iheed

Achieving Universal Health Coverage:
Technology for innovative primary health care education

Wonca
World family doctors. Caring for people.
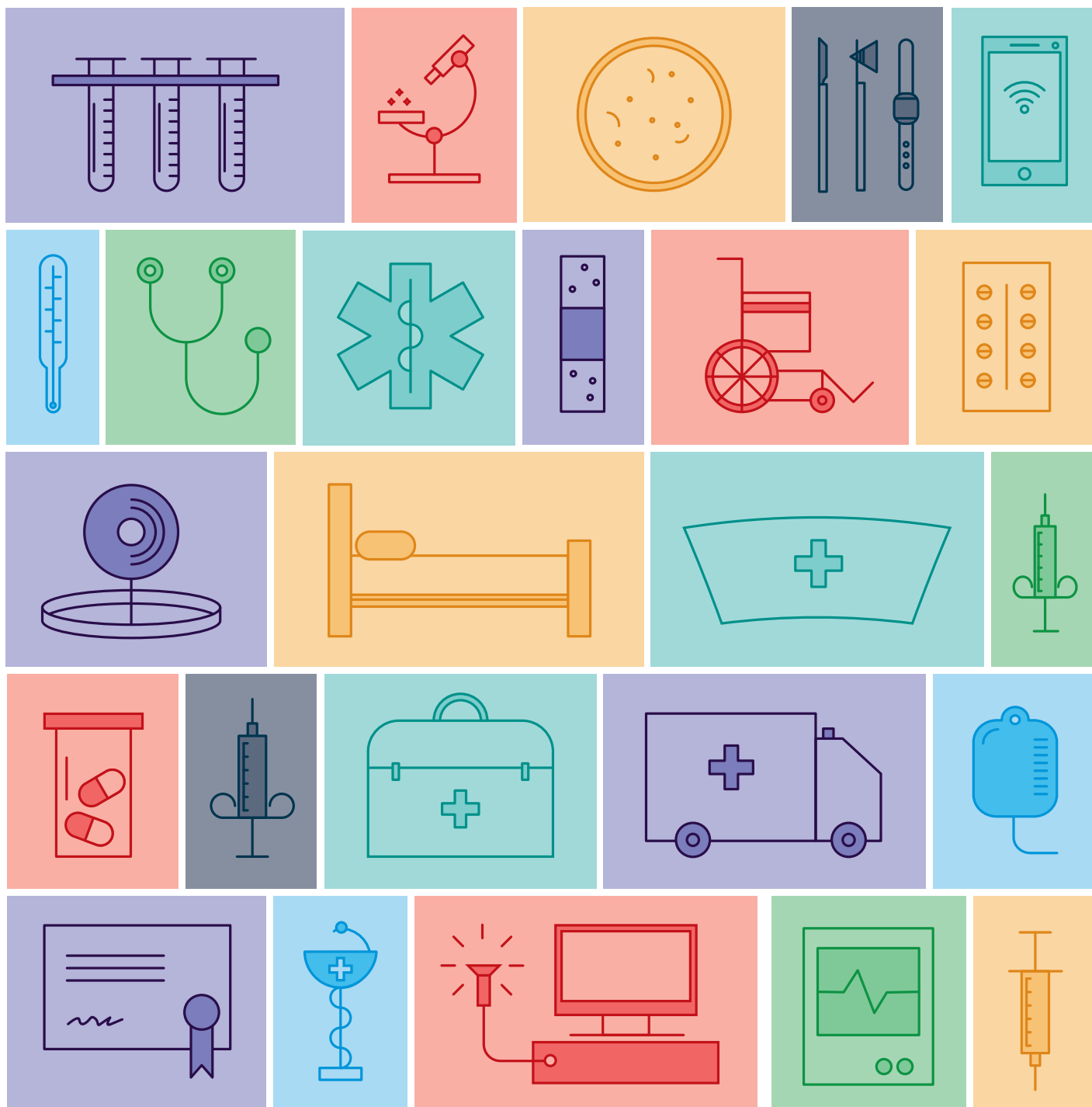
"Half the world's population lives in rural areas, yet, only 25% of the workforce. We need to work with students, young doctors to encourage them to think about a career in rural practice and we've got to support them. If we don't support them, if they remain isolated they won't stay."

Dr. John Wynn-Jones

"One of the things is getting the devices and getting the technology but also, the second is actually knowing how to use them and having them user friendly enough that people actually do want to use them."

Dr. Oathokwa Nkomazana

"Technology has very clearly demonstrated that geographical boundaries can be broken very easily; with the access to technology, distance is not a limiting factor provided connectivity issues are sorted."

Mr. Ravichandran Natarajan

"There's no difference between what is being pushed in UHC and what PHC stands for because within PHC there are issues of affordability of services, acceptability, availability which are all solid features in UHC, so UHC and PHC are linked and I think that's the only way we can ensure that people have access to care."

Ms. Annette Mwansa Nkowane

Acknowledgments

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Abbreviations

AMRF
African Medical & Research Foundation

BYOD
Bring Your Own Device

CHW
Community Health Worker

CME
Continuing Medical Education

CoP
Community of Practice

CPD
Continuing Professional Development

eHealth
Electronic Health

EHR
Electronic Health record

EMEA
Europe, Middle East & Africa

EMR
East Mediterranean Region

EURACT
European Academy of Teachers in General Practice/Family Medicine

GP
General Practitioner

HCV
Hepatitis C Virus

ICT
Information & Communications Technology

ISfTeH
International Society for Telemedicine & e-Health

IT
Information technology

ITU
International Telecommunication Union

LMICs
Low & Middle Income Countries

LMS
Learning Management System

mHealth
Mobile Health

MOOC
Massive Open Online Course

NCD
Non-Communicable Disease

OECD
Organisation for Economic Co-operation & Development

PHC
Primary Health Care

SCORM
Shared Content Object Reference Model

SE4ALL
Sustainable Energy for All

SMS
Short Message Service

UCL
University College London

UHC
Universal Health Coverage

UN
United Nations

VCoP
Virtual Community of Practice

VP
Vice President

WHO
World Health Organization

WONCA
World Organization of National Colleges, Academies & Academic Associations of General Practitioners/Family Physicians
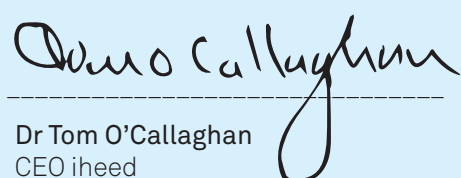
Foreword

At iheed we are proud to be part of a wider global community committed to driving real change in how we deliver results for families and patients. In a world with ever escalating healthcare costs challenging the health budgets of even the richest nations, where years of investment in developing economies healthcare systems have often struggled to have impact and keep pace with escalating healthcare challenges, there have to be new innovative approaches. Family medicine and primary health care as the foundation of any health system and essential for achieving universal health coverage is integral to the solution. Providing patient-centred, coordinated, comprehensive, cost-effective care in the community, it is delivering care to where it is needed most. As such, it is no surprise that health outcomes are better in countries with a strong family medicine and primary health care system. However the challenge is how you scale training, motivation, and retention of a family medicine and primary care workforce.

Recognising the crucial role of family medicine and primary health care as a solution to the tsunami of non-communicable and chronic diseases such as diabetes, chronic lung disease, cancer and more, this report seeks to understand how information and communications technology (ICT) can quickly improve family medicine and primary health care capacity. In particular, it highlights how ICT can be used to enhance and improve education and training of family medicine and primary health care professionals as part of a team. Current education and training models are clearly insufficient as they are not producing adequate numbers of the right types of primary health care professionals to meet population needs nor the best team based interprofessional approaches. In addition, despite postgraduate training being a strong motivational and retaining factor, it can often be difficult to access for busy working professionals who cannot afford to be taken from or replaced in the workforce during their postgraduate education and training. To deliver universal health coverage, the quantity, quality, scalability and evaluation of family doctors and primary health care professional education and training must be prioritised and supported.

The huge power of digital disruption and technology provides the solution to scalable cost effective and clearly measureable new approaches. The infrastructure is now in place including expansion of fibre broadband even into the remotest of global communities, mobile networks across Africa and smart devices at affordable prices meaning that for many health professionals education, training can now occur anywhere, at any time and at the point of patient care. This report highlights examples and the opinions of thought leaders as to how this opportunity can be harnessed and should be prioritised by funding organisations. Our sincere thanks go to all of those who have contributed so generously to this report and to our patients and families who continue to motivate us to do better.

Dr Tom O'Callaghan
CEO iheed

Executive Summary

The challenges to achieving universal health coverage (UHC) are obvious yet vast in their scope: leading these is a lack of strong primary health care (PHC) systems and a global shortage of well-trained health care professionals. Addressing these challenges is paramount, as it is well-trained health care professionals who will build the strong PHC systems that are necessary for UHC. Due to the continuing spread and evolution of information and communications technology (ICT) in health care and education, ICT should be considered as an essential tool for innovative primary health care education.

Many nations face a distinct lack of UHC, grossly unequal health services and an acute shortage of suitably qualified family doctors, nurses and allied health care professionals that constitute the primary health care team. It is estimated that by 2035, the world will have a shortage of 12.9 million health care professionals, however an additional 1.9 billion people will require health care. Recruiting, educating and retaining these primary health care teams is therefore fundamental to meet ongoing demands.

Family doctors contribute to high quality, cost-effective and accessible primary health care. However, PHC faces considerable challenges, including a preference from policymakers, the public, and members of the health care community for specialisation. Specialist-focused care may be attractive, but it is often economically unsustainable and absorbs resources that are necessary for PHC. Yet, cooperation between primary and secondary care is essential for delivering the best care to patients and communities. It should not be a matter of choosing between primary and secondary care, but rather of recognising and adequately supporting the unique attributes and skillsets that each has to offer.

Family medicine lies at the heart of primary health care. The key to producing skilled family doctors is good family medicine training, particularly at a postgraduate level. There is great potential to improve the scale and quality of family medicine training, starting with exposure to the field as early as possible. For the delivery of primary care to be effective – and lead to the achievement of universal health coverage – the composition of the primary care team should reflect the demography and health needs of the local population. Thus, the composition of the primary care team will differ from location to location, depending on the age/sex/health needs of the local population. Family doctors and all of the PHC professionals should have a set of universal core skills, in addition to skills specific to the population and geography they serve. To provide effective care, health professionals need to understand the importance of social factors in influencing population health; therefore, training curricula must be adapted to local contexts

Career development through postgraduate training strongly motivates health professionals to stay in their own localities, as well as being vital for patient safety and improved outcomes. Yet, despite a thirst for postgraduate training among family doctors and other primary health care professionals, it is often difficult to access. ICT may be used to address recruitment and retention issues by providing easily accessible and good quality education.

This report examines a key question: Can ICT facilitate the education of PHC professionals worldwide in order to address the challenges facing PHC and UHC?

Through in-depth literature reviews, analysis, and targeted interviews with key experts, the report concludes that ICT can indeed support, enhance and accelerate the education of the primary health care team's members, in six key ways:

1 **It is an effective means of developing workforce capacity.**
By overcoming geographical barriers and supplementing traditional instruction with online delivery from international and regional tutors, ICT can substantially increase health care professionals' access to postgraduate education without the need for travel, thus helping to avoid disruption to healthcare delivery.

2 **It helps to recruit and retain professionals.**
E-learning overcomes issues of access and isolation, and can be done flexibly to suit the learner. By providing access to specialist support, postgraduate courses and mentoring opportunities, e-learning and telehealth encourage in-country and rural retention of health care workers.

3 **It is cost-saving.**
Traditional models of health professional education are expensive, both for the provider and for health care professionals. Developing ICT solutions may entail high initial costs but these are reduced over time, and with more users, achieve economies of scale.

4 **It facilitates social and collaborative learning which has been shown to have the greatest impact on patient outcomes.**
A blend of synchronous and asynchronous e-learning is likely to be the most effective way of achieving interprofessional learning. Communities of practice are encouraged using ICT and social media, reducing professional isolation and improving collaboration.

5 **It can help to bring contextualised care to where it is needed.**
For example, simulation-based medical education enables problem-based, interactive and contextualised learning. End-user (including patient) participation is paramount when designing ICT-based educational programmes.

6 **It improves the quality of care by facilitating access to evidence-based medicine and reflective learning.**
Email alerts can support education by reaching a large audience and providing trustworthy information tailored to individual needs; social media can aid in streamlining vast amounts of information into a small number of tailored-to-the-individual articles; blogs and electronic portfolios can encourage reflective life-long learning.

Capturing these opportunities will require stakeholders to consider the following:

+ Securing political and financial support to establish and maintain strong PHC systems

+ Adopting a collaborative interprofessional approach between health professionals, from medical school through to the workplace

+ Providing education and training relevant to the context and to user needs

+ Improving recruitment and retention through training

+ Encouraging the standardisation and accreditation of health professional education

+ Investing in ICT training for learners, educators and patients

+ Planning and developing programmes that use technology meaningfully to improve care quality, cost-effectiveness, accessibility, equity and patient safety

+ Recognise and consolidate the interdependence of all the health professionals in the PHC setting.

Introduction
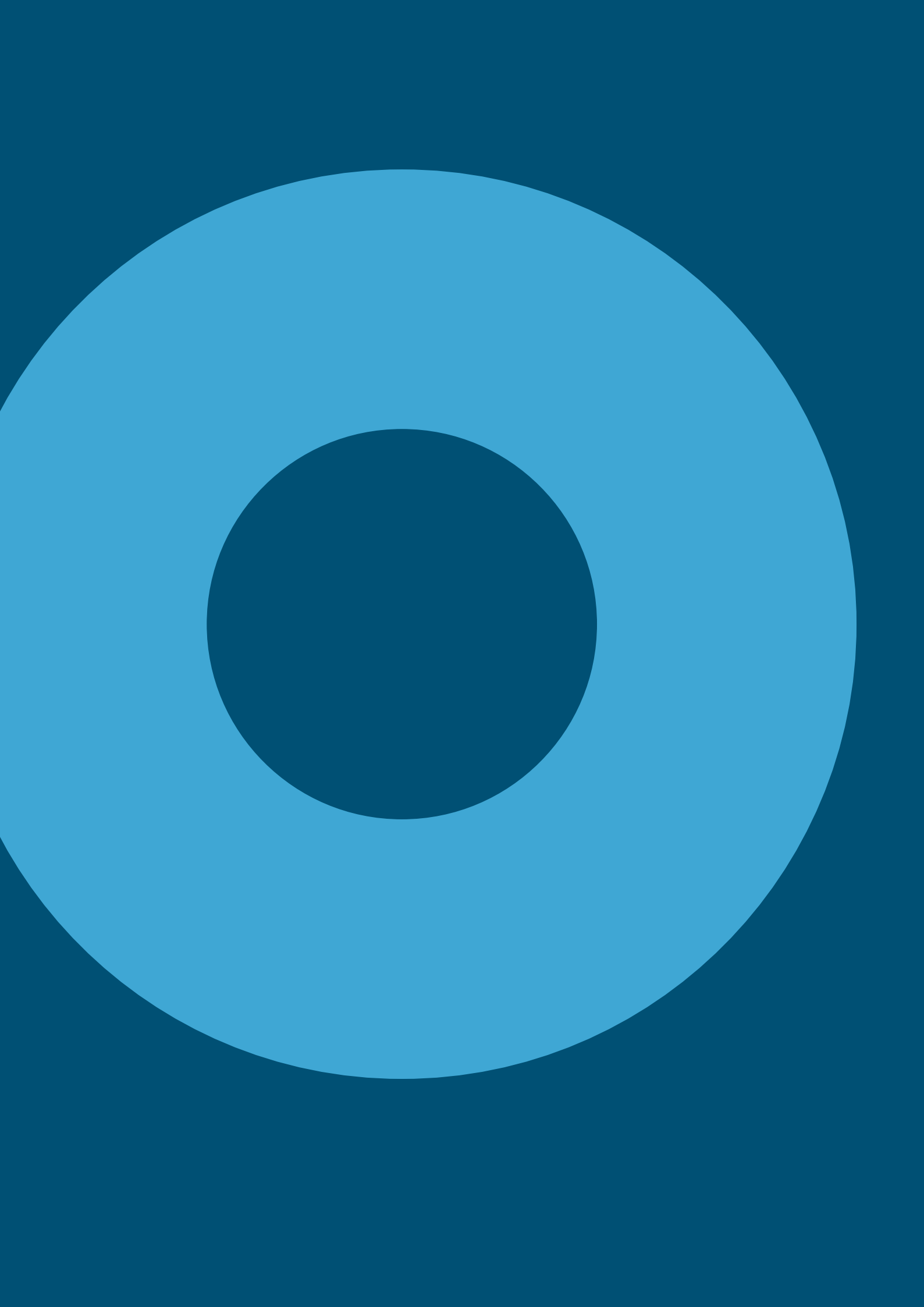
The Challenge

There is a severe shortage of well-trained and motivated primary health care workers, particularly family doctors across the world. Strong primary health care is essential for attaining the global goal of universal health coverage.

Health care systems face ever-growing challenges, including widening inequalities, emerging infectious and environmental risks, the rise of non-communicable diseases (NCDs), and ageing populations. Universal health coverage (UHC) is a goal "to ensure that all people obtain the health services they need without suffering financial hardship when paying for them" (1, 2). The World Health Organization (WHO) and the World Bank have urged governments to provide UHC for their citizens, and it is now a key United Nations Sustainable Development Goal (SDG). Despite this, UHC is proving difficult to attain in many countries. Why?

First, there is chronic under-investment in primary health care (PHC). A strong PHC system can manage almost all health care demands; at the heart of primary care lies family medicine. However, despite PHC and family medicine being crucial to cost-effective UHC, they are not well understood or supported in many countries, with the focus instead on secondary care and hospitals.

Second, there is a severe global shortage of health care professionals. Scaling up educational programmes to produce more health professionals - particularly in PHC - is both essential and urgent. However, simply generating more medical graduates will not be enough. In many areas, the state of health professional education has led to a mismatch between what health care professionals are trained to do and what populations actually need. Additionally, traditional teaching methods such as teaching via print-based materials, establishing training centres, conferences and train-the-trainer programmes are not only expensive but they require that the right set of skills and infrastructure are available in each country. Therefore, better quality undergraduate and postgraduate education and training are also required, to create motivated professionals who can flexibly adapt to the health needs of the populations they serve.
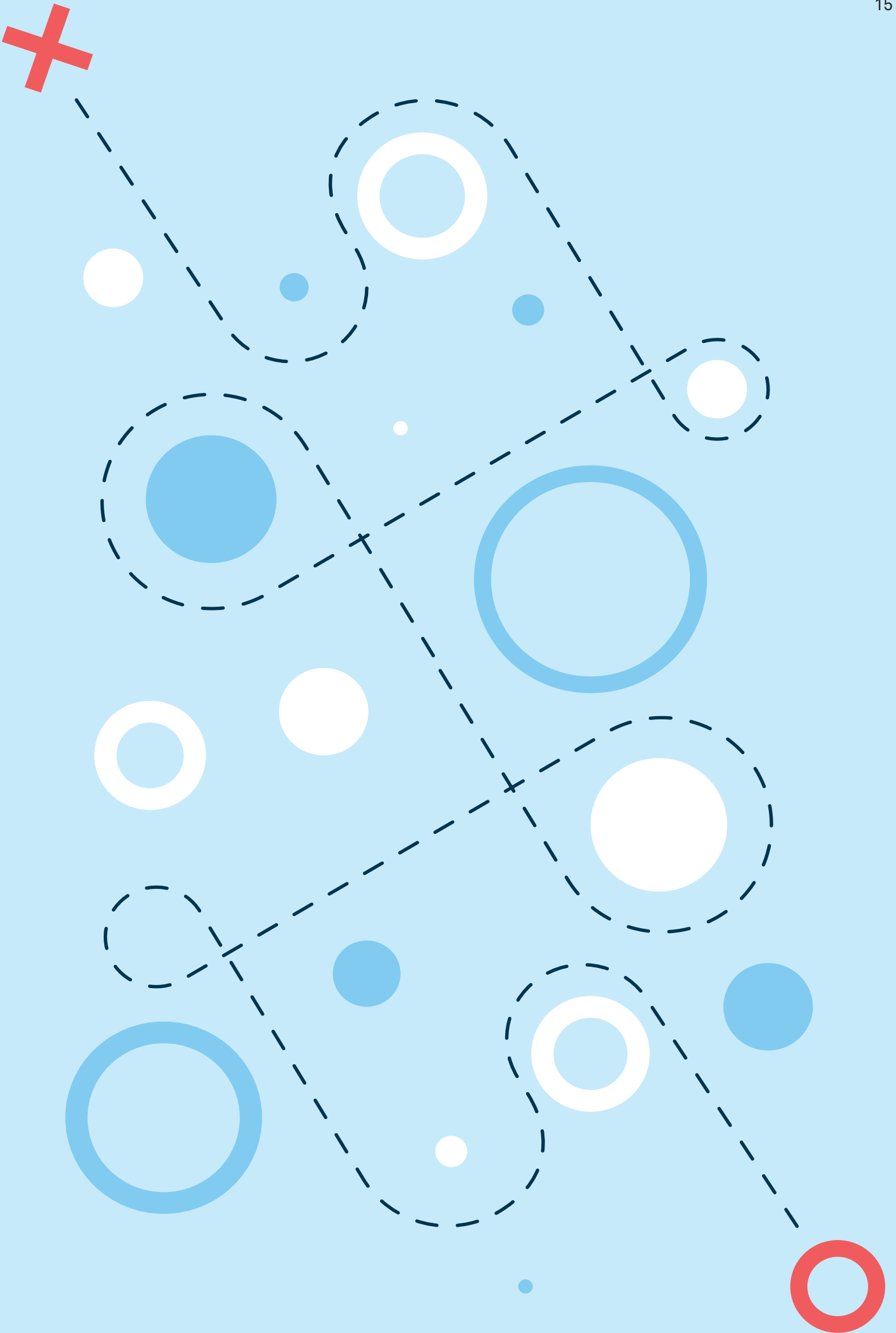
The Opportunity

Information and communications technology can support, enhance and accelerate primary health care professional education to address the challenges facing primary health care and universal health coverage.

Information and communications technology (ICT) has the potential to increase access to high quality, cost-effective education and training, thus broadening its reach and impact. Now that PHC is being recognised for its vital role in providing effective, affordable and equitable health care for all, the challenge is to identify the ways in which ICT can support, enhance and accelerate the training of PHC professionals.

This report addresses the following key question:

Can ICT contribute to and improve the education of PHC professionals worldwide in order to address the challenges facing PHC and UHC?

To answer this the report is divided into three sections that explore the following additional questions:

What is UHC, why is it needed, and how can PHC and family medicine contribute to it?

What is the current state of PHC education globally?

To effectively contribute to UHC, what are the critical learning needs of PHC teams? Are these learning needs being met?

What can technology do to address current limitations, challenges and gaps?

Where are technologies being successfully implemented and what can we learn from them?

A set of recommendations based on the findings from this report is provided in section four. These recommendations should be considered by stakeholders to support, enhance and accelerate primary health care professional education through ICT.

Methodology

First, a broad review was carried out to identify what is meant by UHC and the contribution of PHC in achieving it. Second, an in-depth review of the existing literature was performed to explore the current state of PHC medical education and how ICT has been employed in this field globally. Third, targeted interviews with key experts in the areas of PHC, family medicine, medical education and ICT, were conducted for the purposes of this project. The list of interviewees is included in Appendix I.
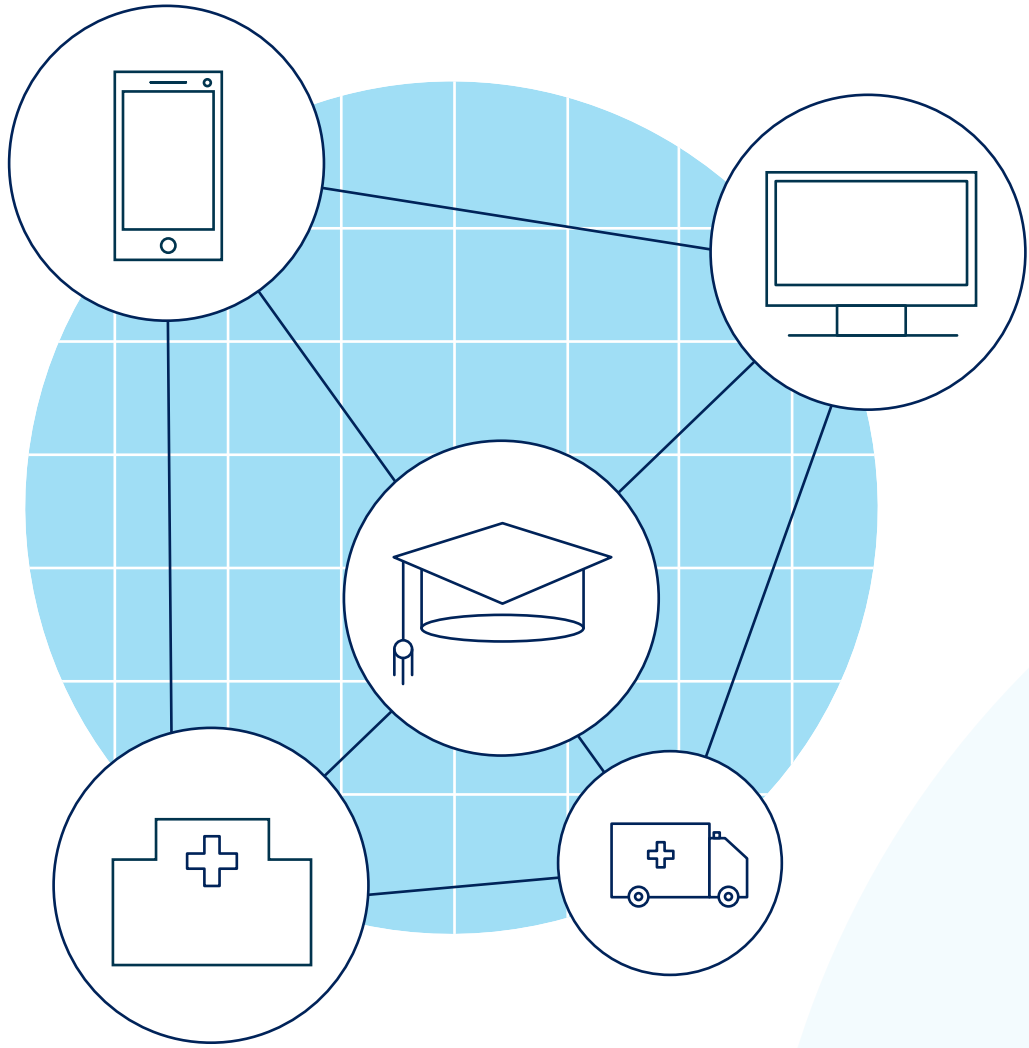
1978

The International Conference on Primary Health Care in Alma-Ata set the historic goal of "Health for all" (WHO recognized PHC as the key to attaining better health for all, participation and solidarity)

2008

The World Health Report 2008 - Primary Health Care (Now More Than Ever). "Health systems need to respond better – and faster – to the challenges of a changing world. PHC can do that"

2010

WHO published World Health Report 2010: Health system financing – the path to universal coverage, with guidance for countries to raise sufficient resources, improve efficiency of health systems, and achieve universal coverage (38)

2014

Within the report of Sustainable Development Solutions Network for the United Nations, UHC was identified as one of the priority challenges and goals

2015

World leaders adopted the 2030 Agenda for Sustainable Development. Under sustainable development goal SDG 3 (Ensure healthy lives and promote well-being for all at all ages) is the target 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.*

2013

WHO published World Health Report 2013: Research for Universal Coverage to improve "understanding [of] how to reach the goal of universal health coverage" using "the highest-quality science in order to deliver affordable, quality health services and better health for everyone" (50).

Section 1

Universal Health Coverage & Primary HealthCare

This section describes the crucial role of primary health care and family medicine in achieving widespread universal health coverage, along with the challenges that must be addressed.

Universal Health Coverage

Healthcare services are grossly inequitable, both within and between countries.

The burden of health inequities, illustrated in Figure 1, particularly affects low- and middle-income countries (LMICs) (2, 8).

The situation is exacerbated by ongoing global changes, notably:

+ the world's population is ageing

+ more people are migrating to urban centres

+ increased global travel and migration

+ non-communicable diseases (NCDs) have become the number one cause of death, replacing acute infections, malnutrition, and perinatal causes

+ more people are living with disabilities including mental health conditions, physical disability and the impact of chronic diseases and injuries (12).

Universal health coverage can provide equitable access to affordable and high-quality health care for all members of a society.

In 2010, universal health coverage (UHC) was defined as a goal "to ensure that all people obtain the health services they need without suffering financial hardship when paying for them" (1, 2). In 2012, the United Nations (UN) urged all governments to move towards providing UHC (5) and in 2014, UHC became a priority challenge and key Sustainable Development Goal (SDG) (6). Adopting UHC can lead to social equity, social and economic development in LMICs, and more rational use of resources.

"Access to health care is one of the fundamental human rights of all people."

Professor Michael Kidd, WONCA President, Past President of the Royal Australian College of General Practitioners (RACGP)

Achieving UHC requires political commitment to increasing health care coverage.

In order to address the above mentioned health inequities, governments must identify gaps and barriers in current policies and strategies, while developing agendas of action and change to implement within their health care systems. Action should be taken to address the dimensions of UHC (Appendix II) by:

+ extending coverage to uninsured people

+ expanding the range of services provided

+ increasing the proportion of costs covered and reduce reliance on out-of-pocket payments.

Achieving UHC requires strong health systems and adequate numbers of skilled health workers. According to the WHO, to achieve UHC the following are required:

+ a strong, efficient, well-run health system that meets priority health needs

+ affordability, through a system for financing health services

+ access to essential medicines and technologies

+ sufficient well-trained, motivated health workers

+ actions to address the social determinants of health.

90%

of the population of low-income countries have no health care coverage
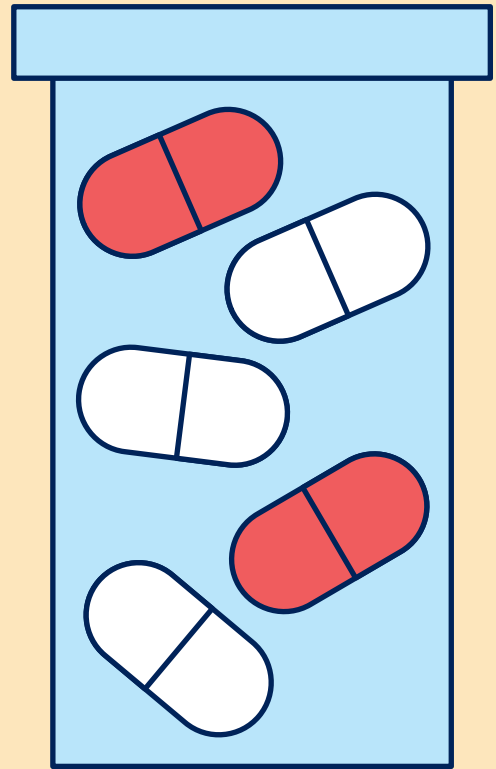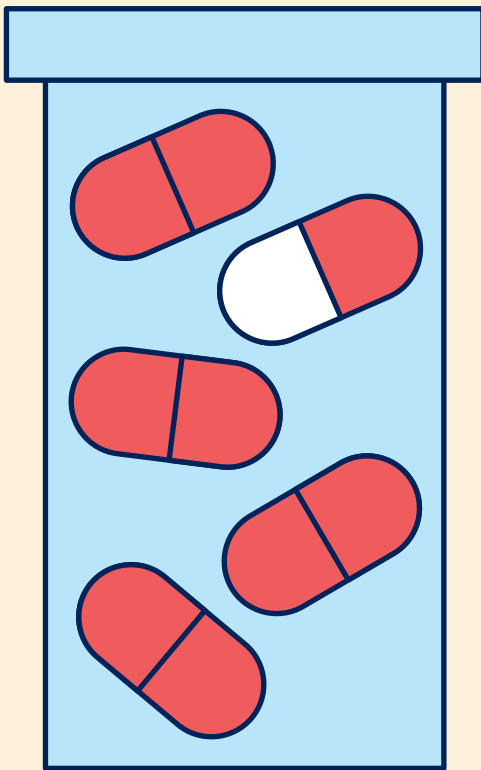
40%

of the world's population have no health care coverage
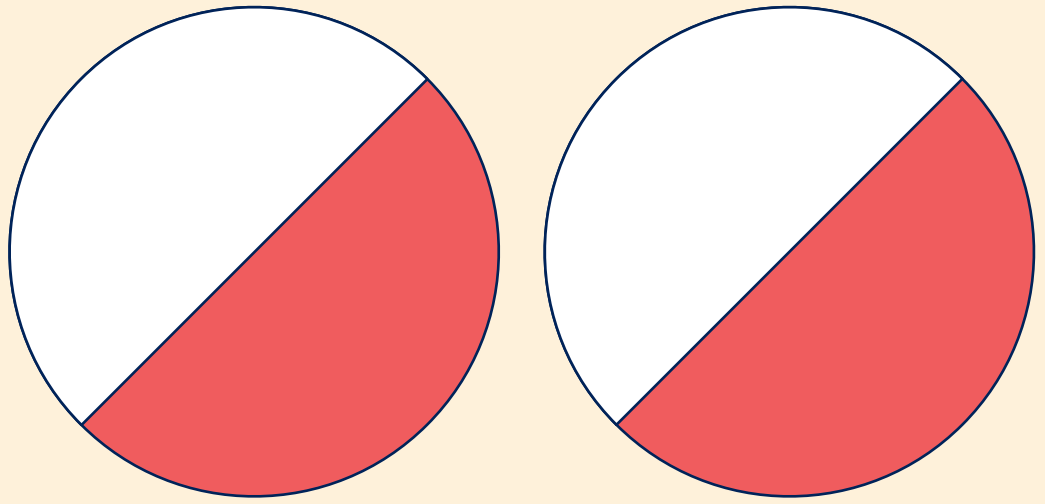
The proportion of births attended by a skilled health worker can be less than 20% in some countries and close to 100% in other

100%

20%
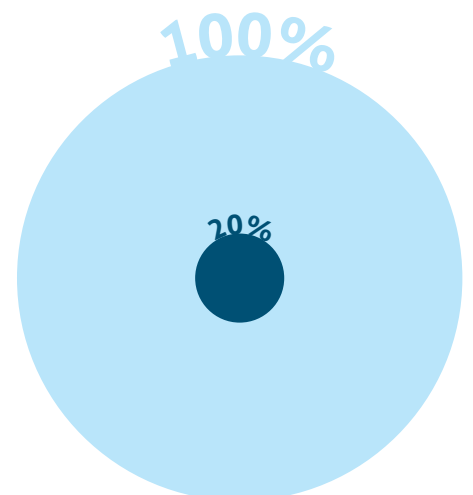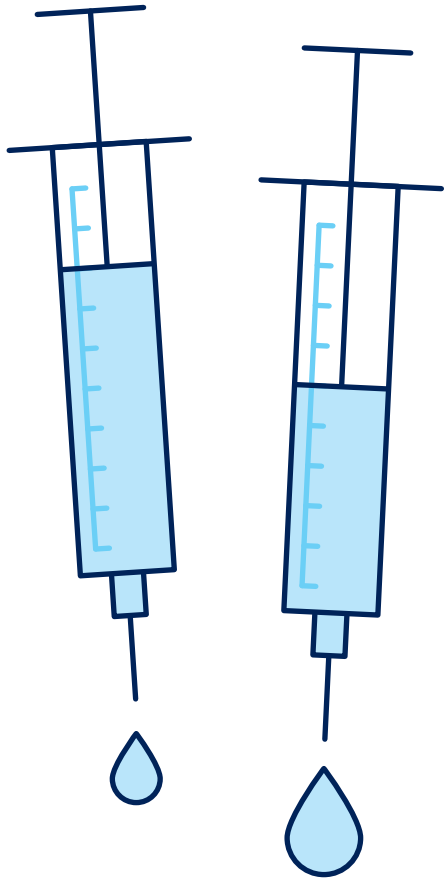
20—40%

of all health spending is wasted due to inefficiencies

100 MILLION

people are pushed into poverty every year due to health care costs

Figure 1: Global healthcare inequities (2, 8)

The Workforce Conundrum

By 2035, the world will have a shortage of 12.9 million health workers.

Having an adequate number of competent and motivated health workers is a pillar of UHC (10). Currently, due to a lack of trained health workers, approximately 1 billion people globally do not have access to health care services (14). By 2035, with an additional 1.9 billion people likely to need high-quality and affordable health care, the global deficit of health workers will have reached 12.9 million (11).

Migration is leading health workers to leave where they are really needed.

For UHC to be meaningful, the health care workforce must be distributed according to need. Yet, in addition to being in short supply, health workers are unequally distributed between and within countries. More are migrating, not only to higher-income countries in search of career progression or a better quality of life, but also within their own countries, for example from the public to the private sector, or from rural to urban areas (13). This phenomenon is colloquially known as 'brain drain'. Although brain drain is particularly evident in underserved rural areas, where over half of the world's population live as illustrated in Table 1 (14, 15), its impact is felt in all countries and across the entire socio-economic gradient; therefore, finding a solution is as much a matter of good economics as one of social justice. Recognising the effects of this health workforce crisis, the Kampala Declaration of the First Global Forum on Human Resources for Health urges policymakers to promote the retention and equitable distribution of health workers (16).

Table 1. Healthcare workforce inequalities in rural areas (14, 15)

Half of the world's population live in rural areas

Only 38% of the total nursing workforce serve these areas

Only 24% of the total physician workforce serve these areas

Example: Senegal's Dakar urban region contains only 23% of the total population but more than 60% of its physicians practice there

Example: 46% of the population of South Africa live in rural areas but only 19% of the nursing workforce and 12% of physicians practice in those areas

The Role of Primary Health Care

One of the most important steps towards achieving UHC is strong primary health care.

In the Alma-Ata Declaration of 1978, the WHO recognised primary health care (PHC) as the key to attaining better health for all, participation and solidarity (17). Its values and principles - including equity, solidarity, social justice, universal access to services and health systems strengthening - have since been reaffirmed by the WHO on several occasions (9, 18).

Primary health care provides entry into the health system, offering continuing care that focuses on the whole person.

What PHC is, and what it does, vary from country to country. Some of its common characteristics are presented in Table 2. In LMICs, PHC often refers only to the very essential set of health interventions outlined in the WHO Alma-Ata Declaration of 1978 (17, 19). However, it can be considered as entry into the health care system offering a person-focused care for all conditions in the community over time (19, 22). Conversely, secondary and tertiary care are specialised services that usually deal with more complicated, technically challenging or rare cases, mostly in a hospital setting (23).

"The other point about primary health care is its breadth, so it's able to serve a much wider variety of people with a variety of needs, and different needs even within the same person."

Professor Cindy Lam, Head of the Department of Family Medicine and Primary Health Care, University of Hong Kong

Primary health care is an extremely cost-effective strategy for delivering a wide range of sustainable health services.

Evidence from the World Bank highlights that 90% of health care demands can be managed through primary health care, with only 10% requiring hospital-based services (25). Experts interviewed for this report frequently highlighted how implementing high quality PHC is an efficient, cost-effective and sustainable strategy for delivering a wide range of health care services.

Health outcomes are better in countries with a strong primary health care system.

In countries with weak PHC systems *"people come later, they get sicker, it costs more; it costs them more, it costs the country more because there is that lost opportunity to stay well for longer"*, Professor Amanda Howe, President Elect of WONCA. Reducing delays in the identification of a condition requiring treatment can be one of the most important functions of PHC, especially within LMICs. Table 3 summarises the advantages of having strong PHC systems.

3

Table 2. Common characteristics of PHC

Patient-Centeredness

The PHC team takes into consideration the patients' concerns, beliefs and understanding of their health problems and adopts a holistic patient approach, addressing the patient's concerns in their bio-psycho-social, cultural and existential dimensions. Patients are empowered to contribute to their own health management (9)

Continuity of Care

Family doctors provide continuity of care and foster a therapeutic alliance with their patients through personal and stable relationships established over years (9).

Comprehensive Approach

The PHC team recognises the health needs of the communities in which they work. They work closely with other stakeholders to promote health (24).

Coordination

PHC is usually the point of first contact of patients with the health care system. The members of the PHC team work closely with each other as well as cooperating and coordinating with secondary care and other services. Team members advocate for the patient, ensure appropriateness, safety and cost-effectiveness, and support rational use of secondary care resources (3, 9, 24).

Community Orientation

The PHC team recognises the health needs of the communities in which they work. They work closely with other stakeholders to promote health (24).

Table 3. Advantages of a strong PHC system

Countries with strong PHC systems have (9, 25-30):

Improved health outcomes

Improved health outcomes

Lower infant mortality

Fewer years of life lost due to suicide

Fewer years of life lost due to all except external causes

Higher life expectancy

Enhanced access to care in socially deprived areas

Decreased use of hospital care and emergency services

Increased treatment compliance

Fewer consultations with specialties

Improved satisfaction with the health care services

Family Medicine

Family doctors contribute to high quality, cost-effective and accessible primary health care.

Family doctors are qualified specialists in family medicine. Family medicine contributes to high quality, cost-effective and accessible PHC (31). Despite this, the challenges family medicine faces in many parts of the world are significant (31-33), in particular: growing burdens of disease, rising patient and physician expectations, ever-increasing medical advances and new technologies, a lack of resources, a lack of formal training for doctors without postgraduate qualifications, and a disproportionate emphasis on specialist care.

Specialist-focused care is attractive but often economically unsustainable, taking resources away from primary health care.

There is a tendency within the health care world, and the public, to favour hospital specialism over community medicine. As Dr. Henk Parmentier of the WONCA Working Party on Mental Health notes: *"in some countries, people are used to immediately go [sic] to a hospital because that's where you get the best care possible, which is, of course, not true."* Policymakers also contribute to the specialist focus through their prioritisation in agendas and investment of scarce funds in secondary health care at the expense of PHC. This approach can be economically unsustainable, explains interviewees Dr. Mohammed Ibrahim Tarawneh, President of the WONCA East

Mediterranean Region, and Dr. Michael Schriver, PhD student of the Centre for Global Health at Aarhus University. Although governments in countries such as some of those of the East Mediterranean Region (EMR) can allocate expensive resources and equipment, such as X-ray machines, CT scans and MRIs, to hospitals, the comparatively small investment that PHC requires is often unavailable.

"Hospitals and the whole secondary and tertiary care systems appear to be incredibly seductive."

Dr. Garth Manning, Chief Executive Officer of WONCA

"You need to have government commitment to establishing [family medicine] as a system. There has to be recognition, incentives, and provisions to enable a system of family medicine to develop."

Dr. Paul Wallace, Professor emeritus of Primary Care, Research Department of Primary Care and Population Health, University College London

Family medicine can also be unappealing to doctors, especially where hospital-based or academic medicine is deeply entrenched, or where the high costs of medical education drive doctors to seek more lucrative specialties. For example, in the USA, the average debt of graduating students is approximately US $200,000 (36). This preference is reflected in data from the Organisation of Economic Cooperation and Development (OECD), which showed that a 35% growth in the number of doctors between 1990 and 2005 was primarily due to the rising numbers of specialists. In 2013, fewer than 30% of doctors were generalists in these countries (Figure 2) (48). This trend has also been seen in Thailand (9) and India, leading to a skew in the types and numbers of health professionals produced. There are too many specialists without the necessary skills to address of the needs of the populations they serve.

Collaboration between primary and secondary care improves health care quality.

It should not be a question of positioning primary and secondary care against each other and choosing between the two. As Professor Roar Maargaard, the EURACT representative for WONCA Europe Region, says: *"I sometimes have had this debate with family doctors from other countries as some of them at least still stick to the old fashioned way of looking upon it, as a specialist, as our enemies. I see them as our good colleagues."* Successful examples of primary care collaboration with secondary care exist, for example in North America and Spain (30) (34) (35). Within the Alzira Model in Spain, the regional government finances private care on a per-capita basis, and in return, universal access to a wide range of services is offered to patients. This functional, professional and clinical integration has been shown to improve health care quality, accessibility and efficiency (35).

In summary, PHC is essential for achieving UHC, but it faces a number of threats - in particular, a lack of well-educated and motivated health care professionals. However, solutions exist for such problems, and section two looks at the role of education in contributing to strong PHC and UHC.

"The reason we need to change the model is because for many years now we've been refighting the First World War. We have two trenches, one is called the hospital and the other primary care. The two trenches have completely failed to recognise each other's relevance or excellence or to be complementary/ complimentary to each other."

Sir Christopher Edwards
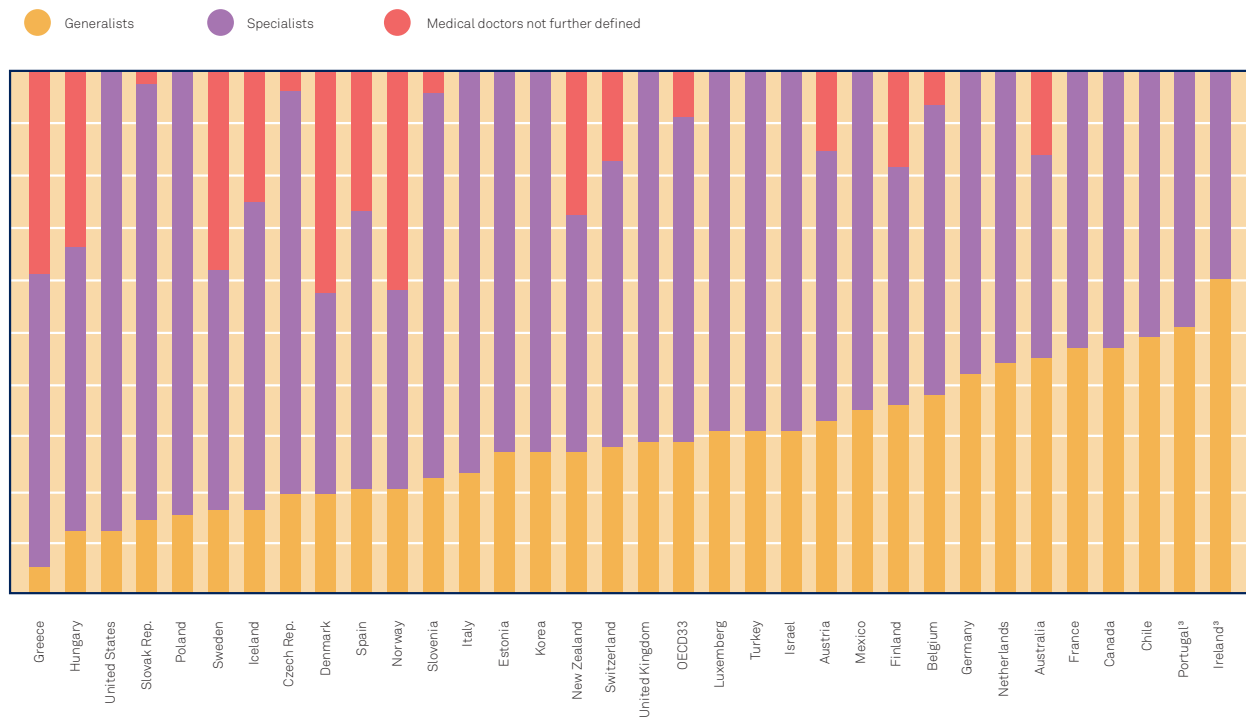
Figure 2. Percentage of generalists and specialists in member countries of the OECD in 2013.

Section 2

Education for Primary Health Care: the Road to Universal Health Coverage

This section examines how primary health care professional education can expand and improve the health workforce, thus contributing to widespread primary health care (PHC) and universal health coverage (UHC).

Health Professional Education & Primary Health Care

A transformative scale-up of health education is necessary to strengthen health systems and improve health outcomes.

As noted in Section 1, in order to strengthen PHC and achieve UHC, more health professionals are required. Worldwide, there are 2597 medical schools (41), 467 schools of public health, and an indeterminate number of post-secondary nursing educational institutions, which generate approximately 1 million new health professionals every year (36) as illustrated in Table 4. However, there is often a mismatch between what these professionals are competent to do and what populations actually need. The Lancet Commission on Education of Health Professionals for the 21st Century argues that this is due to "fragmented, outdated, and static curricula that produce ill-equipped graduates." (36)

Other reasons include:

+ a lack of understanding of population needs and the broader context

+ working in silos

+ a mismatch of competencies to patient and population needs

+ episodic encounters rather than continuous care

+ a focus on hospitals at the expense of PHC

+ imbalances in the professional labour market

+ weak leadership to improve health system performance (36)

+ insufficient collaboration between health and education sectors

+ unequal distribution of medical schools within and between countries (Table 3) (12, 40).

These systemic issues can limit the capability even of highly qualified personnel to improve health outcomes (37). Therefore, in order to improve workforce quality – and, in doing so, strengthen health systems and improve health outcomes - there needs to be a transformative scale-up of health professionals' education and training (38).

"Traditional approaches are not really up to the task of training a new generation of health workers, especially if we need to increase total numbers of health workers dramatically."

Dr. Adam Slote, Senior Health Advisor at USAID

Career development and continuing professional development strongly motivate health professionals to stay in their own localities.

Evidence shows that career development and continuing medical education (CME) strongly motivate health professionals to stay in their own countries and to practice in remote areas (43-45). Yet postgraduate education, including CME, is inadequate or non-existent in many countries (37). There are many reasons for this, from a lack of political commitment to a shortage of educators (40, 46). In sub-Saharan Africa, loss of medical school faculty is substantial, with half of schools experiencing a 6% to 18% decline in teaching staff within five years (47). Countries must retain health professionals by providing them with opportunities for career development, CME, motivation and support (39, 40).

1

Table 4. Number of medical schools worldwide (36)

	Population (millions)	Estimated number of schools		Estimated graduates per year (thosands)
		Medical	Public Health	Doctors
Asia				
China	1371	188	72	175
India	1230	300	4	30
Other	1075	241	33	18
Central	82	051	2	6
High-income Asia-Pasfic	227	168	26	10
Europe				
Central	122	64	19	8
Eastern	212	100	15	22
Western	435	282	52	42
Americas				
North America	361	173	65	19
Latin Amerca / Caribbean	602	513	82	35
Africa				
North Africa / Middle East	450	206	46	17
Sub-Saharan Africa	868	134	51	6
World	**7036**	**24200**	**467**	**389**

Workforce
(thosands)

Nurses / Midwives	Doctors	Nurses / Midwives
29	1861	1259
36	646	1372
55	494	1300
15	235	603
56	409	1543
28	281	670
48	840	1798
119	1350	3379
74	793	2997
33	827	1099
22	540	925
26	125	739
541	8401	17684

Family Medicine

Family medicine lies at the heart of primary health care, and the key to producing good family doctors is good family medicine education.

Expert interviewees point to a very mixed global picture of family medicine and PHC education and training. Dr. Paul Wallace, Professor emeritus of Primary Care, Research Department of Primary Care and Population Health, University College London, argues that general practice was traditionally a "drop-off" profession – one that graduates could enter without any form of postgraduate training – and that it has only been developed as a specialty in recent years in some countries. For example, the UK, Canada, and Australia have had postgraduate family medicine programmes since the 1960s, whereas others, such as some sub-Saharan Anglophone countries, have only begun to climb aboard this century (38), (45). As Dr. Matie Obazee, President of WONCA Africa Region, states: *"Apart from Nigeria and South Africa, I don't think there is any other country in Africa that has 100 doctors that have been trained at the postgraduate level in family medicine."*

There is great potential to improve the scale and quality of postgraduate family medicine training.

In addition to the low number or nonexistence of postgraduate family medicine training programmes in some countries, there are additional problems. According to the experts interviewed for this report, the reasons include:

+ long duration of training, especially in Africa, leading to a long lag time before seeing results
+ programmes concentrated in academic hospitals in urban areas, rather than spread across rural and urban areas
+ fewer medical graduates entering family medicine compared with need (e.g. in Canada)
+ lack of family doctors to teach on postgraduate programmes.

"In many countries there isn't a prior generation of family physicians that current trainees can emulate, or who can mentor the new physicians. Even if the society of family medicine was developed 25 years ago, only very few physicians were trained in the specialty, and now there are residents who are being trained by people who are not family doctors themselves"

Dr. Viviana S. Martinez-Bianchi, Assistant Professor of Community and Family Medicine at Duke University

These issues illustrate the need to modify as well as expand training programmes. For example, in the Eastern Mediterranean Region (EMR), 90% of PHC physicians are unspecialised generalists. As it is not possible for them to undertake a formal 3–4 year postgraduate course, they will need to upgrade their existing skills and knowledge to meet minimum criteria via a modified training process (32).

Every medical student in the world should experience family medicine as early as possible in their training.

The importance of exposure to family medicine in undergraduate training has been stressed by the World Organization of Family Doctors (WONCA) in the Singapore Statement from 2007: *"Every medical school should have an academic department of family medicine / general practice / primary care. And every medical student in the world should experience family medicine / general practice / primary care as early as possible in their training."* (38) If family medicine has a presence in universities, it is better able to provide postgraduate education and significantly increase recruitment into the specialty.

Context & Skillset

Training curricula must be adapted to local contexts.

Primary health care professionals should have a set of universal core skills that include clinical, diagnostic and essential soft skills. In addition, they should have context-specific skills. However, most educational institutions do not tailor their training to local and national needs. There are numerous reasons for this, from the educators themselves to organisational issues and lack of infrastructure, particularly in rural areas. If training does not match community needs, then patients will more often self-refer to secondary and tertiary care facilities, overloading them with problems that could be managed, and often managed better, in primary care (33).

Interviewees emphasised that training curricula must be adapted to the context of each country, acknowledging such factors as diverse disease epidemiology, the culture and tradition of the health care system, and patient expectations. For example, family doctors in Africa are generally expected to have basic surgical skills for emergencies, especially if they are located in rural areas; this is less likely to be the case in Europe and North America, where such care would often be provided by specialists.

To provide effective care, health professionals need to understand the importance of social factors in influencing population health.

In order to prepare health professionals to respond to their communities' health needs, curricula should emphasise the social determinants of health, including how they fuel health inequalities. To achieve this, training institutions need to seek input from and be accountable to their communities, including patients and those who care for them. This inclusivity should not be confined to curriculum design, but should also inform admissions policies and strategic planning (49, 50).

3
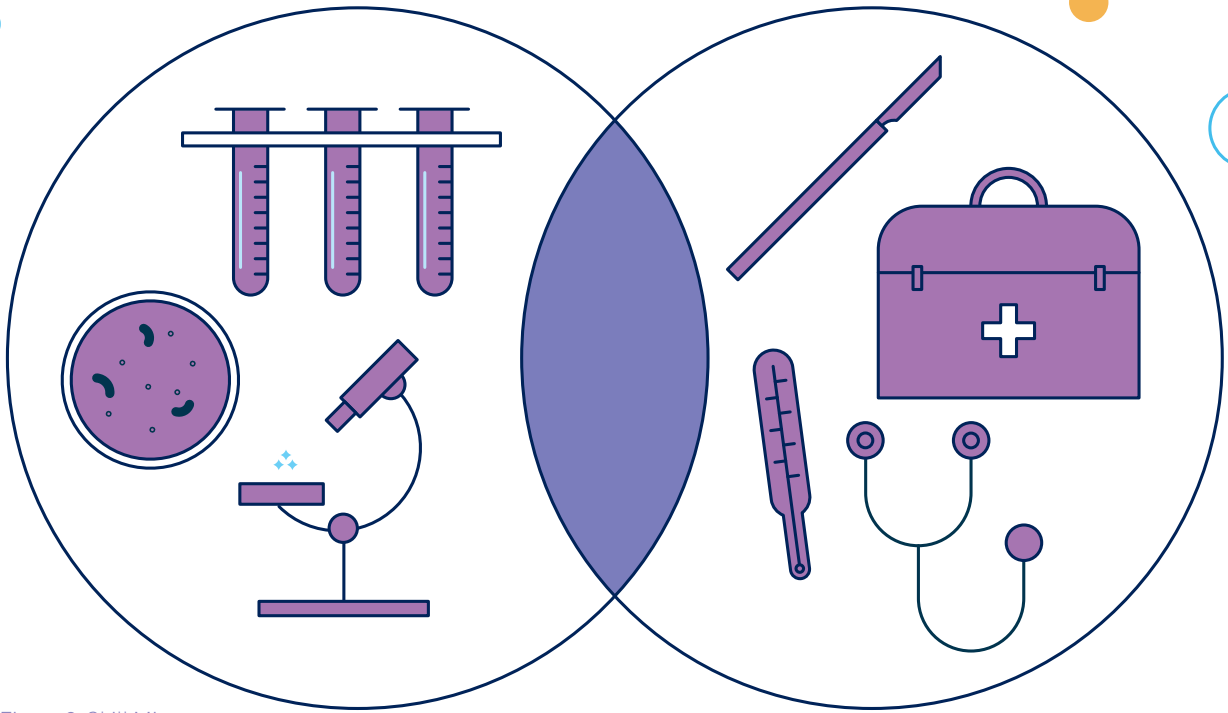
Figure 3. Skill Mix

"If you're a family doctor, in your community, you develop the skills and the competencies that your community needs. If you are a different kind of specialist, you tend to come to the community and you present your skills. 'Here it is, I do endoscopy, I can do this, I can do that' and the community adapts. The fundamental thing in primary health care is that ability to assess and meet the needs of the community and gain those skills."

Dr. Allyn Walsh, Professor in the Department of Family Medicine of McMaster University, Chair of the WONCA Working Party on Education

"So it's got to be (training) by rural doctors for rural doctors, by GPs for GPs. The idea of having specialists, yeah they're specialists in hospital medicine, they're not specialists in general practice; we're the specialists in general practice."

Dr. John Wynn Jones, Senior Lecturer in Rural and Global Health at the Keele Medical School, Chair of WONCA Working Party on Rural Health, Past President of EURIPA

With more people living with long-term conditions, health professionals will increasingly have to reach into homes and communities to deliver care. PHC in the community could potentially be provided by many health care providers with various levels of training, from health assistants, nurses, nurse practitioners, midwives and community health workers (CHWs) to fully trained family doctors (49).

Family doctors are well placed to lead primary health care teams.

However, to ensure effectiveness and sustainability, there needs to be an appropriate mix of health care workers and strong collaborative linkages between professional cadres. It is important to have health professionals who can offer support, supervision and training to team members and who can lead PHC teams. Family doctors are well placed for this role, and to do so will require additional skills to:

+ implement change quickly, based on local knowledge and experience (52)

+ communicate effectively

+ work with other sectors

+ tailor their approach to meet community and patient needs (50).

Interprofessional education is vital for effective primary health care.

If, as demonstrated above, interprofessional teams are crucial for delivering PHC, it is necessary to re-evaluate how each group of health professionals is trained; currently, this is in isolation from each other, until they join the workplace, where they are expected to perform as members of a team. To be more effective, they must develop cooperative and collaborative skills during their training, through learning with and from other disciplines and professions (12, 32).

Interprofessional teamwork that includes non-professional health workers may be of even greater importance for health system performance in PHC, especially if it includes ancillary health workers, administrators and managers, policy makers, and local community leaders (36). Therefore, *all* members of the PHC team, not just the health professionals, should have continuing education and training.

Allied Health Professionals

Community Health Workers

Nurse Practitioners

Midwives

Family Doctors

Figure 4. The Primary healthcare team

"Maybe primary health care is not about more doctors. It's about different kinds of doctors and more nurses and more community health workers delivering care at home and a more empowered and educated patient population."

Dr. Robert Bollinger, Professor of Infectious Diseases; Founding Director of the Center for Clinical Global Health Education (CCGHE), Johns Hopkins University

"You also have to have a trained community health worker or primary care physician to say ok, this is what I can do, this is what I have to refer to another level."

Dr. Francisco Becerra, Assistant Director of Pan American Health Organisation (PAHO)

Continuous & Postgraduate Learning

Continuing medical education (CME) is vital for patient safety and improved patient outcomes. Yet, despite a thirst for CME among primary health care professionals, it is often difficult to access.

In order to keep up-to-date with current best practice and new health issues, PHC professionals must continuously learn and upskill themselves. Continuous postgraduate education plays a vital role in maintaining high quality standards to ensure patient safety and optimal patient outcomes (53-59). Access to CME is also important for retaining rural practitioners (43, 59, 61).

Primary health care professionals are greatly motivated to acquire and retain the skills necessary for their daily roles (65). However, in some countries CME is not a legal requirement or even recognised; in other countries, it is mandatory but may suffer a lack of organisational support or accredited, university-led courses to deliver it. The individual will often have to learn in their own time and must be motivated to do so.

In addition, many will struggle to access CME due to professional isolation, lack of locum relief and heavy workload(9,10); this is seen particularly in rural areas, for example in China, sub-Saharan Africa and Brazil (59, 62-64). Much CME traditionally happens through conferences, seminars and other face-to-face meetings, which can make attendance difficult. Additionally, little is known about what happens to patients when professionals leave their posts to be trained elsewhere.

"We have a responsibility to teach and we have a responsibility to learn and we never stop doing that. When we stop doing that we might as well leave the profession."

Dr. John Wynn Jones, Senior Lecturer in Rural and Global Health at the Keele Medical School, Chair of WONCA Working Party on Rural Health, Past President of EURIPA

4

"So unless I am just intrinsically motivated to continue bettering my skills as a clinician or a nurse or a community health worker, there really is no extrinsic motivation, incentive or disincentive or requirement that will prevent me from maintaining my livelihood without spending any time on CME."

Dr. Alain Labrique, Associate Professor, Program in Global Disease Epidemiology and Control, Department of International Health, Johns Hopkins Bloomberg School of Public Health
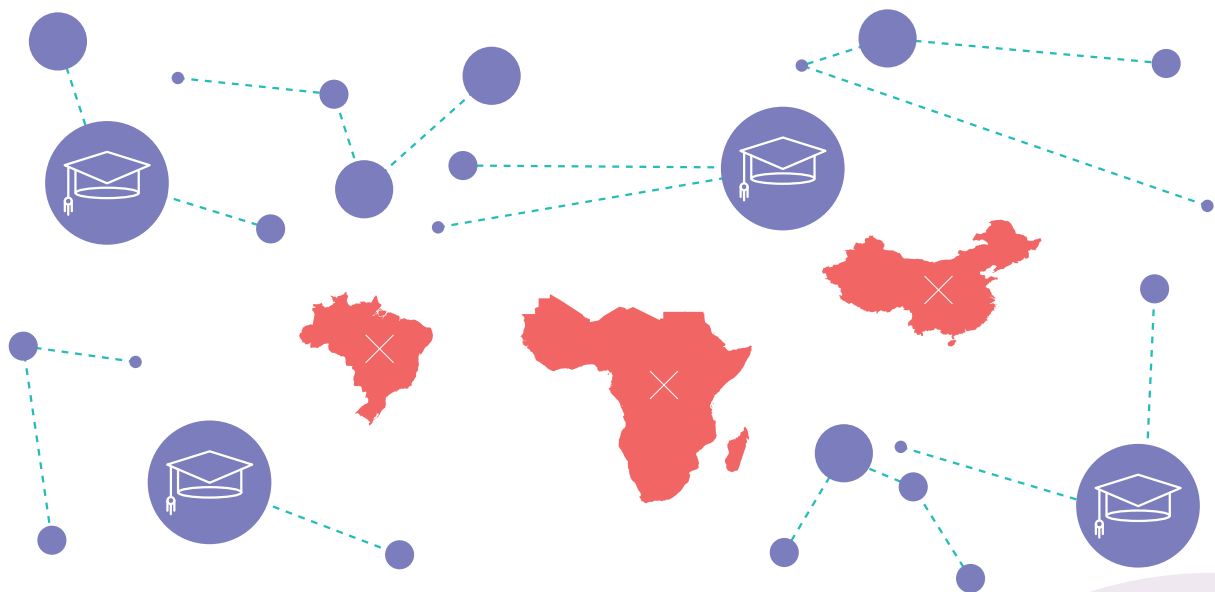

Figure 5. Difficulty in accessing postgraduate training and CME

"None of us have done an opportunity cost for the client when their providers are being taken away from their practice sites out into training for one week, two weeks, three weeks at a time. What does that do to the client that's been left behind? Are they getting services? We couple it with a major shortage in health workers and you can imagine what kind of situation it leaves them in."

Mustafa Kudrati, Pathfinder International Country Representative in Tanzania

A framework for improving quality and reducing inconsistencies in continuing medical education.

Despite approximately US$100 billion per year being spent on health professional education globally (36) very little is known about its cost effectiveness (42). The quality of medical education is generally assessed through the ability of candidates to pass exams rather than their ability to improve health outcomes; as Dr. Robert Bollinger of Johns Hopkins University says: *"We're just doing a lot of education, and we're measuring knowledge, but we're not measuring other outcomes."*

In family medicine, mechanisms to regulate the quality of education are often weak and inconsistently applied (37). Based on the Postgraduate Medical Education World Federation for Medical Education (WFME) Global Standards for Quality Improvement, WONCA have developed the *Global Standards for Postgraduate Family Medicine Education*, which offers a far-reaching and flexible framework suitable for quality improvement, new programme development, peer review, and recognition and accreditation (60).

While global standards are important, the real challenge lies in getting health professionals to undertake learning *"that is matched to their deficiencies and not on their expertise or the things they are already good at"* [Professor Jean Muris, Director Specialty Training in Family Medicine and Professor of Asthma and COPD in Primary Care at Maastricht University]. Understanding this is in itself a skill to be developed throughout the educational process.

Section three examines how these challenges to primary health professional education can be addressed through the use of Information and Communications Technology (ICT).

"I think it's important that we respect the professionalism of the members of our profession, that we don't have to mandate all elements of continuous professional development, that doctors are able to determine their own educational needs."

Professor Michael Kidd, WONCA President, Past President of the Royal Australian College of General Practitioners (RACGP)

Section 3

How Can Information & Communications Technology Enhance and Improve Health Care Education?

This section describes how Information and Communications Technology (ICT) is currently used in health professional education and explores how it can improve primary health care (PHC) professional training as part of a broader strategy to achieve universal health coverage (UHC) through high quality, affordable and equitable PHC.

ICT can improve the education of PHC professionals worldwide in order to address the challenges facing PHC & UHC.

Electronic health (eHealth) applications, including e-learning[1], are flourishing, as a result of recent global advances in ICT such as fibre and wireless technology. Currently, ICT is used in medical education, clinical practice, for CME, and in developing professional social networks (68). As this report demonstrates, there are huge opportunities to further harness its potential in the transformative scale-up of health professionals' education and training (46, 67). ICT can improve PHC professional education in a number of ways, described opposite.

ICT can help to scale-up and build capacity in health professional training

The problems highlighted in Sections 1 and 2 (unequally distributed medical schools; insufficient numbers of graduates; scarcity of postgraduate education; migration of health professionals; critical shortage of teaching faculty) clearly demonstrate a need for alternative approaches to scaling-up the health workforce.

E-learning provides a rich learning environment for training health professionals in large numbers.

ICT, specifically e-learning, is an effective means of developing workforce capacity (68)(83), primarily due to its ability to overcome geographical barriers (see below). For example, South Africa's National School of Public Health developed an online learning programme that resulted in five times more graduates than all other schools in the country combined within 5 years (36).

Common e-learning options include:

+ internet-supplemented courses that include online lectures, email, and links to online resources

+ internet-dependent courses that require students to use resources from the web

+ full online courses with little classroom or direct human interaction

To deliver education successfully through e-learning, the relationship between technology, pedagogy and content is vital. In undergraduate health professional education, e-learning has been shown to achieve the same level of knowledge and skill acquisition as traditional learning (66). E-learning has also been successful in improving specific knowledge, behaviours (69-77) and skills in practicing health professionals (78-82).

[1] e-learning is "an approach to teaching and learning, representing all or part of the educational model applied, that is based on the use of electronic media and devices as tools for improving access to training, communication and interaction, and that facilitates the adoption of new ways of understanding and developing learning." (66)

ICT can be used to supplement instruction where there is a shortage of teaching faculty.

E-learning can be used where there is a shortage of teaching faculty in institutions. One way of doing this is through learning management systems (LMS) such as Moodle or BlackBoard, which include interactive course material and quizzes. LMS can also simplify administrative tasks, track learners' achievements and store educational resources (86). Other tools for supplementing instruction include virtual libraries, webcasting, and recording of training sessions for playback at a different time or place (46, 68).

"I've seen it used in Botswana, where they are extremely challenged by large geographic distances, and where they've set up these smart boards so that they can have one session going on in one location and then 800km away another group of trainees are able to participate in that session too."

Professor Per Kallestrup, Associate Professor; Co-Director of Center for Global Health, Aarhus University
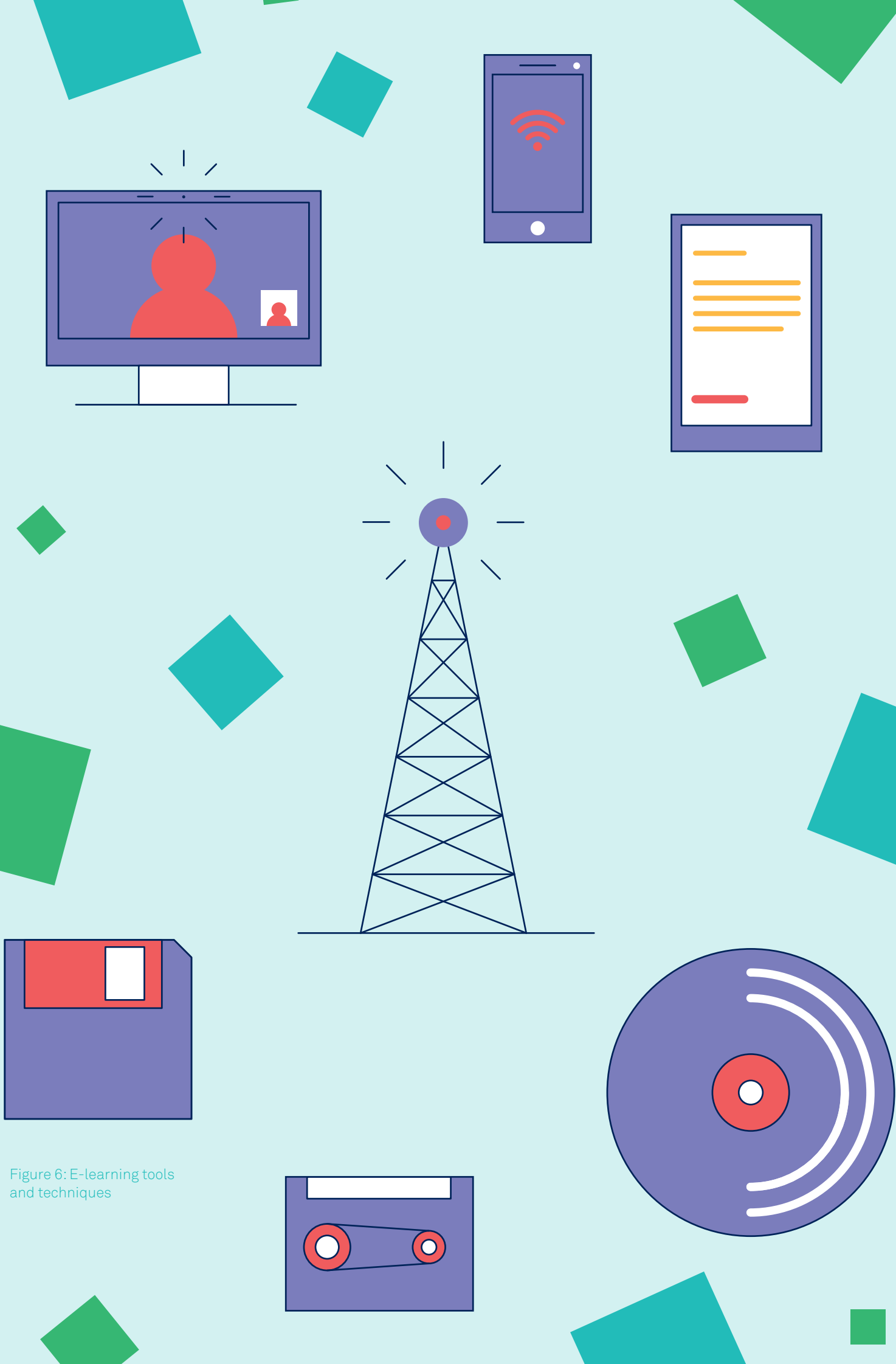
ICT can overcome issues of access & isolation

E-learning is flexible to suit the learner and helps avoid disruption to healthcare delivery.

The phenomenal expansion of mobile devices, along with increased interest in mobile health solutions, has made it possible for e-learning to occur anywhere, at any time (Figure 4).

E-learning allows health professionals to access high quality, appropriate and relevant education at times and places that suit them best, saving them money and time (43, 65). E-learning can take place in the community, at the point of care or at other convenient places, enabling more contextual learning and permitting health-care providers to remain within their clinics and communities without disruption to healthcare delivery (46, 98). As illustrated opposite, online CME has become the most popular form of CPD for doctors in the USA (70).

Online Continuing Professional Development (CPD) activities represent by far the most popular form of CPD in the United States (40% of all CPD credits). Between 2003 and 2010, the number of physicians receiving credit for online CPD increased by 800%, compared with an 89% increase for all CPD programmes (70).

"Technology increasingly has a place to play, particularly in rural and remote areas. But I think from the education and training point of view it offers massive opportunities for people in more isolated positions to be able to upgrade their skills and their knowledge and everything else."

Dr. Garth Manning, Chief Executive Officer of WONCA

"The mobile phone is the most potent virus the world has ever invented. It has infected nearly 5 billion people"
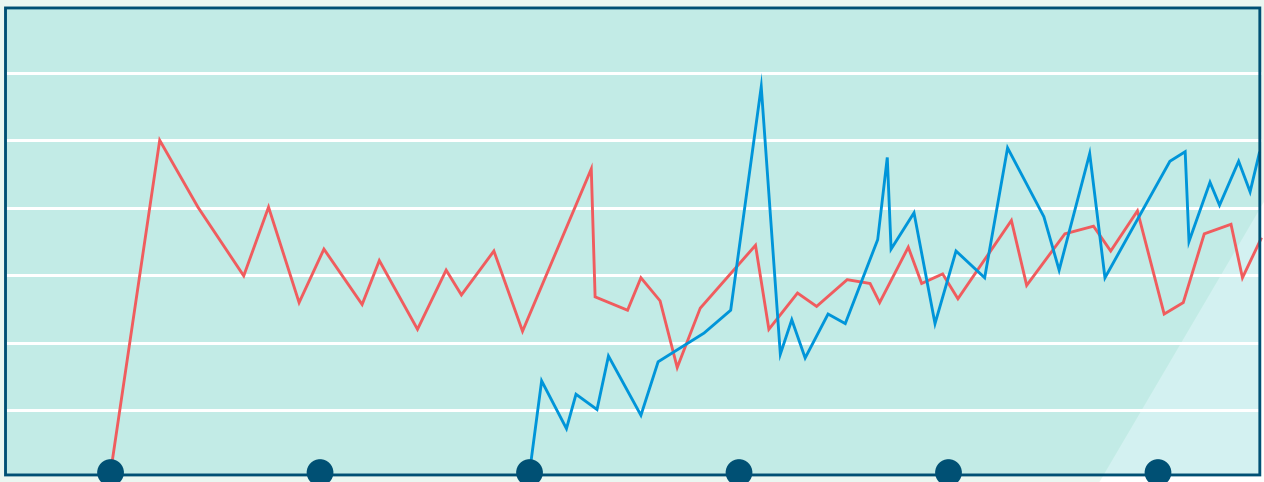
Sir Christopher Edwards

Figure 7. Search interest for the terms "mHealth" (blue line) and "mobile health" (red line) since 2004 –via Google trends.

"So this makes them know that when they go into a facility that has telemedicine capabilities that they actually will not be alone. They will have specialty back-up in those areas and they can consider doing that."

Kelly Rhone, MD FACEP, Emergency Physician, Innovation Medical Director at Avera eCare

By providing access to specialist support, postgraduate training, CME and mentoring, e-learning and telehealth[3] encourage in-country and rural retention of health professionals.

Telemedicine [4] allows PHC professionals to learn from specialists. This can be done through direct interaction (e.g. asking questions, discussing a case), or indirectly, by observing the specialists consulting with patients remotely (103). For example, in Brazil, the Ministry of Health has established an eHealth programme, which offers tele-education to Family Health Strategy teams via web conference courses, and tele-support via teleconsultants who answer clinical questions and discuss cases (91). Knowing there is support just a video call away reassures health professionals that they are not alone, which is an important factor in retaining and recruiting staff.

Telemedicine also has a positive impact for patients. Through telemedicine consultations, patients can access specialist care or advice where it might otherwise have been unavailable. This can reduce the need for costly, inaccessible referrals (101, 102). Dr. Francisco Becerra, Assistant Director of the Pan American Health Organization, notes that if *"the person doesn't have the means to pay the bus ticket or the money to eat and stay for two or three days in a referral facility, then that person is lost, because that person will never go to the referral."* For patients, this leads to poorer health outcomes.

Telehealth increases access to CME. It has been proven to be effective in upskilling health professionals in the management of Hepatitis C virus (HCV) and mental health, amongst other things (101, 102, 104). As Maurice Mars, Professor and Head of the Department of Telehealth at the University of KwaZulu-Natal in South Africa argues *"you don't need to have the most expensive video conferencing infrastructure, you can do it over Skype"*. Furthermore, it allows patients to give feedback about their care, which can help to improve quality and effectiveness.

There is also a role for telehealth in mentoring learners as traditional face-to-face mentoring can be hampered by geographic isolation and lack of time or faculty. E-mentoring is a computer-mediated, mutually beneficial relationship between a mentor and a mentee, the benefits of which include:

+ no geographic barriers to mentorship

+ trainee access to otherwise unavailable expertise and assistance

+ more frequent and convenient interaction between mentees and mentors

+ more privacy and anonymity than face-to-face communication, so mentees may be more liable to address sensitive and personal concerns.

Despite some legitimate concerns about how far teleconferencing can go to replace 'real' physical interaction (66, 106), together e-learning and e-mentoring promise great opportunities for health professionals (105). Video or teleconferencing tools can provide practical training and develop even those skills commonly considered only possible to teach in person. Notably, telemedicine has been widely used to successfully mentor and train surgeons (107). Dr. Kelly Rhone, an emergency physician in the United States who helps rural practitioners with emergency cases via video, says: *"Oftentimes I feel that when I teach over the camera, it's very similar to when I teach at the bedside. I can't actually guide their hands, but I can walk someone through that pretty easily."*

[3] According to the WHO, telehealth includes surveillance, health promotion and public health functions (100).

[4] Telemedicine is the use of telecommunications to diagnose and treat disease and ill-health. It is a narrower definition compared to telehealth, as it does not include ICT to support management, surveillance, literature and access to medical knowledge (100).

ICT is Cost-Saving

Developing ICT solutions may entail high initial costs, but these are reduced over time, and with more users, create economies of scale.

Traditional models of health professional education are expensive and time-intensive for the educator and learner alike. The initial costs of e-learning, e.g. for equipment, connectivity, and tailoring programmes, may also be high (68). However, as Dr. Alain Labrique, Associate Professor at Johns Hopkins Bloomberg School of Public Health, points out, once the necessary equipment and infrastructure are available, e-learning can offer monetary savings while at the same time improving quality and access. Furthermore, once the initial investment has been made, the resources will last for a number of years, requiring approximately only a 5-10% annual updating cost (10).

Normally, for a fixed investment cost an online learning resource can be made available to almost limitless numbers of learners at negligible extra cost. When programmes are provided to large numbers of learners, the lower the cost per individual learner (95), thus creating 'economies of scale', and especially so in medical education, which has the potential for massive scale-up. Bearing this in mind, providers should strive to reach the largest possible audience (97).
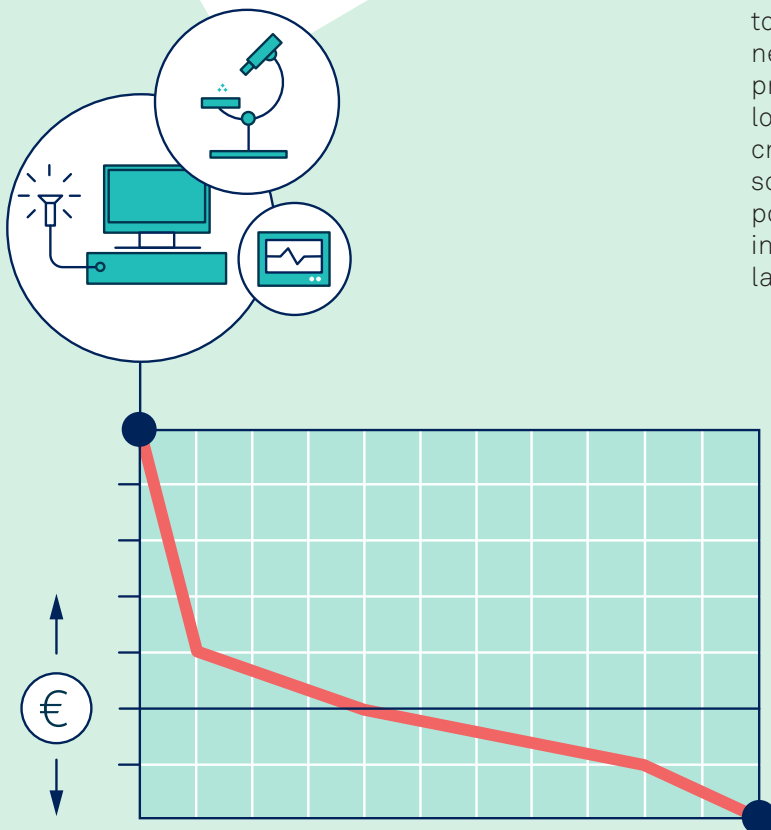
Figure 8. Cost-saving with e-learning

"It's very much scalable and you can get thousands of people through the e-learning resource, track them and encourage them to change their practice as a result. Eventually over a period of time, it becomes relatively low cost, but more importantly high value in terms of the quantity and quality of education that you've delivered."

(E-learning professional)

To achieve cost savings in e-learning, providers should pay attention to sharing of resources, interoperability between different systems, usability, and accessibility.

In addition to high start-up costs, interviewees pointed to the costs of technology redundancy and sustainability. A lack of willingness by providers to share the fruits of their invested time and money can increase overall costs related to e-learning (97). Dr. Judith Shamian, President of the International Council of Nurses, refers to the consequent technological redundancy as the **'black hole phenomena'**:

"Every organisation thinks that they have to invent the universe for themselves. Everybody goes out and spend millions and millions for no justification in order for them to get what they're going to throw out in three or four years because they are not happy with it."

Even if content were to be shared to reduce costs, individual systems, strategies and protocols may not be interoperable(14). Dr. Krishna Jafa of the Bill and Melinda Gates

Foundation notes that this lack of or limited interoperability may break information flows and thus continuity of care for patients, especially in highly mobile populations. However, there are technical standards for e-learning that can help with these issues, for example the Shared Content Object Reference Model (SCORM)[5]. They also ensure quality and protect any investment made in the creation of e-learning (66). At the same time, greater support of the open education resources movement to access to freely licenced materials for teaching and learning should be encouraged (36).

The bring-your-own-device (BYOD) trend - using participants' own mobile devices, such as laptops, tablets and smartphones - may mitigate the costs of acquiring, maintaining and updating equipment, and transfers responsibility for security and repairs to the end-user (98). However, it is worth noting that apps that store and transmit patient data should conform to regulations that uphold patient confidentiality (99).

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[5] This model was developed to provide standards for use, exchange, management and tracking of learning content. It ensures the five SCORM- "-ilities" (interoperability, reusability, accessibility, manageability and durability) (66).

ICT facilitates interprofessional and collaborative learning

ICT can facilitate interprofessional and collaborative learning, which has the greatest impact on health outcomes.

Section 2 noted that interprofessional education, while being crucial for effective primary health care (PHC), is sorely lacking. The ability to provide interprofessional education may be hampered by large numbers of students, low faculty-to-student ratios, cramped facilities, scheduling conflicts and geographical distance. By circumventing these barriers, ICT can bring together groups that might not otherwise have an opportunity to learn together and from each other (16) (108).

Research has consistently shown that interactive techniques have the greatest impact on patient care outcomes, compared with didactic approaches that only provide information (109). Despite this, most online CME and postgraduate education providers tend to ignore the social and collaborative aspects of interprofessional learning, offering instead pre-packaged modules that provide information in a linear sequence.

A blend of synchronous and asynchronous e-learning is an effective way of achieving interprofessional learning.

This is known as the "blended learning" approach (110), which promotes a "flipped classroom" in which health professionals can access learning materials asynchronously (for example, through e-mails, podcasts, recorded lectures, videos and journals), and synchronously (through teleconferencing, internet chat forums, instant messaging and social media). The synchronous, real-time aspect can help to overcome the lack of interaction, limited tutor support and feelings of isolation that may occur with e-learning and promote collaborative learning.

Virtual communities of practice (VCoPs) and virtual worlds can facilitate collaboration.

Knowledge-sharing and face-to-face communication within a community of practice (CoP)[6] can be augmented virtually (VCoPs) and supplemented by social media platforms (111). VCoPs are merging in different health system levels and offer numerous benefits.

"Through WhatsApp we do chat and through chatting using WhatsApp I feel more educated. The person I am chatting with educates me and also I educate her or him so it helps me. You know some send photos and explain about them, therefore I learn"

(CHW interviews from the mCHW mobile learning project)

All cadres of health workers can participate in VCoPs. For example, community health workers (CHWs) can use easily accessible tools such as WhatsApp, as demonstrated by the mCHW mobile learning project in Kenya, a collaborative effort between the London Knowledge Lab at University College London (UCL) and the African Medical and Research Foundation (AMREF). Here, WhatsApp facilitated communication between CHWs and their supervisors, strengthened their link to the PHC system, and offered peer learning opportunities. Despite the benefits, VCoPs can be challenged by a lack of time, privacy concerns, technological hurdles, and continuous demand for content (111, 113). Appendix III outlines ways to increase user satisfaction with VCoPs.

Virtual worlds are computer-based, simulated multimedia environments, which offer graphical representations of physical spaces, where real people use avatars to interact with each other and their surroundings. They allow immersion[7] and social presence[8], which is conducive to experimentation, simulation, collaboration, community-building and information exchange. Their ability to allow interaction with other health centres, health professionals and faculty have been cited by health professionals as some of the most important positive features (90, 93). However, some argue that like social networking, virtual worlds are antisocial and lacking in human connection (93). Other challenges associated with teaching in virtual worlds are illustrated in Table 5. Vikram Patel, Professor of International Mental Health & Wellcome Trust Senior Research Fellow at the London School of Hygiene and Tropical Medicine, counters that, while human connection cannot be replaced by digital training completely,

"What it can do is improve access to learning for some skills and then reserve the face-to-face components for the skills which are not transferable to digital platforms."

Table 5. Challenges related to teaching in virtual worlds.

Technical problems associated with hardware and software requirements, bandwidth, and firewalls

A steep learning curve to acquire technical skills

Time required to adjust to using an avatar

Lack of facial expressions

Difficulty in reading body language

Potential for distraction

Possible exposure to inappropriate content

[6] Communities of practice have been described as "groups of people who share a concern or a passion for something they do and learning how to do it better as they interact regularly" (111)

[7] Immersion refers to the sensation of being enveloped by and interacting with the virtual surroundings.

[8] Social presence is a sense of being present with other avatars at the same time and at the same place despite geographic distance (93).).
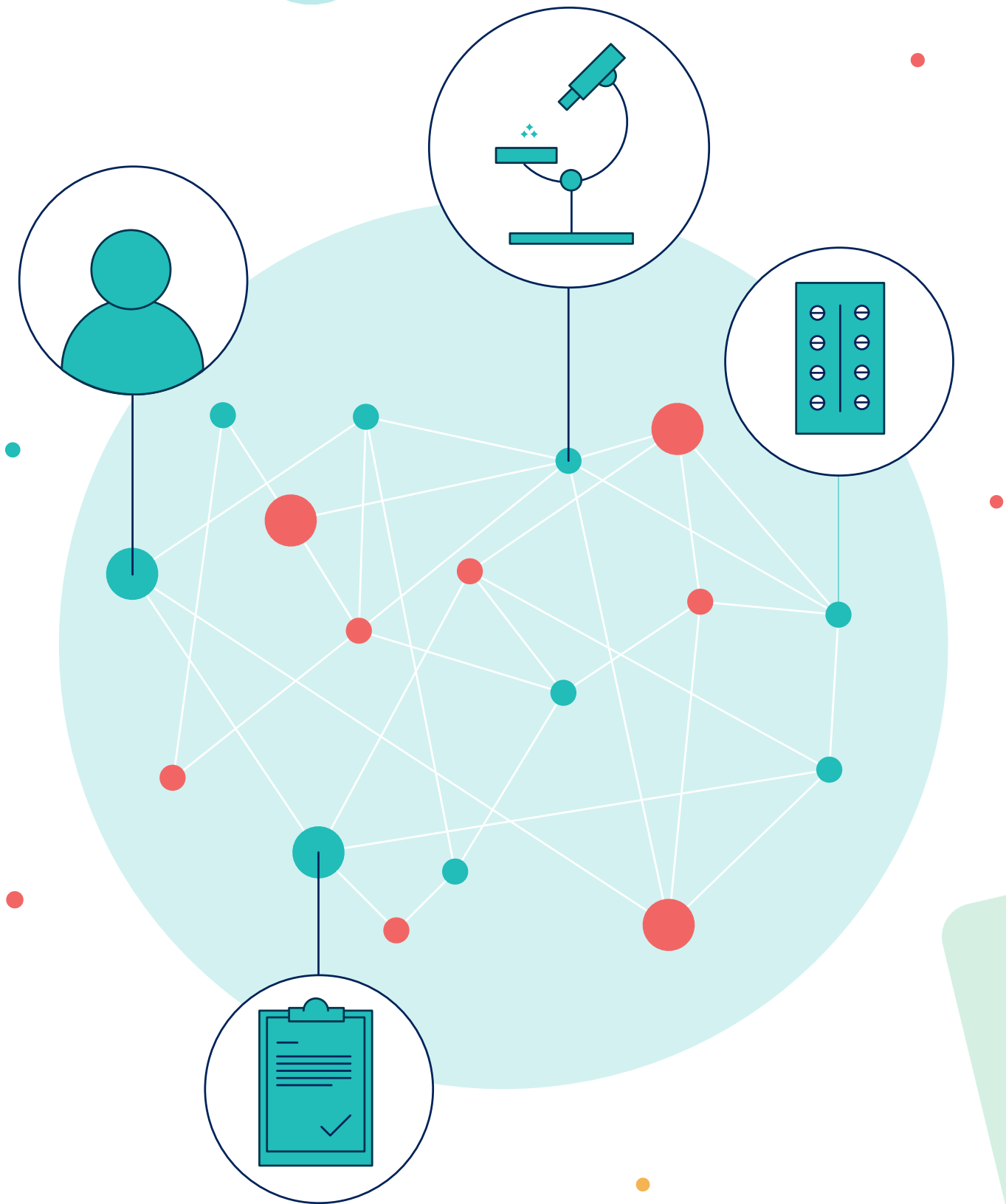
Figure 9: Benefits of VCoPs

ICT Enables Contextualised Learning

Simulation-based medical education enables problem-based, interactive and contextualised learning.

Learning should not simply transmit information abstracted from the context of which it is to be applied (116, 117). In line with situated learning theory and cognitive apprenticeship theory, learning can and should take place in specific social, physical and professional environments (114,115, 118). Simulation-based medical education can help replicate 'real' clinical scenarios, allowing trainees to develop skills based on the situation at hand (119, 120). It can be particularly helpful where large numbers of people need to be taught but where trainers are unavailable, and where iterative practice is necessary to expose trainees to a variety of environments and situations (121, 122).

Using computer simulated patients can be at least as effective as more traditional methods of teaching.

Computer simulated patients are interactive reproductions of real-life patient encounters that enable virtual history taking, physical examination and treatment (123-125). They have been used to teach health professionals to manage complex patients, at a pace appropriate to the individual learner, and to teach and assess more difficult aspects of family medicine, such as patient-centred skills, cultural-sensitivity, holistic approach and clinical reasoning (123). In addition, virtual encounters can reduce the fear of making mistakes and associated discomfort (130, 131). This method has been shown to be at least as effective as more traditional methods of teaching (126, 127). In order to increase participants' engagement, computer simulated patients must come across as authentic (123, 126, 128). This can be done by incorporating patients' perspectives (e.g. about the disease experience and quality of life) from the beginning.

"Simulation offers good scope for training of interdisciplinary medical teams. The realistic scenarios and equipment allows for retraining and practice till one can master the procedure or skill. An increasing number of health care institutions and medical schools in Malaysia are now turning to simulation-based learning."

Dr. Noor Hisham Abdullah, Director General of Health, Ministry of Health, Malaysia

"It's very important that you build ownership of the whole system from the beginning, from the library to all the other people. We had a grant that supported this but the grant has finished and now the university owns the e-learning platform that was created. I think it only worked because everybody was involved from the beginning."

Dr. Oathokwa Nkomazana, Associate Program Director at University of Botswana School of Medicine

User involvement is paramount when designing ICT-based educational programmes.

Lack of user friendly technology is a commonly cited limitation to using ICT. To address this, increased awareness of the diversity of baseline user needs, capabilities and interests should be employed when introducing ICT programmes (134). In the commercial world, testing the usability of ICT products is common practice, whereas in health professional education the baseline needs of users seem rarely to be considered (97, 133) (134). Frank Lievens, Executive Secretary of the International Society for Telemedicine and e-Health (ISfTeH), says that, to date, programme design has been led by the ICT sectors, with little input from health professionals. The design, content and implementation of such programmes would be greatly improved if ICT, education, health sectors, and - importantly - patients, collaborated in their development.

ICT Can Improve Healthcare Quality

ICT facilitates rapid access to evidence-based practice.

ICT is a proven method of supporting health professionals to access good quality evidence-based resources at the point of care (135) (143). This knowledge can be accessed, for example, through embedded links inside electronic health record (EHR) software, or via tailored email alerts (145). It is possible to tailor these resources to the individual user's needs and the requirements of different specialisations (141). The benefits of using such tools in practice are shown in Table 6 (136-140).

Table 6. Advantages of using ICT tools to access evidence-based resources.

Managing complications more successfully

Improvement in differential diagnosis

Employing tests and procedures appropriately

Avoiding unnecessary hospital admissions

Preventing adverse drug reactions and medical errors

Decreasing the possibility of litigation

"So alerts come into my email, there is a table of contents. What do I want to read, what do I not. I don't try and read the whole journal. When you've got it in front of you in paper, you waste a lot of time. When it comes in as an email alert, you just click on what you need."

Professor Allyn Walsh, Department of Family Medicine at McMaster University and Chair of the WONCA Working Party on Education

Social media can play a role in selecting the most appropriate resources.

As more health professionals build trustworthy online networks where information is curated by their peers, social media can be used to streamline information into a small number of tailored-to-the-individual articles. John Herlihy, former VP at Google EMEA and current VP at LinkedIn, supports this argument: *"For example, I follow what we call "influencers" as well as certain groups on LinkedIn related to some niche areas of interest of mine. Instead of sifting through hundreds of articles in a week, I now get 3-5. I read every one of those, because of their relevance and timeliness. I know who is authoring and recommending them and because of the level of specificity of what I'm looking for, I get inordinate value after that."*

Reflective life-long learning can be encouraged with the use of blogs and electronic portfolios.

Reflection is the "ability to gain understanding of specific issues in practice through critically contextualizing, observing and analysing to generate new knowledge and insights which can enhance practice." (146, 147)

Many health professionals see blogging as a creative way to reflect on their own practice (148). They may use other social media platforms, such as Facebook, Twitter and Tumblr, to communicate with a broader or selective audience (149). Reflective learning and assessment can also be facilitated by electronic portfolios (92) which record, rather like a diary, individual trainees' practices. E-portfolios can guide the planning of training programmes, help identify learning needs, give an overview of progress, and provide opportunities for discussion and feedback between trainer and trainee. In order to make these resources effective and meaningful, sufficient protected time for completion is essential (92, 111, 145, 148).

The Digital Divide impacts greatly on how ICT may be used in primary health care professional education.

Inequalities in access to and use of ICT, known as the Digital Divide (Appendix IV), impact greatly on how ICT may be used in PHC professional education (46). For example, learners in rural areas or LMICs often have access only to the most basic technology (66); e-learning programmes for this market may provide only basic instruction – for example, sending one-way short message service (SMS) messages over basic mobile phones to community health workers – which may rapidly become obsolete. Moreover, this may further marginalise those learners.

"Lowest common denominator technologies are often the only consideration for people who are already marginalised. And therefore, instead of promoting inclusion, this can have the opposite effect of increasing marginalisation because the technology used only allows for the simplest interactions from an educational point of view. More complex tech is seen as just for those who already have the best access and support. The result is a widening of the gap between the haves and have-nots."

Dr. Niall Winters, Associate Professor of Learning and New Technologies at the Department of Education, University of Oxford
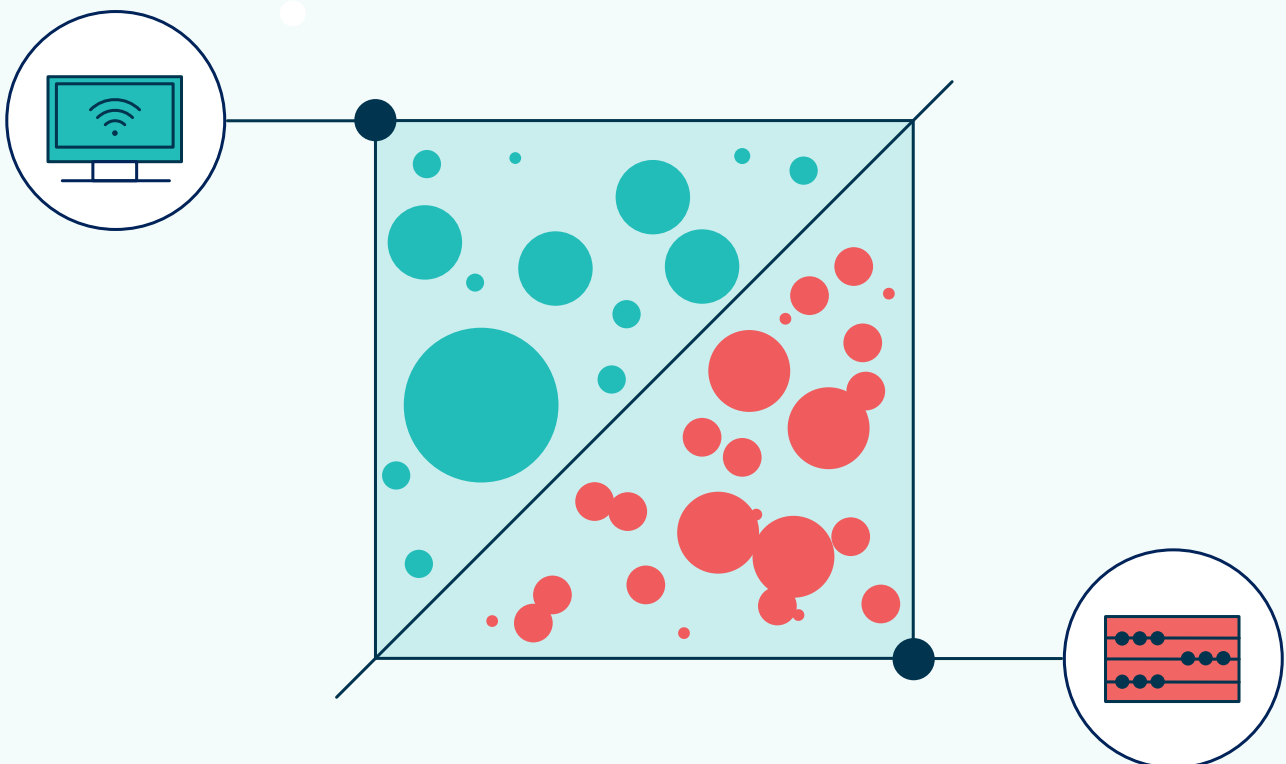

Figure 10: The Digital-Divide

"Technology doesn't come easily to people, health workers have to be taught. This has to be included in the education of medical professions and then also introduced in their continuous professional development; if people don't know how to use technology they get frightened."

Annette Mwansa Nkowane, Technical Officer of Nursing and Midwifery in the Health Workforce Department of the World Health Organization

Individuals or institutions may show varying degrees of willingness to embrace ICT over more traditional methods; they may express concerns about privacy, security, professionalism, lack of time, and doubts about the relevance or practical benefits of such tools (150, 151). The learning curve for ICT use can be very steep and obtaining a set of new technical skills requires time commitment from already busy health professionals (92, 93). At the same time, using ICTs can be a daunting prospect for many. It has been demonstrated that unfamiliarity with computers is perceived as one important barrier to using internet-based programmes, while having experience with online courses is the best predictor for its current use (17).

For these reasons, ICT products and programmes must be developed sensitively, with sufficient training from skilled ICT personnel to maximise their appropriate use (94). Including technology in the curriculum ensures that health professionals are comfortable with ICT and use it appropriately (111, 112, 145). Training should also be provided to faculty members. Their role in facilitating the online learning experience is essential to enable effective learning (94). For example, at the University of Botswana, School of Medicine, family medicine providers found that offering training on how to search online databases enabled learners to feel more comfortable using these resources, which consequently increased the practice of evidence-based medicine.

This section has illustrated how ICT can support, enhance and accelerate primary health care professionals' education, improve quality, and create economies of scale. A number of methods and tools can be used to achieve this. However, it is necessary to acknowledge that ICT should be used because it is the right option for the context – not for technology's sake.

Section 4
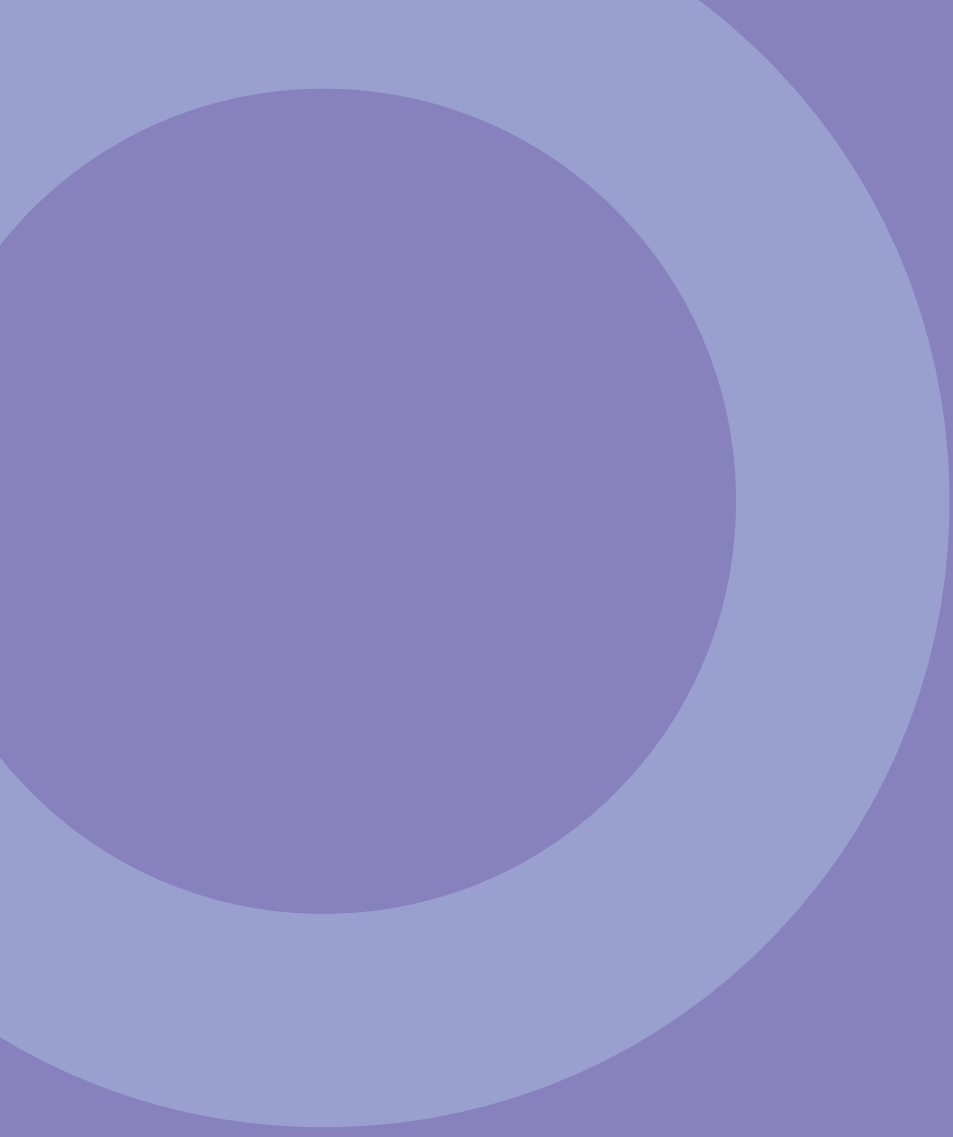
Recommendations

A strong and supported primary health care (PHC) system is the best means of delivering universal health coverage (UHC), ensuring that everyone, everywhere can access quality health services without being forced into poverty. ICT is a transformative catalyst for change; harnessing its power to strengthen PHC will require multiple stakeholders to invest their time, attention and resources in eight broad areas.

1

Securing political and financial support to establish and maintain a strong PHC system

Policy makers, the health and medical education sectors, development partners, as well as the general public must recognise the importance of PHC within health systems. A strong PHC system plays a significant role in the sustainability and cost-effectiveness of health systems, as well as ensuring health equality. Increased political and financial support from governments and donor communities is crucial to strengthen PHC systems.
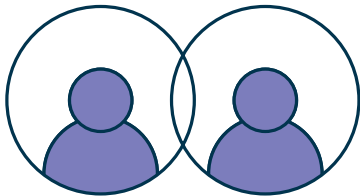
2

Adoption of a collaborative interprofessional approach between health professionals, from training through to the workplace

This can be achieved through:

Education: all health professions must experience primary health care education and gain experience through placements in PHC settings.

Online-learning: ICT such as video conferencing tools, virtual communities of practice, social media, and virtual worlds can be used to support interprofessional and team-based learning.

Investments in information exchange: tools such as medical records, e-prescribing and note-sharing systems are essential for optimal clinical care and learning.

Collaboration during the design, development and implementation of ICT educational programmes: this will require contribution from education, ICT and health sectors, users, and patients.
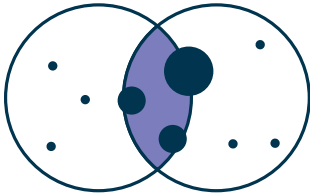
3

Provide education and training relevant to the context and to user needs

Education and training should emphasise the social determinants of health and the local health context. To achieve this, training institutions and PHC teams must seek input from and be accountable to their communities, patients and caregivers.

Widely available mobile devices, mobile apps, and video conferencing tools should be used to aid healthcare professional education and support community-based care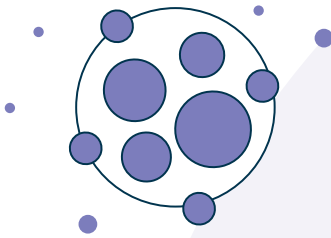. These tools should also be used to communicate with patients and gather their feedback to improve quality of care. This should be systematically gathered and analysed, and communicated transparently to improve individual and collective confidence in PHC.

4

Recruit and retain through training

CME, postgraduate education, mentoring and support must be considered as strategies to recruit and retain health professionals, particularly in rural and under-resourced areas. The use of video conferencing tools and telehealth to provide support should considered. E-portfolios, e-learning modules, e-mail alerts and adaptive online learning environments (OLEs) are valuable for learning. Although highly accessible, these methods still require dedicated learning time. There is a clear need for protected time for health professionals to learn meaningfully without impacting on their practice or personal time.

In addition, academic primary care and family medicine must be sustained by strengthening training and research, increasing capacity, and establishing proper career paths to recruit and retain faculty members.

5

Standardise and accredit health professional education

Due to global mobility and migration, standardised curricula based on core skills, with adjustments for local context, are essential. Standardisation should also be carried into CME and postgraduate training. Training should include adequate assessment of learning outcomes, course evaluation, and recognised certification. Furthermore, it should be accredited by a reputable institution to ensure quality, recognise the learner's achievements, and acknowledge the course (if e-learning) as a valid alternative to traditional education.

When developing e-learning programmes designers should take into consideration such issues as the appropriateness of the subject matter, the technological platform, the selected teaching methodology, what technical support is available for users, and follow standards such as SCORM.
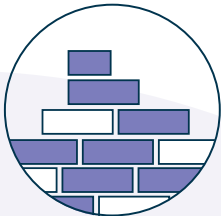
6

Develop ICT training for learners, educators and patients

Appropriate ICT training should be provided to teachers and learners, in undergraduate and postgraduate health professional education, to ensure the effective, safe and meaningful use of ICT tools. This training should be further extended to patients, to encourage its use for self-care and providing feedback on quality of care. To achieve this, more skilled ICT personnel are required to offer training and support, and should be part of the educational institution or health facility.

7

Use technologies appropriately

When considering the use of ICT in health, efforts must focus on quality of care, accessibility, patient safety, and cost. The effectiveness of all eHealth programmes (including e-learning) should be rigorously evaluated, and those solutions that are proven to work should be scaled up accordingly.

The introduction of ICTs should be carefully planned taking into account available resources and infrastructure. Long-term implications, expected and unforeseen changes must be assessed to avoid the risk of technology redundancy and further marginalisation of those with limited access to ICTs. Investments in ICT infrastructure and equipment are necessary to support the above goals.

8
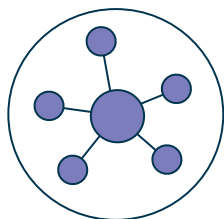
Recognise and consolidate the interdependence of all the health professionals in the PHC setting

Universal health coverage will be achieved through the provision of clinically competent, continuous, cost-effective and co-ordinated care by a range of health professionals working in primary care settings. Many of the skills required by the range of health professionals overlap, with some skills specific to each professional group. Further research is required, reflecting on the range of clinical, communication and co-ordination skills required by each of the PHC team members. These should be mapped, showing the skill mix, areas of overlap and the different levels of skills needed by each professional group. ICT learning platforms must be developed which can be used by the whole team, to ensure consistency of messages and skills, in addition to learning tools for individual PHC professionals.

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Appendix I
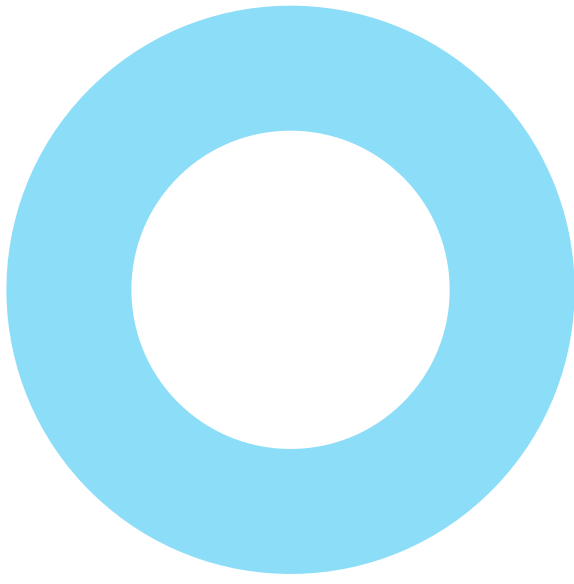
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SIR CHRISTOPHER EDWARDS
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MS. MELISSA FARRELL
Assistant Deputy Minister, Health System Quality and Funding Ministry of Health and Long-Term Care, Ontario, Canada

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MS. SOMA GOSHAL
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Two interviewees wished to remain anonymous.

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Dimensions of UHC

To achieve UHC, all three of the following dimensions need to be taken into account within the boundaries of a fiscal space:

1. **Population:** who is covered

2. **Services:** which services are covered and at what quality

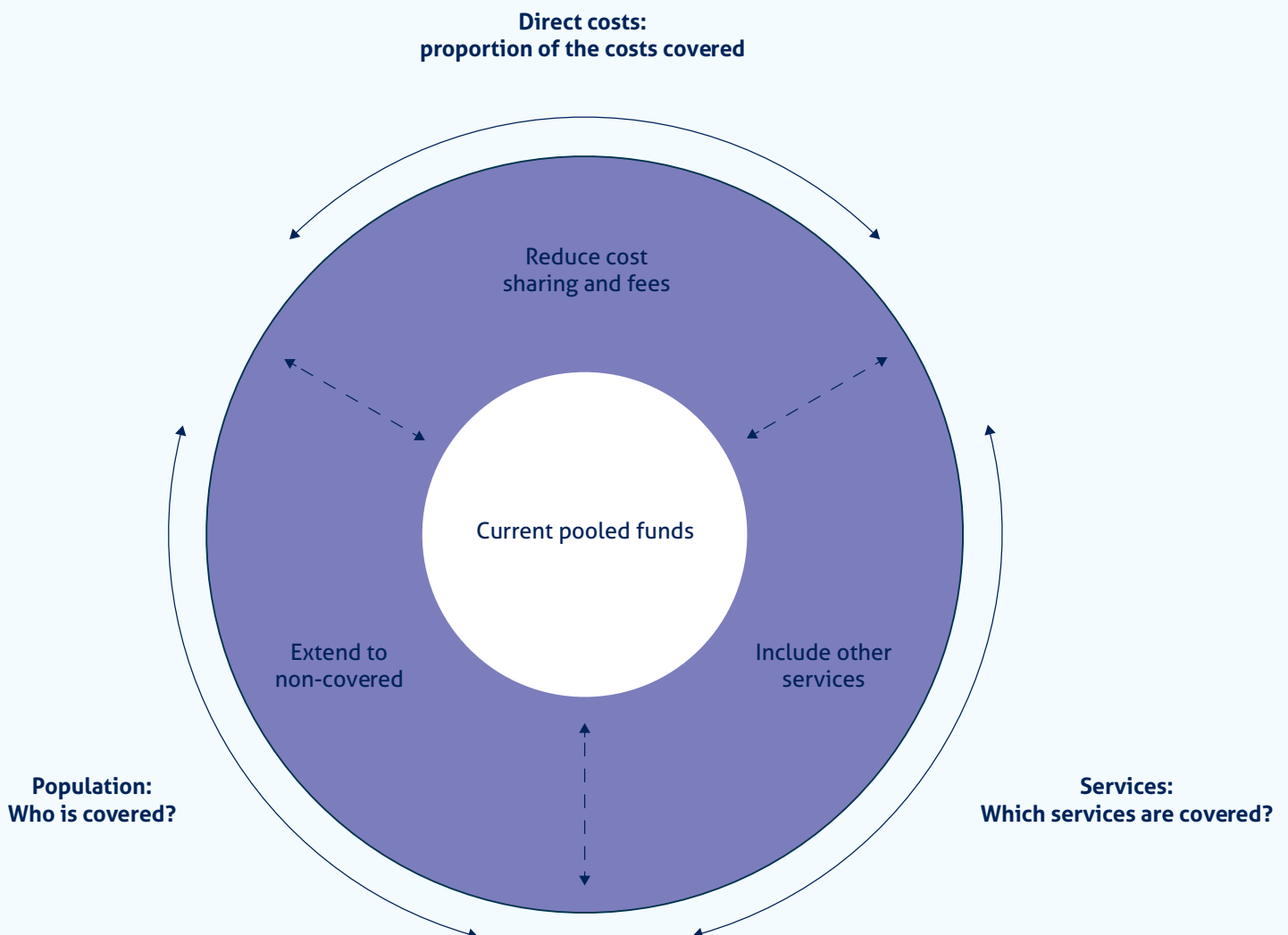3. **Cost:** how much of the cost is covered and how much needs to be paid out-of-pocket.

Appendix II

Figure 11. The three dimensions of universal health coverage.

Appendix III

Recommendations for increasing user satisfaction and participation in VCoPS

1. Capable facilitators are needed to promote engagement, create knowledge opportunities and maintain the community rules and code of conduct

2. The objectives of the VCoP must be clear to all its members

3. Leadership should be distributed and accountable, governance must be transparent and rules clearly established and accepted by its members

4. The involvement of different professional and expert groups is recommended to provide multiple perspectives

5. A supportive and positive culture can help establish a safe and flourishing environment for knowledge uptake

6. Volunteerism and self-organisation are recommended to enhance members' motivation and creativity

7. A user-friendly and accessible environment should be provided

8. A blended approach, with asynchronous communication and face-to-face meeting, is recommended to increase the value of the community

9. Feedback should be systematically sought and actions must be taken to improve the members experience and perceived usefulness (111-113).

Appendix IV

The Digital Divide

The International Telecommunication Union (ITU), estimated that 4 billion people from LMICs did not have access to the Internet in 2015 (88). The Digital Divide may be related to poor infrastructure, as illustrated in Table 7, including power supply shortages, limited access to computer and IT resources, inadequate bandwidth, high connectivity charges and unsustainable costs for acquiring and maintaining equipment.

Although 3G population coverage is projected to increase from 45% in 2011 to 69% in 2015, only 29% of the rural areas are covered.

In addition, electricity supply and power failures represent a major obstacle for the wide implementation of all ICT solutions. According to the Global Tracking Framework report of the Sustainable Energy for All (SE4All) initiative, 85% of the global population had electricity in 2012, however 1.1 billion people were still living un-electrified (89). In India, Nigeria and Ethiopia, 263 million, 75 million and 67 million people, respectively, do not have access to electricity. It is imperative to resolve electrification issues before attempting to address internet or bandwidth issue.

Table 7. Limitations in ICT Infrastructure (18).

Between 2000 and 2015, internet penetration has increased from 6.5% to 43% of the global population

There are 3.2 billion internet users, of which 2 billion are from developing countries

A large gap: internet penetration amounts to 83% of the population in the developed countries compared to only 35% in the developing and 9% in the least developed countries.

In developing countries only 34% of the households have internet access as opposed to 80% in the developed ones

In the least developed countries this drops to 7%

Although 3G population coverage is projected to increase from 45% in 2011 to 69% in 2015, only 29% of the rural areas are covered.

"Technology has very clearly demonstrated that geographical boundaries can be broken very easily; with the access to technology, distance is not a limiting factor provided connectivity issues are sorted."

Mr. Ravichandran Natarajan

"People have learnt a great deal on how to take care of patients when they come to a hospital but what they have not learnt is, how much of that care can be actually delivered at the patient's home."

Professor. P.S. Reddy

"In the medical education setting, the dogma of specialism makes it hard to have a whole person orientation."

Professor. Richard Roberts

"I think there is lip service given to the importance of Primary Care or PHC, but the financial investment continues to be in the cities and in acute care; that's at the global level."

Dr. Judith Shamian

"Thinking about primary care, think about, again on Star Trek, there's only one doctor in the whole system and guess what? That's not a surgeon. It's a GP."

Dr. Henk Parmentier