Research for innovations that accelerate Universal Health Coverage (UHC) towards good health at all ages: A concept note

1. Background

The WHO Kobe Center (WKC) has put forward a strategic plan for 2016-26, which focuses on acceleration of Universal Health Coverage (UHC) through innovation, particularly in light of population ageing. Innovation can be defined very broadly as a new method or approach – whether it is within the scope of policy, systems, or technologies – and implies the translation of ideas to action towards a specific goal. In this context, the action aims to achieve the goal of progressive realization of UHC, or universal access to quality needed health services without people facing financial hardship.

Innovations are designed to solve specific problems. In this concept note, we first categorize countries by Healthy Life Expectancy (HLE) and level of UHC attained as measured by an index that represents the strength of the health system. We then categorize countries in terms of three elements: the main health challenges, the primary objectives of the health system and challenges to attaining UHC, and examples of innovations that can address the main health problems and accelerate UHC achievement.

Using WHO data for 2016, **Figure 1** graphs healthy life expectancy (HLE) as well as a composite index measuring the progressive attainment of UHC. From this graph, we can see several groupings of countries to help define the most appropriate kinds of innovations needed:

a) Countries with HLE< 60 years and lower levels of UHC attainment.
b) Countries with HLE between 60 and 70 years and moderate levels of UHC attainment.
c) Countries with high HLE over 70 years and high UHC attainment of basic services.

For each of these three broad groupings, we can identify the categories of innovation to help them solve the problems that they face in progressive realization of UHC. While these categories are not mutually exclusive, it serves as a framework towards the most appropriate research in a given setting.

In this context, therefore, we classify innovations for UHC in terms of those that **extend access** to needed health services, those that **improve quality and efficiency** particularly at lower cost, and others that **empower individuals, families and communities** to participate in the promotion and service delivery towards better health. Given that UHC also incorporates the concept of **financial protection**, we also consider research towards policy and systems innovations that reduce out of pocket payments, catastrophic payments, and households falling into poverty related to health spending.

2. Group a) HLE<60 years and lower levels of UHC attainment: innovations to extend access

The first set of countries (a) has the lowest levels of HLE (<60 years) as well as the lowest levels of UHC attainment. In this setting, the main health problems faced towards increasing HLE include **reducing child mortality** and ensuring access to reproductive health services, infectious disease prevention, care and treatment, and public health services including immunizations.

For these countries, the priority for innovation is to **extend access to basic health services,** particularly in settings where health systems are operating under the constraints of low health spending, weak

infrastructure, and few qualified health workers. The concept of "frugal innovations" has been developed, to identify the development and dissemination of practical low cost tools to common problems.[1] Such frugal innovations have been categorized into four types:[2]

- *Lean tools and techniques* that adapt existing technologies towards use in more difficult settings- ensuring durability and portability for example, and easy maintenance. An ECG machine adapted to commonly used printer technology in India reduced the price to US$1 per patient.[3]
- *Opportunistic solutions* use existing technologies to solve health problems, such as the use of mobile phones and SMS messages to improve medication adherence.[4]
- *Contextualized adaptations* imply that existing technologies are repurposed to solve a different problem, such as replacing Raney clips with paper clips in dental surgery.[5]
- *Bottom-up innovations* are simple tools or ideas that frequently come about in environments of scarcity, such as local transportation for ambulance services or solar water disinfection.[6]

Ensuring access also requires policy and systems innovations to ensure financial protection, avoid health-related impoverishment, and prevent people from foregoing necessary health care due to costs. Such innovations may need to address challenges such as the presence of a large informal work sector, migrant workers, and lack of civil registration systems. Research is needed to identify the appropriate innovations to solve the problems in ensuring access to coverage of essential health services in countries that may face supply-side challenges including physical and social acceptability, affordability and capacity of system itself.

3. Group b) HLE of 60-70 years and moderate levels of UHC attainment: innovations to improve service quality and efficiency

The second group of countries (b) has HLE between 60 and 70 years and moderate levels of UHC attainment. The main health problems in this setting that inhibit HLE include **premature mortality from non-communicable diseases and high rates of their risk factors**, including tobacco, alcohol, diet and exercise. In this context, existing innovations evaluated as cost-effective may not yet be fully implemented - including those that can have an important impact on healthy life expectancy: i.e., colon, breast, and cervical cancer screening; prevention, management and control of hypertension and diabetes; and pneumococcal, chickenpox, and shingles vaccines.

Uptake of cost-effective care depends heavily on health service delivery systems that promote cost- effective care and deliver it effectively and comprehensively. This group of countries broadly represents those that are investing in the foundations of their service delivery and governance systems to extend

[1] INSERM http://frugal-innovation-medicine.com/
[2] Tran and Ravaud, Frugal innovation in medicine for low resource settings, 2016
https://bmcmedicine.biomedcentral.com/articles/10.1186/s12916-016-0651-1
[3] World Health Organization. Emerging economies drive frugal innovation. Bull World Health Organ. 2013 Jan 1;91(1):6-7.
[4] Lester RT, Ritvo P, Mills EJ, Kariri A, Karanja S, Chung MH, et al. Effects of a mobile phone short message service on antiretroviral treatment adherence in Kenya (WelTel Kenya1): a randomised trial. Lancet. 2010 Nov 27;376(9755):1838-45.
[5] Waknis PP, Prasad GS, Wadje S. A simple method to control bleeding by stationary paper clips as an alternate to raney clips during coronal incisions. J Maxillofac Oral Surg. 2013;12(1):117–9
[6] Conroy RM, Elmore-Meegan M, Joyce T, McGuigan KG, Barnes J. Solar disinfection of drinking water and diarrhoea in Maasai children: a controlled field trial. Lancet. 1996 Dec 21-28;348(9043):1695-7.

access broadly. The priority for innovation therefore is **improve service quality and efficiency** and strengthen public health interventions, while also ensuring that people do not fall into poverty because of health spending. Thus, innovations to improve service quality and efficiency may include:

- *Organizational innovation* to improve service delivery: the effective models of care that promote a patient centered approach and the implementation requirements. How to sequence *large-scale system change*, including shifting the allocation of resources from hospital-based systems to primary and patient-centered systems.
- *Financial innovation*: shifting from fee for service to prospective payment mechanisms and systems of active purchasing and monitoring of system performance that promote prevention, quality, health outcomes, and reduce out of pocket payment at the point of service.
- *Technological innovations* that promote better quality and can leapfrog progress to UHC, i.e., new diagnostics to ensure rapid diagnosis and treatment, and packaging reminders for medication adherence.

Premature mortality of NCDs is critically dependent on the prevention of their risk factors. For this set of countries, innovations and reforms in governance also are needed to advance cost-effective public health policies for NCD risk factors- such as those for tobacco control, prevention of harmful use of alcohol, reduction of consumption of salt, sugar, and fats, and improvements in diet and exercise.

4. Group c) HLE of >70 years and high levels of UHC attainment: innovations to improve service quality and efficiency while controlling costs, and empower patients and consumers

For the third group of countries (c), HLE is 70 years or more, the population 85 years and older is growing, health systems are already functioning at a very high level, and financial protection mechanisms are generally in place. This group is experiencing most immediate effects from population ageing and are adapting their models of UHC in response to changing demographic and epidemiologic profiles, especially if the current levels of UHC attainment were reached under considerably different circumstances. In these settings, countries are concerned with reducing the growth of health spending while maintaining quality, relevance and accessibility of services. The successes in UHC attainment have also led to higher expectations among the people and relatively high health literacy. Therefore innovations can be used to empower patients, consumers and communities to be fully engaged in promoting their own health. Health systems innovations can be implemented similar to those mentioned for group (b), but could also focus on high-cost, high- need patients, i.e.:

- *Service delivery models* to detect and prevent functional decline among older adults and intervene to provide health and social care, i.e., social prescribing. Shifting towards a *network-based health system*, with multi-disciplinary teams managing patients with complex needs
- *Financing innovations* that are aligned with comprehensive care models
- *Technological innovations* that empower patients and their families, i.e., wearable technologies that monitor glucose levels, vital signs or falls; sensor technology to regulate hydration, etc.

5. Research needs

In terms of research for *frugal innovation to extend access to health care*, particularly in resource poor environments, scientific evaluation of safety and efficacy is needed before wide dissemination. Where such innovations are safe and efficacious, they must be evaluated in terms of whether they may be accepted for use by patients or health care providers. Evaluation is needed to determine acceptance across different settings – whether within the same health system or whether applicable to different country context – and how such innovations could be disseminated and sustained effectively.

Changes in the *organization and financing of health systems* require cross country studies to evaluate different component and elements of such change common across multiple settings and identification of the minimum conditions needed particularly in terms of human resources, infrastructure, and governance requirements. Evidence about payment mechanisms has been established but research could help identify the needs for monitoring the unintended consequences of changes in payment on behaviours and identify adjustments that can be made. Many technological innovations exist to leapfrog progress towards UHC and research can usefully inform the health systems requirements for their use and application. *Operational research* can help identify constraints and barriers that may impede the full benefit of cost-effective innovations.

Evaluations of impact need to consider the outcomes that the innovation would improve for older populations - i.e., quality of life, functional autonomy. Network based health systems could be evaluated based on improved outcomes in comparison with existing systems, as well as human resource and infrastructure implications. A proliferation of new technologies exists to empower patients and families and *prioritization* may be needed in terms of outcomes evaluated and *barriers to adaptation* across different settings. Empowerment is a cross-cutting area for all settings, where innovation is needed to fully inform, involve and empower consumers and patients.

6. Implications for WKC

The research needs for innovations towards accelerating UHC in light of population ageing are vast. The current WKC research program has focused on community based social innovation, to meet the health and welfare needs of older persons in countries categorized in group b). In addition, WKC recently commissioned a systematic review of service delivery models for end of life care, primarily a concern of countries in group c). In light of its mandate towards innovations in low- and middle-income settings towards UHC, WKC could consider the following activities towards prioritization of its research:

   a) Identifying the critical needs and the priorities for innovative solutions
   b) Documenting inequities to be met through innovations and who benefits
   c) Horizon scanning of new innovations, their impact on health, quality of life and functional autonomy, and the contexts under which they may work
   d) Operational research to promote scaling up of existing cost-effective interventions
   e) Technological innovations that promote patient and consumer empowerment that are widely applicable across different country contexts
   f) Innovations in financing that can ensure financial protection, particularly for older adults
   g) Learning from other countries that have been successful in implementation of innovations

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Relationship between Healthy Life Expectancy and the progressive realization of Universal Health Coverage (UHC) (Source WHO 2015, 2016)
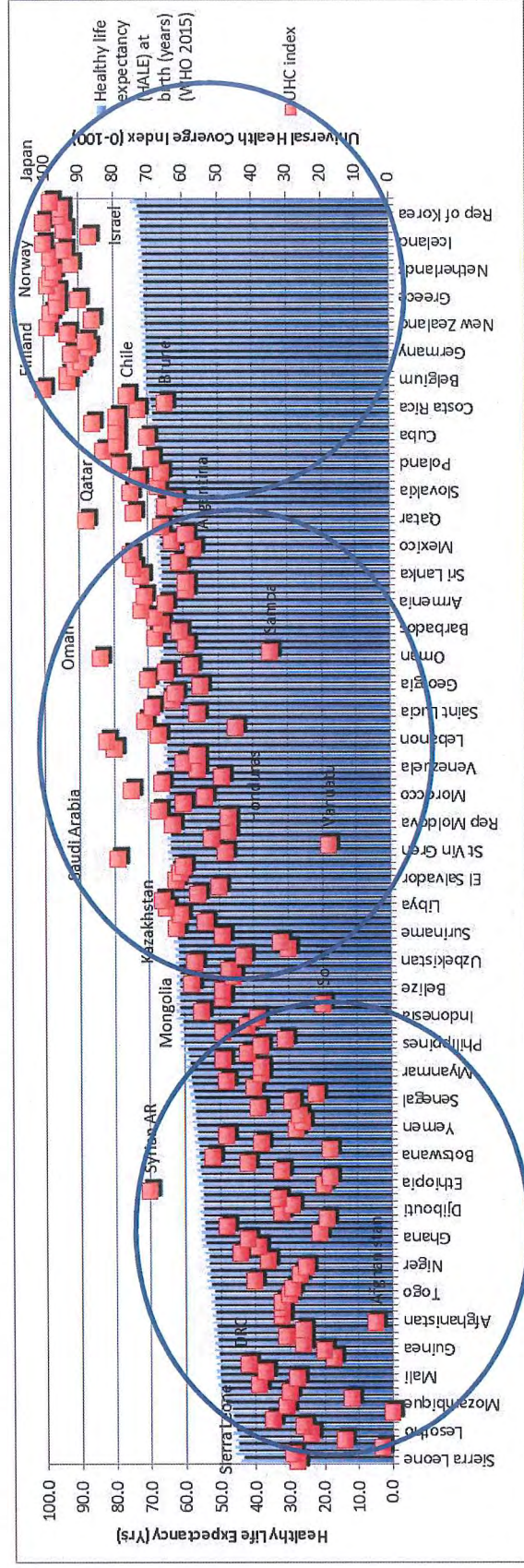
Frugal innovations to extend the reach of the system …   Systems innovations to improve quality…   Innovations to empower consumers

Universal Health Coverage (UHC):
Metrics and Measurement in Light of Population Ageing

1. Background

All United Nations Member States have committed to the Agenda for Sustainable Development and the corresponding Sustainable Development Goals (SDG) to achieve by 2030. The third goal aims to ensure healthy lives and promote wellbeing for all ages.[1] Among the 13 targets related to this goal, target 3.8 commits countries to:

Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all.

Simply put, achieving Universal Health Coverage (UHC) means that every person receives the health services they need while ensuring that the use of these services does not result in high health expenditures, which cause financial hardship or push households below the poverty line. Needed health services include public policies for health promotion (i.e., such as tobacco control policies), illness prevention (i.e., vaccinations and screening), as well as treatment, rehabilitation, and palliative and end-of-life care. Such services must also be of sufficient quality to be effective.

UHC is recognized as a progressive and dynamic process, in that its design and implementation responds to continually shifting demographic, epidemiological and technological trends, as well as people's expectations. In particular, demographic trends can have a profound influence on health, social and economic conditions. Population growth is slowing with declines in fertility rates in all regions of the world except Africa. Changes in fertility rates, longevity and migration influence population structures. Shifts in population growth and urbanization can drive the demand for services – including health, food, and water. By 2050, 2.1 billion people will be older (60 years of age or more), representing 21% of the world's population. Older people already outnumber children five years and younger; by 2035, they will exceed the number of children under the age of 10.[2] Thus, investments in UHC require careful consideration of the population dynamics and the resulting pressures on health systems as they both change within the foreseeable future.

2. WHO's UHC index for monitoring global progress in essential health services coverage

Monitoring UHC involves three dimensions – health services, finance, and population. For global monitoring of service coverage, the WHO identified four domains: reproductive, maternal and child health; infectious disease prevention and control; non-communicable disease prevention and control; and service capacity and access. Four indicators were selected

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[1] http://www.who.int/sdg/targets/en/
[2] United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2017 Revision. New York; 2017.

within each of the domains to calculate a composite index for service coverage.[3] Three additional indicators were chosen to measure financial protection (Annex 1), including out of pocket spending, catastrophic spending and health spending that induces poverty.[4]

The indicators were chosen as tracer conditions to capture the concept of universality and the strength of the health system. They represent health interventions for which every person should benefit- regardless of the country's wealth, burden of disease level, or health system structure. In addition, data are available for most countries and such data are collected in similar ways, enabling comparability.

The WHO set forth four criteria for the selection of these specific indicators. The first is **relevance** in reflecting the burden of disease and the availability of cost-effective interventions. The second is **conceptual soundness** including a measurable numerator and denominator, a clear target, and a definition that captures effective coverage. The third is **feasibility** in the availability of current, comparable data available for most countries, which can be disaggregated for equity analysis. And lastly, indicators should be **usable**, in the sense they are easy to communicate.[5]

UHC is grounded in the principle of equity. Therefore, where data are available, the index can be reported by income, sex, age, race, ethnicity, migratory status, disability and geographic location to capture inequality. It is anticipated that the index and measurements will evolve to ensure their relevance, particularly for middle- and high-income countries. Countries of all levels of economic development are facing the challenges of **population ageing**. Thus one question is how WHO's composite index for UHC could be refined or augmented to better reflect these challenges.

Annex 1 reflects on the individual indicators and their relevance to population ageing. For example, advances in reproductive, maternal and child health are critical to achieving longer life expectancy. Effective non-communicable disease prevention and control can prevent premature mortality, and extend life expectancy at age 60.[6] Population ageing and urbanization will create considerable pressures on health system capacity due to the growth in the sheer numbers of people that need to be served and the heavier use of healthcare among older people. The inclusion of indicators for health system capacity, such as hospital access and health workforce, can measure the health system's capacity to provide the full range of services from primary prevention to end of life care. As the monitoring systems for UHC strengthen, it is anticipated that countries will increase their data collection efforts and improve accuracy.

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[3] WHO. Developing an index for the coverage of essential health services. Geneva; 2016.
http://www.who.int/healthinfo/universal_health_coverage/UHC_WHS2016_TechnicalNote_May2016.pdf
[4] Metadata for tracer indicators used to measure the coverage of essential health services for monitoring SDG indicator 3.8.1.
WHO; 2017. http://www.who.int/healthinfo/universal_health_coverage/UHC_Tracer_Indicators_Metadata.pdf
[5] WHO. Developing an index for the coverage of essential health services. Geneva; 2016.
http://www.who.int/healthinfo/universal_health_coverage/UHC_WHS2016_TechnicalNote_May2016.pdf
[6] Mathers C et al. Causes of international increases in older age life expectancy. *Lancet*. 2015, 385, 540-48.

Notably, there has been a concerted effort to collect data to assess coverage of services for NCDs, especially for the treatment and management of diabetes and hypertension.

3. Country-level monitoring and evaluation of UHC in light of population ageing

Many countries have embarked on specific policies and innovations to attain UHC by 2030. Using the WHO framework depicting the three dimensions of UHC, countries can measure progress towards UHC in terms of the breadth of the population covered, depth of service coverage, and height or level of financing for these services (Figure 1). In terms of population ageing, this corresponds with coverage of the whole population regardless of age, including services relevant for the quality of life of older people, and sustainable financial coverage that promotes healthy ageing.[7]

#### Figure 1. WHO's Dimensions of Universal Health Coverage
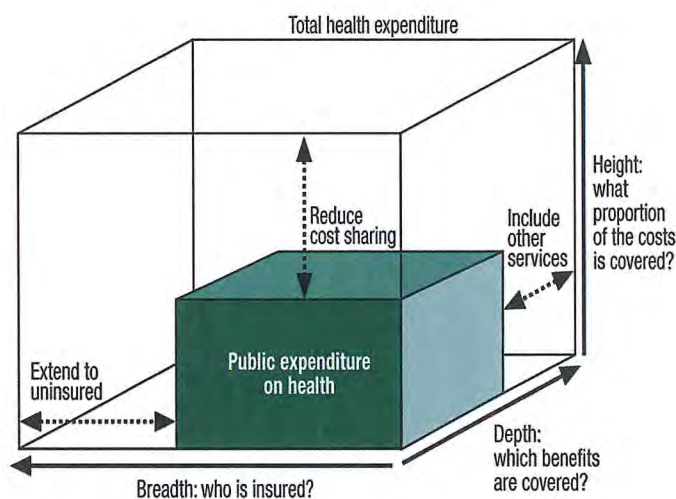
Given that all countries are starting at different points in terms of burden of disease, population structure, and health systems infrastructure and investments, country specific monitoring and evaluation is essential. Specifically, where there are reforms being undertaken to extend coverage and provide greater financial protection, there is a need to know whether these efforts are achieving improved results in terms of access, quality, and outcomes.

WHO has developed a framework for monitoring and evaluating country-level efforts towards implementing large-scale programs (Figure 2). In this framework, countries can determine their own national core indicators with a consideration of balance across the domains of input, processes, output, outcome, and impact that are sensitive to the national policy changes

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[7] Lopez, McKee, and Stuckler, UHC and population ageing: a systematic review of the relationships. Unpublished manuscript commissioned by WHO Kobe Center.

proposed, and utilize existing monitoring systems and available baseline data. This framework can be adapted to specific policy interventions to attain UHC through a step-wise approach in which the monitoring indicators are linked directly to the policy interventions. The approach facilitates both a stepwise approach to policy, and a monitoring framework that identifies progress and enables modification during implementation.

Figure 2. WHO's country level monitoring and evaluation framework
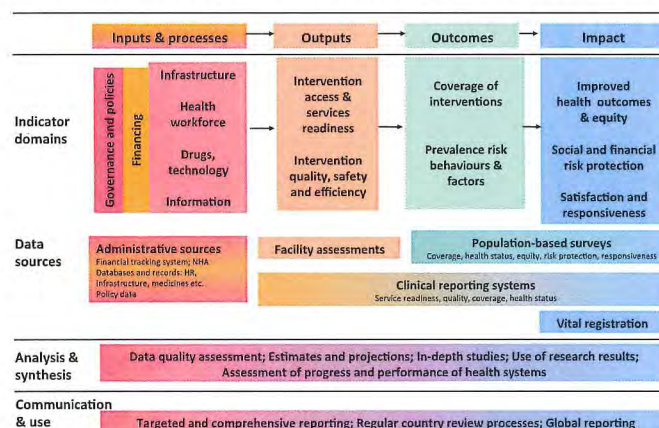
4. Discussion questions

- What additional set of tracer conditions should be used for monitoring? How should these be prioritized for a 'core set'?
- How should we handle coverage across multiple chronic conditions in older adults?
- What is the right mix of physical (e.g., diabetes) and mental health(e.g., depression) chronic conditions?
- Should coverage with assistive technology be included?
- What are the critical dimensions of equity that should be examined for older populations (e.g., by age, capacity to pay)?
- What would be the data requirements and investments at country level to monitor and evaluate advancements in UHC and its responsiveness to population ageing? How can WHO assist countries?
- What are the data requirements to capture financial protection among older persons?
- What other outcomes in older adults matter that may not relate to coverage but is influenced by UHC (e.g., Subjective Well Being)?
- What other determinants need to be measured with specific regard to older adults – e.g., social networks, household transfers, etc.?

Annex 1. Components of WHO's UHC index and indicators for financial protection

Measurement area	Indicator	Implications in light of population ageing (added by WKC)
Reproductive & newborn health	Demand satisfied with modern family planning method among women 15-49 who are married or in a union (%)	High use of modern family planning methods can reduce fertility rates and accelerate shifts towards population ageing.
	Average coverage of 4 or more antenatal visits and skilled birth attendance (%)	Access to skilled ANC and delivery may reduce maternal mortality and increase gains in life expectancy.
	One year old children who have received 3 doses of a vaccine containing diphtheria, tetanus and pertussis (%)	Immunization reduces infant mortality, which increases life expectancy.
	Care seeking behaviour for children with suspected pneumonia (%)	Effective management of childhood illnesses reduce infant mortality, which increases life expectancy.
Infectious disease:	People living with HIV receiving ART (%)	Effective ART treatment increases life expectancy and quality of life (QOL).
	TB cases detected and cured (%)	Effective management of adult infectious illnesses increases life expectancy and QOL.
	Population at risk sleeping under insecticide treated bed nets (%)	Effective prevention of malaria increases life expectancy and QOL.
	Average coverage of households with access to improved water and sanitation (%)	Access to improved water and sanitation meet basic needs, and thus have strong implications for one's dignity and wellbeing. It is also a form of infectious disease prevention that can increase life expectancty and QOL. Physical accessibility of these facilities may need to be improved for older people with limited mobility and strength.
Non-communicable diseases	Age-standardized prevalence of non-raised blood pressure among adults aged 18+	Effective prevention, early detection, treatment and management of cardiovascular disease increases life expectancy and QOL. Prevalence tends to increase with population ageing, creating pressures on the health system.
	Age-standardized mean fasting plasma glucose for adults aged 25 years and older	Effective prevention, early detection, treatment and management of diabetes increases life expectancy and QOL. Prevalence tends to increase with population ageing, creating pressures on the health system.
	Percentage of women aged 30–49 years who report ever having been screened for cervical cancer	Effective prevention, early detection, and treatment of cervical cancer increases life expectancy and QOL for women. Prevalence increases with age after first peak in younger age. Diagnostic activity may be reduced in very old age.
	Age-standardized prevalence of adults >=15 years not smoking tobacco in last 30 days	Effective prevention and cessation of tobacco smoking can help prevent respiratory diseases and cancers for the smoker and for those exposed to secondhand smoke, and thereby increase life expectancy and QOL.
Health systems	Hospital beds per capita, relative to a maximum threshold of 18 per 10,000 population	Population ageing tends to increase demand for hospital care for serious injuries and illnesses, and for end of life care. Demand for beds in residential settings for long-term care may also increase.
	Health professionals (physicians, psychiatrists, and surgeons) per capita, relative to maximum thresholds for each cadre	Population ageing generally increases the demand for a complex mix of health professionals, given the higher prevalence of multiple, chronic and often serious conditions, etc. This indicator may not capture other kinds of health professionals whose services are increasingly important for older people's care, e.g. those who can offer effective management of multiple comorbidities, rehabilitation, pain management, and long-term disease management.
	Percentage of health facilities with essential medicine	Population ageing generally increases the demand for healthcare facilities and prescription medications. The current essential medicine's list may not include some of the essential medicines needed for the treatment of NCDs and other conditions that tend to increase with age.
	International Health Regulations (IHR) core capacity index, which is the average percentage of attributes of 13 core capacities that have been attained at a specific point in time.	Effective implementation of the IHR by member states can help protect the lives of all people, globally, and contribute to their improved longevity and QOL.
Financial hardship	Out of pocket expenditures <20% of total health expenditures	Lower OOP can reduce the financial burden of healthcare for older people, who tend to be heavier users of healthcare than younger people. The definition of health expenditures, however, may not capture significant indirect healthcare-related costs incurred by older people and their caregivers (e.g. transport for frequent/regular visits, care for older spouse or other family members). Effective poverty lines may also be different for older people, who have different income and cost structures compared to working-age adults.
	Catastrophic health spending where health spending >25% of total household expenditure	
	Impoverishing expenditure defined as health spending that results in household expenditure to drop below international poverty lines (e.g. PPP US$ 1.25 or 2.00 per person per day)	