



GCRF demonstrate impact in developing countries: round  
2, phase 1

Project 73108

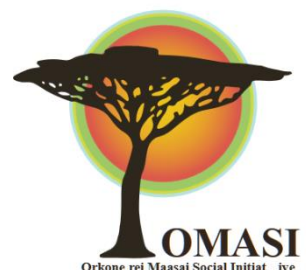
**“Innovative Access to Healthcare for Impact in Remote  
Communities”**

**Tele-Health System Design Priorities**

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# Introduction

Detailed research was carried out into the healthcare system in Tanzania, and more specifically for rural communities around Terat, Tanzania, where our partner organisation is based (See the Community Remote Healthcare Priorities Report). The findings confirmed that there is a need for improved access to a doctor, and that remote consultation technology could provide a potential solution. More in-depth discussions were then held with the Terat doctor, and focus groups, to get feedback on how a tele-health system could fit into the existing healthcare system, and to better understand how communities would react to the new technology. Two remote health clinics were run in Loswaki, a neighbouring village to Terat, where patients could turn up, have their vitals taken, and then video call Dr Tumaini in Terat, with medicine delivered at the end of the health trial as appropriate.

The results of the above activities led to a list of key learnings and functionalities that should be included in a remote healthcare Beta-System going forward. These priorities are described with context in this report, and although the supporting evidence is based on research done in Terat, Tanzania, the findings should be transferable to other SSA rural communities with poor or limited access to healthcare. For each section, we set out the high, medium and low priorities in terms of functionality required for the beta system.

## Telehealth remote consultation Location

Two options:

- At dispensaries where a trained nurse is present to assist with diagnosis.
  - A doctor is present at the Terat dispensary, but the surrounding dispensaries have only a nurse.
  - This is the method preferred by 'CACHA', a group of Canadian doctors who do missions out in Tanzania.
- In remote villages that are serviced by the dispensaries
  - This is the method preferred by the doctor at Terat.
  - Each dispensary services a radius of about 20km, whether or not they have a trained doctor present. The nurses in the other dispensaries treat their dispensary catchment of patients. He did not feel there would be any benefit to patients from other dispensaries calling him as the nurses can usually treat their patients directly, and he doesn't know their patients as well. Patients would still need to travel significant distances to reach a dispensary. It would be better to set up the clinics in the villages furthest from a dispensary (regardless of whether the dispensary is serviced by a nurse or trained doctor), and have them call their nearest dispensary.

### High Priority:

- Be closer to community members than the doctor/nurse giving the remote consultation, in order for journey time and travel costs to be reduced
- Ensure privacy during the consultation - not possible for waiting patients to overhear.
- Internet access sufficient to enable phone consultation
- Power supply consistent to power telecommunications devices and diagnostic equipment, or equipment is able to run for a full telehealth service period on battery power.

### Medium Priority:

- Internet access sufficient to enable video consultation
- Consultation room cleaned regularly between patients

# Doctor Location

The local doctor should be consulted first, as he knows the patients and the most common ailments for people in the area, so is most likely to make an accurate diagnosis. The community members also know and trust their local doctor, and may prefer to see his familiar face to an external specialist.

There is scope for the project to expand to call specialists in the main cities, and for local doctors to call on other experienced doctors, even internationally, for advice during a consultation. However, it is important to keep the system grounded in local knowledge and experience, and to empower local practitioners.

## High Priority

- Involve local doctors and nurses over international doctors, or city doctors.

## Low Priority

- Capability for local doctors/nurses to consult with city or international specialists when required.

# Frequency/Scheduling

This depends on the doctor's availability. Must avoid market day as this is when patients travel into the main town and are more likely to see the doctor in person.

An example would be two days a week, for a few hours each time. The doctor would need to choose whether to ignore all patients that turn up at the dispensary except for emergencies, or whether to try and see a mixture of patients at the dispensary and at the remote clinic. Demand for the service is hard to estimate until a longer-term trial has been run, and it is expected the number of patients may rise as more patients want to see the doctor remotely at their convenience from their village, and about 50% of these patients may then need a follow-up appointment in person. The doctor would prefer that patients turn up and wait to be seen, as is currently done at the dispensary. Patients are happy with this arrangement, but are concerned they may not get seen if the doctor has an emergency at the dispensary, however this could equally occur if they were waiting at the dispensary in person.

Patients would prefer the service to be available all day, everyday, but this is probably not feasible.

## High Priority:

- Remote consultation service must not overwhelm the local doctor on days when he has lots of in-dispensary patients, i.e. on market days.
- Service is available at least once a week in the most remote villages for a few hours
- Drop-in service means patients can turn up and wait to be seen on the days that the service is running.

## Medium Priority:

- Service is available on multiple days a week in several remote villages

## Low Priority:

- Service is available all day, everyday.

# Operatives

Operators should be trained to:

- assist with operating calling technology
- take basic health measurements such as temperature, blood pressure etc.
- first aid training to treat basic wounds
- ethics training to respect patient privacy

Two operators would be needed, one male for assisting male patients, and one female for assisting female patients. This was requested by the community members during focus groups, particularly if the operator is someone from their community that they know. The Terat doctor thought that operator gender should not matter as both male and female patients trust him to discuss their illnesses. So long as the operator is appropriately trained, patients may be happy to confide with them in the same way that they do with their doctor, regardless of the operator's gender. If the patient is especially concerned, the operator could step outside for privacy during the consultation.

The operative not involved in assisting with the consultation would be available to help triage patients on arrival.

## High Priority:

- Operatives able to operate calling technology
- Operatives are able to take basic health measurements, such as temperature, blood pressure etc.
- Operatives received ethics training to respect patient confidentiality, and will give patient privacy during consultation if requested

## Medium Priority:

- Operatives trained in basic first aid to treat wounds and minor emergencies

## Low Priority:

- Operative gender matches patient gender - At least one male and one female operator needed at each telehealth hub

# Language

Patients who do not speak Swahili usually bring a translator, or other village members present would help with the consultation. Hiring an additional translator to facilitate discussion with the doctor would not be necessary.

## High Priority:

- Remote consultation calling point has space for the patient, operator and a translator, if required.

# Diagnosis equipment required

Simple equipment that can be used by a basic trained operator to aid the doctor's diagnosis. This triage step is important in speeding up the consultation process. Digital equipment is preferential to minimise user error in reading the device.

- Thermometer
- Blood Pressure
- Pulse oximeter
- A ruler (to measure wound length)
- Good lighting
- First aid kit (for basic first aid treating wounds)
- Blood glucose meter
- Weighing scales

More advanced/expensive to conduct remotely, and may require significant operator skill:

- Stethoscope
- Audoscopes
- Urine dip-sticks
- Urine pregnancy test

## High Priority

- Digital measurement equipment available to be used by operator with minimal training  
E.g.:

- Thermometer
- Blood Pressure
- Pulse oximeter
- A ruler (to measure wound length)
- Good lighting
- First aid kit (for basic first aid treating wounds)
- Blood glucose meter
- Weighing scales

## Low Priority

- Advanced diagnostic equipment available, requiring significant operator skill to use. E.g.:
  - Stethoscope
  - Audoscopes
- Less frequently required diagnostic tests available. E.g.:
  - Urine dip-sticks
  - Urine pregnancy test

# Patient identification

The doctor knows many of the villagers. Patients are never asked to prove who they are when they come to the dispensary, and there is a large degree of trust. Medicines are prescribed informally. Dr Tumaini believes there is no need to prove patients are who they say they are, especially as he

already knows many of them. It is possible that patient ID may become more important if the patient isn't known to the doctor. This should be investigated further with more rural doctors.

**Low Priority:**

- Processes in place to verify patient identity if the doctor consulted does not personally know the patient.

## Conferencing Platform

- Must be able to video and voice call, while not being too demanding on data requirements (in case of poor signal). Patients prefer video calls for trust/comfort and believe it is necessary for the doctor to make a correct diagnosis. However, if this is impossible due to poor signal, then they would accept a phone call.
- Video cameras should be reversible (i.e. back or front, to show wounds or patients face).
- Must be end-to-end encrypted for patient security and privacy (exact requirements to be verified with the Tanzanian Health Authorities in future work).
- Should also have a platform to record patients names, health measurements (temperature, blood pressure etc.), and arrival time, to be viewed by the doctor in advance of appointment.
- Following the appointment, it should also have the facility to record the medicines prescribed, and costs (would require liaison with pharmacies to include costs, and medicine source - shop or dispensary).

**High Priority:**

- Enable voice calling with low bandwidth internet signal
- Enable video calling with good quality internet.
- Data is encrypted and conforms to in-country security standards for confidential patient data.

**Medium Priority:**

- Enable video calling with low bandwidth internet signal
- Video Camera reversible
- Integrated platform for recording patient data for doctor, pre-consultation. (Name, age, triage measurements).

**Low Priority:**

- Integrated platform for recording medicines prescribed following consultation & estimated cost
- Platform linked with pharmacist and dispensary medicine stocks, to determine cost of medicine to ensure patient has the funds to pay prior to delivery

## Video size

Ideally both the patient and doctor will have a small tablet-sized device for video-calling, to ensure the other person and any wounds/rashes can be more clearly seen.

**High Priority:**

- Video call screen size at least 5.1"

**Medium Priority:**

- Video call screen size at least 7"

## Medical Records

- Doctor to make and keep paper copies of medical records at the dispensary during consultation. Medical records are not stored electronically until being sent to the main hospital where they are scanned in. For the first implementation, it would be easier to keep records on paper, for privacy, cost, and ease of integrating with the existing medical system.
- Operators can make notes for patients if required, although the standard practice is for a patient to simply remember what the doctor has told him/her.

**High Priority:**

- Telehealth system to fit in with existing systems for keeping medical records.

## Prescriptions and Medication

There are no pharmacies in the villages surrounding the Terat dispensary. All pharmacies exist in Terat due to the general requirement for a prescription before medicines can be bought (although this is not enforced outside cities). For patients to get medicines, there are three options:

1. Patients requiring medicines must travel into the main town to buy their medication following the doctor's consultation. A prescription should be given to the patient during the consultation, perhaps in the form of an officially stamped piece of paper (usually it would require a doctor's signature), which they can take to the pharmacy. The disadvantage is that patients would then still need to pay for transport to the town.
2. A pop-up pharmacy is set-up with the Telehealth hub, stocking the main medicines. To stock medicines, you need a license which is given by the district pharmacy. To sell the medicine you need to be trained as a nurse (any one of the three levels of training) and then do another one month training to become a pharmacist. This would require the operator to be significantly more educated, or for a pharmacist to be hired, adding extra cost. This is the patient's preference.
3. Medicine is transported from the pharmacies in the centre of town to the Telehealth hub at the end of the day, or every few hours. Medicine would be sent over on a motorbike, so only one motorbike is required per 5-10 patients, which would reduce transport costs, and

save the elderly patients from needing to make the journey. Medication is packaged with patient names, costs, and usage instructions. This requires significant organisation from the doctor to liaise between the pharmacy at his dispensary, and other private pharmacies if medicines are unavailable. If significant numbers of medicines are transported, the pharmacies may be willing to pay the transport costs. Otherwise the cost of the motorbike could be split between patients. There is a risk patients will not have the correct money, but until the medicine has been sourced from the dispensary (subsidised) or a pharmacy (private) the cost cannot be predicted. The ability to pay should be verified before medicines are sent. (This method was trialled in Loswaki in Feb 2021, and was the doctor's preference.)

**High Priority:**

- Patient is able to obtain medicine following consultation, in their own time. The simplest method of implementing this might be for a prescription to be written by the operator, approved by the doctor, that can be taken to a pharmacist for collection and payment.

**Medium Priority:**

- Patient is able to obtain medicine at the site of the remote consultation, a few hours after having a consultation. (Medicine is delivered from the pharmacies once the required medicines are known, with instructions on use).

**Low Priority:**

- Patients are able to buy and collect medicine immediately following consultation, from telehealth centre medicine stocks.

## Emergencies

Villagers are wary of the usefulness of a tele-health system due to its limitations in the emergency use-case. If the technology is set up and available in a village, there should be a facility to call the doctor in an emergency, at any time, although his ability to help remotely may be limited.

**Low Priority:**

- Telehealth facility can be used in an emergency at any time, to immediately contact doctor for advice

## Costs

It currently costs patients 2,000TZS to see a doctor, and is free if they have health insurance. For a private doctor, it costs 10,000TZS. Patients would happily pay the same for a remote consultation. Due to the additional operators and technology involved in setting up a remote health system, we may want to charge slightly higher for the remote consultation. Most patients pay around 3,000TZS for a motorbike into town, and may be happy to instead spend this on the consultation as it saves them the time and effort of making the journey.

**High Priority:**

- Cost of Telehealth consultation does not exceed the total typical cost incurred by patients when travelling to their local dispensary, combined with the cost of seeing the doctor.



## Other general feedback from focus groups

They particularly like the locality of the service, as making the journey to the dispensary can be difficult for old people and pregnant women.

Community members were often wary of the concept and insisted they needed a hospital. There was the belief that the doctor must see them in real life and take measurements (e.g. blood tests) in order to make a correct diagnosis. However, once having had a remote consultation, satisfaction levels were extremely high, and it is clear that patients simply could not understand the new technology and novel concept.

Emergencies and assistance for pregnant women are a high priority, but the remote health system cannot meet these needs. There were also concerns about the lack of medicines in the local area so patients would still need to travel to obtain medicine (although our final design hopes to meet this need).

There were concerns about the affordability of modern technology, and limitations on power availability and internet signal. When such a system is installed, it would be in conjunction with reliable power sources (e.g. solar) and additional internet signal boosting equipment as required, so this should not be an insurmountable challenge.

They worry that a small pop-up consultation point run by a couple of operators would not be able to provide services to everyone in a large village, and more assistance would be needed. This concern shows the clear demand for the service, as they expect it to become overwhelmed with patients.

Overall, feedback from the remote health trial was extremely positive, showing the potential for such a system if installed more widely.