

## Project Proposal



### The Kashikishi Project

**Improving Patient Outcomes**  
through  
**Strengthening the Quality of Care**  
and establishing a  
**Comprehensive Out-Patient Department**  
at  
**St. Paul's General Mission Hospital in Kashikishi, Zambia**

Project-Region:	Nchelenge District, Luapula Province, Zambia
Project-Duration:	2021 – 2025 (5 years)
Responsible Organizations:	Basel Association for Medical Cooperation (BAMC) SolidarMed (SM) Universitätsspital Basel (USB)
Local Partner-Organization:	St. Paul's General Mission Hospital Kashikishi (SPH)
Project-Budget 2021-2023:	CHF 166,760
Resource Needs 2022:	CHF 89,045
Target Population:	Inpatients and outpatients treated at SPH Hospital Staff (improved working conditions and training)
Project Goal:	Improve patient outcomes at SPH

## EXECUTIVE SUMMARY

**The Kashikishi Project:** Improving patient outcomes through strengthening the quality of care and establishing a comprehensive out-patient department at St. Paul's Hospital

### Background

St. Paul's Hospital is a Level II General Hospital located in northern Zambia; its mission is to provide basic and specialized medical care of good quality to the population in its catchment area in the northern half of Luapula Province, counting 650,000 persons. The challenges SPH faces in providing quality care to its patients are multifaceted; they are partly related to limited resources, for example inadequate funding for sufficient Blood Products to meet SPH needs. However, many challenges are caused or exacerbated by insufficiently organized procedures in the areas of Procurement of Medications/Medical Supplies, Human Resource Management, Patient Management ("patient flow") and Rational Prescribing of Medications.

### Project Description and Aim

The aim of this project is to improve patient outcomes by strengthening the organizational capacity of SPH and by streamlining patient management ("patient flow") along the pathway from first encounter and triage to immediate emergency care, inpatient hospitalization, referral to a specialty clinic, or non-urgent-but-same-day care.

### Action Lines

SPH will improve its Organizational Capacity in the areas of Procurement, Human Resource Management and Rational Use of Medications by establishing standardized procedures consisting of regular teaching, supervision and monitoring. Blood Product availability will be improved by contributing financially to the provincial blood bank so that it can meet demand at SPH. Patient flow will be improved by exchanging knowledge (e.g. in triage, urgent care, non-communicable diseases, etc), by establishing a new "Triage Building", and by renovating and extending the existing Outpatient Department to form "Comprehensive Outpatient Department (C-OPD)" Premises.

### Partnership

This project represents an understanding between SPH and the Swiss partner organizations. The Swiss will offer know-how in its area of expertise, finance Triage and C-OPD premises, and provide financial resources to insure an adequate supply of blood products. The Zambian partners at SPH will address internal processes in order to strengthen Organizational Capacity. The commitment of Zambian partners to improve internal processes is the essential component required to achieve a sustainable outcome.

### Expatriate Medical Doctor

Although organizational improvement is the province of SPH, the expatriate doctor appointed by The Kashikishi Project partners is expected to assist in this internal change process. The expatriate candidate appointed for this project is chosen not only for his or her medical competence, but for a proven ability to work together with the partners and facilitate institutional change. The expatriate medical doctor has been financed by the University Hospital of Basel for the years 2021 through the end of 2022 and is foreseen to continue at least through 2025.

### Zusammenfassung

## Das Kashikishi-Projekt

Verbesserung der Patientenversorgung durch Steigerung der Behandlungsqualität und Einrichtung einer umfassenden Aufnahmestation im St. Paul's Hospital

### Hintergrund

Das St. Paul's Hospital ist ein General Hospital im Norden Sambias und dient als Referenzspital. Diese Institution soll für ihr 650'000 Menschen umfassendes Einzugsgebiet in der nördlichen Hälfte der Provinz Luapula eine medizinische Versorgung von hoher Qualität anbieten. Die Herausforderungen sind vielfältig. Teilweise entstehen Schwierigkeiten infolge einer chronischen Unterfinanzierung des Spitalhaushaltes, wie die Versorgung von Blut und Blutprodukten aus dem Transfusionszentrum der Provinz eindrücklich zeigt; teilweise aber werden Engpässe durch unzureichende organisatorische Abläufe verursacht, wie im Bereich der Beschaffung von Medikamenten und medizinischem Material, des Personalmanagement, der Regulierung der Patientenflüsse oder des rationalen Gebrauchs von Pharmaka.

### Projektbeschreibung und Projektziel

Das Ziel dieses Projekts ist Verbesserung der Patientenversorgung, indem die organisatorischen Prozesse im SPH optimiert und der Andrang der Patienten in sinnvolle Bahnen gelenkt werden: Nach dem ersten Kontakt im Triage-Raum soll ein Patient speditiv zur sofortigen Notfallbehandlung, zur stationären Aufnahme, zur Überweisung in eine Spezialklinik oder zur ambulanten Versorgung gewiesen werden.

### Handlungslinien

Das St. Paul's Hospital wird seine organisatorische Kompetenzen in den Bereichen Beschaffung, Personalmanagement und rationalem Einsatz von Medikamenten mit eigenen Mittel selber durch die Einführung standardisierter Prozesse und in Form von Monitoring, Supervision und regelmäßiger Weiterbildung verbessern. Der Bedarf an Blut und Blutprodukten soll gedeckt werden, indem ein finanzieller Beitrag an die Blutbank der Provinz geleistet wird. Der Patientenfluss wird durch Weiterbildung in medizinischer Triage und Notfallmedizin verbessert. Die Errichtung eines neuen Triage-Gebäudes und die Renovation und Ausbau der bereits bestehenden Objekte schaffen die räumlichen Voraussetzungen für einen geregelten Ablauf. So wird eine umfassende Aufnahmestation entstehen.

### Partnerschaft

Dieses Projekt beinhaltet eine Zusammenarbeit zwischen dem St. Paul's Hospital und den Schweizer Partnerorganisationen. Die Schweizer Seite stellt ihr Know-how in ihren Fachgebieten zur Verfügung und finanziert die Bau-Kosten für die umfassende Aufnahmestation. Des Weitern beschafft sie Geldmittel zur Unterstützung der Blutbank in der Provinzhauptstadt. Die Sambischen Partner optimieren die organisatorischen Abläufe in ihrer Institution. Dieses Engagement der Sambischen Seite stellt für die weitere Entwicklung des St.Paul's Hospital eine ganz wesentliche Komponente dar.

### Aus der Schweiz entsandte Ärztin oder Arzt

Obwohl die organisatorischen Verbesserungen in die Zuständigkeit des St.Pauls Hospital fallen, wird von dem aus der Schweiz entsandten Arzt erwartet, dass er diesen internen Veränderungsprozess begleitet und unterstützt. Die für dieses Projekt ernannte Persönlichkeit wird nicht nur aufgrund ihrer medizinischen Kompetenz ausgewählt, sondern auch aufgrund ihrer nachgewiesenen Fähigkeit, mit den Partnern konstruktiv zusammenzuarbeiten und institutionelle Veränderungen zu fördern. Die Auslandarzt-Stelle wurde vom Universitätsspital Basel für die Jahre 2021 bis 2022 finanziert; eine Fortsetzung ist bis mindestens 2025 vorgesehen.

Übersetzt von Hans-Ruedi Banderet, 28.12.2021

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## List of Abbreviations

7NDP	Seventh National Development Plan	MOH	Ministry of Health
ART	Antiretroviral Therapy	MS	Medical Superintendent
BAMC	Basel Association for Medical Cooperation	MVA	Manual Vacuum Aspiration
BP	Blood Pressure	NCD	Non-Communicable Diseases
CHF	Swiss Franc	NHIMA	...National Health Insurance Scheme
CO	Clinical Officer	NHSP	National Health Strategic Plan
CSE	Clinical Support Expert	NPS	Net Promotor Score
DRC	Democratic Republic of the Congo	OPD	Out-Patient Department
ECG	Electrocardiogram	PHO	Provincial Health Office
FBC	Full Blood Count	PROMS	. Patient Reported Outcome Measures
GDP	Gross Domestic Product	SATS	South African Triage Scale
HA	Hospital Administrator	SM	SolidarMed
HCC	Head of Clinical Care	SPH	St. Paul's General Mission Hospital Kashikishi
HDI	Human Development Index	TB	Tuberculosis
HFS	Health Financing Strategy	TKP	The Kashikishi Project
HIV	Human Immunodeficiency Virus	TRIAGE	Reception / Triage Building
HR4H	Human Resources for Health	UN	United Nations
I&D	Incision and Drainage of Abscesses	UNDP	United Nations Development Programme
iv	Intravenous	USB	Universitätsspital Basel
MD	Medical Doctor	USD	United States Dollar
ML	Medical Licentiate	WHO	World Health Organization
		ZMW	Zambian Kwacha

## Background



Population (07/2021 est.)	19'077'816
Area km <sup>2</sup>	752'618
Official Language	English
Life expectancy at birth (2021 est.)	65.92 years
UNDP HDI ranking (2019)	146 / 189
GDP per Capita (2019 est.)	USD 3'470
Population below poverty line (2015 est.)	54.4%
Population living in rural areas (2021)	54.8%
Birth rate (2021 est.)	35.23 births/1,000 population (rank 17)
Population growth rate (2021 est.)	2.93% (rank 10)
Median age (2020 est.)	16.9 years (rank 220)
Population aged 0-14 years	45.74%

<http://hdr.undp.org/en/countries/profiles/ZMB>

<https://www.cia.gov/the-world-factbook/countries/zambia/>

<https://www.nationsonline.org/oneworld/map/zambia-political-map.htm>

## 1.1 Overview

Zambia is a landlocked country in southeastern Africa, which has earned a reputation for political stability. Since independence in 1964 the country has remained peaceful without major clashes. Government priorities are set out in the Seventh National Development Plan (7NDP) and represent a move to a more integrated whole of government approach to development.

Half of the Zambian population lives in poverty (less than USD 1.9/day). The United Nations Development Program's Human Development Index (HDI) ranks Zambia 146 out of 189 countries with an HDI of 0.584. While this ranking places Zambia in the category of countries with "medium human development", the country suffers from huge inequalities; it has one of the highest inequality coefficients in Africa with nearly half the provinces having a Human Development Index of less than 0.55, which puts them in the category of "low human development".

Kashikishi is part of Nchelenge district which is located in the northern part of Luapula province. On the western border, Luapula River and Lake Mweru mark a natural boundary to the Democratic Republic of the Congo (DRC). The total land mass is 4'900 square-kilometers (km<sup>2</sup>), of which 2'391 km<sup>2</sup> (60%) is comprised of land, 400 km<sup>2</sup> (10%) swamps and 1'231 km<sup>2</sup> (30%) water. Nchelenge has a population of 203'336 people. The population density of 15.1 persons per km<sup>2</sup> is described as "densely rural". Nchelenge district is 250 km from the provincial capital, Mansa, by a tarred road, which ends at St. Paul's General Mission Hospital.

## 1.2 The Health Sector

The Zambian health sector faces multiple challenges. Mortality rates remain very high and can be attributed to, among other factors, poor health seeking behavior, insufficient provision of health services, unequal distribution of quality care and a critical and persistent lack of skilled health professionals. Inequalities in health outcomes remain especially high in rural areas (UN, 2013). The population has a high burden of preventable diseases, particularly HIV, malaria, TB and diarrheal and respiratory illnesses (UNDP, 2016). Additionally, demographic and epidemiological evidence show that disease burden is shifting from communicable to chronic non-communicable diseases (NCD) (Bollycky et al, 2017) such as cardiovascular diseases, cancer, chronic respiratory diseases and diabetes mellitus. This development places an additional burden on countries like Zambia, whose health sector had previously focused their limited human, financial and material resources on acute care of primarily infectious diseases.

Latest figures from the National Health Strategic Plan (NHSP) show that less than 60% of approved clinical health worker positions are currently filled, demonstrating

that the Human Resources for Health (HR4H) crisis in Zambia is ongoing. Zambia's response to alleviating the HR4H crisis is multifaceted. "Task-shifting", or the rational redistribution of tasks among health workforce teams, is a strategy which Zambia has followed. In order to make more efficient use of available human resources, where appropriate, specific tasks are shifted from more highly qualified health workers to health workers with shorter training and fewer qualifications (WHO, 2008), who receive extra training in order to perform specific tasks. As part of the task-shifting approach, the scope of practice for nurses and midwives was expanded in 1997. In 2017 a new model of education was developed to train three types of nurses: regular nurses, midwives, and public health nurses. Furthermore, a new cadre of Clinical Officer (CO) was developed, the Medical Licentiate (ML). ML's can perform not only all the medical tasks of general Medical Doctors (MD), but also surgery.

### **1.3 St. Paul's General Mission Hospital Kashikishi (SPH)**

St. Paul's General Mission Hospital Kashikishi (SPH) is a faith-based institution, founded in 1962 by the Sisters of charity from Schijndel, Netherlands. Currently the hospital is managed by the Sisters of the Little Servants of Mary Immaculate. The hospital is a grant-aided institution under the authority of and financially supported by the Zambian Government and cooperating partners. Associated with the Hospital is St. Paul's School of Nursing and Midwifery that was commissioned in 1972.

The hospital has a bed capacity of 250 beds, of which 175 beds are established, and provides the following wards and departments: Medical, Pediatrics, Surgical & Gynecology, Isolation, Obstetrics, Dental, Out-Patient Department (OPD), Eye Clinic, and HIV/ART Department. Other supportive and technical departments are: Radiology, Physiotherapy, Environmental Health, Pharmacy, Laboratory, and Nutrition. The radiology department has a conventional X-Ray machine and an ultrasound machine.

SPH was upgraded from District-Hospital to a Level II ("General") Hospital in 2017 and since then serves as the reference hospital for three other district hospitals in the northern part of Luapula Province (~650'000 people, including refugees from DRC), although it does not yet meet the formal requirements of a Level II hospital, such as specialist doctors and/or specialist departments in: Internal Medicine, General Surgery, Pediatrics, Neonatology, Gynecology and Obstetrics, Dental Medicine, Psychiatrics and Intensive Care Medicine. SPH is the only institution responsible for providing Level II services in Nchelenge and surrounding districts in the northern half of the province. The next Level II hospital is in the provincial capital, Mansa, at a distance of 250 km.

Already, as a Level I District Hospital, SPH struggled to meet its mandate to provide basic care of good quality to the population in its catchment area. Now as a Level II General Hospital, SPH is mandated to provide not only basic but also specialty medical

care to an expanded catchment area. However, financial, human and material resources have not been augmented sufficiently to enable SPH to fulfill its mission as mandated. Furthermore, the organizational capacity of SPH has not been strengthened to cope with the new increased demands of serving a larger catchment area, managing a larger staff, and procuring more medical materials – in a setting of limited resources, exacerbated by the Covid-19 pandemic.

In 2020 there were 26,849 patient contacts, of which 15,571 were managed as out-patients and 11,278 were treated as inpatients. 2,530 women had in-hospital safe deliveries; of these, 56 were assisted deliveries and 545 required a C-section. 4,733 patients received life-saving HIV-treatment (ART).

#### 1.4 Challenges facing SPH

**Procurement** of essential **medications and medical products** as well as availability of **blood and blood products** is the **first challenge** facing SPH. Although financial constraints play a role, significant improvements could be achieved by more efficient data catchment and procurement practices.

The **second challenge** SPH faces lies in the area of **human resource management**. Firstly, there are **staff shortages due to inability to fill vacant positions**, e.g. specialist medical doctor (“consultant”) positions at SPH which are already financed. The designated staff appointment scheme for SPH as a general hospital consists of: 33 General Medical Doctors (21 Senior Resident Medical Officers and 12 General Medical Officers), 11 Consultant Medical Doctors (specialists), 21 General Clinical Officers, 5 Clinical Officer Psychiatry, 1 Clinical Officer Ophthalmology, 1 Senior Clinical Officer Anesthesia, 1 Dental Surgeon, 1 Principal Dental Therapist, 3 Dental Therapists. These positions are approved and financed. However, since the upgrade to a Level II hospital lies only a few years back, only few of the positions approved and designated have been filled.

The designated staff appointment scheme for a District Hospital, which SPH was before the upgrade to Level II, consisted of: 16 general medical doctors, 4 consultant medical doctors, 4 medical licentiates and 20 clinical officers. Even then, SPH was unable to fill the designated number of staff. As of November 2021, only 5 General Medical Doctors and 12 Clinical Officers (1 of whom worked solely in Anesthesia and 4 are on study leave) were employed at SPH.

Secondly, there are **“artificial staff shortages”** caused by lack of accountability regarding hospital duties and informal organization of vacation leaves. As a result, ward rounds are conducted irregularly and there are temporary shortages of key

personnel. Thirdly, there is a complete **lack of internal training, supervision and teaching** among existing medical staff. A program of continuing medical education within the hospital is minimal. Supervision and training by senior staff of junior staff does not exist.

The **third challenge** SPH faces regards **patient management**. **"Patient flow"** has not been managed adequately to meet the demands of a Level II General Hospital. SPH lacks a system of directing patients along the pathway from first encounter to triage, immediate emergency care, inpatient hospitalization, referral to a specialty clinic, or non-urgent-but-same-day care. Due to irregular medical attendance at ward rounds, discharge of patients is often delayed for days. Furthermore, there are not enough rooms of sufficient size and appropriate location to accommodate different needs and to be able to systematically direct patients to reach appropriate services in a timely manner.

The **fourth organizational challenge** which SPH faces concerns **rational use of medications** and medical products/supplies. Overprescribing and wastage, due to lack of continuing medical education as well as insufficient monitoring, are endemic.

### 1.5 Financing of SPH

The Zambian Health Financing Strategy (HFS) 2017-2027 has developed an essential health care package with primary and preventive health services offered free of charge in primary health facilities. This system is implemented at SPH where all primary and preventive healthcare is provided to patients free of charge. Therefore, SPH has only one source of income, which is a government grant. In order to diversify its financial support, SPH is creating a "high cost department" (private ward, for which patients pay extra), and has been introducing the National Health Insurance Scheme (NHIMA) under which the hospital has started to receive additional funds.

The hospital staff is paid directly by the Ministry of Health (MOH); therefore, filling gaps in the staff appointment scheme will not cause additional costs for the hospital. A disadvantage of centralized staff financing, however, is that SPH loses the option of using performance-based positive and negative incentives to encourage better staff performance, as well as to prevent poor adherence to established working conditions. Unfortunately, repeatedly hospital staff have been paid despite not having reported for scheduled work.

## 1.5 Out-Patient Department of SPH

Currently at SPH the out-patient department (OPD) covers all out-patient services, it functions as “walk-in” clinic for non-severe illnesses, for chronic non-communicable diseases (NCD), for chronic communicable diseases such as HIV and Tuberculosis, as point of care for emergency cases and as admitting office for in-patients. However, there is neither reception desk, triage unit nor admitting office. There is no standardized method of moving patients from one area to another. Patients are neither separated according to contagiousness nor purpose of their visit (chronic specialty care, admission, emergency care, collection of medication, laboratory specimen collection, etc.).

The OPD is staffed exclusively by Clinical Officers (CO). Although Medical Doctors (MD) are assigned on a rotating basis to staff the OPD and supervise the CO's, in practice, the MD's are often not available. The CO's are trained in the management of non-serious primarily, but not exclusively, infectious diseases. However, the training is insufficient to diagnose and manage complex diagnostic cases, particularly NCD's, as well as life-threatening emergencies. Although theoretically MD's should be called in to consult or take over complex cases, these cases may not be recognized by the CO's as such.

Basic equipment is available in the hospital, but not necessarily in the OPD itself: thermometers, BP measuring cuffs, oxygen saturation measuring device, rapid glucose test. There is one ECG available, but currently out of service. As a result, often vital signs are not assessed.

Laboratory equipment for basic analyses is not always functional. As of November 2021, the Full Blood Count (FBC) machine was not functioning. Furthermore, one-way-use cuvettes, which are necessary for the analyses, are frequently lacking, even when the equipment is functional.

A functioning ultrasound and mobile X-ray machine were available. A digital X-ray machine has been approved by the Ministry of Health, but has not yet been procured.

Due to stock-outs in basic medical supplies, syringes, needles, infusion sets, tape, and iv cannulas are often unavailable. Due to stock-outs in medications, essential medications are often lacking.

## 1.6 Supply of Blood Products for SPH

Due to insufficient funding, the provincial Blood Bank in Mansa is unable to collect and deliver enough blood products to serve the needs of the province, including SPH. The capacity in terms of human resources, infrastructure, and knowledge is however present in Mansa. Given sufficient funding, they would be capable of meeting demand.

Blood banks in Zambia are centralized under the authority of the ZNBTS (Zambia National Blood Transfusion Service); only one blood bank is permitted per province. Mansa General Hospital is the sole delegate of this responsibility for the province.

Another reason contributing to insufficient blood availability at SPH is due to inadequate funding and the dramatic devaluation of the Kwacha (ZMW); the cost of fuel is so prohibitively high, that trips to the provincial Blood Bank in Mansa (4 hours' drive by car) cannot be conducted as frequently as necessary in order to transport available blood products to SPH.

## 2 Overall goal, description and specific objectives

### 2.1 Overall goal

The overall goal is to **improve patient outcomes** at SPH by providing basic and specialized medical care of good quality to the population in its catchment area (~650,000 persons). The care provided is available, accessible, efficient, effective and affordable.

### 2.2 Description

This project aims to improve patient outcomes by

- Strengthening the organizational capacity of SPH
- Streamlining patient management ("patient flow") along the pathway from first encounter to triage, immediate emergency care, inpatient hospitalization, referral to a specialty clinic, non-urgent-but-same-day care or hospital discharge

### 2.3 Specific Objectives

#### 2.3.1 Strengthening the Organizational Capacity of SPH

- Procurement procedures are effectively managed so that essential medication and medical products are consistently available
- Human Resources are effectively managed and supervised so that all departments are adequately staffed and routine clinical obligations fulfilled
- Medications are prescribed rationally and usage of medications/medical products is monitored in order to prevent over-prescribing and wastage

### 2.3.2 Ensuring effective and efficient patient management by establishing a Comprehensive Outpatient Department (C-OPD)

A C-OPD will be established in order to manage patient flow effectively and efficiently starting from the point of first contact, providing the following services:

- Reception/triage/admission office to direct patients to appropriate services in a timely manner
- “Walk-in” clinic to treat non-serious, primarily acute, infectious diseases
- Specialty clinics for chronic non-communicable diseases and chronic communicable diseases in order to provide non-urgent specialist care
- Emergency room services to manage urgent/severe cases correctly and urgently

## 2.4 Geographic Focus and Target Population

The project focuses on St. Paul's General Mission Hospital Kashikishi (SPH) and on Nchelenge District (please see: 1.2).

The project's three target populations are:

- 650'000 inhabitants in the catchment area (northern part of Luapula Province) will benefit from improved medical services in SPH
- Approximately 27,000 persons per year, who use SPH services, will receive better quality of care and experience better outcomes
- Staff of SPH will benefit from better working conditions (streamlined and efficient processes, consistent availability of medications and medical products, better equipment) and career development opportunities through on-going training
- Spill-over effect to the rest of the hospital: All in-patient wards (e.g. Pediatrics, Medicine, Surgery, Obstetrics) and service departments (e.g. Laboratory, Radiology, Pharmacy) will benefit from the improved organizational capacity of the hospital as a whole as well as better patient management in the C-OPD, especially concerning “patient flow”. Patients will arrive at their inpatient destination or examination in an orderly and timely manner.

### **3 Action Lines**

#### **3.1 Strengthening the Organizational Capacity of SPH**

##### 3.1.1 Management of procurement procedures

Objective: Medications and medical supplies are consistently available

- Medication and medical supply usage data entered into existing electronic digital system regularly
- Head of Pharmacy supervises, that data are entered regularly
- Head of Pharmacy alerted to impending shortages from digital system and informs Head of Clinical Care and/or Finance Committee directly
- Finance Committee procures medications/supplies before stocked out

##### 3.1.2

##### 3.1.3 Management of blood products

Objective: Blood products are consistently available to meet the need at SPH

- A Memorandum of Understanding among Provincial Health Office in Mansa, SPH, and BAMC is written and signed in which respective organizational and financial responsibilities for blood product collection and delivery are delineated, with the aim of ensuring adequate supply of blood products to SPH in accordance with its needs, while maintaining adequate supply for the whole province. The provision of sufficient blood products for SPH will not come at the cost of supplies for the rest of the province.
- SPH will collect statistics on blood product usage, improve its data management and supervise blood product prescribing practices in order to be able to use blood products more efficiently, procure products on a timely basis, minimize wastage and avoid stock-outs.
- Blood will be delivered by the Provincial Blood Bank in Mansa using a refrigerated vehicle
- Swiss Donor support of the collection and delivery of blood products as part of The Kashikishi Project (TKP) is envisioned for 2022 and 2023
- Long-term financial strategy following termination of TKP to be determined by 3rd quarter, 2022 (consideration of long-term financial support by BAMC)

##### 3.1.4 Human Resource Management

- Head of Clinical Care (HCC) of the whole hospital is appointed. This position is standard for a Level II hospital in Zambia. It exists at SPH and is funded, but

not yet filled. According to the Hospital Algorithm this position is second to the Medical Superintendent (MS). This position is to be filled by the most competent and currently available MD at SPH, as chosen by the Hospital Administrator (HA) and Medical Superintendent. The HCC is responsible for insuring quality of clinical care in all departments by working with colleagues above, parallel and below him/her in the hospital in all departments and wards (e.g. HA, MS, Head of Human Resources, Pharmacy, Clinical Officers (CO), Medical Doctors (MD), Nurses). This doctor is also responsible for Supervision, Training and Teaching at SPH, including Stewardship of medication prescribing practices.

- Head of Human Resources and Head of Clinical Care institute standard, binding procedures in regard to staff leaves and performance of hospital duties (e.g. performing ward rounds at least 5 days per week).
- Appropriate personnel appointed to positions in C-OPD as enumerated below: Head of C-OPD, MD's, CO's, Nursing staff, Administration and Maintenance.

### 3.1.5 Management of "Patient flow"

Objective: Patient flow is managed effectively and efficiently

- Triage system established
  - Prioritization of patients according to their urgency
  - Efficient direction of patients according to their needs
- Standardized collection of data on patient flow (e.g. numbers of patients using different services as shown in patient flow diagrams, Appendix) to guide architectural design and plan the appropriate infrastructure of the Triage Building and the C-OPD Premises. The aim is to plan structures of adequate size and layout which enable proper patient flow and management (see below point 3.2 C-OPD)

### 3.1.6 Management of medication procedures

Objective: Medications are prescribed rationally, wastage is minimized

- Standardized supervision and teaching of MD's and CO's on regular basis
- Standardized supervision by pharmacy of prescribing practices and medication usage on wards and C-OPD
- Return of unused medication to pharmacy

- Standardized communication between pharmacy and medical staff of available medications and impending expiry dates

### 3.1.7 South-South Cooperation within Zambia

This project promotes cooperation between SPH and the neighboring level II hospital within Luapula Province, Mansa General Hospital. Sharing resources, (e.g. blood bank products), human resources (e.g. specialist exchange), knowledge and experience would benefit both sides and potentially reduce costs.

## 3.2 Comprehensive Outpatient Department (C-OPD)

### 3.2.1 Human Resources

Reorganization of existing SPH staff to provide at least one general MD, 2 nurses, 2-4 CO's, one administrator and one person responsible for maintenance of equipment to work regularly in the C-OPD.

#### 3.2.1.1 Expatriate medical doctor (Clinical Support Expert, CSE)

One expatriate medical doctor with experience in Internal Medicine and Project Management to support SPH and the local MD's in the establishment of the C-OPD with the aim of coaching, teaching and guiding, but not replacing, local colleagues. The CSE will therefore work primarily in the C-OPD, but may be deployed to an inpatient ward and to the operating theater as his/her capabilities permit and as needed by SPH. The precise mixture of inpatient, outpatient and supervisory activities is to be determined in good faith by the CSE, HCC and Medical Superintendent. In order to become familiar with the hospital structure and staff, an initial phase of rotating through inpatient wards accompanied by the responsible ward MD, is envisioned. During this introductory phase, the CSE can also begin working in the C-OPD.

In addition to clinical duties the CSE is also expected to conduct activities for The Kashikishi Project: collect data on patient flow, provide interim reports to Swiss partners and participate in organizing monitoring activities (e.g. patient surveys, focus group discussions, performance indicators). The division of work load between clinical and project responsibilities will be defined in the Terms of Reference to be agreed upon by the CSE, SPH and the Swiss Partners.

### CSE responsibilities:

- Establish the triage system and NCD clinic
- Gradually establish the C-OPD processes (e.g. triage system, patient flow from outpatient to inpatient, patient flow to appropriate services, patient discharge) over the course of one year
- See patients' side by side with Zambian colleagues in the C-OPD
- Supervise MD's and CO's working in the C-OPD
- Teach and train a Zambian general doctor to become Head of C-OPD department within 1-2 years
- Train staff in elements of triage and establish appropriate protocols
- Ensure use of national protocols for disease management
- See patients in a specialist NCD-clinic on a regular basis at least several times weekly together with Zambian colleagues
- Collect data regarding patient flow, quantity of patients and types of illnesses being managed in the C-OPD in order to determine the necessity of infrastructure requirements in the future (e.g. expansion or construction of additional C-OPD premises)

#### 3.2.1.2 Head of C-OPD

One Zambian medical doctor to work in the C-OPD and to be trained in:

- Triage system
- Emergency Room medicine
- Care of Non-Communicable Diseases
- Prepare to become Head of C-OPD in 1-2 years
- Head of C-OPD responsibilities:
  - provide leadership of the C-OPD department
  - work in the C-OPD regularly, as much as staffing permits, but presumably at least 3 times per week
  - ensure adequate staffing of C-OPD with nurses, CO's, CL's and MD's. It is envisioned, should staffing permit, that at least one Zambian MD always be present in the C-OPD.
  - Supervise and teach C-OPD staff

### 3.2.1.3 Administrator of C-OPD

One Zambian administrator to be responsible for administrative and financial aspects of C-OPD working under the Hospital Chief Administrator on the one side and in cooperation with the Medical Head of C-OPD department on the other side. This person is also responsible to ensure a working supply-chain of medicinal products, blood products and medication. This is not a full-time position, but rather a part-time function, which should be designated to one person as part of his or her duties.

### 3.2.1.4 C-OPD technical support

One trained person responsible for supervising and monitoring all small equipment. Person to be appointed by the Head of C-OPD in cooperation with the Head of Administration and Medical Superintendent and supervised by the Medical Head of C-OPD. This is not a full-time position, but rather a part-time function, which should be designated to one person as part of his or her duties.

## 3.2.2 Equipment

### 3.2.2.1 Small Equipment

Small Equipment (pulse-oximeter, thermometers, blood pressure cuff, rapid blood sugar, etc.) available and maintained

- Equipment to be located in a safe place
- Correct usage, proper care and cleaning, return to safe place of small equipment under responsibility of appointed person

### 3.2.2.2 Large Equipment

Large equipment available at SPH and in functioning order. Hospital Administrator and Medical Superintendent to determine responsible persons to provide preventive maintenance of large equipment. The Swiss donors are not responsible for financing these items:

- Ultrasound (currently available and functional)
- Mobile X-ray (currently available and functional)
- Digital X-ray machine ordered and approved by MOH in 2020
- Full Blood Count Machine: currently not functioning/non-reparable, new machine has been ordered and approved by MOH

### 3.2.3 Infrastructure

**Triage Building:** A reception / triage building with a well-ventilated waiting room to prevent spread of contagious diseases will be constructed.

**C-OPD Premises:** the current hospital structure will be renovated and extended to accommodate additional rooms for OPD services (i.e. walk-in clinic), treatment, isolation, consultation and emergency rooms.

Supervision of the building process will be conducted internally.

#### 3.2.3.1 "Reception / Triage Building" (TRIAGE)

A new "Reception / Triage Building" (TRIAGE) to serve as triage station shall be constructed in the forecourt of SPH, between the front gate and the existing OPD. The structure will include also the registry, which is currently located in the entrance to the existing OPD. The TRIAGE will be constructed as a solid building with adequate ventilation in order to minimize the risk of contagion by airborne diseases. The structure should allow forward-only movement of the patient and should provide two areas, one for sitting patients and one for lying patients.

Inside the TRIAGE building an initial assessment will take place according to the South African Triage Scale (SATS) (Appendix). This initial triage will assess the severity, urgency and nature of the complaint in order to determine the patient's grade of urgency and to direct the patient to the appropriate service accordingly:

- Severely ill patients -> Emergency room
- Patients needing to attend a specialty clinic (HIV/ART, dental clinic, eye clinic, mother & child-care, NCD clinic, nutrition department, physiotherapy, TB corner, etc.) -> specialty clinic
- Women needing to attend maternity -> maternity
- Patients sent by a health-center to obtain a specific technical service (laboratory-test, ultrasound, X-Ray, etc.) -> respective department
- General walk-in patients -> OPD (to be seen by CO, supervised by MD)

#### 3.2.3.2 "C-OPD Premises"

The current OPD wing of SPH will be renovated and extended as needed to accommodate the new "C-OPD premises" providing: Emergency Rooms, consultation rooms, an Isolation Ward, a Treatment Room (for minor surgical interventions), an Ultrasound room and a room for medical personnel on night duty.

The current OPD premises will continue to harbor consultation rooms for pediatric patients, consultant/specialty-clinics, HIV/ART-Clinic, and Mother/Child-Care. The "TB Corner", currently located in the midst of the OPD, will be relocated to an appropriate location where isolation can be guaranteed. The HIV/ART Clinic will be accessed separately.

## 4 Necessary Interventions

### 4.1 Interventions needing financial investment from Swiss Partners

- Expatriate medical doctor with a degree in internal medicine and experience in project management capable of implementing the project
- Purchase of Small Equipment (see: 3.2.2.1)
- Purchase of a Hemoglobin device with necessary cuvettes
- Purchase of an ECG machine
- Investment in Provincial Blood Bank in Mansa in order to ensure sufficient collection of blood products
- Investment in Provincial Blood Bank in Mansa in order to enable availability and delivery of blood products on a monthly basis
- Investment in SPH laboratory to purchase a refrigerator for blood product storage
- New Building(s): Planning and Construction:
  - "Reception/Triage Building" (TRIAGE) (see: 3.2.3.1)
  - "C-OPD Premises": renovation and extension of existing structure (see: 3.2.3.2)

### 4.2 Interventions SPH will address using its own resources

- Procurement: Improved procedures to ensure consistent availability of essential drugs and medical supplies (see: 3.1.1)
- Blood Products: coordination with Provincial Blood Bank to ensure timely ordering of amount required to meet demand (see: 3.1.2). SPH will collect statistics on blood product usage, improve its data management and supervise blood product prescribing practices in order to be able to use blood products more efficiently, procure products on a timely basis, minimize wastage and avoid stock-outs.

- Human Resources: better organization and supervision to ensure consistent availability of existing staff (see: 3.1.3)
- Rational medication prescribing practices and monitoring of medication / medical supplies usage to diminish overprescribing and wastage (see: 3.1.5)

## **5 Project Impact and Sustainability**

### **5.1 Integration into the Zambian Health System**

The project has been developed in cooperation with SPH and with the Office of the Provincial Health Director in Mansa. It serves the purpose of facilitating SPH's upgrade from District-Hospital to a Level II General Hospital, which was officially announced in 2017, with the overall goal of improving patient outcomes. Furthermore, in 2019, a Letter of Intent was signed by Swiss and Zambian partners, including the Permanent Secretary to the Minister of Health, agreeing to work together on a cooperative project at SPH.

### **5.2 Local commitment**

In a workshop held in June 2021, the major organizational challenges SPH faces, which impair its ability to provide optimum care, were identified. Workshop members comprised: the Provincial Health Office, SPH's medical and administrative leadership, key hospital personnel in medical, nursing, and laboratory departments and stakeholders in the community. Challenges were identified in the areas of Procurement, Human Resource Management, Management of Patient Flow and Rational Prescribing of Medications. SPH developed action plans, a time line and delegated responsible persons to address these challenges. This commitment reflects SPH's willingness to work in partnership with the Swiss donors, to implement improvements within the hospital that it can achieve on its own with its own resources. In return, the donors have agreed to commit financial resources to the projects requiring external funding. This project proposal was drafted during 4 months in 2021 in collaboration with SPH leadership.

### **5.3 Sustainability**

Sustainability is promoted by:

- Local ownership: Working hand in hand with local partners from the first phases of project identification, planning and throughout implementation.
- Integration: Integrating the project into the existing hospital infrastructure within the local, provincial and national hierarchy. Zambian National Ministry of

Health (MOH) and Provincial Health Office (PHO) of Luapula Province have been involved from the start and will continue to play a leading role.

- Health systems strengthening through systematic support of the SPH management, financial and operational teams. Patient outcomes will be improved sustainably only if the hospital as an institution is strengthened sustainably. The focus of this project is on organizational capacity building in the area of improved procurement procedures, human resource management, streamlined management of patient flow, and rational use of medication.
- Planning, supervision and maintenance of technical infrastructure is promoted as part of organizational capacity building.
- Human Resource Development: Improve quality and retention of human resources through better organization, supervision, knowledge transfer, further education and career development.
- Filling two key hospital positions with Zambian staff, who will continue to supervise long-term, as appointed by the SPH administrative and medical leadership:
  - Head of Clinical Care (HCC): The HCC is responsible for ensuring quality of clinical care in all departments by working with colleagues above, parallel and below him/her in the hospital in all departments and wards (see: 3.1.3)
  - Head of C-OPD: One local medical doctor in charge of the the C-OPD to provide leadership, work in the C-OPD on a regular basis, supervise and teach C-OPD staff (see: 3.2.1.2).

## **6 Financing and Implementation**

### **6.1 Financing**

- The expatriate doctor position has been financed by USB through the end of 2022. USB intends to finance this position for at least an additional 3 years (final approval pending, to be determined in 2022).
- Fundraising for project costs will be conducted primarily by BAMC, with SolidarMed offering assistance on a good-will basis.

### **6.2 Implementation and timeline**

- Overall Milestones are enumerated in Chapter 7
- Detailed Milestones are enumerated in the Appendix

### 6.3 Reporting

- Reports will be sent to the supervising partner, BAMC, every 6-months. BAMC will relay the reports to SM and USB.
- The reports will be written by the CSE with input from the “Head of Clinical Care”, Head of C-OPD, SPH Medical Superintendent and SPH Head of Administration.
- Possible additional input may come from the District Health Office and the Provincial Health Office

## 7 Milestones

	2021	2022	2023	2024	2025
<b>Project Organization</b>					
Clinical Support Expert (CSE) working at SPH					
Problem-Analysis by the CSE					
Workshop with Stakeholders					
Definition of Project Goals					
Writing of Project Proposal					
Fundraising					
Funds approved					
<b>Infrastructure: Construction Triage and C-OPD Buildings</b>					
<b>Phase I: pre-Planning</b>					
Determine building location					
Determine usage and dimensions					
<b>Phase II: Planning</b>					
Professional architectural planning					
Choice of construction company					
Data collection in C-OPD to determine future infrastructure needs					
Evaluation of collected data: infrastructure needs determined					
<b>Phase III: Construction</b>					
Construction Triage Building (TRIAGE)					
Furniture and equipment for TRIAGE acquired and installed					
Renovation of old OPD for use as C-OPD Premises					
Furniture and equipment for C-OPD acquired and installed					
Extension of old OPD/new C-OPD Premises as determined 2023					

<b>Organizational Capacity Building: Human Resources</b>					
<b>Medical Doctors (MD)</b>					
Clinical Support Expert (CSE) 1 (expatriate MD)					
Clinical Support Expert (CSE) 2 (expatriate MD)					
Clinical Support Expert (CSE) 3 (expatriate MD)					
Head of Clinical Care (HCC) in office					
Zambian Specialist at SPH					
Swiss doctor-in-training (12 or 6-month cycles/year)					
MD/CO vacation and local leaves organized					
<b>C-OPD (Patient Flow)</b>					
Head of C-OPD in office					
Administrator of C-OPD in office					
CSE teaches/coaches MD's in C-OPD					
Triage System implemented					
Emergency Room functioning					
NCD clinic functioning					
Triage services functioning in new building					
<b>Organizational Capacity Building: Blood Supply</b>					
Situation/Cost Analysis for Luapula Province & SPH					
Working Paper with aims, activities and budget					
Blood supply: Memorandum of Understanding signed					
Blood collections at provincial level improved					
Blood availability at SPH improved					
<b>Organizational Capacity Building: Procurement of Medication &amp; Medical Supplies</b>					
Current national data entry system available and in use					
Data entry of medication/products consumption consistent					
Regular supervision by pharmacy of medication use					
Unused medication at discharge returned to pharmacy					
Regular communication of shortages to Finance, MS, & HA					
Stock-outs of medications/medical supplies reduced					
Medication/supply shortages reduced thru less wastage					
<b>Organizational Capacity Building: Rational Prescribing of Medication</b>					
Zambian National "essential drug lists" in place					
National protocols are in place and in use					
HCC: teaching/supervision among Zambian staff					
CSE: know-how transfer re: rational drug prescribing					
Shortages of medications reduced thru rational prescribing					

## 8 Responsibilities of the Project Partners

BAMC, SM and USB divide and share responsibilities. Responsibilities may change during the implementation period.

Partner	Responsibility	Contact
USB	<ul style="list-style-type: none"> <li>• Leadership of the Swiss Steering-Committee „The Kashikishi Project“</li> <li>• Recruitment of CSE together with BAMC</li> <li>• Financing of CSE deployed to Kashikishi</li> <li>• Contact ad hoc for specific medical topics</li> <li>• Support in project development</li> </ul>	Prof. Manuel Battegay  Prof. Niklaus Labhardt
BAMC	<ul style="list-style-type: none"> <li>• Project development in coordination with SPH</li> <li>• Project implementation in coordination with CSE</li> <li>• Ensure cooperation and coordination with SPH concerning the mission of the CSE</li> <li>• Organize accommodation for CSE in Kashikishi</li> </ul>	Dr. Jody Stähelin Dr. Roland Dürig Dr. Hansruedi Banderet
SM	<ul style="list-style-type: none"> <li>• Administrative responsibility for the CSE</li> <li>• Facilitation of national contact within Zambia</li> <li>• Support in project development</li> <li>• Consultant concerning construction of new buildings through “Houses for Health”</li> </ul>	John Tierney (Zambia)  Patrick Thomas (Switzerland)
SPH	<ul style="list-style-type: none"> <li>• Participation in project development with BAMC</li> <li>• Implementation, supervision and monitoring of internal organizational capacity building</li> <li>• Appointment of the “Head of Clinical Care”</li> <li>• Appointment of the Head of C-OPD</li> <li>• Administrative responsibility</li> </ul>	Dr. Luc Kambale Kamavu  Sr. Honester Tambatamba
PHO	<ul style="list-style-type: none"> <li>• Participation in development, implementation and supervision of the project</li> <li>• Collaboration concerning blood supply and procurement</li> </ul>	Dr. Peter Bwalya  Dr. Danny Katongo

## 9 Monitoring and Evaluation

### 9.1 Monitoring, Evaluation and Learning

This project aims at improving both patient satisfaction and objective health outcomes. To assess progress, challenges and success, the project will be monitored regularly, and evaluated at baseline, during and upon completion of implementation to evaluate the impact of organizational capacity building (procurement, HR, rational medication use), the newly established C-OPD and improved availability of blood products.

#### 9.1.1 Monitoring

- Milestones will be monitored according to the schedule proposal but at least semi-annually
- Cost-controlling will be conducted upon reaching a specific milestone but at least annually

#### 9.1.2 Evaluation

- Methods to assess the quality of services will be introduced:
  - Patient Reported Outcome Measures (PROMS)
  - Net Promotor Score (NPS)
  - Quantitative surveys
  - Qualitative surveys
  - Exit interviews
- A set of key performance indicators will be followed up over time

#### 9.1.3 Learning

In order to facilitate learning:

- Schedule semi-annual exchange with USB/BAMC/SM
- Schedule stakeholder meeting annually to assess progress

## 9.2 Key Performance Indicators

In addition to the Milestones, the following indicators will be monitored regularly, at least semi-annually:

### 9.2.1 Quantitative Indicators

- Availability and stock-outs of Essential Medications (see list in Appendix)
- Availability and timely delivery of blood products
- Availability and stock-outs of key materials: Infusion / Injection materials (cannulas), Suturing materials
- Case Fatality Rate (CFR) of selected illnesses (see Appendix)
- Total inpatient mortality rates (see Appendix)
- Inpatient duration for selected illnesses (see Appendix)
- Number of outpatient consultations per age-category and gender and patient group (see Appendix)
- Surveys of patient satisfaction

### 9.2.2 Qualitative Indicators

- Focus group discussions with patients
- Focus group discussions with stakeholders

## 10 Project Partners

### 10.1 Basel Association for Medical Cooperation (BAMC)

Knowledge is an important factor for the improvement of health and health services. Our first priority is to promote an exchange of knowledge. We help partners abroad by supporting existing medical facilities such as hospitals, rehabilitation centers, and health centers by organizing professional education, seminars, and practical training on-site. Financial and material support is an important, but secondary, part of our work: BAMC finances housing for health care workers, as well as invests in hospital infrastructure and maintenance projects (e.g. solar energy, water and sanitation, etc). Our projects are developed in close collaboration with local authorities and partners, with the aim of building local capacity. A sustainable improvement in health care is the goal of this collaboration.

## **10.2 Universitätsspital Basel (USB)**

Universitätsspital Basel (USB) has been involved in important partnerships with countries in Africa over many decades and plays a major role in these cooperative endeavours. Currently it supports different core programs, which are not to be considered to be aid programs, but rather programs for „mutual learning for change“. The goal of these programs is to create a gain in knowledge for both North and South by means of mutual learning in areas relevant for health development.

## **10.3 SolidarMed (SM)**

SolidarMed aims to improve the health of 2.5 million people in Lesotho, Mozambique, Tanzania, Zambia and Zimbabwe by improving selected medical facilities and training local health personnel. Our health programs are developed in close cooperation with local hospitals, health centers, partner organizations and health authorities, facilitated by our on-site health experts.

In Switzerland and Liechtenstein SolidarMed generates awareness for the medical needs of the people in rural Africa. As a Swiss non-profit organization with Zewo-certification SolidarMed works efficiently, conscientiously, and transparently. SolidarMed reviews all projects continuously concerning their effectiveness and improves them appropriately.

## **10.4 St. Paul's General Mission Hospital Kashikishi (SPH)**

St Paul's General Mission Hospital Kashikishi (SPH) is a faith-based, grant-aided Level II hospital with a capacity of 250 beds, situated in rural Nchelenge district, Luapula province, Zambia. SPH is supported by the Zambian Government and cooperating partners.

SPH serves as a Level II reference hospital for three other district hospitals in the northern part of Luapula Province, with a population of ~650'000 people. SPS also serves as a Level I District hospital for the immediate surrounding district, Nchelenge, with a population of ~200,000.

## 11 Appendix

### Availability and stock-outs of Essential Medications

- Malaria: Artesunate, CoArtem
- Antibiotics: Amoxicilline, Azithromycine, Ceftriaxone, Ciprofloxacin, Cloxacilline, CoTrimOxazole, Doxycycline, Gentamicine, Metronidazole
- Anti-Mycotics: Fluconazole (oral and injectable)
- Anti-Parasitic medication: Albendazole, Ivermectine, Praziquantel
- Anti-Pyretics: Diclofenac (injectable), Paracetamol
- Maternity medications: Magnesium Sulfate, Misoprostol, Oxytocin, Phytomenadione, Tranexamic Acid
- NCD medications: Acetylic-Salicylic-Acid, Amiloride/HCT, Amlodipine, Atorvastatine, Bisoprolol, Dexamethasone, Enalapril, FeSO<sub>4</sub>, Glibenclamide, Insuline lente/mixed/soluble, Metformine, Nifedipine, Omeprazole, Phenobarbitale, Prednisone, Furosemide.

### Case fatality rate

*(Baseline for children under 5 years)*

Condition	2018	2019	2020
Malaria	04.9 %	08.3 %	05.7 %
Anemia	13.2 %	12.6 %	14.1 %
Diarrhea	08.1 %	06.1 %	04.2 %
RTI Non-Pneumonia	11.0 %	18.9 %	04.3 %
Severe Malnutrition	17.0 %	19.8 %	17.6 %

### In-patient duration for selected illnesses

*(Baseline for Pediatrics ward)*

Condition	days
Malaria	8
Anemia	4
Diarrhea	3.5
RTI Non-Pneumonia	3.5
Severe Malnutrition	12

### Mortality rates for the total admission and total deaths

Mortality Rate	2018	2019	2020
Mortality Rate per 1'000 population	89.2	72.8	68.5

### Number of Outpatients consultations per age-category

Period	<1 year	1-4 years	5-14 years	>=15 years
Jan to Mar 2018	247	292	367	1960
Apr to Jun 2018	225	267	209	1891
Jul to Sep 2018	233	241	221	695
Oct to Dec 2018	240	251	106	411
Jan to Mar 2019	262	350	374	2177
Apr to Jun 2019	268	368	492	2357
Jul to Sep 2019	270	345	444	2357
Oct to Dec 2019	282	248	311	2408
Jan to Mar 2020	565	803	801	3084
Apr to Jun 2020	490	807	809	3067
Jul to Sep 2020	856	868	964	3412
Oct to Dec 2020	407	521	562	3112
Jan to Mar 2021	436	437	551	2496
Apr to Jun 2021	494	535	681	3684