context is essential (12;40;60). The use of research evidence and initiatives undertaken to implement KT cannot be separated from its social context (12;18;61). The political context has been identified as an influential component in determining the importance and use of knowledge in policy (16). The context can refer to the broad range of characteristics, circumstances, and conditions surrounding the use of research in management and policymaking (6). Implementing change and instituting findings from research evidence in health care involves many complex interactions, some of which can be classified within the context. It is important to note that while research evidence should be considered in policymaking, other factors do come into consideration such as institutions, ideas, and interests and these need to be considered when examining the overall context; research evidence is only one input into the policymaking process (62;63). Numerous factors need to be considered when examining the local context and ensuring successful implementation such as economic conditions, political environments, overall policy processes, local actors in the policy process and conditions of conflict (18;64).

One review found 54 different definitions for organizational climate and, similarly, many definitions exist for culture (6;65). Climate is most often viewed as the localized manifestation of the large overarching culture, is a phenomenon that varies across groups or units, and is typically less stable over time compared to culture (6). In fostering climate for research use, it refers to the political will and the overall desire of knowledge users to want to use research evidence. The climate needs to be conducive to linking research to action (66). Climates that are receptive to the use of research in management and policymaking are reflected by: leadership in the health system that promotes the use of research evidence in decision making and structures or positions that exist within the health system to ensure accountability for using research evidence in decision making (4;67).

Examples of tools:

- Tools to assess the local context can be found through the ODI; a workbook is provided with numerous tools on how civil society organizations can map various aspects of the political context (46). This workbook provides tools to assist in assessing political context as a whole, and not specific to the use of research evidence.
- To assess the local climate and interest in using research in management and policymaking can, one can either use
 - The CHSRF self-assessment tool which includes assessing the organization's capacity to acquire, assess, adapt and apply evidence (52),
 - Lavis et al's framework for assessing country-level efforts to link research to action, which builds on the CHSRF tool but adds more components such as research production (68), or
 - The SUPPORT self-assessment tool which draws on the previous two frameworks and addresses the key steps needed to facilitate the use of research evidence in management, decision and policymaking (14).

- Tools to implement broad based changes in a health systems' context or climate with respect to research use in policymaking have not been developed and therefore none have been identified for this report.

Having a climate that is conducive to linking research to action, and permits consideration of the effects of the local context on the use of research is a foundational building block which permits the following components to be implemented. It is essential to understand and assess the local climate and context in order to determine the feasibility and possible challenges in using research evidence to influence policymaking.

Table 8 provides a list of questions and considerations to assist countries in assessing the current context with respect to ageing and health initiatives, as well as the climate related to knowledge translation activities. These questions assist in establishing the current climate and context, and depending on the outcomes of this assessment, potential interventions and initiatives that are outlined in the following tables can be implemented as appropriate (4;69).

Table 8: Climate and Context for Research Use

Element	Questions to assess country-level context and climate
Climate and context for research use	<p>Context and Climate for Ageing and Health</p> <ul style="list-style-type: none"> • Is there a willingness to accept ageing and health as an issue? • Is there a positive acceptance of ageing or is ageism viewed negatively? • Is there an awareness of the impacts of population ageing and the associated demographic transition? Is ageing addressed as an important issue for national development interests that policy needs to address? • Are there policies related to ageing and health or do existing health policies relate to ageing? Are there policies related to non-communicable diseases? • Are there existing intermediary organizations (i.e. advocacy or national groups) on ageing and health? • Is there a position or department in the national government level that supports ageing in general and ageing and health? • What is the priority afforded to ageing and health reflected in the resource allocation? • What are the competing priorities (globally, internationally, nationally...)? Can the ageing and health agenda build on the other priorities (i.e. globally, nationally...for that context)? • Is there a national repository of policy documents? Can it be easily accessed? • Is the country implementing the Madrid Action Plan? • Are there country teams or is the opportunity there to establish country teams to facilitate the use of research in policymaking in ageing and health? • Does the health system evaluate and consider the local context with respect to ageing and health and determine its effect on research use and application? <p>Context and Climate for Knowledge Translation</p> <ul style="list-style-type: none"> • Is there an appetite or an interest for the use of evidence in policymaking? Do researchers, intermediary organizations, and users understand the importance of KT in ageing and health? • Do the health systems, intermediary groups and research users emphasize the value of research use in the policymaking process? • Do leaders within the health systems promote the use of evidence in policymaking?

	<ul style="list-style-type: none"> • Is there a formal infrastructure or are there positions wherein the accountability for encouraging research use in policymaking in ageing and health lies? • Do clear points of contact exist in the health system regarding where to turn to in order to acquire, assess, adapt and apply research evidence in decision making processes (e.g., networks, knowledge brokers, library resources, opinion leaders)? • Do funders within the health systems have a mandate to support efforts to link research to action and do they support these efforts in several ways, such as ensuring a KT component in each funding proposal? • Are there recognition programs in the health system that acknowledge and reward organizations and institutions that use research evidence in decision making?
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2) Linkage and exchange efforts

Many frameworks discussed the importance of linkage and exchange between researchers and knowledge users; some frameworks mention it as an element in and of itself, whereas others incorporate it within other elements (4;6;16;63;70). Linkage and exchange does permeate all the other elements and is essentially a foundational building block for the following elements. Strong links between policymakers, stakeholders, and researchers can enhance the transfer of research into practice (71). Researchers and knowledge users need to have open relationships where dialogues occur so that necessary information can flow as necessary. Linkage and exchange efforts fundamentally occur when there are positive relationship between research producers or purveyors and knowledge users (72).

The ‘two communities theory’ has been in existence for decades; the theory states that the reason research has limited impact on policymaking is because researchers and policymakers live in two different communities and separate worlds, with different values, reward systems, and languages (73). In the past decade, many have argued that this needs to be addressed by increasing interaction between the two groups to achieve a shared understanding, which can improve the links between research and policy (16;18;19;72;74-76). Linkage and exchange can lead to higher levels of interactive knowledge sharing (77). Linkage and exchange can take many forms such as working relationships, communities of practice, or formalized networks (78).

Linkage and exchange are more likely to be beneficial when the parties involved are committed to work together in asking, analyzing, and answering policy-relevant questions, when relationships are personal and ongoing, when a team-based approach is used, and where there are meaningful partnerships where the role and expertise of all members are respected (19;79;80). Health systems that have positive linkage and exchange elements have activities such as regular meetings with research presentations and interactive workshops that include deliberative dialogues on policy-related issues (4;81). Again, components of linkage and exchange will be found in all the other elements as well. For a more detailed list of possible activities, see Table 9.

Examples of tools:

- There is one tool that assists in assessing a health system’s linkage and exchange efforts which is Lavis et al’s framework for assessing country-level efforts to link research to action (82).
- Another tool that helps develop deliberative dialogues and makes them meaningful for linkage and exchange efforts can be found in the SUPPORT series of tools (63). This tool suggests six questions that guide the development of policy dialogues.
- Tools to address broad-based interventions for improving linkage and exchange at a country level have not been developed and therefore none were identified for this report.

Table 9: Examples of Linkage and Exchange Efforts

Element	Examples of initiatives
Linkage and Exchange Efforts	<ul style="list-style-type: none"> • Researchers on ageing and health, knowledge users (i.e. policymakers, advocacy groups, older community, providers, actors), funders (i.e. governments, national institutes, private, NGO/ civil society), consumer groups, and professional bodies have open and positive relationships that support the use of evidence informed policymaking. • Health systems promote formal and informal networks of researchers and/or users in ageing and health. • Health systems have intersectoral committees (i.e. across ministers across governments) that can facilitate the use of research in policymaking on ageing and health. • Consumer groups are interested in ageing and health and facilitate the use of knowledge in the health system. • Relationships with professional bodies and learned societies exist that address ageing and health in this context. • Public media efforts (TV programs, newspaper columns...) specifically address ageing and health exist in the health system. Alternatively, media efforts specific to health exist and collaboration initiatives can be pursued. • Health systems currently have a policy dialogue on ageing and health. • Health systems establish formal and informal (or strong and weak) ties to researchers and brokers within and outside the system who can assist in acquiring, assessing, adapting or applying research evidence in the decision making process. • Health systems establish and fund regular meetings where research presentations that focus on ageing and health issues are made to relevant groups. • Health systems ensure the capacity to convene interactive workshops that bring together researchers and research users in ageing and health, and organize “deliberative dialogues” during which the knowledge arising from systematic reviews can be combined with tacit (i.e., how to) knowledge and other types of knowledge brought forward by stakeholders.

3) Creation of new knowledge:

Some of the frameworks referred to this element as research production while others referred to it as knowledge creation (42;60;83). The latter is the term that will be used, since when we discuss the use of evidence in policymaking we do not only refer to pure research, but rather various types of knowledge such as research evidence, local data, published research, and experiential evidence (2;18;34). One can refer to the different generations of knowledge, where the first generation refers to primary research studies such as randomized trials, the second generation of knowledge refers to knowledge synthesis such as systematic reviews, and the third generation of knowledge refers to tools and products used to present knowledge in user-friendly formats such as front-end summaries of systematic reviews (42;60). The type of knowledge, evidence, or research that is appropriate for integration needs to be determined at the local level and depends on the local context (18).

Creating knowledge and research that is relevant and timely are essential components within this element. Too often, policymakers claim that the evidence that is currently available is dated and irrelevant and therefore there is limited research to contribute to the policymaking process (9;20). There is limited external generalizability, validity, and applicability of the current research that is being produced and this effects transferability to the policymaking process (84). Using good methods that are transparent, and managing conflicts of interest, can enhance the uptake of research evidence in policymaking (85;85). The quality of the research, the topic relevance, the operational usefulness, the

solutions or recommendations associated with the research, and the credibility of the source are all important characteristics that can enhance the use of research in policymaking (16;18;86).

Health systems need to ensure that they have the capacity to conduct research and the capacity to fund the creation of new knowledge (87). There is a lack of need driven research, particularly in developing countries (2). Furthermore, changes are needed so that local stakeholders such as policy-makers, civil society, and researchers, can have influence in determining the nature, quality and applicability of the research being conducted (87). Ownership of research and research ideas by stakeholders are also important (18). Health systems that support the creation of new knowledge that is applicable and relevant will have such elements such as regular priority setting processes with researchers, stakeholders, and policy makers, fund new research in the form of partnerships between research agencies and health services agencies, and have the overall capacity to conduct or commission research (4;88;89). For a more detailed list of possible activities, see Table 10.

Examples of tools:

- One tool to assess health systems capacity in the creation of new, timely and relevant knowledge can be found in Lavis et al's Linking RTA framework: health systems can evaluate their initiatives or support for new knowledge based on the framework provided in that report (90).
- The ODI, in their RAPID program's toolkit for policymakers in developing countries, identify three tools that assist in improving the standards of qualitative research (91). The considerations listed there can assist in determining the type of research to be funded or commissioned.
- Other reports have been published that can assist researchers in determining relevance and generalizability of their research such as Green and Glasgow's report (84).

Table 10: Examples of Knowledge Creation

Element	Examples of initiatives
Knowledge Creation	<ul style="list-style-type: none"> • Researchers, intermediary groups or knowledge users ensure that there are knowledge translation platforms dedicated to ageing and health or to other health issues. • Research groups address ageing and health issues (i.e. access, financing). • Funders commission or fund scoping reviews in ageing and health to identify the state of research in priority areas before undertaking efforts to support systematic reviews or additional research on a topic. • Health systems ensure that gerontology and geriatrics research centres or research centres that carry out research on issues on ageing exist within the health system. • Health systems ensure that there is a national funding program on ageing and health and the necessary capacity to produce primary research, reviews and research-derived products • Health systems collect data on older people that can be disaggregated by age, and ensures the capacity to analyze and interpret data on older people • Health systems ensure the access to and linkages with databases and national statistics bureaus/ census data, and national health information systems • Health systems participate in regular priority setting processes related to research on ageing and health (to ensure that systematic reviews, primary research and efforts to link research to action are highly relevant to the needs of potential research users). • Health systems provide and researchers participate in skill development programs to help researchers ensure the relevance, timeliness and generalizability of their research on ageing and health.

4) Push efforts

Some frameworks allude to the role of researchers and intermediary groups (34;40) whereas others explicitly define the role they play in the use of research in evidence informed policymaking (4;16;92). The activities taken by researchers and intermediary groups can be termed ‘push efforts’ as they push the knowledge out to the necessary groups in appropriate formats. The ‘push’ efforts that researchers or intermediary groups undertake can bring research evidence about an issue to the forefront and to the attention of policymakers and inform the policy development and implementation processes (19). Push efforts are essential strategies that are used to support action based on messages that arise from current research. Based on the discussion above regarding the two communities (linkage and exchange), strategies for research dissemination need to focus on bridging the gap between the two ways of understanding (18). The messengers, communication, and the packaging of the research are important characteristics to consider (9;18).

Traditionally, researchers disseminate their findings via publications and the conference circuit: all of which are important initiatives but primarily contain the research findings within academic circles. Pushing the knowledge out to users requires re-packaging of information and highlighting actionable, jargon-free messages (9). To have an impact, research findings must be translated and adapted to specific contexts and situations (18). Developing applied products and tools that help knowledge users see the relevance and usefulness of the research is a factor that can effect the successful transfer of research into practice (9;93).

Examples of push efforts are identifying actionable messages arising from research, fine-tuning the messages for different user groups, working with credible messengers for each group to disseminate the messages, supporting decision making and actions associated with the messages, and developing media releases for the actionable messages, and training researchers to develop their capacity to create, disseminate and execute evidence informed push efforts (94). For a more detailed list of possible activities, see Table 11.

Examples of tools:

- Lavis et al’s framework to assess country level efforts to Linking RTA can be used as a tool to determine levels of push efforts within a health system (95).
- Lavis et al provided a framework specifically for pushing out research evidence, and the framework addresses five key issues which can assist in developing push efforts (96). The five key issues are; what should be transferred, to whom, by whom, how should it be transferred and with what effect should it be transferred. While this is not a tool per se, it can help research and intermediary organizations assess if their transfer of research findings addresses these main points.
- One strategy to pushing out research knowledge is the development of policy briefs; article 13 in the SUPPORT series provides a guide for those individuals preparing and using policy briefs to inform evidence informed policymaking (97).
- The ODI has numerous tools on their website to assist in the communication of research findings: one recent tool focused on the development of policy briefs, research briefs and stories of change (98).
- The International Development Research Centre in Canada also developed a toolkit to support push efforts for researchers that contains some chapters such as context mapping, the communication of research, and writing a policy brief (99).

Table 11: Examples of Push Efforts

Element	Examples of initiatives
Push Efforts	<ul style="list-style-type: none"> • Researchers or intermediary organizations specifically package information for ageing and health and disseminate the necessary information to different user groups. • Researchers or intermediary organizations compile national professional journals, letters, and bulletins on ageing and health and disseminate them to the appropriate groups. • Researchers or intermediary groups develop media releases and use the mass media to disseminate applicable and relevant findings in ageing and health. • Researchers or intermediary groups engage in systematic push efforts in ageing and health such as identifying actionable messages, fine tuning messages for different user groups, work with the most credible messengers, and using research informed strategies to encourage and support action based on these messages. • Health systems or organizations provide support services for academics and policymakers to socially market their messages (i.e. PR and marketing departments) in ageing and health. • Health systems and funders provide, and researchers participate in skill development programs to enhance their capability of developing and executing research-informed push efforts.

5) Facilitating pull efforts

In considering efforts to link research to action, efforts to facilitate “user pull” are usually aimed at making it easier for managers and policymakers to identify relevant research evidence when they need it. Typically researchers and intermediary groups lead these initiatives (19;100) and while one can argue that it should fall under the element of push efforts, it remains separate since the ‘facilitating pull’ efforts really try to support knowledge users in obtaining the evidence when necessary, whereas ‘push’ efforts focus on pushing out actionable messages. Many of the frameworks analyzed discussed different initiatives that researchers can take to increase the uptake of their research findings. Furthermore, health systems can address some of the barriers associated with facilitating pull such as limited access to information, journals and technology (2).

Interactive knowledge sharing mechanisms are one mechanism of facilitating pull efforts, and can include mechanisms such as online discussion forums, webinars, training workshops, and personalized briefings (77). Health systems that have efforts that facilitate pull can have technical infrastructures with easy access to online resources, systems that support the use of research in decision making (i.e. documentation and reporting tools), and websites that provide “one-stop shopping” (4;101). Providing “friendly front ends” with a graded-entry format for systematic reviews (e.g., 1 page of take-home messages, a 3-page summary, and a 25- page report) can offer promise as an initiative of both push and facilitating pull efforts (19;102). Developing summaries of systematic reviews with local recommendations and implication considerations are another tools that health systems can use to facilitate pull of research evidence for policymaking (28). For a more detailed list of possible activities, see Table 12.

Examples of tools:

- Lavis et al’s framework to assess country level efforts to Linking RTA can be used as a tool to determine levels of facilitating pull efforts within a health system (103).

- One tool to assist in assessing interactive knowledge sharing mechanisms can be applied from the BRIDGE criteria that define important components of interactive knowledge sharing mechanisms such as how it is organized and supported (77).
- One stop shopping websites with summaries of systematic reviews can serve as tools to assist policymakers in identifying relevant information (102). Examples of such websites are
 - Health Systems Evidence, (www.healthsystemsevidence.ca), which houses a repository of research syntheses about governance, financial and delivery arrangements within health systems,
 - Health Evidence (www.health-evidence.ca), which houses reviews focused on the public health sector, and
 - SUPPORT summaries (<http://www.support-collaboration.org>), which houses summaries of policy-relevant systematic reviews.
- Use of evidence in policymaking can come from a number of sources such as other country's experiences. One tool to assist in providing practical help and guidance to policymakers in the use of international comparisons in policymaking was identified in the RAPID toolkit yet while this website does provide links to other websites that can assist in identifying comparators, it is quite a long list without a comprehensive search engine to assist in obtaining information (104).

Table 12: Examples of Facilitating Pull Efforts

Element	Examples of initiatives
Facilitating Pull Efforts	<ul style="list-style-type: none"> • Health systems ensure the ability to access a national, regional, or global network of ageing and health experts. • Health systems identify opportunities (i.e. websites, forums...) for hosting ageing and health information • Health systems implement a technical infrastructure to support research use and limit restrictions to online resources and journals that may contain relevant research evidence on ageing and health. • Health systems, funders, researchers or intermediary groups maintain web-sites that provide 'one-stop shopping' for systematic reviews on ageing and health that are optimally packaged and of high-relevance. • Organizations in the health systems implement accessible and efficient systems to support the use of research in decision making (e.g., documentation and reporting tools, communication tools, and decision support tools).

6) Pull efforts

Four of the frameworks and two tools specifically discuss the role of the knowledge user in using research evidence in policymaking. The activities undertaken within a health system by the knowledge users can be classified as 'pull efforts'. Pull efforts by policymakers usually require a change in structures and processes to improve the health system's ability to acquire, assess, adapt, and apply research evidence (19). Pull efforts are utilized in situations where knowledge users value the use of research and recognize the need to address an information gap (105).

Health systems that are strong in 'pull efforts' may have revised their decision making process to include explicit consideration of research, conducted or participated in training programs to enhance skills related to accessing, assessing, acquiring and adapting research, created a rapid response unit that provides information about the best research in a timely manner, or they may engage knowledge brokers or opinion leaders to assist in obtaining and applying the appropriate evidence (4;19;106;107).

Utilizing knowledge brokers can be a component within ‘linkage and exchange’ but engaging and actively seeking out knowledge brokers, opinion leaders and internal champions in policymaking can be classified as a pull effort (18;86;108). Having intermediaries like these that are knowledgeable, enthusiastic, and able to ‘sell’ new ideas can greatly increase the pull of research into policymaking (18;86). For a more detailed list of possible activities, see Table 13.

Examples of tools:

Lavis et al’s framework to assess country level efforts to Linking RTA, and the assessment tool in the SUPPORT series, can be used as a tool to assess pull efforts within a health system (56;109).

- Lavis et al’s framework to assess country level efforts to Linking RTA, and the assessment tool in the SUPPORT series, can be used as a tool to assess pull efforts within a health system (56;110).
- The SUPPORT series of articles provides a range of tools that assist in user pull efforts. Articles 3-12 assist knowledge users in using research to clarify a problem (111), frame options to address a problem (112), consider implementation issues (113), and assess the pros and cons of policies (114).
- The SUPPORT series also assists knowledge users in finding systematic reviews (115), assessing quality and applicability (116;117), and determine equity conditions (118). Tools to finding research on local conditions (119) and resources and costs (120) are also provided.
- The ODI has a plethora of tools on their website that may assist in user pull efforts in developing countries (16;121).

Table 13: Examples of Pull Efforts

Element	Examples of initiatives
Pull Efforts	<ul style="list-style-type: none"> • Health systems institute a national policy to encourage the use of evidence in decision and policymaking. • Health systems develop and use rapid response units that have access to experts on ageing and health that can provide primary research, written summaries, and telephone or in person consultations about the best research in a timely manner. • Health systems provide and participate in programs and training to enhance decision makers’ capacity and skills to develop and execute efforts to facilitate user pull and assist in acquiring, assessing, adapting and applying research evidence in decision making. • Health systems engage knowledge brokers or opinion leaders in ageing and health within the system to assist in acquiring, assessing, adapting and applying research in decision making. • Health systems facilitate open communication between users and the research community in ageing and health

7) Evaluation of efforts to link research to action

The final element in supporting health systems’ efforts to use research evidence in policymaking is the evaluation of the various efforts. Majority of the frameworks discuss the importance of evaluation. Rigorous evaluation is needed on the various activities that support linking research to inform future efforts of linking research to action (122).

Health systems that support evaluation efforts should not only fund rigorous evaluations but also ensure that funders, researchers and knowledge users participate in these rigorous evaluations

(4;19;107;123). For a more detailed list of possible activities, see Table 14. Besides utilizing evaluations of effects, other methods may be used as well such as impact evaluations and outcome mapping (124-126). Rigorous evaluation efforts should be matched to the type of implementation and context within which the initiative is being undertaken and therefore tools to assist in evaluation efforts have not been identified.

Table 14: Examples of Evaluation Efforts

Element	Examples of initiatives
Evaluation Efforts	<ul style="list-style-type: none"> • Health systems allocate resources and funding to monitor implementation and evaluate the impact of evidence informed decision making in ageing and health. • Funders, research and intermediary groups partner and participate in identifying criteria for success and conducting rigorous evaluations of efforts to link research to action. • Health systems ensure that the process of KT is evaluated as well as the outcome measures. • Funders, researchers, and intermediary organizations ensure that the knowledge has been applied appropriately to specific subgroups including different age groups, gender, income, living arrangements, dementia, other disability, ethnic and other cultural groups.

Case Studies:

The purpose of this section is to review the identified high quality case studies where research has led to some kind of action (policy development, management, collective engagement etc.) on ageing and health, and where case studies on ageing and health are not available, high quality case studies from the broader health care field are reviewed. The searches for case studies did not identify any case studies in the area of ageing and health. This section will identify successful approaches of how to promote the knowledge uptake and implementation of interventions and policies on ageing already shown to be effective in other areas of health care. The case studies used here are the most comprehensive ones that address multiple efforts to influence the use of evidence in policy making however there is additional work that focuses specifically on various distinct elements of the framework. Those studies can be examined as needed by groups that undertake this type of effort.

Case studies evaluating the effects of a full KT infrastructure or system on the use of evidence by health system managers and policy makers were not identified. Eight high quality case studies were identified that each discusses different but multiple components of the proposed KT framework. The eight case studies as well as the type of evidence examined, their objectives are included in Table 8. Furthermore, beside each case study, the associated elements from the framework in Table 7 that are discussed in the case studies are identified. Many of the case studies focused on barriers and areas for improvement as opposed to actual interventions. This review illustrates that while numerous independent initiatives are in place in different healthcare systems; no one KT infrastructure framework has been developed or studied to determine overall effectiveness. Furthermore, during the meeting convened by WHO of the experts on ageing and health, discussion ensued that while there may not be high quality case studies in the published literature on KT in ageing and health, members of the group were aware of situations where research has and/or continues to influence practice in ageing. Members of the expert group provided case studies from their own experiences and this is provided in the following section.

The case studies supported different components of the proposed KT framework, as is demonstrated in the last column in Table 15. The next section walks through the seven domains of the proposed framework and provides examples from the case studies that support components of the seven elements.

1) A climate and/ or context for research use:

The case studies demonstrated that high level political will, support, and commitment is necessary to facilitate the use of evidence to inform policymaking (85;127). In a case study from Mexico and Venezuela, the need to promote and build a research culture were seen as facilitators in the use of evidence (127). The lack of a political will and the lack of a desire to use evidence to inform health policy can act as a barrier i.e. an

"impediment to successful interaction between researchers and decision-makers was part of what our informants called 'political culture'. Both researchers and decision-makers described an attitude among officials in which decision-making was based on experience and immediate pressures, instead of taking into account information generated by research" (128 p108)

Formal manifestations of the climate and context can come in many forms, as was discussed in the proposed framework above. The case studies discuss some of the formal manifestations i.e. creating formal structures, developing the capacity internally for staff to acquire, assess, adapt and apply the research evidence, and recognizing and rewarding the use of research in decision making.

Creating formal structures or positions that can encourage the use of research and evidence in policymaking were discussed in the case studies. For example, establishing and developing institutional arrangements can facilitate the level of use. Three examples from the case studies that discussed institutional arrangements that support the use of evidence in health policy:

- "We also found mixed models, such as the Sheps Center at the University of North Carolina, which does not have a formal program in state health policy, but has a deputy director for policy, plus a senior staff member who works almost exclusively on state health policy issues. The experience of the states we visited suggests that models that provide for a distinct organizational unit for state health services research and applied policy analysis activities have certain advantages. Distinct programs seem to promote the building of core staff and faculty with the appropriate skills for state level policy work"(129 p147)
- "it is the existence of institutional arrangements, which drives the level of its use. In particular, Infarmed in Portugal (for certain new drugs) and National Institute of Clinical Excellence (NICE) in the United Kingdom (for health technologies having a major impact on the health-care system) have led to an increase in the formal use of economic evaluation" (127 p11)
- "Health economics units: A team of health economists (with or without other disciplines) of varying size with well developed roles and functions to support decision making...Three of the four other government departments approached in NSW had internal economics units." (130 p4)

Establishing clear points of contacts to these institutional arrangements and developing guidelines as to how to utilize them was also discussed in one of the case studies (130). Health systems require organizations that develop and support the use of research (85), and for a further discussion and examples for linkages between researchers and policymakers, see the second element on Linkage and Exchange.

The case studies also demonstrated the importance of building capacity and ensuring skilled staff that is able to acquire, assess, adapt and apply relevant evidence to the policy process. Jewell and Bero (2008) and Wilkinson et al (2007) found that an organization's limited capacity to collect data impeded the use of evidence (131;132). Respondents in many of the case studies discuss the importance of capacity building among those working in an organization and in the health system (85;133-135), not only with respect to their knowledge but also having specific skill sets in certain areas such as economic evaluation or data interpretation (85;131).

In setting a climate for research use, one case study identified the need to "create incentives and rewards that are supportive of state policy work" (129 p147). Also, strategies to recruit and retain staff should reflect the desire to include evidence in decision-making, as is demonstrated in one case study where position descriptions require certain appreciation or understanding of economics (130). Alternatively, one case study ensured the appropriate skill set among decision makers by recruiting policymakers from the research sector i.e.

"Mexico's successes at integrating research into decision-making are often attributed to that rotation between positions as researchers and as decision-makers.... This phenomenon [of incorporating researchers in decision-making] intensified since the early 1980s when it became increasingly common for individuals trained as researchers to take on decision-making positions while maintaining their informal contacts with other researchers. For example, the Ministers of Health for the past three presidential terms have been drawn from the research community." (128 p110)

Overall, developing a climate for research use should stem from the political will and commitment; however the formal structures, positions, reward, recruitment and retention strategies are the formal manifestations that are essential components in building the climate. These strategies need to be in alignment with the current political context and need to be linked to the appropriate level and place in the health system.

2) Linkage and exchange efforts between researchers, stakeholders and knowledge users

Linkage and exchange between knowledge producers and knowledge users can take many forms, such as regular meetings to discuss available research (133) and conducting interactive workshops where the use of evidence in decision making can be discussed (136). The one subdomain that was reported most often as influencing the use of research in decision making was the formal and informal relationships to people outside the organisation who can assist in obtaining the appropriate research evidence. Formal relationships, such as agreements between universities, contracting or commissioning research, and establishing research agencies that support the use of research can enhance the use of evidence in policymaking (129;130;134) (numerous examples of types of formal relationships are provided in the case studies). Numerous case studies stated that informal relationships and communication were also critical in ensuring the use of evidence (128-130;134). For example, "Many interviewees remarked that informal communication was a critical channel between research and decision-making" (128 p109).

Investing and developing a positive relationship between the knowledge producers and knowledge users can positively influence the use of evidence in decision making. For example, some case studies stated:

"Two organizational strengths were repeatedly cited by individuals participating in the site visits – use of an evidence- based approach, and existence of a strong relationship between researchers and policymakers... The strong relationship between researchers and policymakers came in the form of both traditional relationships (in Mexico, the Philippines, South Africa, and Thailand) and in the form of some researchers becoming policymakers themselves, which allowed them to bring to the policymaking process their knowledge of research evidence and their contacts within the research community (in Mexico, the Philippines, and Thailand)." (135 p3-4)

"A cholera researcher illustrated the issue: 'if there isn't a good relationship between a researcher and a decision-maker...it is difficult for research results to be taken into account. It doesn't matter whether it [the trouble] comes from one side or the other, if there isn't a good relationship, I don't see how research results will be noticed.'" (128 p106-7)

"informants spoke of the critical role played in Mexico by official research organizations in the health sector, such as the National Institutes of Health, research departments in general directorates ..., and National Councils.... Such organizations provide environments in which the personal connections important in establishing credibility and influence can be created and strengthened. As one family planning researcher in such an organization put it, about his work with decision-makers, 'they see you everyday, they ask how things are going, they are waiting for your results...'" (128 p108)

"In Brazil the researchers reflected on the important process of building trust with the decision-makers based on their new roles in government." (136 p100)

One case study identified that having close relationships may lead to conflicts of interest and may not be positive i.e. "Thai participants pointed out that having researchers in very close relationships with policymakers can lead to distortions in their research" (135 p5).

The importance of linkage and exchange was mentioned in all the case studies. The formal and informal relationships can take many forms, yet the type of relationships and the connections between the producers and users of knowledge are important.

3) Knowledge Creation

The case studies discussed two main points with respect to the creation of new knowledge; a) the importance of priority setting processes that include appropriate stakeholders, and b) ensuring the research commissioning capacity within the health system.

The first point, the importance of priority setting processes, addresses the need to ensure the input and solicit advice from key stakeholders such as policymakers, decision makers and management before proceeding with funding or conducting research. Without their input, chances are that the research is not useable i.e.

“policymakers’ needs do not drive research... academic researchers generally follow their own interests when choosing what studies to conduct or tailor them to specific requests for grants. Similarly, the synthesis of existing research in the form of systematic reviews is driven by the researchers’ particular interests. As a result, policymakers find that research often “sort of applies . . . but not quite. You know, if we had had this conversation earlier, we could have added this or we could have, you know, fired ten

degrees to the west, and we'd have been right on in terms of really helping us all." (132 p189)

Involving the target users in the selection, design, development and implementation of the research can ensure that the research is more applicable. It also helps to establish which issues require the most urgent action and thus requires additional research (128). In two cases that were studied, one in Argentina and one in Brazil, "the interaction with the decision-maker helped to define and narrow the scope of the topic and the research questions" (136 p104).

The second point was alluded to in some of the case studies, where sometimes research needs to be commissioned to answer policy-relevant questions. In one case study, specific studies are commissioned on an as needed basis (127), another case study discussed co-operative agreements between academic institutions and health service agencies whereby through the agreement, the academic institution engages in activities to support decision making such as applied research and policy analysis (129), and a third case study discussed the need to use external services and contract research by tender on an as needed basis (130).

4) Push efforts

As was discussed above in the proposed framework, the activities taken by researchers and intermediary groups can be termed 'push efforts' as they push the knowledge out to the necessary groups in appropriate formats. Some of the case studies discussed the importance of intermediary groups. Two such examples:

"The case of Washington State, where the Health Policy Analysis program faculty and staff have provided considerable support to state agencies on healthcare reform, highlights the important role that persons can serve the bridging and translation functions between the university and state government can play in positioning the university's work in the policy process. One state official referred to such persons as "policy entrepreneurs" - persons who have sufficient research backgrounds and credentials to understand the culture and methods of the university research organization, but who also understand the policy process and can communicate effectively with state policymakers" (129 p145)

"AIDS researchers in Mexico produce a 'Monthly AIDS bulletin' which informs decision-makers about AIDS issues and describes the most recent research results. Formal documents like these sensitize decision-makers about the importance of research..." (128 p109)

One case study identified that there is room for growth and certain international organizations can play a role in these push efforts i.e.

"Participants from three organizations suggested that WHO play a role in creating knowledge-related global public goods. Participants from Mexico emphasized WHO's role in developing and promoting conceptual frameworks, standardized methods, and comparative analyses. Participants from the United Kingdom, on the other hand, recommended that WHO set up the evidence synthesis component of their country's National Institute for Clinical Excellence for LMICs to use as an input into their own CPG and HTA production processes." (135 p6)

Push efforts were discussed as important efforts and can be in alignment with the Linkage and Exchange element above. The case studies that were identified in this report did not address additional push efforts however there is another body of research which focuses on the specific role that researchers can play in pushing out evidence to policymakers and provides numerous recommendations on how to package the necessary information.

5) Facilitating pull efforts

Facilitating pull efforts refers to efforts usually aimed at making it easier for managers and policymakers to identify and access relevant research evidence when they need it. Numerous case studies identified that one of the barriers to the use of evidence in policymaking was the poor access to evidence. For example:

“Data were collected and held within multiple sources with some outside NHS boundaries (e.g. private sector), rendering it difficult or impossible for network teams to access.” (131 p215)

“Even when evidence is available, policymakers may have problems obtaining it. Some officials do not have access to databases like the Cochrane Library because their state has not subscribed to them. In other cases, the prevalent studies have not been centralized; examples cited were publications on benefit design and state Medicaid evaluations. And in many cases, the data are never published, such as studies conducted by pharmaceutical companies: “And you wonder how it would have impacted your view of the world if they had been there, or what limitations were uncovered that someone didn’t want to pursue and for what reason.” (132 p189)

Recommendations were provided i.e. in Columbia it was recommended to “increase access to existing evidence” (127 p13) and in the United States one case study recommended “creating accessible sources of consolidated research evidence” (132 p203). Respondents in Lavis et al’s case study suggested the need to “create awareness about the need for free online access to journals in middle-income (as well as low-income) countries (Chile)” (135 p6).

6) Pull efforts

The activities undertaken within a health system by the knowledge users can be classified as ‘pull efforts’. The case studies discussed varying activities, one of which was the ability of users to summarize or conduct primary research that facilitates the use of research in decision making (132;135). Furthermore, using dedicated staff to pull research into decision making was found to be a useful strategy: this dedicated staff could have had specific expertise, could be trained to find the research, or could be a specific data lead who supported the rest of the organization (130-132).

Another aspect was developing and implementing decision making processes that promote the use of evidence in decision making. A lack of understanding of the importance of evidence informed decision making can be a barrier to the use of evidence (134). In Latin America, “a clearly defined set of criteria to facilitate or guide the decision-making processes ... was identified as one of the main obstacles preventing the use of economic evaluation studies” (127 p9). Some countries are implementing formal processes to ensure the incorporation of research evidence in decision making i.e. in Argentina, the Superintendent of Health Services “has established that its recommendations will be evidence based according to criteria of clinical effectiveness and cost effectiveness” (127 p6) and in the US, some administrative officials are “introducing formal procedural changes that require evidence in the decision-making process” (132 p199).

Additionally, training and continuing education were identified as an important factor in ensuring the use of evidence in policymaking. The lack of appropriate training in the necessary skills as to how to acquire and critically appraise the evidence were mentioned as barriers to evidence use in decision making (129;132). Numerous case studies recommended developing useful and applicable training to assist evidence informed policy-making (129;133;135). Of those case studies that discussed the implementation of a training program, they discussed the importance of ensuring accountability and creating 'informed consumers' of evidence (130). Training in appraising evidence influenced practice and was found to be helpful i.e.

“Six administrative officials talked about how evidence-based training had led them to make significant changes in the practices that agency personnel followed ... Training legislators also was reported to be helpful. .. Because most politicians do not have a scientific background, simply realizing that “just because there was an article in a journal doesn't make it true” and “just how many bad studies there are out there” was described by many as being a tremendous insight in itself. But training also made them better equipped to investigate basic research quality issues such as whether a study was a randomized controlled trial, whether it was *replicable*, who funded it, and where it was published.” (132 p199-200)

7) Evaluation of efforts to link research to action

Only one case study mentioned evaluation efforts, and even that case study stated that a minority of organizations conduct evaluations to assess the use of evidence in decision making (133;134). There is a growing body of literature on different type of evaluations including program evaluation, outcome mapping, and others. This is an essential element of evidenced based policy development and will require further attention. As was discussed in the proposed framework, more evaluation efforts need to be undertaken to build up this body of literature and determine appropriate interventions as necessary.

Table 15: Case study overview, objectives, and KT elements addressed by the case study

Authors, year	Country	Type of research/ evidence examined	Purpose/ objective of study	KT elements discussed in the case study
Coburn et al 1998 (129)	5 states in the USA	"University-based health research and policy analysis programs" (p.140)	To compare the experiences of state health policymakers and university-based health research programs to develop hypotheses about "(1) the states' evolving needs for research, policy analysis and technical support; (2) the extent to which university-based programs are addressing these needs; (3) the benefit of state-level involvement for the university and; (4) whether there are models for organizing and financing university/state government partnerships that would be helpful" to form better working relationships." (p.140)	-Climate for research use- formal structures and positions, recognition programs -Linkage and exchange activities- formal and informal relationships -Knowledge creation- commissioning capacity -Push efforts- knowledge intelligence service -Pull efforts - training and continuing education
Iglesias et al 2005 (127)	9 Latin America and 3 European countries	Economic evaluations	"The aim was to identify the opportunities, obstacles, and changes needed to facilitate the introduction of economic evaluation as a formal tool in health-care decision-making processes in Latin America". P1	-Climate for research use- culture, formal structures and positions -Linkage and exchange efforts- formal and informal relationships -Knowledge creation - commissioning capacity -Facilitating pull efforts- enabling easy access to resources -Pull efforts- decision making processes and training and continuing education
Jewell & Bero 2008 (132)	USA	The types of evidence that policymakers mentioned (i.e. systematic reviews, RCTs, anecdotal, economic evaluations)	The objective was "to discover both hindrances to evidence informed health policymaking and those facilitators that may be most amenable to targeted interventions by researchers and policymakers." P179	-Climate for research use- culture, formal structures and positions -Linkage and exchange efforts- formal and informal relationships -Knowledge creation - priority setting processes -Facilitating pull efforts- enabling easy access to resources -Pull efforts- summarizing primary research, decision making processes, training and continuing education, use of dedicated staff
Lavis et al 2008 (85;133-135)	LMIC (project reference group had representatives from Africa, Asia, Latin	Health technology assessments, clinical practice guidelines, any type of research evidence that can be used in "developing	"to identify organizations around the world, and especially in LMICs, that are in some way successful or innovative in supporting the use of research evidence in the development of CPGs, HTAs, and health policy, and to describe their experiences." (p3)	-Climate for research use- culture, formal structures and positions -Linkage and exchange efforts- formal and informal relationships, regular meetings -Knowledge creation - priority setting processes -Push efforts-Knowledge intelligence service

	America, North America, and Europe)	health policy on an international, national, and state or provincial level" p1		-Facilitating pull efforts- enabling easy access to resources -Pull efforts- summarizing primary research, decision making processes, training and continuing education -Evaluation efforts to link research to action
Madden et al 2009 (130)	Australia	Health economics	"To describe how government health departments in Australia use specialist health economic advice to inform policy and planning and the mechanisms through which they access this advice." P1/7	-Climate for research use- formal structures and positions, recruitment and retention -Linkage and exchange efforts- formal and informal relationships -Knowledge creation - commissioning capacity -Pull efforts- training and continuing education
Pittman & Almeida 2006 (136)	Latin America and the Caribbean	Health services research (specifically, social protection in health)	To examine preliminary results of a new research program strategy requiring partnerships among researchers and decision-makers from the start of the research design.	-Linkage and exchange efforts- formal and informal relationships, interactive workshops -Knowledge creation - priority setting processes
Trostle et al 1999 (128)	Mexico	Biomedical, health services research, and social science research	"To reconstruct the processes through which research was used to make decisions and policies; to characterize these processes; and to identify the elements that enable or impede the transfer of research results." (p. 104)	-Climate for research use- culture, formal structures and positions, recruitment and retention -Linkage and exchange efforts- formal and informal relationships -Knowledge creation - priority setting processes -Push efforts- knowledge intelligence service -Pull efforts- decision making processes and training and continuing education
Wilkinson et al 2007 (131)	UK	Routine national data sets i.e. cancer waiting times, hospital episodes statistics, and national cancer patient survey, and any other data used	"To examine how nationally available aggregated routine data are perceived by cancer network teams and to determine whether such data are used to inform strategic decision-making and planning." (p. 212)	-Climate for research use- formal structures and positions -Linkage and exchange efforts- formal and informal relationships -Knowledge creation- priority setting processes -Facilitating pull activities- enabling easy access to resources -Pull efforts-use of dedicated staff

Case Studies provided by the KT in ageing and health expert group

Case #1: Inclusion of Older Persons' Health Issues into National Health Frameworks by the Uganda Reach the Aged Association

Problem: Despite a high burden of ill-health and malnutrition among the older population in Uganda, issues of older persons were largely overlooked in National Health and Nutrition Frameworks.

Background: An interest group comprising of civil society, academic, and policy role players was formed to work towards the inclusion of older persons.

Case Description: The group collected qualitative data on older persons' experiences and perspectives through focus group discussions and key informant interviews. They also undertook a systematic review to identify old age- related gaps in all relevant policy documents including the Minimum Health Care Package 2006; National Health Policy 2004; National Health Sector Strategic Plan 2006; National HBC Policy/Guidelines 2006; Essential Drugs Lists 2006, Village Health Team Handbook and National Nutrition Handbook 2006

Members of the interest group negotiated participation in and, based on the collected evidence, contributed to the deliberations of technical working groups instituted by the Ministry of Health to inform a process of health sector review, including a revision of several national policies and guidelines. In addition, the interest group built relationships for influence with key decision makers, developed policy briefs with key messages and participated in other official policy review processes.

Outcomes: Chapters on older persons were included in the Nutritional Handbook for Uganda and National HBC Policy/Guidelines. Medicines for Non-Communicable Diseases were incorporated in the National Essential Drugs List 2006.

Synthesis between proposed framework and case study:

This case study demonstrates the effects that *linkage and exchange* between researchers, interests groups and knowledge users can have on the use of research to inform policy. This influenced the *knowledge creation* and ensured that it was timely and relevant. This case study also provides examples of concerted *push efforts*, such as developing policy briefs, as well as some *pull efforts*, such as working groups instituted by the Ministry of Health to pull in the necessary information.

Case #2: Inclusion of Data on Older Persons' HIV/AIDS Prevalence in National Datasets in Kenya

Problem: The two first National AIDS Strategic Plans in Kenya (KNASP) made no provision on testing and prevention services for persons over the age of 49.

Background and context: Since 2000 the National AIDS control council of Kenya (NACC) has developed successive KNASP to control and address the morbidity and mortality burden of the HIV/AIDS epidemic. A major pillar has been a focus on voluntary testing, counseling and prevention activities. In line with the common focus of HIV/AIDS programs on adults of reproductive age (15-49), the two first strategic plans (KNASP (2000-2005) and KNASP II (2005/6 – 2009/10)) did not focus on adults over the age of 49.

Case Description: For the development of KNASP III (2009/10-2012/13) NACC undertook and drew explicitly on a first Kenya AIDS Indicator Survey (KAIS) (2007). In contrast to other national surveys that only provided data on HIV/AIDS prevalence and impacts for the population aged 15-49, the KAIS 2007 was expanded to include persons aged 50-64 in its sample. The expansion arose from informally percolating notions, rather than direct or formal advocacy, on the relevance of HIV/AIDS also to older persons. The results of the KAIS 2007 showed a significant prevalence of HIV/AIDS infection among adults aged 50-64.

Outcomes: As a direct result of the findings, the KNASP III guidelines regarding the provision of testing, counseling and prevention services in KNASP III explicitly expanded the target group to include persons aged 50-64.

This case study demonstrated

- a) The need to harness windows of opportunity associated with the development or revision of national policies or strategies, which are often based on explicit evidence and stakeholder consultation, and,
- b) The effect that the direct involvement of policy making bodies have in the generation of evidence and the influence it can have on enhancing its use in the formulation of policy

Synthesis between proposed framework and case study:

This case study demonstrates the need to focus on the current *climate*, take advantage of windows of opportunity, and consider the local *context*. There are also elements in this case study that demonstrate the need for effective *linkage and exchange* between researchers and knowledge users, as well as ensuring that *knowledge creation* activities are relevant and can inform policy.

Case #3: Increasing the use of research in health policy: the Sax Institute Evidence Check process

Problem: The need for rapid appraisal of evidence for health policy.

Background and context: While there are many excellent examples of research informing policy in Australia, many opportunities for translating evidence into health policy are missed. The New South Wales (NSW) Ministry of Health advises that activities to improve health should be supported by sound evidence. One example to support the use of research in health policy in Australia is provided by the Sax Institute (137) (more information can be found at www.saxinstitute.org.au).

Case Description:

The Sax Institute is supported by NSW Health and other partners, and has 38 member organizations drawn from university and research groups undertaking public health and health services research in NSW. The Sax Institute aims to increase the use of research in policy making by facilitating:

- (a) **Generation of new knowledge relevant to policy:** The Institute enables collaborations between policy makers and researchers for the commissioning and co-funding of new policy-relevant research and supports researchers to enable and strengthen policy and practice focused research.
- (b) **Access to and the use of existing research:** Sax has a range of strategies including *Evidence Check* (below) and a quarterly eBulletin *PulsE*, which is distributed to stakeholders, provides

information about newly published systematic reviews of public health and health services interventions.

Evidence Check

Evidence Check is a service provided by the Sax Institute to assist policy makers to gather the best and most relevant research to inform policy making and program development. It was established in response to a survey of NSW government policy makers that found that two thirds reported difficulty finding research reviews when needed and this was a major barrier to using evidence (138).

Evidence Check uses a highly structured process to help policy makers identify review questions and to commission senior researchers to provide high quality reviews. These reviews have the advantage of being tailor-made and informed by the policy and research expertise at the Institute. They are completed within 6 -12 weeks and the average cost is \$24,000. Nearly 100 reviews have been commissioned through *Evidence Check*, covering a broad range of policy issues.

The *Evidence Check* process includes:

- (i) **Defining the question:** Knowledge brokers meet with the policy agency and work through a commissioning tool that is designed to help understand exactly what the policy maker needs from the review and how he or she intends using the final product.
- (ii) **Finding a researcher:** As part of *Evidence Check*, **RADAR (Researcher Accessible Database for the Allocation of Reviews)** has been developed as a register of national and international experts in population health and health services research who have agreed to undertake *Evidence Check* reviews. The Sax Institute uses the from the knowledge broker to find a researcher who can conduct the review within the time frame—usually senior researchers with the associated expertise are selected.
- (iii) **Agreeing on the final product:** Researchers are provided with the policy agency’s report requirements, which generally includes an executive summary highlighting key findings, the report length, language style for the audience (e.g. for senior policy makers), and often an assessment by the researchers on the applicability of the findings to NSW.

Reviews are commissioned by Government Departments and other agencies and have covered a wide variety of topics. Some reviews relating specifically to ageing and health include:

- Best-practice recommendations for physical activity to prevent falls in older adults
- Conflict resolution in end of life treatment decisions
- Rapid appraisal of health strategies for older people: Improving transitions for older patients – when patients return “home”.

Outcomes:

Because these reviews are commissioned to inform a specific piece of policy development, there are many examples of a direct impact on policy. One example specific to ageing and health is:

- Does physical activity prevent falls?** Based on the findings, the review made recommendations about the type, frequency and intensity of physical activity most effective in reducing risk of falls in older people. The recommendations were distributed widely to

clinicians and health promotion staff and prompted a review of NSW Health's fall prevention programs to assess use of evidence based best practice

The Sax Institute follows up each review to determine whether the agency was satisfied with the *Evidence Check* process and the impact of the review on policy. More formal evaluations have also been undertaken and are currently underway (139). Policy makers express a very high level of satisfaction with the process. The NSW Ministry of Health and its agencies, the NSW Treasury and the NSW Department of Premier and Cabinet are all regular users of *Evidence Check*.

Synthesis between proposed framework and case study:

This case study is an excellent example of all of the components of the elements of the proposed framework. The current *climate and context* in NSW is very supportive and encourages the use of evidence to inform policymaking. The Sax Institute also enables relationships between researchers and knowledge users through RADAR and therefore promotes effective *linkage and exchange*. Furthermore, it also ensures *knowledge creation* that is timely, relevant and jargon free. The various strategies enlisted by the Sax Institute are examples of *push efforts* (i.e. eBulletin PulseE), *facilitating pull efforts* (i.e. access to a variety of experts), and *pull efforts* (i.e. enabling rapid results through Evidence Check). The Sax Institute also *evaluates* the efforts of linking research to policymaking.

Case #4: Preventive Assessments for people aged 75 years and over

Problem: The need to prevent illness and improve quality of life for older people

Background and context: Health assessments to identify individuals at high risk of poor outcomes have been trialed overseas and in Australia (140). Since 1999 the Australian Medical Benefits Schedule (MBS) allows for people aged 75 years or over to consult with a medical practitioner for in-depth assessment of their health needs. The assessment provides “a structured way of identifying health issues and conditions that are potentially preventable or amenable to interventions in order to improve health and/or quality of life” (MBS item 702) (141). This item was broadly based on results from a randomized controlled trial of home based health screening (the “Preventive Care Trial”) undertaken by the University of Newcastle for the Department of Veterans Affairs (140) and through consultancies with the Department of Health and Ageing.

Case Description: In the 1990's the Australian government was interested in understanding the potential for preventive assessment programs to improve health outcomes for community-dwelling older people. Initial interest in these programs came from the Department of Veterans Affairs who commissioned a literature review, a feasibility study and a randomized controlled trial of health assessments. The (then) Department of Human Services and Health was also interested in different approaches to the prevention and management of chronic and complex health needs affecting older Australians. The Enhanced Primary Care (EPC) Medicare Benefits Schedule items were introduced in 1999-2000 to improve the health and quality of life of older Australians, people with chronic conditions and those with multi-disciplinary care needs.

Researchers worked with policy makers and providers to review existing literature, develop tools and processes for undertaking the assessment, and for evaluating their effectiveness. The researchers were also consulted and invited to participate in policy forums in the development of the Medicare item. Other agents were also engaged in preparation for the introduction of the assessments and their evaluation, with particular emphasis on the role of the general practitioner.

Researchers from the University of Newcastle were commissioned by the Department of Veterans Affairs to develop a system for the conduct of assessments and to undertake the Preventive Care Trial. Reports and presentations were provided to government during the conduct of the trial; results of literature reviews, instrument development and evaluations were also presented at national and international conferences and published in peer reviewed journals.

A national evaluation of the uptake of the Medicare health assessment items was undertaken. There were also a range of other ad hoc studies to explore uptake and equity of health assessments, provider attitudes, and main health findings. The uptake of the Medicare health assessment item was initially limited but has since become more widely used. Among a cohort of 886,185 people aged 75 years and over (almost a national sample), during the first year following the introduction, less than 4 per cent of people over 75 made a claim for item 702. In the following year 7.5 per cent, and in the third year 10.3 per cent made a claim for this item (142).

Synthesis between proposed framework and case study:

This case study demonstrates the importance of *linkage and exchange* between research and knowledge users as they worked together to define the needs and develop the necessary research. The *knowledge creation* was specific to the users' needs and relevant and applicable. Examples of *push efforts* (i.e. presentations) and *pull efforts* (i.e. commissioning the research and conducting policy forums) are also evident in this case study.

Conclusion

This report examines the barriers to knowledge translation in the policymaking environment, reviews existing theories, models and tools, and proposes a framework for WHO to consider for incorporating evidence into policymaking for Ageing and Health. This report brings together and advances the thinking of various bodies of knowledge in this area. The case studies help demonstrate the importance of the different elements within the proposed framework. Policy development is both complex and very context specific. While the framework will serve as the foundation to frame the work it can be used to inform the process. As countries commit to build evidence informed policies the outcome will be attained only if the process is attended to with equal and maybe even more rigor. The reason that we do not see extensive case studies is due to the complex nature of this process and the relevant newness of the KT science at the macro level.

Knowledge translation strategies and processes have been developed and continue to be proposed, however more research is needed to determine what works and in what contexts (5;6). Furthermore, the evaluation that has occurred has been primarily in developed countries, and more work is needed in developing countries (5). "None of these promising knowledge-translation processes has yet been rigorously evaluated, so the challenge remains to undertake these and other promising initiatives on a sufficiently large scale and with a sufficiently rigorous evaluation so that robust conclusions can be drawn about their effectiveness" (19 p43). More work is needed in this area and the implementation and testing of the proposed model will be the next step.

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