BE HEALTHY
BE MOBILE
A handbook on how to implement mCervicalCancer
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mCervicalCancer
ACKNOWLEDGEMENTS

The World Health Organization (WHO) and International Telecommunications Union (ITU) gratefully acknowledge the following contributors to this handbook:

**Handbook preparation**
WHO/ITU Be He@lthy, Be Mobile team: Sameer Pujari, Allison Goldstein, Virginia Arnold, Vinayak Prasad, Susannah Robinson, Surabhi Joshi, Liliane Chamas, Hani Eskandar, Suzanne Hodgkinson, Per Hasvold, Tim Ryan and Stephanie Meagher.

**Content development**
Members of the Be He@lthy, Be Mobile mCervicalCancer Informal Expert Group: Surendra S. Shastri, Rengaswamy Sankaranarayanan, Parham Groesbeck, Raveena Chowdhury, Achim Schneider, Patrick Petignat, Dan Murokora, Mauricio Maza, Sharon Kapambwa and Karen Yeates.

**Guidance**
Be He@lthy, Be Mobile Steering Committee members, from WHO: Douglas Bettcher, Ed Kelley, and Nick Banatvala; and from ITU: Yushi Torigoe, Eun-Ju Kim, and Kemal Huseinovic.

**Further contributions**

**Administrative support**
Zahra Ali Piazza.

**Editing**
Sarah Whitehouse.

**Layout and design**
Phoenixdesignaid.
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ACRONYMS

AEFIs ............ Adverse events following injections
BHBM .......... “Be He@lthy, Be Mobile”
CCS&PT ....... Cervical Cancer Screening & Preventative Therapy
CECAP .......... Cervical Cancer Prevention Program
HCP .............. Healthcare professional
HPV ............... Human papillomavirus
IARC ............ International Agency for Research on Cancer
ITU .............. International Telecommunications Union
IAEA ............ Atomic Energy Agency
ICC ............... Invasive cervical cancer
LEEP ............ Loop electrosurgical excision procedure
LMICs .......... Low- and middle-income countries
mHealth ......... Mobile technology
MST ............. Marie Stopes International Tanzania
NCDs ............ Noncommunicable diseases
SEVIA .......... Smartphone enhanced VIA
SMS ............. Short message system
TAG .............. Technical Advisory Group
VIA .............. Visual Inspection with acetic acid
VILI .......... Visual Inspection of the Cervix with Lugol’s Iodine
VUCCnet ....... Virtual University for Cancer Control
WHO ............. World Health Organization
ZICTA .......... Zambia Information and Communication Technology Authority
Introduction

Purpose

“Be He@lthy, Be Mobile” (BHBM) is a global initiative, led by the World Health Organization (WHO) and the International Telecommunications Union (ITU), based on mobile technology for health (mHealth) – particularly text messaging and mobile applications (apps) – to address noncommunicable diseases (NCDs) such as diabetes, cancer, cardiovascular diseases and chronic respiratory diseases. The initiative originated in response to the outcome of the First Global Ministerial Conference on Healthy Lifestyles and Noncommunicable Disease Control – the Moscow Declaration (WHA64.11) and the Political Declaration of the High-level Meeting of the United Nations General Assembly on the Prevention and Control of Non-communicable Diseases (A/RES/66/2), to identify concrete actions to be undertaken by Member States, and actions to be included in the Global Action Plan for the Prevention and Control of NCDs 2013–2020. This marked an active decision by WHO to scale up activities using innovative technologies to reduce the global burden of NCDs. The initiative is in line with the 2030 Agenda for Sustainable Development and its Sustainable Development Goals.

This handbook was prepared by an international group of cervical cancer experts for WHO and ITU and is intended to provide evidence-based operational guidance and resources for implementing mobile phone-based support (mHealth) for cervical cancer prevention and control. It describes how an mHealth cervical cancer control (mCervicalCancer) programme can be used to strengthen existing cervical cancer prevention and control programmes, and illustrates the steps required for successful implementation. The handbook describes the considerations and decisions to be made in planning for a national mCervicalCancer programme in five areas:

1. Operations management
   a. Needs assessment
   b. Programme leadership and partnerships
   c. Work plan development
2. Content development and adaptation
3. Technology
4. Promotion and recruitment
5. Monitoring and evaluation.

The annexes include examples of key messages and content, lessons learnt, examples of mCervicalCancer programmes set up in Africa, and a draft budget breakdown.

The handbook’s target audience includes WHO staff members, government officials from participating countries, academics, and implementing partners in countries involved in large-scale mHealth programmes.

Background

NCDs are the leading cause of death and disability globally, causing significant health and economic burdens for individuals, societies and health systems (1). Cancers, in particular, caused some 8.2 million deaths in 2012 (2). Cervical cancer is the fourth most common cancer in women (2). In 2012, there were an estimated 266,000 deaths from cervical cancer worldwide, more than 85% of which occurred in low- and middle-income countries (LMICs) (2). Cervical cancer is caused by the human papillomavirus (HPV), the most common sexually transmitted infection of the female
reproductive tract. Almost all sexually active individuals will be infected with HPV at some point in their lives and some may be repeatedly infected. The peak time for infection is shortly after becoming sexually active. Most cases of HPV infection resolve spontaneously and do not cause symptoms or disease. Persistent infection with specific types of HPV may, however, lead to precancerous lesions. Globally, HPV16 and HPV18 are the most common genotypes, although in sub-Saharan Africa other carcinogenic HPV types are relatively more frequent compared to other world regions (3). The lesions associated with carcinogenic HPV types, if untreated, may progress to cervical cancer (4). Symptomatic cervical cancer patients in LMICs usually present with late stage disease and have low survival rates. Evidence from these countries also shows that raising public awareness about cervical cancer improves early diagnosis, with women presenting with more early stage disease in areas where such interventions have been made (5).

While both cross-sectional and longitudinal studies are inconsistent in their findings about condom use as a means of protecting against HPV in women (6), much evidence shows that a comprehensive approach to cervical cancer prevention and control throughout the life course will reduce the burden of the disease. The goal of any comprehensive cervical cancer prevention and control programme is to reduce the burden of cervical cancer by: (i) rapidly increasing human papillomavirus (HPV) immunization (or vaccination) coverage for girls (aged 9-13) and reducing HPV infections; (ii) detecting and treating cervical pre-cancer lesions; and (iii) providing timely treatment and palliative care for women diagnosed with invasive cancer, (see Figure 1).

Digital health and technology can play an important role in supporting ongoing efforts to heighten the prevention, control and management of cervical cancer. This handbook is intended to provide guidance for stakeholders...

Figure 1: The WHO comprehensive approach to cervical cancer prevention and control: Overview of programmatic interventions throughout the life course to prevent HPV infection and cervical cancer

* Tobacco use is an additional risk factor for cervical cancer.
on the appropriate mobile technologies for use in this approach, to make comprehensive cervical cancer care feasible and affordable. The activities described can be adapted to suit different aspects of cervical cancer management and tailored to specific national priorities.

While awareness strategies for cervical cancer prevention and control have existed for many years, national programmes for vaccinating against, screening and treating cervical cancer and its precursors are in various stages of development and implementation. Mobile phone-based support provides the means to strengthen national cervical cancer programmes by facilitating the implementation of interventions in a mobile and technology-based format.

Recent reviews, including studies on cervical cancer prevention and control that focus on increasing knowledge and awareness of cervical cancer and related health services (7,8), have indicated that text messaging may be an effective means of promoting healthy behaviour change and disease management. Although evidence of this effectiveness is not yet complete, the fact that worldwide mobile phone usage has increased dramatically – from 1 billion subscriptions in 2002 to more than 7 billion in 2015 (corresponding to a global penetration rate of 97%) – makes mHealth one of the most attractive methods of public health intervention (9). Some studies have looked specifically at how this reach could be leveraged to improve cervical cancer control. For example, one recent trial found that an SMS message-based intervention was effective in increasing participants’ knowledge of cervical cancer and uptake of screening in clinics (10). Similar mHealth interventions have demonstrated the opportunity that mobile technology affords for increasing knowledge and use of prevention services, both in screening and appropriate therapeutic interventions (7).

Detailed examples of SMS message content libraries and lessons learned from mCervicalCancer programmes can be found in Annexes 1-4.
**What is an mCervicalCancer programme?**

There are several mHealth interventions that could be used to complement national cervical cancer strategies; these may be used in isolation or combination (see Figure 2) and are further described below. The interventions shaded in dark blue are either currently supported by the joint WHO/ITU programme on mHealth for NCDs or have been suggested for future implementation. The programme does not cover those shaded in light blue. Country implementation examples are provided for some of the interventions.

**mAwareness**

**Intervention**

A cervical cancer primary prevention awareness campaign using text messaging

This mHealth intervention is adapted from chapter 3 of the WHO guideline: Comprehensive Cervical Cancer Control – A guide to essential practice (13).

**Objective**

The goal of using mHealth for awareness-raising is to maximize coverage and utilization of cervical cancer prevention and control services. Where available this could include HPV vaccination awareness messages.
Target

Messages relating to cervical cancer prevention need to reach the six priority groups listed below.

• Young adolescents (and their families): Research indicates that HPV vaccines are most effective if provided to girls or women prior to the onset of sexual activity and exposure to HPV infection. The target population for the HPV vaccine, as recommended by WHO, is therefore young adolescent girls aged 9 to 13 years. Research is also under way to determine the utility and cost-effectiveness of HPV immunization for boys, and some high-income countries have already launched programmes that target boys as well as girls. This provides an opportunity to engage boys in discussions about healthy lifestyles, sexual and reproductive health. Boys should also be included in awareness-raising and information campaigns.

• Adult women: From a resource utilization perspective, countries with very limited capacity are encouraged to screen women at least once in their lifetimes, ideally between the ages of 30–49. This is because most women are infected with HPV in their teens and twenties and the virus normally takes 10 to 15 years to produce precancerous changes. Recommended screening age groups can, however, vary depending on national guidelines and resources (national guidelines in Zambia, for example, recommend targeting the 25–59 age group). Inclusion of family members, and particularly male partners, when conveying related health education messages is critical to ensuring acceptance of screening services.

• Vulnerable groups: Evidence shows that services tend to be least used by those most at risk. It is not enough to set up services and assume that girls and women who are at risk will automatically use them. Special efforts need to be made to reach the most vulnerable populations. These include:
  » girls who are hard to reach, especially those not in formal education;
  » women who live far from services and have few resources;
  » migrant workers, refugees and other marginalized groups; and
  » women and girls living with HIV, or other immunosuppressed individuals, who may require screening to commence at an earlier age and with a more intensive screening schedule.

• Community leaders and champions: Efforts can be greatly facilitated by engaging community leaders; strong leaders who become champions of the cause can foster community support that will ensure a successful programme. Their contributions may include seeking buy-in from local men, securing financial support for families in need, arranging transport to services or providing a venue for a talk or campaign event.

• Advocacy groups and cancer survivors: Advocacy by national, regional or local women’s groups of cervical cancer survivors, or joint groups of cervical cancer and breast cancer survivors, can boost efforts considerably. The “survivor voice” is powerful and can be very influential in promoting behavioural change in women at risk and encouraging them to be screened. These advocacy groups – particularly if they have a high-ranking or popular spokesperson – can also be important influencers for government and policy-makers.

• Men: As with other aspects of women’s reproductive health, it is crucial to involve men. Men are often the “gatekeepers” of access to services for their wives and daughters, so their support (or, in extreme cases, their permission) may be needed. Increasing their knowledge and understanding of women’s health issues helps them to make better health decisions for themselves and their families, and helps build stronger programmes. Information about HPV and cervical cancer can be given to men in clinical and community settings, with messages about the importance of encouraging their partners to be screened.
and treated when necessary. Furthermore, mHealth can be used to provide messages that HPV also causes cancer in men, most notably head and neck (oral) cancer, and anal and penile cancers.

Methods
To ensure that all target populations are reached, the text messages need to be able to be sent through all telecommunications operators active in the country. Specific mass educational/informational text messaging – if appropriate and permissible in the country – could be used. This is most successful when combined with mass media campaigns and, where possible, an SMS-based question and answer service. Consultations with regulatory authorities will be necessary to identify whether “opt-in” is required for the messages to be sent.

A specific national strategy needs to be developed and messages should be adapted to the specific populations identified. Appropriate stakeholders need to be included in developing the strategy and its content. Messages can be adapted from existing WHO prevention guidelines or existing programme content libraries (See later Content Development and Adaptation and Annexes 1-3).

For the campaign to be effective, public health messages should be repeated on a regular basis, in line with national capacity for increased testing and, if appropriate, HPV vaccine administration.

Adapted messages should be sent to healthcare professionals prior to these campaigns, to allow them to prepare to give appropriate answers to the population, and anticipate increased screening and counselling. This can also be included in mTraining.

mTraining

Intervention
Training modules to be delivered by SMS and supported by mobile devices and online portals

This mHealth intervention is adapted from the joint WHO/Pan American Health Organization (PAHO) guideline: Monitoring national cervical cancer prevention and control programmes: quality control and quality assurance for visual inspection with acetic acid (VIA)-based programmes (14).

Objective
The goal of using mHealth for training in a cervical cancer prevention programme is to ensure that there are sufficient competent staff, and to increase and strengthen health workforce capacity to attract women to services, screen those eligible using appropriate tests, administer vaccines where possible, provide information and counselling, and provide treatment for those who have tested positive and are eligible to receive it.

Target
The main target audience for this intervention is health care professionals, with some additional training for community leaders to provide assistance and counselling with regard to prevention efforts.

Methods
Virtual training tools can be developed, such as VIA image banks (see mQualityAssurance), which can be used to provide on-going training to providers.

Health care professionals should receive the same awareness messages as those sent to the population, as well as information on how to answer any questions that might arise from the campaign.

Training may also include key messages on patient counselling prior to screening and treatment, as well as on the importance of follow-up and future screening.

For tertiary prevention, training modules can be adapted from eTraining content, such as the International Atomic Energy Agency (IAEA) Virtual University for Cancer Control (VUCCnet) modules and content from the Geneva Foundation for Medical Education and Research.

The establishment of an mTraining intervention can be either a continuation or adaptation of modules from similar tools developed by the International Agency for Research on Cancer (IARC) (accessible here: http://screening.iarc.fr/
Country Example: Colombia

The Ministry of Health of Colombia has developed a virtual VIA and cryotherapy course for health care professionals selected from various regions to participate in training. The course includes theoretical and practical assessments, both of which participants must pass. The virtual course is useful for ensuring that health care providers already have a certain level of knowledge before they attend a particular training course in person. Once providers have been trained and have begun practising at the regional level, they are required to pass a monthly virtual examination, which involves responding to images selected at random for evaluation. If providers score below 85% in these examinations they will automatically receive a supervisory visit from a gynaecologist. These virtual tools have proven to facilitate effective follow-up and also provide documentary evidence of health care providers’ learning trajectory.

mQuality Assurance

Intervention
Quality assurance images of the cervix to be stored in VIA image banks, which can be used for ongoing training.

This mHealth intervention is adapted from the WHO/PAHO guideline Monitoring national cervical cancer prevention and control programmes: quality control and quality assurance for VIA-based programmes (14).

Objective
The goal of using mHealth for quality assurance is to maximize screening tests to accurately differentiate true positive and true negative cases, and to feed those results into training for health care professionals.

Target
The target audience for this intervention is health care professionals.

Methods
In many low-resource settings, the human resources required for routine quality assessments may not be readily available, particularly if health facilities are located in remote and hard-to-reach areas. Supervisors can liaise directly with health care professionals to conduct quality assurance for screening using alternative strategies, such as digital photography (cervicography). After the application of acetic acid during the VIA test procedure, an on-site health care provider can use a camera to photograph the cervix and send the digital image electronically to a supervisor. The supervisor’s diagnosis can then be compared to that of the on-site provider, ensuring a system of quality assurance. Further specifications and details have been elaborated in relevant studies (15, 16, 17).

Quality assurance images can be stored in VIA image banks and be used for ongoing training.

It is important to note that appropriate data security will need to be ensured and an image database and technology support will need to be established with operators.

Apps for mHealth are also being developed by various groups to facilitate remote diagnosis using smartphone picture messages of the cervix (Petignat et al. 2014, Division of Gynecology, Department of Gynecology and Obstetrics, Geneva University Hospitals, Geneva, Switzerland; Madagascar; 16). These
have yet to be validated and reviewed by WHO. This handbook will be updated once guidelines are available.

**mFollow-up**

**Intervention**
Records of visits, which feed into a central database and result in the sending of SMS reminders about subsequent appointments and the nearest location of clinics and hospitals for further investigation, referral and treatment.

Ideally this would be integrated with an electronic medical file for the individual and would be part of a larger national electronic health records system.

**Objective**
The goal of mHealth for follow-up is to maximize patient follow-up for treatment and screening through mobile and point-of-care electronic capture of data, which can be integrated into national health information systems.

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**Country Example: El Salvador**

Lessons in setting up an integrated platform for surveillance and follow-up

The Ministry of Health of El Salvador, in collaboration with PAHO/WHO, has developed a web-based surveillance system. The VIGEPES (Sistema Nacional de Vigilancia Epidemiológica / National Epidemiological Surveillance System) was developed to unify criteria for the registration of the diseases or events of which notification is obligatory. This system is used to create epidemiological reports with representative and reliable data. This application allows the user to detect a trend in diseases or events that may affect the population. When the Ministry entered into collaboration with Basic Health International to launch a demonstration project for the implementation of HPV testing in El Salvador, it seemed essential to have a proper means of tracking the women involved in the screening project. An additional component was added to the VIGEPES system, to track women using a unique identification number. Subjects are enrolled at a primary care setting and followed until they receive their care at a secondary/tertiary level health facility.

When considering implementing HPV testing in a low- or middle-income country, it is essential to have a reliable information system in place. There has to be a way of tracking the women who will be screened with HPV testing, since there can be relatively long intervals between tests for those whose HPV test results are negative. The purpose of tracking is two-fold: to avoid over-screening of women by repeating HPV tests too frequently; and to notify women who are not receiving proper follow-up. mHealth solutions could add value to the system by sending out reminders for annual check-ups and treatment follow-up.

Various challenges have been encountered in setting up this new component in the VIGEPES system. Its introduction also means the incorporation of new forms to be filled out that will be used to input information into the system. In that regard, various preparatory steps need to be undertaken. Agreement must be reached on what information to include in those forms, and training must be provided on how to complete the forms accurately and how to input the data into the system. More computers are needed in the centres where HPV sample processing will be carried out. With new information to be uploaded, a higher burden of work falls on the staff inputting data, meaning that more personnel might be required in certain facilities to ensure that the system is kept up to date.
Target
The target audience for this intervention is women who have been screened and are suspected to have cervical neoplasia.

Methods
Whether using cytology, HPV testing, or VIA, women who are suspected to have cervical neoplasia need to be further assessed and given appropriate treatment. In some instances, this will require a second and possibly a third visit to the clinic (primary health care setting) or a referral to a different centre. Research indicates that in some regions a significant proportion of women do not complete the planned initial treatment and of those who are treated many are lost to post-treatment follow-up. This intervention generates records of visits and further screening reminder messages for patients, including details of the closest health care facility.

A national electronic health records (or equivalent) system with personal identifiers can provide the platform for such an intervention.

mSurveillance

Intervention
mHealth data collection, through input of indicators, is facilitated by an SMS or app which sends the data to a central database

This mHealth intervention is adapted from the following WHO guidance:

- Global Action Plan for the prevention and control of noncommunicable diseases 2013–2020, Objective 6: To Monitor the trends and determinants of noncommunicable diseases and evaluate progress in their prevention and control (18);
- Monitoring national cervical cancer prevention and control programmes: quality control and quality assurance for VIA-based programmes (14);
- Comprehensive Cervical Cancer Control – A guide to essential practice (13).

Objective
The goal of mHealth for surveillance is to maximize data collection of cervical cancer prevention and control indicators through mobile point-of-care electronic data capture for integration into national health information systems. This can help to compare the situation in certain communities against others in the same region, and provide a foundation for advocacy, policy development and coordinated action.

Target
The target audience for this intervention consists of health care professionals and the Ministry of Health (or equivalent).

Methods
Surveillance can provide real-time data, captured through a dashboard, on trends in cervical cancer over time, and changes in knowledge and behaviours. Health care providers will input chosen indicators into a central database or screening registry using the selected platform (SMS, apps, or secure online platform).
Developing a national mCervicalCancer programme

1. Operations Management

Needs Assessment

A needs assessment provides a vehicle for consolidating information for planning, identifying knowledge gaps and helping with decision-making. It will give the national technical advisory group and in-country operational project team an understanding of the programme setting. The needs assessment will involve visiting, observing, and interviewing key informants and stakeholders and documenting existing resources. The data will inform the community- and country-specific development and implementation of mHealth, and can act as a baseline measure from which the programme can be monitored and evaluated. The needs assessment will also determine the national capacity, through screening and management facilities, to support the programme’s implementation and expansion. It should be noted that the time spent conducting a needs assessment, and the assessment priorities in terms of desired outcomes, will vary from country to country depending on which data already exist and the stage of development of the national cervical cancer programme.

There are several themes and considerations to be explored when conducting a needs assessment, as outlined in Table 1.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Considerations</th>
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<tbody>
<tr>
<td>Current situation</td>
<td>- The extent of the health issue(s)</td>
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<tr>
<td></td>
<td>- Statistics and availability of vaccination, screening and treatment programmes</td>
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<td>- National guidelines and strategy for prevention and control and choice of intervention</td>
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<td></td>
<td>- Pathology and laboratory capacity</td>
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<td>- Human resources and health workforce</td>
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<td></td>
<td>- Knowledge levels, cultural attitudes, perception of risk, current behaviours and behaviour trends</td>
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<td></td>
<td>- Existing programmes and synergies</td>
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<td>- Training and quality assurance systems</td>
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<td>- Referral and monitoring systems</td>
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<td>- ICT capacity for selecting systems, configuration and support</td>
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<td></td>
<td>- The state of mobile communications, mobile phone use, networks and cost</td>
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<tr>
<td></td>
<td>- The possible existence of regulatory restrictions (privacy, text message transmission, data security, opting out of programme)</td>
</tr>
<tr>
<td>Topic</td>
<td>Considerations</td>
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</tbody>
</table>
| Target group | - Target populations (size and demographics are important to ensure that providers can provide services in each community)  
- Barriers to and opportunities for accessing that population? |
| Contextual, geographical, Cultural and behavioural influences | - Community dynamics and actors that would support a successful intervention  
- People who can be considered “trusted advisers” and how to leverage them  
- Expected interactions between target populations and potential information channels in health interventions: SMS, web, app, phone call, interactive voice response, brochure, face-to-face coaching or consultation  
- Convenience for the population  
- Cost (who will pay: the population, government, or mobile phone company)  
- Culture |
| Promotion | - The best communication strategies (e.g. texts, voice messages, or apps) and additional health promotion channels (e.g. social media)  
- The channels through which mCervicalCancer will be promoted: what are the existing channels (e.g. telecommunications companies, mass media)? What works, what doesn’t and why? How will mobile telephone numbers be obtained (houses of prayer, women’s groups, schools, telecommunication companies, sign up functions)?  
- Timeframes  
- Incentives to encourage participation  
- Access and availability to health care services and resources  
- Access and availability to mobile technology and services |
| Content | - Messages: consider the current message library, context of the messages, consumer message preferences, language, triggers, audience, tone, frequency, intensity, type and timing  
- Source of messages: consider the credibility of text messages in terms of who the message should come from (health ministry, schools, community leaders, sports personalities)  
- Client/receiver: who is the target audience? what do we know about them (from a demographic, psychographic, ethnographic point of view)?  
- Effect: what is the intended effect of the messages? Are there opportunities to change the wording and add new messages?  
- Feedback: what mechanisms will be used for feedback? Will communication be one-way or two-way? |
| Further research | - Other areas in which further research is required to facilitate a successful “soft” launch and implementation |
Programme leadership and partnerships

To facilitate planning, implementation and monitoring of interventions in the mHealth programme, a leadership team should be established with clear responsibilities and accountability for the programme (Figure 3). The team should comprise:

- a national mHealth steering committee to ensure agreement on general direction and decision-making;
- a national technical advisory group comprising high-level experts to support in-country project teams;
- in-country teams for management of operations, technical specifications, content development and adaptation, recruitment and promotion, and monitoring and evaluation; and

Figure 3: Proposed structure of a mHealth management team

National mHealth Steering Committee
Group including representatives from the Ministry of Health, Ministry of Communications, WHO and ITU to ensure agreement on general direction and decision-making

WHO, ITU, and the Informal Expert Group
A group of experts that assist in drafting the country handbook and advise on its implementation.

National Technical Advisory Group (TAG)
Government sectors (including health, business, and treasury and planning), telecommunications and software industry, local telecommunications/mobile network providers, NGOs, health professionals, academic and research organizations, health insurance groups, health service providers, civil society groups, opinion leaders and the media.

Operations Project Team
Manages overarching programme operations including needs assessment, work plan, and budget.

Content Team
Develops and adapts the content for each intervention.

Monitoring and Evaluation Team
Manages the development and implementation of monitoring and evaluation plans for the programme.

Technical Team
Manages technical aspects of programme development and implementation.

Recruitment and Promotion Team
Manages recruitment, communications, marketing, and dissemination for the programme.
National mHealth Steering Committee
From the government perspective, it is important that the collaboration established between the ministries responsible for health and communications is represented in the steering committee.

To maintain the overall “Be He@lthy, Be Mobile” coherence and shared learning between countries, WHO and ITU headquarters should also be represented and contribute to decision-making processes.

The Steering Committee should consider the appropriate mechanisms to formalize a clear governance structure and functions (terms of reference, meeting frequency, roles and accountability).

National Technical Advisory Group (TAG)
This is a stakeholder advisory group that will support, inform and advise the programme throughout the various phases of its inception, development, implementation and evaluation. Regular meetings will be required for information sharing and progress updates.

The TAG will assign the roles and responsibilities of the various organizations involved in each of the programme’s phases: development and adaptation, implementation, evaluation and on-going service provision. This should include discussions on assigning overall programme ownership, funding, and the conclusion of contracts or agreements on dealing with technical and other issues.

The TAG will assist the in-country operational team in making important decisions regarding the population segments to be included, the type of programme, programme objectives, programme design, evaluation design and scope, programme support, and integration into existing cervical cancer prevention services and programmes.

The TAG will also support implementation and promotion of the programme.

In-country operations, technical, content, recruitment and promotion, and monitoring and evaluation project teams
These teams include those who will actually develop or adapt the programme for cultural relevancy and technical accuracy, promote it, operationalize and maintain it, integrate it into the health system and health promotion services, and evaluate it.

Teams may include representatives from the ministries of health and telecommunications, and should include those responsible for making decisions regarding funding and planning, those who will be involved in implementing, promoting and evaluating the programme, and those who can contribute to its long-term sustainability.

These teams will either report to or be a subset of the TAG. They will assign leaders for the specific intervention working groups and will have decision-making authority, autonomy and resources to direct the planning, implementation, technical aspects, content development and adaptation, promotion, and monitoring and evaluation of the mCervicalCancer programme. Key roles will include liaising with representatives of current cervical cancer prevention programmes and knowledge brokers of the national guidelines for cervical cancer prevention and control, to ensure programme synergy.

Another important aspect will be to engage and maintain strong partnerships with telecommunications operators, since this will be beneficial for speed and ease of implementation and an eventual reduction in the cost of the programme. In this regard, it will be helpful for teams to include members with prior experience in operator engagement and negotiation.

WHO, ITU, and the Informal Expert Group
The international experts that assisted in drafting the country handbook also have experience in programme implementation and will be available to advise on technical aspects, legal issues, choice of platforms for scaling up, and feasibility.

Experts from international information technology organizations, health economists and business development experts can also be invited to advise on models for the programme’s sustainability.
Work plan development

A comprehensive cervical cancer programme on a national scale must take account of the spectrum of the disease, appropriate technologies, and the needs and cultural norms of the population. The use of mHealth at the population level to educate people through cervical cancer prevention and control messages in multiple languages can be readily implemented at scale in LMICs owing to the widespread use of mobile telephones. The success of the programme will, however, require that a much broader range of factors than the technology alone be taken into consideration from the outset.

Table 2 contains a checklist or template for developing a work plan, which can be used and adapted to implement an mCervicalCancer programme in any country.

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**Table 2. Checklist for a large-scale mCervicalCancer programme**

**Background and context:** This section uses information from the needs assessment, relevant to decisions on the implementation strategy.

- Problem statement: a description of the problems related to cervical cancer that the programme is intended to address
- Present situation or context of cervical cancer and its prevention in the country
- National or government commitment to the programme
- Process used in programme identification or formulation, information used and stakeholders involved
- Relation to previous and current programmes or activities related to cervical cancer

**Operations management:** In this section, clear planning decisions are made, a description of the programme is developed, and an operations management plan is elaborated including identification of those responsible for implementing the project and service provision.

- Overall project objective: for example, “to create a cervical cancer mHealth programme for the population of X, particularly targeting Y consumers, and to implement it as a free national service”. Clearly state that you will engage individuals in this programme and not only change policy
- How the programme fits into national or regional strategies
- Strategy for operationalizing and promoting the programme
- How the initiative will evolve with progress in technology and society, be extended to cover other NCDs and become integrated into a comprehensive mNCD model
- Roles and responsibilities: programme team members, responsibilities for main activities, project team leader assigned
- Overall description of programme management
- Management committee (if applicable, terms of reference)
- Accountability for programme implementation
Public–private partnership: A public–private partnership, in which every partner has a unique role and all are motivated by the desire to improve health by using technology, is recommended. This section sets out the important underlying principles to be considered.

- A “win–win” philosophy, particularly for a long-term strategy, driven by the government with the private sector and NGOs involved in implementation
- A service that is free of charge to consumers to maximize its public health impact (enrolment tends to be very low when consumers have to pay)
- Consideration of the environmental effects of a mobile network
- Appropriate contractual arrangements with the best providers
- Assurances that service provision is sustainable in the long term

Content development and adaptation: This section should be based on a research-driven message refinement process.

- Review existing programme content and rules of implementation
- Refinement content through focus groups and consumer pre-testing, translation, rewording, deleting and adding new messages, changing the rules in the system, and designing the registration, opt-in, and administration functions of the new programme
- Plan to update messages using evaluation results and user feedback

Promotion and recruitment: This section pertains to decision-making regarding marketing of and enrolment in the programme.

- Promotion and recruitment plan (launch, short-term, mid-term and long-term strategies)
- Recruitment methods (by text, web, missed calls, third party)
- Promotion strategy (media, health workforce training, civil society outreach etc.) adapted for various client groups (by demographics such as urban, rural, age, gender and income, taking into consideration health and digital literacy)

Technology: This section involves decisions on what considerations are required regarding the programme’s infrastructure and regulations.

- Type of mHealth intervention and channels to be used (text, voice, apps, etc.)
- Availability of technology options within the public sector and/or private sector
- Process for procurement and adaption of technology
- Dashboard development and access
- Procurement of a short code
- Negotiation with telecommunications regulators, aggregators and operators for pricing
- Data security
- Technology pre-testing and scale-up plans

Monitoring and evaluation: This section involves decisions about what the programme will measure, and with what frequency.

- Monitoring and evaluation plan (to be developed) based on the Handbook on monitoring and evaluation of mHealth programs for Non-communicable Diseases (19)
- Short-term, mid-term and long-term plans
- Reports and dissemination plans for evaluation, refinement, and improvement of service provision
2. Content development and adaptation

Health messaging content development and adaptation

Experience shows that despite the best efforts of an expert group to appropriately craft messages for a particular audience, programmes can be critically improved through a primary research-driven message refinement process. The following steps should be considered when composing and adapting the message content for mCervicalCancer programmes (11,12):

1. The national TAG should review any existing mHealth or cervical cancer programmes and guidelines that may guide the composition of the messages (see Annexes 1-3), taking into account both the desired content and the rules for implementation of the programme.

2. In writing the text messages, the following should be considered:

- the language, tone, clarity, health literacy, technological literacy;
- provision of both motivation and information;
- salience of practical tips and strategies for the population;
- tailoring for specific groups (women with cervical cancer, healthy populations, rural or urban populations, particular
socioeconomic status, ethnic group, age, gender);

- Including an “active” component, or an “ask” to the message (in Tanzania, women were more likely to act on messages that gave a concisely written true statement and then asked them to act on it, such as “Get screened now”);

- whether the information should be static or dynamic, depending on whether the programme is uni- or bi-directional, fully interactive via an app or based on input from the user; and

- length of characters per text message allowed in each country.

3. Research shows that there are “mediators of meaning” when developing text messages, which go beyond the basic tailoring of messages to different cultural settings (12). These mediators help explain the hidden assumptions related to culture, health, and the health system, which may be interpreted through health communication text messages. Maar et al. (2016) (12) found that there are six main themes or factors that influence the level of congruence between the message content that researchers perceive to send versus the content that is actually perceived by the recipients. Table 3 shows the relationship between the main strategies, operationalizing strategies, and the affected behaviour change conditions, which will be helpful to keep in mind when composing the text messages (12).

4. When setting the rules and logistics of the programme, the following should be considered:

- the timing, frequency and duration of intervention;

- collection and storage of baseline and accumulating research data;

- registration, opt-in and opt-out process and administrative communication (if any);

- whether there will be two-way interaction;

- degree of choice and flexibility in the programme;

- possibility of stopping and/or changing the programme; and

- extent of interaction with clinicians or the health service system.

5. Local experts should help guide the adaptation process. This should include focus groups and consumer pre-testing, translation, rewording, removing and adding new messages, adapting the system rules, and designing the registration, opt-in, and administration functions of the new programme. The target population should be given the opportunity to comment on the intent, the media and channels used, the interaction flow, and the key communications involved in the programme. The following three-step process can provide a cost- and time-balanced approach to message adaptation.

i. The first step is to establish focus groups for pre-testing among the target population. This may be a small number of in-person focus groups (e.g. five groups of 8-10 participants) designed to provide feedback on the programme as a whole by reviewing its objective and all of the proposed text messages in the one sitting. Focus group composition should include the key demographics of the geographic area where the programme will be implemented (e.g. rural, urban, language group, income, etc.). The number of participants will depend on the number of different target populations and the degree of change from an existing and already tested programme. If necessary, some focus groups could be substituted by telephone interviews. The results from these focus groups should bring to light any major gaps in the programme before it is rolled out. It is important to note that receiving a text message on a mobile phone during a normal day is different from sitting down to read a number of text messages on paper. It is best to also conduct testing under the conditions in which the programme will ultimately be received, although this is not always feasible or practical. While
focus groups are therefore necessary prior to the launch, they may not be sufficient; additional small group and “real world” consumer testing, although time-consuming, is important (see step iii).

ii. The second step is to further test the messages for 1-2 weeks with a small group of participants (approximately 15), and ask them to rate each message immediately as they receive it by providing feedback on the acceptability and helpfulness of the message (e.g., “how much did you like the message?”, “how helpful was the message on a scale of 1 to 5?”).

iii. The third step is to conduct “real world” consumer testing to refine the messages.

The revised programme is sent live to a pilot group of people who are opting-in to the mCervicalCancer programme. The group is surveyed periodically during the course of the programme, mainly to determine the appropriateness of the messages. The results are used to refine the programme.

6. The national TAG must finalize and agree on a plan for maintaining the database of messages. Messages may need to be reviewed and updated regularly; a clear plan should be in place determining who is responsible for doing so and the necessary steps to be taken.

### Table 3: Main themes and operationalizing strategies for text message development

<table>
<thead>
<tr>
<th>Main strategies based on themes</th>
<th>Operationalizing strategies for message development based on sub-themes</th>
<th>Behaviour change condition affected</th>
</tr>
</thead>
</table>
| Use positively framed advocacies, they are more persuasive; avoid negative or non-affirming framing of advocacies | • Empower and ease stress by pointing to successes  
|                                                                       | • Inspire  
|                                                                       | • Show respect for receivers  
|                                                                       | • Show compatibility with positive indigenous views of health as “living a good life”                                         | • Motivation                        |
| Avoid fear- or stress-inducing messages                               | • Do not exacerbate people’s stressful lives (eg, experience of low income or racism)                                             | • Motivation                        |
| Avoid oppressive or authoritarian messages                            | • Show respect for autonomy: Authoritarian messages are perceived as lacking in respect; invoke historic distrust issues with colonial/medical system; and may cause defiant response.  
|                                                                       | • Provide healthy life style education message along with pharmacotherapy                                                      | • Motivation                        |
Main strategies based on themes | Operationalizing strategies for message development based on sub-themes | Behaviour change condition affected
--- | --- | ---
Build on healthy cultural and traditional practices whenever possible; avoid incongruity with cultural and traditional practices | • Empower with a strengths-based approach to local culture  
• Show respect for culture | • Capability, opportunity, motivation  
• Capability, opportunity, motivation
Recognize social determinants of health as drivers of ability to adopt behaviours; avoid disconnect with the reality of social determinants of health and the diversity of cultures within a population | • Consider cultural settings and cultural norms related to lifestyle  
• Understand affordability and accessibility of foods and medications  
• Consider access to providers and/or medications in the health care system | • Capability, opportunity  
• Capability, opportunity  
• Capability, opportunity
Ensure pragmatic content within the local setting; avoid lack of clarity and lack of practicality of content | • Preference for practical tips over higher level advice  
• Avoid ambiguity in wording and assumptions  
• Consider and check the local dialect in translation | • Capability  
• Capability  
• Capability

3. Recruitment and promotion
A nationwide or population-specific strategy to promote outreach and recruitment into the programme can be a potentially expensive component and should be considered early in the planning stages, taking account of the following considerations.

- Target audience and access to media/promotional strategies.
- Who the public considers to be the “owner” of the programme and the data, as the operational model will likely direct the promotional campaign.
- Existing health programme promotion strategies and synergies: which organizations/notable personalities are currently involved in mass media campaigns for cancer control or prevention services and can those campaigns be linked or leveraged? Which mHealth programmes have previously been implemented in the area? Can lessons be learnt about which promotional techniques are effective?
- How people will register with or sign up to the programme: directly by text message, online, by telephone, in person, or through a third party.
- The amount of data to be collected at baseline to allow tailoring and ensure follow-up.
- The local mobile network environment: whether sending unsolicited text messages is allowed (this contravenes network codes of conduct in some countries). This may also be an important consideration in the potential effectiveness of or engagement in the programme: whether a population that has been desensitized to receiving unsolicited health-related text messages will be likely to read mCervicalCancer text messages.
- Use of incentives to encourage participation.
- Effectiveness of mobile messaging for outreach and promotion.
• Leveraging the marketing and promotional campaigns of the stakeholder agencies, including technical partners, such as telecommunications companies. This can allow for campaigns where consumers (women) can self-issue health messaging around this topic, i.e. a health promotion social marketing programme with posters and radio advertisements, through community settings and places of gathering or through social media, where mobile numbers are available for texting and automated health information can be sent to the self-issuer.

• Timing of the campaign: consider 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.

• Cost of radio and TV advertising. These are important methods for promoting the programme and, in many countries, can be very expensive. Initial underestimation of promotional costs is common and can be difficult to remedy later.

4. Technological specifications

The following technical aspects of an mHealth programme must be considered by the national TAG from the start, in collaboration with local partners:

- type of mHealth intervention, channels to be used (SMS, voice, apps, etc.)
- availability of technology options within the public sector and/or private sector
- process for procurement and adaption of technology
- dashboard development and access
- procurement of a short code
- negotiation with Telecom regulators, aggregators and operators for pricing
- data security
- technology pre-testing and scale-up plans.

It is important to note that mobile communications network environments differ from country to country. The specificities should be considered in the planning stage by including in the TAG technical experts (such as representatives of telecommunications companies, operators, telecom regulatory authorities, government departments responsible for information, communication and technology, cellular associations) or individuals knowledgeable about the communications network in the country. Network operators, telecommunications companies or industry organizations can provide help in setting up the programme and advising on its sustainability. Some providers may view supporting such a programme as good publicity or a useful addition to the services they offer.

In the absence of such support, the programme 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 a large number of participants, regardless of their mobile carrier or location, without establishing these interfaces individually. Although the aggregator adds a further cost, this cost decreases as the scale of the programme increases; using an aggregator can therefore be more cost-effective than attempting these activities “in- house” unless capacity and infrastructure already exist.

When thinking about the technical aspects of an mHealth programme, the TAG may also consider the following questions:

- Partnerships: What sort of arrangement with telecommunications companies and/or the aggregator will best suit long-term implementation of the programme?
- Communicating messages: Should voice messages, interactive messaging or interactive voice response systems be used? What are the capacity, cost-effectiveness and reach of the available technologies in the country?
- Free access: How can we ensure that the programme is free and available to all consumers regardless of their carrier, network or location?
- Market research: Who will conduct interviews and on which system?
• Data ownership, privacy, security and interoperability with health systems: What are the considerations, and how should a central database best be maintained?

• Sustainability: What are the operating costs of the programme, such as per message, and how will these affect the scale of the programme?

• Contracts: In establishing contractual arrangements with partners, what are the considerations regarding intellectual property, security and privacy of mobile phone numbers, testing, expectations of involvement in monitoring and evaluation and service agreements? Who will hold the contractual arrangements, and what support will be given for maintenance and any other problems?

The TAG should also consider logistics and the functional plan and finalize the functional specifications in collaboration with technical partners who will build the appropriate systems and interfaces and test internal and user acceptance.

5. Monitoring and Evaluation

A plan for implementing monitoring and evaluation activities as part of the mCervicalCancer program is of vital importance. The framework and outline of the plan should be prepared as early as possible in the process of developing the mCervicalCancer programme. There are many resources that can be used to develop monitoring and evaluation processes. For simplicity and uniformity, the Handbook
on monitoring and evaluation of mHealth programs for Non-communicable Diseases (19), developed as part of the Be He@lthy, Be Mobile handbooks, is recommended as a reference point to develop the mCervicalCancer monitoring and evaluation framework. As a guide for planning the evaluation process, the Monitoring and Evaluation Handbook proposes a framework or logic model (see Figure 4) that may be expanded and adjusted to the context of the programme and the aspects that are considered key objectives and goals for the programme.

The person centered domain indicated in Figure 4 looks at the programme performance in terms of its reach and impact regarding the targeted end users. This domain lays out different components of the initiative from an end user perspective, and places them in an order that will support the implementing body, usually a country’s Ministry of Health, in designing the monitoring and evaluation framework. The programme centered domain looks at the policy aspect of mHealth implementation. By looking at inputs such as governance and policy data, outputs such as coverage of intervention and outcomes such as integration of mHealth within the existing health systems, the programme centered domain articulates the internal and external elements that could affect the program’s success at a policy level. It also lays out the essential components that the implementing partner (usually the Ministry of Health) should take into account prior to designing an mHealth programme.

Monitoring is the routine tracking of an intervention’s performance using data collected on a regular and ongoing basis on specified indicators. This information is used to assess the extent to which an intervention is achieving its intended targets on time and on budget. The purpose of monitoring an mCervicalCancer program is to check the status of the programme in order to understand its performance, assess and identify situations that may require adjustments to the programme, fine tune the technology, or identify other corrective measures. As monitoring will be a regular process, the data must be easy to collect and the values easy to interpret. At the start of a programme it may be necessary to monitor the programme more frequently than later on, when the programme has reached a level of quality and stability that renders frequent monitoring less important.

Depending on the programme priorities, the country implementing the programme can identify the core monitoring indicators in addition to those identified in the handbook. For example, if the programme is focusing on outreach, meaning reaching out to women in the screening age group with the objective that they come to the cervical cancer clinic for screening, then one of the core indicators could be “Number of women who visited the clinic because she received a text message” (delivered through the mCervicalCancer programme). Local context may require additional steps and other types of indicators, although it is encouraged that in order to maintain uniformity and harmonization, all programmes try to maintain core recommended indicators as per the handbook, and reuse as many of the same indicators as possible from other similar programs. This allows comparisons across the different national implementations of an mCervicalCancer programme.

A monitoring process requires data collection, but also a team that can analyze the data and suggest and implement adjustments to the system and the service. This team should consist of the project lead, the person responsible for technical systems, a representative for the users, and any other key stakeholders that may be necessary to make informed decisions on the issues that need to be adjusted and be responsible for implementing changes. It is advised that such a forum create regular meeting summaries for reporting purposes.

Evaluation is an episodic assessment of either a completed or ongoing programme or intervention to determine the extent to which it achieved its stated objectives efficiently and effectively. It is a more elaborate and complex process than monitoring that may require different methods and approaches to acquire the necessary data. Evaluation takes more time and resources, but is very important as a means of having an in-depth understanding of the outcomes and impact of the programme. In the initial stages of implementing an mCervicalCancer programme, the purpose of the evaluation could be to determine the
current effectiveness of the programme in terms of assisting end users to get screened for cervical cancer and understanding how helpful the program was in establishing the desired reach. In this case, stakeholders may wish to use the following evaluation objectives:

• understand the reach of the programme
• estimate the impact for participants (how many of the targeted end users got screened at the clinic)
• understand and improve the user experience of the programme

The findings from the evaluation could then be used to improve the programme, and thereby improve its effectiveness. However, the evaluation priorities can be different depending on how the mCervicalCancer programme is designed.

WHO has developed clear indicators (4) for the evaluation of cervical cancer prevention and control programmes, which can be adapted for the evaluation of mHealth for cervical cancer strategies and further tailored to a country-specific context (Figure 5). Indicators can also be adapted from the joint WHO/PAHO guideline entitled Monitoring national cervical cancer prevention and control programmes: quality control and quality assurance for VIA-based programmes, and the WHO guideline Comprehensive Cervical Cancer Control – A guide to essential practice (13,14).

Figure 5: Indicators for cervical cancer prevention and control

**Performance indicators for HPV vaccination:**

- Vaccine coverage of the target population: proportion of girls fully vaccinated by the age of 15 every year (measured using the WHO–UNICEF joint reporting form).
- Rate of adverse events following injections (AEFIs): number of AEFIs reported every year.

**Performance indicators for cervical cancer screening and treatment:**

- Coverage of the target population:
  i. percentage of women aged 30–49 years who have been screened at least once since age 30.
  ii. percentage of women aged 30–49 years who have been screened that year
- Screening test positivity: percentage of screened women aged 30–49 years with a positive result in the previous 12-month period (information can be obtained from logbooks).
- Treatment rate: percentage of screen-positive women completing appropriate treatment for pre-cancer and treatment for invasive cancer in the previous 12-month period (information can be obtained from logbooks).

Note: For the above indicators, the denominator is the number of women in the population aged 30–49 years, and it is important to disaggregate the data by five-year groups. Data can be assessed using a survey of women aged 30–49 years that includes a question about whether they have been screened at least once. Information can also be obtained from service logbooks, taking care to disaggregate first screening from repeat screens.

**Impact indicator:**

Information can be collected through programme data or as part of mSurveillance, through text messages, questionnaires, and interviews with a sample of participants.

In summary, a monitoring process should aim to provide corrective input on the progress of the programme, while an evaluation process will measure how well the programme is performing against a set of indicators. The evaluation indicators should be related to the goals and expectations of the programme. If a careful needs assessment was carried out at the beginning of program development, this may also be an important resource to identify these goals. Any monitoring and evaluation actions are only as good and useful as the quality of the data collected; thus, it is important that there is transparency and traceability in how data is collected and aggregated. It is also important to keep the raw data (unprocessed data) for future analysis and knowledge development.

Conclusion

On 4 February 2016, World Cancer Day, the Secretary-General of the United Nations called for “the elimination of cervical cancer as a public health issue”. This handbook highlights opportunities for an mHealth approach to assist in realizing this vision by providing a comprehensive framework and resources for governments that wish to integrate an mCervicalCancer programme into their national health system, outlining steps in five programmatic areas: operations management, content development and adaptation, technology, promotion and recruitment, and monitoring and evaluation. By incorporating strategies from this handbook into existing infrastructure and health systems, mHealth for cervical cancer prevention and control can be made a regular part of patient care, which can improve cervical cancer prevention and control for women country-wide.
References


4 All electronic references accessed on 31 July 2016.


Additional Resources


Annex 1: Examples of mAwareness key messages and content

Examples of key messages for mAwareness are provided below. These messages are adapted from the WHO guideline: Comprehensive Cervical Cancer Control – A guide to essential practice, Chapter 3 (14). Please note that these messages should be further adapted and tested with the target population before implementation (see section 2 “Content development and adaptation”).

Five key messages about the HPV vaccine:

1. There is a safe, effective vaccine that can protect against cervical cancer.
2. The HPV vaccine works best if received before sexual activity begins.
3. All girls in the age cohort or in the school class/grade/year identified as the target population by the national programme should receive the HPV vaccine.
4. HPV vaccines do not treat or get rid of existing HPV infections.
5. Girls who are already sexually active can also be given the HPV vaccine, though it may be less effective.

Five key messages about screening and treatment:

1. Cervical cancer is a disease that can be prevented.
2. There are tests to detect early changes in the cervix (known as pre-cancers) that may lead to cancer if not treated.
3. There are safe and effective treatments for these early changes.
4. All women aged 30–49 years should be screened for pre-cancer at least once.
5. No one needs to die from cervical cancer.

The specific messages developed for use in each country need to comply with the country’s national guidelines, including the specified target populations (i.e. age ranges for vaccination of girls against HPV and for women’s cervical cancer screening).
Annex 2: mCervicalCancer programme and message content from Tanzania

The Office of Global Health, Queen’s University, Ontario has developed a programme to improve cervical cancer screening with VIA in Tanzania using smartphone enhanced VIA (SEVIA). This allows newly trained cervical cancer screening providers to share VIA images with trainers and expert reviewers and receive timely feedback (in a closed user group) to improve the quality of screening and track relevant outcomes (17). The SEVIA programme is being scaled up across Tanzania jointly with the Ministry of Health Cervical Cancer Prevention Programme (CECAP).

In order to further explore the barriers to cervical cancer screening uptake, the programme has also designed a number of interventions that are under evaluation. One such intervention is an mHealth text messaging programme for women – both in rural and urban areas – who are at risk for cervical cancer. The pilot project is under way in Northern Tanzania (see Annex 4). In order to develop relevant and culturally sensitive messages regarding cervical cancer and the importance of screening, the team undertook a process of SMS message composition using focus groups, piloting and repiloting of messages among women at risk and other stakeholders in Tanzania.

These messages are being used in the pilot programme as part of a series of interventions to increase knowledge of cervical cancer risk and the importance of screening by encouraging behaviour change among women at risk and enabling and empowering women to access screening services in the district where they reside. Interventions include SMS messages and travel vouchers delivered to participants’ mobile phones to offset costs of public transportation to the cervical cancer screening programme at their local health facility. The results of the implementation of this pilot programme will be forthcoming in 2016.

English Adult Cervical Cancer Prevention Library

1. Hello! Thank you for agreeing to participate in our cervical cancer prevention program. You will now be receiving some important messages.

2. Screening can prevent cervical cancer by detecting changes on the cervix before they turn into cancer! Get screened soon!

3. The closest screening location to you is _______________________. The hours of operations of the screening location are ______________________. Get screened soon! [The blanks will be informed by the participants geolocation at recruitment]

4. Present this code_______________ (5 digit participant ID) at the cervical cancer screening clinic present in the last message to be reimbursed for your travel cost (up to a maximum of__________) (amount depending on location) to that screening visit. [VOUCHER GROUP ONLY]

5. The transportation voucher code in the previous message should be redeemed before April 2nd. Get screened for cervical cancer soon! [VOUCHER GROUP ONLY]

6. Many women die from cervical cancer even though it is almost 100% preventable when detected early! Get screened soon!

7. Screening is underway at ______________(hospital name)! Bring your study registration card and you will be directed to the screening clinic at the hospital. Come get screened!
8. Screening is free and painless, you can have your choice of the sex of the service provider and the results are private. Get screened soon!

9. Women who have early stage of cervical cancer have no symptoms. Get screened to make sure that you stay healthy!

10. If changes are found early, treatment is free and simple. If changes are found later, treatment is more complicated. Get screened soon!

11. Screening capacity has been nationally increased. This greatly reduces your risk of not being seen if you go for screening. Get screened soon!

12. Cervical cancer screening is recommended every 3 years for HIV negative women and every year for HIV positive women. Women should start getting screened at 25 and continue until they are 49.

13. Every woman who has had sex before is at risk for cervical cancer. Get screened soon!

14. Even if you are in a committed relationship and/or have not had sex recently, you are still at risk for cervical cancer! Get screened soon!

15. It is normal to be afraid, but it is good to face your fears and to get screened for cervical cancer. Our well-trained team is at the hospital to help you. Get screened soon!

16. Your voucher for transportation expires in one week! Please take advantage and get screened if you can! [VOUCHER GROUP ONLY]

17. Thank you for participating in this cervical cancer prevention research program. The research has now finished but you can be screened for free at___________(hospital). The regular screening days and hours are ________________.
Annex 3: mCervicalCancer programme and message content from Zambia

The Zambian Department of Health, in cooperation with Be He@lthy Be Mobile, is developing a mobile-based system focusing on reducing cervical cancer rates. In 2015, the Government of Zambia, with support from Be He@lthy Be Mobile, developed a work plan for mCervicalCancer which included plans for the mobile-based programme to be incorporated in its National Cancer Control Strategic Plan, 2017–2021. This step will help to ensure the programme’s sustainability as a core health provider for cervical cancer services. In preparation, the Government, together with WHO and ITU, has developed a systematic evidence-based content library and algorithm. The programme is expected to be launched nationally in 2016 and will aim to reach out to women and the immediate family members of those at risk, as well as improving patient contact with local health workers. The mobile system will alert and educate women aged between 25 and 59 years old, who are most at risk of developing the disease.

English Adult Cervical Cancer Prevention Library

1. Good News! Together we can fight Cervical Cancer by being screened. Women 25 years and above should come for free screening at the nearest clinic.

2. Good News! Cervical cancer can be prevented by early and regular screening. All women 25 years and above should come for screening at the nearest clinic.


4. Health Fact! Did you know that Cervical Cancer is the most common cancer in Zambia? Women 25 years and above should come for screening at the nearest clinic.

5. Health Fact! Human Papillomavirus is the main cause of early changes on the cervix that lead to cervical cancer if left untreated. Get screened!

6. Health Fact! Early screening prevents cervical cancer, women 25 years and above should come for screening at the nearest clinic.

7. Health Fact! Healthy looking women may have changes on the womb without knowing. These changes are treatable. Get screened for Cervical Cancer!

8. Health Fact! Thousands of women die from cervical cancer yearly in Zambia. Yet it is preventable. Come for free screening at the nearest clinic.

9. Health Fact! Over 300,000 women in Zambia have been screened for Cervical Cancer. Be counted! Come for free screening at the nearest clinic.
Case studies from planning a national mCervicalCancer programme in Zambia

Background
Zambia, with a population of 14 million, has the fourth highest cervical cancer rate in the world. Cervical cancer is the most common cancer in Zambia with incidence and mortality rates of 52.8 and 38.6 per 100,000 women, respectively. Zambia is preparing for a national launch of its mCervicalCancer programme by the end of 2016. The preparations for this programme have been ongoing for some time; lessons learnt are outlined below.

Case study on policy and financing
Recognizing the importance of mHealth in supporting the prevention and control of cervical cancer and the need to ensure the programme’s sustainability, the Ministry of Health included a budgeted component on national implementation of the mCervicalCancer programme in its National Cancer Control Strategic Plans for 2015–2016 and 2017-2021. The Strategic Plan serves as the foundation for the national response to the burden of cancer, in line with the Political Declaration of the High-level Meeting of the United Nations General Assembly on the Prevention and Control of Non-communicable Diseases and the Global Action Plan for the Prevention and Control of NCDs 2013–2020. It addresses gaps in cancer management and strives to engage all stakeholders and key players, as well as communities, in cancer-related activities through a well-formulated and coordinated framework. The plan recognises that change can only be achieved through prudent management of available resources, use of innovation and technology, and consistent implementation of cancer-related activities. It further acknowledges the benefits of taking advantage of the strong mobile network coverage in Zambia. The mHealth component in the strategic plan also looks at the importance of partnerships between various stakeholders in the country regarding implementation of the programme, such as the Zambia Information and Communication Technology Authority (ZICTA) and the Ministry of Communications and Transport. It also addresses the need to enhance mHealth capacity and develop or adapt well-designed tools for mHealth implementation, which can lead to a national scale-up of the programme.

The expected outcome of the first phase of the mCervical Cancer programme in Zambia is to increase knowledge of cervical cancer among women in the screening age interval (25–59 years), so that more women access cervical cancer screening services. The programme will achieve this by using text messages to raise awareness and knowledge of cervical cancer. This will include addressing components such as causes and prevention of cervical cancer and access to screening and treatment. The programme is intended to reach 576,000 women (288,000 each year for two years) within the first phase of implementation.

This is a significant step towards the institutionalization of mCervicalCancer in Zambia. It not only recognizes the importance of the mHealth programme in key policy documents, but also ensures the sustainability and government ownership of the programme.

Case Study on monitoring and evaluation
The cervical cancer prevention programme in Zambia started in 2006 with two screening clinics. Currently the country has over 50 clinics nationwide and over 350,000 women have been screened for cervical cancer. A robust monitoring programme currently exists for the national cervical cancer
programme. Women who come in for screening are asked to provide their source of information on cervical cancer. Sources of information can include health care provider, church, friends, family, or mobile phone messages. This information is captured in the cervical cancer national database. The information collected can be used to help plan future awareness programmes and to create focused health promotion interventions that are evidence-based.

To ensure that information on the mCervicalcancer programme is captured, an option has been added that allows women to note “SMS” as a source of information. This will help in the monitoring and evaluation of the women who will come for screening through the mCervicalCancer programme.

Following the completion of the current phase of the programme, an evaluation of the programme will be conducted and possible inclusion in the Health Management Information Systems (HMIS) will then be considered.

Lessons learnt from Marie Stopes International

Background
The Cervical Cancer Screening and Preventative Therapy (CCS&PT) initiative brings together Marie Stopes International Tanzania, Population Services International, International Planned Parenthood Federation, and Society for Family Health, to integrate CCS&PT services into existing reproductive health networks. The objective of the partnership is to scale up the number of cervical cancer screening services available and to provide cryotherapy services to clients who test positive for pre-cancerous lesions of the cervix. By using a partnership model, CCS&PT services can be rapidly scaled up using the existing infrastructure in some of Africa’s most underserved communities. Since 2013, the partnership has been delivering services in Nigeria, Kenya, Tanzania, and Uganda.

Lessons learnt about messaging for cervical cancer prevention
Targeting women in the 30–49 age group and those most at risk
- For a screening programme to be successful it is particularly important to target women aged 30–49 years. This must be reflected in the photographs shown in educational materials.

- Specific targeting of women most at risk might also be required, in addition to general population targeting.

Working with community leaders, doctors and prominent national figures
- Working with members of parliament has proven very effective in getting women to present for screening at mass events. Ensuring high-level political engagement can, however, be difficult where more advanced treatment is not available.

- Working through community health workers can be effective for ensuring a sustained demand for screening services among the community. This approach was used in Kenya to mobilize women for screening through outreach. Community health workers have successfully increased awareness about cervical cancer among women in the community and opinion leaders (chiefs, religious leaders). This approach has ensured constant demand for cervical cancer screening in the intervention districts.

- Radio chat shows with doctors who are well known and respected in the country were effective in improving uptake.
Working with existing structures and groups
- In Uganda, village health teams have been effective in mobilizing women. Similarly in Nigeria, joint work with microfinance groups and church communities has been effective in encouraging women to seek services.

Radio and print materials
- Cervical Cancer prevention is highly sensitive to demand creation. Radio announcements have been an effective way to mobilize women to attend mass screening events.
- All print and mass media messages should emphasize that all women aged 30–49 must be screened and that cervical cancer, if identified at an early stage, is highly treatable. Materials that link cervical cancer to multiple sexual partners, smoking and lifestyle tend to increase the stigma around the disease.
- Materials that are simple and not medically technical are the most effective for encouraging women to present for screening.

Pre-screening counselling
- A strong pre-screening counselling component helps to ensure that the treatment cycle is completed.
- In Nigeria, couples counselling was found to be useful to increase the acceptability of cryotherapy.
- During counselling, the optimum age for screening must be emphasized to discourage women outside the 30–49 age group from presenting for screening.
- In Tanzania, a single visit approach, along with strong messaging about the fact that cervical cancer is highly treatable has led to a 100% treatment rate.

Packaging of services
- Packaging cervical cancer prevention services with other services has been effective in increasing service uptake. In all project countries, cervical cancer prevention has been integrated with family planning services. In Nigeria, packaging with general medical examinations for women has helped to reduce the stigma associated with screening.

Training and post-training follow up
- It is vital to have a critical mass of national trainers for CCS&PT. Tanzania’s partners depended on the small number of national trainers to set up their CCS&PT programme. Population Services International Tanzania is supporting efforts by the Government and stakeholders to increase the number of cervical cancer prevention trainers and widen the pool of national trainers; two members of its staff are now qualified as national trainers.
- Marie Stopes International Tanzania found that an assessment of equipment at the practicum site prior to training is very important to ensure that the available equipment corresponds to the number of trainees.
• Strong and dedicated post-training follow up is required by competent mentors and supervisors to set up high quality CCS&PT services. Post-training follow up and supervision are vital to ensure that providers develop and maintain competency in screening and treatment.

• Immediate post-training follow up is important especially for providers who did not have sufficient opportunity to practice performing cryotherapy during the training. It is also important to equip sites early, so that when newly trained providers return to their sites, they can continue practising until they are proficient.

• All partners found that a critical mass of trainers and supervisors is required for cascading training and post-training follow up. Creating this internal capacity is time consuming and resource intensive.

Other lessons
• Marie Stopes International Tanzania has achieved sustained high positivity rates, which are interpreted as being due to frequent supportive supervision to reinforce skills, infection prevention procedures and data quality management. Nigerian partners have positivity rates of 2.6%. This is consistent with other organizations working in Nigeria, such as the University of Maryland, which has reported similarly low positivity rates of around 3%.

• Partners have also found that the standardized CCS&PT audit checklist has helped to enhance the quality and uniformity of services delivered across all sites.

Lessons learnt from The Queen’s University Office of Global Health mCervicalCancer programme in Tanzania

Background
A randomized controlled trial of 860 women in the Kilimanjaro region of Tanzania has offered encouraging preliminary results regarding the use of behaviour change messages delivered by SMS to increase uptake of cervical cancer screening services. The behaviour change messages, developed through intensive focus groups with screening nurses and women from the community, contained encouragement to seek screening, proximal screening locations and information on cervical cancer risk factors (see Annex 2). Women receiving the behaviour change messages were also randomized to receive a transportation voucher through a text message noting that they would be reimbursed for their transport up to a maximum amount, based on a GPS measurement of where they lived (or were enrolled) and the distance to the screening site (see Annex 2).

Sending 10–12 behaviour change messages, as well as a voucher for return transportation to screening (average value $1.50) resulted in an uptake of 18.9% in urban areas and 14% in rural areas, versus the control group, 5% and 4.2%, in urban and rural respectively. Sending identical behaviour change SMS messages without the transportation voucher yielded an uptake of 13.6% in urban areas and 11.5% in rural areas versus the same control group. It is likely that in a scale-up incorporating the lessons learned, the effects of both interventions (SMS + voucher and SMS alone) would be greater. For analysis purposes, mobile telephone numbers were collected through a household survey concurrently with baseline characteristics. Going forward, the best way to implement the programme would be in a manner in which the participant opted in (through print or media advertisement or SMS blast).
The exponential increase in mobile phone ownership, particularly in low- and middle-income countries, fosters a unique, cost-effective opportunity to overcome barriers (misconceptions, fear, financial constraints) to cervical cancer screening. When recruiting in communities, the project found that women had questions about their reproductive health and would ask the field surveyors either because they do not have anyone else to ask or felt embarrassed to address these issues with a health service provider. Sending behaviour change messaging by SMS to a woman with her own telephone opens a two-way dialogue that allows women a private, comfortable space to ask questions about cervical cancer screening and the ability to talk about barriers that they may be facing.

Lessons learnt about messaging for cervical cancer prevention
Logistical issues that arise when using SMS to educate women about cervical cancer and elicit behaviour change to increase cervical cancer screening uptake

- In a telephone survey among a random selection of participants, the programme found that participants were receiving 50% to 75% of messages. This was most likely due to network issues. In the proxy cases (where the woman provided the mobile number of a family member or relative in the same household), it could also be due to the mobile phone owner not showing the participants the messages as previously agreed. To rectify this problem, important messages were sent multiple times in order to make sure that participants received a satisfactory number (greater than 10).

- It would be wise to have a mechanism to verify the participant’s mobile phone number on site to avoid enrolment mistakes as a result of human error in entering the numbers. While this happens rarely, it is an issue that should be addressed.

- The programme recognized early on that the timing of message delivery is important, depending on the context of the recipient community (rural vs. urban), especially in light of the inclusion of proxy phones: when is the greatest likelihood that the message will be shown to the participant? This is something that needs to be considered in programme implementation or during message piloting activities.

Message Content

- In future, programmes should consider implementing tailored or personalized messages, based on responses to the baseline survey and using participants’ names. Consideration should also be given to implementing two-way messaging and encouraging women to ask questions. Despite the fact that in the Tanzanian research platform the programme was not designed to accommodate this, women would – on a relatively frequent basis – text the programme number or even call the number to seek further information. A way to accommodate this was found once it was noted that it was not a rare occurrence. The messages and calls from participants typically consisted of questions and requests for further information.

- In the research intervention, the team followed the Health Belief Model to help shape the tone of the SMS messages. They learnt that for future programmes they should focus less on targeting the perceived susceptibility and perceived severity of cervical cancer and instead provide more cues to action and focus on building self-efficacy. Greater acknowledgement would be given to the fear that surrounds cancer and hospitals in Tanzania, and efforts would be made to incorporate more messages aimed at reducing those fears. Messages need to have a strong tone of encouragement and focus less on the perception of risk.
Proxy Mobile Numbers

• If the participant uses a proxy telephone, it is advised that the individual who owns the phone be present when the project is being explained. If the owner of the telephone is unaware of the programme, there is a high likelihood that they will not understand why they are receiving the messages and may delete them.
## Annex 5: Example Budget Breakdown

<table>
<thead>
<tr>
<th>Activity</th>
<th>Type of expense</th>
<th>Phase component</th>
<th>Product or outcome</th>
<th>Estimated cost (US$)</th>
</tr>
</thead>
</table>
| **Formulation, design and development** | Capital expense       | Operations management             | • Formative research and successful evidence Review  
• Formation of an informal international experts group  
• Compilation of best practices and lessons learned  
• Assessment of resources/technology available and mapping to needs assessment  |                      |
|                                 |                       |                                  | • Engagement with ministries of health, ICT and local stakeholders  
• Identification and formation of a national m-Health for NCD taskforce  
• Consultation meetings of national taskforce  |                      |
|                                 |                       |                                  | • Country workshop with local and international experts to learn from international experience and finalize project concept and design.  
• Development of programme handbook  |                      |
| **Content**                     |                       |                                  | • Content development + adaptation + focus group’s evaluation for adaptation (to develop culturally appropriate new content prototype for the country (content, level of interaction of SMS, etc.)  
• Focus group meetings to translate content into local languages and modify for cultural acceptability  |                      |
| **Technology**                  |                       |                                  | • Develop/adapt technical platform/solution  
• Develop database for the country  
• Piloting and deployment at country level  
  » Telecoms provider / SMS gateway integration  
  » Multi-language set-up and user language tracking  
• Application maintenance and fine tuning  
• Platform hosting and maintenance  |                      |
<table>
<thead>
<tr>
<th>Activity</th>
<th>Type of expense</th>
<th>Phase component</th>
<th>Product or outcome</th>
<th>Estimated cost (US$)</th>
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</thead>
<tbody>
<tr>
<td><strong>Implementation and support</strong></td>
<td>Capital (one-time expense)</td>
<td>Promotion and recruitment</td>
<td>• Testing technical platform and messages</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Promotion, marketing, preparation of materials to recruit participants</td>
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<td></td>
<td></td>
<td></td>
<td>• Strengthen human resource capacity to effectively implement m-Health for NCD projects</td>
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<td></td>
<td></td>
<td>Operations management</td>
<td>• Train local partners in project design, platform, SMS database, sampling, results framework and evaluation of results</td>
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<td></td>
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<td></td>
<td>• Training in use of mTraining tools</td>
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<tr>
<td></td>
<td>Operational</td>
<td>Promotion and recruitment</td>
<td>• Marketing</td>
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<td></td>
<td></td>
<td></td>
<td>• Patient communication (telecommunications company)</td>
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<td></td>
<td></td>
<td></td>
<td>• Maintenance of infrastructure</td>
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<tr>
<td><strong>Programme management</strong></td>
<td>Operational</td>
<td>Operations management</td>
<td>• Project team (one senior staff, one junior staff and one administrative support)</td>
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<td></td>
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<td></td>
<td>• Miscellaneous (e.g. travel, meetings, communication)</td>
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<td></td>
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<td>• Develop method for data collection and analysis of results, sample size and results framework</td>
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<td></td>
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<td></td>
<td>• Adapt global mHealth impact assessment indicators for country</td>
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<tr>
<td></td>
<td>Capital (one-off expense)</td>
<td>Monitoring and evaluation</td>
<td>• Adapt global mHealth impact data collection instrument for country</td>
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<td>• Develop reporting and analysis module for monitoring and evaluation</td>
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<td>• Develop cost impact assessment model for sustainable financing based on global model</td>
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<tr>
<td><strong>Monitoring and evaluation</strong></td>
<td>Operational</td>
<td>Monitoring and evaluation</td>
<td>• Continuous evaluation and assessment</td>
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<td>• Analysis and reporting</td>
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<td>• Results dissemination</td>
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<td>• Continuous adjustments</td>
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<tr>
<td><strong>Miscellaneous</strong></td>
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<tr>
<td><strong>Total operational expenditure (annually recurring)</strong></td>
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<td><strong>Total capital expenditure (one-time)</strong></td>
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<tr>
<td><strong>Total cost (capital + operational for 1 year)</strong></td>
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