



# Towards a global strategy to improve musculoskeletal health



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# EXECUTIVE SUMMARY

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## Why this project?

Musculoskeletal (MSK) health refers to the health of the human locomotor system, comprising muscles, bones, joints and adjacent connective tissues. MSK health impairments include more than 150 discrete conditions (e.g. arthritis, gout, osteoporosis and fragility fractures, sarcopenia, auto-immune and rheumatic conditions), pain associated with MSK tissues/structures or presenting in MSK tissues/structures (e.g. low back pain, neck pain, fibromyalgia) and injury and trauma of the MSK system (e.g. sporting, occupational and road traffic injury and trauma).

A healthy MSK system is fundamental to mobility, dexterity, physical function, participation and quality of life. MSK health impairments are associated with pain, disability, reduced ability to work, study and care for self and others, increased health resource utilisation, and for many people, premature retirement from the workforce. These outcomes have profound impacts on a person's quality of life and on the prosperity of families and communities.

MSK conditions are the leading cause of disability worldwide, with low back pain identified as the single condition responsible for the greatest disability in almost all countries. In high-income countries, MSK conditions are responsible for the greatest share of health system expenditure. Of all conditions, the need for rehabilitation globally is greatest for MSK conditions, in particular low back pain.

Robust population health research suggests the prevalence, burden and cost of MSK health impairments will continue to rise globally, especially in low and middle-income countries (LMICs), owing to population growth, population ageing, an increasing prevalence of risk factors for non-communicable diseases and increasing rates of MSK injury and trauma.

These sobering projections paint a stark warning to health systems and economies globally - *the demand for health services for MSK health impairments will continue to rise and the economic impacts of lost human capital will increase dramatically*. Health systems strengthening efforts are urgently needed to improve the prevention and management of MSK health impairment and arrest the escalating global disability and economic burden.

## Responding to the problem

Over the last decade, there has been increasing national and global attention towards the health and economic burden associated with non-communicable diseases (NCDs) and injury, with multiple recommendations for urgent health systems strengthening efforts from the World Health Organization (WHO), national governments and civil society and advocacy organisations.

The [Global Alliance for Musculoskeletal Health](#) (G-MUSC) is a network of national and international patient, professional, scientific and civil society organisations around the world focused on raising the priority for MSK health in global and national health agendas. In 2020, G-MUSC called for a strategic global response to address the health, social and economic burden associated with MSK health impairments. In response to that call, the program of work described in this report aimed to engage and consult with the global MSK health community and other multi-sectoral stakeholder groups, to inform the co-design of a blueprint for a global strategy for MSK health.

## What was done in this project?

The purpose of the work was not to develop a full strategy, but rather, identify requisite components, i.e. a 'blueprint', to guide later strategy development that could be adaptable for global-level and/or country-level health systems strengthening efforts. Importantly, the blueprint was co-designed and supported by the global community, including people with lived experience. It is intended that this work would ultimately support, guide and accelerate emerging initiatives within the World Health Organization (WHO) to prioritise MSK health within its 13th General Program of Work and the strategic directions of other global and international agencies.

Three phases of work were undertaken to derive the blueprint of actions:

- 1. Qualitative study:** An in-depth qualitative study of international key informants (KIs) to understand the contemporary global landscape for MSK health and identify the key priorities and actions for a global strategy to improve prevention and management of MSK health<sup>1</sup>.
- 2. Health policy scoping review:** A scoping review of national health policies and strategies relevant to MSK health to create a snapshot of contemporary policy trends and priorities<sup>2</sup>.
- 3. Global eDelphi:** Integration of the earlier two phases to create a framework of components for a global strategy that were presented to the global MSK health community and other multi-sectoral stakeholders for review and priority ranking in an eDelphi study<sup>2</sup>.

## Overview of findings

Thirty-one KIs participated in the qualitative study, representing 20 countries and 25 peak global or international organisations.

From Phase 1, the qualitative data were used to construct a logic model for the program of work and to create a structure for the framework of components/actions of a global strategy on MSK health (Executive Summary Figure 1). The logic model comprises 5 guiding principles, 8 pillars (strategic priority areas) and 7 accelerators for action.

From Phase 2, the health policy scoping review identified 41 eligible policy documents from 22 countries and 2 regions. Eight priority policy themes were identified and these mapped closely to the 8 pillars identified in the logic model.

Finally, in Phase 3 an eDelphi study was deployed, involving 674 multi-sectoral stakeholders across 72 countries. The Delphi panellists were asked to rate the importance of and comment on, a framework of 8 pillars and 60 detailed components/actions. Ultimately, a framework of 8 pillars and 59 components/actions was supported (Executive Summary Figure 2).

### Executive Summary Figure 1 (on next page):

Data-driven logic model developed for the project directly informed by the Phase 1 qualitative study with international key informants. The logic model is adapted from Briggs et al<sup>1,2</sup> and supported by G-MUSC.

**G-MUSC vision:** A world where prevention and management of musculoskeletal (MSK) health conditions, MSK pain and MSK injuries/trauma are prioritised in health systems to optimise people's functional ability and participation across the lifecourse and to reduce the associated global burden of disability.

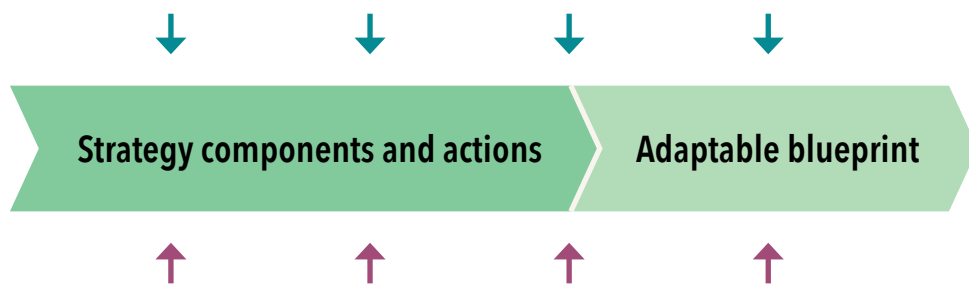
**Goal:** To create an adaptable blueprint for a global strategy to support country-level health systems strengthening in value-based MSK health, injury and pain care that is co-designed and supported by the global community, including patients and which targets improving function, participation and overall quality of life for all ages.

Musculoskeletal (MSK) health means MSK conditions, MSK pain and MSK injury and trauma

### GUIDING PRINCIPLES



### PILLARS FOR HEALTH SYSTEMS STRENGTHENING FOR MUSCULOSKELETAL HEALTH



### ACCELERATORS

- Increase societal and government awareness of MSK health and the impacts of MSK-related disability
- Identify essential, evidence-based standards or actions to enable lower-resourced settings to initiate reforms
- Align with existing global or regional strategies or policies
- Provide guidance on MSK health in the context of pandemics; e.g. COVID-19
- Translate guidance into multiple languages
- Leverage multi-sectoral partnerships and co-operation
- Co-design objectives and performance indicators for a full strategy

# PILLARS FOR HEALTH SYSTEMS STRENGTHENING FOR MUSCULOSKELETAL HEALTH



## PILLAR 1

**Engaging, empowering and educating citizens, communities, organisations and governments**

5 priority sectors for pursuing engagement and forging partnerships to support prevention and management of MSK health

4 priority sectors for MSK health education

7 priority messages for public health education about MSK health

5 priority enablers to drive advocacy and support community-wide education

## PILLAR 2

**Leadership, governance and shared accountability**

3 actions for integration with existing policy and systems strengthening initiatives

4 actions for global and national leadership to prioritise MSK health, pain and injury prevention and care

2 actions for measurement and classification

1 action for legislation and regulation

## PILLAR 3

**Financing approaches**

1 action for integrated financing models

3 actions for flexibility for different financing models

2 actions for financing for the *right* care, at the *right* time, by the *right* team, in the *right* place

## PILLAR 4

**Service delivery**

4 actions for delivery of the right care: effective, safe, affordable and accessible

1 action for care at the right time: early diagnosis, triage and intervention for secondary prevention

1 action for delivery of care from the right team: interprofessional service models

3 actions for delivery of care in the right place: bolstering community and primary care to reduce inequity in access to care

3 actions for prevention

**Executive Summary Figure 2:** Eight pillars and their supporting actions.



**PILLAR 5**

**Equitable access to medicines and technologies**

2 actions



**PILLAR 6**

**Workforce**

3 actions for workforce volumes and access

4 actions for workforce training

1 action for workforce remuneration



**PILLAR 7**

**Surveillance: monitoring population health**

3 actions



**PILLAR 8**

**Research and innovation**

5 priority fields of research

2 capacity building priorities in MSK research

1 action for funding MSK health research

2 actions for innovation and evidence translation

Ten components/actions of the framework were considered essential, irrespective of the level of economic development across countries. These essential actions included:

### Essential, globally-relevant health systems strengthening actions for MSK health

1. Drive engagement and partnerships with citizens, patients and civil society organisations.
2. Drive engagement and partnerships with industry, workplaces and employers.
3. Drive engagement and partnerships with national and sub-national governments.
4. Deliver MSK health education across the following sectors: schools and higher education facilities; workplaces; health workforce; and the community, to improve prevention and management of MSK health.
5. Foster and support country-level leadership to prioritise MSK health impairment by national governments.
6. Extend global and national health and performance indicators beyond mortality reduction to consider function and participation.
7. Integrate health promotion and health care delivery for MSK health into existing healthcare financing models.
8. Ensure service models for MSK conditions support early diagnosis and triage and management through local care pathways.
9. Prioritise evidence-based diagnostic and therapeutic practices in service models over approaches that are not supported by evidence, are costly and potentially harmful.
10. Identify, resource and provide access to essential therapeutics and rehabilitation for priority MSK conditions.



### What does this mean for health systems?

Without action on MSK health, including population-level prevention and appropriate management, the demand on international healthcare systems attributed to MSK health impairments will continue to rise rapidly and become unsustainable.

The framework of pillars and priority actions/ components outlined in this report provides a blueprint for the development of a global strategy to improve the prevention and management of MSK health. A global strategy should then be adapted to local contexts for targeted health systems strengthening efforts.



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## LIST OF ABBREVIATIONS

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<b>COVID-19</b>	coronavirus disease
<b>DALY(s)</b>	disability-adjusted life year(s)
<b>G-MUSC</b>	Global Alliance for Musculoskeletal Health
<b>GBD</b>	Global Burden of Disease study
<b>ICD</b>	International Classification of Diseases
<b>ICF</b>	International Classification of Functioning, Disability and Health
<b>KI(s)</b>	key informant(s)
<b>LMIC(s)</b>	low and middle-income country(ies)
<b>MSK</b>	musculoskeletal
<b>NCD(s)</b>	non-communicable disease(s)
<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>PREM(s)</b>	patient report experience measure(s)
<b>PROM(s)</b>	patient reported outcome measure(s)
<b>QALY(s)</b>	quality adjusted life year(s)
<b>SDG(s)</b>	Sustainable Development Goal(s)
<b>UHC</b>	Universal Health Coverage
<b>WHO</b>	World Health Organization
<b>YLD(s)</b>	year(s) lived with disability

# ABOUT THIS REPORT

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## What is this report about?

This report describes a program of work that aims to provide global and national-level guidance on health systems strengthening priorities for musculoskeletal (MSK) health. The work was undertaken in recognition of the absence of such guidance at the global level and an observed lack of prioritisation and policy responses in many countries. An empirically derived blueprint is proposed that enables agencies to take action on prevention and management of MSK health impairments.

## Who is this report for?

The report is primarily intended for stakeholders tasked with designing, implementing, financing and evaluating health systems strengthening responses for non-communicable diseases (NCDs) and injury and trauma across the lifecourse. The report is also relevant to citizens, healthcare providers, educators and researchers. The report is intended to support the work of the World Health Organization (WHO), other global health agencies and policy makers and health service managers at national and sub-national levels. For the WHO, it is particularly relevant to technical units for NCDs, rehabilitation, injury prevention, child health and ageing and health service delivery and financing.

## How to use this report

The report is structured in 8 sections:

- **Sections 1 and 2** provide the background to the program of work and specific aims and objectives.
- **Sections 3 and 4** provide an overview of the methods and key results.
- **Section 5** is the focus of the report and provides comprehensive detail on the blueprint for a MSK health strategy.
- **Section 6** provides a commentary about implications for health systems.
- **Sections 7 and 8** provide the supporting material for the document.





# THE IMPORTANCE OF MUSCULOSKELETAL HEALTH



# WHAT IS 'MUSCULOSKELETAL' (MSK) HEALTH?

MSK health broadly refers to the health of the muscles, bones, joints and adjacent connective tissues – structures and tissues that are essential for mobility and dexterity. MSK health impairments comprise:

- established MSK conditions (i.e. more than 150 conditions that affect the muscles, bones or joints; such as arthritis, gout, osteoporosis and fragility fractures, sarcopenia, auto-immune and rheumatic conditions)
- MSK pain (such as low back pain, neck pain, fibromyalgia)
- MSK injury and trauma.

Persistent and recurrent pain, reduced physical function and impaired quality of life and wellbeing are unifying features of MSK health impairments. MSK health impairments and sequelae are relevant across the lifecourse; they are not just manifestations of older age. MSK health impairments are common in children and adolescents and are associated with significant functional, educational and social impacts<sup>3-5</sup>, highlighting the importance of a lifecourse lens to prevention and management.

## Burden of disease

Non-communicable diseases are recognised as the most important issue for population health globally<sup>6</sup>. While health systems must respond to emerging threats and priorities, such as the COVID-19 pandemic and the emerging burden of long-COVID, the burden of disease associated with NCDs and their sequelae has been consistently rising and the focus of serial global health priority meetings<sup>6-8</sup>.

Non-communicable diseases are responsible for 64% of disability adjusted life years (DALYs) globally and 80% of years lived with disability (YLDs)<sup>9</sup>. The global health impacts and trajectories associated with NCDs, particularly in low and middle-income countries (LMICs), are well recognised. Urgent attention to improving prevention and control of NCDs is recommended<sup>6, 10, 11</sup>, with a particular focus on LMICs<sup>12</sup>.

**Within the breadth of NCDs, MSK conditions are the leading contributors to disability globally across the lifecourse, accounting for 17% of all YLDs in 2019<sup>9</sup>.**

This contribution likely underestimates the extent of the burden of MSK disability, when considering persistent pain conditions and MSK injury due to bone fragility, accidents and violence and road traffic trauma<sup>13-15</sup>. Importantly, the MSK-attributed disability burden is greatest in LMICs<sup>9</sup>. Globally, rehabilitation services are in highest need for MSK health conditions and greatest for low back pain<sup>10</sup>. The burden of disease associated with MSK conditions, MSK pain and MSK injury and trauma continues to rise globally, largely attributed to ageing and the increasing prevalence of NCDs and their risk factors, and road traffic trauma<sup>16-18</sup>.

MSK conditions represent the highest healthcare cost by condition group in high-income economies like Australia, Europe and the United States<sup>17, 19-21</sup>. In LMICs, MSK conditions impose a significant burden of disease and a threat to economic and social development for both individuals and communities<sup>12, 22</sup>. This will only increase as population ageing accelerates most rapidly in these countries<sup>23, 24</sup>, together with increasing MSK injury, falls and trauma<sup>25, 26</sup>.

There is a strong rationale for considering MSK health as a priority for care and health systems strengthening in NCDs, rehabilitation and childhood health and ageing<sup>30-32</sup> due to:

- the burden of disease and high prevalence of MSK health impairments in co- and multi-morbidity health states for NCDs<sup>27</sup>
- MSK health impairment as a risk factor for other NCDs<sup>28</sup>
- MSK health as a key feature of healthy ageing<sup>29</sup>.

**MSK health impairments are the leading cause of disability globally and the magnitude of disability has increased over time and on current trends will continue to accelerate.**

## Health systems strengthening responses

Despite the unequivocal burden of disease associated with MSK conditions and persistent pain of MSK aetiology, health systems strengthening responses to arrest the trajectories of disability and productivity loss; impaired quality of life and healthcare expenditure are lacking at the global level<sup>31, 33-36</sup>. The global NCD reform agenda is strongly aligned with performance indicators for the Sustainable Development Goals (SDG) and focused on reducing avoidable mortality from cancer, cardiovascular disease, lung disease and diabetes (SDG target 3.4). While appropriate, this focus inadequately addresses the morbidity burden of NCDs, driven largely by MSK health conditions and the increased risk of mortality with chronic MSK conditions<sup>37-40</sup>.

Nonetheless, several nations have initiated national and sub-national policy and strategy responses to address MSK conditions and persistent MSK pain in their populations, such as Australia and the United Kingdom<sup>31</sup>. While other nations have also explicitly integrated MSK health and persistent pain priorities into policy responses for NCDs, a recent systematic policy analysis suggests that such integration has been undertaken by only half of the Member States of the Organisation for Economic Co-operation and Development (OECD)<sup>30</sup>. Population health monitoring of MSK health conditions is also lacking<sup>41</sup>. While the 2000-2010 Bone and Joint Decade was effective in raising awareness of the global burden and impact of MSK conditions<sup>42</sup>, global leadership in stewarding a response to address these issues has not been prioritised by policy makers<sup>31</sup>. There is now a strong need to address this global leadership gap by empirically defining the requisite components of a global strategy for improving MSK health.

## Context for this work

Building on the activities from the 2000-2010 Bone and Joint Decade and subsequent calls for action<sup>31</sup>, in 2020, the [Global Alliance for Musculoskeletal Health](#) (G-MUSC) called for a strategic global response to improving MSK health. In response to that call, this project aimed to engage and consult with the global MSK health community and other multi-sectoral stakeholder groups to inform the co-design of a blueprint for a global strategy for MSK health.

The purpose of this project was not to develop a comprehensive strategy. Rather, to identify requisite components, for guiding later strategy development that could be adaptable for global-level and/or country-level health systems strengthening efforts. Specifically, the work aimed to create a blueprint for value-based MSK health, injury and pain care that is co-designed and supported by the global community, including people with lived experience. The intention of this work is to ultimately support, guide and accelerate emerging initiatives within the World Health Organization (WHO) to prioritise MSK health within its 13th General Program of Work and the strategic directions of other global and international agencies.

The purpose of defining empirical, consensus-driven and prioritised components<sup>†</sup>/actions of a global strategy is to enable and guide the WHO and other agencies to accelerate work on developing a full and detailed global strategy, inclusive of actions, resourcing requirements and performance indicators. By defining the components, the global MSK community has the opportunity to identify and communicate key areas for system-level and service-level reform by Member States that are relevant across the globe, providing the critical foundation work for the development of a full strategy.

† Components are defined as topic areas of focus or priority within the structure of a global strategy. The components may be broad and be supported by specific and more detailed sub-components or actions.



# 2

## AIMS AND OBJECTIVES OF THE PROGRAM OF WORK



The aim of this program of work was to engage and consult with the global MSK health community and other multi-sectoral stakeholders, including people with lived experience, to inform the co-design of prioritised components/actions for a global strategy for improving MSK health. Here, MSK health refers to MSK conditions, MSK pain and MSK injury and trauma. The specific objectives were to:

1. Identify and synthesise:
  - (a) the contemporary challenges in delivery of value-based care for the prevention and management of MSK health impairment
  - (b) globally-relevant priorities for action/reform in health systems and services to achieve improved prevention and management of MSK health impairments.

2. Synthesise current national policy approaches to improve MSK health.
3. Empirically derive the requisite components and priorities for a global strategic response to improve MSK health.

Detailed research papers have been developed (and are in development) for each objective<sup>1,2</sup>. The purpose of this report is to provide an overview of the key findings with emphasis on describing the requisite components of a global strategy on prevention and management of MSK health, as outlined in Section 5.





# 3

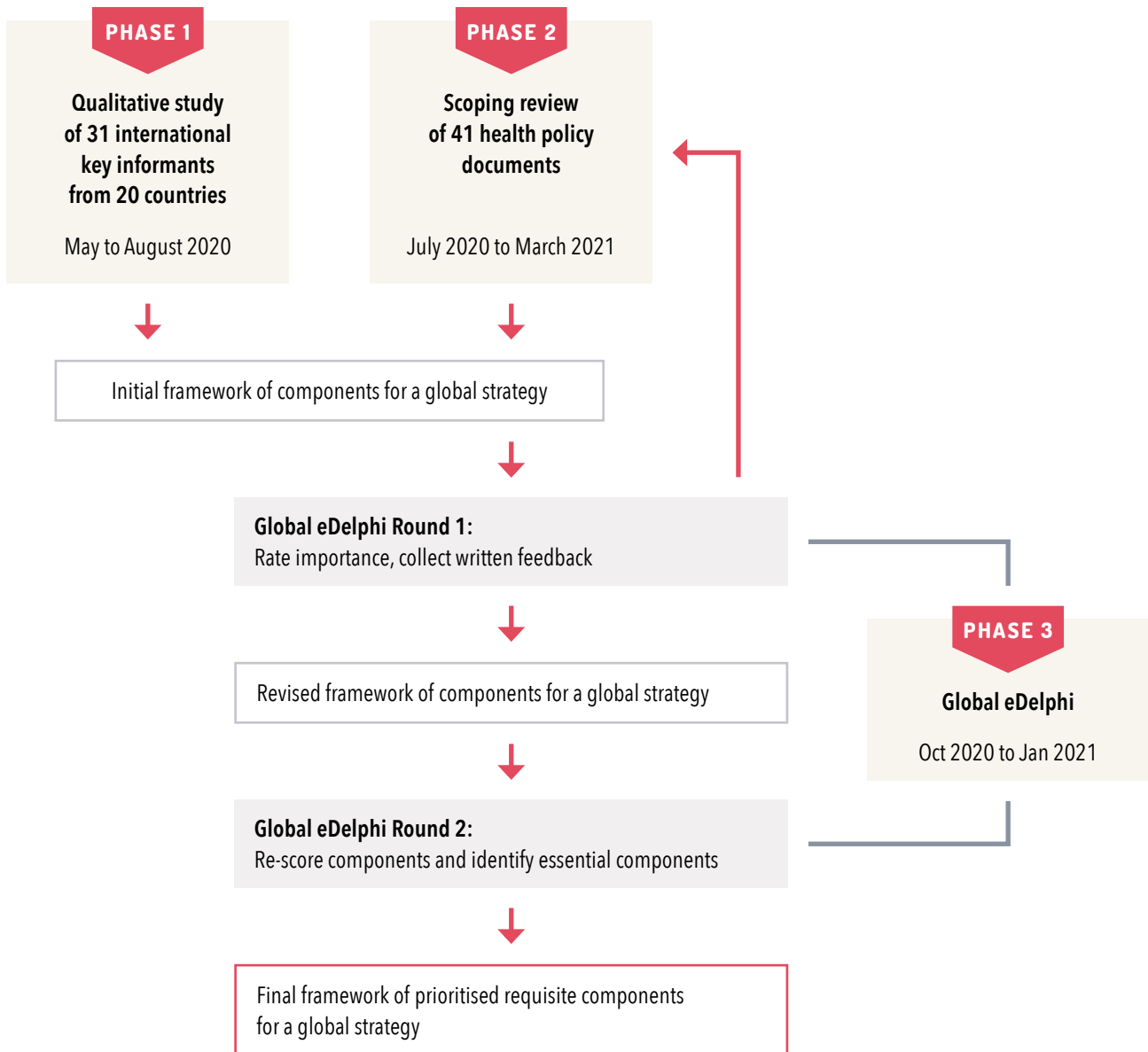
DEVELOPING  
THIS REPORT

Three research designs were adopted for the project, aligned to each of the objectives. Each design enabled unique evidence to be derived that could inform a global strategic response for MSK health. The designs included:

1. an in-depth qualitative phase
2. a policy scoping review phase
3. a global eDelphi phase.

These three discrete research designs were adopted to enable several rich sources of data to be triangulated and to strengthen the evidence of the final product. Importantly, the first two phases – the qualitative research and policy scoping review – were designed to inform the quantitative eDelphi phase from which a final framework of components/ actions for a global strategy was derived.

Figure 1 outlines the sequencing of each phase of work undertaken between May 2020 and March 2021.



**Figure 1:** Phased components of the program of work. Phases 1 and 2 triangulated to inform Phase 3.



# 4

## OVERVIEW OF RESULTS

## 4.1 PHASE 1: INTERVIEWS WITH KEY INFORMANTS AND ESTABLISHMENT OF A LOGIC MODEL

This phase involved an in-depth qualitative study with 31 international key informants (KIs). The detailed methods and results of this phase have been reported elsewhere<sup>1</sup>. Individual semi-structured interviews were undertaken between May and August 2020, including a pilot phase.

### Who participated?

Key informants were sampled across six eligibility criteria (Box 1).

Other than the category of ‘thought leader’, KIs were intentionally sampled as affiliates or representatives of organisations to enable results to be reflective of broader perspectives, beyond just those of the individual. However, the data presented do not necessarily reflect the endorsed views of the organisations represented.

31 KIs from 20 countries (40% LMICs based on the [World Bank list of economies, June 2020](#)) participated. The demographic and geographic profiles are summarised in Table 1.

#### Box 1: Sampling criteria for Phase 1 key informants

1. A President/Chair, Vice President or appropriately delegated senior-level official (e.g. leader of a special interest group or subcommittee) of an international or global clinical/professional organisation relevant to MSK health, persistent pain care and/or injury and trauma, having held this post for at least 12 months.
2. A President/Chair, Vice President or appropriately delegated senior-level official of an international or global advocacy (including patient advocacy) organisation relevant to MSK health, persistent pain care, injury, ageing, NCDs, or health systems strengthening, having held this post for at least 12 months.
3. An official of the WHO with a scope of work relevant to MSK health, ageing and lifecourse or NCDs, having held this post for at least 12 months.
4. A senior officer in a national Ministry of Health having held a position for at least 12 months that includes international activities in health systems strengthening efforts (i.e. beyond a single national context).
5. A thought leader defined by the publication of at least 3 peer-reviewed academic journal papers or health policies in the last 5 years that have a focus on health system reform or health policy relevant to MSK health, persistent pain care or injury and trauma.
6. A person with a lived experience of an MSK health condition and/or persistent MSK pain for more than 5 years.

**Table 1:** Demographic and geographic profile of the KIs (n = 31) from Phase 1.

Sampling categories <sup>#</sup>	Demographic characteristics
<ul style="list-style-type: none"> <li>Person with a lived experience of an MSK condition or persistent MSK pain: <b>7</b></li> <li>Global or international clinical/professional organisation relevant to MSK health, persistent pain care and/or injury and trauma: <b>20</b></li> <li>Global or international advocacy organisation relevant to MSK health, persistent pain care, injury and trauma, ageing, NCDs or health systems strengthening: <b>11</b></li> <li>Thought leader in health system reform or health policy relevant to MSK health, persistent pain, or injury and trauma: <b>7</b></li> <li>World Health Organization: <b>3</b></li> <li>National Ministry of Health: <b>1</b></li> </ul>	<p>Mean (SD) age, range:</p> <ul style="list-style-type: none"> <li>57.9 (10.8), 41–77 years</li> </ul> <p>Mean (SD) years of experience in healthcare, range:</p> <ul style="list-style-type: none"> <li>30.4 (11.2), 6–53 years</li> </ul> <p>Registered clinicians:</p> <ul style="list-style-type: none"> <li>22 (71%)</li> </ul>

**11 clinical disciplines**

Chiropractors: **2**  
 Emergency medicine physician: **1**  
 Family medicine physician: **1**  
 Neurologist: **1**  
 Occupational therapist: **1**  
 Orthopaedic or trauma surgeons: **3**  
 Paediatric rheumatologist: **1**  
 Physical medicine and rehabilitation physicians: **2**  
 Physiotherapists: **3**  
 Public health physicians: **2**  
 Rheumatologists: **5**

**20 countries included**

 Argentina	 Italy
 Australia	 Japan
 Bangladesh	 Kenya
 Brazil	 Malaysia
 Canada	 Norway
 Ethiopia	 Philippines
 Finland	 South Africa
 France	 Switzerland
 Germany	 United Kingdom
 India	 United States

<sup>#</sup> groups are not mutually exclusive, meaning a KI could identify as representing one or more of the sampling categories.

A total of 25 organisations were represented.

## Organisations represented

### Global (n = 14; 56%)

Global Alliance for Musculoskeletal Health (G-MUSC); Health Systems Global (HSG); International Association for the Study of Pain (IASP); International Society of Physical & Rehabilitation Medicine (ISPRM); International Federation on Ageing (IFA); International Osteoporosis Foundation (IOF); Osteoarthritis Research Society International (OARSI); Rehabilitation International; Société Internationale de Chirurgie Orthopédique (SICOT); World Federation of Chiropractic (WFC); World Federation of Occupational Therapists (WFOT); World Health Organization (WHO); World Physiotherapy (IFOMPT sub-group); World Spine Care.

### International high-income (n = 4; 16%)

Australia and New Zealand Musculoskeletal Clinical Trials Network (ANZMUSC); European Alliance of Associations for Rheumatology (EULAR); European Society for Clinical and Economic Aspects of Osteoporosis, Osteoarthritis and Musculoskeletal Diseases (ESCEO); EUROSPINE.

### International low and middle-income (n = 3; 12%)

African League Against Rheumatism (AFLAR); AO Alliance Foundation; Santokba Durlabhji Memorial Hospital (India).

### International mixed income (n = 3; 12%)

Asia-Pacific League of Associations for Rheumatology (APLAR); Community Oriented Program for Control of Rheumatic Disorder (COPCORD)s; Pan-American League of Associations for Rheumatology (PANLAR).

### Ministries of Health (n = 1; 4%)

Public Health England.

## What did the key informants tell us?

Transcripts of the interviews were analysed in a phased approach using an inductive, grounded theory method<sup>43, 44</sup>. The data from the transcripts were organised into five categories to build a logic model for the project (Figure 2). This logic model provided the foundation to the project, to which subsequent phases were anchored.

The logic model was built around the following categories:

- 1. Context:** the contemporary landscape for MSK health at the global level, as described by KIs.
- 2. Goals:** suggested goals or targets for a global strategy on MSK health.
- 3. Guiding principles:** concepts or approaches that should underpin all activities or actions within a strategy. These principles are reflected in the final framework of pillars and components in Section 5 (page 39). These principles may be applied by countries/organisations to develop national-level strategies.
- 4. Strategic priority areas or Pillars:** groups of components or actions important for a contemporary global strategic response to improve MSK health. These Pillars, along with their detailed components for action, were further informed by the Phase 2 policy scoping review. These were ultimately used to build the final framework presented in this report, after validation in a global eDelphi study (refer to Section 4.3, page 31).
- 5. Accelerators:** processes or supports that enable action on strategic priority areas. The accelerators represent foci for implementation planning that can be used by countries or organisations to operationalise the components of the framework.

This report focuses on Category 4 - 'Pillars', while the detail underpinning other areas has been reported elsewhere<sup>1</sup>. Broad contextual considerations expressed by KIs are summarised on pages 23-24.

**G-MUSC vision:** A world where prevention and management of musculoskeletal (MSK) health conditions, MSK pain and MSK injuries/trauma are prioritised in health systems to optimise people's functional ability and participation across the lifecourse and to reduce the associated global burden of disability.

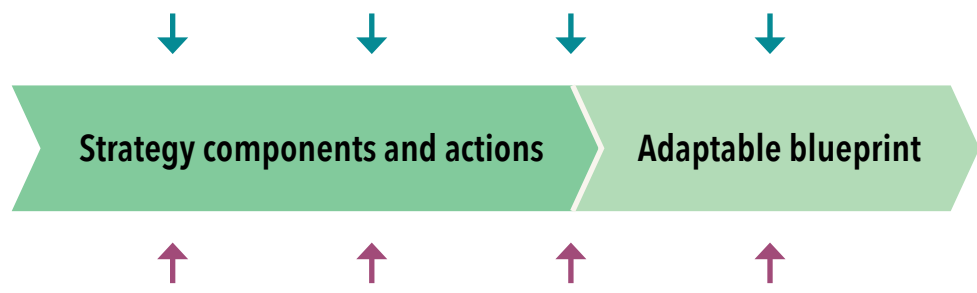
**Goal:** To create an adaptable blueprint for a global strategy to support country-level health systems strengthening in value-based MSK health, injury and pain care that is co-designed and supported by the global community, including patients and which targets improving function, participation and overall quality of life for all ages.

Musculoskeletal (MSK) health means MSK conditions, MSK pain and MSK injury and trauma

**GUIDING PRINCIPLES**



**PILLARS FOR HEALTH SYSTEMS STRENGTHENING FOR MUSCULOSKELETAL HEALTH**



**ACCELERATORS**

- Increase societal and government awareness of MSK health and the impacts of MSK-related disability
- Identify essential, evidence-based standards or actions to enable lower-resourced settings to initiate reforms
- Align with existing global or regional strategies or policies
- Provide guidance on MSK health in the context of pandemics; e.g. COVID-19
- Translate guidance into multiple languages
- Leverage multi-sectoral partnerships and co-operation
- Co-design objectives and performance indicators for a full strategy


**Figure 2:** Data-driven logic model developed for the project directly informed by the Phase 1 qualitative study with international KIs. The logic model is adapted from Briggs et al<sup>1,2</sup> and supported by G-MUSC.




## Category 1: The current global landscape for MSK health: contextual considerations for health systems strengthening


Important contextual considerations for a global strategic response identified by the KIs are outlined below and reflect six overarching themes, with examples of supporting quotes. Comprehensive reporting of these considerations has been undertaken previously<sup>1</sup>.


### 1. MSK health is afforded a relatively lower priority status compared with other health conditions and is poorly legitimised.

 "I think that MSK conditions are not directly life-threatening diseases, so the importance of MSK conditions has been underestimated. I think that lower back pain and knee osteoarthritis are two major targets in musculoskeletal conditions, but many people feel that conditions such as knee osteoarthritis would be far less important compared to cancer or cardiovascular disease." (KI 1, Japan)


 "I think MSK would need to compete with so many other priorities that low and middle-income countries are faced with, but I think the important difference here is you can show a very high number on mortality on so many NCDs and even communicable diseases. The mortality number is missing (for MSK), although there is a tremendous burden on disability and other things that we can talk about. But I think the sheer fact that there is no hard number on mortality that you can count, it just slips very low on the priority side." (KI 19, India)

### 2. Improving MSK health is more than just healthcare. It needs inter-ministerial prioritisation, co-operation and collaboration. Attention must extend beyond healthcare to also consider industry, transport and infrastructure as well as the built environment.

 "You may not really want to ever get out of your home because it's really challenging to move around. Then you find where the road systems have improved, like in the capital city here we now have nice, really beautiful highways, but the highways actually have limited places where you can cross on foot. So, if you're physically challenged and the vehicles are cruising at a high speed - or if there's a crossing, it is very, very far away, it is so far that you can't walk that distance. These are not major, but they are major to the quality of life." (KI 3, Kenya)

 "People who do not have secure housing, who do not have access to nutritious food, who do not have safe places to recreate and move, it's not like they're just making choices to not change their lifestyle; their environment is prohibitive of them being able to change their lifestyle. So, there are things that can be done to change that too, like created environments, built environments can go a long way towards including musculoskeletal health that aren't ever going to be done in the clinic, they have to be done in the community." (KI 8, USA)

### 3. Global-level guidance such as that from the World Health Organization, is needed for country-level health systems strengthening in MSK health.

 "I think that raising awareness in whatever form is critical if we are to gain any sort of success when it comes to MSK disorders. We need to raise that awareness and without a global strategy I think the management of MSK disorders will continue to be suboptimal, it'll continue to be relegated. So, I think just merely stating that there's a problem is not the answer. I think we all know there's a problem and just mitigating that is not the answer. So, I think any action that is taken needs to be significant and it needs to be sustained." (KI 7, UK)

**4. The COVID-19 pandemic will have an impact on MSK health globally and opportunities for health system strengthening in MSK healthcare may be compromised.**



*"Like, for example, if you look at home rehabilitation services for people with disabilities, now because of COVID we are not able to provide home-based rehabilitation services because most rehabilitation services require physical contact. So, because of this, most rehab in institutions in Addis Ababa and some African countries, they're almost not functioning at this point. This situation worsens the conditions for people with disabilities like, for example, children with cerebral palsy who need regular exercise, people who need regular rehab exercises. Since they've already stopped doing the exercise, their condition will worsen and the same thing will happen in musculoskeletal and other disabling situations. So, the impact is really huge." (KI 30, Ethiopia)*

**5. There are multiple inequities (health, social, economic and work) associated with impaired MSK health. For this reason, the social determinants of MSK health must also be considered.**



*"I've done some work in Botswana... and I recognise that when the breadwinner is compromised through MSK disorders then that has a real ripple effect throughout the whole family and into the community. I think particularly in areas where the social determinants of health are such that citizens are poorly supported, an inequity leads to an exacerbation of these MSK disorders." (KI 7, UK)*



*"...because in our country there will be many people whose income level is lower and they don't bother about the loss of income, they lie in their home, so they have to make effort to report to the facility whenever they are ill and they also don't give time to the musculoskeletal pain often." (KI 5, Bangladesh)*

**6. Service delivery for MSK health is characterised by multiple complexities, such as a very large number of diseases/ conditions, multiple practitioners responsible for care and service delivery spanning community to tertiary-level care. There is also no universally accepted classification system for MSK health impairment.**



*"...there is the fact that for all these other chronic conditions that you have said, a specific physician is treating them. In musculoskeletal conditions, apart from the fact it can be a physiatrist or as it happens in some countries directly a physiotherapist that can treat them, it can be a rheumatologist, it can be an orthopaedic surgeon. It's also sometimes really difficult for the patient to understand who should take care of them." (KI 29, Italy)*



*"The nomenclature for musculoskeletal disorders is actually quite unsatisfactory. We have competing professions and this leads to an awful lot of confusion. So you'll have chiropractors, osteopaths, MD doctors, orthopaedic surgeons and physical medicine rehab doctors all using similar but different terminology to describe the same phenomena and everybody's confused, so a lot of people throw their hands up and say, "We can't pay attention to this because it's too fragmented." (KI 18, India)*

## 4.2 PHASE 2: MUSCULOSKELETAL HEALTH POLICY SCOPING REVIEW

### Approach to the review

This phase involved a systematic search and appraisal of national health policies relevant to MSK health. The approach to undertaking the review aligned with the methodologic framework proposed by Arksey and O'Malley<sup>45</sup> and subsequently adapted by Anderson et al<sup>46</sup> for policy mapping. The aim of the review was to derive a snapshot of contemporary MSK-specific national policy approaches and priorities in order to: i) enable policy learning from local policy action and ii) to further inform the framework of components derived from Phase 1.

#### A health policy document was defined as:

1. government issued; published by government departments; or explicitly endorsed by government departments as representing the policy of a specified jurisdiction
2. targeting population-level improvement in MSK health; or containing substantial content dedicated to MSK health or any category of MSK health condition (e.g. MSK pain, injury, MSK conditions)
3. containing jurisdiction-wide strategies, action plans or system-level Models of Care or Models of Service Delivery<sup>47</sup>, consistent with an earlier approach<sup>30</sup>.

### Searching for policy documents

Policy documents were identified using a number of search strategies, including:

1. a systematic online desktop search across the 30 most populated nations<sup>†</sup> using standardised keywords
2. identifying policy documents known to the G-MUSC International Co-ordinating Council members and known policy researchers (expert round), including access to raw data from an earlier integrated NCD policy review of OECD Member States<sup>30</sup>
3. snowballing methods that also allowed for inclusion of multi-national policies
4. policy documents being identified by panellists in the eDelphi phase (Phase 3, Section 4.3).

The yield of policy documents was reviewed for eligibility for inclusion by two reviewers.

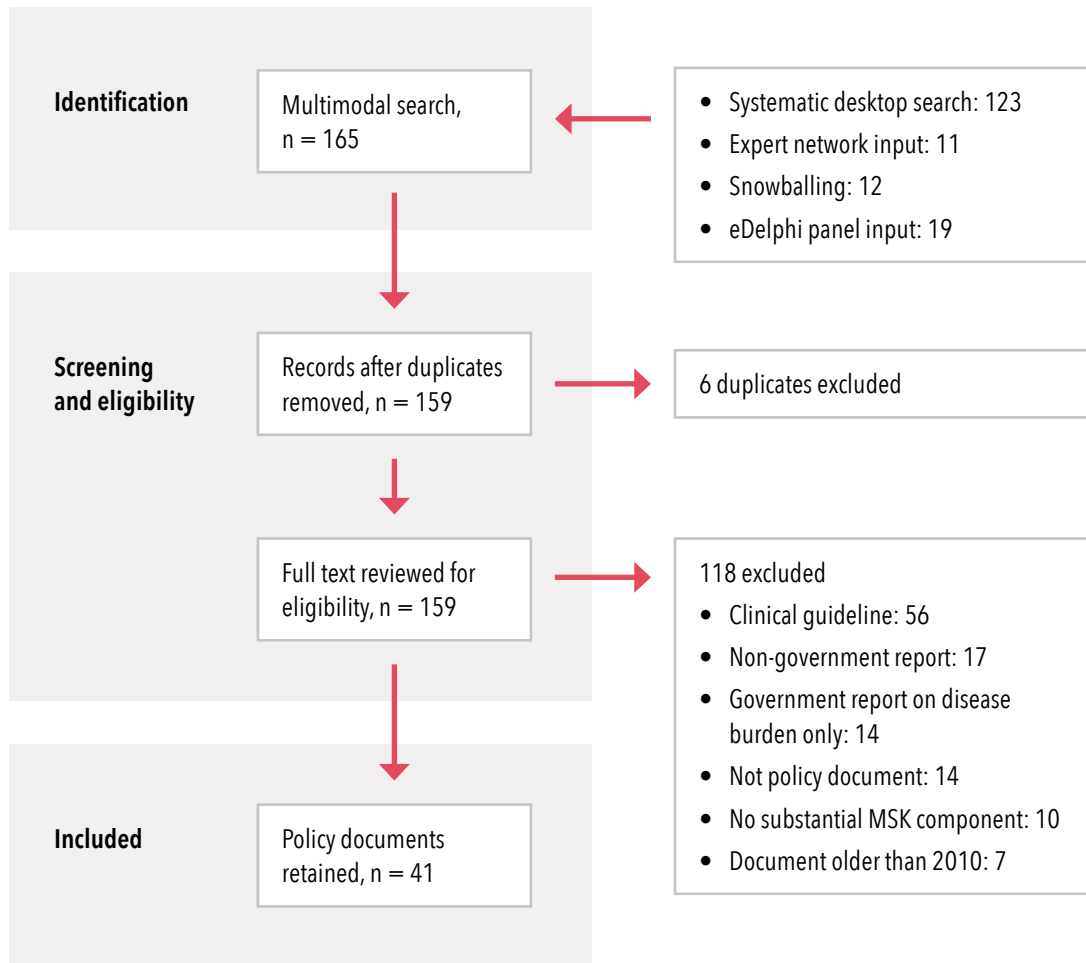
### Analysing policy documents

Data extraction was undertaken by a single reviewer and analysis was undertaken inductively using a content analysis method to identify the key themes from the included policies. These policy themes were then compared with the logic model derived in Phase 1 to further develop and refine the Pillars in preparation for Phase 3.

† based on UN World Population Prospects (2019)

## Review outcomes














165 policy documents were identified with 41 (24.8%)<sup>48-88</sup> retained after exclusions and removal of duplicates (Figure 3). The final yield represented policies from 22 countries (20 (90.9%) high-income nations; 2 (9.1%) upper middle-income nations) and two multi-national regions (Table 2).


















**Figure 3:** PRISMA-aligned flowchart of policy search and selection process.

**Table 2:** Table of included policies by country/region

Country or region	Title of policy (Publisher)	Year published (Years operational)
 Australia 1 <sup>50</sup>	Australian National Strategic Action Plan on Arthritis (Australian Government Department of Health)	2019
 Australia 2 <sup>51</sup>	Australian National Strategic Action Plan on Osteoporosis (Australian Government Department of Health)	2019
 Australia 3 <sup>49</sup>	Australian National Strategic Action Plan for Pain Management (Australian Government Department of Health)	2019
 Belgium 1 <sup>52</sup>	Aanpak van chronische pijn in België: Verleden, heden en toekomst (Management of chronic pain in Belgium: past, present and future) (Federal Public Agency for Public Health, Safety, Food and the Environment, Belgium)	2011
 Canada 1 <sup>65</sup>	Institute of Musculoskeletal Health and Arthritis Strategic Plan 2014-2018: Enhancing Musculoskeletal, Skin and Oral Health (Canadian Institute of Health Research)	2014 (2014-2018)
 Canada 2 <sup>48</sup>	Joint Action on Arthritis - a framework to improve arthritis prevention and care in Canada (Arthritis Alliance of Canada)	2012
 Canada 3 <sup>84</sup>	Chronic Pain in Canada: Laying a Foundation for Action (Health Canada)	2019
 Chile 1 <sup>62</sup>	Estrategia Nacional De Salud Para el cumplimiento de los Objetivos Sanitarios de la Década 2011-2020 (National Health Strategy to complete the Health Objectives of the Decade) (Government of Chile)	2011 (2011-2020)
 Columbia 1 <sup>70</sup>	Plan Nacional de Seguridad y Salud en el Trabajo 2013-2021 (National Plan for Safety and Health at Work 2013-2021) (Ministry of Labor, Columbia)	2014 (2013-2021)
 Denmark 1 <sup>71</sup>	Anbefalinger for tværsektorielle forløb for mennesker med kroniske lænderygmerter (Recommendations for multidisciplinary management of low back pain) (National Health Board of Denmark)	2017
 European Union 1 <sup>60</sup>	European action towards better musculoskeletal health (EFORT/EULAR/IOR)	2017
 European Union 2 <sup>59</sup>	Occupational health and safety risks in the healthcare sector-Guide to prevention and good practice (European Commission, Luxembourg)	2010

Country or region	Title of policy (Publisher)	Year published (Years operational)
 Finland 1 <sup>61</sup>	Kroonisen kivun ja syöpäkivun hoidon kansallinen toimintasuunnitelma vuosille 2017–2020 (National Action Plan for the Treatment of Chronic Pain and Cancer Pain) (Ministry of Social Affairs and Health, Finland)	2017
 France 1 <sup>68</sup>	Plan d'amélioration de la prise en charge de la douleur, 2006–2010 (Monitoring Plan for National Pain Program) (Ministry of Health and Solidarity, France)	2006 (2006–2010)
 France 2 <sup>69</sup>	Plan santé au travail, 2016–2020 (Occupational Health Plan 2016–2020) (Ministry of Labour, France)	2016 (2016–2020)
 Hungary 1 <sup>63</sup>	Egészséges Magyarország 2014–2020 (Health Hungary 2014–2020 Health Sector Strategy) (Ministry of Human Resources, State Secretariat for Health, Government of Hungary)	2015
 International 1 <sup>53</sup>	A Framework to Evaluate Musculoskeletal Models of Care (Global Alliance for Musculoskeletal Health of the Bone and Joint Decade, United Kingdom)	2016
 Italy 1 <sup>57</sup>	Piano Nazionale della Cronicità (National Plan for Chronic Disease) (Directorate-General of Health Programming, Italy)	2016
 Ireland 1 <sup>80</sup>	The Model of Care for Rheumatology in Ireland (Royal College of Physicians of Ireland)	2015
 New Zealand 1 <sup>72</sup>	National Health Committee Low Back Pain: A Pathway to Prioritisation (National Health Committee, New Zealand)	2014
 New Zealand 2 <sup>73</sup>	Low Back Pain (LBP) Tier 2 Assessment (National Health Committee, New Zealand)	2015
 New Zealand 3 <sup>75</sup>	The Mobility Action Program (New Zealand Ministry of Health)	2015
 Norway 1 <sup>58</sup>	Norway: Together for a good working environment (European Agency for Safety and Health at Work)	2007–2010
 Norway 2 <sup>76</sup>	Folkehelsemeldinga 2018–2019: Gode liv i eit trygt samfunn (Public Health Report 2018–2019: Good Life in a Safe Society) (Norwegian Ministry of Health and Care Services, Government of Norway)	2018 (2018–2019)
 Portugal 1 <sup>56</sup>	Plano Estrategico Nacional De Prevencao E Controlo Da Dor (PENPCDor) (National Strategic Plan for Pain Prevention and Control (PENPCDor) (Directorate General Health, Portugal)	2017
 Republic of Korea 1 <sup>67</sup>	제3차 국민건강증진종합계획 (2011~2020) (The 3rd National Health Promotion Plan 2011–2020) (Korean Ministry of Health and Welfare)	2011

Country or region	Title of policy (Publisher)	Year published (Years operational)
 Spain 1 <sup>54</sup>	Estrategiade Atenciónal Dolor 2017-2020 (Pain Care Strategy 2017-2020) (City of Madrid, Spain)	2017 (2017-2020)
 Switzerland 1 <sup>82</sup>	Nationalen Strategie Prävention nichtübertragbarer Krankheiten (NCD-Strategie) 2017-2024 (National strategy for the prevention of noncommunicable diseases 2017-2024) (Federal Office of Public Health and Swiss Conference of Cantonal Health Directors, Bern, Switzerland).	2016 (2017-2024)
 Switzerland 2 <sup>83</sup>	Nationale Strategie Muskuloskeletale Erkrankungen (2017-2022) (National Strategy for Musculoskeletal Disorders 2017-2022) (Rheumaliga Schweiz, Switzerland)	2017 (2017-2022)
 Turkey 1 <sup>78</sup>	Türkiye Kas ve İskelet Sistemi Hastalıkları Önleme ve Kontrol Program (2015-2020) (Turkey Musculoskeletal Disease Prevention and Control Program 2015-2020) (Ministry of Health, Turkey)	2015 (2015-2020)
 United Kingdom (England) 1 <sup>85</sup>	Developing partnerships and a whole-system approach for the prevention of musculoskeletal conditions in England (Public Health England, England)	2018
 United Kingdom (England) 2 <sup>79</sup>	Musculoskeletal core capabilities framework for the first point of contact practitioners (Health Education England and NHS England, England)	2018
 United Kingdom (England) 3 <sup>55</sup>	Musculoskeletal health: A 5-year strategic framework for prevention across the life course (Department of Health and Social Care, Public Health England and Department for Work and Pensions, England)	2019 (2019-2023)
 United Kingdom (Scotland) 4 <sup>86</sup>	Allied Health Professional (AHP) Musculoskeletal Pathway framework (National Minimum Standard) (The Scottish Government, Scotland)	2014
 United Kingdom (Scotland) 5 <sup>81</sup>	Future Provision of Specialist Residential Chronic Pain Management Services in Scotland: Consultation Report (The Scottish Government, Scotland)	2014
 United Kingdom (Wales) 6 <sup>88</sup>	Living with Persistent Pain in Wales (Welsh Government, Wales)	2019
 United States of America 1 <sup>87</sup>	Improving pain management and support for workers with musculoskeletal disorders: Policies to Prevent Work Disability and Job Loss (US Department of Labor/IMPAQ International, USA)	2017

Country or region	Title of policy (Publisher)	Year published (Years operational)
 United States of America 2 <sup>74</sup>	National Institute for Occupational Safety and Health (NIOSH) Musculoskeletal Health Program (National Institute for Occupational Safety and Health, USA)	2019
 United States of America 3 <sup>77</sup>	A National Public Health Agenda for Osteoarthritis: 2020 Update (Osteoarthritis Action Alliance, Centre for Disease Control and Prevention, Arthritis Foundation, USA)	2020
 United States of America 4 <sup>66</sup>	National Pain Strategy: A Comprehensive Population Health-Level Strategy for Pain (Department of Health and Human Services / Interagency Pain Research Coordinating Committee, USA)	2011
 United States of America 5 <sup>64</sup>	Relieving Pain in America: A Blueprint for Transforming Prevention, Care, Education, and Research. (Institute of Medicine, USA)	2011

A detailed analysis of the policy documents is reported elsewhere<sup>2</sup>. Eight policy themes were identified across the 41 included documents, each supported by a number of sub-themes (Figure 4). The detailed sub-themes underpinning each of these 8 policy themes were then compared and contrasted with the detailed components underpinning the Pillars of the logic model from Phase 1. These policy data then supplemented the components underpinning the Pillars of the logic model to create a final framework of components for Phase 3 of the project (Section 4.3).



**Figure 4:** Eight policy themes derived from content analysis of policy documents. Each of the 8 policy themes were supported by a number of sub-themes (data not shown).



## 4.3 PHASE 3: GLOBAL eDELPHI

### Purpose

A global eDelphi was undertaken between October 2020 and January 2021. The purpose of the eDelphi was to engage a large, international, cross-sectoral panel to review, rate and revise the framework of components of a global strategic response, defined empirically from the data in Phase 1 and Phase 2.

### Participants

The panellists for the eDelphi were sampled as individuals or organisations, meeting at least one of the nine criteria outlined below (Box 2).

Recruitment of panellists was undertaken through:

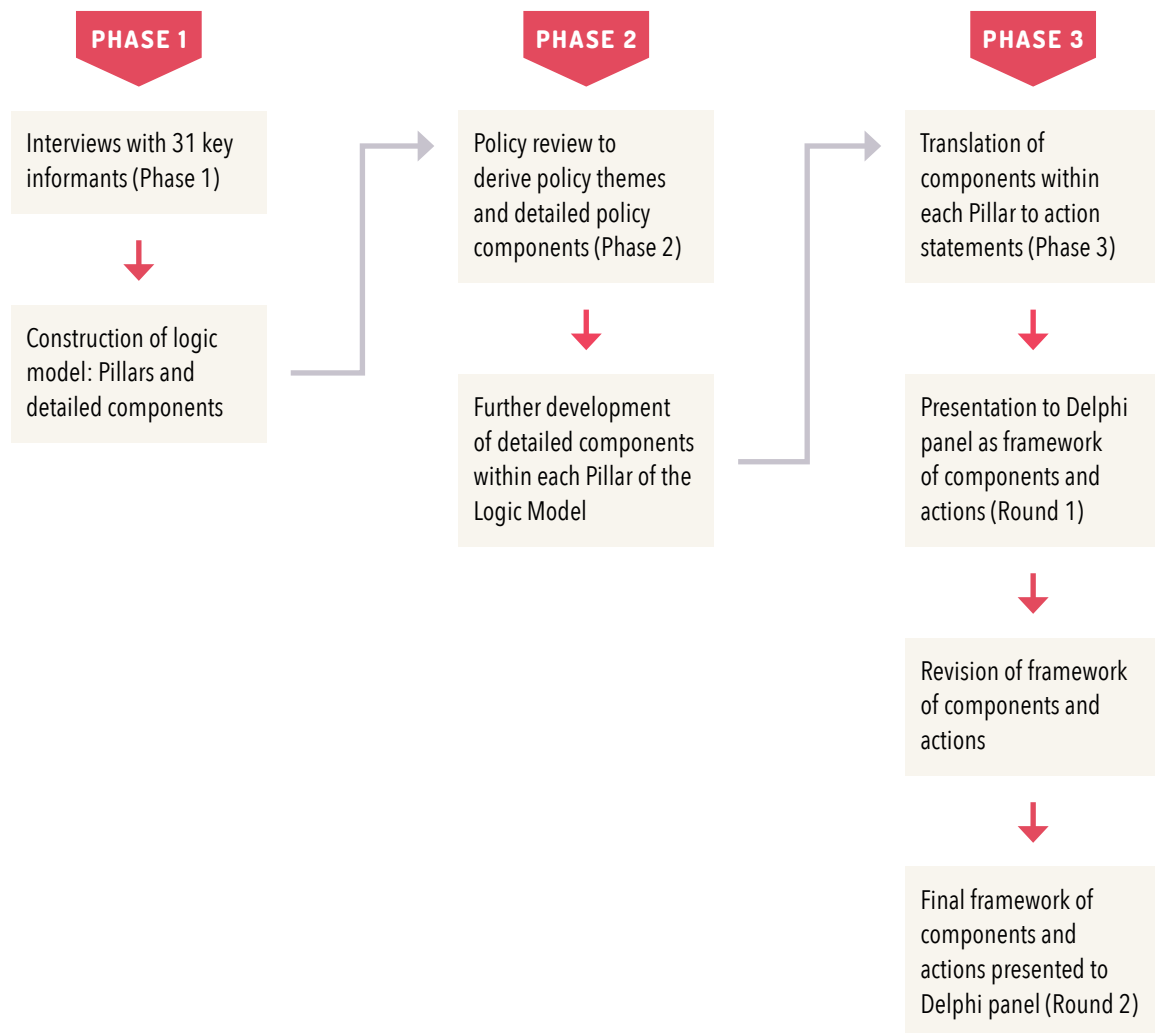
- contact databases held by G-MUSC (compliant with privacy standards)
- a systematic desktop search of clinical and civil society organisations relevant to MSK health and disability across the 30 most populated nations based on [UN World Population Prospects](#)
- through open invitations on social media platforms.

#### Box 2: Sampling criteria for Phase 1 key informants

1. A person with a lived experience of a MSK health impairment (MSK condition, MSK pain, MSK injury) for at least 5 years.
2. A registered clinician or other health worker, working in MSK health, pain care or injury care for at least 5 years.
3. An officer of a clinical/professional organisation relevant to MSK health, pain care or injury care and have held this post for at least 12 months.
4. An individual currently involved in global or national health policy, service design or service implementation related to MSK health, MSK pain, injury, NCDs, ageing, disability or rehabilitation for at least 2 years.
5. An individual currently involved in advocacy (including patient advocacy) in the context of MSK health, MSK pain, injury, NCDs, ageing, disability or rehabilitation for at least 2 years.
6. A thought leader, defined as an individual who has published at least 2 peer-reviewed papers or health policies in the last 5 years related to global health systems or health service reform for MSK health, MSK pain, injury, NCDs, ageing, disability or rehabilitation.
7. An individual holding an academic (e.g. research or teaching) or workforce training position(s) related to MSK health, MSK pain, injury, NCDs, ageing, disability or rehabilitation for at least 2 years.
8. An officer of the WHO.
9. An officer of a national or sub-national Ministry of Health.

## Development of a framework of components

The rich and detailed qualitative data obtained from the KI interviews in Phase 1 were used to define the components within each Pillar of the logic model. These components were then further extended by the policy data derived from Phase 2. Finally, components were expressed as action statements for health systems and services in preparation for presentation to the eDelphi panel and creating a final framework of requisite components for a global strategy on MSK health (Figure 5).



**Figure 5:** Process of deriving the components and actions underpinning each Pillar of the logic model through to creating a final framework of requisite components and actions for a strategy on MSK health.

## Data collection

Panellists responded to two online surveys in October 2020 (Round 1) and December 2020 (Round 2).

### Round 1

In Round 1, panellists rated 60 discrete components according to their importance for health systems strengthening for MSK health. Panellists provided free-text comments where revisions were required.

Where the rating of importance of a component/action met a pre-specified threshold<sup>†</sup>, the component was retained in the framework, revised (if appropriate) and re-presented to the panel in Round 2. Where a component did not meet the threshold for retaining, it was removed from the framework.

### Round 2

In Round 2, panellists considered a revised framework of components/actions and identified, which they considered 'essential', 'desirable' or 'unsure'<sup>‡</sup>. Panellists also rated the final framework according to its value and credibility for health systems strengthening.

## Outcomes

The Delphi panel characteristics are summarised in Infographic 1.






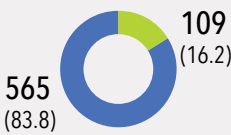
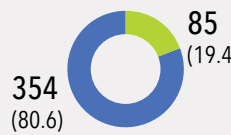


674 valid responses (47% female) were recorded for Round 1 (109 organisation-level responses and 565 individual-level responses) and 439 valid responses (65%) in Round 2. Seventy-two countries were represented in Round 1 (46% LMICs) and 66 in Round 2 (44% LMICs), covering all UN geographic regions (Figure 6A). At a panellist-level, most of the panellists were resident in Europe and Central Asia and North America (Figure 6B).

† Across the components presented in Round 1, the panel median was categorised as 1–3: 'not important', 4–6: 'equivocal', or 7–9: 'important'. An item was retained for Round 2 where the overall panel median score was  $\geq 7$  with level of agreement of  $\geq 70\%$  by panellists within the band 7–9. An item with a panel median of 4–6 or other median band with a consensus of  $< 70\%$  within the same band was defined as 'uncertain' and flagged for re-rating in Round 2. An item with a panel median of 1–3 and a level of agreement of  $\geq 70\%$  by panellists within the band 1–3, was defined as 'unimportant' and removed from the framework.

‡ A component was considered 'essential' where  $\geq 80\%$  of the panel ranked it as 'essential'.

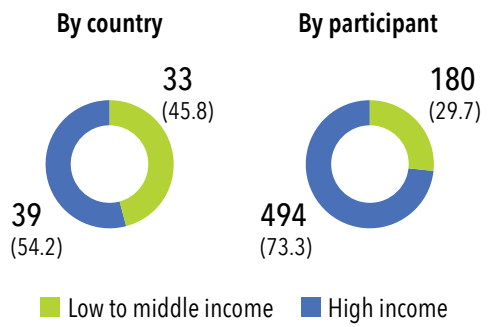
**DELPHI PANEL**

PHASE 3

		Round 1 (n = 674)	Round 2 (n = 439)
	<b>Age</b> Mean (95% CI)	<b>48.3</b> (47.3, 49.3)	<b>49.7</b> (48.5, 50.8)
	<b>Gender</b>		
	Male	351 (52.1)	231 (52.6)
	Female	316 (46.9)	206 (46.9)
	Other	7 (1.0)	2 (0.5)
	<b>Countries represented</b>	<b>72</b>	<b>66</b>
	<b>Percentage low to middle income</b>	<b>46%</b>	<b>44%</b>
	<b>Type of response, n (%)</b>		
	<div style="display: flex; align-items: center;"> <div style="width: 15px; height: 15px; background-color: #90EE90; margin-right: 5px;"></div> Organisation                 <div style="width: 15px; height: 15px; background-color: #4169E1; margin-left: 20px; margin-right: 5px;"></div> Individual             </div>		
	<b>Total years healthcare experience</b> Mean (95% CI)	<b>21.1</b> (20.2, 22.0)	<b>22.2</b> (21.1, 23.3)
	<b>Total years lived experience with MSK health condition</b> Mean (95% CI)	<b>18.7</b> (16.4, 21.0)	<b>20.9</b> (17.9, 23.9)

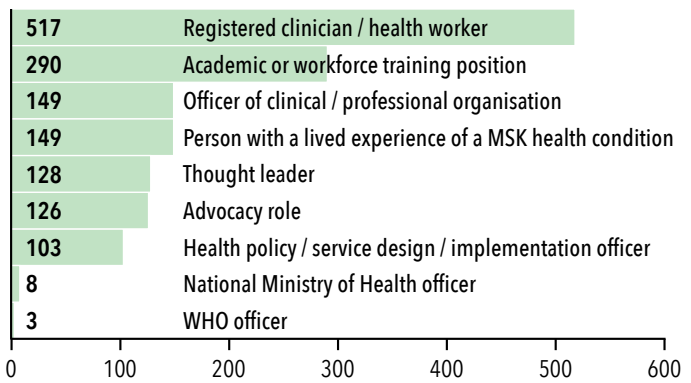
**Economic band**

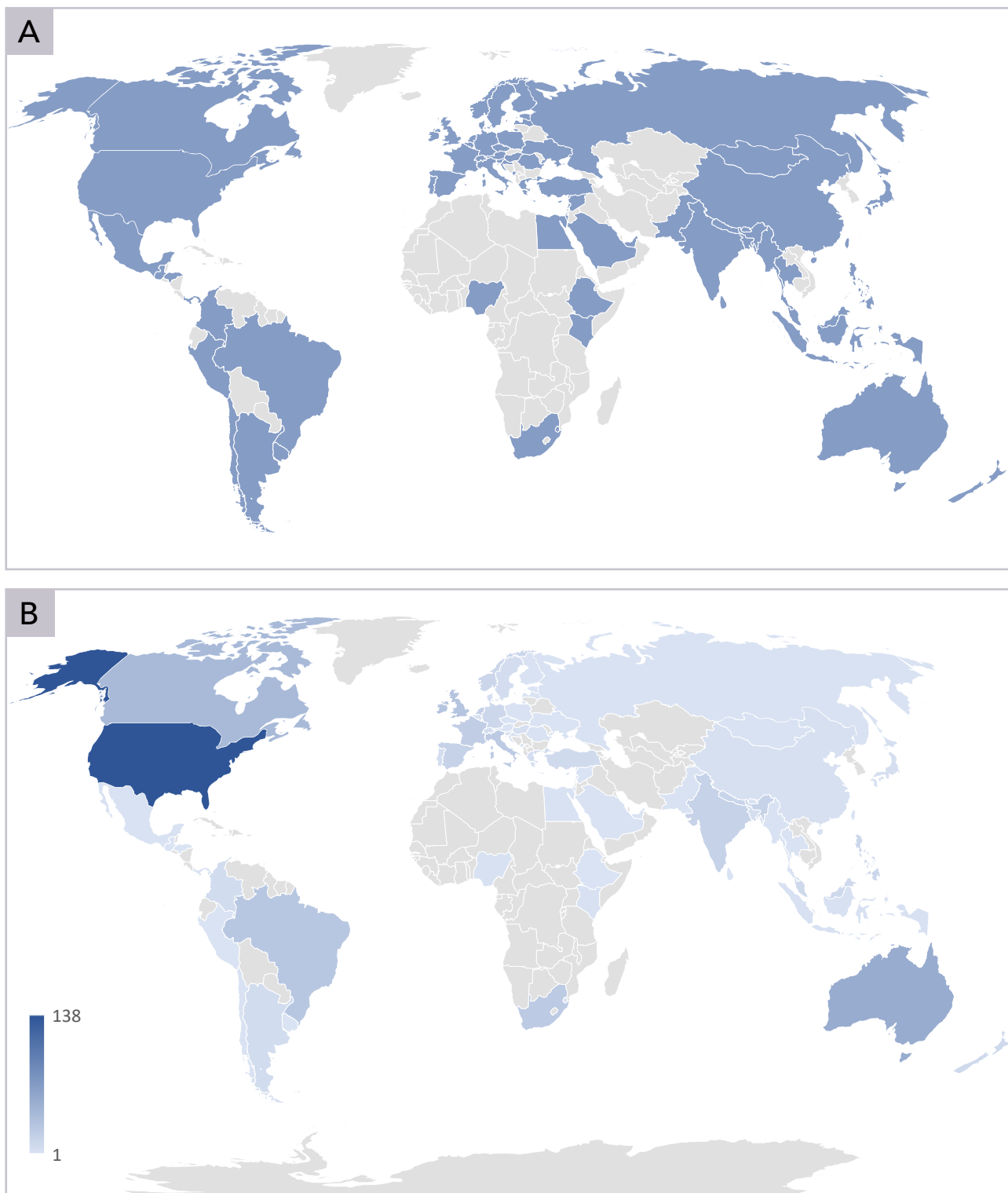
(World Bank Classifications 2020)  
(Round 1 only)



**Sample by respondent category**

(Round 1 only; categories are not mutually exclusive)





**Figure 6:** Global geographic heatmap showing distribution of participants in Phase 3. Graphic powered by Microsoft Excel (Microsoft Corporation, Redmond, WA, USA).

**Panel A** illustrates the distribution of countries represented in Phase 3 ( $n = 72$ ). Consistent blue shading reflects the countries represented.

**Panel B** illustrates the distribution of participants ( $n = 674$ ) by country, ranging from 1 to 138 participants by country. Graded blue shading represents frequency of participants by country, with darker shading representing a greater number of participants in that country.

The 116 organisations represented in Phase 3, in addition to G-MUSC, are listed below.

### Clinical societies

1. African League of Associations of Rheumatology (AFLAR)
2. American Academy of Orthopaedic Manual Physical Therapists (AAOMPT)
3. American Association of Nurse Practitioners (AANP)
4. American College of Rheumatology (ACR)
5. American Physical Therapy Association (APTA)
6. Associazione Italiana per lo Studio del Dolore (Italian Association for the Study of Pain)
7. Associazione Nazionale Malati Reumatici - Anmar Onlus (Italian National Association of Rheumatic Diseases)
8. Belgian Chiropractic Union
9. British Chiropractic Association
10. Canadian Chiropractic Association
11. Chiropractic Association of South Africa
12. College of Podiatry, UK
13. Cyprus League Against Rheumatism
14. De Nationale Vereniging ReumaZorg Nederland (National Association of Reuma Care Netherlands)
15. Deutsche Rheuma-Liga
16. Deutschen Gesellschaft für Orthopädie und Orthopädische Chirurgie (DGOOC) (German Society for Orthopedics and Orthopaedic Surgery)
17. Deutschen Gesellschaft für Unfallchirurgie (DGU) (German Society for Trauma Surgery)
18. European Academy of Chiropractic
19. European Alliance of Associations for Rheumatology (EULAR) - People with Arthritis and Rheumatism sub-group
20. European Chiropractors' Union
21. European Federation of National Associations of Orthopaedics and Traumatology (EFORT)
22. European Society for Clinical and Economic Aspects of Osteoporosis, Osteoarthritis and Musculoskeletal Diseases (ESCEO)
23. Hellenic League Against Rheumatism
24. Hungarian Chiropractors' Association
25. International Association for the Study of Pain (IASP) Global Alliance of Pain Patient Advocates Presidential Task Force
26. International Association for the Study of Pain (IASP): Musculoskeletal Pain Special Interest Group; Pain, Mind and Movement Special Interest Group
27. International Federation of Podiatrists (IFP)
28. International Maitland Teachers Association
29. International Pediatric Association (IPA)
30. International Society of Physical and Rehabilitation Medicine (ISPRM)
31. Japanese Association of Chiropractors
32. Japanese Society of Chiropractic Science
33. Kenyan Society of Physiotherapists
34. Malaysian Allied Health Profession Council
35. Malaysian Physiotherapy Association
36. Medical Rehabilitation Therapists (registration) Board of Nigeria
37. Mongolian Physical Therapy Association
38. Mongolian Society of Physical and Rehabilitation Medicine
39. Netherlands Chiropractors' Association
40. Norwegian Chiropractors' Association
41. Norwegian Interdisciplinary Organisation in Rheumatology
42. Pain Society of the Philippines
43. Pan Arab Osteoporosis Society (PAOS)
44. Pan-American League of Associations for Rheumatology (PANLAR)
45. Russian Association on Osteoporosis
46. Sociedad Argentina de Reumatología (Argentinian Society for Rheumatology)
47. Société Internationale de Chirurgie Orthopédique et de Traumatologie (International Society of Orthopaedic Surgery and Traumatology) (SICOT)
48. Spanish Pain Society
49. Syrian National Osteoporosis Society
50. Turkish Chiropractic Association
51. World Federation of Chiropractic (WFC)
52. World Federation of Occupational Therapists (WFOT)
53. World Physiotherapy (including International Federation of Orthopaedic Manipulative Physical Therapists (IFOMPT) subgroup)

## Academic organisations

54. Al-Aleem Medical College; Rheumatology Faculty University of Health Sciences (UHS), Pakistan
55. Care & Public Health Institute, University Maastricht, Netherlands
56. Fatima Jinnah Medical University (FJMU), Pakistan
57. Journal of Joint Diseases and Related Surgery
58. Lee Kong Chian Medical School, Nanyang Technological University, Singapore
59. Maastricht University Medical Center, Netherlands
60. National University of Mongolia, Department of Physiotherapy
61. Philipps-Universität Marburg, Germany,
62. Seminars in Arthritis and Rheumatism (scholarly journal)
63. Universidad del Norte, Columbia
64. Universiti Teknologi MARA Shah Alam, Malaysia
65. University College of Osteopathy, UK
66. University of Pittsburgh, USA

## Global health agencies

67. Global Fragility Fracture Network (FFN)
68. Humanity & Inclusion
69. International Osteoporosis Foundation (IOF)
70. NCD Alliance
71. NCD Child
72. Osteoarthritis International Foundation
73. Paediatric Global Musculoskeletal Taskforce (Global Alliance for Musculoskeletal Health)
74. Rehabilitation International
75. World Health Organization (WHO)
76. World Spine Care

## Research organisations

77. Academic Consortium for Integrative Medicine and Health, USA
78. American Society for Bone and Mineral Research (ASBMR)
79. Australia and New Zealand Musculoskeletal Clinical Trials Network (ANZMUSC)
80. Osteoarthritis Research Society International (OARSI)
81. The Center for the Study of Pain of Mongolia
82. The Japanese Society for Bone and Mineral Research

## Health service organisations

83. Afyafrica Orthopedic Services, Kenya
84. Defence Forces Physiotherapy Ireland
85. IPA Manhattan - Physical Therapy, USA
86. Johnson and Johnson Physical Therapy, USA
87. National Hospital & Medical Center (NH&MC), Pakistan
88. Pain Center of Hospital das Clinicas of University of Sao Paulo School of Medicine, Brazil
89. Pain Relief and Physical Therapy, USA
90. Pain Relief and Physical Therapy Orthopedic Physical Therapy Residency, USA
91. Peking University People's Hospital, China
92. Tan Tock Seng Hospital, Singapore
93. The Karen Hospital, Kenya

### National civil society organisations

- 94. American Bone Health
- 95. American Chronic Pain Association
- 96. Ankylosing Spondylitis Association South Africa
- 97. Arthritis & Osteoporosis Western Australia (AOWA)
- 98. Arthritis and Musculoskeletal Alliance UK
- 99. Arthritis Care Foundation, Pakistan
- 100. Associazione Malati Reumatici del Piemonte (Rheumatic Patients Association of Piedmont)
- 101. China Disabled Persons' Federation
- 102. Institute for the Study and Treatment of Pain, Canada
- 103. Institute of Physical Art
- 104. Juvenile Arthritis Research
- 105. Lupus Foundation of Bangladesh
- 106. MiracleFeet, USA
- 107. Musculoskeletal Australia
- 108. Norwegian Association for Women with Pelvic Girdle Pain
- 109. Norwegian Council for Musculoskeletal Health
- 110. Programa Municipal de Espalda Saludable (Healthy Back Programme of City Council, Spain)
- 111. Rheumatology for All
- 112. Turkish Joint Diseases Foundation
- 113. Tzeadim-Israeli Association for Joint Disease and Joint Implanted People
- 114. US Pain Foundation
- 115. Vision Community Based Rehabilitation Association, Ethiopia

### National Ministry of Health

- 116. Public Health England

At the conclusion of Round 2, 59 components across 8 Pillars were retained. While all components were defined as important, 10 were identified as essential by the panellists. The components are presented in the following section ([Section 5](#)).





FRAMEWORK  
OF REQUISITE  
COMPONENTS

5

## What is the Framework?

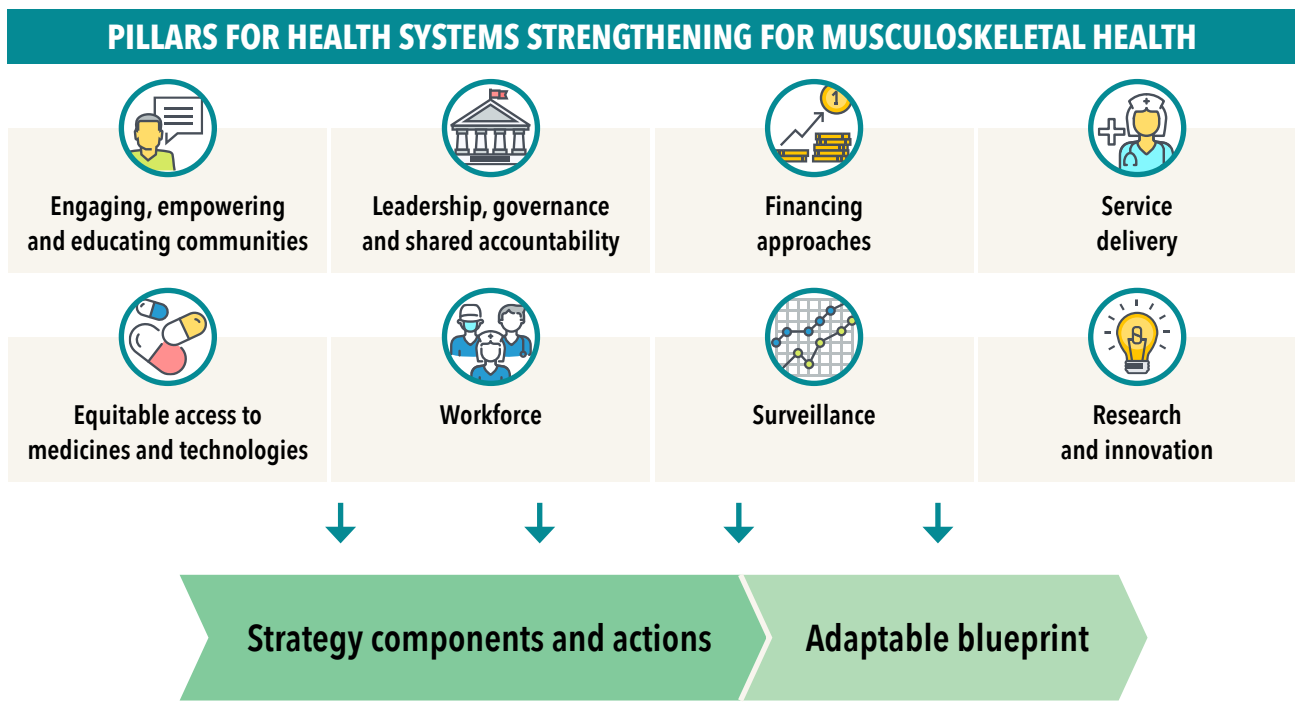
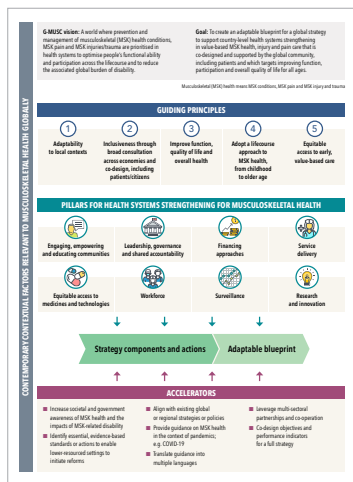
This section of the report provides a summary of the requisite components/actions for each of the 8 Pillars of the logic model, derived across the three phases of the project (Figure 7).

Each Pillar represents a strategic priority area, while the actions aligned to each Pillar explain how the Pillar can be operationalised in health systems. The Framework of Pillars and actions provide the guidance for *what* and *how* to strengthen health systems for optimising MSK health.

## How to use this section

The 8 Pillars and their associated actions are outlined across the following 8 sub-sections (5.1 to 5.8). Each sub-section provides:

- a definition of the Pillar and its scope.
- a table of actions/components and their definitions/scope.
- actions/components identified as essential are highlighted with a star ★.



**Figure 7:** Logic model derived from this project, highlighting the 8 Pillars for health systems strengthening.

## 5.1 **PILLAR 1: ENGAGING, EMPOWERING AND EDUCATING CITIZENS, COMMUNITIES, ORGANISATIONS AND GOVERNMENTS TO ACT ON MSK HEALTH**

### Scope and summary

There is a need to establish and sustain multi-sectoral partnerships and deliver widescale education about MSK health to empower citizens, communities, organisations and governments to act on prevention and management of MSK health conditions, MSK pain and MSK injury and trauma.



In particular, a multi-sectoral approach that supports engagement with and education of the community (people, patients, organisations, governments) and the establishment of partnerships between government and non-government agencies is strongly advocated to improve the prevention and management of MSK health, pain and injury/trauma care. There is also a need to consider cultural differences in terms of how health is conceptualised.

Four priority areas for action are proposed:

- (i) *Engage and forge partnerships* with a range of sectors including citizens, patients and civil society organisations; industry, workplaces and employers; schools and educational facilities; and national governments.
- (ii) *Tailor public health education messages* to different sectors including schools and higher education facilities; workplaces and employers; health workforce; and society in general.
- (iii) *Raise awareness and understanding* of MSK conditions in the population including the importance of MSK health across the lifecourse; why physical activity and play are essential; and highlighting the range of effective management strategies available for MSK conditions.
- (iv) *Harness enablers to drive advocacy and deliver educational messages*. Enablers include: empowering people with lived experiences of MSK conditions to share their stories, utilising social media widely and partnering with patient and professional organisations.

## Requisite components or actions for this Pillar

### Priority sectors for pursuing engagement and forging partnerships to support prevention and management of MSK health

Item	Component or action	Definition
1.1	<p>Improving prevention and management of MSK health requires engagement and partnerships with:</p> <ul style="list-style-type: none"> <li>★ <b>Citizens, patients and civil society organisations.</b></li> <li>★ <b>Industry, workplaces and employers.</b></li> <li><b>Third-party payers/insurers.</b></li> <li><b>Schools and education facilities.</b></li> <li>★ <b>National and sub-national governments.</b></li> </ul>	<p><b>Citizens, patients and civil society organisations:</b> Engaging and empowering citizens and patients to learn more about MSK health and act on prevention and management, such as through awareness campaigns, will be essential to achieving population health gains and reducing disability. Forging partnerships between governments and civil society/community organisations can be an effective mechanism to drive citizen and patient engagement, in particular for engaging with vulnerable groups e.g. older adults and minority groups.</p> <p><b>Industry, workplaces and employers:</b> Engaging with and supporting industry, workplaces and employers to act on injury prevention and management, support return to work after injury and implement workplace accommodations to enable people with compromised functional ability due to MSK health conditions to equitably participate in work will be important for maintaining national work productivity and financial security of individuals.</p> <p><b>Third-party payers/insurers:</b> Engaging with health and industry insurers to prioritise MSK health in insurance schemes will be important to facilitate access to care and prevention and management of work-related injury.</p> <p><b>Schools and education facilities:</b> Engagement and partnership with schools and education facilities is needed to support education about prevention and management of MSK health conditions and design environments and curriculum that support healthy behaviours for children, in particular, support for participation in physical activity, play and healthy eating.</p> <p><b>National and sub-national governments:</b> there is a need for whole-of-community engagement with national and sub-national governments to define MSK health and advocate for action on MSK health given the enormous burden of disease and costs associated with MSK health impairment. Advocacy around threats to economic development and sustainability and return on investment is important in the context of healthcare expenditure, work productivity loss and absenteeism, taxation revenue loss, social care payments and socioeconomic consequences for families and communities.</p>

★ Identified as essential

## Priority sectors for education about MSK health

Item	Component or action	Definition
1.2	<p>★ Improving prevention and management of MSK health requires education across the following sectors: schools and higher education facilities; workplaces; health professionals; and the community.</p>	<p>Priority sectors for education about MSK health:</p> <ul style="list-style-type: none"> <li>• In schools and higher education facilities prioritise education about MSK health and its importance across the lifecourse and a contemporary understanding of pain.</li> <li>• Educate industry and workplace insurance providers how workplaces can prevent MSK injury (e.g. through risk identification and mitigation), support healthy work habits (e.g. through promotion of movement and activity) and support people with MSK health impairments to maintain productivity and return to work. In this regard, workplaces can be used as an effective portal and model for public health education.</li> <li>• Support the dissemination of best-practice evidence for prevention and management of MSK health and injury to educate the health workforce at scale.</li> <li>• Educate society and community at large (including government and policy makers), including tailored messages and approaches for vulnerable groups (e.g. those of lower socioeconomic status, people with intellectual and/or developmental disabilities, people in rural settings, ethnic minority groups). Specifically:             <ul style="list-style-type: none"> <li>– Educate society/community at large concerning the importance of MSK health for living well (i.e. functional ability and socioeconomic security and welfare across the lifecourse), so that the value of MSK health is better understood and misperceptions are corrected.</li> <li>– Educate society/community at large concerning exposure to modifiable risk factors for MSK health loss, including physical inactivity, obesity, malnutrition, smoking and how to adopt and maintain positive health behaviours to achieve better MSK health and quality of life. Education needs to also focus on early detection and intervention for both disease features and unhelpful behaviours and beliefs. This is particularly relevant in resource-limited settings.</li> <li>– Educate the society/community at large to address misconceptions about management of MSK health conditions and particularly MSK pain. Specifically, provide education about what is the right care for MSK health conditions and MSK pain, the role of early detection and treatment and a contemporary understanding of pain.</li> </ul> </li> </ul>

## Priority messages for public health education about MSK health

Item	Component or action	Description
1.3	Improving prevention and management of MSK health requires globally-relevant educational messages contextualised to local settings.	<p>High priority public health messages include:</p> <ul style="list-style-type: none"> <li>• MSK health enables function, participation and enjoyment across the lifecourse, with the impacts of impaired MSK and persistent pain profound and wide reaching, including increased risk of mortality. This message should be supported by concrete examples and metrics that are locally relevant and understandable by the general population.</li> <li>• Physical activity, play, sport and movement are essential for good MSK health, mobility, function and preventing multiple diseases.</li> <li>• MSK conditions and MSK pain are relevant across the lifecourse - they are not an inevitable part of ageing and they impact young people too.</li> <li>• There are effective strategies to manage many MSK health conditions and MSK pain to improve function and quality of life. Interventions are most effective when they are introduced early and coupled with positive lifestyle and behavioural changes. On the other hand, there are also many interventions that are less effective and potentially harmful (low-value), particularly for long-term MSK pain where the experience of pain may not be related to structural pathology.</li> <li>• MSK health conditions are the most significant global healthcare problem in terms of disability (activity impairment and work loss) and cost to individuals and communities.</li> <li>• MSK health is not just about diseases. The majority of trauma, sporting injuries and workplace injuries are MSK in nature.</li> <li>• Many MSK health conditions and injuries can be prevented by raising awareness about modifiable risk factors and screening for some MSK conditions.</li> </ul>

### Priority enablers to drive advocacy and support community-wide education

Item	Component or action	Description
1.4	Use mechanisms to drive public education, including empowering people with lived experience to share stories and co-design messages; mass and social media; peer support models and engaging civil society and professional organisations.	<p>Priority enablers to drive advocacy and support community-wide education:</p> <ul style="list-style-type: none"> <li>• Empower people with lived experience, including children and their families, from different settings and with different conditions and injuries to share stories relevant to local and cultural contexts and co-design messages. Importantly, lived experiences should also reflect vulnerable and minority groups.</li> <li>• Lever mass media and social media to disseminate education and advocacy messages.</li> <li>• Peer support models and group-based education, relevant to the local context, to support people with long-term MSK health conditions.</li> <li>• Support and resource civil society, such as national or sub-national advocacy organisations, to champion advocacy and education initiatives and empower and support patients, governments and society with accurate knowledge about MSK health conditions, their prevention and management, and strategies for system reform.</li> <li>• Empower and support professional clinical associations to assume advocacy roles and foster relationships with their national government.</li> </ul>

## 5.2 PILLAR 2: LEADERSHIP, GOVERNANCE AND SHARED ACCOUNTABILITY

### Scope and summary

Leadership and governance refer to the requirement for global and national-level leaders to raise the priority for MSK health, pain and injury/trauma within and across nations.



Four priority areas are proposed:

- (i) *Integration with existing policy and system strengthening reforms* which refers to incorporating MSK health into broader reform efforts, such as inclusion with broader NCD prevention and management initiatives; Universal Health Coverage packages of interventions and reform efforts in ageing, rehabilitation and injury.
- (ii) *Advocacy and leadership across sectors, ministries and global organisations* to increase the priority status of MSK conditions.
- (iii) *Measurement and classification of MSK conditions: health state measures need to be extended to provide a greater emphasis and understanding on function and participation outcomes across society.* There is a need for MSK conditions to be classified into meaningful diagnostic categories to enable a clearer understanding of the conditions and appropriate management pathways.
- (iv) *Legislation and regulation needs to be considered across nations to support sustained health system strengthening for MSK conditions.*

### Requisite components/actions for this Pillar

#### Integration with existing policy and system strengthening reforms

Item	Component or action	Definition
2.1	MSK health should be explicitly integrated with broader reform efforts for non-communicable diseases (NCDs).	MSK health conditions and MSK pain are not adequately integrated with NCD prevention and management policy and financing in a manner commensurate with their burden of disease. The focus on mortality reduction in NCD reform substantially deprioritises the disability burden associated with MSK conditions and persistent pain. Consequently, there is an urgent need to more explicitly integrate MSK health conditions and pain with broader NCD reform efforts by national governments, with guidance and leadership from the WHO. Given the shared risk factors and shared management strategies between many NCDs and MSK health conditions (e.g., smoking, alcohol use, nutrition, obesity, physical inactivity), integration and strategy alignment would serve to positively impact not only MSK health conditions, but also other NCDs. This is further reinforced by the fact that prevalent MSK conditions are a risk factor for developing other NCDs.



### Integration with existing policy and system strengthening reforms

Item	Component or action	Definition
2.2	Universal Health Coverage (UHC) essential care packages and/or insurance schemes should include prevention and management of MSK health impairment.	Healthcare (prevention and management) for MSK conditions, pain and injury should be guaranteed in all countries through Universal Health Coverage (UHC). This is warranted due to the disability burden imposed by these conditions and the prevalence of MSK health conditions in co- and multi-morbid NCD health states where it is usually the MSK condition(s) that is the main contributor to disability. In countries with health coverage through established public, private, social or statutory insurance schemes, coverage for MSK health should be included.
2.3	Strategic global responses for MSK health should explicitly link with, and support implementation of, existing global and national health system strengthening efforts.	A global strategy for MSK healthcare, pain and injury/trauma should explicitly link with, and support implementation of, existing global and national efforts in health system strengthening, for example in care integration (e.g. <i>WHO Framework on integrated people-centred health services</i> ), ageing (e.g. <i>WHO Global strategy and action plan on ageing and health</i> ), rehabilitation (e.g. <i>WHO Rehabilitation 2030 agenda</i> ), disability (e.g. <i>WHO Global disability action plan 2014-2021</i> ), NCD care (e.g. <i>WHO Global action plan for the prevention and control of noncommunicable diseases 2013-2020</i> ), injury prevention and trauma care.

### Global and national leadership to prioritise MSK health, pain and injury prevention and care

Item	Component or action	Definition
2.4	<i>Global leadership</i> from the WHO in prioritising MSK health is essential to drive a global response to the burden of MSK health impairment.	Global leadership from the WHO in prioritisation of MSK conditions, pain and injury is essential to catalyse a global response to the burden of disease, particularly in LMICs and to inform the strategic activities of global clinical organisations. In this regard, there is a need for a global Strategy, Action Plan or Framework to guide Member States to initiate appropriate policy, financing and health service reform initiatives and for clinical organisations to prioritise their efforts in global reform and advocacy initiatives.

## Global and national leadership to prioritise MSK health, pain and injury prevention and care

Item	Component or action	Definition
2.5	★ <i>Country-level</i> leadership is needed to prioritise MSK health impairment by national governments.	<p>National leadership is required to advocate for prioritisation and action on prevention and management of MSK health and injury by governments, commensurate with their established burden of disease across the lifecourse.</p> <p>To increase prioritisation of MSK health by government, there is a need to communicate the disease burden to all governments, relative to other health states, where larger proportions of health resources are currently directed.</p> <p>National governments need reliable evidence on the local burden of disease and cost data in order to catalyse leadership for local system reform and to work collectively with other governments to advocate to the WHO to act on MSK health. In particular, national leadership in advocacy and policy formulation that emphasises the importance of MSK-related disability prevention on human capital and economic development (e.g. return on investment) is needed.</p> <p>Leadership activity should extend beyond advocacy to include the establishment of local systems to facilitate decision-making e.g. responding to new evidence. Structurally, this may include establishment of appropriately regulated expert advisory groups/taskforces or stakeholder committees within and/or across the health system in partnership with civil society partner organisations.</p>
2.6	Leadership is needed from <i>professional and civil societies</i> and citizens that extends beyond just MSK health.	Collaborative engagement and consultation between professional/clinical and civil society organisations and citizens across the health sector (i.e. beyond just MSK health and injury groups) with national governments and the WHO is needed to advocate for the prioritisation of MSK health and injury prevention and management in national health reform efforts.
2.7	Global and national <i>multi-sectoral and inter-ministerial leadership</i> is needed to prioritise action on policy and financing for MSK health.	<p>Global and national leadership across sectors and government ministries (i.e. beyond the health sector e.g. social care, industry, sport, transport) is critically important to elevate the priority of MSK health prevention and management to government, industry and private organisations.</p> <p>Multi-sectoral and inter-ministerial leadership in MSK health will facilitate better integration of prevention and management initiatives across public policy and financing, which is essential to achieve impact.</p> <p>At the government level, leadership may include specific Ministerial responsibility for MSK health and the establishment of dedicated focal points in national governments and global organisations, such as WHO.</p>

## Measurement and classification

Item	Component or action	Definition
2.8	★ Global and national health and performance indicators must extend beyond mortality reduction to consider function and participation.	<p>Measures of health and performance in health reform must extend beyond mortality reduction and consider function/participation restriction and recognise the health and economic benefits of disability prevention.</p> <p>An expansion in targets and performance measures to recognise function and participation will better support systems strengthening for MSK health.</p>
2.9	A meaningful, acceptable and internationally comparable classification system is needed for MSK health impairments.	<p>Countries need to classify MSK health states into meaningful diagnostic categories rather than symptomatology alone, supported by guidance from WHO and in alignment with the International Classification of Disease (ICD) system, in order to make sense of the wide constellation of MSK conditions.</p> <p>Such classification is needed to design appropriate local models of service delivery, workforce configurations and financing to support care pathways for different classifications of MSK conditions. Without classification, the scale of the problem is too large and too complex to initiate meaningful action, particularly for lower-resourced countries.</p> <p>Classification also enables countries to prioritise responses to specific groups of MSK conditions based on national population health need.</p>

## Legislation and regulation

Item	Component or action	Definition
2.10	Legislation and regulation are needed to sustain reform efforts in health systems strengthening for NCDs, including MSK health.	<p>National legislation and regulation to support long-term health system strengthening for NCDs, including MSK health, is needed to sustain efforts with successive changes in governments.</p> <p>This will be particularly important in the wake of COVID-19 as priorities shift to communicable diseases.</p>

## 5.3 PILLAR 3: FINANCING APPROACHES

### Scope and summary

Financing refers to how nations pay for prevention and management services for MSK health, pain and injury care in the context of financing requirements and priorities for other health conditions.

Integrated financing models; flexibility in approaches to funding and revenue raising; protecting allocated funds; and financing and incentivising effective, safe and interprofessional care are recommended. This is particularly relevant in the context of UHC packages.



### Requisite components/actions for this Pillar

#### Integrated financing models

Item	Component or action	Definition
3.1	★ Existing healthcare financing models need to integrate health promotion and health care delivery for MSK health.	<p>Existing healthcare financing models need to accommodate health promotion and health care delivery for MSK health conditions, MSK pain and MSK injury in multidisciplinary models. This may be achieved in financing for health promotion, NCD care, injury and trauma care or ageing and long-term care. Integrating funding for MSK health care with other established funding priorities will be important, particularly in the context of COVID-19, where new funding streams will be extremely limited.</p> <p>In the context of global burden of disease data, there is a strong rationale for an increased allocation of funding for MSK health.</p>

#### Flexibility for different financing models

Item	Component or action	Definition
3.2	Financing models for MSK health should accommodate flexibility for public-private partnerships, partnerships with civil society, international aid, tagged donorships and revenue-raising strategies.	<p>Financing models for MSK health promotion and care should accommodate the flexibility for:</p> <ul style="list-style-type: none"> <li>• public-private partnerships</li> <li>• partnerships with civil society, international aid, tagged donorships underpinned by appropriate regulation to avoid unhelpful commercial influence and conflicts of interest</li> <li>• specific revenue-raising through taxes for specific purposes, such as supporting care of the injured through workplace taxes or transport/fuel taxes.</li> </ul> <p>Flexibility in funding models is also important to enable health systems to respond to emerging innovations or technological advancements that may improve health outcomes.</p>

★ Identified as essential

### Flexibility for different financing models

Item	Component or action	Definition
3.3	Support multi-national foreign aid for MSK care in low resource settings.	Multinational foreign aid is needed to support MSK health prevention and care in low resource settings and where basic care for MSK health cannot be sustainably delivered due to competing health priorities and limited resources.
3.4	Allocated funding, essential medicines funding and donor funding for MSK health and injury care need to be quarantined.	Governments need a specific budget allocation for prevention and management of MSK conditions and the ability or regulation to quarantine donor funds for MSK health services, particularly to ensure availability of, and accessibility to essential medicines in lower resourced countries.

### Financing for the right care, at the right time, by the right team, in the right place

Item	Component or action	Definition
3.5	Financing for MSK healthcare should cover well defined, high-value (effective, safe, affordable) packages of care for prevention, diagnosis and management, particularly for community-based interventions.	Financing models, particularly for LMICs, should be formulated to support essential packages of care for MSK health conditions and injury, where funding of treatments and prevention strategies should be based on evidence, safety and cost effectiveness, targeting low cost and high yield. Ideally, these funding packages should be part of UHC essential packages and other locally relevant insurance schemes to minimise or eliminate out-of-pocket expenses. Packages should be tailored to different levels of the health system from community care through to tertiary care. Initial priority packages of funding should be directed towards interdisciplinary community-based care where out of pocket expenses are minimised or removed. For LMICs in particular, efforts to integrate packages of MSK interventions with established packages (e.g. 'Best Buys' for NCDs) should be prioritised to maximise return on investment and integration across conditions.
3.6	Financing models should incentivise prevention and integrated inter-disciplinary care for MSK health conditions.	Financing models should incentivise prevention (based on established modifiable risk factors) and integrated, interprofessional care for MSK health conditions so that a continuum of care is supported, as well as care between health settings and service providers.

### Scope and summary

Service delivery refers to providing access to health information and health services at a population level to manage established MSK health conditions, MSK pain and MSK injury (including secondary prevention) and primary prevention efforts.



There is a need for effective, accessible and sustainable service delivery models that prioritise high-value care<sup>†</sup> and support established disease and prevention care at the right time (early access and triage) and in the right place (community settings, where appropriate). Furthermore, care should be integrated and delivered by the right teams to ensure it is safe, effective, affordable and acceptable to citizens, while lower-value<sup>‡</sup> approaches should be de-adopted.

Services for MSK health conditions should be integrated with existing service models for NCD care in community settings or regionally-based centres, linking with service initiatives that target the broader social determinants of health. Importantly, service models need to be co-designed with the community and prioritise access for vulnerable groups.

For prevention, three key service delivery areas are relevant:

- (i) **MSK health should be integrated into primary and secondary prevention initiatives** for NCDs given the shared risk factors and frequent co- and multi-morbidity of conditions.
- (ii) **MSK-specific primary prevention initiatives should be promoted and implemented** where evidence of clinical and cost effectiveness exists.
- (iii) **National injury (sport, workplace, falls) and trauma prevention strategies and campaigns are needed** to reduce the disability burden associated with MSK-related injury and trauma.

† high value care: care for which evidence suggests it confers benefit to patients or probability of benefit exceeds probable harm<sup>89</sup>.

‡ low value care: care for which evidence suggests it confers no or very little benefit to patients or risk of harm exceeds probable benefit<sup>89</sup>.

## Requisite components/actions for this Pillar

### Care at the right time: early diagnosis, triage and intervention for secondary prevention

Item	Component or action	Definition
4.1	★ Service models for MSK conditions need to support early diagnosis and triage and management through local care pathways.	<p>Service models need to promote equitable access to early diagnosis and triage into appropriate, locally-supported care pathways that include referral systems to provide emergency or urgent care (e.g. trauma) or specialist-level care when indicated.</p> <p>This is important to arrest chronicity and disability, especially in younger people and those with inflammatory diseases, such as rheumatoid arthritis.</p>

### Delivery of the right care: effective, safe, affordable and accessible

Item	Component or action	Definition
4.2	★ Evidence-based diagnostic and therapeutic practices should be prioritised in service models over approaches that are not supported by evidence, are costly and potentially harmful.	<p>The overuse of technology in MSK care in high income countries (e.g. the overuse of MSK imaging) has been associated with overall limited clinical benefit in health outcomes and may promote unhelpful behaviours and beliefs about MSK health and pain care by patients and the broader community.</p> <p>A focus on delivery of safe and effective diagnostic (e.g. imaging) and therapeutic interventions (e.g. safe use of medicines and appropriate indications for surgery) is needed. This may be supported with global and country-level tools such as clinical guidelines and quality standards.</p>
4.3	Local care pathways should support essential packages of affordable, effective and safe care for MSK health impairment, while de-adopting care that is not supported by evidence, is costly and potentially harmful.	<p>Service models should promote the 'right care', that is effective (evidence-based), safe, affordable and accessible care through locally-supported care pathways that enable interdisciplinary care and access to tertiary or specialist-level care when needed, particularly in areas of high need/limited access.</p> <p>Care pathways and their components may be derived by defining essential packages of affordable and effective care for established classifications of MSK conditions and injuries, with an emphasis on low cost and high yield interventions. In many cases, interventions will be non-surgical, outside the context of trauma and end stage osteoarthritis.</p> <p>Low value diagnostic tests and interventions should not be recommended in essential packages for funding and should be defunded. Coupled with the formulation of care pathways and essential care packages is the need for building workforce capacity to provide the right care.</p>

### Delivery of the right care: effective, safe, affordable and accessible

Item	Component or action	Definition
4.4	Services for MSK healthcare should be integrated with service models for NCDs and services that target the broader social determinants of health.	<p>Services for MSK health conditions, pain care and injury care should be integrated with existing service models for NCD care and service initiatives that target the broader social determinants of health.</p> <p>In some settings, piloting such integration may be warranted to produce data on satisfaction, cost and health outcomes. In this regard, MSK health should be considered as an important component to holistic, person-centred care healthcare. This is justified on the basis of the high prevalence of MSK health conditions in co- and multi-morbidity health states for NCDs and the increased risk of developing NCDs on a background of MSK health impairment.</p>
4.5	Service models for MSK conditions should support integrated, person-centred care that targets functional ability through a biopsychosocial approach.	Services models that promote integrated, interdisciplinary person-centred care and that target functional ability through a biopsychosocial management approach are needed to shift from a purely disease-focused and biomedical paradigm.

### Delivery of care from the right team: interprofessional service models

Item	Component or action	Definition
4.6	Service models for MSK healthcare should promote community-based interdisciplinary care.	<p>Service models for MSK conditions should promote community-based interdisciplinary care tailored to the needs of the person and grounded in common standards of care delivery across providers.</p> <p>In some settings, primary care may be best triaged and coordinated by trained MSK practitioners or other local providers (e.g. family physicians, paramedical workers, local healers, female health workers) where there are access limitations to specialist medical practitioners. Service models should also enable timely access to tertiary and/or specialist-level care when indicated.</p>



### Delivery of care in the right place: bolstering community and primary care to reduce inequity in access to care

Item	Component or action	Definition
4.7	MSK care should be integrated into existing community- or regionally-based service models for NCD care.	Service models for MSK care should be community- or regionally-based and integrated with existing service models for NCDs and/or traditional care practices to reduce care disparity due to geography and better support integration of care across different health conditions and providers. Depending on workforce availability, community-led models could be primarily responsible for risk assessment, delivery of community-based interventions and on-referral where more advanced care is needed and not available locally.
4.8	Community-led service models for MSK healthcare should be co-designed by the community.	Community-led service models for MSK healthcare should be co-designed by the community (inclusive of community and religious leaders) to ensure services are aligned with community needs and are appropriate, acceptable, feasible and sustainable. Decentralisation of health delivery to municipalities or communities will also better support integration of services with existing community-based initiatives and resources.
4.9	Service models should prioritise access to health information and care to vulnerable groups.	Service models need to prioritise access to health information and care to vulnerable groups (e.g. those of lower socioeconomic status, people with intellectual and/or developmental disabilities, people in rural settings, ethnic minority groups) where care disparities are often wider and health outcomes poorer. For example, telehealth services may be useful in overcoming care disparities due to geography.

### Prevention

Item	Component or action	Definition
4.10	Primary and secondary prevention initiatives for NCDs should include MSK health.	Primary and secondary prevention initiatives for NCDs should integrate MSK health conditions and pain care, given the shared risk factors (e.g. smoking, physical inactivity, obesity, poor nutrition) and frequent co- and multi-morbidity between MSK health conditions and other NCDs.
4.11	MSK-specific primary prevention initiatives should be delivered where evidence of clinical and cost effectiveness exists.	In addition to addressing shared risk factors with other NCDs, MSK-specific primary prevention initiatives should be included in service models where evidence of clinical and cost effectiveness exists (e.g. osteoporotic fracture prevention).
4.12	National injury (sport, workplace, falls), trauma prevention strategies and campaigns are needed.	Injury and trauma prevention models are critical for MSK health since most injury and trauma outcomes are MSK-related. Priorities include prevention initiatives for workplace injury, sport injury and trauma from road traffic accidents.

## 5.5 PILLAR 5: EQUITABLE ACCESS TO MEDICINES AND TECHNOLOGIES

### Scope and summary

Equity in access refers to ensuring access to care, essential medicines and rehabilitation and new technologies to individuals with MSK conditions across the globe regardless of the economic status of a country or context of a pandemic.

There is a need for countries to identify and resource medicines for priority MSK conditions and improve access to new and/or effective therapies and technologies (e.g. digital innovation and surgical innovation and joint replacement surgery), particularly in LMICs. Furthermore, greater focus needs to be placed on innovation to aid the development of and access to low-cost assistive devices and technologies to support function.



### Requisite components/actions for this Pillar

Item	Component or action	Definition
5.1	★ Countries need to identify, resource and provide access to essential therapeutics for priority MSK conditions.	<p>There is a need for secure supply chain mechanisms in lower resourced nations to facilitate access to essential therapies for MSK conditions and to enable access to newer, highly effective therapies that control disease activity and improve function.</p> <p>The current COVID-19 pandemic has exposed limitations for MSK healthcare, particularly in LMICs, including access to care and availability of essential medicines.</p>
5.2	Global and national prioritisation and management is needed in innovation of and access to low-cost assistive devices, technologies and interventions that support function.	<p>Research and private partnerships are needed to develop and disseminate low- cost assistive devices (living aids) and technologies (e.g. apps, artificial intelligence, telehealth, surgical innovation such as joint replacement) to improve function and quality of life for people with MSK health conditions or injuries, particularly for use in low resource settings.</p> <p>Coupled with this, there is a need for country-level health technology assessment and management to ensure safety and appropriateness for the local population.</p>

## 5.6 PILLAR 6: WORKFORCE: BUILDING WORKFORCE CAPACITY, SYSTEMS AND TOOLS

### Scope and summary

Workforce capacity refers to the capacity of health professionals and other non-clinical healthcare workers to identify, triage, refer and appropriately manage people with MSK health conditions, MSK pain and injury.



Key recommendations for building workforce capacity include:

- (i) *increasing workforce volumes and building capacity* in the existing workforce to deliver the right care and establishing models of service delivery that enable more timely access to assessment, triage and basic evidence-based care.
- (ii) *extending training of the current and pre-licensure workforce* across disciplines to build capacity to deliver the right MSK healthcare at the right time, particularly for persistent pain care.
- (iii) *increasing remuneration for the health workforce in LMICs* to maintain workforce volumes.

### Requisite components/actions for this Pillar

#### Workforce volumes and access

Item	Component or action	Definition
6.1	Increase the number of medical specialists and allied health practitioners for MSK healthcare in LMICs.	<p>In many LMICs there is very limited access to specialist physicians, surgeons and some allied health professionals due to low workforce volumes and distributions being largely in cities or urban centres.</p> <p>The limited volume of health professionals and their training positions in LMICs creates care disparity gaps in access to specialist-level care for MSK health conditions. In coming years, the situation is likely to worsen as ageing and retirement of the current medical specialist workforce will further contribute to volume shortages.</p> <p>In addition to responding to current workforce needs, there is a need to engage in future workforce forecasting to inform appropriate capacity-building strategies.</p>
6.2	Build capacity in the local existing community-based workforce to contribute to basic MSK health and injury care.	Build workforce capacity in LMICs to address MSK and injury care by leveraging opportunities and building competencies in the existing local, community-based workforce including: traditional and complementary medicine practitioners, volunteers, community health workers, clinicians and other locally-relevant cadres working in other disease or health areas to deliver MSK information/education and care to patients.

### Workforce volumes and access

Item	Component or action	Definition
6.3	Establish flexible service models to enable the non-medical workforce (e.g. nurses, pharmacists, allied health) to adopt advanced practice/extended scope roles that improve access to evidence-based triage, assessment and management of MSK conditions and injuries.	<p>Establish flexible service models, supported by locally appropriate regulation frameworks, to enable the non-medical workforce (e.g. nurses, pharmacists, allied health practitioners or new workforce cadres such as 'primary musculoskeletal clinicians') to adopt leadership positions. This can be achieved through advanced practice/extended scope roles to improve access to evidence-based triage, assessment and management of MSK conditions and injuries, particularly in primary care settings.</p> <p>This strategy may enable more timely access to care and facilitate medical and surgical staff to devote time to where their services are most needed, while building sustainable workforce networks or communities of practice to support training and development.</p>

### Workforce training

Item	Component or action	Definition
6.4	Integrate MSK health into curricula across medical disciplines and increase the number of MSK medical specialist training positions in LMICs.	There is a need to expand opportunities for training of medical specialists in MSK medicine in LMICs and integrate MSK health conditions management in medical training/curriculum more broadly to build capacity across medical disciplines (e.g. general physicians, primary care/family physicians).
6.5	Build skills-based competencies across medical, nursing and allied health disciplines (and non-clinical roles LMICs) in the identification of MSK health problems and basic prevention and management practices.	<p>Build skills-based competencies across medical, nursing, pharmacy and allied health disciplines (e.g. through professional development programs) and non-clinical roles in LMICs in primary care/community settings in the identification/screening of MSK health problems (including identification of 'red flags') and best practice basic management of MSK health conditions and injuries.</p> <p>Such training may require shifting entrenched beliefs and practices about MSK and pain care. Competencies should include early triage and on-referral to more advanced-level care as indicated, supporting effective self-management and delivery of basic, evidence-based education and services (e.g. the advice for managing acute low back pain or other sprains/strains).</p> <p>Workforce competencies could be enhanced through the establishment of clinical networks or virtual communities of practice to support learning in clinical care, cultural competence and health system literacy.</p>

## Workforce training

Item	Component or action	Definition
6.6	Extend training curricula for pre-licensure medical, nursing, pharmacy and allied health clinicians in MSK health, persistent pain and injury care within a biopsychosocial model.	<p>Extend training curricula for pre-licensure medical, nursing, pharmacy and allied health clinicians in MSK health, persistent pain and injury care within a biopsychosocial model that emphasises person-centred, interdisciplinary care.</p> <p>In particular, there is a need for enhanced curriculum for medical students and other health professional students to support delivery of the right, evidence-based care for MSK health and for all disciplines in best-practice care for persistent pain (e.g. aligned with the <a href="#">International Association for the Study of Pain curriculum recommendations</a>).</p>
6.7	Educate healthcare workers and health planners to deliver information and care aligned to positive health behaviours for MSK health and other NCDs.	<p>There is a need for educating and supporting healthcare, public health and health administration/planning workers to deliver information and care aligned to positive health behaviours in order to reduce modifiable risk factors for MSK health conditions and other NCDs. This includes supporting healthy life choices (e.g., nutrition, activity) and health literacy.</p> <p>A greater emphasis from the health workforce on primary and secondary prevention may serve to better support public health initiatives targeting risk reduction for NCDs. In this context, workforce capacity could be enhanced through the establishment of clinical networks or virtual communities of practice to support competencies in positive health behaviour change.</p>

## Remuneration

Item	Component or action	Definition
6.8	Increase remuneration for the health workforce in LMICs to maintain workforce volumes.	There is a need to increase remuneration for health workers who manage people with MSK conditions in LMICs in order to retain the workforce and attract trainees.

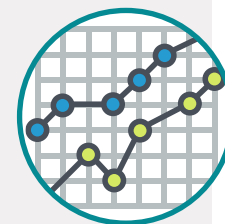
## 5.7 PILLAR 7: SURVEILLANCE: MONITORING POPULATION HEALTH

### Scope and summary

Surveillance refers to the capacity within countries to accurately and prospectively measure population health states, including MSK health, with the ability to report on population health outcomes by age, sex, gender, geography and ICD and ICF classifications over time.

Three key priorities are suggested to improve monitoring, measurement and reporting of MSK health by countries:

- (i) *Ensure national level surveillance capacity to monitor incidence, prevalence and impact of MSK conditions, MSK pain and injuries over time through integration with existing surveillance infrastructure and systems.*
- (ii) *Include measurement of function, participation, quality of life and care availability and accessibility in national surveillance systems.*
- (iii) *National health surveillance capability should ensure data can be reported by narrow age bands, sex, gender, geography, socioeconomic status and ICD and ICF classifications.*



### Requisite components/actions for this Pillar

Item	Component or action	Definition
7.1	Build country-level population health surveillance capacity to monitor incidence, prevalence and impact of MSK conditions.	<p>There is a need to develop national capacity in surveillance of population health states that includes MSK health conditions, pain and injuries. MSK health surveillance should be integrated with existing national health surveillance systems, rather than promoting the establishment of stand-alone monitoring.</p> <p>Integration with existing surveillance systems and metrics is important to ensure a comprehensive understanding of population health and relative burden of disease. In some contexts, integration of data may require data linkage systems.</p> <p>Surveillance capacity requires infrastructure and systems for accurate population health assessments (e.g. population health surveys; occupational injury systems; road traffic injury systems). The G-MUSC Surveillance Taskforce and the Global Burden of Disease MSK Expert Group have developed an <a href="#">MSK survey module</a> for use in population health monitoring. In particular, there is a need to measure national-level outcomes of incidence, prevalence, morbidity and system impact (e.g. cost and health service utilisation) over time.</p> <p>Local surveillance data inclusive of prevalence, cost and morbidity are critical to inform appropriate national-level responses to local burden of disease estimates, support local advocacy efforts and contribute to global burden of disease research.</p>

Item	Component or action	Definition
7.2	National health surveillance metrics need to include measurement of function, participation, quality of life and care experience.	<p>Surveillance metrics needs to extend beyond disease and injury measurement (prevalence, incidence) and cost (service utilisation) to also monitor disease impacts (function, participation, satisfaction and quality of life - for instance, Patient Reported Outcome Measures [PROMS]) and availability, access and satisfaction (i.e. Patient Reported Experience Measures [PREMS]) with care in order to inform policy and resourcing decisions at national and sub-national levels.</p> <p>For adults, this may include participation in work, while for children it may include participation in school. The wide-scale use of digital devices and wearables in many countries may enable rapid and scalable measurement of population health states and health behaviours in the future.</p>
7.3	Surveillance outcomes should be disaggregated by age, sex and gender, geography, socioeconomic status and by the <a href="#">International Classification of Disease (ICD)</a> and <a href="#">International Classification of Functioning, Disability and Health (ICF)</a> systems.	<p>National health surveillance capability should include capacity for disaggregation of data by narrow age bands, sex and gender, geography, socioeconomic status and ICD and ICF systems. Such disaggregation and systems for reporting are needed to determine local priorities by population group(s) and monitor responses across the lifecourse and broad range of MSK conditions in real-time (cross-sectionally) and over time (retrospectively and prospectively).</p> <p>Country-level disaggregated data can also be used as primary source data for Global Burden of Disease Study health estimates, rather than relying on modelling data which are less precise.</p>

## 5.8 PILLAR 8: RESEARCH AND INNOVATION

### Scope and summary

Four key areas are relevant to support research and innovation in MSK health, namely:

- (i) *identifying priority areas for national- and international-level MSK health research*, with reference to specific research fields ranging from basic science to health economics
- (ii) *building capacity to undertake research* (particularly in LMICs) through multi-national collaborations and partnering with patients and clinicians
- (iii) *advocating for a greater proportion of research funding* to be directed towards MSK health research
- (iv) *harnessing new technologies and big data* to explore prevention strategies, dynamic systems modelling and establishing mechanisms across countries to share innovations.



### Requisite components/actions for this Pillar

#### Five priority fields of research

Item	Component or action	Definition
8.1	Priority research area 1 <b>Epidemiologic and population health research:</b> lifecourse risk factors; risk assessment tools; core outcomes for population health research.	Research is needed to identify evidence for: <ul style="list-style-type: none"> <li>• modifiable and non-modifiable risk factors for MSK health conditions across the lifecourse and by sex and gender</li> <li>• the development of tools to simply identify risk of MSK conditions for use in clinical care and by the public</li> <li>• a core set of outcome measures or indices for MSK health that can be used across countries in prospective population health research.</li> </ul>
8.2	Priority research area 2 <b>Public health research:</b> public health interventions to shift health behaviours; impact of MSK health on other conditions; dynamic systems modelling to inform public health policy.	Public health research is needed to: <ul style="list-style-type: none"> <li>• examine health behaviour change strategies targeted to modifiable risk factors and how MSK health impairments or injuries impact on health outcomes for other NCDs is needed</li> <li>• evaluate prevention initiatives for priority conditions, such as MSK pain, through public health interventions and dynamic systems modelling. Such evidence is needed to inform policy decisions for prevention of MSK health conditions.</li> </ul>



## Five priority fields of research

Item	Component or action	Definition
8.3	<p>Priority research area 3</p> <p><b>Health policy and systems research:</b> implementation of MSK service models across contexts; strategies to reduce health inequalities and access inequities; development of MSK health classification systems; effectiveness and acceptability of digital technologies to support MSK care and surveillance.</p>	<p>Priorities for health policy and systems research include:</p> <ul style="list-style-type: none"> <li>• National-level implementation research on acceptable and (cost)-effective service and financing models, including innovative pilot programs, to support delivery of the right MSK care in primary and secondary care settings is needed. Such evidence likely needs to be collated from research using designs other than randomised controlled trials (e.g. mixed-methods research) with a focus on examining implementation feasibility and acceptability to people in different settings and in the context of other health priorities, local healthcare practices and integration with existing service models. For example, intrinsic capacity varies widely among older people, so service models that aim to increase functional ability need to consider such variability.</li> <li>• Research that examines how health systems can be influenced to support reductions in inequalities in health outcomes and inequities in access to MSK healthcare and how positive health behaviour change can be supported at the population level is needed.</li> <li>• Research is needed that supports the development and evaluation (acceptability and utility) of classification systems for MSK health conditions for use by health systems.</li> <li>• Health services research is needed to evaluate the effectiveness and acceptability of digital technologies in improving access to care and scalable surveillance of health behaviours.</li> </ul>
8.4	<p>Priority research area 4</p> <p><b>Clinical and basic science research:</b> mechanisms associated with MSK conditions, including persistent pain; curative therapies for MSK conditions; biomarkers, assays and diagnostic applications; and extend evidence for non-surgical and non-pharmacologic interventions.</p>	<p>Basic science research should continue to pursue:</p> <ul style="list-style-type: none"> <li>• the understanding of mechanisms associated with MSK conditions, including persistent pain</li> <li>• curative therapies for MSK health conditions (supported by registries to monitor safety and effectiveness); and</li> <li>• the exploration of new biomarkers for MSK diseases, assays and early diagnostic applications.</li> </ul> <p>In clinical research, there is a need to maintain and extend evidence for non-surgical and non-pharmacologic interventions for various MSK health conditions. Such evidence is needed to inform clinical care and health service design and funding.</p>

### Five priority fields of research

Item	Component or action	Definition
8.5	<p>Priority research area 5</p> <p><b>Health economics:</b> cost of MSK health conditions and injuries to communities and governments; cost effectiveness of treatments; cost effectiveness of integrating MSK health prevention and management within broader NCD care; and return on MSK health investment for other sectors such as workforce participation.</p>	<p>Key priorities for health economics research include:</p> <ul style="list-style-type: none"> <li>• Broad health economics research is needed to produce robust evidence concerning the scope and size of the cost burden of MSK health impairment to governments and the cost of the counterfactual argument of not taking any action.</li> <li>• Focused health economics research is needed to produce evidence on the cost-effectiveness and system-level efficiencies achievable from integrating MSK healthcare with other health service models (e.g., NCD care).</li> <li>• Focused health economics research is needed to produce evidence on the cost-effectiveness of new therapies for MSK conditions, using metrics such as Quality Adjusted Life Years (QALYs).</li> <li>• Health economics research is needed that shows return on investment for acting on MSK health impairment prevention and management to sectors outside of health, e.g. workforce and schooling participation, unemployment benefits, disability payments, long-term care services for older adults.</li> </ul>

### Capacity building priorities in MSK research

Item	Component or action	Definition
8.6	<p>Capacity priority 1:</p> <p>Support national-level MSK health research; multi-national and interdisciplinary research collaborations; and lower-resourced settings undertaking critical local research.</p>	<p>There is a need to increase capacity in MSK health research globally through supporting national-level MSK health research, supporting multi-national research collaborations and supporting lower-resourced settings to undertake critical local research and participate in international research (e.g. through postdoctoral fellowships).</p> <p>At a national level, countries with sufficient resourcing may consider establishment of dedicated MSK health research institutes to address national priorities/knowledge gaps in MSK healthcare, to support cross-discipline collaboration and to drive research translation and dissemination.</p>

### Capacity building priorities in MSK research

Item	Component or action	Definition
8.7	Capacity priority 2: Support co-design of research by people with lived experience of various MSK health conditions and clinicians.	Greater prioritisation for partnering with patient groups and clinicians is needed from the inception of research initiatives in order to identify research priorities and outcomes that are meaningful to local population groups.  These partnerships are also critical to supporting dissemination and driving strategic directions for national MSK health research. This is particularly important for vulnerable and minority groups where care disparities are often wider.

### Funding for musculoskeletal health research

Item	Component or action	Definition
8.8	Increase the proportion of research funding allocated to MSK research and allocate additional funding leveraged through public-private partnerships.	A greater proportion of research funding (from any source) needs to be directed to MSK research commensurate with the burden of disease, while specific additional research funding for MSK health research may be facilitated through public-private partnerships.  Countries should identify national health priority areas aligned to burden of disease and target research investment within these priority areas.

### Innovation and evidence translation

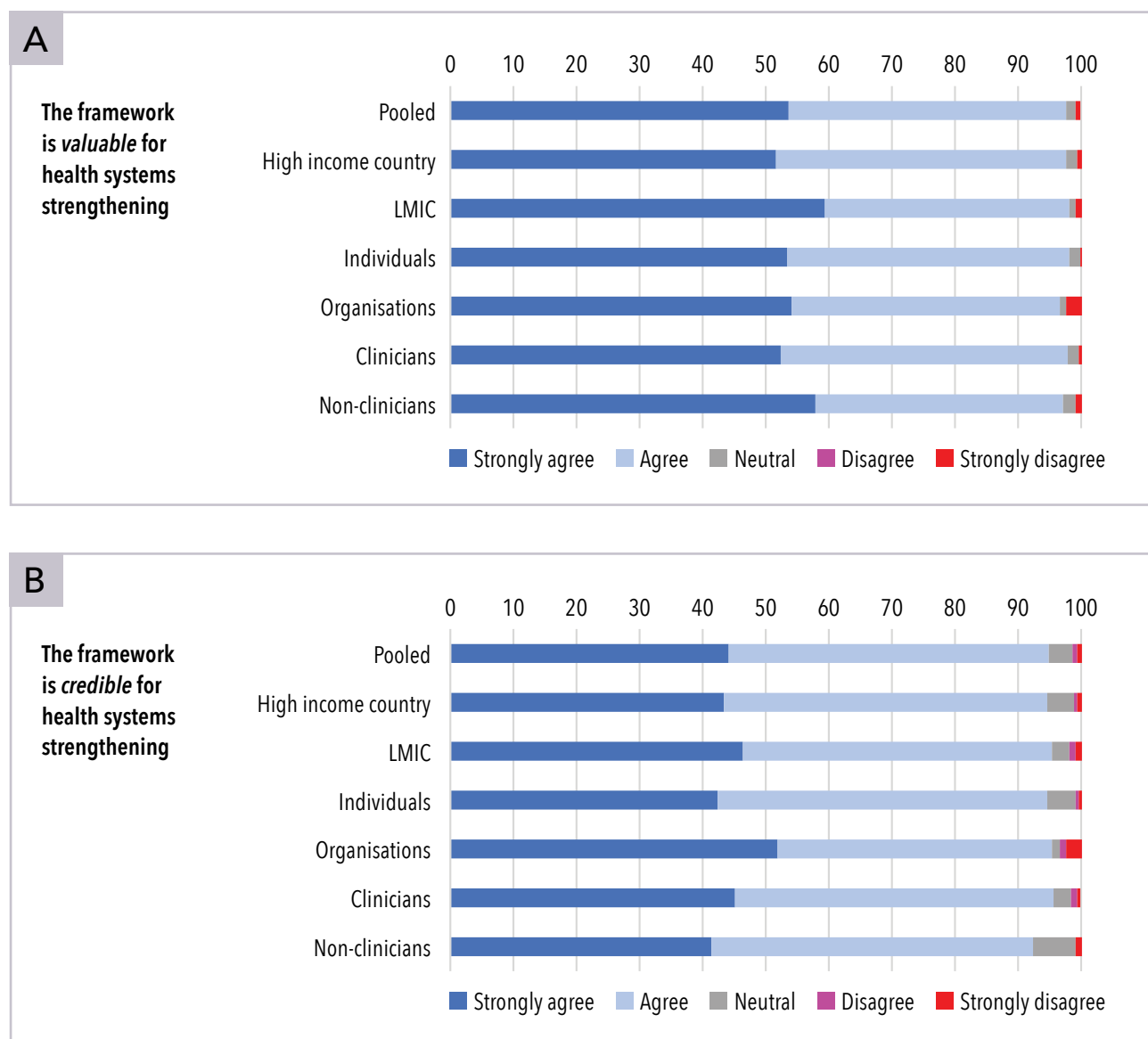
Item	Component or action	Definition
8.9	Support innovation sharing between countries and between researchers and clinicians.	Establish mechanisms and systems that allow countries to facilitate sharing of interventions or system innovations for MSK health. This is particularly important to share innovation between high-income and LMICs to mitigate gaps in access to research innovations.
8.10	Support research that harnesses the emerging potential of digital technologies and the collection and use of 'big data' and machine learning.	Research and innovation that harnesses the emerging potential of digital technologies and the collection and use of 'big data' and machine learning are important for exploring prevention and management opportunities for MSK health conditions and MSK pain (e.g. personalised medicine, identification of personalised risk factors).



# IMPLICATIONS FOR HEALTH SYSTEMS AND KEY RECOMMENDATIONS

Calls for Action on MSK health have been numerous and sustained, preceding, during and following the Bone and Joint Decade 2000-2010<sup>31, 90</sup>. Calls have typically focussed on 'what' needs to be done and placed less emphasis on 'how' to achieve impactful and sustained health and health system improvements. This program of work has been undertaken to address this gap, ensuring the approach is data driven, considers a person's lifecourse and is co-designed with multi-sectoral stakeholders including people with lived experience.

The framework of priority areas (Pillars) and underlying components or actions outlined in Section 5, provide principle-level guidance for health systems strengthening to improve prevention and management of MSK health impairments. The Framework is intended to guide global activity; in particular, to inform the development of a global strategy for MSK health. Such a strategy would ultimately inform and guide reform efforts at national levels. The value and credibility of this empirically-derived framework for health systems strengthening was deemed to be high by the Delphi panel in Phase 3 (Figure 8).



**Figure 8:** Ratings by the global eDelphi panel concerning the potential value (A) and credibility (B) of the framework for health systems strengthening on MSK health. Data are expressed as a percentage (0-100%) in the stacked bar graph. 97.6% and 94.8% agreed or strongly agreed the framework was valuable (panel A) and credible (panel B), respectively, for health systems strengthening.

Importantly, there is close alignment between the 8 Pillars for action and their components with existing models, including the WHO Health Systems Building Blocks model<sup>91</sup> and strong resonance with a contemporary framework of value-creating learning health systems<sup>92</sup>. Together with findings from the policy scoping review, this provides confidence in the construct validity of the logic model.

The 5 guiding principles outlined in the logic model are embedded across the Pillars and action areas and should be considered in any future work to transform the blueprint provided here into a full strategy. Importantly, the guiding principles also align with other global initiatives: the WHO Rehabilitation 2030 Agenda<sup>93</sup>; WHO Framework on integrated, people-centred health services<sup>94</sup>; WHO Global strategy on human resources for health: Workforce 2030<sup>95</sup>; WHO model of healthy ageing<sup>96</sup> and the UN Decade of Healthy Ageing 2020-2030<sup>97</sup>.

The actions recommended across the 8 pillars are intended to be flexible and adaptable to local contexts. While all 59 components/actions are considered important for health system strengthening, this represents the combined views of a global panel. Priorities and needs of individual countries will vary, so the level of priority of each action may also necessarily vary.

Similarly, the 10 actions ranked as 'essential' also reflect the views of a global panel, based on an arbitrary threshold. While these 10 actions may be considered essential at a global level, they should not be interpreted as the only actions that are needed or the only actions essentially needed. Jurisdictional variation will occur. For example, we identified that panel members in LMICs identified more actions as essential compared to those in high-income countries<sup>2</sup>. The definition of 'essential' will also depend on the threshold definition used with potential movement reflecting contextual priorities as they evolve.

The widespread and enthusiastic contribution of the global MSK health and other communities over the course of this project highlight the importance and urgency of global action on improving MSK health and arresting global disability trends. The goodwill and momentum catalysed through this project must now be harnessed, sustained and targeted to achieve positive changes to global health.



*"So I think a multi-sectoral partnership within the country where all the stakeholders would come together, the public, the private sector especially and citizens, if they get engaged I think that would help push country's response and overall activity in the countries."*  
(KI 19, India)

While G-MUSC can support health systems strengthening initiatives, individual champions, civil society organisations and national governments must rise to the challenge to support not only national-level work but also global activities, such as those initiated by the WHO and other global health agencies. The UN Decade of Healthy Ageing 2020-2030 provides a timely opportunity to harness such collective effort.



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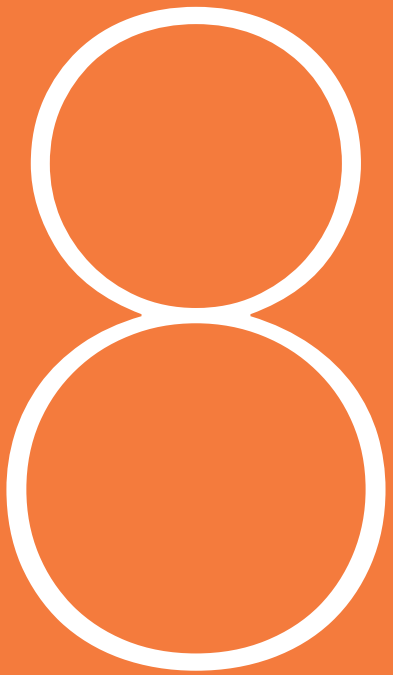
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An external Steering Group, established from the Bone and Joint Decade Foundation and International Co-ordinating Council of G-MUSC oversaw the progress of the project and provided strategic-level advice over the course of the project. The Steering Group comprised: Prof Anthony Woolf (chair; United Kingdom), Prof Kristina Åkesson (Sweden), Neil Betteridge (United Kingdom), Prof Karsten Dreinhöfer (Germany), Dr Manjul Joshipura (India).

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