

## Primary health care policy paper series



**Population  
health management in  
primary health care:**  
a proactive approach to improve  
health and well-being

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**World Health  
Organization**

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European Region

**Population health management  
in primary health care:**  
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## **Abstract**

Population health management can play a critical role in strengthening primary health care (PHC) by providing a data-driven, people-centred and proactive approach to managing the health and well-being of a defined population. By identifying subgroups with similar characteristics and needs, population health management can enable PHC providers to move from a one-size-fits-all approach to targeted and tailored interventions that account for the needs of different groups and individuals. By focusing on the social determinants of health and psychosocial needs, population health management can help PHC providers in adopting a holistic and proportionate universalism approach to address health inequalities at the community level. This publication identifies key success factors at the system, organizational and clinical levels to enable population health management in PHC. It includes 12 country examples from across the WHO European Region showing how population health management is used in PHC. The publication provides a set of 16 policy actions to help PHC providers move towards a population health management approach that are classified following the PHC levers of the WHO Operational Framework for Primary Health Care.

## **Keywords**

Population Health Management  
Primary Health Care  
Delivery of Health care  
Social Determinants of Health  
Health Care Reform

## CONTENTS

Acknowledgements.....	iv
Executive summary .....	v
<b>About this policy paper .....</b>	<b>1</b>
<b>Why is interest growing in population health management? ...</b>	<b>1</b>
<b>Why is population health management particularly relevant for PHC? .....</b>	<b>3</b>
<b>The population health management cycle.....</b>	<b>7</b>
1. Defining and identifying the population .....	8
2. Health assessment and population segmentation .....	9
3. Risk stratification and impactability.....	15
4. Tailored service delivery .....	21
5. Evaluation.....	28
<b>Enabling population health management.....</b>	<b>32</b>
<b>Recommended policy actions.....</b>	<b>38</b>
<b>References.....</b>	<b>41</b>

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The manuscript was written by Dan Alton (General Practitioner and National Clinical Advisor, Population Health Management, NHS, England), Marc Bruijnzeels (Associate Professor and Educational Director for Population Health Management, Leiden University Medical Centre, Netherlands), José Cerezo Cerezo (Health Policy Analyst, WHO European Centre for Primary Health Care) and Esteban de Manuel Keenoy (Former CEO, Kronikgune (currently, Biosistemak), Institute for Health Systems Research, Basque Country, Spain).

José Cerezo Cerezo (Health Policy Analyst, WHO European Centre for Primary Health Care), Toni Dedeu (Senior Advisor, WHO European Centre for Primary Health Care), Melitta Jakab (Head of Office, WHO European Centre for Primary Health Care) and Arnodas Jurgutis (Technical Officer, WHO European Centre for Primary Health Care) provided technical editing.

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This paper was reviewed by Natasha Azzopardi-Muscat (Director, Division of Country Health Policies and Systems, WHO Regional Office for Europe); David Novillo Ortiz (Unit Head, Data and Digital Health, WHO Regional Office for Europe); Stefania Davia (Technical Officer, Data Monitoring, Analysis and Forecasting, WHO Regional Office for Europe); Helen Caton Peters (Technical Officer, Digital Health, WHO Regional Office for Europe); Jill Farrington (Regional Medical Officer, Cardiovascular Diseases and Diabetes, WHO Regional Office for Europe); and Stefanie Claire Gissing (Consultant, Cardiovascular Diseases and Diabetes, WHO Regional Office for Europe).

## EXECUTIVE SUMMARY

Interest is growing in population health management, driven by several well-known pressures on health systems in the WHO European Region, including: the rapid growth of multimorbidity and disability driven by improved survival and ageing; increasing health-care costs in a context of limited resources and budget constraints; rising health inequalities; and rising and changing patient expectations. The COVID-19 pandemic has intensified some of these long-lasting pressures and brought new challenges.

These forces call for greater emphasis on prevention and greater appreciation of the social determinants of health to improve population health and reduce health inequalities. Innovative approaches such as population health management rooted in primary health care (PHC) can substantially contribute to this shift. The relationship between population health management and PHC is that of a virtuous circle. Population health management helps to make PHC more effective, and many elements of a strong PHC model are essential for effective population health management.

Population health management is defined here as a people centred, data-driven and proactive approach to manage the health and well-being of a defined population, considering the differences within that population and their social determinants of health. Population health management entails data-driven assessment of the health status of a specific population followed by prediction of health outcomes and anticipating the resources needed to proactively address these.

The most important elements of population health management can be summarized through a cycle of five subsequent steps. It can be performed in any health system if it is adapted to contextual strategic objectives, available resources and health system maturity. The cycle consists of defining and identifying the population; health assessment and segmentation; risk stratification and impactability; tailored service delivery; and evaluation and improvement.

Population health management can substantially contribute to realizing some of PHC's central attributes, including person-centeredness; accessibility; comprehensiveness; attention to health problems in their physical, mental, social, cultural and existential dimensions; continuity; coordination and community orientation. It can do this by supporting PHC providers in:

- moving from a one-size-fits-all approach to targeted and tailored approaches that account for the needs of different groups within local catchment populations or population clusters with similar needs or health conditions;
- moving from passive and reactive to proactive care, ensuring that people with different risks are identified and have their care anticipated;
- moving from a narrow focus on clinical needs to a holistic approach focusing also on psychosocial needs and the social determinants of health; and



- moving from fragmented and poorly coordinated care to better coordination and integration with secondary and tertiary care and partnership with other sectors and actors in the community.

Although moving towards system-wide implementation of population health management requires several years of development work and takes time to achieve impact, population health management can promote improvements in PHC even before the full benefits of population health management are realized. Key and common success factors to enable population health management in PHC are described here as system (such as information governance arrangements that promote information sharing within and outside the health system, data stewardship capacity and skills and support of regulatory agencies); organizational (multidisciplinary and networked PHC models and integration and close collaboration with public health and social care agencies); and clinical-level factors (such as comprehensive and systematic data collection in PHC and patient and community engagement).

The recommended policy actions to help countries move towards population health management are grouped here following the PHC levers of the WHO Operational Framework for Primary Health Care. This aims to underscore three important considerations: (1) Population health management is most effective within a holistic health system strengthening approach with PHC at its core. (2) Investing in PHC is paramount since it is the best place to engage in population health management approaches. (3) Achieving maximum impact requires synergistic action spanning over several or all PHC levers.

PHC Levers	Recommended policy actions
Governance and policy frameworks	<ol style="list-style-type: none"> <li>1. Establish a clear policy framework and governance arrangements for population health management at all levels, ensuring a shared vision, properly defined roles and responsibilities, a stepwise implementation strategy and accountability mechanisms in place.</li> <li>2. Adjust current legislation and regulations to enable population health management by promoting interdisciplinary governance structures, data sharing, interoperability and integration.</li> </ol>
Funding and allocation of resources	<ol style="list-style-type: none"> <li>3. Use population health management to contribute to the informed decision-making process for efficient and equity-sensitive funding and allocation of resources in PHC.</li> </ol>



PHC Levers	Recommended policy actions
Engagement of the community and other stakeholders	<p><b>4.</b> Establish a network of population health management champions to share experience, draw lessons learned and support implementation. Ensure that champions include frontline clinical and non-clinical PHC workers and professional associations, health managers and planners and implementers.</p> <p><b>5.</b> Encourage PHC providers to map the community resources and stakeholders (local government, nongovernmental organizations, patient organizations, charities, cultural resources etc.) active in their catchment area and establish mechanisms to engage them in the whole population health management cycle and develop strategies for activating patients.</p>
Models of care	<p><b>6.</b> Incentivize PHC organizations to engage in population health management by making them formally responsible for the population outcomes of a stable, clearly identified and registered population, usually as part of a defined catchment area.</p> <p><b>7.</b> Move progressively towards risk-stratified models of care in which multidisciplinary PHC teams provide coordinated care based on a wider range of people's needs and their determinants.</p>
PHC workforce	<p><b>8.</b> Create a learning environment for population health management by updating existing or developing new educational programmes and postgraduate professional training, including continual review and improvement cycles.</p>
Purchasing and payment systems	<p><b>9.</b> Adjust current payment systems to stimulate population health management and promote provider autonomy, early detection and condition management, task profile expansion, interdisciplinary work and intersectoral activities (through, for example, capitation, pay for performance, pay for coordination or shared savings arrangements).</p>

PHC Levers	Recommended policy actions
Digital and data technologies for health	<p><b>10.</b> Enhance population health management by ensuring the sharing of data within the health system (between services or levels of care) and move progressively towards sharing, interoperability and integration with other sectors, such as social care.</p> <p><b>11.</b> Enhance population health management by stimulating data quality, storage, integration and stewardship in PHC and invest in tools that allow PHC professionals to visualize population segmentation and stratification results in a clear and digestible manner.</p> <p><b>12.</b> Invest in the digitalization of PHC as part of an overall system-wide, long-term, health information system strategy that sets a clear vision and objectives on population health management and is context specific.</p>
Systems for improving data-driven quality of care	<p><b>13.</b> Use population segmentation and risk stratification tools in PHC to improve the quality of care, enhance clinical decision-making, tailor service delivery, reach out proactively to patients and seek out population cohorts experiencing health inequalities.</p> <p><b>14.</b> Create professional awareness and competencies among PHC professionals to appreciate the use of data analysis and the potential of predictive models to contribute to improving service delivery and planning and implementing targeted programmes for all risk strata.</p> <p><b>15.</b> Promote the use of sociodemographic data by PHC professionals throughout the population health management cycle.</p>
Monitoring and evaluation	<p><b>16.</b> Regularly plan, monitor and review the performance of the population health management inputs, processes and results to enhance equity, efficiency, effectiveness and impact.</p>

## ABOUT THIS POLICY PAPER

The aim of this policy paper is to showcase the opportunities and benefits that adopting a population health management approach offers to health systems and especially how it is a key part of an approach to strengthening primary health care (PHC). In doing so, this paper will:

- introduce the concept of population health management and explain the methods and rationale for applying it;
- describe how population health management can support PHC;
- explain the key elements of population health management and the PHC-specific applications;
- provide recommendations on how to implement population health management in PHC; and
- provide practical country-specific examples on using population health management in PHC.

The target audience of this policy paper are national and subnational policy-makers and implementers in the WHO European Region who are responsible for leading PHC reform and strengthening efforts. These include decision-makers in health ministries, public health departments and centres, PHC organizations and health purchasing agencies. Even if there is not an immediate intention to move towards system-wide implementation of population health management, many of the steps towards it will also strengthen PHC and other aspects of the effectiveness of the health system.

## WHY IS INTEREST GROWING IN POPULATION HEALTH MANAGEMENT?

There are several well-known pressures on health systems in the WHO European Region, including (1–3):

- rapid growth of multimorbidity and disability driven by improved survival and ageing;
- increasing health-care costs in a context of limited resources and budget constraints;
- rising health inequalities; and
- rising and changing patient expectations.

The COVID-19 pandemic has intensified some of these long-lasting pressures and brought new challenges (4–6). Its impact has been greater in the most disadvantaged groups in society, and the gap in levels of well-being between those with low incomes and those with high incomes has increased by 50% since the pandemic (7). This adds to previous trends on widening health inequalities since 1990s, due to less progress achieved among lower socioeconomic groups, which can result in stagnation in progress across various health indicators (8). The pandemic has also highlighted that, within any given population, some subgroups need additional support since they bear a higher risk of contracting COVID-19 (such as workers that cannot telework and people living in small and crowded households) or developing a more severe disease (such as individuals with pre-existing conditions and older people); or they face greater barriers to accessing health-care services (such as marginalized and underserved populations).

As part of this, there is growing consensus that there should be greater emphasis on prevention and greater appreciation of the social determinants of health to improve population health and reduce health inequalities. This calls for innovative approaches to how health care is provided, and population health management can offer part of this solution (9). By supporting health systems and PHC providers addressing health inequalities and reaching out to those that are often left behind, population health management can strengthen health systems' contribution to building healthier, safer and more cohesive societies and then towards building well-being economies (10).

Countries' interest and investment in digital solutions is increasing as they seek to build more resilient health systems in the recovery phase from the COVID-19 pandemic by introducing new ways of working. Developing digital approaches to managing health at the population level, with the aim of moving health and well-being from reactive care models to active community-based and disease prevention models is a key regional focus area of the regional digital health action plan for the WHO European Region 2023–2030 approved by all Member States (11). This opens a window of opportunity for population health management since greater digital maturity is a major enabling factor for advanced population health management. Big data is becoming widespread across sectors as a driver of insights, innovation and new interventions (12). Enabling the delivery to decision-makers and practitioners of a volume and variety of structured or unstructured data not previously possible entails a new impetus and multiplies the potential for a data-driven approach such as population health management (12). Big data can be paramount in intervention and research activities to accelerate progress in disease prevention in population health. It has been shown to enhance precision in the population health management process, including population segmentation, risk stratification and targeting interventions for individuals and homogeneous subpopulations (12–14).

Although population health management has no single, clear, agreed definition, there is a broad consensus about its key elements (15). Population health management is defined here as a people-centred, data-driven and proactive approach to managing the health and well-being of a defined population, considering the differences within that population and their social determinants of health. Population health management entails data-driven assessment of the health status of a specific population followed by prediction of health outcomes and anticipating the resources needed to proactively address these. This involves several processes forming the population health management cycle (described in detail in Section 4) that enable the population to be classified into subgroups with similar characteristics for which targeted and tailored interventions best serve their health needs. The social determinants of health are at the heart of population health management, since they strongly influence health outcomes and drive health inequalities (16). Thus, education, socioeconomic and employment status, working conditions and housing, environmental and other factors are key areas of focus throughout the population health management cycle. Population health management interventions span over the entire continuum of care: for instance, they may be related to promoting healthy living or disease prevention activities and also to programmes to manage high-risk people with multimorbidity.

By supporting health systems and PHC providers addressing health inequalities and reaching out to those that are often left behind, population health management can strengthen health systems' contribution to building healthier, safer and more cohesive societies.

In this way, population health management can enable and/or enhance the following health system governance processes and clinical care approaches that are especially relevant for PHC, which will be illustrated theoretically and through practical country examples throughout the paper:

- evidence-informed, data-driven health planning;
- identifying care gaps and the most efficient interventions to address them and who would benefit the most within a defined population;
- Identifying the factors driving health inequalities and delivering effective interventions to address them;
- proactive and tailored care across the care continuum to population subgroups or segments with similar health needs and/or risks to improve key health outcomes; and
- coordinating across care levels and identifying levers at local or regional level to improve health, even if these are outside the health-care system.

By doing so, population health management supports health systems to achieve the quintuple aim: enhancing the experience of care; improving the health and well-being of the population; reducing the per capita cost of health care and improving productivity; addressing health and care inequalities; and increasing the well-being and engagement of the workforce (17,18).

## WHY IS POPULATION HEALTH MANAGEMENT PARTICULARLY RELEVANT FOR PHC?

Population health management can substantially contribute to realizing some of PHC's central attributes, including person-centredness; accessibility; comprehensiveness; attention to health problems in their physical, mental, social, cultural and existential dimensions; continuity; coordination and community orientation (Fig. 1) (19,20).

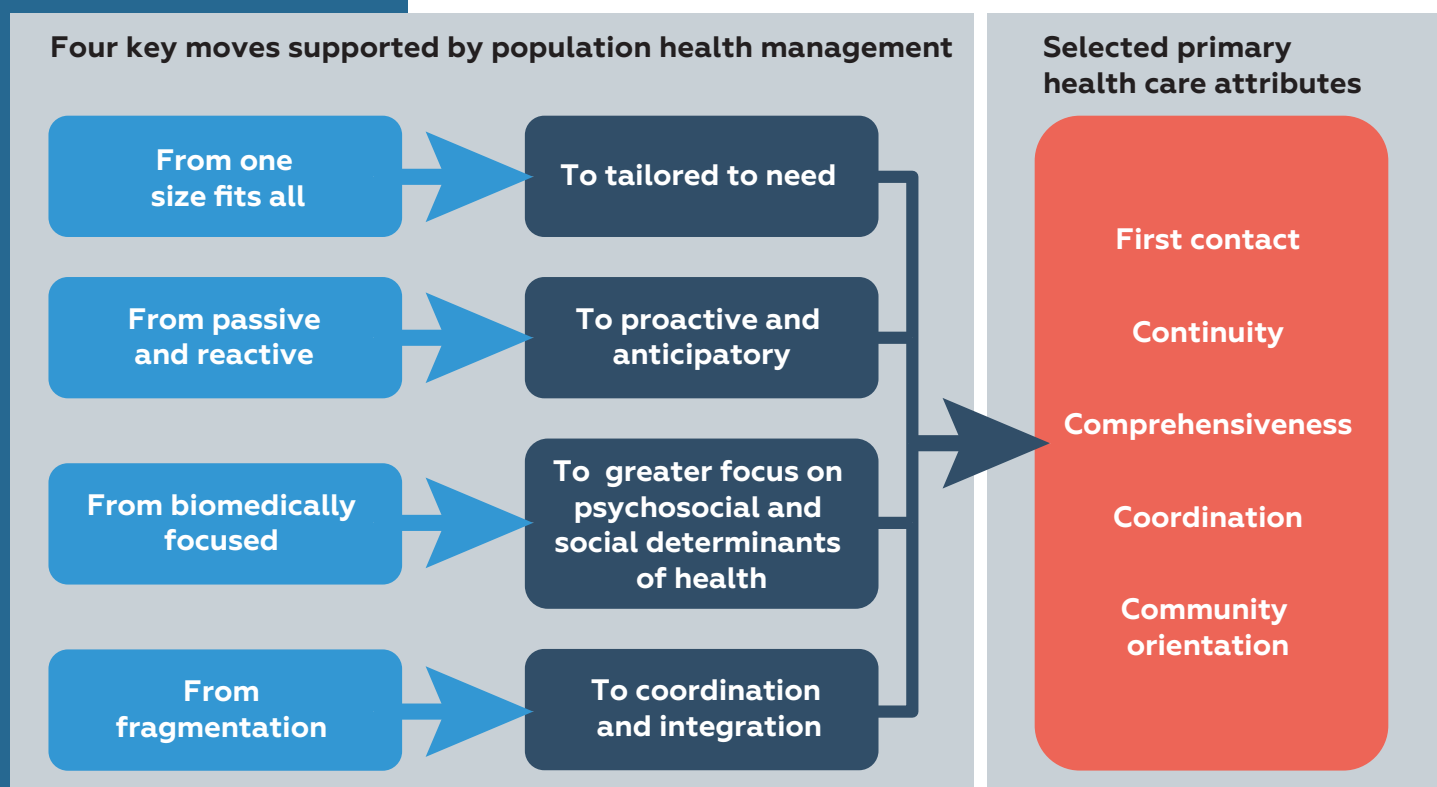
It can do this by supporting PHC providers in:

- moving from a one-size-fits-all approach to targeted and tailored approaches that account for the needs of different groups within local catchment populations or population clusters with similar needs or health conditions;
- moving from passive and reactive to proactive care, ensuring that people with different risks are identified and have their care anticipated;
- moving from a narrow focus on clinical needs to a holistic approach focusing also on psychosocial needs and the social determinants of health; and
- moving from fragmented and poorly coordinated care to better coordination and integration with secondary and tertiary care and partnership with other sectors and actors in the community.

The essential public health functions are at the core of a PHC approach as a recognition of the need to go beyond clinical, curative services to realize PHC's full potential in improving population health (21,22). Integrating essential public health functions and focusing on monitoring and evaluating

population health needs at the community level is a focus area under core priority one, moving towards universal health coverage, in the WHO European Programme of Work, 2020–2025 (23). The steps of the population health management cycle (see next section) provide a pragmatic framework to help PHC providers in operationalizing several of them, including: (1) monitoring and evaluating the population's health status, health service utilization and surveillance of risk factors and threats to health; (2) supporting efficient and effective health systems and multisectoral planning, financing and management for population health; (3) promoting the prevention and early detection of diseases, including noncommunicable and communicable diseases; (4) promoting health and well-being and actions to address the wider determinants of health and inequity; (5) ensuring community engagement, participation and social mobilization for health and well-being; and (6) assuring the quality of and access to health services.

**Fig. 1. Four key moves supported by population health management to help to realize PHC attributes**



Moreover, by providing sophisticated understanding of populations and their determinants that enables them to be classified into subgroups with similar characteristics and needs, population health management can help PHC and public health services to deploy a proportionate universalism approach to address health inequalities at the community level: reducing the steepness of the social gradient in health through universal actions but with a scale and intensity that is proportionate to the level of disadvantage (24).

In summary, the relationship between population health management and PHC can be described as a virtuous circle. Population health management helps make PHC more effective, and many elements of a strong PHC model (such as multidisciplinary teams, larger-scale PHC and integration with public health services) are essential for effective population health

**Country example 1:  
ENGLAND,  
UNITED KINGDOM**



management. Thus, regardless of the situation of PHC in a country or region, population health management can drive the health of the population. Section 5 discusses PHC-specific elements as factors for success for population health management.

PHC professionals often already have deep understanding of the population that they serve, their needs and the wider determinants of their health. A data-driven population health management approach does not replace this understanding but rather complements it, quantifies it, enables even deeper understanding and, at times, can challenge pre-existing assumptions. PHC professionals' understanding of their community (in which they often live) naturally facilitates population health management as an effective approach within PHC. There are resultant benefits when clinicians participate in leading this transformational change, even though most of the day-to-day work required is often not done by the clinicians themselves and, in fact, often reduces their workload.

The country example described below provides a practical example of the moves mentioned above. The next section describes the key elements of population health management; under each of them, PHC-specific applications are presented.

**Improving diabetes care through population health management in Berkshire West, part of Buckinghamshire, Oxfordshire and Berkshire West Integrated Care System**

Berkshire West is a geographical area covering about 500 000 people. For several years, there has been close collaboration across primary, secondary and tertiary health care, local government, patient groups and the voluntary sector, to create a coordinated environment to provide holistic care driven by population health management.

Using linked population health data from PHC, secondary health care and mental health, Berkshire West's team identified variation in the health outcomes among people with type 2 diabetes. With further segmentation and stratification, a cohort of the population was identified that appeared to need dedicated attention because of poorer outcomes: people with type 2 diabetes who often had a background diagnosis of anxiety or depression and who were overweight. These people were identified as having a very high risk of complications from diabetes and, moreover, frequently as poor users of the standard NHS diabetes education offered. The data analysis also revealed that this cohort was especially present in two areas within Berkshire West.

This finding was the first step of an iterative process aimed at harnessing the on-the-ground intelligence to go beyond the numbers and better characterize the cohort. The participatory process included several discussions with the people within this cohort, led by their PHC team (their own trusted clinicians) and with diabetes lead nurses in practices within primary care networks (25). These discussions were often carried out by the patients' own general practitioners, who the patients knew and trusted, simply telephoning the patients in the cohort and asking them whether they would be willing to speak about



their diabetes and lives more generally. This was initially done as part of the NHS England Population Health Management development programme, which allowed dedicated time and support for this new way of working.

The process was vital to conclude that the problems faced were different in each of the two main areas of residence of the identified cohort, reflecting varying populations. Thus, clinical leads for population health management within each local area (called population health clinical ambassadors) developed tailored approaches to deliver nuanced diabetes services based on the main characteristics and determinants of health in their respective populations.

In South Reading, many of the people in the group were from the Nepalese community who faced language, cultural and practical barriers to engage with primary care networks and have their diabetes reviewed. To address this, a new programme targeted to their needs was implemented to provide group education sessions coordinated and delivered within general practice surgeries but backed up by a diabetes lead consultant at the hospital. The programme was developed jointly with the community and with the leadership of a Nepalese-speaking general practitioner.

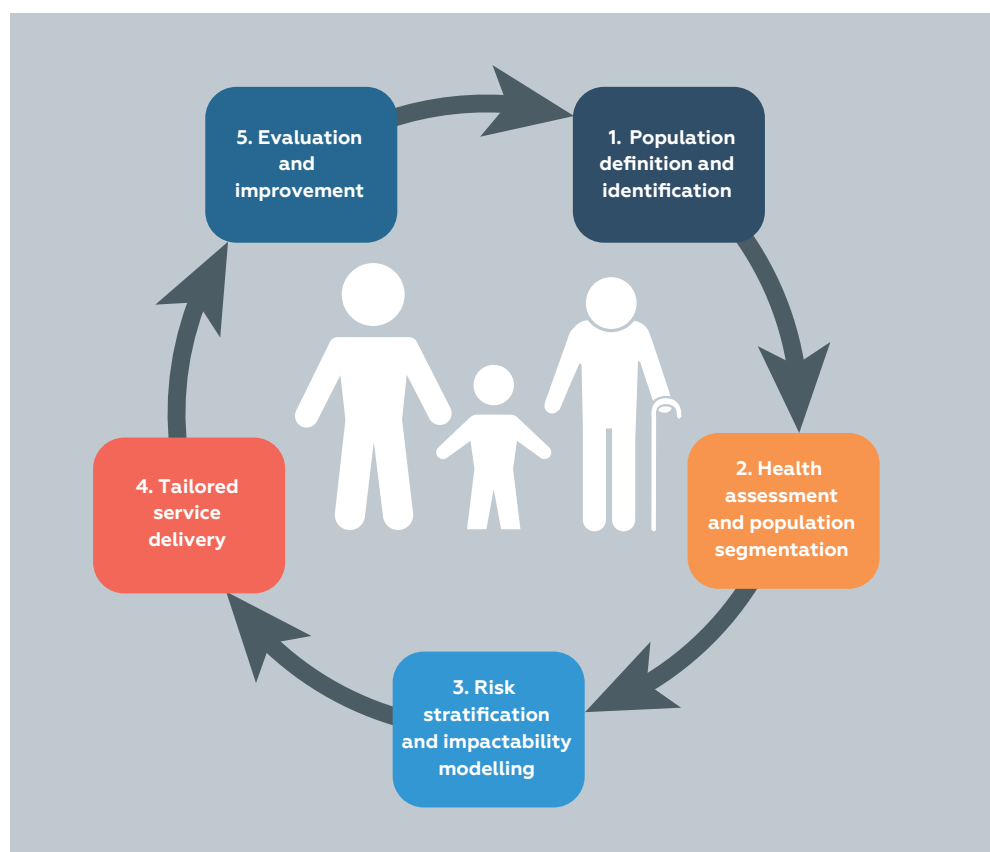
In Wokingham North, an economically affluent area with a high percentage of commuters into London, a different issue was identified. Since diabetes review appointments were scheduled in the week, often during work hours, the cohort's patients sometimes struggled to get to them. In addition, conversations with patients showed that they were interested in understanding more about how their stress and behaviour were affecting their diabetes and not just being told to eat less sugar and given more medication. A diabetes evening clinic was therefore set up to provide group education as well as a general practitioner intervention centred on addressing risk factors, devoting time to discuss with patients (and sometimes also their spouses, who were invited to attend) how stress, exercise and eating habits can all synergistically contribute to diabetes outcomes.

Early findings indicate that, for both groups of patients, their average blood glucose levels are now better controlled (an improvement in average glycated haemoglobin three months after the intervention versus baseline of 8.6 and 8.1 (26) for the South Reading and Wokingham North interventions, respectively). However, a variety of other outcomes are being measured to assess the programme's effectiveness, including measuring longer-term outcomes. Moreover, personnel motivation has increased with the deployment of a population health management approach, since they feel more involved in designing services.

# THE POPULATION HEALTH MANAGEMENT CYCLE

This paper uses a cycle comprising five subsequent steps to review the most important elements of population health management: defining and identifying the population, health assessment and segmentation, risk stratification and impactability (27)<sup>1</sup>, tailored service delivery and evaluation and improvement (Fig. 2).

Fig. 2. The population health management cycle



The population health management cycle can be performed in any health system. The whole process is directed towards achieving defined population health objectives and has to be aligned with the objectives and local resources of the health system. The implementation details depend on the aims, maturity of health and social services, data availability, health information systems, availability, competences and profile of health-care professionals in the national and local settings, as discussed in the following sections. Thus, there is no unique way of going through the five steps of the cycle.

Although the cycle provides a good theoretical framework and helps in structuring the paper, three points must be considered to better understand how population health management works in practice.

- **The boundaries between the steps may not be necessarily clear-cut and overlaps and iteration back and forth can happen.** For instance, in many cases, interventions are directly implemented after population segmentation without engaging in risk stratification.

<sup>1</sup>The degree to which various subpopulations are likely to benefit from a range of interventions.

- **The role of frontline PHC professionals in each step may differ considerably depending on the health system context and the service delivery model.** For instance, risk stratification results can be provided to PHC professionals, but they can lead on the tailored service delivery or be involved in health needs assessment for a specific risk stratum along with public health teams.
- **Decisions on population health management can be taken at various governance levels and by various actors.** For instance, regional, national or local health authorities may decide to adopt a specific risk stratification tool or plan a tailored programme. However, how such tools are used in practice or how services are delivered can vary locally and/or across PHC practices.

These points are highly context-specific and are illustrated throughout the multiple country examples included in this section.

### Defining and identifying the population

The first step in population health management is defining a target population. This sets the basis to not only offer health-care interventions (for instance, from preventive to curative services) to those seeking them but also to reach out to those who do not show up in practice. This way, vulnerable individuals and populations can be identified and offered appropriate care even before they develop an illness or condition or its complications. This also improves understanding of the interface between individual health and its broader determinants and therefore enables more effective interventions to be designed that can address the root causes of diseases, taking advantage of economies of scale.

There are different approaches to defining the target population in population health management depending on the overall scope, aims and the health-care organization. In PHC, the target population for population health management is often identified as the catchment area. It can vary from a comprehensive registration of all inhabitants in one or more general practices to geographical lists of communities through municipalities or people enrolled with the health insurer (28). The target population can also be defined as a discrete subpopulation of individuals with specific characteristics or care needs within one or several PHC practices. The members of a discrete population can be known with some certainty. Examples are all people registered with a specific condition or multiple conditions in a certain age category. For example, everyone with type 2 diabetes or all people older than 60 years with at least one noncommunicable disease registered and with five or more medication prescriptions (29).

For PHC to engage in population health management, PHC organizations must ideally be formally responsible for a stable, clearly identified and registered population they work with and follow over time. Through this, PHC organizations are made accountable for population outcomes along with individual outcomes and for providing care over time not only to those who seek it but also to those who require proactive outreach. This is a basic incentive to proactively identify hard-to-reach individuals and those with poor health care-seeking behaviour and offer them appropriate care even before they develop illness or its complications. A defined registered population enables better continuity of care and also enables capitation as a purchasing model (alone or as part of a mixed model) and moving towards strategic purchasing (30).

# 2

## Health assessment and population segmentation

Next, the health needs and their distribution in the identified population have to be thoroughly analysed. This comprises two complementary processes: needs assessment and population segmentation.

The purpose of population health assessment is to gather the information required to understand the differences within that population, the type of needs and the services required to improve the health of the population with maximum impact (31). Ideally, needs should be assessed and updated for the entire defined population (PHC catchment population or the practice's or PHC centre's lists, neighbourhood, town or city). It involves assessing the health needs, including how they are distributed (geographically, by age group, socioeconomic status, occupation and other), describing the current patterns of use and level of services provided and identifying the extent of the gap between need and supply and the possible causes, including barriers to access. For instance, data can come from medical records, referrals, retrospective claims, disease registries or health surveys or questionnaires. When larger population groups are considered, other sources can be used such as population databases and registries, health care utilization, prescriptions or dedicated surveys (18).

Different approaches for gathering and analysing information about the needs of the population are combined.

- **Epidemiological approaches:** based mainly on quantitative data to estimate the size, composition and characteristics of the population of interest, including information on the geographical distribution, on trends over time and by key population subgroups. Civil registration and vital statistics systems and health information systems are good sources of data (32). The level of need is indicated by the prevalence of disease, disability or adverse life circumstances and the current provision of services to meet these situations. Comparing data between geographical settings, socioeconomic groups or across time can identify various needs, including relative insufficient or excessive health-care provision based on morbidity, service availability, visits to or by health-care professionals, quality of care, medication prescribed or specialist referrals (33).
- **Patient and community engagement approaches** provide first-hand qualitative information to understand which population groups could be better served with more tailored health and care services. Needs are usually related to social determinants of health and how they are experienced by patients, more than purely biomedical aspects. For instance, self-reported biological, mental, functional and social domain inputs have been used in the Netherlands for population segmentation and demonstrated their predictive ability of the segments for health-care utilization (34). Involving local organizations such as nongovernmental organizations or voluntary groups can help to access information that may otherwise not be registered in official registries or databases (country example 2). Patient-reported outcome measures are tools for capturing the patient's perspectives on the outcomes of their own treatment and care (35). Depending on the target, patient-reported outcome measures can be generic, disease-specific or condition-specific. Patient-reported outcome measures can help patients and clinicians to make better decisions, but they can also enable comparisons of providers' performances to stimulate improvements in services (36).

Based on the assessment of needs, the goal of population segmentation is to group individuals in relatively homogeneous groups (segments) (31), depending on the type of care needed and how often they will need it (37). In current daily practice, segmentation is often based on the general characteristics of the population. The best way is to start with the information easily available and then gather more information as it is needed, gradually building up a richer and more complete picture. The simplest segmentation is based on single variables only such as frailty, physical functioning, pattern of health-care utilization, health-related quality of life or need for a specific health-care service. More complex population segmentation can include more information combining different data in a composite index to improve understanding of the health needs, such as the Charlson index, the Cumulative Index Illness Rating Scale or the Duke Severity of Illness Checklist (38,39).

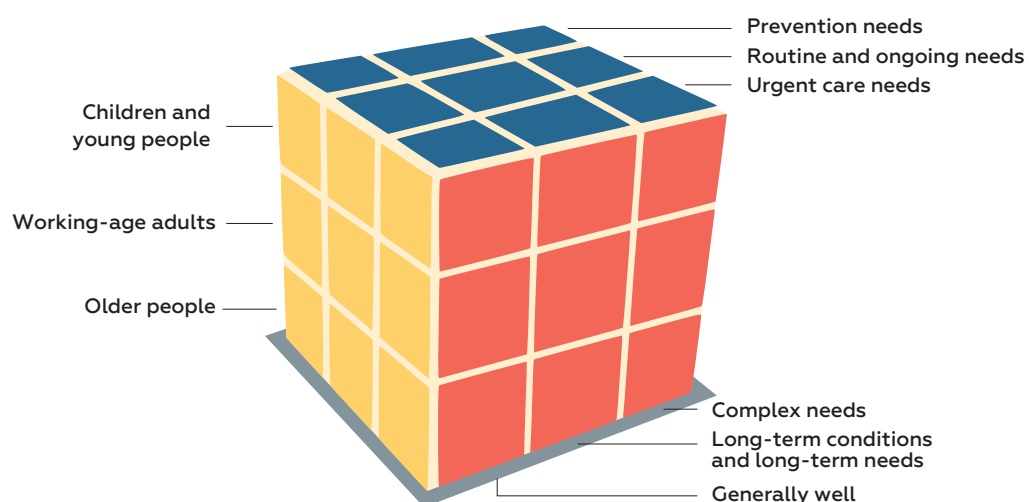
Examples of patient segments have been identified in several studies ranging from simpler to advanced divisions. They include:

- "young, healthy"; "middle age, healthy"; "stable, chronic disease"; "complicated chronic disease"; and "frequent admitters" (40);
- "robust seniors without chronic conditions"; "seniors with one or more chronic conditions"; "seniors with advanced illness and end-organ failure"; and "seniors with advanced frailty or at the end of life" (41); and
- "frequent attenders in primary care"; "patients receiving home care support by the primary care team, emergency services or teams specialized in geriatric and palliative care"; "patients receiving social support visits"; and "patients receiving polypharmacy" (42).

Segmentation can also be based on specific populations with certain diseases or conditions, such as mental health, cancer, respiratory, cardiovascular and gastrointestinal conditions (31). The more concrete and targeted a segmentation process is, the more services can be tailored and the greater the impact.

For instance, in England, the National Association of Primary Care (43) has developed a framework to help segment their population into manageable groups and design personalized services around them (Fig. 3). It tracks three dimensions: stage of life, holistic health and care needs (generally well, long-term conditions and complex health needs) and type of needs (prevention, routine or ongoing and urgent care needs).

**Fig. 3. The National Association of Primary Care cube framework**



### Box 1. Population segmentation in health systems with a dispensarization heritage

Dispensarization refers to one of the world's first preventive medicine systems introduced in the USSR in the 1970s, consisting of massive health check-up programmes followed by follow-up for the whole population. It was introduced through a stepwise approach, starting with children and the economically active population to cover, from the early 1980s, the whole population.

The scope and frequency of the check-ups for healthy people was defined by employment categories, but it was often once per year at a minimum. Once the massive population check-ups had been performed, the population was classified into four main broad groups: (1) healthy people with no known risk factors; (2) people with one or more risk factors for noncommunicable diseases but without chronic conditions; (3) people with one or more chronic conditions (such as hypertension, asthma or diabetes) or, later, moderate to severe acute illness (such as pneumonia) and reproductive, maternal, newborn and child health, including people with multimorbidity but diseases often being reported separately in the corresponding dispensarization book; for instance, a person with hypertension and diabetes would be included in the two books; and (4) people with severe disability. Then, based on the disease and its severity, and often on employment status, a number of visits and tests were planned usually for a one-year period.

This system can be viewed as one of the first segmentation approaches implemented and a good starting-point to move to a more mature PHC approach since it entailed:

- moving the focus of PHC from just individuals seeking care towards the community, with district internists and district paediatricians receiving more responsibilities for following up everyone in the catchment areas and not only those who seek care;
- classifying the population into groups based on their health conditions and offering protocolized care accordingly, which can be considered a predecessor of more advanced population segmentation processes;
- adopting a standardized system for following up patients that contributed to moving from sporadic contacts to planned and regular visits with health-care providers; and
- expanding the focus towards a more comprehensive range of health issues, including reproductive, maternal, newborn and child health and a wide range of noncommunicable diseases, which contributed to questioning the ability of internal medicine specialists (the first points of contact for the population in PHC clinics) to meet the new priorities and, consequently, whether PHC physicians needed to obtain a more comprehensive range of clinical knowledge, triggering thinking about the relevance of family medicine.

Despite country-specific differences based on their service delivery model, level of digitalization, governance arrangements, priority given to noncommunicable diseases and other health system factors, several countries in the WHO European Region still preserve some forms of dispensarization (44–47). Although some of its features provide a good starting-point for communities to get PHC services



## Box 1. (continued)

more proactively, countries are progressively introducing reforms to overcome some of its limitations and make it fit for purpose for a modern health system built around a PHC approach. These are not limited to countries with a Semashko model heritage and include: dominance of a disease-oriented, biomedical approach; lack of more holistic assessment of individual and community needs; lack of attention to social determinants of health; lack of focus on individual and population outcomes and giving priority to inputs (visits and diagnostic tests) and reporting criteria; excessive reliance on narrow specialists to manage people with uncomplicated noncommunicable diseases such as hypertension or type 2 diabetes; vertical relationships between doctors, nurses and patients (and communities), which diminished the patient's role and responsibilities to care for their own health; or low uptake and insufficient evaluation.

Country examples 5 and 10 include examples from countries with a Semashko heritage (Uzbekistan and Kazakhstan) that are moving from biomedical towards more holistic assessment of needs and social determinants through population health management approaches.

### Country example 2: LITHUANIA



#### **Institutionalizing community engagement for health needs assessment and priority setting at the local level**

Lithuania decentralized health system governance by giving municipalities a greater role and responsibility in PHC governance and local public health policies. In a hospital-centred system, equipping municipal administrations with formal mechanisms to shift policy priorities from treatment towards addressing upstream causes of diseases and social determinants of health was very important. To achieve this, the circle of decision-makers was expanded beyond health service managers by engaging with other relevant actors at the local level.

Community health boards were established in the late 1990s in all 60 municipalities in Lithuania as a formal governance structure that brings together municipal politicians (such as the mayor or deputy mayor), representatives of municipal institutions (such as the municipal chief physician and representatives from social care institutions, PHC centres, public health bureaus, hospitals, schools, kindergartens and youth centres) and nongovernmental organizations and community organizations (such as patient organizations) working in health. The aim was to engage all these parties in health needs assessment and priority-setting processes and enable them to provide advice to municipal councils on implementing health promotion and disease prevention activities. Community health boards are advisory boards under municipal councils, which are responsible for approving their regulation and financing their activities.

Community health boards use an inclusive and participatory approach to develop four-year health action programmes that set strategic goals based on the contextual needs of municipalities that shape municipal public health policy. They have a major role in advocating for action to improve health and well-being by connecting the priorities expressed by communities with the priorities obtained by monitoring health data and indicators. Community health board activities



generally include (1) health needs assessment through meetings with communities, public health specialists, health service representatives and municipal institutions from different sectors; (2) defining priorities for multisectoral community health intervention projects; (3) providing advice on implementing preventive programmes such as on noncommunicable diseases or tuberculosis; (4) announcing calls for health projects, assessing those submitted and making proposals to the municipal council for funding selected ones; (5) monitoring the implementation of the community projects and contributing to disseminating their results; and (6) disseminating good practices for improving health at the local level within and across municipalities.

For instance, in the Municipality of Klaipeda, after the Public Health Bureau presented the children's health profile, the community health board organized a round of discussions with stakeholders, and the Municipality funded a project proposed by the community health board on creating and supporting the network of healthy schools. In 2022, 68% of the children in Klaipeda attend a healthy school and 80% of schools belong to the National Healthy School Network. In the Municipality of Kašiadoriai, the community health board, together with representatives from the local hospital, public health bureau and PHC centre, promoted and participated in creating a "green corridor" for breast cancer check-up and ensured transport for women with lower socioeconomic status living in rural areas to health facilities, improving their access to preventive programmes.

Over the years, community health boards have proved their role as advocates for promoting health, preventing disease and improving health and well-being in alignment with the priority health needs expressed by communities. They have contributed to shifting the dominance in health needs assessment and priority-setting processes from hospital specialists to PHC professionals in the first place and progressively to greater involvement and leadership of representatives from other sectors, including social care and education. This enabled the scope of policy priorities to be widened from just treating diseases towards addressing the upstream causes of disease. In the Municipality of Klaipėda, this along with further public health action and PHC strengthening contributed to (1) reducing the number of hospitals beds per 10 000 population from 17.8 in 2007 to 7.2 in 2019 (48); and (2) reducing avoidable mortality by 45% (from 421 per 100 000 population in 2007 to 231 in 2021) (49).

### Country example 3: NETHERLANDS



#### **Person-centred segmentation to improve care for older people**

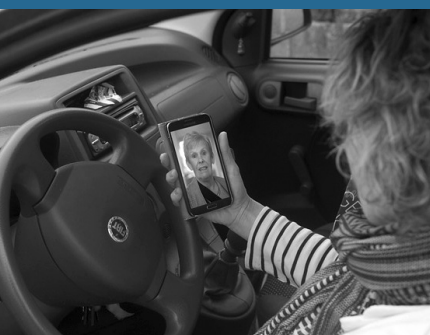
In 25 diverse health-care and welfare organizations and associations of older people in the Netherlands (50), a population segmentation approach based on people's experienced difficulties in fulfilling their needs was adopted to provide efficient, demand-driven care to older people. The programme was initiated through a grant from the national research council, the academic hospital and the department for older people in combination with the PHC department. The programme is being extended to all northern provinces in the Netherlands.

Data were collected on the difficulties in biopsychosocial functioning, and older adults were categorized into five segments: feeling vital;

difficulties with psychosocial coping; physical and mobility complaints; difficulties experienced in multiple domains; and feeling extremely frail. The segmentation was carried out by a team of data analysts at the university and was made available to the health-care professionals on a three-month basis on paper. At a later stage, this was built in within the electronic medical record, so the process was fully digitalized.

The segmentation improved the targeting of the interventions delivered not only by general practitioners or nurses but also by physiotherapists, psychologists and social care services. This segmentation process provides PHC and other health-care providers the option to perform a more comprehensive first triage step than only a disease-based (biomedical) one. It offers a starting-point for providing more person-centred care and to focus more predominantly on unfulfilled needs instead of symptoms and diseases. For example, the segmentation showed that the segment “difficulties with psychosocial coping” was relatively large and included individuals about whom the general practitioner did not know that they experienced psychosocial difficulties. As a result, a specialized nurse in mental health started visiting these older adults at their homes.

#### Country example 4: UNITED STATES OF AMERICA



#### **The Kaiser Permanente segmentation approach**

Kaiser Permanente is one of the largest non-profit health maintenance organizations in the United States, with more than 12.6 million members in eight regions of the country. Kaiser Permanente's integrated care model is based on segmenting and stratifying the population and supplying different types of services according to needs.

The Senior Segmentation Algorithm developed by Kaiser Permanente for older people identifies older adults in four care groups with similar needs, trajectories and utilization patterns (“robust seniors without chronic conditions”, “seniors with one or more chronic conditions”, “seniors with advanced illness and end-organ failure” and “seniors with advanced frailty or at the end of life”). The core components of the Kaiser Permanente model emphasize disease prevention, self-management support, disease management and case management for members with multiple conditions. PHC professionals work alongside other specialist and health-care providers to deliver integrated care (51).

It is being implemented in all Kaiser Permanente regions, with the goal of determining the key elements of care for members in each group. The algorithm requires multiple sources of data, such as clinical data from the electronic health record and encounter diagnosis, the use of home oxygen and home hospital beds, surgeries and procedures, severe organ failure and hospice or palliative care orders (41). The segment assignment is included in the patient's electronic health record and prompts doctors to take certain actions that are tailored to the segment's specific needs. Based on these data, it offers a range of interventions tailored to the needs of different individuals and population groups to support people to remain healthy and to deliver the right treatments when they become ill.

# 3

Risk stratification is essential for PHC practices to be proactive and reach out to individuals based on their risk profile even if they do not present to PHC facilities and to tailor PHC service delivery accordingly.

## Box 2. Basic risk stratification

### Risk stratification and impactability

Risk stratification is an intentional, planned and proactive process that predicts the probability of adverse events occurring and assigns an individual a risk status or score. Based on individual risk assessment, patients are typically classified into high-, medium- (rising-) and low-risk groups. Risk levels should correspond to the likelihood that patients experience negative health outcomes and/or higher rates of unnecessary or preventable health care utilization (52). This allows targeting effective interventions to prevent them and promotes resource utilization based on individual and population needs rather than demand (43,53).

Risk stratification is essential for PHC practices to be proactive and reach out to individuals based on their risk profile even if they do not present to PHC facilities and to tailor PHC service delivery accordingly. As described in the examples below, even if risk stratification (especially as it becomes more sophisticated) is not done at the PHC level, the results can be made available to PHC professionals, often through integrated electronic health record systems, so they can benefit from it in their daily practice.

Risk stratification may be carried out in PHC settings with varying degrees of complexity depending on local resources and with different purposes depending on the context. In many cases, countries' first engagement in risk stratification in PHC is with a single risk for specific diseases, such as cardiovascular disease, diabetes or renal failure (see Box 2). These tools can estimate the risk of morbidity, severity, pain, discomfort, dysfunction or mortality (54). Some of the risk stratification tools use simple paper-based algorithms; others are supported by software applications. Data sources range from data from paper registers in single practices to those from integrated electronic health record systems at the regional or national level.

PHC professionals can use relatively simple tools for estimating the total risk of cardiovascular disease and thus enhance cardiovascular disease management. This is often countries' first engagement in risk stratification.

The European Society of Cardiology has developed, derived, calibrated and validated a new algorithm to predict the 10-year fatal and non-fatal risk of first-onset cardiovascular disease in European populations based on age, sex, smoking status, history of diabetes, systolic blood pressure and total and HDL cholesterol (55). The WHO package of essential noncommunicable disease (PEN) interventions for PHC protocol also offers a cardiovascular disease risk table requiring data such as age, sex, current smoking status, presence or absence of diabetes, systolic blood pressure and total cholesterol (56). Both recommend counselling or treating according to risk level, following the WHO HEARTS technical package, including behavioural risk interventions (focused on diet, physical activity, tobacco cessation and avoiding harmful use of alcohol); drug treatment; and advice for follow-up (frequency of visits) (57). Another example is the Finnish Diabetes Risk Score (58), the most recommended risk-screening tool that has proved to reliably predict future and prevalent undiagnosed diabetes in European and other populations.

## Box 2. (continued)

For multimorbidity risk assessment in PHC, the Charlson index is frequently used. It was initially developed among hospitalized patients but is now adapted to PHC. It estimates mortality prognosis based on age and the fixed weights of 20 specific disorders, including cerebrovascular disease, myocardial infarction, skin ulcers or cellulitis, congestive heart failure, chronic obstructive pulmonary disease or asthma, diabetes, dementia or depression (59).

There are also validated scales that can be used in paper format to stratify social risks such as the Escala de Gijón used for evaluating the social situation of older people in Spain. It assesses five items (family situation, economic situation, housing, relationships and social support), providing an overall score that can be used to complement clinical risk and enhance clinical decision-making and tailored care (60).

As health system maturity increases, countries can move towards more sophisticated risk stratification approaches that use large population databases that combine data from different sources and perform statistical clustering and predictive modelling methods (see Box 3). These sophisticated risk stratification approaches require mature health information systems, ability to link and combine data from different databases and strong analytical capacity or analytical systems, which is a future perspective for many systems.

## Box 3. Comprehensive automated risk stratification tools

Automated stratification approaches can efficiently stratify large patient panels. A recent EU- funded study identified and assessed 48 models for risk stratification using 14 performance metrics (61). The most known advanced analytical tools are the Johns Hopkins Adjusted Clinical Groups system (62–64), used in EU regions in Italy or Spain or in the United Kingdom, the 3M Clinical Risk Groups (65,66) used in many health-care organizations in the United States or the adjusted morbidity groups (42) used in most regions of Spain. All use information from multiple sources comprising demographics, diagnosis, hospitalization, primary care visits, outpatient visits to specialists, emergency department visits, skilled nursing facilities, home hospitalization, palliative care and the mental health services, drug prescriptions, medical transportation, rehabilitation or others.

These tools consider multimorbidity (which shows well-established associations with both high use of health-care resources and poor patient prognosis) and can be progressively fine-tuned, for instance, by including data on social complexity, which enriches their predictive capacity and equity sensitivity since individuals with similar clinical risk can evolve very differently, and have different needs, based on social factors such as family situation, socioeconomic status, housing conditions and quality of social networks (67). In selecting tools, several criteria should be considered, including the availability of the required technical (analytical) skills and the time and resources required to integrate them into existing information technology systems, including the electronic health record (52). Other considerations are licensing constraints; whether computational algorithms are open source; and whether the adjusted morbidity groups rely mostly on statistical criteria or include expert-based coefficients that make transferability more difficult (68).

### Box 3. (continued)

The bias and shortcomings that can be found in some risk scores should also be considered. For example, age bias (favouring older people); giving priority to diseases that generate the most health-care use; or racial bias (for example, Black patients assigned the same level of risk by the algorithm being sicker than White patients) (69,70).

A key feature is that the organization deciding the selection and use of these tools (health ministry at the national or regional level, insurer funds or health boards) should aim to have the confidence of the clinical, analytical, managerial and patient communities. The periodical update of the risk stratification solutions is required by monitoring estimated and actual outcomes in the population, demographic trends, prevailing public health issues or the health-care system (71).

Risk stratification requires not only identifying at-risk individuals or patients but also determining how likely they are to respond (be affected) by various actions or treatment options. This process is known as impactability. Groups or patients identified are to be amenable, impactable or care sensitive to preventive care (27). Impactability has two dimensions. First, at-risk individuals, groups or patients have to be identified and approached. The means to reach them have to be available or deployed to avoid increasing inequalities. They have to be willing and able to participate in dedicated care interventions. Second, clinical and health needs have to be actionable (preventive programmes or care interventions should be able to decrease their risks and/or mitigate their needs (72).

There are several methods for identifying those who are most likely to benefit. These include identifying those:

- with a condition known to benefit from preventive care, such as an ambulatory care-sensitive condition such as hospital admissions for asthma) (73);
- with a gap between the care they are currently receiving and the care that is evidence-informed best practice for their condition(s); for example, inadequate PHC treatment or adherence to care may enhance the long-term complications of diabetes such as renal, eye, nervous system and circulatory disorders;
- with a rising risk score, who are likely to have a higher risk of an adverse event within a specified time scale;
- whose health outcomes are worse or utilization is different than expected for their diagnosed condition, such as visits by people with chronic obstructive pulmonary disease to emergency rooms resulting from inappropriate ambulatory care;
- with high-impactable moments, such as newly diagnosed, recent discharge from hospital, recent cancer scare in which they presented with a symptom that may have been suggested to be cancer but tests were negative;
- who are likely to engage with behaviour change to improve health care, such as those with a high score on patient activation measures; and
- past behaviour – a measure of receptivity to indicate how cohorts might respond to future interventions based on previous behaviour.

In summary, the potential of risk stratification tools increases substantially with (1) the ability to account for multimorbidity and social complexity and

The potential of risk stratification tools increases substantially with the ability to account for multimorbidity and social complexity and to link the stratification results to the individual level.



Country example 5:  
UZBEKISTAN



(2) the ability to link the stratification results to the individual level. The former requires the capacity to link data sets across the health system (PHC, secondary care, mental health services and public health) and outside it (social services and local authorities). The latter requires assigning a risk score to every patient, as opposed to aggregate data at local or catchment area levels and making it available to PHC professionals. Moreover, the identification of high-risk patients most likely to benefit from different interventions and/or participation in care management programmes should be facilitated by a combination of predictive modelling (risk stratification) and selection by PHC physicians (74).

**Strengthening PHC proactivity through cardiovascular disease risk stratification and the universal progressive patronage model**

In 2018, Uzbekistan embarked on a comprehensive health reform aiming at transforming its health system into a modern, high-performing system. Landmark legislation was approved in 2020, providing the basis for transforming the health system in the areas of service delivery, health financing and health information systems. The package mandated a stepwise approach for the countrywide roll-out of the new system, starting with Syrdarya Oblast in 2021.

One key reform pillar is strengthening PHC to improve the quality of and equal access to health-care services by introducing a team-based, community-oriented PHC model with greater attention to health promotion and disease prevention. Newly established PHC teams generally comprise one family doctor; one practice nurse and two patronage nurses with expanded roles; and one midwife, who is shared between two or three teams. Teams work within a defined catchment area and are responsible for an average of 2000 population and have been formally linked with the *makhallas* (community organization) that operate in their catchment area.

Practising nurses have started to perform pre-doctoral check-ups and triage in separate rooms and have obtained more responsibilities in noncommunicable disease management. They especially focus on individual risk stratification for adults older than 40 years through paper-based WHO PEN and HEARTS protocols. Based on the cardiovascular disease risk groups, practising nurses plan follow-up visits together with patronage nurses. Patronage nurses have taken on new responsibilities for noncommunicable diseases and are now responsible for home visits to people with chronic diseases. They contribute to following up these patients more closely and ensure that they attend the follow-up appointment with family doctors or practice nurses. They act as the link between PHC teams and the community through their joint work with *makhallas*. Patronage nurses also deploy now a more systematic approach to assessing and addressing the needs of families with pregnant women and children by applying the universal progressive patronage model, which includes two components: universal, that covers every family with pregnant women, women in the postpartum period and children younger than five years and defines a set frequency of visits; and targeted, or families identified as being at risk, which includes the development of a family eco-map prepared by the PHC team with tailored recommendations to reduce and/or remove the risk.

## Country example 6: SPAIN



The systematic implementation of PEN and HEARTS (56,57) protocols for individual cardiovascular disease stratification along with the universal progressive patronage model is helping PHC teams in Syrdarya to plan their work, schedule follow-up visits and distribute responsibilities among team members and can be the basis for more advanced population risk stratification in the future. Along with the establishment of clear catchment areas, this has contributed to increasing the proactivity of PHC teams, shifting the responsibility of PHC providers from the patients who emphasize their needs to all the population for which they are formally responsible. However, despite these good features, further work is needed to improve the focus on tailoring protocols to the individual needs of patients to effectively improve patient outcomes.

### Considering multimorbidity and social complexity for risk stratification

The adjusted morbidity groups were developed by the Catalan Health Service and implemented, under the leadership of Spain's Ministry of Health, in most regions of Spain to stratify their population (more than 38 million people) (42,75,76). They use information from hospitalization, primary care visits, emergency department visits, skilled nursing facilities, palliative care, mental health services and pharmacy prescription and expenditure to classify the population into several mutually exclusive morbidity groups, which are further divided into five degrees of severity. The adjusted morbidity groups also enable the population to be stratified, assigning a single value or risk score to each individual. Importantly, clinical complexity is not assessed solely based on age or individual diseases but on their interaction.

In the region of Catalonia, with a population exceeding 7.6 million, the adjusted morbidity groups are used to include individuals in programmes for patients with complex chronic conditions or for patients with advanced chronic conditions (77). The adjusted morbidity group stratification results appear in the clinical work station used by primary care professionals, who receive a risk score for each patient (78). They can then draw up a list of their most complex patients by combining the information provided by the adjusted morbidity groups with other clinical variables, which enhances the provision of proactive care and the management of high-risk patients. The adjusted morbidity groups complexity index is also used in other regions of Spain to set priorities for individuals for eligibility for influenza vaccination and COVID-19 vaccination and for alerting them by text messages to make sure they present to the PHC clinic. Besides clinical management, adjusted morbidity groups are also used for equity-sensitive health workforce planning and resource allocation in PHC (76).

The Agency for Health Quality and Assessment of Catalonia developed a socioeconomic index to measure deprivation at the level of PHC catchment areas. The index is the result of combining information on the percentage of blue-collar workers; the percentage of population with basic education; the percentage of the population that is unemployed; the percentage of the population born in low- and middle-income countries; older people living alone; and socioeconomic status. The index is integrated with information provided with the adjusted morbidity groups and is used to adjust resource allocation for



Country example 7:  
ENGLAND,  
UNITED KINGDOM



each PHC team based on the socioeconomic level of its served population. PHC teams can use the additional funding to reinforce the services provided to deprived populations and to provide additional services. This supports the social work dimension in PHC and can inform community health action (79).

**Reaching out to vulnerable people through risk stratification during the COVID-19 pandemic**

In a health-care system in southwestern England (Bristol, North Somerset and South Gloucestershire) comprising about 1 million individuals from 78 general practices, a population health management approach was followed to identify and characterize individuals at high risk of severe COVID-19. The purpose was to manage their health needs and mitigate potential shielding-induced harm (80).

Individual-level information, including current chronic conditions, historical health-care utilization and demographic and socioeconomic data, was used for descriptive analysis of this group using population health management methods. A system-wide data set was created at the integrated care system through the collaboration between all partners within the system with its own digital and data team (including analysts). The data set consisted of two tables – attributes and activity. The first table contained information about patient characteristics, such as demographic information (age and sex), clinical information (long-term conditions), socioeconomic information (deprivation index) and other data such as smoking status and social status. These data were principally derived from general practitioners' patient administration systems. The second table contains information regarding patient contacts such as point of delivery (such as secondary care, inpatient or elective), specialty (such as dermatology), provider, dates, times and cost (81).

Geospatial analysis revealed that 3.3% of rural and semirural residents were in the high-risk group versus 2.91% of urban and inner-city residents ( $P < 0.001$ ); 29 798 individuals (2.94%) were identified as high risk, 32.79% as moderate risk and the remaining 67.01% as low (baseline) risk. Segmentation uncovered six distinct clusters comprising the high-risk population, with key differentiation based on age and the presence of cancer, respiratory and mental health conditions. The distinct characteristics of types of individuals in each cluster enabled a more tailored response from health and care providers and policy-makers. These include regular contact with them and connecting them to a safety net of health and social care resources coordinated by PHC networks. In a later stage, it supported vaccination uptake among the at-risk groups, with a focus on equity.

# 4

## Tailored service delivery

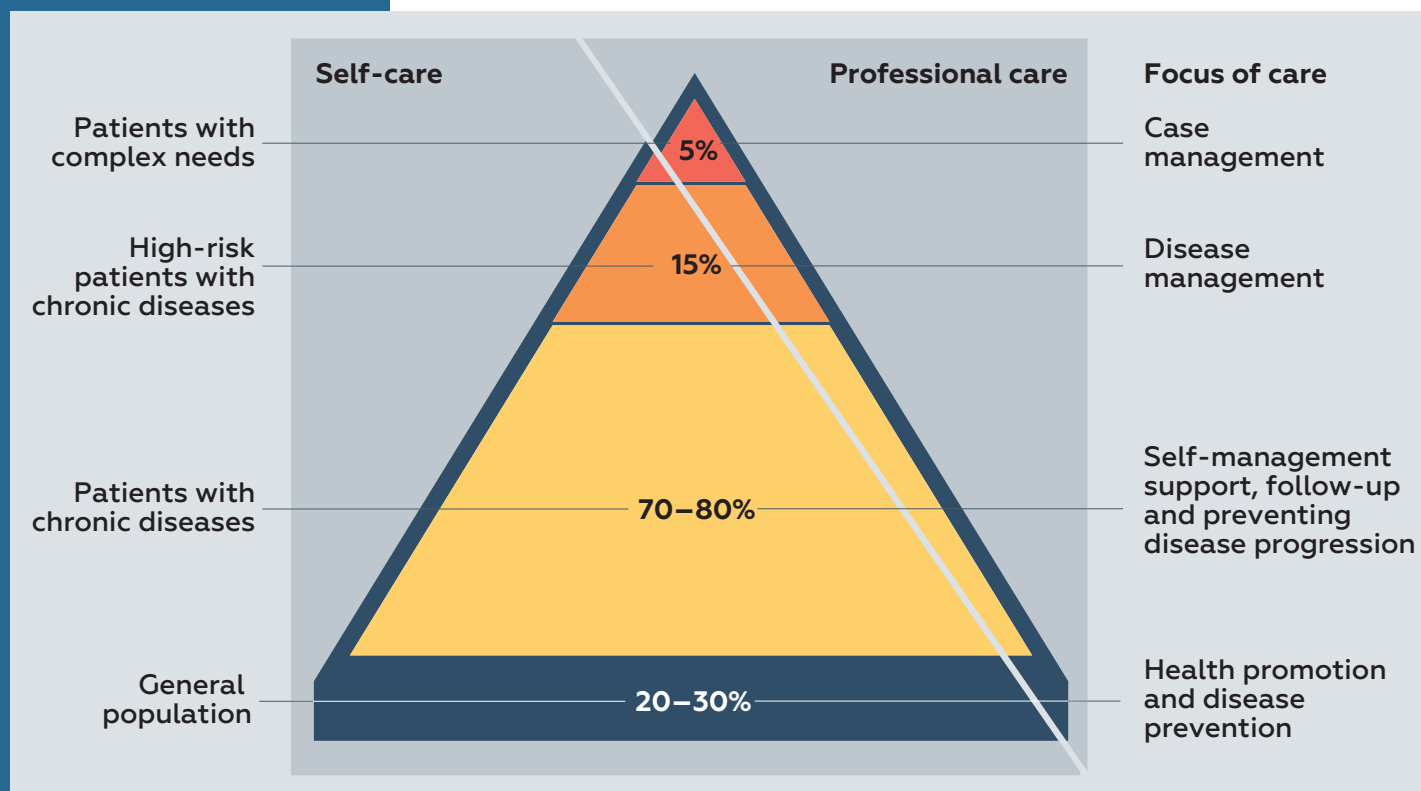
The next step is defining the interventions or care programmes to fill the care gaps proactively, tailoring them to each of the different groups or risk strata (Fig. 3) and to individuals. By enabling a risk-informed and equity-sensitive service design, population health management helps to ensure that available resources are used to maximize benefit, delivering better value.

Population health management interventions span the entire continuum of care, from promoting healthy living or disease prevention activities to programmes to manage high-risk patients with multimorbidity. Different levels of need or risk require different approaches to care (self-management through education programmes and other resources, disease management or case management) with a different balance between self-care and professional care required (Fig. 4). The dotted red line in Fig. 4 shows the different balance between self-care and professional care in the different strata of the pyramid. Prevention services can include clinical preventive services, such as immunizations, screening, health education, mother and child care, counselling and education; or community preventive services, such as fluoridation or lead testing.

In considering the segments or risk groups, the aim is to deploy structured integrated care programmes, organizing services to target the group's needs. Addressing each individual's clinical and care needs requires combining the segmentation or risk stratification provided by the tools used with the functional status (mobility, strength and cognitive status) and the clinical information (42). In dealing with the risk of an individual patient, the aim is to define a personalized intervention or care plan to support his or her specific needs and priorities. It has to be ensured that there are no conflicting goals and treatment plans for individual patients. For example, in the group of advanced frailty or at the end of life, aggressive efforts to reach target goals for specific chronic diseases are potentially counterproductive (41).

By enabling a risk-informed and equity-sensitive service design, population health management helps to ensure that available resources are used to maximize benefit, delivering better value.

**Fig. 4. Type of services and balance between self-care and professional care according to risk strata, adapted from Kaiser Pyramid (51)**



A search for determinants and underlying mechanisms of the unfulfilled need or care gap is needed across the population health management cycle.

Interventions resulting from population health management approaches are not necessarily an add-on to existing services but can be an alternative solution to improve the existing approach and deliver services more efficiently. This often involves redesigning existing care pathways and workflows to ensure better integration between teams or levels of care; changing the roles and/or composition of PHC teams (such as reinforcing the preventive skills of nurses or adding social workers, psychologists or pharmacists); or looking for actors active in the community to partner with (such as nongovernmental organizations providing mental health services or sexual and reproductive health education). For example, empowering people with chronic obstructive pulmonary disease at home within their own social context to better maintain their health can be a joint exercise between PHC, public health specialists, secondary clinicians, the voluntary sector (in the form of smoking-secession charities for example) and patient communities themselves (in the form of local peer support groups). Each of these services may already exist, but the population health management approach enables an identified cohort of patients who would most benefit from an integrated approach to be identified and jointly supported by these networks, working in a collaborative manner. It supplies a clear patient group for which these disparate teams collaborate and thereby leads to turning the somewhat nebulous concepts of collaboration and integrated working into reality.

Population health management interventions should clearly focus on addressing the social determinants of health. Effective population health improvement requires attention to social and environmental determinants of health as well as health care (8). This is especially true since health-care systems determine only 10% of health outcomes, whereas health behaviour and social and physical settings determine at least 50% (7). Changing health behaviour and social and physical settings requires activities beyond the clinical setting that incorporate community and public health systems (82). A search for determinants and underlying mechanisms of the unfulfilled need or care gap is needed across the population health management cycle. PHC providers, who are deeply rooted in the communities they work, are in a unique position to ensure this.

Addressing the social determinants of health requires strengthening the community orientation of PHC providers and, as part of this, engaging with community-based partners operating in their catchment areas (83).

Population health management can support community health by providing actionable quantitative information on the social determinants of health. In addition, community health processes can strengthen risk stratification and segmentation processes through first-hand qualitative information from individuals and communities. This is true for the three levels of community health:

- **individual and family level:** a biopsychosocial approach and recommendation of assets for health and community resources;
- **group level:** education for health focusing on social determinants; and
- **intersectoral collective level:** community action on health (84).

PHC is in a privileged position to partner with community-based assets that may be better equipped to address behavioural, commercial, social and environmental determinants of health (83). This requires PHC providers to have a good overview of the community organizations functioning in their

**Box 4. Social prescribing:  
enhancing coordination  
between PHC and  
community resources for  
improving health and  
well-being**

catchment area so they can contribute to addressing gaps in coverage and supporting the well-being of communities, families and individuals.

Over time, a population health management approach can bring about cultural change, and teams in different places within and outside the health system can start working together. The aim is to reach out to populations most in need, coordinate services to avoid duplication and maximize niche skills, ensuring smooth transitions across programmes and information sharing (85). This can be facilitated by factors such as professionals from different teams getting to know and trust each other. The result can be integrated organizational development, based on a method that starts with data and analytics and evolves into an approach based on collaboration and trust.

Social prescribing, also known as health asset recommendation, is a means of connecting patients to a range of non-clinical services in the community to improve their health and well-being (86). It builds on the evidence that addressing social determinants of health such as socioeconomic status, social inclusion, housing and education is key to improving health outcomes (86). Activities offered may include sports, cookery, weight management, befriending, volunteering, gardening, arts activities and welfare advice programmes related to employment, housing or financial advice, depending on patients' needs and local availability (87). The three main actors usually involved in providing social prescribing services play differentiated (although complementary and often overlapping) roles.

**PHC teams**

PHC professionals often initiate the referral when they identify well-being needs that can potentially be addressed or supported by wider community-based services. Exploring and obtaining understanding of patients' wider concerns (beyond the specific reason for consultation) are critical to initiating referral. Mapping local community health assets is central to social prescribing initiatives. For example, the initiative promoted by the community health strategy in Aragón, Spain (88) included the inventory (or map) of community assets (whose willingness to participate in the programme was previously validated by public health services) in the electronic health record. This contributes to facilitating the referral process during routine consultations and enables social prescribing activities to be registered and analysed.

**Community-based organizations**

Community-based activities are typically provided by voluntary and community sector organizations but may also be delivered by local authorities (such as libraries and sports centres) or the health system (such as health coaches, patient support groups organized within PHC practices). Although community-based organizations are involved in practically all social prescribing arrangements, their role varies across programmes. They are often considered mere service providers or the destination of referral pathways instead of active partners and co-producers. As a result, their experiences and challenges are rarely studied and remain poorly understood.

### Community connectors (or social prescribers)

The connection between PHC and community resources is essential to many social prescribing models and is often (though not always) facilitated through dedicated staff members. Some countries have created specific social prescribing roles with different names, such as link workers in the United Kingdom (89) or well-being coaches in the Netherlands (90). Others have repurposed existing health-care personnel, such as social workers in Portugal (91) or nurses and allied health workers in Germany (92), or encouraged joint PHC team involvement, such as by relying on and upskilling existing multiprofessional teams in Spain (93). Social prescribers are fundamentally knowledgeable about the local community health assets and PHC teams involved so that they can make relevant connections and contribute to strengthening community partnership.

Social prescribing programmes have been typically implemented in areas of great socioeconomic need as a way of tackling health inequalities by providing additional support to people facing an increased social and disease burden. Social prescribing programmes have also increasingly targeted specific patient groups based on their medical diagnoses and/or health-care utilization. The Ways to Wellness programme in the United Kingdom, for instance, focused on people diagnosed with long-term conditions living in areas with high socioeconomic deprivation (94). The Culture Vitamins initiative in Denmark offered art activities for people with mental health conditions (95). The Social Prescribing in Sweden programme delivered personalized social activities for older adults reporting loneliness and social isolation in PHC (96). The activities offered, referral mechanisms and target groups might vary, but social prescribing schemes should remain relevant, appropriate and accessible to the people with the greatest health and social needs.

### Country example 8: GERMANY



### Targeted services for various high-risk patients

Located in southwestern Germany, *Gesundes Kinzigtal* is one of the few population-based integrated care approaches in Germany. It covers all age groups and care settings for a total population exceeding 30 000 people. The system serving about half of the population of the region is run by a regional health management company (*Gesundes Kinzigtal GmbH*) in cooperation with the physicians' network in the region (*MQNK*), a German health-care management company (*OptiMedis AG*) and two statutory health insurers (97–99). *Gesundes Kinzigtal GmbH* and the two health insurers established a shared savings contract providing financial incentives for managers and health-care providers to realize substantial efficiency gains based on a population health management approach.

The *Gesundes Kinzigtal* model groups their population into healthy insured, low-risk, rising-risk and high-risk groups and develops separate strategies for each group. To do so, the regional health management company gathers insurer, hospital and provider data to run analysis and build connections between providers to track patients across the system. Their data warehouse includes insurer data on



claims, diagnoses, services, prescriptions and hospital admissions as well as data from service partners. All partnering doctors can access information stored by all other partnering providers through the regional organization. A system-wide electronic health record ensures that information about patients is available across providers and care settings.

Health-care professionals target interventions for each risk group by establishing collaborations with a wide range of community actors, including gym and sport clubs, schools, self-health groups and local governments. Health-care professionals have been also trained in shared decision-making to ensure that patients are actively involved in their own care. For the healthy insured before getting into risk (about 35% of the total), interventions include health literacy training, health festivals and health promotion in schools and companies and prevention efforts aligned with various chronic care programmes initiated in PHC. For the insured at risk (about 40%), they provide healthy weight programmes, a blood pressure initiative, joint development of health goals and cooperation with sports clubs. For the group with rising risks (about 20%), they provide multispecialty support through disease management, earlier psychotherapy visits, self-help and self-management training for people with chronic diseases. Finally, for the high-risk patients (about 5%), they focus on polypharmacy issues, intensive health coaching and programmes with doctors and nurses.

The model has led to significant gains in population health, improvements in the experience of care and reduced per capita costs (99). It has shown a decrease in the overuse of health services for the prescription of anxiolytics, antibiotics for upper-respiratory tract infections, nonsteroidal anti-inflammatory drugs, non-recommended prescriptions for vascular dementia and for Alzheimer's disease and an increase in the prescription of antiplatelet drugs and statins (where appropriate) for patients with chronic coronary heart disease, prescriptions of statins for patients with acute myocardial infarction and cardiology referrals for patients diagnosed with heart insufficiency. A propensity score matched control group suggests an increase in life expectancy by 1.4 years and 10 years since the inception of the model (99).

#### Country example 9: SLOVENIA



#### **Addressing noncommunicable disease risk factors through nurse-lead, equity-sensitive proactivity**

Slovenia has a longstanding tradition of providing accessible and comprehensive PHC services. Established in 1927, Slovenian PHC strongly emphasizes addressing health equity and reaching out to vulnerable populations in local communities to identify environmental, social and behaviour-related risk factors and diagnose disease in its early stage of development (100).

Registered nurses in family medicine teams conduct regular screening and follow-up for people with noncommunicable diseases to reduce family doctors' growing burden and workload. Each family medicine practice has a list of registered patients (a capitation list), managed in defined groups of healthy individuals; those with risk factors; and those with the most common chronic diseases. Financial incentives are

given for meeting target values in screening check-ups. The National Public Health Institute manages and leads the noncommunicable disease prevention and control programme at the national level.

Screening focuses on shared metabolic and behavioural risk factors (hypertension, high blood sugar, high blood lipids, overweight and obesity, unhealthy diet, lack of physical activity, tobacco use, risky alcohol use and sleep disorders) and people 30 years and older are invited every five years for screening (101). Patients are referred to family physicians for further diagnostic and treatment procedures if results indicate disease, and to health promotion centres if risk factors are present.

Health promotion centres offer evidence-informed intervention programmes to support individuals in addressing their behavioural risk factors with the expertise of various professionals, including nurses, physiotherapists, psychologists, dietitians and kinesiologists, with a proven impact on health outcomes (Fig. 5) (100). Health promotion centres enable individuals to choose from short educational activities, focused workshops on specific risk factors or comprehensive healthy lifestyle support programmes (102).

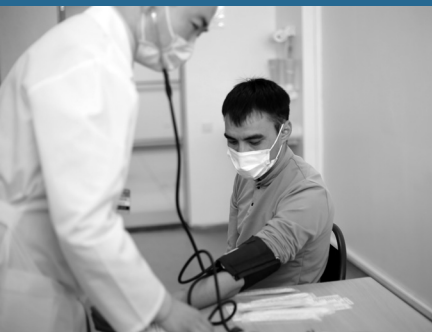
Community nurses provide home visits for patients who cannot visit PHC centres, focusing on disadvantaged and vulnerable populations. If patients do not attend PHC centres, the community nurse is informed and assesses the reasons, including lack of invitation, motivation or ability or refusal to cooperate. During home visits, patients are screened for family function, loneliness and risk of falls, ensuring equal management of all registered patients (104).

**Fig. 5. Integrated health promotion centres (103)**





## Country example 10: KAZAKHSTAN



In the past 20 years, more than half of all adults underwent screening for risk factors, with nearly 50 000 people attending health promotion centre intervention classes annually. The premature mortality rate in Slovenia has declined by 14% from 2011 to 2020, from 230 to 197 per 100 000 population (105).

### **Universal progressive home-visiting model in PHC focusing on family and social determinants of health**

The existing model of PHC visiting services for women and young children in Kazakhstan was too narrowly focused on the clinical needs of women and not sufficiently oriented towards the entire family and their psychosocial determinants of health. As a result, it was decided to implement a universal progressive home-visiting model aimed at reducing morbidity and mortality risk factors from the first days of life and for all age groups by providing two types of services: universal (general) and progressive (targeted). The principles are family orientation, attention to the social determinants of health, lifelong health monitoring with a focus on disease prevention, intersectoral cooperation and integrating PHC, social care and public health services. The model was initially piloted in one region with extensive technical and implementation support by the UNICEF Country Office in Kazakhstan and implemented nationwide in 2018 under the State Programme for Healthcare Development, becoming a central element of PHC.

All families with young children and pregnant women are covered by universal home visits provided by PHC nurses to assess the health, development and well-being of children. Home-visiting nurses identify health, social, educational and other needs and assess and monitor the child's physical, cognitive, psycho-emotional and social development as well as their safety and well-being. Pregnant women are allocated two visits, and families with children younger than three years are allotted nine visits. Compared with traditional home visits, the number of compulsory visits was reduced by almost threefold, but quality requirements and more holistic assessment of the health needs of the entire family were improved. The family's ability to ensure the child's healthy development and safety is assessed through multiple elements, including good nutrition, emotional warmth towards the child, the mental well-being of parents, the family's socioeconomic status and the presence of behavioural risk factors among family members. The local community context is also assessed, including the availability of social, psychological, health care and other types of support to ensure the healthy development of the child and the absence of stigma and discrimination against the family.

If health and social risks are identified, the family is provided with an additional progressive package of (targeted) services in accordance with the individual family support plan. There are several criteria for providing an extended progressive home-visiting package for pregnant or breastfeeding women (such as imbalanced diet, depression and smoking) for children (such as difficulties with breastfeeding, delayed speech and stunted growth) and for parents (such as lack of involvement in raising the children and refusal to vaccinate the children). In such cases, the home-visiting nurse makes additional visits that involve counselling and teaching the family the

# 5

necessary skills. If the home-visiting nurse cannot solve the problem, other members of the PHC multidisciplinary team are involved in developing and implementing a joint plan to solve a wide range of problems. Multidisciplinary teams are able to address psychosocial problems more holistically since they also have psychologists and social workers in addition to family doctors and home-visiting nurses.

If children are in extremely vulnerable situations (abuse or other threats to the child's life, health and safety) and problems cannot be solved by the health system alone, additional support is provided to the family through intersectoral cooperation. The PHC centre where the family is registered plays a coordinating role, initiating the review of the case by an interdepartmental commission for providing special social services. Such commissions operate in every region, and the number of cases removed from high-risk status is increasing, according to national monitoring (106).

The universal home-visiting package covers 85% of pregnant women and 76% of young children in the country (106). Besides specific training, nurses are also supported by standards and algorithms for monitoring early development and case management, a comprehensive tool for assessing children's needs and questionnaires on depression and identifying social risks. The model is subject to constant evaluation and improvement. Although there is no solid evidence yet of a reduction in mortality, regional evaluations have revealed increased awareness of health literacy among parents, improved satisfaction with PHC services and higher breastfeeding levels (107). For example, in Kyzylorda Region, the number of children receiving infant formula had halved by the end of the pilot project, saving 83 million tenge in 2017 (108).

## Evaluation

The final step is to monitor and evaluate the intervention implemented, which is a core part of the population health management process (18). Management monitoring is an ongoing process, whereas evaluation generally is a one-off or periodic activity with time limits that helps in understanding the impact of the intervention. Both ensure that the whole process remains fit for purpose since they enable the system to learn and evolve. They help to reduce variation in the quality and safety of care, improve efficiency and reinforce the accountability of all stakeholders involved (109).

Not all population health management interventions have proven to be effective (110–113), and both the process and outcomes should be evaluated to determine what is working well and what has to be improved in all steps of the population health management cycle. More evaluation research on health outcomes is needed to add to the existing evidence base on population health management (114). A successful evaluation strategy requires a clear goal and realistic outcomes in terms of what can be improved or changed but also acceptance from key stakeholders and commitment to learn from evaluation, effective and appropriate data collection tools and resources and budget available (43).

Segmentation and risk stratification should be evaluated locally by analysing the distributions of various subpopulations by age, sex, race and disease and checking that the results of each model do not cause inadvertent bias.

The emphasis can range from validating the segmentation and predictive tools (40,42,115) to evaluating the design, implementation, performance and outcomes of the services deployed to address the needs. Segmentation and risk stratification should be evaluated locally by analysing the distributions of various subpopulations by age, sex, race and disease and checking that the results of each model do not cause inadvertent bias (69). Depending on the main objective, the evaluation can happen at different levels and be carried out by different actors (such as the health ministry, PHC network or provider or the municipal level).

A good evaluation approach requires that PHC leaders, health professionals and other team members at various levels have a set of tools and techniques to regularly plan, continually monitor, periodically measure and review the performance of their work in terms of indicators and targets for efficiency, effectiveness and impact. The complexity of the evaluation design has to align with the goals, data and resources available. In population health management, developing dashboards with indicators at the patient level, group level and programme level is useful tools to steer the direction of the specific interventions and overall efforts. In any case, true collaboration between analysts, clinicians and managers is required to define the evaluation framework, analyse the data, draw insights, reach conclusions and refine the whole process, helping to modify or co-design services and interventions.

Ethical and equity issues should also be considered, ensuring that bias is not introduced in the design for identifying patients eligible for specific interventions (116). The potential stigmatizing effect of labelling an individual or a group of people should also be considered. Evaluation studies should also address this possible effect. The circular or reflective nature of the monitoring and evaluation promotes a learning system informed by data.

#### Country example 11: BASQUE COUNTRY, SPAIN



#### Evaluation of risk stratification

The Basque National Health Service (Osakidetza) covers all residents, with a target population of 3 million. The system was hindered by fragmentation, insufficient coordination between health-care levels and inability to provide the continuity of care required for good management of complex patients living with multiple chronic conditions. Within this context, the Basque Department of Health decided to adopt a risk stratification approach to identify and select target groups (with a focus on complex patients) that may benefit from specific health programmes. Consequently, the adjusted clinical group predictive model was adopted and adjusted to the context of the Basque Country.

The data come from Osakidetza and the Basque Department of Health, based on previous use of health resources and demographic and clinical variables from primary care electronic medical records and hospital and specialist outpatient care electronic databases. A socioeconomic score is also included based on a social deprivation index specific to place of residence. The Predictive Index, the next year's predicted cost for each patient compared with the average predicted cost per patient in the Basque Country, is used as a proxy for health needs (117). The risk score is displayed in the electronic health record and enables PHC professionals to identify patients and proactively provide targeted care.

Country example 12:  
UNITED STATES OF  
AMERICA



Based on the stratification results, an integrated programme based on new professional roles, improved care coordination and an extensive infrastructure of information and communication technologies was implemented. As a result, 9% of hospitalizations were avoided. This effect was not found in groups not given priority, whose probability of hospitalization increased (118). A modified version, the CareWell programme for identified at-risk people with multimorbidity, was deployed in four health-care areas. Compared with a control group, in the intervention group, the number of hospitalizations and visits to emergency centres was reduced, and the number of PHC contacts increased. The intervention group had more appointments with a family doctor for both face-to-face visits ( $P = 0.04$ ) and phone contacts ( $P = 0.002$ ). The number of face-to-face visits to the PHC nurse was also higher in the intervention group ( $P = 0.002$ ). Clinical changes were also observed, such as reduced body mass index and blood glucose levels. The main changes triggered by the implementation of the programme were related to PHC nursing roles, proactivity and patient empowerment. Nurses were perceived as more alert and watchful, more closely following up the health status of the patients. The satisfaction level was high for all stakeholders (119).

**Population health management assessment in Kaiser Permanente Washington State (120)**

Kaiser Permanente of Washington State has a mission to design, finance, and deliver high-quality health care and is committed to providing appropriate, comprehensive and coordinated care in collaboration with their members. This means providing the right care in the right place at the right time and with the right outcome. Kaiser Permanente of Washington State has developed a population health management strategy to help achieve their quality vision, aligned with the Triple Aim of health-care objectives: improving the patient experience of care (including quality and satisfaction); improving the health of populations and reducing the per capita cost of health care.

The Kaiser Permanente Population Health Program relies on annual analysis of their member population and segmentation of the population into targeted groups. It includes five programmes and services that work synergistically to improve the health of their members across the health and wellness spectrum: Clinical Quality Improvement Program, Complex Case Management Program, Diabetes Care Program, Health Profile and Care Transitions Program. The Population Health Program is assessed rigorously and regularly. The first step to developing meaningful evaluation is setting programme goals and objectives. The Population Health Program description is revised annually, and Kaiser Permanente of Washington State reviews overall and individual programme goals based on the previous year's performance. Relevant clinical, utilization and experience measures are qualitatively and quantitatively analysed to evaluate the efficacy of the Population Health Program. These results are interpreted and used to develop the coming year's targets. During this period of evaluation, Kaiser Permanente of Washington State considers revising, adding or eliminating programmatic services to better meet the member population's health needs.

In addition, Kaiser Permanente of Washington State also assesses the needs of their member population. The population is assessed annually in the third and fourth quarter and uses the previous year's member data to assess their health and needs. At minimum, the annual population assessment examines the characteristics and needs, including social determinants of health. It identifies and assesses the needs of relevant subpopulations, children and adolescent members, members with disabilities and members with serious and persistent mental illness. This information is then used to make recommendations regarding the Population Health Program and other services and functions that could better meet their needs. Kaiser Permanente of Washington State uses the population health assessment to identify potential gaps in care and services that do not have a current population-based strategy and to recommend areas of opportunity for Kaiser Permanente of Washington State to serve their especially vulnerable members.

Kaiser Permanente of Washington State receives data on their members' health and health-care utilization from a variety of sources. They use these data to further segment their population and ensure that they have programmes in their Population Health Program that address the needs of the smaller segments of the population. Kaiser Permanente of Washington State completes an annual segmentation report that enables them to segment the entire member population into four intervention levels: preventive care needs, emerging health risks, health safety concerns and multiple chronic conditions. Within each intervention level, the report further segments the population by the programmes and services (such as the Complex Case Management Program) designed to address member care needs. Kaiser Permanente of Washington State uses the previous year's data from claims, electronic medical records, health risk assessments, laboratory data, immunization records from the Washington State database, case management documentation systems and Emergency Department Information Exchange to identify which populations belong to each level of intervention. This information is stored within various systems, and the segmentation report pulls data directly from those sources or from the Electronic Data Warehouse of Kaiser Permanente of Washington State. The segmentation report is completed annually in conjunction with the population health assessment.

Kaiser Permanente models have historically extensively evaluated their programmes, showing impact. For example, between 2002 and 2005, in northern California, Kaiser Permanente helped reduce the prevalence of smoking among its members by 25%, compared with a 7.5% reduction across California as a whole. Among its members in northern California, the rate of heart disease mortality decreased by 26% from 1995 to 2004, and members were 30% less likely to die from heart disease than other people in California in 2004 (121). They have reduced disparities for cardiac risks and diabetes markers between black and white older people, in contrast to other health plans in the western United States (122). Colorectal cancer screening achieved higher screening rates than the national average. Screening rates for Black, White, Hispanic/Latino and Asian members are in the top 10% nationally (123).



# ENABLING POPULATION HEALTH MANAGEMENT

Although moving towards a system-wide implementation of population health management requires several years of development work and takes time to achieve impact, taking steps towards population health management can promote improvements in PHC even before the full benefits of population health management are realized. This section describes success factors that are common to all systems trying to implement or upgrade a population health management approach (Fig. 6).

The key success factors set out below are classified as system, organizational and clinical factors. System-level factors are best implemented from the national level down to local systems. They create the foundational infrastructure and environment (digital, professional, regulatory, financial and cultural) that enables population health management to develop successfully locally. Organizational factors are those within local organizations providing care that can successfully engage in population health management when empowered by the infrastructure and environment. Clinical-level factors are those necessary for on-the-ground teams to work with their patient communities to transform the organization factors into a reality of innovative new models of proactive care.

Nevertheless, some critical factors affect several or all levels and are not only relevant to implementing population health management but to any health system reform.

1. **Time:** with the day-to-day pressures, change may not happen without time and thinking space specifically allocated to enable the key agents of change to take the reform forward. Formal organizational development programmes, such as the national Population Health Management Development Programme in England, can help to formalize and fund the time and facilitation needed – at least in some pilot areas, with the learning spread to other areas.
2. **Funding:** adopting new approaches often requires providers to have additional funding, at least at the beginning, to be able to implement changes before health outcomes improve.
3. **Learning networks of population health management leaders:** this is key for explaining population health management and its benefits for PHC, spreading and sustaining good practices and learning from implementation mistakes. It supports making informed decisions about scale-up by capitalizing on practical implementation experiences at all levels and promoting peer to peer exchange of experiences to build a social movement and improve the overall quality of interventions.
4. **A culture in which innovation is encouraged and rewarded and first runners are appreciated:** moving towards system-wide implementation of population health management is an iterative, long process. Achieving measurable impact on overall population health outcomes takes time.
5. **Aspiration for sustainability.** All new innovations introduced and changes made should aim to lead to long-term sustainable change, which includes a change in the organizational culture of each level described below. Although effective implementation of the factors described in this section should naturally lead to sustainability, the fact



that population health management should lead to a long-term approach to improving population health rather than merely being a series of pilot projects should be separately emphasized and understood at each stage of the design process.

### System-level factors

1. **An integrated, holistic, health and well-being mindset** that puts patients and communities at the centre instead of the needs of the various institutions working in silos: leadership for population health management is based on collaboration, connecting people who need to work together and a culture of integration (124). This can be influenced from the very top of the organization if the health ministry or other key decision-makers, depending on the context or country, take a firm position and show leadership to influence the political atmosphere and policy directions of other key actors (insurance funds, purchasing agencies and professionals) while also focusing on reallocating resources, modifying incentives and implementing regulations towards population health management (addressed below).
2. **Support of policy and regulatory agencies** such as health ministries, health insurance funds and purchasing agencies: these agencies can support population health management by providing a population health management framework with a shared vision and objectives and training resources. They can also support the establishment and evaluation of pilots and the scaling up of successful experiences and promote the creation of professional networks of population health management champions. They can ensure that professional regulations enable PHC professionals to work at the higher end of their competencies and have the time to engage in population health management approaches (especially extending the role of nurses). They play a vital role in promoting an optimal regulatory environment to promote data sharing (while paying due attention to data confidentiality) and digitalization and enhancing the adoption of population health management approaches through the right incentives (see points below). Agencies should also consider developing an overall strategy to ensure that investment and needs are aligned. Insights from first movers and population health management leaders are to be considered.

In countries with unsuited legislation, the first step entails examining barriers that prevent data sharing within the health system (between different services or levels of care) and move progressively towards safe and appropriate sharing, interoperability and integration with other sectors, such as social care. Inadequate legislation can embody a substantial barrier for population health management. Concerns related to consent, confidentiality and cybersecurity should be addressed.

3. **Information governance arrangements** that promote information sharing within and outside the health system: population health management relies on data from a wide range of sources, organizations and professionals (within and beyond the health sector). This requires a trust framework to secure the flow of information among multiple systems and sites of care, which may range from data sharing to data integration and developing large combined data sets. Efforts to create cross-border exchange of data should be enhanced, such as the European Health Data Space (125). Population health management can be successfully implemented without initially having all these data available. However, promoting an environment of information liquidity is needed for engaging in advanced population health management. Accounting for information governance from the beginning can help avoid important implementation hurdles.

The core starting-point is moving from paper-based to electronic health records, which are more collaborative and include data from a wider set of PHC providers, enabling a multidisciplinary PHC approach. Then, integrating patient-generated health information from personal health records, which can also be used by the patients and put them at the centre of their care. This enables moving from basic analytical functionality in silos to linked data across the health system to linked data across health and social care and beyond. Digitalization will require selecting and managing terms, standards and identifiers and harmonizing them to achieve interoperable information systems.

**4. Fit-for-purpose information systems:** greater digital maturity embodies a major leapfrogging opportunity to facilitate successful population health management. Well-managed and -governed digitalization of health processes enables easier data collection and storage, including patient-generated data, more rapid and easier information exchange across dispersed databases and its integration; identification and increased refinement of patient cohorts; more sophisticated segmentation and stratification processes; actionable visualization of the population health management results by PHC professionals; and better evaluation of interventions. Digital solutions such as multiprofessional and intersectoral electronic health records, patient portals, mobile health solutions for self-monitoring or for promoting medication adherence and analytical software support different aspects of population health management.

**5. Data stewardship capacity and skills:** the ability to handle health-related big data, to master sophisticated analytical tools and to guide organizations to adapt their work practices in the context of the digital transformation is critical to advanced population health management. These can be enabled by new professionals, such as data analysts working closely with public health and PHC professionals, who act between the various organizations at the regional and local levels to ensure proper use of the data and focus on data integration, storage, analysis and visualization.

In countries where public health is not fully developed as a discipline and/or with no availability of data analytic specialists, the starting-point may be to invest in the data stewardship and analysis skills of public health specialists and of professionals working in the statistical offices and involving informaticians. Coordination and agreements to promote the synergistic work of national statistical offices, institutes of public health and health ministries, which are often separate institutions with separate mandates, are paramount.

In countries in which strategic purchasing is not yet a reality, the starting-point may involve moving away from line-item budgets towards capitation-based payment in PHC and making legal changes to move towards greater provider autonomy.

**6. Financial incentives** that support early detection and condition management, task profile expansion and coordination and integration across providers and levels of care. Payment mechanisms aimed at enhancing PHC's resolute capacity and excessively incentivizing hospital activity can support the adoption of population health management. Likewise, reforms shifting payment of providers from traditional fees for services towards value-based payment models may support population health management. Changing incentives by adapting the existing payment mechanisms to reward for continuity of care and proactive care, disease prevention and care coordination is key (126,127). Pooling funds across a set of social and health-care services to redefine investments that will optimize health can also enhance population health management (128).

## Organizational-level factors

### 7. Multidisciplinary and networked PHC models:

although a population health management approach can be deployed in health-care systems with distinct characteristics, small stand-alone PHC practices or PHC working alone cannot deliver several elements of the more complex applications of population health management. Primary care networks that connect primary and secondary care providers (or that enable PHC to move towards multidisciplinary teams) and that synchronize expertise in information governance and data analysis facilitate population health management. Multidisciplinary PHC teams can better provide coordinated care and meet a wide range of patients' needs, including addressing mental health problems and the social determinants of health, paramount for population health management (129). They can include community nurses, mental health professionals, physiotherapists, dietitians, health and well-being coaches and social prescribers.

In countries with a low resolute PHC, the starting-point may be strengthening or establishing the family medicine specialty, expanding the role and scope of practice of PHC nurses and promoting teamwork and shared decision-making. Once this is solidified, a gradual approach can be adopted to add new members to the teams such as social workers or mental health professionals.

In countries with no tradition of collaboration and coordination between PHC and public health services, a starting-point may involve delivering some public health services in PHC settings (such as vaccinations and screening); planning together and delivering community health activities (such as health promotion activities); and sharing population-level data (including on the social determinants of health) and clinical information to fine-tune health needs assessment, population segmentation and stratification processes, and enhance clinical decision-making. A shared forum to enable professionals from across PHC and public health to develop collaborative approaches for population health management can be a first step to develop this tradition.

**8. Integration and close collaboration** with public health and social care agencies: strong links with public health services can enhance many of the elements required for PHC providers to adopt population health management, such as: adopting a population perspective in clinical practice; identifying and addressing community health problems with focus on the wider determinants of health; and strengthening health promotion and disease prevention (130). Public health agencies can support PHC by providing training, sharing and exchanging information for community action, providing evaluation frameworks and research support etc.

A starting-point to improve data collection in PHC may be adopting WHO International Classification of Primary Care coding, which classifies patient data and clinical activity and enables classification of the patient's reason for the encounter, the problems or diagnosis managed, interventions carried out and the ordering of these data by episodes of care. For data on the social determinants of health, an initial step may be establishing a core list of information to be collected and integrated in PHC information systems and working together with identified community organizations to collect it.

## Clinical-level factors

### 9. Comprehensive and systematic data collection in PHC:

the quality of the segmentation and stratification processes depends on the richness (such as including data on social determinants of health) and quality of the data collected, in many cases, by health-care

professionals themselves. Improving data recording, diagnostic coding or updating registries improve the accuracy and reliability of the patients' needs and risk scores.

#### 10. Support from analysts, managers and local finance teams:

since PHC professionals are trained to deliver care instead of analysing data, manage projects and implement programmes, moving towards population health management becomes easier if such profiles support PHC. This becomes a symbiotic relationship between primary care professionals, analysts, financial administrators and managers. Embedding these new profiles into PHC practices can be facilitated by the networked approach described above. Each contributes their skills and knowledge to ensure that the insight from the data is translated into interventions that not only lead to programmes of work to improve population health now but sustain and develop them in an iterative manner, continually improving.

In settings in which these profiles are not easily available, a starting-point may be to work closer with public health professionals or statistical agencies, which may have better data analysis skills. Investing in building health management capacity among PHC team leaders is another good strategy to start with.

**11. Guidelines** to guide multidisciplinary and intersectoral workflows for the various risk groups: since each professional group is socialized within its own discipline, new ways of working need to be rooted and promoted by developing multidisciplinary guidelines and care pathways. In moving towards multidisciplinary teams, revising and updating the existing clinical guidelines and protocols are essential to clearly reflect the new roles and responsibilities of all team members.

An initial step to improve patient engagement is to ensure that PHC providers are equipped to improve health literacy; to provide e patient education on risk factors and on self-management strategies; and to deliver effective behavioural interventions to support patients in behavioural change as part of their routine clinical work. Regarding the latter, the WHO manual on integrated brief interventions for noncommunicable disease risk factors in primary care (134) is an effective tool for primary care providers to help people quit tobacco, reduce or stop alcohol use and increase physical activity and can also help people achieve healthy eating behaviour and manage weight for those living with overweight and obesity. In addition, for people with chronic diseases, PHC teams planning appointments in advance and following up proactively via phone calls, text messages or other available tools is also relevant for patient engagement.

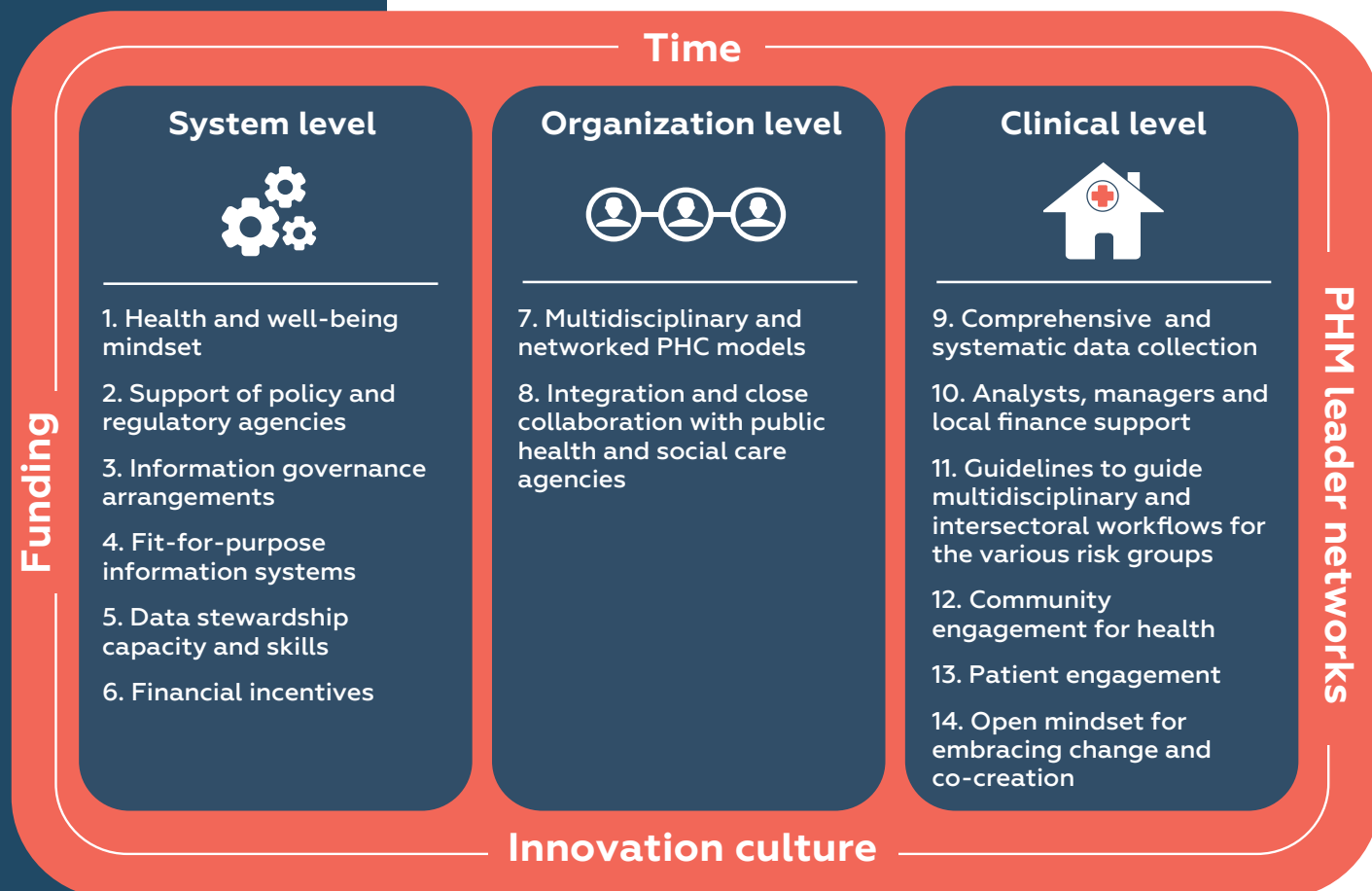
**12. Patient engagement:** population health management enhances the development of tailored treatment plans and disease prevention activities agreed with patients. Population health management can support patient engagement and activation (activated citizens or patients have the motivation, knowledge, skill and confidence to take on the role of managing their health) as the refined knowledge about a population (and its individuals) and their social determinants of health and enables engagement strategies to be tailored. In addition, patients actively engaged in their own care are more likely to adhere to these plans and to make shared decisions about their own health, which yields better health outcomes (131). People actively involved in their health tend to have better outcomes and, some evidence suggests, incur lower health costs (132). Activated individuals are more likely to engage in positive behaviour and have better health outcomes (133). Patient engagement is key, for instance, for ensuring that high-risk patients attend regular and follow-up appointments, quit smoking or adhere to medication plans.

A critical initial step is establishing clear catchment areas to make PHC responsible for the health outcomes of a clearly defined population (not only individuals). Once this is done, PHC organizations can start by mapping the community resources (nongovernmental organizations, patient organizations, charities, cultural resources etc.) active in their catchment area and establishing mechanisms to engage them in service delivery and/or refer patients to them.

**Community engagement:** successful models of population health engage partners across their communities to address community culture, perceptions of needs and the broader social determinants of health (127). PHC providers are in a privileged position for driving this approach. Engaging communities in population health management can help move away from biomedically focused solutions to public health ones that address the wider determinants of health. This can also help PHC providers in fine-tuning population segmentation and risk stratification processes by providing local intelligence.

**13. An open mindset of health workers** can overcome the limitations of business as usual and embrace change by co-creating new ways of working with each other and with patients and reaching out to the community. Increasing the acknowledgement of the potential benefits that adopting a population health management approach can bring to clinical practice can facilitate PHC personnel to engage in a new approach that will often include person-centred care and shared decision-making, since these approaches naturally lend themselves to addressing the underlying wider determinants driving the health outcomes being addressed. The peer-to-peer networks outlined above can help to foster this approach.

Fig. 6. Success factors for population health management





## RECOMMENDED POLICY ACTIONS

Table 1 groups the recommended policy actions to help countries move towards population health management following the PHC levers of the WHO Operational Framework for Primary Health Care (21). This aims to underscore three important considerations:

- Population health management is most effective within a holistic health system strengthening approach with PHC at its core.
- Investing in PHC is paramount. It is the best place to engage in population health management approaches and make progress towards achieving the quintuple aim (17).
- To achieve maximum impact, synergistic action spanning over several or all PHC levers is required. None of these recommendations will move countries closer to population health management if implemented in isolation.

The relationship between population health management and PHC is that of a virtuous circle. Population health management helps to make PHC more effective, and many elements of a strong PHC model are essential for effective population health management. These elements have been discussed as success factors in the previous section (multidisciplinary teams underpinned by strong family medicine and advanced nursing roles, close coordination and integration of primary care and public health services and PHC networks). Thus, moving towards population health management requires a determined effort for their implementation. Table 1, however, focuses specifically on the recommendations more narrowly related to population health management.

**Table 1. Recommended policy actions for population health management**

PHC Levers	Recommended policy actions
Governance and policy frameworks	<ol style="list-style-type: none"><li>1. Establish a clear policy framework and governance arrangements for population health management at all levels, ensuring a shared vision, properly defined roles and responsibilities, a stepwise implementation strategy and accountability mechanisms in place.</li><li>2. Adjust current legislation and regulations to enable population health management by promoting interdisciplinary governance structures, data sharing, interoperability and integration.</li></ol>
Funding and allocation of resources	<ol style="list-style-type: none"><li>3. Use population health management to contribute to the informed decision-making process for efficient and equity-sensitive funding and allocation of resources in PHC.</li></ol>



**Table 1. (continued)**

PHC Levers	Recommended policy actions
Engagement of the community and other stakeholders	<p><b>4.</b> Establish a network of population health management champions to share experience, draw lessons learned and support implementation. Ensure that champions include frontline clinical and non-clinical PHC workers and professional associations, health managers and planners and implementers.</p> <p><b>5.</b> Encourage PHC providers to map the community resources and stakeholders (local government, nongovernmental organizations, patient organizations, charities, cultural resources etc.) active in their catchment area and establish mechanisms to engage them in the whole population health management cycle and develop strategies for activating patients.</p>
Models of care	<p><b>6.</b> Incentivize PHC organizations to engage in population health management by making them formally responsible for the population outcomes of a stable, clearly identified, and registered population, usually as part of defined catchment area.</p> <p><b>7.</b> Move progressively towards risk-stratified models of care in which multidisciplinary PHC teams provide coordinated care based on a wider range of people's needs and their determinants.</p>
PHC workforce	<p><b>8.</b> Create a learning environment for population health management by updating existing or developing new educational programmes and postgraduate professional training, including continual review and improvement cycles.</p>
Purchasing and payment systems	<p><b>9.</b> Adjust current payment systems to stimulate population health management and promote provider autonomy, early detection and condition management, task profile expansion, interdisciplinary work and intersectoral activities (through, for example, capitation, pay for performance, pay for coordination or shared savings arrangements).</p>

**Table 1. (continued)**

PHC Levers	Recommended policy actions
Digital and data technologies for health	<p><b>10.</b> Enhance population health management by ensuring the sharing of data within the health system (between services or levels of care) and move progressively towards sharing, interoperability and integration with other sectors, such as social care.</p> <p><b>11.</b> Enhance population health management by stimulating data quality, storage, integration and stewardship in PHC and invest in tools that allow PHC professionals to visualize population segmentation and stratification results in a clear and digestible manner.</p> <p><b>12.</b> Invest in the digitalization of PHC as part of an overall system-wide, long term, health information system strategy that sets a clear vision and objectives on population health management and is context specific.</p>
Systems for improving data driven quality of care	<p><b>13.</b> Use population segmentation and risk stratification tools in PHC to improve the quality of care, enhance clinical decision-making, tailor service delivery, reach out proactively to patients and seek out population cohorts experiencing health inequalities.</p> <p><b>14.</b> Create professional awareness and competencies among PHC professionals to appreciate the use of data analysis and the potential of predictive models to contribute to improving service delivery and planning and implementing targeted programmes for all risk strata.</p> <p><b>15.</b> Promote the use of sociodemographic data by PHC professionals throughout the population health management cycle.</p>
Monitoring and evaluation	<p><b>16.</b> Regularly plan, monitor and review the performance of the population health management inputs, processes and results to enhance equity, efficiency, effectiveness and impact.</p>

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### WHO European Centre for Primary Health Care

UN Plaza  
303 Baizakova Street  
Almaty A15G7T0  
Kazakhstan  
Email: [eurocphc@who.int](mailto:eurocphc@who.int)  
Website: [https://www.who.int/europe/teams/centre-for-primary-health-care-\(kaz\)](https://www.who.int/europe/teams/centre-for-primary-health-care-(kaz))