A toolkit on how to implement MyopiaEd

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Executive summary

“Be He@lthy, Be Mobile” (BHBM) is a global initiative led by the World Health Organization (WHO) and the International Telecommunication Union (ITU). It is based on the use of mobile technology for digital targeted client communication messaging to address a range of noncommunicable diseases and health issues.

Myopia represents an important public health issue in the 21st century. Uncorrected myopia is a leading cause of vision impairment; it can contribute to poor academic performance in children, and poses a considerable financial burden on countries, with an estimated annual global productivity loss of US$ 244 billion. To further confound this problem, the prevalence of myopia is projected to increase substantially in the coming decade, from 2.6 billion in 2020 to 3.36 billion in 2030. During the same period, the number of people with high myopia, an emerging cause of irreversible blindness, is projected to impact over 500 million people by 2030. Although refractive correction, through use of spectacles, provides a simple and safe means of correcting myopia, compliance with spectacle-wear among children and adolescents is often suboptimal, commonly attributable to misconceptions and stigma.

Growing evidence among child populations strongly implicates lifestyle risk factors, including intensive near vision activity (as a risk factor) and longer time spent outdoors (as a protective factor), in the onset and progression of myopia during childhood. Interventions targeting these lifestyle factors therefore offer great possibilities for reducing the risk of developing high myopia and its related potential blinding complications later in life.

Education campaigns play a vital role in the management of myopia and its associated complications, while also raising awareness of good eye care behaviours (for example the importance of regular eye examinations) and addressing common reasons for non-compliance to spectacle-wear. The MyopiaEd programme was prepared by WHO and ITU, in collaboration with an international group of experts in myopia, behavioural science and mHealth. This toolkit includes evidence-based message libraries for key end-user client groups, that are formatted for digital targeted client communication text message delivery, along with operational guidance and resources for implementing and monitoring the initiative. The toolkit is targeted at government officials, WHO staff members, academics, and in-country implementing partners who are involved in digital health programmes.

This toolkit includes evidence-based message libraries for key end-user groups, that are formatted for SMS delivery, along with operational guidance and resources for implementing and monitoring the initiative.

The toolkit is structured in two parts: Part I contains introductions and considerations specific to the development and implementation of an MyopiaEd programme. Part II contains general information which relates to any BHBM initiative, including MyopiaEd. The information provided on technology specifications and the role of different stakeholders is essential for the development of any BHBM initiative and should be read in full prior to embarking on an MyopiaEd programme.

Part I

MyopiaEd programme

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Introduction

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1.1. Vision, vision impairment and blindness

Vision is the most dominant of the five senses and is essential in every aspect of our lives *(1)*. The newborn depends on vision to recognize and bond with its mother; the toddler, to master balance and learn to walk and talk; the schoolchild, to walk to school, read and learn; the young adult to participate in the workforce; and the older adult to maintain their independence.

Globally, it is estimated that at least 2.2 billion people have a vision impairment; of these, at least 1 billion have a vision impairment that could have been prevented or is yet to be addressed *(1)*. Of the many eye conditions that can cause vision impairment or blindness, the most common are refractive errors, cataracts, glaucoma, diabetic retinopathy, and age-related macular degeneration.

Uncorrected refractive errors are the leading cause of vision impairment among children and adults. A refractive error occurs when abnormalities in the shape or length of the eye, or its optical power, prevents light from focusing accurately on the retina, resulting in blurred vision. There are different types of refractive error; namely, myopia (shortsightedness), hyperopia (longsightedness), presbyopia (difficulty seeing objects at near distance with increasing age), and astigmatism. stigmatism often occurring in combination with either myopia or hyperopia.

1.2. Myopia: magnitude and impact

Myopia (as described in Box 1) is the most common refractive error globally, affecting an estimated 2.6 billion people in 2020 *(2)*. Uncorrected myopia poses a considerable financial burden, with an estimated annual global productivity loss of US$ 244 billion *(3)*. In addition, vision impairment caused by uncorrected myopia has serious consequences for individuals across the life-span. If left uncorrected, myopia significantly impacts on quality of life (QoL) *(4, 5)* and can contribute to poor academic performance in children *(6, 7)*. To further confound this problem, the prevalence of myopia is set to increase substantially in the coming decade, with 3.36 billion people estimated to be impacted by 2030 *(3)*. During the same period, the number of people with high myopia, often associated with severe (pathological) complications (such as cataract, glaucoma, retinal detachment, and myopic macular degeneration) is projected to increase from 399 million in 2020 to 516.7 million in 2030 (Figure 1) *(2)*. Complications of high myopia are emerging as a major cause of new cases of blindness in some parts of the world *(8–10)*. Even lower degrees of myopia carry an increased risk of these complications compared to individuals without myopia *(11)*.

The prevalence of myopia is set to increase substantially in the coming decade, with 3.36 billion people estimated to be impacted by 2030.

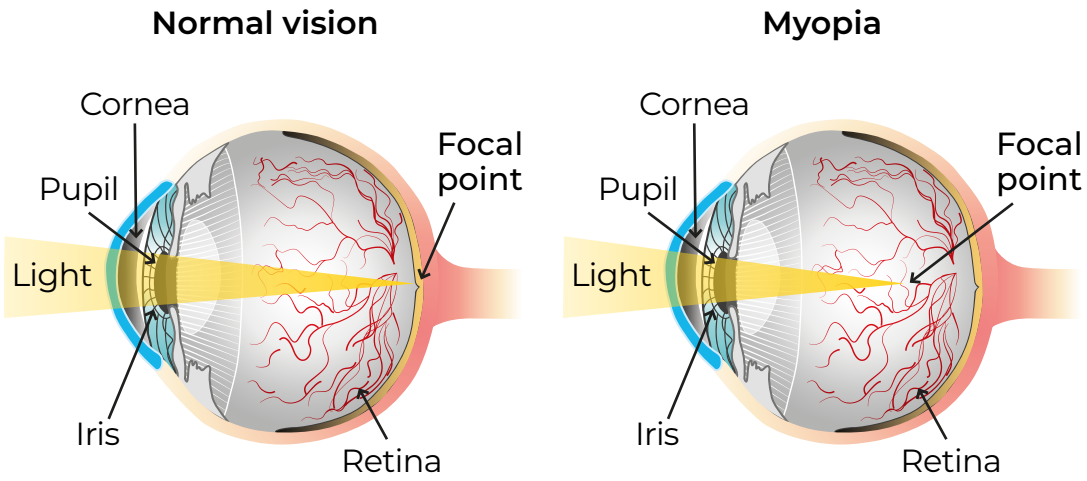
The number of people with myopia is growing in all regions of the world; however, during the past two decades, increases have been particularly notable among younger people in East Asia. In urban areas of China, Singapore and Chinese Taipei, for example, rates of 20% have been reported in children attending early primary school. This has increased to more than 80% in young adults, with parallel increases in the number of young adults with high myopia *(12–14)*.

Box 1:

What is myopia?

Myopia is known by several names:
Shortsightedness
Nearsightedness

What is myopia?
Myopia is an eye condition in which the shape or length of the eye prevents light from focusing directly on the retina, resulting in blurred vision. The age of onset of myopia can be as early as 5 years of age in some regions.



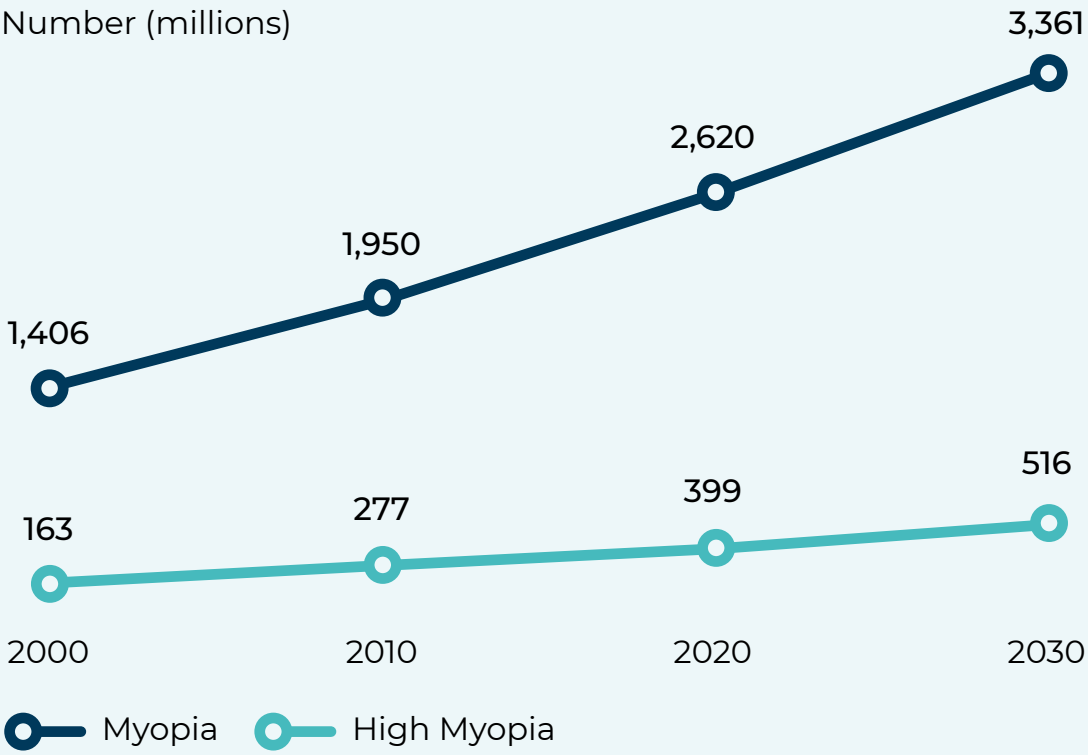
What are the common symptoms of myopia?

The most common complaint of a person with myopia is blurred distance vision. If uncorrected, this can affect a person's activities in daily living and they may frequently complain of difficulties in carrying out specific activities. Children with myopia may complain of having difficulty seeing the chalkboard clearly in a classroom, playing sports, reading print on a television screen or recognizing faces. Common complaints among adults may include not being able to see street signs while driving or difficulty seeing across a room in an office.

People with myopia may display certain behaviours in order to get a clearer picture: for example, peering, squinting, moving closer to the television or chalkboard in a classroom or avoiding driving at night.

Figure 1:

Projected number of people estimated to have myopia and high myopia for each decade, 2000–2030*



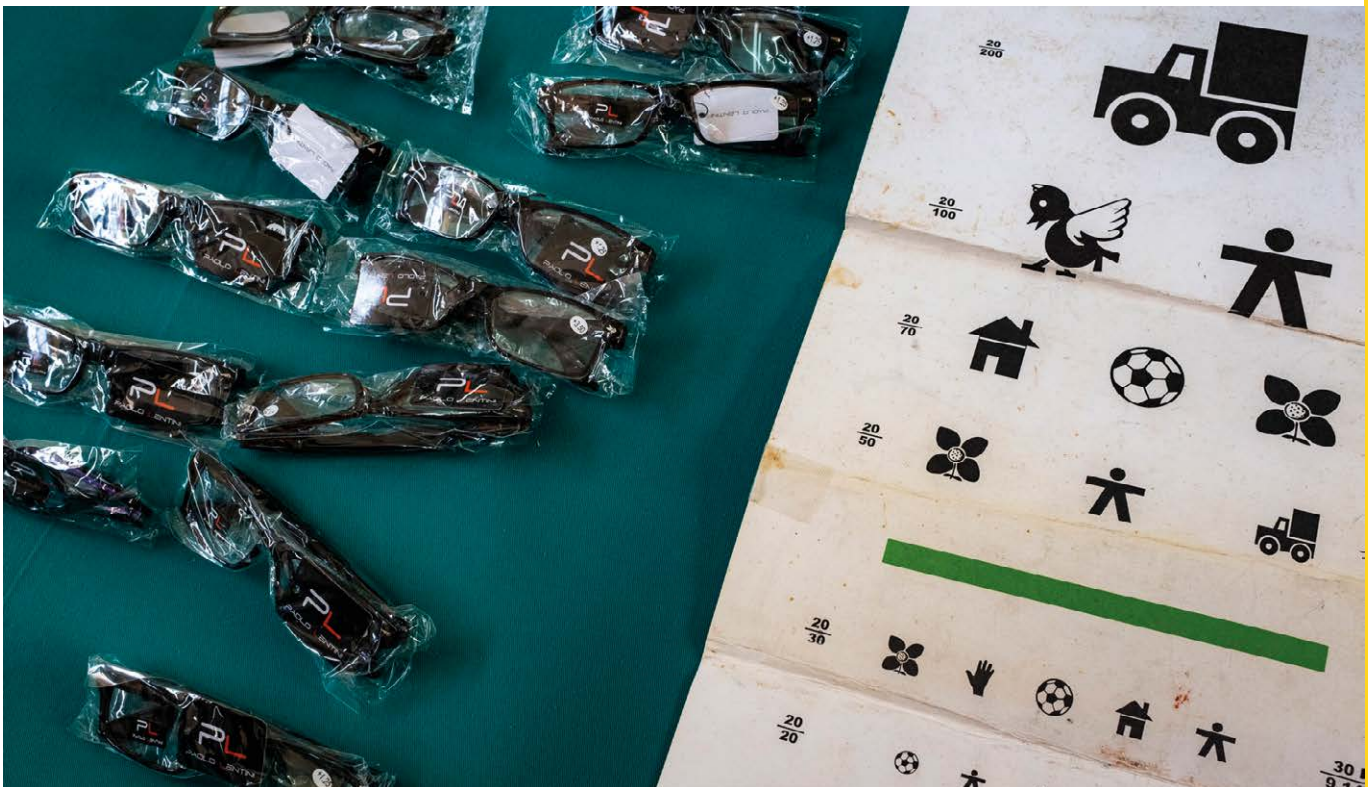
**Source:* Holden BA, Fricke TR, Wilson DA, Jong M, Naidoo KS, Sankaridurg P, et al. Global prevalence of myopia and high myopia and temporal trends from 2000 through 2050. Ophthalmology. 2016; 123(5):1036–42.

1.3. Effective strategies for myopia and high myopia

Interventions to detect and correct myopia

Screening for refractive errors is recommended for preschool- and school-aged children in order to avoid the negative impact of uncorrected refractive errors on academic performance *(15, 16)*. Reduced vision from myopia and other refractive errors can be fully corrected with the use of spectacles or contact lenses, or corrected by laser surgery on reaching adulthood. Spectacles, a non-invasive intervention, are among the most practical and cost–effective of all health-care interventions to implement *(17, 18)*.

Although spectacles provide a simple and safe means of correcting refractive error, a large body of evidence suggests that compliance with spectacle wear among children and adolescents is suboptimal *(19–21)*. For example, a recent systematic review of 23 studies estimated an overall spectacle compliance rate of 40% among children and adolescents, with rates ranging from 9.8% to 73% *(22)*. Several higher risk population groups have been identified, with poorer compliance with spectacle wear commonly reported in boys, in older children, and children with lower levels of refractive error *(23)*. Among the leading reasons cited for non-compliance were the misconception, particularly with parents, that using spectacles worsens the child's myopia, peer pressure and a negative effect on the self-esteem of children and adolescents with myopia *(22, 23)*.



Interventions to slow myopia progression and reduce risk of complications from high myopia

Interventions are warranted to reduce the risk of developing blinding complications of high myopia. The objective of these measures is to delay the age of onset, and slow the progression of myopia, the two main predictors of developing high degrees of myopia in later life.

While it is established that genetics play a role in the development of myopia *(24, 25)*, growing evidence among child populations strongly implicates lifestyle risk factors, including intensive near vision activity (as a risk factor) and longer time spent outdoors (as a protective factor), in the onset and progression of myopia during childhood *(26–31)*. As a result, clinical practice guidelines include recommendations for the education of parents or caregivers on these modifiable risk factors *(15)*.

Given the safety of the intervention, a number of large-scale programmes and policies have been established within countries with a high prevalence of myopia, aimed at myopia prevention through targeting increased time spent outdoors among child populations *(28, 29, 32)*. Initiatives to increase time outdoors among school children are also a central component of Singapore's National Myopia Prevention Programme *(31)* (see Box 2) and China's myopia prevention plan *(33)*.

It is important to acknowledge that a growing number of promising clinical measures (such as atropine eye drops, orthokeratology contact lenses, and soft multifocal contact lenses) are also available to reduce or slow the progression of myopia. Evidence on the efficacy of these treatments is constantly being updated *(17, 34)*.

Box 2. Case study:

An initiative to delay the onset and progression of myopia in Singapore: using public education awareness and vision screening*

The Singapore School Health Service took up the mandate of the National Myopia Prevention Programme, a large-scale collaboration between various ministry departments, professional associations, academic and research institutions, to address high childhood myopia rates in Singapore. The initiative began in 2002 and used a two-pronged strategy of public education to raise awareness and delay the onset and progression of myopia, and vision screening for early detection and management of myopia.

Annual routine vision screening was instituted in all schools since 1996, however, since the initiative began, it has been expanded to include preschool children as young as five years of age. Evidence-based messages that focused on reducing time spent on near work activities like reading, writing and using electronic devices together with messages encouraging outdoor activities to delay the onset and progression of myopia in children (37) became the key strategy in the education initiative. The messages were directed toward children, parents, teachers, and the general public. Specifically, the vision care messages involved:

1. Age-appropriate fun activities like dramas, jingles, dance and a mobile "health lifestyle" bus were developed for children, together with the use of a mascot to trigger recall of good eye care messages.
2. Training programmes for teachers to gain an in-depth understanding of myopia and to encourage children to develop their own creative and novel approaches to promote good eye care habits among peers.
3. Group counselling sessions, school-cluster seminars and public forums were held to engage parents and families to promote good eye care habits at home.
4. Mass media was used to deliver messages to encourage good eye care habits among the general public through television advertisements, radio and parent's magazines. The Singapore Health Promotion Board's website delivered information on childhood myopia.

To gauge the impact of the programme in reducing childhood myopia rates, myopia prevalence rates were analysed between 2004 and 2015 among students from 12 primary schools and 12 secondary schools. The analysis revealed a statistically significant downward trend in myopia prevalence among (solely) the primary school students, from 37.7% to 31.6% during this period.

**Source:* Karuppiah V, Wong L, Tay V, Ge X, Kang LL. School-based programme to address childhood myopia in Singapore. Singapore Med J. 2021;62(2):63–68.

1.4. BE HE@LTHY, BE MOBILE and mHealth for myopia

Digital targeted client communication offers a solution to the problems of reaching large audiences, and potentially changing health-related behaviour *(38)*. For example, a text message-based programme can be used to facilitate transmitting evidence-based targeted health information messages to high-risk populations *(39)*. Systematic review evidence shows moderate effects in favour of targeted client communication digital health interventions to support behaviour change initiatives across numerous risk factor areas including quitting smoking *(40)*, diabetes self-management *(41)*, increasing medication adherence in people who have cardiovascular diseases *(42)*, and increasing physical activity levels *(43)*.

While not extensive, literature on the use of targeted digital health targeted client communication messaging in the area of eye care shows promising results for improving adherence to treatment of chronic eye conditions *(44–46)* and, more recently, behaviour modification for the prevention of myopia *(47)*. Targeted text messages routinely sent to mobile phones have been shown to increase the rate of attendance at eye care facilities in some settings *(48–51)*. Furthermore, targeted and untargeted public health-related messages for behavioural change have long been used successfully in the prevention of infectious eye diseases *(52, 53)*.

Be He@lthy, Be Mobile (BHBM) is a global initiative led by the World Health Organization (WHO) and the International Telecommunication Union (ITU) to encourage and enable the use of mobile technology for health (mHealth). The aim is to help combat noncommunicable diseases (NCDs) and other areas of health, where the use of modalities such as text messages, applications, and chatbots can influence behavioural change and positively impact health and well-being. BHBM supports governments in digital health programming by providing disease topic-specific toolkits and technical expertise, including guidance on programme design, fundraising and evaluation. Official partnerships are currently in place within 12 countries representing a range of income groups and disease focuses, including tobacco cessation, diabetes and cervical cancer.

A key recommendation of the 2019 WHO World Report on Vision was to raise awareness and engage and empower people and communities.

In October 2019, WHO's Vision Programme launched the *World report on vision* which highlights the importance of preventive strategies for eye conditions *(1)*. A key recommendation of the report was to raise awareness of eye conditions and eye care, and engage and empower people and communities. In line with this recommendation, WHO recognizes the vital role education campaigns play in the prevention of high myopia and its associated complications, while also raising awareness of good eye health behaviours (for example the importance of regular eye examinations) and addressing common reasons for non-compliance to spectacle wear. This, coupled with encouraging evidence on the effectiveness of digital targeted client communication messaging, and other BHBM initiatives (for example the mTobaccoCessation and mDiabetes initiatives) in changing health-related behaviour, provides a strong rationale for the use of digital targeted client communication messaging for myopia education and prevention.

The MyopiaEd programme was prepared by WHO and ITU, in collaboration with an international group of experts in myopia, behavioural science and client focused digital health interventions. This toolkit includes evidence-based message libraries for key end-user groups, that are formatted for SMS delivery, along with operational guidance and resources for implementing and monitoring the programme. An overview of key aspects of the MyopiaEd programme are summarised in Table 1.

It is recommended that the MyopiaEd programme is not conducted in isolation; rather it should be complimentary to existing clinical interventions, policies and awareness related to myopia and eye health. The MyopiaEd toolkit targets government officials, WHO staff members, academics, and in-country implementing partners who are involved in deploying large-scale client focused digital health intervention programmes.

Table 1:

Overview of key aspects of the MyopiaEd programme

Aim	1. To support behaviour change that contributes to delaying the onset, and slowing the progression, of myopia 2. To improve awareness and health literacy of the importance of regular eye examinations and spectacle compliance among children and adults with myopia
Target end user groups	Individual message libraries are available for the following population groups: 1. General population involved in the care of children, including general health workers and educators 2. Parents or caregivers of children with myopia 3. Adolescents with myopia 4. Adults with myopia
Themes of the messages	1. General education on myopia: the causes, warning signs and misconceptions 2. Lifestyle behaviour changes, including time spent outdoors and near-work related parameters, that can reduce the risk of high myopia and its complications 3. Importance of regular comprehensive eye examinations 4. Importance of compliance with refractive correction
Message delivery modality	Messages have been designed for targeted client one-way SMS (text message) delivery but are appropriate for delivery via other modalities, including app messaging and social media.
Programme duration	All message libraries include scheduling and periods that range from 6 to 12 months in duration.

2

Development and design of the MyopiaEd programme

2.1.	Development process of the MyopiaEd programme	14
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This section of the toolkit provides an overview of the development process of the MyopiaEd programme, including the methods for developing of the message libraries, and details of the design of the programme. The message libraries for MyopiaEd are available as a Web Annex to this document.

2.1. Development process of the MyopiaEd programme

The development of the MyopiaEd programme followed a stepwise process with the involvement of different stakeholders. The WHO Vision and Eye Care Programme and the BHBM team were responsible for the overall coordination of the project as well as technical and developmental work. An Informal Expert Group (IEG), comprising experts in myopia, digital health and health behaviour change from all six WHO regions, provided technical input throughout the different stages of development. The design and content of the initiative were developed by the experts in health behaviour change, with input from individuals from WHO, IEG members and target end users (for example, parents of children with myopia, adults and adolescents with myopia).

The development process for MyopiaEd was aligned with published development frameworks *(54, 55)* with a focus on implementation, use of behavioural change theory, and involvement of the target population.

Initial consultations were held with members of WHO and the IEG; the main objectives were to review and provide guidance on the context, purpose, target population, key topic themes, and modality of the proposed MyopiaEd programme. Table 2 provides an overview of the end-user groups and key themes of the programme based on a review of the best available evidence and the outcomes of the consultation with the IEG members. While messages on general myopia education (such as prevalence, and potential long-term consequences) apply to all population target end users, the theme of other messages varies according to the profile of the individual.

Table 2:

Overview of end-user groups and key themes of the MyopiaEd programme

End-user groups	Key themes of the messages
1. General population who are involved in supporting/caring for children at risk of developing myopia (e.g. parents of children without myopia, teachers, health-care professionals)	Designed to support people in understanding myopia, its warning signs, and to encourage engagement in behaviours required to delay the onset of myopia among children that they may care for or work with.
2. Parents of preschool or primary-level children who have myopia	Designed to encourage regular eye examinations to ensure optimal correction and access to the most up-to-date care; address common myopia related misconceptions; raise awareness of the importance of spectacle compliance; and increase awareness of strategies to delay progression of myopia.
3. Adolescents who have myopia	Designed to target the importance of compliance with refractive error correction; common myopia-related misconceptions; and raise awareness of the importance of regular eye examinations to ensure optimal correction and awareness of management options to delay progression of myopia.
4. Adults who have myopia	Designed to target the importance of regular eye examinations due to the higher risk of other sight-threatening complications in adulthood.

Based on the outcomes of the IEG consultation, an expert in health behaviour change drafted separate MyopiaEd message libraries for each of the four end-user groups. Message content was developed based on the best available evidence, written with a global perspective and with the understanding that the messages may need to be adapted for country use. A review of existing education campaigns on the topic of myopia helped inform the development of the draft message libraries.

The message libraries were extensively reviewed by the IEG and other myopia and behaviour change experts. The purpose of this expert review was to ensure that messages were not only clinically and factually correct but also relevant to the target audiences. Following each stage of expert review the messages libraries were updated to incorporate feedback.

Following expert review, pretesting of the message libraries was undertaken, via a mixture of focus groups and indepth interviews, in a diverse sample of English-speaking end-user groups. This included testing among members of the general population involved in the care of children, parents/primary carers of children with myopia, adolescents and adults with myopia. The purpose of pretesting the message libraries was to ensure that both the design of the programme and the message content were acceptable to the target audience.

2.2. Programme design

The BHBM MyopiaEd content libraries include messages for educating the target audience on myopia and its prevention and control, and makes suggestions for programme length and schedule of messages delivered (the algorithm). Based on experience of BHBM initiatives, expert inputs and user feedback, suggestions regarding the format, timing of the programme, and frequency of messages to be delivered, are outlined below. Each country/implementing partner may modify these in line with local context.

- **Message format:** The message libraries are written in the format of one-way SMS (text) targeted client messages; techniques for behaviour change were used to underpin the messages. Each message is categorized into one of four domains: Motivation, Support, Information, or Reminders. Messages are designed to be clear and direct, offering practical and relevant advice, in simple language, appropriate for those with lower health literacy. Messages are framed positively (gain/benefit), and focus on emphasizing the benefits of action. Repetition of key messages is designed to support knowledge uptake (particular in those with low health literacy), and behaviour change.

- **The media and channels used:** SMS format, using available telecommunication networks, is the most equitable modality to deliver health messaging in resource-restricted settings (where much of the population may not have access to a smartphone). Other modalities such as WhatsApp messaging, WeChat, Signal and others can be considered based on the local context. The MyopiaEd message library contains descriptions of multimedia content as a guide to accompany messages when delivered via a modality which allows for this (such as social media or app messaging).
- **Timing:** It is important to understand the common practices among the target group, in order to understand at what time people are most likely to engage in the behaviours targeted. For example, with adolescents, sending messages after school will be preferred; they can have more ability to be outside and to limit near-sighted activities, and receiving messages is likely to be less disruptive to their educational requirements. Similarly, for parents, messages should be delivered at times when the child is in their company.
- **Frequency:** The programme starts at a higher frequency and decreases over time *(56)*, with messages more frequent in the initial behaviour change period and less so after the acute phase *(52)*. The frequency is designed to not overwhelm or burden the user *(52)* and is balanced with the need for the user to build trust and engagement with the programme. Repetition of key messages is important to ensure that they are understood; behaviour change is supported and then maintained. Where repetition of key messages occurs, these are spaced to reduce the likelihood of user boredom.
- **Duration of programme:** The suggested algorithm for the message library aimed at the general population (myopia prevention programme) is 12 months in duration. For the remaining message libraries developed for end-user groups who already have myopia (disease management programme), the suggested algorithms are approximately 6 months in duration. This duration was chosen based on evidence showing that complex change in health behaviour takes 6 months to habitually incorporate into a person's lifestyle *(57, 58)*.

Details of how the MyopiaEd message libraries and programme design may be adapted can be found in Section 5.

3

Operations management

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3.1. Establishing leadership for the MyopiaEd programme

It is recommended that the MyopiaEd programme be developed and implemented as part of an existing national or regional digital health programme or be part of a national/regional eye care plan. The parent programme should have the overall responsibility for MyopiaEd, and a small project team (comprising, for example, a project manager and an additional 2–3 people) may need to be established to manage the overall programme design and assist with day-to-day programme operations, monitoring and evaluation.

In places with no digital health programme, an intersectoral (including, for example, government, academia, civil society) leadership team may need to be established specifically for the MyopiaEd programme. Wherever possible, efforts should be made to engage with other government programmes focused on digital targeted messaging operating in the country (including, for e.g., mAgeing and mDiabetes); sharing technical resources across these different initiatives ensures optimization of available resources as well as cross-learning and experience-sharing.

3.2. Undertaking a situational assessment

Undertaking a situational assessment is crucial to first understanding the need for a MyopiaEd programme and is based on factors such as the local epidemiology (for example, data on vision impairment, myopia and trends), existing policies and awareness activities, and priorities. If a "need" is established, a situational assessment can provide an understanding of the programme setting through:

- mapping ongoing digital health programmes that may feature messaging capabilities (review existing country digital health programmes registered in the WHO digital health atlas (healthatlas.who.int) listing);
- mapping activities for the promotion of myopia care/eye care;
- exploring existing telecommunication companies, mobile network providers, statistics of mobile phone use, costs to consumers of text messages, and any industry-representing body or association;
- identifying existing national or subnational eye care regulatory policies; and
- identifying funders of health promotion and/or digital health interventions.

The findings gathered will inform community- or country-specific implementation of the MyopiaEd programme and should be carried out at the start of planning.

The situational assessment can include specific indicators to act as baseline measures for monitoring and evaluation (M&E). It is thus advisable to read Section 8 of this handbook before initiating the design. The time needed to undertake a situational assessment, and the assessment priorities identified in terms of desired outcomes may vary from country to country depending on existing information and the development stage of any national interventions related to vision impairment and myopia.

For help with planning or undertaking a situational assessment, please contact the BHBM team at bhbm@who.int.

3.3. Stakeholder analysis and engagement

As with any project, it will be necessary to consider a range of stakeholders for engagement in the MyopiaEd programme. Such stakeholders may include:

- Ministry of Health and other ministries such as Finance, Information and Communications Technology (ICT), Telecommunication, Data protection
- Telecommunications regulatory authority
- Digital or mHealth service providers
- Telecommunications operators
- Local aggregator
- Data privacy commission
- WHO, ITU and other UN entities
- Academic institutions working in field of digital health (including eHealth or mHealth)
- Technology providers
- National informatics centre
- Technology development agency
- Local NGOs working in eye care or mHealth/digital health
- Potential donors.

Further details of the roles of different stakeholders involved in BHBM initiatives (digital health programmes) are provided in Annex 1. When planning the MyopiaEd programme, it may be important to identify and engage with:

1. institutions and experts with specialized knowledge or research in this field to guide the content adaptation process (if required), as well as monitoring and evaluation;
2. representatives of the target group (i.e. parents of children with myopia, children, adolescents and adults with myopia and the general public including health workers and educators) to provide feedback and advice on content adaptation (if needed);
3. civil society groups (see Section 3.4) and associations of young people to actively support and encourage roll-out and uptake of the MyopiaEd programme; and/or
4. influencers and role models for the target group can facilitate the promotion and recruitment strategy by running campaigns on their platforms and liaising with media outlets.

3.4. Engaging with civil society

Engaging with civil society is a strategic option for obtaining funding and in-kind support. Civil society groups working in the field of eye care and related fields can support the project through engaging with the target groups, undertaking media outreach, and raising awareness of eye care and MyopiaEd programmes in schools, parent associations and other relevant platforms. Civil society can also assist in development and translation of promotional materials.

3.5. Forming strategic partnerships with the private sector

Strategic partnerships with the private sector can be mutually beneficial if they if they share a long-term corporate strategy or goal. The first step in the process of forming partnerships is to identify organizations in the private sector who are interested in funding either elements of the project or entire projects.

A number of factors can motivate the private sector to collaborate with country programmes, including shared missions, and opportunities to share knowledge and extend programme reach. Engaging with the private sector can provide BHBM initiatives with several opportunities to improve service delivery. For example, private companies may benefit from a direct partnership through exposure or association and thereby may offer a reduced fee, or provide cost-free or in-kind services. Different types of sectors are likely to have interests in different aspects of the programme. For example, telecommunications companies may be interested in providing a special product offer to clients, and manufacturers of smartphones may engage in MyopiaEd as part of their corporate social responsibility (CSR) programmes.

Any contracts or written agreements should be accompanied by a due diligence process with clearly stated clauses regarding data ownership and intellectual property. To maximize chances of success, attempts should be made at selecting companies whose longer-term engagement is consistent with their corporate strategy and core business. This will ensure a sustainable and long-term partnership. BHBM has experience in working with private partners and can provide advice and support with managing potential partners.

3.6. Funding the MyopiaEd programme

Ensuring a robust funding model for MyopiaEd is essential. While the initial costs of an MyopiaEd programme can be high, careful implementation that maximizes input through integration with other digital health programmes and eye care programmes, and the utilization of existing infrastructure and staff support etc. to reduce costs, can make the investment more than worthwhile. At the outset, each country should commit financial and human resources, as well as political will, to ensure the programme's success. Estimates of the budget requirements for the MyopiaEd programme can be found in Section 4.7.

BHBM initiatives have found several sustainable and successful business models for scale digital health programming; these broadly fall into three categories:

1. **Government funding:** this may be through existing or newly created budget lines.
2. **Bilateral or multilateral support:** bilateral support is the investment in one Member State by another Member State. Multilateral support typically comes from a multilateral development bank, chartered by two or more countries (for example, the African Development Bank).
3. **Third-party grants:** these grants typically come from international health donors; national nongovernmental organizations (NGOs) or health donors; philanthropists; or the private sector. (See Annex 2 for guidance on applying to funders.)

These options are not mutually exclusive; they should be explored as early as possible in the programme's development. (Further information on funding sources is included in Annex 3).

4

MyopiaEd workplan development

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4.1. Establish the "problem statement" and objective of the programme

The problem statement should describe the problems that the MyopiaEd programme intends to address, drawing on the needs and context revealed through the situational assessment. The overall project objective should be developed based on the problem statement, for example: "To create a targeted client communication text messaging programme, providing education on myopia including its causes and prevention, for the population of [country], implemented as a cost-free national service, particularly targeting persons at risk of developing high myopia; and raising awareness of good eye health behaviours".

4.2. Identify requirements of technology, infrastructure and regulations

To deliver an effective MyopiaEd programme, it is critical to select and implement the best technology; consideration of all ICT and software expertise from the Ministry of ICT partner is required, and any digital health and IT specialists in the Ministry of Health and other relevant ministries.

The process of selection and implementation includes the following steps:

- Selecting technology to be used
- Identifying software needs
- Procuring technology
- Developing a dashboard and enabling access for monitoring and reporting
- Procuring a shortcode if necessary
- Negotiating pricing with telecommunications regulators, aggregators, and operators to ensure recipients can use the service free of charge
- Testing by recipients of the technology and registration process
- Developing data security and interoperability standards
- Technology pretesting.

A detailed explanation of technology specifications is provided in Section 6.

4.3. Content adaptation

As described in Section 2, this toolkit includes a library of messages (Web Annex) which can be used by governments, partners, and other interested organizations. If necessary, the message content and programme design (e.g. intensity of the messages and duration of the programme) may be adapted to suit the local context, ensuring that adaptation to the message content is driven by user-research. The aim is for the libraries to be translated into all six WHO official languages; however, in countries with no use of these six languages, translation may be necessary for implementation of the programme. Further details on the process of adaptation are provided in Section 5.

Note: When including an attribution to WHO, the adapted messages should be shared with the BHBM team prior to their finalization and use.

4.4. Promotion and recruitment

In parallel with content adaptation, it is important to outline the strategy for promoting the MyopiaEd programme in the target population, and for generating enrolment.

Section 7 provides comprehensive guidance on how to plan promotion and points to consider for maximizing recruitment. In summary, this includes:

1. Getting to know the target audience.
2. Setting up the programme enrolment procedure and service, and ensuring it has been adequately tested before user recruitment.
3. Developing a promotion plan including details of:
    - who will be targeted;
    - what the short-term, mid-term and long-term promotion strategies will be;
    - who will be promoting? For example, will there be third party marketing specialist involvement? How will workers, civil society, community leaders, and media personalities be involved?;
    - how will they promote? For example, will they select promotion channels according to user preferences (mobile phone messages, social media, health centres etc.).

- what means will be used for promoting? For example, what are the key messages for different target user segments? What other promotional materials (posters, leaflets) will be needed?; and
- when will promotion occur? For example what is the launch date/ other important dates for the calendar (such as World Sight Day or national vision or eye care day/week).

4.5. Monitoring and evaluation

When setting up an MyopiaEd programme, it is important to decide how progress will be measured. Section 8 of this toolkit provides detailed guidance on the monitoring and evaluation (M&E) of the MyopiaEd programme. The steps required for this include:

- Defining M&E outputs
- Adapting an M&E framework
- Planning M&E human resources
- Selecting M&E indicators
- Designing data collection and selecting tools
- Preparing a budget
- Monitoring the data collected
- Evaluating the data collected
- Preparing reports and dissemination plans for evaluation
- Reviewing and refining the programme and improving service provision.

A comprehensive set of indicators for the MyopiaEd programme is presented in Annex 4. Given that data collection can be costly, core indicators have been marked in blue. Examples of pre- and post-survey questionnaires for capturing self-reported behaviour change for MyopiaEd can be found in Annex 5.

4.6. Estimated time frames

The time frame for establishing a client targeted digital messaging programme may vary depending on the country and on local processes and requirements and may be considerably shorter if implemented as part of an existing national or regional digital health or mHealth programme. The timeline outlined below is based on ongoing BHBM initiatives:

- Planning: 3–4 months
- Content adaptation: 4–6 weeks
- Technology: 4–6 weeks
- Development of promotion and recruitment strategy and material: 4–6 weeks
- Programme implementation: 6–12 months
- Monitoring and evaluation: throughout programme, and at the end of programme cycle.

4.7. Budgeting

The budget required for targeted client communication message programming varies between countries. The goal is for the MyopiaEd programme to be free of charge for end users, as costs can be a major barrier to uptake. Year 1 costs will be typically higher (US$ 90 000–200 000) because of the capital costs of content and software development, and higher engagement and support needs. Based on current experience, the following very rough estimates are presented (in US dollars):

- Programme coordination: US$ 30 000
- Content adaptation: up to US$ 15 000
- Technology platforms and procurement: US$ 30 000–100 000
- Promotion: US$ 30 000
- Monitoring and evaluation (across the span of the programme): US$ 40 000

These costs will vary depending on a number of factors, as summarized in Box 3. It is advisable to include a contingency fund of around 10%, as unexpected costs can often arise with technological programming (for example, software bug-fixing or last-minute necessary changes to specifications). This financial buffer can then either be repaid to the donor or absorbed into the financing of subsequent project phases.

Box 3: Common factors that influence the budget of an digital health targeted client communication programme

- **An existing national or regional digital health programme with messaging capabilities.** Costs may be considerably lower if there are existing digital messaging programmes already running within the country.
- **The chosen delivery platform and costs of software development.** These could include SMS, an existing messenger app, in-app messaging, a purpose-built app, website, diagnostic tool etc. (See Section 6 for further details.)
- **Current and needed resources.** These include human resources, content and technology/software requirements.
- **Need for new content.** This toolkit contains a library of validated messaging content; however if the programme requires translation, and cultural and contextual adaptation, or additional content such as e-learning content, diagnostic guidance etc, this could require further development.
- **Promotion and recruitment methods.** Marketing the product or programme can be costly (social media advertising is an example of a marketing method that could be utilised).
- **Monitoring and evaluation capacity.** This can be costly; nonetheless, investment is worthwhile and can help determine that you are having impact expected from the messaging, facilitate course-correction, and also make the case for programme expansion and further funding.

5

Content adaptation

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Experience shows that, despite best efforts to craft the content for behaviour-change appropriately for a global audience, programmes are most often improved through adapting the message content and/or programme design to the local context. This section of the toolkit provides guidance on:

- **adapting programme design; and**
- **adapting the existing BHBM MyopiaEd content library to individual context.**

Note: WHO requests that any additional messages or content be shared with the BHBM secretariat (bhbm@who.int) to inform further iterations of the global content libraries, and for the benefit of other stakeholders.

5.1. Adapting MyopiaEd programme design

There is flexibility to adapt the programme to the social and cultural context within countries; to the available infrastructure and technologies as used by the population; to available funding; and to existing health and social systems.

As outlined in Section 2, the MyopiaEd message library includes one-way SMS messages and makes suggestions for programme length, and frequency of messages sent (the algorithm). The suggested duration for each module is 6–12 months. There is flexibility to adapt the programme to the social and cultural context within countries; to the available infrastructure and technologies as used by the population; to available funding; and to existing health and social systems. Implementers may also shorten or lengthen the programmes; increase or decrease the intensity of messages; adapt the system rules; and adapt registration, opt-in/out and other functions.

When adapting the programme, including its rules and logistics, the following factors should be considered and guided by feedback from target users:

- The objectives of the programme.
- The media and channels used.
- The timing, frequency, and duration of the programme.
- The collection and storage of baseline and accumulating research data.
- Registration, opt-in and opt-out process, and administrative communication. Through querying the reasons for quitting (for example, programme length; frequency of messages), the programme will provide useful information for revising and refining the programme algorithm and messages. Such feedback should be collated and discussed with the project leadership and should also be shared with WHO.
- The degree of tailoring, personalization and flexibility in the programme. It may be possible for some digital targeted client communication messaging platforms to provide recipients the option of customizing the time of day they receive the message, personalize or tailor content, or to adapt its frequency and theme according to type of exposure being faced.
- The extent of interaction end users will have with clinicians or the health service system.

The SMS messages can be adapted easily to free-phone voice messages which can benefit low-literacy populations or persons with vision impairment. However, if the situational assessment and inputs from target users suggest that providing the programme through smartphone apps in addition to SMS may have more impact, the content library may be adapted to a messenger app (as normal instant messages or in chatbot format) or as a stand-alone app. Annex 6 provides guidance and considerations for adapting the content library for different messaging formats; Table 3 in Part 2 describes the strengths and weaknesses of the different channels and applications. Considerations for selecting the technology to use can be found in section 6.1.

5.2. Adapting the existing MyopiaEd content library

As detailed in Section 2, the process for creating the MyopiaEd content libraries was comprehensive, being based on the best available evidence, and undertaken in close collaboration with a group of international experts. Message content was written with a global perspective, and with the understanding that the messages may need to be adapted and/or additional content may need to be developed based on the social or cultural context in a given country or setting.

Adaptation is important; through adaptation information can be made clearer and more relevant to the target population. Adapted content will enable users to relate to and implement the strategies for behaviour change, and may lead to higher retention of users. To increase their impact, the messages must be understandable, acceptable and relevant.

The following general questions can be used as a guide to assess whether the message content needs to be adapted, new content developed, or whether the existing BHBM MyopiaEd libraries are sufficient (some of them may have been included already in the situational assessment):

- Are there any groups or subpopulations in your country that are not served by adopting the existing MyopiaEd message content?
- Are there any misconceptions or false beliefs around myopia that are specific to your target population and that warrant additional content?
- Is myopia highly stigmatized in your country?
- Are there special needs in your country resulting from high prevalence of related eye conditions that are not already covered in the BHBM library?
- Are there existing public health campaigns around myopia that align with the proposed MyopiaEd programme?
- Can the population of your country readily access eye care professionals and services?
- Is it more appropriate to run the programme through a conversational agent (in which case, conversational scripts and additional content may be necessary)?

In the current MyopiaEd message library, some notes have been provided where surface or superficial adaptations may be necessary, including:

- The use of local terminology with respect to specific health professionals (for example, ophthalmologists or optometrists).
- The provision of links to local evidence-based resources that are cost-free and accessible to end users (for example, WHO or local government, professional association websites related to myopia).
- References to contact lenses and other available and accessible treatment options being added to messages. The current message library refers to spectacles as the main form of refractive correction.
- The encouragement of time spent outdoors to delay the onset, or slow progression, of myopia; a reference to sun protection should be added where applicable.
- The addition, where applicable, of the recommended age of first eye examinations, and frequency of eye examinations based on country-level guidelines.
- The personalization of messages, where possible. Examples may include adding local greetings, and the participant's (or child's) name to start the message.

Local experts and target users should guide the adaptation process and/or the creation of new content. Their inputs can be gathered through review processes and qualitative methods, including focus groups, surveys and consumer pretesting. Any information incorporated should be evidence based and agreed upon by experts and health-care providers, as well as end users. The BHBM team can also help with content adaptation or additional content development (email bhbm@who.int). The case study below provides some insight on adaptation of messages *(59–62)*.

Box 4. Case study:

Adaptation of the "Takore i te Kai Ava'ava" ("Stop Smoking") programme, New Zealand

A smoking cessation text message programme (STOMP) in New Zealand was adapted for use in the Cook Islands by the Te Marae Ora Cook Islands Ministry of Health and the University of Auckland, New Zealand (financed by WHO). The STOMP programme, which is theory-based and shown to be effective in supporting smoking cessation, had previously been adapted for Argentina, Samoa, and the United Kingdom of Great Britain and Northern Ireland. The adaptation process involved making the linguistic and cultural nuances necessary for the new context while maintaining the integrity of the original, evidence-based programme. The messages needed to be adapted in order to be more focused on the direct health effects of smoking rather than be general motivational messages to support behaviour change. This was due to the low level of previous population-based education on the harms of smoking in the Cook Islands. Another key feature of the adaptation was the need for formal language to be used in both the English and Cook Island Māori versions without abbreviations or text language. The final version of the free text message programme was named "Takore i te Kai Ava'ava", and a shortened version of the name ("TextTakore") appeared at the start of all text messages to distinguish them from unsolicited messages common in the Cook Islands. As the local telecommunications provider was unable to provide two-way message functionality, different language versions – as well as personalization and tailoring within messages – of the programme had to be delivered from New Zealand through a gateway company direct to users in the Cook Islands. A pilot study of "Takore i te Kai Ava'ava" found the programme to be highly acceptable and demonstrated potential to provide motivational support to smokers in the Cook Islands wanting to quit.

Part II

Generic content on running a BHBM initiative focused on targeted client communication messaging

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6

Technology specifications

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When developing a technology plan for implementing MyopiaEd messages, it is advisable to onboard all available ICT and software expertise from the Ministry of ICT partner and any digital health and IT specialists in the Ministry of Health and other relevant ministries.

If you wish to embed MyopiaEd messaging within a wider existing digital health platform it is important to understand the capabilities of the digital health platform, and how your programme will fit within it. If your country does not have a targeted client communications capabilities within the digital health platform, it may be worth learning about, and advocating, setting one up.

For more information, see the *Digital health platform handbook for health: building a digital information infrastructure (infostructure) for health (63)*, and the *WHO Digital Health Implementation Investment Guide (64)*.

6.1. Selecting appropriate technology for the context

When defining and designing the technological aspects of an MyopiaEd programme, appropriate to country context and target users, the following must be considered from the outset by the project team, in collaboration with local partners (aspects that feature in the considerations for a situational assessment are marked with an asterisk*):

1. **Key functions that the technology needs to perform** – for example, using a health (text) message delivery system on myopia to send automated messages according to an algorithm with a predefined frequency. An important consideration is how users access the programme and how often they will interact with it.
2. **Current and predicted use and uptake of mobile technologies and communications*** for health in the target population, both from public sector and private sector. Consideration is needed for the preferences and user ratings of the target population, and the availability and sustainability of these technology options within the public sector.
3. **Outcomes of market research** – for example, which telecommunications system is most appropriate in the country, based on reach (subscribers), coverage, costs, security, and sustainability?
4. **Equity of access to different technologies*** – for example for technologically-disadvantaged groups (SMS or interactive voice response system (IVRS) are likely to be most equitable); reach, and access to different language versions.

5. **Messaging formats within the parameters of the chosen technology** – for example, should voice messages, video messages, images, GIFs, interactive messaging be used? What is the reach capacity of these features and content, their cost in the country, and using different platforms?
6. **Ensuring that the programme is cost-free and available to all consumers**, regardless of device, carrier, network or location. Could the data-cost of the initial download of an app or the receipt of WhatsApp messages be waived by the telecommunications provider?
7. **Ethical and regulatory data considerations and specifications** – for example, to ensure that data are handled sensitively, to protect human rights and personal safety. Using a need-to-know principle, what data collection is necessary? Who owns the data? Where are they hosted and how robust is the security of the host? What are the privacy regulations and how will data be protected and kept secure? What are the considerations for data protection and how should a central database best be maintained?
8. **Conducting monitoring and evaluation** – for example, how can user data be used to report on the key performance indicators (see blue indicators in Annex 4)? What frequency and which indicators should be used? How will the system produce reports and present data from users? How can the design of a dashboard enable data presentation? Can these data be made interoperable with existing health information systems? Is periodic reporting of aggregated analytics data possible?
9. **Interoperability considerations** – for example, are there existing health system technologies with which the programme must communicate? If there is another health messaging programme running, can some or all of the same infrastructure be used? If health workers are "prescribing" the programme, can this be recorded in the health record system, patient data system or health insurance billing mechanism? Can the health record system receive data such as those for behaviour change reported by the user to the messaging platform?
10. **Sustainability**, including ongoing operating costs of the programme maintenance; costs for users, such as per message or unit of data, and how these will affect the scale of the programme.
11. **Contractual arrangements with partners** – for example, considerations regarding intellectual property, security and privacy of mobile phone numbers, testing, expectations of involvement in M&E, and new and outstanding service agreements. Who will hold the contractual arrangements, and what support will be given for maintenance and any other problems?

These considerations and a list of simplified strengths and weakness of different technology channels are outlined in Table 3. The table is designed to help with the selection of the ideal technology or channel for an MyopiaEd programme. It is essential to consider the technology literacy and accessibility levels of the target population when selecting the technology channel. Older users, for example, may be less familiar with, or have less access to, newer technologies.

Table 3:

Technology options and applications: strengths and weaknesses

Description	Strengths	Weaknesses
IVR (Interactive Voice Response)		
IVR is an automated phone system that interacts with users using prerecorded voice responses. Users can respond using touch tone keypad selection or via preset/ valid vocal responses (e.g. “yes”, “no”)	• Voice- and phone-enabled access • Fast time-to-market • Supports natural language • Ease of integration • Accessible to those with feature phones	• Limited capability and development tools • Inability to pause, resume, forward and rewind • 2-way communication can be prone to malfunction due to misinterpretation of voice inputs
SMS (Short Message Service)		
SMS allows short text messages to be exchanged between mobile phones	• Simple, easy and convenient • Can negotiate cost–effective delivery • Private communications • Fast communications • Accessible to those with feature phones	• Some security vulnerabilities • Fake SMS (spoofing) can result in trust issues • 2-way messaging limited to simple interactions • May be costly if cost–effective delivery cannot be negotiated
USSD (Unstructured Supplementary Service Data)		
USSD uses alphanumeric codes to exchange information with a server in real-time (e.g. user can use a code to check account balance and add money to account without need of an internet connection	• Simple and logical • Real-time, fast and responsive • Inexpensive • Interactive navigation	• Session-based timeouts • Codes more difficult to remember than Common Short Codes

Description	Strengths	Weaknesses
Multimedia messaging service		
MMS extends SMS technology by allowing the exchange of a variety of media (images, audio, etc.)	• Direct and personal • Messages can be stored and forwarded • Interactivity through multimedia	• Not compatible with basic phones • More expensive than SMS • Content adaptation limited by screen size and resolution variations • Read and response rates lower than SMS
Existing messenger services		
These include apps and platforms that enable instant messaging via an internet connection (e.g. WhatsApp, Facebook, Messenger)	• Low cost • High usage • Increased interactivity and engagement • Maintained by the app provider • Allows sending of graphics and videos • Can deploy conversational agents or chatbots (where responses are tailored to users' inputs) • Can be simple or elaborate (natural language processing and artificial intelligence) • Can carry an avatar or visual identity	• Third party private sector involvement or deployment software may be necessary (e.g. to set up and manage back-end functions) • Potential data costs for end user to receive content • With conversational agents (if using artificial intelligence capabilities), can require data and training before launch. Also, bugs or bot miscomprehension of inputs can be dissatisfying and potentially risky

Description	Strengths	Weaknesses
Smartphone applications		
Software/programme that runs on a mobile device that commonly needs to be downloaded and installed before use	• Self-contained experience • Graphics and videos easily integrated • User-generated content and data input • Automatic updates and read content offline • Leverages device-native capabilities (camera, Global Positioning System (GPS), step counter) • Can deploy conversational agents (for tailored 2-way messaging)	• Need to build for multiple platforms, involving time and high cost • Managing multiple releases/updates • Sensitive to users' device changes or operations • Need to submit to app stores for approval • High user drop-out rates • Initial data required for download can be costly for end user • Often requires 3G or 4G coverage • Only compatible with two platforms (iOS and Android)
Mobile website		
A mobile website/ webpage designed specifically for mobile device access	• Cheaper to develop and maintain • Supports mobile phones and smartphones • Mobility for content and services • Videos and graphics easily integrated	• Less functionality, unable to use advanced phone features such as camera, GPS • Small display size • Low bandwidth affects functionality

6.2. Technology implementation needs

Having identified the technology to be used, there may be additional technology needs for implementation; these include:

- Identification of process for procurement, adaptation and maintenance of the selected technology.
- Dashboard design and development and access needs (consider M&E indicators for dashboard development: what monitoring and success indicators should the dashboard present? Who should have access to the dashboard?).
- Procurement of a shortcode (if using SMS or telephone networks for IVRS)
- Data security needs
- Pretesting and scale-up needs

Some of these needs may be apparent from the situational assessment; if not, further research will be necessary to define these. The extra research is worth the investment: revising developed software due to unforeseen needs can be very costly.

6.3. Software needs

A service delivery platform is necessary for running a digital targeted client communication messaging initiative to ensure that the initiative works smoothly for users and is integrated seamlessly within the mobile telecommunications network. Such a platform will have different capabilities and features depending on the technology chosen to deliver the content (SMS, messenger services, standalone smartphone app). The choice of service delivery platform may depend on the wider digital health landscape in the country. Based on requirements, it will be necessary to identify whether an existing or off-the-shelf solution is appropriate or whether a customized solution (designed and built for the initiative) is best. It is also important to ensure the content shared does not violate any data-sharing policies (some social media platforms have very stringent policies on what data in the medical field can be collected or shared on their platform).

The first step in preparing to run the initiative, is to list the functions required of the system. This is not a technical list, simply what the system will need to do. For example, if research with target users (including consideration of the strengths and weaknesses listed in Table 3) has shown that a messenger app delivery mechanism using a simple bot would be most appropriate, and that target users mainly use Facebook, the service delivery platform may need the following capabilities or requirements:

- A simple Messenger for Facebook conversational agent.
- The ability to reach anyone with a Facebook account.
- The capacity to reach millions of users as part of this national initiative.
- The capability to for the system to run, for example, in three different languages.
- An easy sign-up procedure.
- The ability to deliver messages according to an algorithm.
- The capability for the user to interact using buttons only (i.e. no artificial intelligence involved).
- A system that notifies users of new content.
- A system that allows data to be stored by the initiative servers.
- Technical and maintenance support (with the aim of transferring this support to the Ministry of Health IT team after Year 2).

Once these capabilities are established, software requirements will need to be considered. It may help to look to other service providers or countries running similar digital targeted client communications initiatives to see which software is being used, the challenges faced, and lessons learned. The WHO toolkit for planning an information system (Annex 4) *(61)* can help guide decisions on whether to use an existing solution, or to develop one that is customized. It is worth considering the pros and cons of each option and mapping the technology requirements to the capabilities of the platforms. Also helpful, is to investigate the programming needs (should any adaptation or integration with other systems be needed), the level of ongoing support available for each option, and the costs.

In some cases, the following considerations will be necessary when making a decision on the software and financing model:

- How will the software integrate with the mobile telecommunications environment? Will it work across different mobile network operators (MNOs)?
- What partnerships will need to be developed to activate the service (for example, partnerships with aggregators, MNOs, mobile gateway providers)?
- How will the platform be able to adapt to changes and advances in technology?
- Based on the chosen platform, will the project need new or additional hardware (computers or a server to run the initiative)?
- What are the interoperability and licensing issues (for example, if you would like to "prescribe" the initiative to health service users, and how you might integrate and record the use of the initiative – and patient outcomes associated with that use – in the health information system).

6.4. Selecting a software provider

It is likely that your organization will have existing processes and procedures for the procurement of services and will likely issue a request for proposals (RFP). An initial step can be adding to the RFP the background information compiled, and ensuring the goals, values and desired outcomes for the initiative are set out. Working with service providers whose values align with those of the initiative will help with relationship management. Researching service providers prior to selection can help establish whether values are aligned.

A next step can involve using the list of requirements created to build the RFP. Software providers, if part of the team, can suggest specifications appropriate for programme needs. The BHBM country support team can also assist with writing the RFP.

It is worth considering software providers who have already implemented similar solutions at scale (asking to see audit results may be necessary and should be permitted); ensure the provider is able to manage the demands of the initiative and maintain their service throughout (including establishing what maintenance activities are included in the fee, for example). It is important to understand what components of the software will be proprietary (licensing these to the owner of the MyopiaEd programme, if possible); aiming for open-source components wherever possible is preferred.

When selecting the software company, designing or adapting an existing scoring matrix to help standardize any contracting decisions made may be a desired option (see the WHO toolkit, *Digital Implementation Investment Guide (DIIG): Integrating Digital Interventions into Health Programmes (64)* for a comprehensive scoring matrix that can be adapted to purpose).

6.5. The role of telecommunications operators

It is important to note that mobile communications network environments differ from country to country. The specificities of end user access to SMS, calls or mobile data (for stand-alone or messenger apps) should be considered in the planning stage by individuals knowledgeable about the communications network in the country. Network operators, telecommunications companies, or industry organizations can provide help in setting up the initiative and advising on its suitability and sustainability.

Certain providers may view supporting such an initiative as good publicity or a useful addition to the services they offer. This can be favourable for negotiations. Before inviting involvement in technology specification, it is important to consider what sort of arrangement with telecommunications companies would best suit the long-term implementation of the initiative; what other partnerships could be useful or necessary; and what parameters need to be set for negotiating the pricing of message dissemination with telecommunication regulators, aggregators, and operators.

6.6. Negotiating with telecommunications operators

Engaging in, and maintaining, strong partnerships with telecommunications operators is critical for implementation of an MyopiaEd programme, as well as for any eventual reduction in the cost. BHBM initiatives have established that enrolment tends to be very low when consumers have to pay for the programme. Moreover, a major barrier to two-way messaging initiatives is the cost to participants of replying to messages; such costs resulted in one initiative having a reply rate of only 30%. The greater the reduction in costs of engagement to users, the more successful a two-way initiative will be in terms of user activity. Using SMS, there should be no fee to receive or reply to initiative messages; with messenger apps, it will be necessary to waive data costs associated with message receipt and reply. If the choice is to build a standalone MyopiaEd app, the initial download must be cost-free (both for the app and the data required for its download); subsequent information exchange should also be cost-free. In all cases, user data should be private and secure.

To this end it may be helpful for teams to include members with experience in operator engagement and negotiation; if required, the BHBM country support team can assist with this. The ITU (regional office) can act as a bridge to facilitate negotiations between the Ministry of Health, the telecommunications authority, and the telecommunications companies. A template for a telecommunications operator agreement is available on request from bhbm@who.int. WHO has also released a comprehensive guide to negotiating with mobile operators (this guide relates to mHealth for reproductive, maternal, newborn and child health, but its principles are relevant across other health issues).

The objectives of the negotiations are to reduce or cut costs associated with the initiatives, especially those borne by the intended user; to make the initiative hassle-free for the end users; and to ensure data protection and privacy.

Tips for negotiating

- Include in the consultation an IT expert with **technical knowledge** of the platform and software being used to respond to technical questions or discussions.
- **Share and discuss values and vision**, including those of the telecommunications company, highlighting the areas where values correspond.
- Estimate the **intended user numbers** of the initiative before commencing negotiations with telecommunications operators – this will help assess the scale of contribution they need to make.
- Negotiators must be **aware of the current costs of services, costs of packages, and sliding rates**, all of which are vital for negotiations.
- **Ensure the project is jointly shared by both the Ministry of Health and the Ministry of ICT** – in some countries the Ministry of ICT may have an established relationship with several mobile network operators and may be in a stronger position to negotiate (especially in the case of national public network agencies).
- Ahead of negotiations, **hold consultations with relevant authorities** (for example, telecommunications authority, national ministries, market regulators) to identify and understand which benefits or privileges could be granted to telecommunications operators in return for their collaboration (Box 5 outlines ideas on how to do this).

In the absence of telecommunications provider support and where an SMS or IVR programme is used, the initiative can be delivered through a contractual arrangement with an “aggregator” or “gateway” company that has established relations with all telecommunications companies and networks. This can be a cost–effective way to deliver messages to many participants, regardless of their mobile carrier or location, without establishing these interfaces individually. Although the aggregator will add a further cost, this cost decreases as the scale of the initiative increases. Using an aggregator can therefore be more cost–effective than attempting these activities “in-house”, unless capacity and infrastructure already exist.

Box 5:

Ideas for incentivizing operator "buy-in"

- **Direct benefits** to the operators from the **Ministry of ICT**, e.g. a small tax reduction.
- Offering an **access point into a new market by understanding mHealth service structure and user experiences**.
- Within the broader programme timeline, operators can use their growing experience to **develop their independent mHealth portfolios**, nationally or internationally, driven by rising national demand.
- Showing effectiveness of mHealth services could offer operators a **new source of future revenue in value-added health services**.
- Given that, in most countries, the telecommunications market consists of two or three major providers with similar subscription plans, a telecommunications operator can distinguish itself from others by demonstrating the ability to offer additional benefits to its customers.
- **Early-mover advantage:** knowledge transfer. Operators need to learn how to run largescale public health programmes. Participation in the programme will **maximize quantity and quality of knowledge in comparison to competition**.
- **Good public relations:** Good visibility as a socially responsible company can showcase the company's contribution to public well-being. The Ministry of Health needs to ensure that it offers telecommunications companies the options for this visibility, including: promotion in mobile stores with Ministry of Health logo, mobile operator office, website and public campaigns.
- **Good working relationship with the Ministry of Health** (and possibly with the Telecommunications Authority).
- Operators may need support with their own interests in the mHealth, mobile money or mobile health insurance fields and could be working on common areas with Ministry of ICT or Ministry of Health. **Telecommunications companies can be invited to identify priority areas where the government may consider providing them with support in the future.**

7

Promotion, participation and retention

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7.1. Promoting the mHealth programme

It is essential to promote the MyopiaEd messaging programme; through promotion, potential users will know about the programme and be able to subscribe easily and conveniently. Without users signing up, the programme will become obsolete. A nationwide or population-specific strategy to promote outreach and recruitment into the programme can be a potentially expensive component and should be considered carefully and early on in the planning stages.

Feedback from implementors of most BHBM initiatives reported that more promotion, and more regular campaigning, should have been undertaken, and multiple engagement channels used. They further suggested using multiple media channels for promotional activities prior to launch, and noted that social media, SMS and posters were useful channels: radio and television advertising less so. Important considerations, learning points and suggestions from other BHBM initiatives are outlined below in Table 4.

Table 4:
Considerations for project promotion

Consideration	Description
Target audience for promotion	Once defined, get to know your target audience if you have not done so already, through focus groups, interviews and surveys. There will be numerous target audiences for promotion: 1. End users who can be reached directly (e.g. adults in the general public; or children in schools; parents at school or community gatherings; educators in schools, health workers in clinics/practices) 2. Key promoters – local and international eye care organizations and associations, health workers, educators, social workers, telecommunications companies and health insurance companies, NGOs, social media influencers and any other end user facing groups with an interest in health promotion The more that promotion and recruitment strategies are tailored to the target population, the more effective they will be at encouraging people to subscribe, and the wider the reach of the programme.

Consideration	Description
Target audience for promotion (continued)	Segmenting them into smaller groups based on characteristics –age, gender, or socioeconomic status, for example – and understanding their values and motivations can help make recruitment more successful (e.g. leveraging motivation for change in the recruitment campaign and tailoring promotion materials for different segmented groups). Running focus groups with people representative of the target audience helps inform the design of the initiative and gather ideas and recommendations about recruitment methods to use as a basis for the strategy. It is important to establish if there is any stigma directed towards myopia or spectacle wear among the users as this will affect the response to the initiative. It may be useful to conduct an anti-stigma campaign just before and/or overlapping with the promotion campaign to prepare the population for acceptance of the initiative. It may also be beneficial during promotion to detail the risk factors for myopia (e.g. excessive near work, not spending enough time outdoors), as well as the early signs of myopia (e.g. squinting to see clearly, children not seeing the chalkboard in a classroom, etc.); the benefits of using spectacles; the importance of increasing literacy of myopia and eye health; and raising awareness of the need for the initiative among potential end users.
Cost of the campaign	Find out from target users, what channels they will engage with (e.g. social media advertising, radio and television); invest in these for initiative success. Initial underestimation of promotional costs is common and can be difficult to remedy later. The principles of negotiation with telecommunications companies can also be useful when negotiating with broadcasting and social media companies (see section 6.6).

Consideration	Description
Strategies and synergies, and leveraging other campaigns	The strategy should be based on actual research with the target audience; this will identify the most appropriate channel. Identify which organizations/notable personalities are currently involved in successful mass media campaigns for eye care; whether these campaigns can be linked or leveraged; which, if any, mHealth initiatives have been implemented previously in the area; and which promotional techniques are effective in the country. Leveraging existing marketing or health promotional campaigns of stakeholders of the initiative or partner agencies, such as telecommunications companies, can cut costs. Telecommunications companies or vendors could advertise the initiative on SIM card packaging, or run announcements when users are placed "on hold" when phoning for technical support or customer services. Countries can also leverage from, or integrate into, the campaign strategies of other initiatives, such as for NCDs. If the country is already running a campaign on eye care, the MyopiaEd programme can be integrated as an add-on. For example, if there is a national eye care day or an event related to myopia, the MyopiaEd programme and how to subscribe to it can be announced during the event.
Accessibility of promotion materials	Consider the target audience and if/how they access certain media channels. What is the media channel they will most likely see and engage with? How can you make accessing recruitment materials more equitable to minority populations or people with disabilities? Some BHBM initiatives found that males of higher socioeconomic status were more engaged than females (with some initiatives having 11% only of female users). Promotion should be targeted at difficult-to-access groups. Other BHBM initiatives have found social media along with messaging media (e.g. SMS messaging) most effective for recruitment.

Consideration	Description
Campaign content	A valuable lesson learned by one BHBM initiative was to ensure that all information on access to the initiative is concise and clear. The potential user should know who the initiative is for, and have all relevant instructions and know-how to sign up once they have seen the promotional materials. Users of a BHBM initiative in Tunisia, for example, reported that their reasons for signing up were due to its convenience via mobile phone and not because they thought the initiative would work. As a result, Tunisia then included information in their promotional materials on the effectiveness of such initiatives. Although it may seem obvious, campaigns should state who the intended user is. One BHBM implementer stated that the initiative did not specify that it was for tobacco users; the outcome was that many non-tobacco users signed up out of interest or to learn about addictology.
Who "owns", or is the perceived messenger for, the initiative	BHBM evaluations have shown that users trust and value messages if they come from the government Ministry of Health. For example, in one BHBM initiative, users said that they now believed cervical cancer to be very important because their Ministry of Health would not otherwise be sending messages about it *(65)*. In view of this, if possible, ensure that users see that the message comes from the Ministry of Health or other trusted health authority. Consider setting up a page within their website for users to access information about the initiative, which can be added to promotional materials. Consider promoting through government health services (e.g. on appointment reminder cards, in waiting rooms etc.). Identify other trusted authorities, such as local partners and stakeholders, who can help with promotion and recruitment. These can include faith-based or social organizations, cultural activity groups, civil society (e.g. national eye care associations, private clinics and hospitals (if applicable) etc.).

Consideration	Description
Using marketing specialists	The Ministry of Health or other implementing agency may not have in-house expertise to plan and deliver an effective promotion campaign. Contracting out to a marketing agency may seem costly; however, if an appropriate agency is chosen (one with a good reputation in health marketing), initiative numbers may increase substantially. Creating a call for proposals, with the aim of the promotion campaign and disseminating it to companies, will solicit proposals with a range of methodologies. The selection of a marketing company will depend on the suitability of their proposed methods for the target group, their success and experience with other health campaigns, and a competitive price.
Testing the recruitment strategy through a soft launch	Consider a test-run or a "soft launch" prior to starting the promotional campaign to ensure that all processes are working well before a large number of participants sign up. This may involve running focus groups with users, comparing differently worded or differently presented promotional campaign materials, or asking users what messages about the initiative and marketing materials would encourage them to sign up.
Pre-intervention information session	Launching information sessions about the MyopiaEd programme at places where parents of children with myopia, and adolescents and adults with myopia may frequently visit, can also enhance the visibility of the initiative and encourage participation. This can be part of the promotional and campaign strategy. Displaying flyers in high-density areas (targeting members of the general public), or where specific target audiences (e.g. parents of children with myopia) will visit frequently, such as schools, schools events, or health clinics, can also increase the accessibility of materials.
The local mobile communications environment	Check whether sending unsolicited messages is permitted (in some countries this contravenes the codes of conduct of telecommunications companies). Consider whether a population that often receives unsolicited health-related messages will be likely to read and respond to messages from the initiative. Also consider the issue of message receipt versus message engagement.

7.2. Promotion within existing health services or insurance schemes

Integrating the initiative into existing services and structures is one cost–effective way to encourage use of the initiative.

Health-care workers , such as optometrists, ophthalmologists, pediatricians, general practitioners and nurses, are primely positioned to encourage end users to enrol in the MyopiaEd programme. Health-care workers who are aware of a diagnosis of myopia in a child, adolescent, or young adult can recommend the MyopiaEd programme to them and to their parents.

In order to achieve this, the message library targeting the general public will also include health workers.

When engaging health services in promoting the initiative, it is useful to consider:

- The benefit of the initiative to both the health service and the health worker.
- Whether health workers may be resistant to change and thus to the use of mHealth? And if so, why? How may their apprehension be managed in order to gain their support in promoting mHealth to their patients?
- The level of community engagement and number of volunteers or health-care workers who may assist in promoting the MyopiaEd messaging initiative.
- How users of the health service will register with, or sign up to, the initiative – directly by text message; online; by telephone; in person; or through the health worker.
- Whether the use of incentives to encourage participation is possible in the health service.
- Current or historic use of mobile messaging for outreach and promotion within the service.

Information about the best ways to engage with health services as key promotors of the initiative should be collected from health-care workers themselves (for example, through focus groups).

A healthier population is also in the interest of health insurance companies. Early involvement by them in the implementation process could help; they could then disseminate promotional materials to their clients or even incentivize use of the initiative. Alternatively, they may have important lessons to learn if they have run mHealth initiatives themselves. Case studies with examples on the promotion of mDiabetes are shown for Egypt (Box 6) and Sudan (Box 7).

Box 6. Case study:
mDiabetes promotion in Egypt

In February 2016, the Ministry of Health of Egypt announced the national mDiabetes programme at a media event with the aim of increasing access to information on diabetes prevention and management.

With support from WHO, the SMS and WhatsApp messaging programme was promoted at health-care facilities in greater Cairo and at public places such as train and metro stations. A Facebook page called “Your Health in a Message” was set up for targeted recruitment. Banners, posters and brochures were distributed to patients with prescriptions, and at outpatient waiting areas, pharmacies and offices of various government offices. The ministry also partnered with popular radio and television channels and journalists to promote the programme, and in partnership with WHO conducted a media workshop to inform journalists about the programme, which resulted in widespread media coverage.

A group of social change agents “raedat refeyat” were trained to promote the mDiabetes programme during their home visits in the catchment areas of primary health-care centres in Giza and Qalyobia, giving diabetes patients the option to register by giving their mobile phone numbers. A database of diabetes patients was also obtained from public hospital and primary health-care centre records, diabetes national institutes and from a database of government-sponsored patients enrolled in the National Programme of Treatment. These patients formed the database for the mDiabetes programme.

Self-registration was encouraged through two mobile phone numbers listed on all promotional materials. Diabetes patients had the option to register either by sending a text or WhatsApp message or by a missed call to any of the two numbers or register via the Ministry of Health website.

Box 7. Case study:

Promoting an mDiabetes programme in Sudan

The Ministry of Health of Sudan launched its SMS mDiabetes programme in February 2020. A private company was contracted to run the campaign for the first three weeks; this included a video and audio advertisement as well as posters, brochures and stickers.

In the first week, the advertisement was aired on different media channels (social media, television and radio); in the second week, text message advertisements were sent to all mobile phone subscribers in Sudan through the three main operators within the country. The message reached more than 11 million mobile phone users. In the third week, the programme extended to the general population in public places, encouraging them to participate and distributing printed materials in different states. The campaign successfully enrolled over 75 000 participants in less than three weeks. Initially, the programme was started as part of the mDiabetes campaign which ran for 1.5 months, following which a mRamadan programme, designed to promote good health and spread diabetes-related information during the holy month of Ramadan, was added to the same promotion campaign. In total, 71 242 participants successfully completed the programme.

7.3. Participation in the MyopiaEd messaging programme

An effective promotional campaign should result in a number of interested users being ready to sign up and interact with the MyopiaEd messaging programme. This sign-up process must be user tested to ensure it is clear, easy and brief. Two major barriers to uptake of digital health solutions are costs associated with signing up and difficulties in signing up. BHBM initiative evaluations have shown that long or complicated sign-up processes can lose up to 30% of interested people. In one survey of interested non-starters, the majority who did not complete the process reported the sign-up fee as the biggest impediment to joining the initiative. Another initiative reported a large proportion of unintentional users signing up, thereby wasting resources. Initiatives should be cost-free for the user wherever possible, including replying to messages (see section 6.6 for negotiating with telecommunications operators) or downloads associated with use of the initiative where smartphones are involved. An example of a "missed call" sign up is illustrated in Box 8.

Box 8. Case study:

A "missed call" sign-up mechanism for mTobaccoCessation programme, India

India's Ministry of Health and Family Welfare and the Ministry of Communication and Information Technology partnered with BHBM to introduce innovative technologies for strengthening tobacco cessation services in the country through the mTobacco Cessation programme via two-way text message delivery system. Through this multistakeholder collaboration, a nationwide mCessation programme (QuitNow) was launched in January 2016, as part of the Prime Minister's "Digital India" initiative. Registration with the QuitNow programme involved the following steps:

1. User to call a toll-free number from a mobile phone and hang up within two rings (a "missed call"); or register at the website: http://www.nhp.gov.in/quit-tobacco.
2. Text message sent to the subscriber confirming registration.
3. Series of text messages sent to the user providing information on:
   a. the importance of quitting and encouragement to quit;
   b. setting up a quit date;
   c. tips to support the quit attempt; and
   d. follow-up support.

User testing can be a good way to get feedback and make the sign-up process more user-friendly. A balance will need to be struck between getting all the data needed from the user (in order to place them in a segment that receives tailored content or to act as a baseline for key evaluation indicators) and not tiring or boring them so they give up.

Another option is automatic enrolment for particular groups of health service or telecommunications service users. This approach has been used in BHBM initiatives. In Zambia, for example, all customers of one telecommunications carrier received messages. In India and Sudan, users were automatically enrolled through health services or door-to-door enrolment when they screened positive for being at risk of diabetes (as part of a national inclusive screening initiative); a free and easy opt-out mechanism was available. If appropriate and in partnership with health or screening services, this option could be a possibility, although contextual factors should be considered (for example legality of sending unsolicited messages, or acceptability of such an approach).

Once users have enrolled in the initiative, two-way messages, or gathering data using an app, can help to gauge ongoing user participation (providing that responses are cost-free). These messages or requests can be part of the basic content package such as motivational messages, or designed for the purpose of checking participation and monitoring health behaviour change (for example, “did your child spend at least 90 minutes outdoors today? Reply “1” for Yes, “2” for No”); some BHBM message libraries include such messages. Information on participation can also be captured at evaluation stage; for example, BHBM has collected useful data in surveys in which users were asked to estimate the proportion of messages that they a) saw, and b) read, and whether they sustained behaviour change throughout the initiative.

7.4. Retention

Drop-out rates is high in many health initiatives for behaviour change, and mHealth initiatives are no exception. For example, in an mRamadan tobacco cessation initiative, 30% of participants dropped out in the first week; 56% had dropped out after the first month, and 68% had dropped out by month 4.

If users drop out and two-way messaging is cost-free (or app users can be contacted), it is useful to ask why they are leaving (consent should be gathered for contacting participants about drop-out). Telephone surveys can also gather this information. BHBM initiatives have surveyed drop-outs with interesting findings regarding reasons for leaving: in Tunisia, for example, 47% of those surveyed left because the initiative had not met

their expectations (from what had been advertised); 53% left because the guidance was hard for them to follow; 40% suggested further tailoring of the initiative was required. Another important factor was the messages themselves, with users in India stating messages were not sufficiently motivating. Drop-outs surveyed in India and Tunisia responded that the use of videos and images would be more effective, and furthermore that combining the mTobaccoCessation messaging initiative with other quit services and support would have been beneficial.

Ways to reduce drop-out include:

- **Interaction and two-way messaging *(54)*:** adopting these gives the user dynamic and focused support (for example, in a messaging initiative, the word "CRAVE" can be sent to receive support when having a craving), or messages/tasks about goal-setting and follow-up. If messages are received through an existing messenger app, it is important to ensure that users can be notified of new content: not all messenger apps have this feature (an SMS may gave to be sent to alert the user to new content).
- **Initiative tailoring:** The more users feel the initiative is relevant to them and their goals, the more likely they will be to progress towards their goals and be motivated to complete the initiative. Therefore, user testing of the initiative content is very important. BHBM initiative implementors have also suggested tailoring initiatives to different user groups for this reason. Tailoring means that screening questions will be necessary, to place users in a given group. The reply to these questions should be cost-free; but if for any reason (other than cost) a user cannot reply, they should still be enrolled in a generic version of the initiative.
- **Smoother user experience:** The initiative should run smoothly and responsively on the technology platform of choice. Technical problems, especially if there is no technical support for users, can be very frustrating and is a major reason for drop-out in BHBM programming. Two BHBM initiatives had catastrophic issues resulting from technical difficulties with mobile communications carriers; with one initiative, 60% of messages were not sent, and with the other, no messages were sent for a period of six weeks. It is necessary to ensure, through pretesting the platform, that messages or content will be sent or be accessible and timely. For example, if the initiative features two-way messaging, the response to the users reply should be instantaneous; if not, the user will become frustrated and may leave the initiative. An app should be free of "bugs" and be responsive.

- **Option to opt-out:** "STOP" messages are often included in SMS or other text-based initiatives to enable the user to stop receiving messages (for example: "Reply STOP if you wish to stop receiving mDiabetes messages"). It is an ethical imperative that users can unsubscribe or stop receiving messages if they wish, and it is important in any BHBM initiative that they know how to do this. However, literature suggests that initiatives with more frequent STOP messages have higher drop-out rates *(66)*. Sending two STOP messages is advisable, one near the start of the initiative and one mid-initiative.
- **Gamification of the initiative:** providing a small reward or incentive, such as earning points by completing activities or presenting a certificate at initiative completion, may also give users the motivation they need to finish the initiative.

A checklist for considerations for technology specifications can be found in Section 6.

8

Monitoring and evaluation

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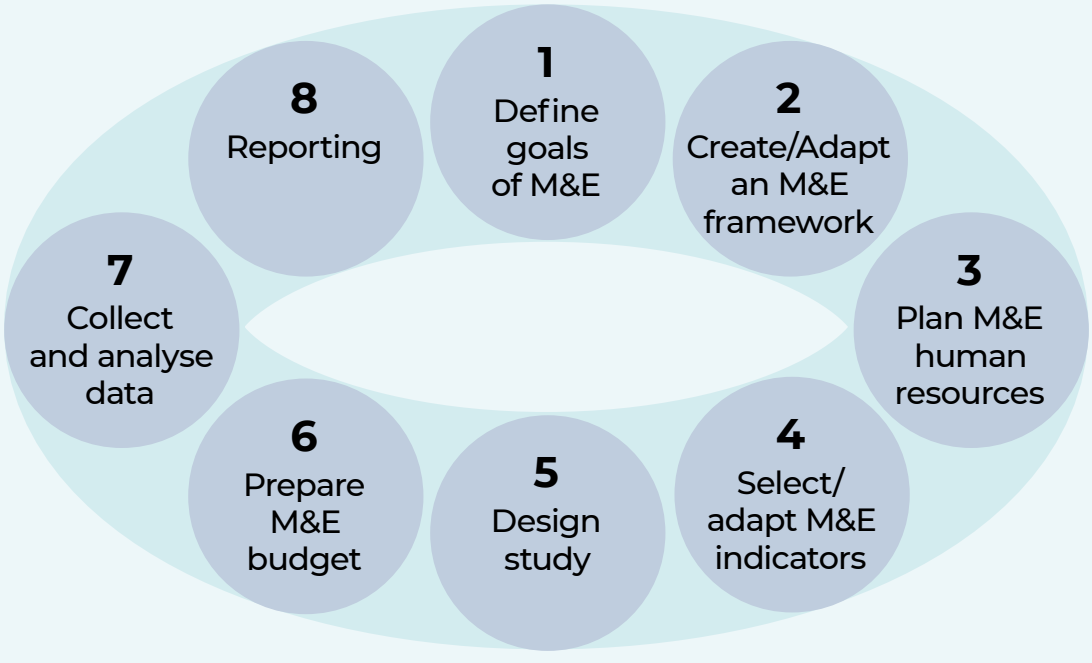
Monitoring and evaluation (M&E) of the MyopiaEd programme is intended to assess whether the initiative improves population-level outcomes, is cost–effective, and/or warrants scaling and further investment. M&E also facilitates implementation and scaling by informing stakeholders, including those in other countries, about barriers, enablers, and effectiveness of a given initiative, as well as generating information that will enable the introduction of other digital targeted client communication messaging and/or myopia initiatives in the country. In addition to this, showing measurable results for any initiative is an asset when fundraising for new or future initiatives as these provide quantifiable arguments and demonstrate impact.

M&E should be integrated into routine initiative management functions as ongoing activities from the start of implementation (see Figure 2). M&E should be led by digital health focal points in collaboration with the concerned unit responsible for the area of disease. Data should be collected on an ongoing basis, ideally establishing a baseline, and used to inform the implementation process and to measure change at the conclusion of the initiative. This helps to assess impact, maximize resources and inform scale-up and year-on-year improvements.

This section of the toolkit represents a short guide to M&E for the MyopiaEd programme. An overview of the steps for M&E of the MyopiaEd programme is provided in Figure 2. More comprehensive guidance is available in the WHO guide for digital health monitoring and evaluation: https://apps.who.int/iris/handle/10665/252183

Figure 2:
An overview of the necessary steps of M&E



8.1. Planning monitoring and evaluation

Step 1: Define the goals of M&E

The project team should determine the desired outcomes of the MyopiaEd programme at the early planning stage. These should include, for example, the ability of the initiative to reach target groups (for example, parents of children with myopia; the general population involved in the care of children including health workers and educators, adolescents and adults with myopia) and the effectiveness of the initiative content to generate changes in health behaviour. From these broad goals, questions to be answered through M&E can be developed and may include:

- Does the MyopiaEd platform operate as expected?
- Is the content easy to understand and accessible to users?
- How effective is the marketing/promotion campaign in reaching new users?
- How many people out of the target population did the initiative reach? What are the socioeconomic and demographic profiles of these individuals?
- How many users completed the initiative in its entirety?
- Are users improving their knowledge as a result of the initiative?
- Are the users modifying their behaviour as a result of the initiative?

It is important to have clear goals and questions in mind to complete the next steps of creating an M&E plan.

Step 2: Create or adapt an M&E framework

After the goals of M&E have been defined, the next step is to create a framework for achieving these goals. A results chain or logic model can be used. The logic model identifies how resources (or inputs) make it possible to carry out initiative activities, which in turn produce a series of results (or outputs and outcomes) and move the initiative towards achieving its stated vision (or impact). Box 9 provides an overview of the key aspects of a “logic model” framework; Figure 3 provides an example of a logic model for the MyopiaEd programme that can be used as a guide.

Box 9:

A logic model framework

A **logic model** is a framework that illustrates the presumed relationships among its inputs, outputs, outcomes and impact, and is easy to map onto the programme's aims. This provides a visual concept of how the elements of the mHealth intervention influence each other.

- **Inputs** are defined as the financial, human, material and intellectual resources used to develop and implement an intervention;
- **Processes** or activities are defined as the activities undertaken in the delivery of an intervention and may include training courses or other capacity-building, software or hardware development, adapting content, partnership/negotiation meetings, programme promotional activities, etc;
- **Outputs** are defined as the direct products/deliverables of process activities in an intervention;
- **Outcomes** refer to the intermediate changes that emerge as a result of inputs and processes; and
- **Impact** can be defined as the medium- to long-term effects produced by an intervention on population health, health systems or other benefits.

A note on impact

Measuring the impact of a scale initiative is unlikely to be feasible for most settings as intermediate and long-term follow-up is required, and this entails significant investment of funds and time. Additionally, it is hard to ascertain the effect of the initiative on the impact indicator (owing to design options of scaled implementation evaluation), often termed attribution challenges. For this reason the toolkit focuses on process (activities) and outcome indicators.

Figure 3:
Example logic model for the MyopiaEd programme

Input
- Programme development resources
- Staff
- Time
- Funding; IT architecture; linking with health services; partnerships
- Governance; policy change (if necessary)
- Operations and stakeholder management

Activities
- Situational assessment
- Content adaptation (incl. user testing)
- Programme design
- M&E plan and implementation
- Technology development (incl. testing)
- Negotiation for free/ low-cost messaging
- Individuals trained for recruitment
- Outreach and promotion

Output
- Baseline and needs data
- Quality adapted content
- Programme specifications
- Functioning and integrated message platform
- Low-cost/free 2-way messaging
- No. of trained individuals for recruitment
- No. of and type of promotion activities
- Analytics on reach of promotion
- No. of users enrolled (reach)
- No. of messages sent and received

Process monitoring and evaluation

Outcome
- Baseline vs post-data
- User satisfaction re: promotion activities
- User satisfaction with message programme
- User engagement
- Technology performance
- Knowledge gains
- Increased health literacy
- Lifestyle behavior change:
  - Reduction in time spent on near work activities during leisure time
  - Increased time spent outdoors
- Greater proportion of time spent wearing spectacles
- Increased frequency of eye examinations
- Systemic change in policy or health service delivery

Impact
- Reduced incidence of childhood myopia
- Reduced incidence of high myopia
- Reduced incidence of irreversible vision impairment due to myopia

Outcome evaluation

Step 3: Plan M&E human resources

Roles and responsibilities are assigned to staff (based on the skills of the team) to carry out the M&E plan. If no one in the implementing team has experience in M&E, it may be necessary to hire or train someone in the skills of M&E design, data collection and analysis.

Two parts of M&E of an mHealth programme will likely require different skills to manage: i) process M&E; and ii) outcome M&E. Process M&E refers to the assessment of the activities and processes related to the implementation of the programme (for example, IT, resources), and will predominantly require internal data collection activities which may be manageable with the existing programme human resources. Outcome M&E refers to the assessment of the ability of the mHealth programme to achieve its target health outcomes (for example, behaviour change) and will more likely require external human resources, or internal human resources that can be field-based or able to reach participants (for example, run surveys with programme users).

8.2. Process monitoring and evaluation

Process monitoring provides information for planning and for feedback about the progress of the project. Inputs and processes are resources critical to developing and implementing an mHealth programme. Implementers of all mHealth programmes should conduct routine process monitoring for the purposes of good programme management. This should be carried out internally and regularly (monthly or quarterly). Monitoring should start at inception of the initiative, and a routine reporting mechanism will need to be set up to monitor the core indicators and key deliverables. In countries with more sophisticated web-based platforms, the monitoring report may be presented as a data dashboard. Monitoring reports and dashboards are helpful in providing a quick overview to see whether an initiative is on track to reach its objectives.

Process evaluation is the periodic assessment of the implementation of an initiative in relation to planned activities and their overall objectives. It identifies the constraints that hinder the initiative in achieving its objectives and can help to provide solutions that can then be implemented. Process evaluation uses a range of data collection methods which can include the simple recording of the completion of key activities; the use of service analytics from the telecommunications company reporting (for example to understand flow of content between the initiative and user); or conducting focus groups and interviews for in-depth exploration of experiences, attitudes and ideas (such as feedback on frequency of messages, user experience, etc.).

8.3. Outcome monitoring and evaluation

Outcome M&E is a type of evaluation concerned with determining if, and by how much, an initiative's activities have achieved the intended targets. It tracks information directly related to users of an initiative, such as changes in knowledge or behaviours. It can be an important investment to analyse and communicate the effectiveness of the initiative.

In terms of design, the two major considerations are data collection methodology and study design. These should be selected based on the goals of the initiative and M&E questions set out in Step 1. A suggested method of data collection for evaluation of the MyopiaEd intervention would include surveys of users. A survey is suggested to assess the self-reported perceptions, behaviours, knowledge, and attitudes of registered users. The best and simplest way to measure behaviour change is to deploy the same survey before and after an intervention. Surveys can be completed online over the internet, or on a mobile device or administered in-person by an interviewer over the telephone or face-to-face. Given that survey fatigue is a common challenge, survey length should be as short as possible.

Step 4: Select and adapt M&E indicators

The next step is to develop the indicators that will be used to answer the question and measure the achievement of the objectives in the logic model.

WHO defines an indicator as "a quantitative or qualitative factor or variable that provides a simple and reliable means to measure achievement, to reflect the changes connected to an intervention or to help assess the performance of a development actor" *(67)*. Annex 4 of this toolkit features a set of recommended indicators for the MyopiaEd programme; these include the number of people who registered/subscribed to the initiative, and the percentage of surveyed MyopiaEd users who report having an improved knowledge of myopia.

Data collection is costly; for feedback to improve the initiative, it is thus important to strike a balance between feasibility of data collection and use of data. For this reason, for identification, core indicators have a background of blue in the indicator matrix in Annex 4. Each indicator is presented, as well as comments and a suggested data collection method and frequency. These core indicators are indicators that every MyopiaEd programme should be routinely collecting and reporting (including to the BHBM secretariat if the initiative is supported by BHBM).

In some cases, M&E may require a review and clearance by an ethical review committee; it is important to check the laws and regulations of a specific country. The government or the agency responsible may identify the need to secure any necessary ethics approval for the process. This may come from national or local ethics committees, or from other stakeholder institutions with formal ethics approval systems.

8.4. Designing evaluation

Step 5: Design the outcome evaluation and prepare data collection materials

While initiative monitoring is conducted routinely, initiative evaluation is conducted periodically (for example, every 6 or 12 months) to gauge whether the initiative is achieving its objectives and to decide if any adjustments need to be made. Annex 7 provides a non-exhaustive list of M&E designs of past evaluation studies of BHBM initiatives.

All BHBM initiatives use surveys; the design of these depends on available resources. For the MyopiaEd programme, example surveys for capturing self-reported behaviour change can be found in Annex 5. Both pre- and post-evaluation designs are recommended; however, if this is not possible or resources are limited, certain message programme monitoring questions that are sent during the programme (for example, “Since the beginning of the programme, have you increased X behaviour?”) may be able to provide similar information.

Once Steps 1–5 have been completed, it should be clear as to what information will be collected including when, how, and by whom. This will enable progression to Step 6: Prepare M&E budget.

Step 6: Prepare M&E budget

It is important that financial resources be dedicated for M&E. This budgeting will depend greatly on the scope of the M&E activities and the evaluation design you have selected. It will be necessary to have budget lines for the following overarching areas:

- **Human resources** – Number of staff needed, including at what pay grade, to carry out M&E activities from design to reporting.
- **Translation, adaptation and/or development of tools** – Existing tools may suffice; however adapting or validating tools to the setting may be necessary, and new questionnaires created that incorporate questions on all selected indicators.

- **Data collection and analysis** – This covers all data collection activities, and could include travel required for project staff to collect data; telephone bills to conduct telephone surveys; incentives for respondents; hiring spaces to meet with respondents; and data analysis software licensing if necessary.
- **Dissemination** – This covers publishing costs if findings are to be published. Certain scientific journals charge US$ 5000 to publish a paper via open access; incorporating findings into future promotional campaigns may be an option, along with updating materials.

Step 7: Collect and analyse the data

Data analysis will be necessary for reporting purposes as well as to inform the viability, impact, continuity and scalability of the initiative. Analysis could be simple percentage calculations (for example, the percentage of end users who have increased their average daily time spent outdoors since the start of the initiative); collating qualitative data into themes (such as reasons why some participants did not/could not change their behaviour), or, if the quantitative data is sufficiently robust, running statistical tests (for example, to establish if there is a statistical difference in the number of users who completed the initiative, based on age, gender or other sociodemographic information). If there is uncertainty as to how to analyse the data gathered, it may be necessary to contact the data division of your organization; alternatively the BHBM country support team can provide assistance. With analysis of the data, it should be possible to substantiate the claims for the initiative set in Step 1, thereby creating an evidence base for them.

Step 8: Reporting and dissemination

M&E data should be reported consistently to inform initiative implementation and provide feedback to decision-makers. Data should be presented clearly and succinctly, in a user-friendly format, and be relevant to the target audience. Data should be used to support collaboration and decision-making among stakeholders, with a view to ongoing resource allocation and processes for the future of the initiative. If the data show irregularities in registration or delivery of messages, or user responses, these issues must be presented to the decision-makers concerned through regular review meetings. In addition, the data should feed into the annual process and outcome evaluation report to demonstrate progress made and lessons learned.

Where there are multiple audiences, such as initiative implementers and policy-makers, the data need to be packaged and formatted differently according to audience main interests and preferences. Evaluators should generate a list of all relevant stakeholders, such as policy-makers, donors, initiative staff, etc, and consider who is most likely to use the data collected from the evaluation, how they might use that information, and the necessary communication style of the report.

Evaluation findings should be disseminated in an accessible and timely manner through:

- formal and informal networks via meetings, newsletters and other forums;
- professional conferences via discussion papers or posters;
- journals (scientific or lay);
- electronic media, such as web pages, social media and e-mail;
- briefings with policy-makers; and
- media channels for key stakeholders such as health and social care workers and the general public.

For detailed information on M&E for digital health interventions, see the WHO 2016 publication, Monitoring and evaluating digital health interventions – a practical guide to conducting research and assessment. This guide provides an introduction to the approaches and methods to support countries in strengthening their digital health deployments, develop robust evaluations, and scale up their activities nationally and regionally.

9

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Annexes

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Annex 1. BHBM and MyopiaEd stakeholders and their roles

Table A1.1:
Stakeholder roles within the MyopiaEd programme

Stakeholder	Role
Ministry of Health (and/or other ministries or departments involved in myopia care, support or activities (e.g. Finance, ICT, Telecommunications, Data protection, etc.)	• Own and act as custodian of the initiative; be part of the national steering committee and a key part of the governance function • Assess and identify needs; develop and validate content • Contract service providers or build in-house infrastructure/ platform • Sign cooperation agreements with all operators and/or service provider • Fund or partially fund the initiative • May host the mHealth platform/database and own the shortcode • Manage the promotion and marketing campaigns • Work with other ministries and departments involved in eye care/myopia policy and campaigns
Telecommunications ministry or equivalent eGovernment entity (if applicable)	• Generate framework to enable mServices (i.e. regulations and policies) • Fund (or partially fund) the initiative and act as part of the governing body • Provide technical expertise to the Ministry of Health • May host the platform • Facilitate dialogue between Ministry of Health and ICT stakeholders • Support the negotiation of preferential prices for mServices

Stakeholder	Role
Telecommunication regulatory authority	• Verify eligibility for shortcode acquisition • Allocate shortcode • Facilitate dialogue between Ministry of Health and ICT stakeholders • Fund or partially fund the initiative
Digital health/ mHealth service providers (if Ministry of Health or eGov does not have a platform)	• Provide management application/platform • Manage the platform and run the initiative • Provide 24/7 technical support • Deal with telecommunications operators; manage the shortcode where necessary
Telecommunications operators	• Deliver messages to end users • Set the cost of messages, using 3G or 4G data, and agree on special tariffs with Ministry of Health if possible • Facilitate interfacing with service providers and/ or local aggregators • Support the promotion of the MyopiaEd service
Local aggregator	• Provide interface with all operators and manage relationship and invoicing process • Provide reporting on services delivered/failed • Possibly own and manage the shortcode in the case of SMS
Data Privacy Commission	• Set the rules for data protection • Enforce the application of data protection regulations • Authorize mHealth services providing they respect data privacy • Authorize data storage outside the country, if necessary
WHO and ITU	• Provide technical expertise and share knowledge from Member States • Help convene all stakeholders

Stakeholder	Role
Technical experts from various academic Institutions	• Design the algorithm • Prepare contents for interventions • Monitor the initiative • Evaluate the initiative
Other relevant private sector parties	• Provide technical expertise and resources with careful consideration of conflicts of interest.
Communications and promotions actors	• Design and facilitate the promotion and recruitment strategy • Liaise with media outlets and service providers • Run campaign on their platform (e.g. social media, television, radio)
End users and their representatives (health-care professionals, eye care associations, parents and people with myopia)	• Health-care professionals, patient associations, parents or patients themselves • Give feedback and opinions on design of the initiative and its content, usability, and adaptation of content, providing human-centred design • Engage with policy-makers for an enabling policy environment
Health-care professionals	• Public and private providers • Be involved in design and development, including adapting content, providing human centred design • Promote and recruit for the initiative
Academic institutions	• Carry out reviews of efficacy of regional or relevant mHealth initiatives ahead of initiative design • Advise on M&E methods or carry out M&E

Stakeholder	Role
Technology providers (private software and application developers or experts; hardware companies; global goods/open software communities)	• Assist with technical specifications or software development
National Informatics Center/Center for Health Informatics	• May be able to assist/are required to house and maintain the database of the participants from the national portal
Ministry of Industry/ Technology Development Agency	• Can help to implement the promotion strategy • Can help to build or maintain infrastructure nationwide
Local nongovernmental organizations (NGOs), international NGOs, UN (WHO, ITU, UNOICT, UNICC, UNICEF etc.)	• Encourage roll out and uptake of MyopiaEd programmes • Provide feedback and advice on initiative design and content
Nongovernmental funders (start- ups, donors, partners, insurers, investors)	• Help fund the MyopiaEd programme in the short and long term

Annex 2. Tips on applying to funders

Fundraising requires time, effort and well written proposals that outline the need for the programme, its goals and objectives, and how these will be achieved, while ensuring that the added value for the various stakeholders involved is communicated. Often donors will have their own structured grant proposals form, but if they do not, a grant proposal should take the following broad structure:

1. History of the organization or department of the ministry, including mission statement/vision.
2. Project summary.
3. Background, context and beneficiaries.
4. Statement of need.
5. Information about the programme (including goals and objectives, strategy, scope, expected outputs and anticipated impact. This section can include a business model).
6. Project timeline.
7. Project budget (including any other funds or statements of in-kind support from partners).
8. Monitoring and evaluation and donor reporting.
9. Project risk identification and management (to be included only if a requirement of the donor).
10. Future funding, scalability and sustainability.
11. Appendices (if necessary).

Other tips for fundraising to consider:

- Appearance is important. Ensure that documents are copyedited and look sleek. Send documents as PDFs (not working documents) using the letterhead of your organization on the covering letter.
- Try to get to know your donor before applying; understanding what is important to them will building the case for your programme. Always keep in mind the donor mission and agenda and how the proposal aligns with, and will advance, their agenda.
- Include concepts such as ensuring equity of access to the programme, capacity-building, monitoring and evaluation, and sustainability; these are important areas that are sometimes overlooked in proposals.
- Be sure to advertise what is unique about your ability to carry out the programme successfully.

Annex 3. Sources of sustainable funding

BHBM initiatives have found several sustainable and successful business models for scale digital health programming that broadly fall into three categories: government funding, bilateral or multi-lateral support, or third-party grants. These options are not mutually exclusive; they should be explored as early as possible in the programme's development. Any opportunities to streamline the approach to these funding sources should be found.

National government funding

mHealth programmes are most sustainable when owned and operated by countries, as political will and financial commitment from governments maximize the programme's chances of success (see Box A3.1 for examples). mHealth grants have been found to fit successfully within the priorities of several national strategies, so a good starting point is to explore the possibility of integrating the programme within existing funding mechanisms.

Example 1: Government funding can come from existing budget lines. For example, funding for MyopiaEd could come from a national health strategy if a pillar is dedicated to eye care or NCDs. Alternatively, because vision loss is part of sensory disability and rehabilitation, and can also be caused by injuries, it may be of interest to explore funding within these areas of health.

Tax levied or mandatory contribution funds can further finance mHealth.

Example 2: Universal service funds (also known as universal access or obligation funds) are collected from telecommunications companies in some countries and although these types of funds do not commonly fund mHealth, this option could be explored. Other examples could be funds raised from tobacco excise or sugar taxes (in the case of smoking cessation or diabetes mHealth programmes). It is worth exploring if such budget lines exist and methods of approaching them for funding.

As BHBM is a partnership between WHO and the ITU, the technology angle is another avenue to secure funding. Ministries of telecommunications commonly have larger budgets than ministries of health and a collaboration between the two would be the best means to ensure long-term sustainability of mHealth projects.

Example 3: As BHBM mHealth programmes rely on technological infrastructure that can contribute toward the digitalization of a health system, they can be nested under digital transformation budgets which are often larger in size and broader in scope.

mHealth programmes should be considered part of a larger national digital health platform which may, in turn, be part of a broader national digital ecosystem. Integration of the programme within these larger pieces ensures that it is sustainable and scalable to expand in other areas.

Box A3.1:

Government funding of mHealth, Egypt and India

In 2014, the Ministry of Health and Population of Egypt established a central NCD unit to accelerate implementation of the mHealth programme. The following year, this ministry along with the Ministry of Communication and Information Technology and the Ministry of Scientific Research, collaborated with BHBM and three local mobile network operators to support the implementation of mDiabetes in Egypt.

The Government of India has demonstrated important political commitment towards the scaling of the mTobaccoCessation and mDiabetes programmes, which gained traction in part due to the Prime Minister's digital health initiative. Other government bodies were engaged in the programme to provide technical support, including the Ministry of Health and Family Welfare, the Ministry of Communication and Information Technology, the MyGov platform of the office of the Prime Minister, and the National Informatics Centre.

Bilateral and multilateral support

Bilateral support is the investment in one Member State by another Member State. Multilateral support typically comes from a multilateral development bank, chartered by two or more countries (for example, the African Development Bank).

Example 4: An example of bilateral and multilateral financing can be seen in Sudan, where the African Development Bank, the Italian Agency for Development Cooperation, and the Federal Ministry of Health are together investing over US$ 1 million in BHBM initiatives.

Third-party grants

Grants typically come from international health donors, national NGOs, health donors, philanthropists, or the private sector. Normally, funds are secured from these organizations through careful outreach and relationship cultivation, sending unsolicited proposals, or responding to short or topic-specific calls for proposals. These may be focused on specific disease areas (such as vision loss or NCDs) or on processes and systems (for example, eHealth, mobile, or technology-specific).

The search identification strategy should not only expand to other multilateral funding institutions but also to specific charitable organizations that may be interested in funding parts of the research or monitoring and evaluation components within each programme (for example, the Welcome Trust). Ideally, secured funding should be obtained for the longer term (4+ years), as relying on donor-based funding may impact sustainability. Nevertheless, this may be a powerful tool to demonstrate impact, results, and build a strong case for investment from national funds.

Annex 4. Monitoring and evaluation indicators

Indicators in blue are Key Performance Indicators – i.e. those seen as core or essential to BHBM programming.

#	Indicator	Logic model component	Comment	Data collection method	Data collection frequency
Operations					
1	Number of full-time equivalent persons working on initiative at leading agency	Inputs	This gauges the human resources commitment from the leading implementation agency.	Terms of reference of involved employees or verbally from team lead	
2	Number of full-time equivalent persons working on initiative at supporting agencies	Inputs	This gauges the human resources commitment from supporting agencies such as WHO or ITU regional or country offices.	Terms of reference of involved employees or verbally from team lead	
3	National technical advisory group set up	Input	This records whether the team is functioning by month 3.	Carried out: Yes/No, and composition	Year 1, month 3
4	Commitments for funding (US dollars) across contributors and the duration of each commitment	Input	The funding source, level and duration will help implementers gauge whether more funding is needed, and plan accordingly.	Qualitative description. May have to speak with others responsible for resource mobility	Annually
5	Number of fundraising activities for sustainability	Activities	Suggest thinking about sustainability from the outset and nurturing funding relationships throughout.	Carried out: Yes/No and description	Annually

#	Indicator	Logic model component	Comment	Data collection method	Data collection frequency
6	Budgeted plan produced for current and following year	Activities	While this plan may evolve as it develops, there should nevertheless be a plan.	Carried out: Yes/No	Annually
7	Budget spent	Input	A budget report, in the form of an Excel spreadsheet or a written report, is useful to monitor spending and plan ahead.	Main budgetary items in US dollars	Quarterly (and cumulative)
Stakeholder engagement					
8	Number of partnerships and name of partner organizations with supporting documentation such as a memorandum of understanding or terms of reference	Inputs	This will enable the initiative to measure the interest and growth of the initiative in terms of partnership support from other government agencies, health services, private sector and civil society.	Records on number of partnerships that include supporting documentation	Annually
9	Number of meetings with external partners	Inputs	This is the number of meetings held between organizations not involved in the everyday running of the initiative. Such organizations would include telecommunications authorities, civil society, other relevant ministries, and private sector partners. Suggest this to take place as required, but at a minimum quarterly meetings with such partners should be held.	Maintain a count of such meetings	6 monthly

#	Indicator	Logic model component	Comment	Data collection method	Data collection frequency
Policy engagement and systemic change					
10	Description of policy engagement	Inputs/ activities/ outputs	This qualitative indicator can describe the policy level support to the initiative, or any change resulting from the initiative. Describe the policy interaction with the initiative during the past year, e.g. policy consultations held; policy-makers involved in initiative meetings; number of policy briefs prepared; newsletters sent; and actual policy change etc.	Maintain a record of such interactions and events	Annually
11	Description of systemic change attributable to initiative activities	Outputs	This qualitative indicator can describe any changes to the health system as a result of initiative activities during the past year. This may include other uses of acquired software or the content delivery platform; institutionalization of the initiative; changes in referral mechanisms; changes in public awareness of the health topic; new synergies between partners or between ministries; and changes in process or procedures among partners due to the initiative etc. This attempts to document other added value of the initiative.	Conduct focus groups or survey to measure these changes	Annually

#	Indicator	Logic model component	Comment	Data collection method	Data collection frequency
Initiative content					
12	Number of design consultations or meetings	Activities	This would include the number of meetings with technical experts, target users and other stakeholders onboarded to work on content.	Maintain a count of such meetings	End of Year 1
13	Initiative specifications have been drawn up	Inputs	Have the initiative design specifications been set, such as verifying the aims, adapting the logic model if necessary, designing the length of the initiative and its rules?	Carried out: Yes/No	End of second quarter
14	Number of new messages developed or messaged adapted/ new app content or features	Activities	Numeric if new messages have been created or description if app content has been created. Any new content must be sent to vision@who.int and BHBM secretariat (bhbm@who.int).	Records of new content sent to BHBM secretariat	Annually
15	Number of content adaptation focus groups/ user testing sessions/ participants (if applicable)	Activities	The number of user testing sessions with different informants, e.g. focus groups with parents, children, adolescents, adults, health workers, specialist clinicians, academics. For example: **Academics and specialists:** Number of groups: 1. Total no. of informants: 6 **Parents:** Number of groups: 3. Total no. of informants: 24 **Health workers:** Number of groups: 1. Total no. of informants: 7	Carried out: Yes/No	Annually (if new content is produced after Year 1)

#	Indicator	Logic model component	Comment	Data collection method	Data collection frequency
17	Verification of message fidelity	Activities	This may be relevant to Year 1 only.	Carried out: Yes/No	End of second quarter
18	Content management system set up and/or maintained	Activities	The content management system (CMS) may be as simple as an Excel spreadsheet or Word document (and passed to telecommunications companies or both providers), or as advanced as an in-house software solution with interoperable programming language. What is important is whether the CMS exists and is maintained.	Carried out: Yes/No	Annually
19	% of users sharing the message content with others not enrolled in the initiative	Output	This will assess the additional reach of messages and can be used as an indication of the satisfaction with content.	Surveys/message survey replies	Post-initiative
20	% of users reporting satisfaction with the content they received e.g: • Ease of understanding the messages • Easy to operationalize advice or instructions • Content appropriateness • Content relevance • Initiative length • Likelihood to suggest initiative to a friend	Output	These suggested indicators can be rated on a Likert scale 1–5.	User testing/surveys/ message survey replies	User testing phase and/or post-initiative

#	Indicator	Logic model component	Comment	Data collection method	Data collection frequency
21	Estimation of the number of messages read by users	Output	Although messages are sent, receiving does not mean engaging. It may be helpful to ask: "How many of the text messages did you read?" (selecting one option only): 1 = None, I received no messages 2 = None, I read no messages 3 = I read some messages (fewer than half) 4 = I read most messages (more than half) 5 = I read all, or nearly all, of the messages	Surveys/message survey replies	During and post-initiative
Promotion					
22	Promotion strategy compiled	Activities	A promotion strategy is a plan laying out the promotion activities that will be completed and their time frame.	Carried out: Yes/No	Annually
23	Number of promotion campaigns and type	Output	**Marketing medium** / **Target population** / **Number of events** / **Reach (no. of people)** Facebook advert / General population / 3 / 300 000 Radio advert / General population / 4 / Approx. 800 000 Posters in clinics / Health service users / 38 clinics / Approx. 900 000	**Marketing medium provider analytics (radio initiative or broadcasting company (TV) or social media platform should be able to provide analytics)**	6 monthly
24	Number of users who were made aware of the mHealth intervention by a given marketing channel	Output	How did you hear about the initiative?	Survey through message channel or telephone survey	Annually

#	Indicator	Logic model component	Comment	Data collection method	Data collection frequency
25	User satisfaction with promotion campaign	Outcome	User satisfaction questions could include: Were the promotion materials easy to understand? Were they appropriate for you and your community? Were you able to sign up with the information provided by the promotion campaign?	Survey	Annually
26	% of surveyed health-care workers or educators who know about (or use) the initiative	Output	Have you heard of MyopiaEd?	Survey	Annually
27	% of surveyed health-care workers or educators who encourage their patients to use the initiative	Outcome	This indicator attempts to understand the health care worker's initiative engagement.	Survey	6 monthly
Functionality and technology performance					
28	Ease of sign up: Was it easy to subscribe on a scale of 1–5? (1 being very difficult, 5 being very easy)	Output	Any barriers to sign-up may have a serious effect on the number of subscribers. The process should be clear, easy, and not overly burdensome. This indicator can check this. If users say it was not easy, you may need to revisit the design of your sign-up procedure.	Message or telephone survey responses	User testing and first Quarter
29	Number of system errors	Output	An error in the operating system or the dashboard that may or may not impact the delivery of content.	Service analytics and/or message or telephone survey responses	Quarterly

#	Indicator	Logic model component	Comment	Data collection method	Data collection frequency
30	Number of days/weeks of system downtime	Output	This records any amount of time that content did not reach users due to a system error.	Service analytics	Monthly
31	Messages: • Number of messages delivered • Rate of successful delivery of messages	Output	The numerator is the messages delivered and the denominator is the number of message attempts.	Service analytics and/or message survey responses	Monthly
32	Number of bugs reported and fixed (apps)	Output	Records should be kept on any technical issues with the app.	Technical report	Monthly
Reach and retention					
33	Number of people who have subscribed/ registered	Output	A number is requested.	System analytics	Quarterly
34	% of target population registered	Output	It may be helpful to report this as a % of the total number of people that the promotion campaigns were estimated to reach, to gauge the success of the initiative. Or this could be expressed as a % of the target population who are able to access the initiative (e.g. those who have access to a phone and power source) (if the number is known), e.g. ((total registered users/promotion reach) x100).	System analytics and promotion analytics	6 monthly

#	Indicator	Logic model component	Comment	Data collection method	Data collection frequency
35	Number of new subscribers per month	Output	This helps to see if appetite for the initiative is maintained and can help with working out if promotion strategies are meeting recruitment targets.	System analytics	Monthly
36	Demographic information about users	Output	This can help assess what groups are equitably accessing/not equitably accessing the initiative	Telephone surveys / message survey replies	Quarterly
37	User engagement: % of users retained for 1. 1 week of initiative 2. 1 month of initiative 3. 3 months of initiative 4. Complete initiative	Outcome	This can be captured by a representative telephone survey, a message survey, or through analytics of STOP replies/opt-outs. Depending on how this data is captured, the definition of retention will change, and the denominator used in the % calculation will change (number surveyed vs number enrolled in initiative).	Survey / service analytics	Quarterly
38	Number of messages/ inputs received from users	Output	If a 2-way messaging initiative or other 2-way communication platform is being used, on average, how many responses were received from participants? This could be reported as a %, with the total number of prompts for reply as the denominator for the % calculation ((replies/ number of prompts) x100).	Service analytics	Quarterly

#	Indicator	Logic model component	Comment	Data collection method	Data collection frequency
39	% of messages sent from initiative that are responded to appropriately by user (if applicable)	Output	This indicator measures active engagement and indicates whether users are complying with instructions or messaging as directed (e.g. number of valid responses to 2-way messaging).	Service analytics	6 monthly
Knowledge gains					
40	% of users who increased their knowledge scores pre- and post-initiative in knowledge quizzes (2-way messaging, chatbots and apps)	Outcome	Example questions could include: What is one method that you can encourage in children to reduce the risk of developing myopia? An annual eye examination in children is recommended to ensure their myopia progression is monitored (True/False). Long-term complications of high myopia can result in sight-threatening eye diseases (True/False).	Telephone surveys/ message survey replies	During and post-initiative
41	% of surveyed MyopiaEd users that report having improved knowledge of myopia risk factors	Outcome	Example survey question: What lifestyle factor do you support your child to do to reduce the risk of developing myopia?	Telephone surveys/ message survey replies	During and post-initiative
42	% of surveyed MyopiaEd users that report having improved knowledge of myopia	Outcome	Example survey question: Compared to how you felt at the beginning of the initiative/last month, do you feel that you have more knowledge on myopia?	Telephone surveys/ message survey replies	During and post-initiative

#	Indicator	Logic model component	Comment	Data collection method	Data collection frequency
Behaviour change MyopiaEd					
43	% of surveyed users (or their children) that increased their average daily time spent outdoors	Outcome	Example questions: Since commencing the programme, have you (or, your child/children in your care) increased how much time you (or, your child) spend/s outdoors per day? 1. Yes 2. No 3. The time I spend outdoors has not changed On average, how much time do you (or, does your child) spend outdoors per day? 1. No time outdoors 2. Less than 1 hour per day 3. Between 1 and 2 hours per day 4. Between 2 and 4 hours per day 5. More than 4 hours per day Note: It may be important to distinguish between weekdays and weekends when enquiring about the “average time” per day for different behaviours.	Telephone surveys/ message survey replies	Pre-initiative, during and post-initiative

#	Indicator	Logic model component	Comment	Data collection method	Data collection frequency
44	% of surveyed users (or their children) who decreased their time spent on near work activities (e.g. reading, playing on a computer or mobile phone) during leisure periods	Outcome	Example questions: Since commencing the programme, have you (or, your child/children in your care) reduced the amount of time spent on near work activities such as reading, playing on a computer or mobile phone (outside of school time) per day? 1. Yes 2. No 3. The time I spend on near work activities has not changed On average, how much time do you (or, does your child) spend on near work activities such as reading, playing on a computer or mobile phone (outside of school time) per day? 1. Less than 1 hour per day 2. Between 1 and 2 hours per day 3. Between 2 and 4 hours per day 4. More than 4 hours per day	Telephone surveys/ message survey replies	Pre-initiative, during and post-initiative
45	Change in health seeking behaviour	Outcome	Example question: Since the programme started have you increased your use of health services (e.g. seeking eye care check-ups or advice)? 1. Yes 2. No	Telephone surveys/ message survey replies	Pre-initiative, during and post-initiative

#	Indicator	Logic model component	Comment	Data collection method	Data collection frequency
46	% of surveyed users (or their children) who increased their daily time wearing their prescribed glasses	Outcome	Example question: Since commencing the programme, have you (or, your child/children in your care) increased the proportion of time per day that you wear your prescription glasses? 1. Yes 2. No 3. The proportion of time per day that I wear my glasses has not changed How often do you (or, does your child) wear your/their prescription spectacles or glasses to see better? 1. I do not have prescription spectacles or glasses to help me see better 2. Never 3. Rarely 4. Sometimes 5. Most of the time 6. Always	Telephone surveys/ message survey replies	Pre-initiative, during and post-initiative

Annex 5. Examples of pre- and post-programme survey questions

This Annex sets out sample questions for the pre- and post-programme questionnaires.

The pre-screening and pre-programme questionnaires for MyopiaEd can be used to gather demographic and baseline measures of key behaviours and lifestyle factors which the programme intends to target. The pre-screening questions are necessary in order to select the relevant message library for each participant based on their characteristics. The questions can be asked over the phone, delivered through a paper or web-based survey and/or adapted for SMS delivery at enrolment into the programme. Note: these sample questions are intended to be used as a guide only and should be adapted and translated as required. All questions may not be applicable to each end-user group.

Sample pre-screening questionnaire (to gather demographic information and to direct the participant to the appropriate MyopiaEd message library)

What is your date of birth?

What is your gender?*

1. Male 2. Female 3. Other

Which of the following best describes you?

1. **I have a child with myopia**, and I would like to better understand what can be done to care for my child's vision.
2. **I have a child without myopia**, and I would like to better understand myopia and what can be done to care for my child's vision and prevent them from becoming myopic.
3. **I am involved in the care of children** (e.g. general health worker or educator) and I would like to better understand myopia and good eye health practices and prevention strategies for the children that I care for or work with.
4. **I am an adolescent with myopia**, and I would like to understand more about my myopia and good eye health practices that may protect my vision from getting worse.
5. **I am an adult with myopia**, and I would like to understand more about my myopia and good eye health practices that may protect my vision.

Why do you want to sign up for the MyopiaEd programme? (Tick all that apply)

*It may also be deemed important to gather data on other sociodemographic variables (e.g. highest level of education)

1. I want to understand more about myopia
2. I want tips on how to manage my (or, my child's) myopia and eye health
3. I want to learn more about how to obtain help and support
4. I want to learn more about the warning signs I should look for that may indicate the worsening of my (or, my child's) myopia
5. Other, please specify

_____

_____

Pre-programme questionnaire (to obtain baseline measures of key behaviours and lifestyle risk factors in which the programme intends to target)

How much do you feel you know about myopia?

1. I know nothing about myopia
2. I know very little about myopia
3. I know some information about myopia
4. I know a fair bit about myopia
5. I know a lot about myopia

Please select how much you agree with the following statement: I understand what behaviours can lead to a higher risk of development and progression of myopia:

1. Strongly disagree
2. Disagree
3. Neither agree or disagree
4. Agree
5. Strongly agree

Please select how much you agree with the following statement: "I know what warning signs to look for that may indicate that my child (or, the children I care for) may have myopia, or their myopia is worsening":

1. Strongly disagree
2. Disagree
3. Neither agree or disagree
4. Agree
5. Strongly agree

How long ago did you (or your child) last have your (their) vision/eye checked by a doctor or other health worker?

1. Less than 1 year ago
2. Between 1 and 2 years ago
3. Between 2 and 5 years ago
4. More than 5 years ago
5. Never

On average, how much time do you (or your child) spend outdoors per day?*

1. No time outdoors
2. Less than 1 hour
3. Between 1 and 2 hours
4. Between 2 and 4 hours
5. More than 4 hours

On average, how much time do you (or your child) spend on near work activities such as reading, playing on a computer or mobile phone (outside of school/work time) per day?*

1. Less than 1 hour per day
2. Between 1 and 2 hours per day
3. Between 2 and 4 hours per day
4. More than 4 hours per day

How often do you (or your child) wear your prescription spectacles or glasses (or contact lenses) to see better?

1. I (my child) do/does not have prescription spectacles or glasses to help me (my child) see better
2. Never
3. Rarely
4. Sometimes
5. Most of the time
6. Always

*It may be important to distinguish between weekdays and weekends when enquiring about the "average time" per day for different behaviours.

The post-initiative questionnaire is used to evaluate the effectiveness of the initiative in changing behaviours and impacting health outcomes, in addition to user experience. It can be delivered in a similar format to the pre-initiative questionnaire (e.g. over the telephone, paper/web survey or adapted to be delivered through messaging at completion of the initiative). The number of questions and format can be adapted depending on how the questionnaire is delivered. The questions should closely match those included on the pre-programme questionnaire for comparative purposes.

Sample post-programme questionnaire

General questions

How many of the text messages did you read? (Select one only)

1. None, I didn't receive any
2. None, I didn't read any
3. I read some (fewer than half)
4. I read most (more than half)
5. I read all, or nearly all, of the messages

Did you share any of the messages with others? (friend, partner, family member, etc.)

1. Yes 2. No

If yes, kindly provide any additional details on how you shared the messages with others:

_____

_____

What did you think about the number of messages we sent?

1. Too few, I would have liked more
2. The right amount
3. Too many messages

What did you think about the length of the programme?

1. Too short 2. The right length 3. Too long

Did you have any technical problems with the programme? (e.g. could not sign up easily or could not read messages)

1. Yes 2. No

If yes, kindly provide any additional details on the nature of the technical problems:

_____

_____

Would you recommend the programme to others?

1. Yes 2. No

Kindly provide any additional details that you feel may be relevant:

Programme specific questions

After completing the programme, do you feel that you have more knowledge on myopia?

1. Yes 2. No

Since commencing the programme, have you (or, your child/children in your care) increased how much time you (or, your child) spend(s) outdoors per day?

1. Yes 2. No 3. The time I spend on outdoors has not changed

On average, how much time do you (or, does your child) spend outdoors per day?*

1. No time outdoors
2. Less than 1 hour per day
3. Between 1 and 2 hours
4. Between 2 and 4 hours
5. More than 4 hours

Since commencing the programme, have you (or, you child/children in your care) reduced the amount of time spent on near work activities like reading, playing on a computer or mobile phone (outside of school/work time) per day?

1. Yes 2. No 3. The time I spend on near work activities has not changed

On average, how much time do you (or, does your child) spend on near work activities like reading, playing on a computer or mobile phone (outside of school/work time) per day?*

1. Less than 1 hour per day
2. Between 1 and 2 hours per day
3. Between 2 and 4 hours per day
4. More than 4 hours per day

*It may be important to distinguish between weekdays and weekends when enquiring about the "average time" per day for different behaviours.

Since commencing the programme, have you (or, you child/children in your care) increased the proportion of time per day that you (they) wear your (their) prescription spectacles/glasses?

1. Yes 2. No 3. The proportion of time per day that I wear my spectacles/glasses has not changed

How often do you (or your child) wear your prescription spectacles or glasses to see better?

1. I do not have prescription spectacles or glasses to help me see better
2. Never
3. Rarely
4. Sometimes
5. Most of the time
6. Always

Since the programme started have you increased your use of health services (e.g. seeking eye care check-ups or advice)

1. Yes 2. No

Annex 6. Adapting content library for voice, messenger apps and chatbots

Adapting to voice

Interactive voice response (IVR) enables you to reach those who may not be able to interact with text content. An actor can record the adapted messages in the BHBM content library and they can be delivered by in- or out-bound calls to a smartphone or a feature phone. The call should be cost-free. With IVR, the user can input a response using key words (initiative: "Have you reached your walking goal today? Say YES or NO" and depending on the user's answer, an appropriate pre-recorded response is given by the initiative).

You can be more creative with voice messages if that would be appropriate for and engage the target users (again, they should be asked their preferences). You could make a series of short 1–3 minute audio plays or stories in order to deliver the BHBM content library via the telephone. Actors could be recorded to be engaged in a discussion, using a number of scenarios (for example, a doctor and a patient receiving information, advice or instruction, or other trusted community member providing information or behaviour change strategies). Be sure to maintain the original intent of the message in the BHBM content library.

Adapting to messenger apps

People check their mobile phones for messages and notifications up to an average of 96 times a day[1]. Messages sent through frequently used messenger apps, such as Messenger from Facebook, WhatsApp, WeChat and Viber, provide an opportunity for messages to be read and noticed. Messenger apps provide more freedom in terms of the length of messages that can be sent, and the different media platforms people engage with, such as audio files, images, GIFs and videos; external web links or localization-based suggestions or content. These are, however, restricted by reaching only users who have smartphones.

[1] Asurion-sponsored survey by Market Research Firm Solidea Solutions conducted 18–20 August 2019 of 1998 smartphone users in the USA, compared to an Asurion-sponsored survey conducted by market research company OnePoll between 11–19 September 2017 of 2000 adults in the USA with a smartphone.

Start from the BHBM content library and add more details to messages where you think the user could benefit from more clarity, preserving the scientific fidelity of the initiative to the original library. We suggest that you ask target users what they would likely engage with in terms of multimedia. See Table A6.1 below for some multimedia dos and don'ts.

Table A6.1:
Multimedia dos and don'ts

Multimedia content dos	Multimedia content don'ts
Do ensure equal representation of all genders, different ethnic groups, and people with disabilities within your target population in all visual content.	Don't use stereotyped images of particular social groups.
Do consider the file size and data usage costs for users, avoiding "heavy" files and compressing image files and video files where possible.	Don't use colours or gestures associated with a particular political or social group.
Do use a variety of relevant regional accents if possible in audio materials.	Don't use complicated infographics, graphs or other visual representations of information. Keep them simple.
Do try quizzes: they can be a fun way to engage, reward and collect data about knowledge gains and behaviour change.	Be aware of accidental product placement in photographs or videos (e.g. a branded good in the background).
Do be creative with content, try to use visuals alongside education messages (e.g. illustration of a culturally-appropriate healthy meal alongside a nutrition instruction about healthy meals).	

Conversational agents and conversationalizing content

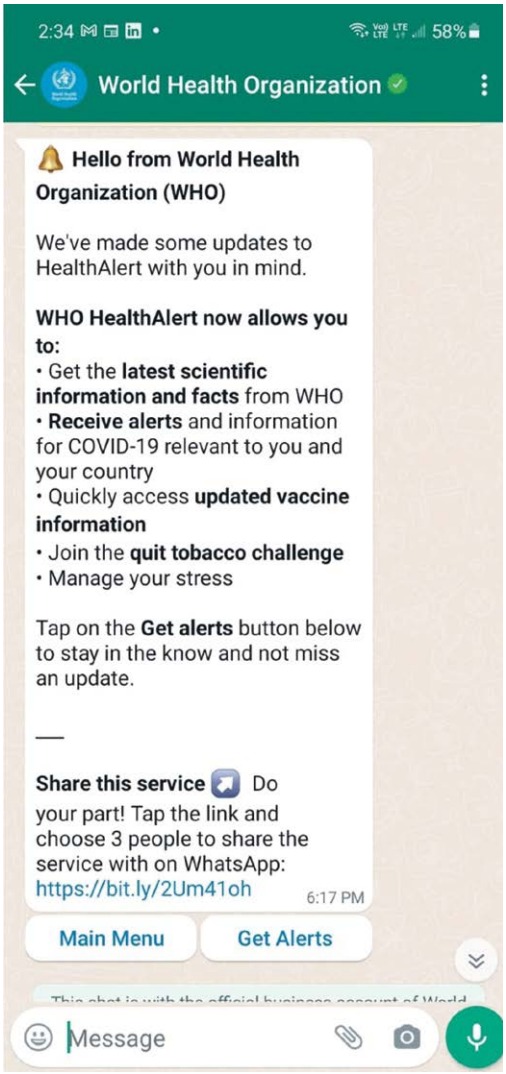
If you wish to create a more interactive and tailored experience, chatbot is one way to achieve this. It is necessary to consider the user experience of a chatbot as you design the conversational scripts for the bot. It is expensive, can be imprecise, and less feasible to use a natural language processing (NLP) chatbot, because NLP incorporates an artificial intelligence system that has to be trained using much data, and must be maintained. Nonetheless, experience with some WHO bots shows that users have more conversational exchanges with an NLP bot.

A conversational interface chatbot (CIC) is much easier to set up than an NLP chatbot. A CIC chatbot presents limited input options for users to select using buttons, emojis or typing the corresponding number or key word from a list of information topics. This results in the user navigating the bot and getting the tailored information they desire with less likelihood of the bot misunderstanding free text inputs. Alternatively, there are hybrid bots that are predominantly CIC but have some basic NLP capabilities, which may lead to a better user experience. See Figure A6.1 for an example of a CIC (the WHO Health Alert service provided through WhatsApp).

Bots also carry the capability to provide links to external websites for further information, to send audio or image files, GIFs or videos, so you can be more creative with the content you provide and potentially retain more users. You should however be aware of the mobile data costs that such content carries for the users. An important limitation however of bots on certain platforms is that the user has to start the conversation each time. Messenger by Facebook is currently the only bot platform where the first message of a conversation (aside from initial enrolment) or a notification comes from the app, potentially leading to higher retention rates.

CICs require a conversational script to be entered into the bot management software, the content of which can be adapted from the BHBM content library. It is however a good idea to start with the initiative goals and knowledge gain and behaviour change aims, then use the BHBM content library to base relevant messages on (see Box A6.1 for key steps in creating a chatbot). After designing the possible topics and conversations, you can make accompanying audio files, images, videos or links according to user preferences. Table A6.2 lists some dos and don'ts for creating bot conversations.

Figure A6.1:
Sample navigation of the WHO COVID-19 health alert chatbot



Box A6.1:

Steps for CIC chatbot creation

The first step is to prepare the thematic outline of the CIC. This is an outline of the themes of each conversation that segmented groups should receive (information, questions, behaviours). The groups for segmenting will depend on target users and the aims of the programme. It may be that you will segment users into youth, middle-adulthood and elderly groups and by gender and disease risk status (general population, at risk or diagnosed). For less sophisticated bots, this will likely be two or three questions at the beginning of each session, the responses to which will place the user into a particular segment or group to follow a given algorithm. (Some more expensive and sophisticated bots can remember and tag a user as in a specific group for all future sessions, but this creates a complicated back-end structure, rather like having many separate bots, and may not be feasible).

The thematic bot outline could be in a table form or a diagram, whichever is suitable for you and your team. It may be informed by the messages in BHBM content library, or you can start from scratch and map the key messages from the BHBM library back to it later. You can outline the different key messages you want users to receive in which week if you wish, or you may give users the choice what they wish to learn each session, so have all available at each chat.

Secondly, create a bot diagram (see appendices x and y for example diagrams of the start of chat sessions) and write the messages according to the thematic bot structure. This diagram maps out the messages that are sent and received by the bot and is a pictorial representation of the algorithm for each chat session. Users may get fatigued after 3–7 reply-bot exchanges, so keep chat sessions short and to the point. When creating a diagram, you could enter the actual messages, or a code corresponding to another document with the full messages written (according to the need of the bot content management system).

Careful maintenance of the script management spreadsheet will be very important. This will also be key for interaction with service providers and may have implications for cost. For example, if messages can be managed using a spreadsheet in advance, this can be used to obtain feedback on the project and approach a company with well organized and structured content, they may provide a lower quote than if they would have to enter and provide a content management system. BHBM can provide assistance with this.

This guidance is also relevant to NLP bots, however and third party company will likely have to be used to set up the bot and train it to understand and process natural language inputs.

Table A6.2 lists some dos and don'ts for creating bot conversations compiled for a variety of blogs and technology magazine articles.

Table A6.2:
Chatbot conversation dos and don'ts

Chatbot conversation dos	Chatbot conversation don'ts
Do keep messages short and simple and to the point	Don't use casual fillers as in normal speech, as these can be misinterpreted
Do explain clearly how the user navigates ("select from the buttons below"; "type the number of your desired response" etc.)	Don't be too chatty
Do have the function to save the user's progress so they can return to the same point if they have to leave the conversation	Don't overwhelm
Keep in mind the goal of the bot when writing the script	Don't use humour unless you are sure it will be understood by all. It could create confusion
Be consistent with your voice and tone throughout the script and with tenses	Don't request clarification on every input; only clarify for important questions such as screening questions for tailoring purposes.
Do proofread and test your script for errors in the algorithm. It is essential that all content works smoothly	Avoid using emojis if multiple messenger apps will be used; emojis can't be recognized over all platforms
Make sure it is obvious when a chat session is over, and how and when the user can next engage	
Personalize either by writing all messages in the first person or including a name or a mascot for the service (characterizing the speaker)	

After you have designed the possible topics and conversations, you can make accompanying audio files, images, videos or links according to user preferences.

Making the content library into an app

Unfortunately, there is no known evidence that includes a components analysis of which features of a health app increase app effectiveness. However, there is emerging literature that attempts to determine which apps are effective; these include a comment facility on their features.

Apps should have an engaging design which enables easy use. All instructions should be clear; navigation should be effortless. User testing is vital to creating an app that will be used and retain its users. Further suggestions for building a successful health app are described in Table A6.3.

Table A6.3:

Characteristics of apps linked to positive user ratings and app engagement

Features/content having a positive impact on user ratings and/or increased use
Content includes reference to internal behaviour change drivers (such as motivation, self-efficacy, illness understanding and attribution (internal drivers)[1]
Content includes reference to external behaviour change drivers (such as availability of information, the beliefs of peers and family, and the role of social networks)[1]
Strong evidence base and behaviour change theory
Service user and professional input: ensures user compatibility and acceptability of app especially at the design stage[1]
Clarity: factors such as ease and simplicity of use, specific instructions, features that save time, accessibility, relevant functions and clear security features are also important with high ratings in app stores[2]
Tangible and intangible rewards provided by the health app
Social competition: seeing other people using the app and sharing behavioural data that could be compared to others on social networking sites and the ability to share personal information (sharing information with family or friends, leads to informational and emotional social support)
Hedonic factors: a gaming element or entertaining feature
Trackers: tracking for awareness and progress (built-in feature to track the user's activity, including diet, exercise, sensor-based automatic tracking)
Trackers: tracking for awareness and progress (built-in feature to track the user's activity, including diet, exercise, sensor-based automatic tracking)
Goal-setting features: help users discipline themselves and change their behaviours

[1] Fitzgerald M, McClelland T. What makes a mobile app successful in supporting health behaviour change? Health Educ J. 2017; 76:373–381.

[2] Mendiola M, Kalnicki M, Lindenauer S. Valuable features in mobile health apps for patients and consumers: content analysis of apps and user ratings. JMIR Mhealth Uhealth. 2015; 3:e40.

Annex 7. The design of past evaluation studies of BHBM initiatives

Type of design	Description
Desk reviews	Desk reviews are conducted mainly to evaluate the processes of the initiative. Data can be collected from meeting reports, memoranda of understanding, signed terms of reference, or official records of implementation meetings.
Focus group discussions or interviews with users	Conducting post-initiative discussions or interviews allows for an in-depth exploration of the experiences and levels of satisfaction of the participants during the initiative, and knowledge gained. Focus groups can be also be conducted among implementers of the initiative to explore different interpretations of survey findings and brainstorming ideas for initiative improvement. Responses are likely to be more detailed and thus more informative.
Post-intervention surveys	These surveys are conducted either over the telephone in a structured interview, online in a self-report form, or as a series of questions and responses using the programme medium (SMS, messenger app etc). A questionnaire is administered after the user has finished the programme. Without baseline data, however, causality is difficult to determine. The lack of pre-programme information for comparison impacts negatively the quality of the study. This is likely though the cheapest way to gather evaluation data from users.
Pre- and post-studies (sometimes called repeated measures design)	With these studies, a survey or other measurement (such as weight or blood pressure) is taken before a user starts the programme; the same survey or measurement is then completed after the programme. Pre-programme measures (baseline measures) are taken after registration but before the programme starts. This enables a comparison between the baseline measures and post-measure in the same participant. Causality is thus marginally more likely to be inferred than, for example, with a post-intervention survey.

Type of design	Description
Prospective cohort studies	Using these studies, a study population is split into groups: for example, a group who receive messages (the intervention group) and a group who do not. A survey or other measurement is taken among both groups before the programme (the baseline measure) and after completion by the intervention group. The results from both groups are then compared. The two groups can be matched on specific characteristics that may affect the outcomes being measured; for example, recruiting persons in the same age range or those who are non-smokers, in order to reduce biasing factors. This is called cohort study matching. This leads to a more accurate interpretation of cause and effect (i.e. any differences arising between the two groups result from the programme). The participants are usually followed up for a period of time to investigate the long-term effects of the intervention.
Randomized controlled trials (RCTs)	With this research design, participants are placed randomly into groups (e.g. those participating in the initiative versus those who are not); measures are taken pre- and post-programme. If the population is sufficiently large, the random group allocation should allow for biasing characteristics of the participants being equally present in both groups. Moreover, elements of the study are controlled – such as participant selection characteristics (e.g. only participants who do not take medicines for cardiovascular diseases). With this study method, the differences measured pre- and post-programme are more likely to be attributable to the programme and not to other factors. However, RCTs are very costly and may sometimes be unrealistic when running scale programmes. While RCT designs are often considered the gold standard of scientific robustness, they may not be the most appropriate for evaluating scale programmes. They are costly and their coverage will be limited. In past BHBM initiatives they have been used to evaluate a pilot programme, providing robust proof of a concept, for example.

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