INTERNSHIP AT CMED HEALTH LTD.

AHANAB HAQUE AKIB

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An internship report submitted
in partial fulfilment of the requirements
for the degree of
Bachelor of Science in Computer Science and Engineering

UNIVERSITY OF LIBERAL ARTS BANGLADESH
Dhaka, Bangladesh

April 2020

DECLARATION

I declare that this internship report entitled “INTERNSHIP AT CMED HEALTH LTD.” is the result of my own research except as cited in the references. The report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature :

Name **:** AHANAB HAQUE AKIB
ID **:** 161014037
Date **:** April 23, 2020

CERTIFICATE OF APPROVAL

The internship report entitled "INTERNSHIP AT CMED HEALTH LTD." is submitted to the Department of Computer Science and Engineering at University of Liberal Arts Bangladesh (ULAB) in partial fulfillment of the requirements for the degree of Bachelor of Science**.**

Dated: April 2020

Dr. Md. Abdul Mottalib
Professor & Head of Department
Computer Science and Engineering
University of Liberal Arts Bangladesh

Signature & Date

Dr. Farhana Sarker
Assistant Professor and Course Coordinator
Computer Science and Engineering
University of Liberal Arts Bangladesh

Signature & Date

DEDICATION

To my lovely parents, who gave me endless love, trust, constant encouragement over the years, and for their prayers.

To my mentors and peers for their patience, support, love, and for enduring the ups and downs during the completion of this thesis.

This internship report is dedicated to them.

ACKNOWLEDGEMENT

Firstly, I express my heartiest thanks and gratefulness to Almighty Allah for his divine blessings that made me complete the final year internship successfully.

I owe my gratitude to many people, both in University of Liberal Arts Bangladesh and CMED Health Ltd. First, I express my gratitude to University of Liberal Arts Bangladesh and Department of Computer science and Engineering for providing me opportunities to learn and grow.

I would like to express my gratitude to Dr. Md. Md. Abdul Mottalib, Head of the Department for providing me the chance to do the internship.

I am really grateful and owe my profound indebtedness to Dr. Farhana Sarker Assistant Professor and Course Coordinator, Department of Computer Science and Engineering. Her endless patience, scholarly guidance, continuous encouragement, constant and energetic supervision, constructive criticism, valuable advice made it possible to complete this internship.

Also my sincere gratitude to my industry supervisor Habibur Rahman and rest of the CMED staff for their support and guidance which helped me to overcome the challenges I faced during the past three months at CMED

ABSTRACT

The internship report in “Internship at CMED Health Ltd” explains my three-month experience in my hosting company CMED Health Ltd. The content of all chapters is broadly explained, and it is constructed from the practical & technical knowledge I have gained during my internship period.

In the opening chapter I have explained why I chose an internship over project/thesis & explained some of the major objectives of the report to fulfill my requirements of the internship. Then in the second chapter, I described the company background including all the details of the company in terms of reader can easily know and access the company.

During my internship at CMED Health Ltd. I got assigned to Software testing of “ENRICHed SASTHO” mobile and web application. It is a community health and survey project of Palli Karma-Sahayak Foundation (PKSF), Bangladesh. I’ve also had participation in “Corona Module” project. In addition I’ve worked in swagger to test for data mismatch and API structure for multiple projects including “Tottho Apa”, “CMED agent”, “ENRICHed SASTHO” etc.

The report also describes the other co-curricular skills I have achieved throughout my internship period.

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CHAPTER 1

INTRODUCTION

Internship is a way to explore the professional world and expand a student's skills to learn how everything works apart from academic knowledge. Internship provides him/her to enter into a particular career field. It offers a great opportunity for an undergraduate student to explore his knowledge. I choose internship over other choices because my career goal is to work on an engineering field and for that practical experience is a must. Fortunately, I got the internship in CMED Health Ltd to fulfill my career goal. I believe that my involvement at CMED Health Ltd as an intern was not only enriched my career but also increased my ability to effect progressive change everywhere and make a valuable influence in the field of Software engineering.

Why Internship

Here are just a few reasons why internship is important for me to shape my future:

i. Real-world experience: Joining a company as an intern gives the opportunity to work in a professional environment.
ii. Networking: Internship regularly offers the chance to go to gatherings and occasions. By associating with experts, I will have the option to increase new associations and figure out how to convey in an expert situation.
iii. Resume Builder: As a college understudy I know the significance of a solid resume. Without a strong resume it tends to be harder to be considered for an occupation position. Entry level positions are vital to building experience as an understudy or late alumni.
iv. Time Management: Time management is vital in every circumstance whether I am attending meetings, finishing tasks on deadlines, making phone calls, etc.

when working in a fast-paced professional environment, I will be able to learn that every minute counts.

v. Career Foundation: Internships provides the building blocks a student need for his future. Many internship opportunities help set the foundation for one's career. It will help me to focus on pursuing my career & to work in a field that I am interested in. [1]

Objectives of the report

The major objective of the report is to fulfill the partial requirement of my Bachelor degree in Computer Science and Engineering. This report describes my internship experience at CMED Health Ltd where I achieved practical work experience, learned various technologies used in software companies.

Arrangement of the report

This report is the outcome of the internship work and experience gathered during the time of my work at CMED Health Ltd. as an intern in the Software Development department. The report will be focused on my assigned tasks and projects which are:

i. Software testing of ENRICHed SASTHO mobile/web application
ii. Software testing of Corona Module.
iii. Working in swagger.

CHAPTER 2

COMPANY PROFILE

2.1 CMED Health Ltd.

CMED developed multiple smart monitoring system for necessary health checkup. CMED developed and used different types of health check-up devices that can be connected to a smartphone and the collected data can be secured in a cloud server. The users of these devices can get their health check-up data immediately. With the help of smartphone and CMED also generates health records that will help doctors to minimize diagnostic time and to give better treatment.

2.1.1 Impact of CMED

CMED uses a cloud-based smart health monitoring system, consists of a portable smart monitoring device and a Smartphone Application. Unlike the existing devices, CMED devices keep records of the user's data automatically. These devices also give suggestions to the users to see the Doctor immediately when their health condition is at risk. At this current stage, CMED devices can monitor Blood Pressure, Blood Glucose, Pulse, Blood Oxygen Saturation (SpO2), Body Temperature, Weight, Height and Body Mass Index (BMI). With inclusion of this monitoring system CMED is designed to reduce the risk of life-threatening diseases like stroke, heart attack etc. Community Health Workers can also play a vital role in the rural areas by using CMED.

2.1.2 Program Overview

CMED Health Limited aims to create a healthy workforce from Hire to Retire by providing preventive healthcare service to workers/employees through Workforce Wellness Program. This program has been designed to create awareness regarding Non-Communicable Diseases and promote healthy lifestyles within the workforce. CMED will provide the technical and medical supports where the employer will assign a representative to oversee the program. [2]

Table 1: Company Profile of CMED Health Ltd.

Feature	Information
Name of the company	CMED Health Ltd.
Logo	
Slogan	i) Monitor Your Health, Stay Healthy ii) Your Health Status on Your Fingertips iii) Connecting People, Saving lives
Legal Structure of the Company	Private Limited Company
Corporate Office	Apt# C-5, House# 761, Safura Green, Satmasjid Road, Dhanmondi, Dhaka-1209
Website	https://cmed.com.bd/
Email Address	info@cmedhealth.bd
Phone no.	(+88) 017 42 92 5686, (+88) 015 58 24 1551
Chairman	Dr. Khondakar Abdullah Al Mamun
Managing Director	Dr. Farhana Sarker
Partners	ICT Division, a2i ,DGHS, Startup Bangladesh, HelpAge International, Diabetic Association of Bangladesh, Grameen Phone, Maya Apa,

	SeedStars World, bKash , Nogod, ASA, PKSF , DGDA , Pragati life insurance, United International University, AIMS Lab
Year of establishment	2016

2.1.3 Department

CMED Health Ltd has four Major Departments according to their business and technical requirements:

i. Finance & Accounts
ii. HR & Admin
iii. Market & Sales
iv. IT & Technical

The whole organogram of CMED Health is shown below [3]:

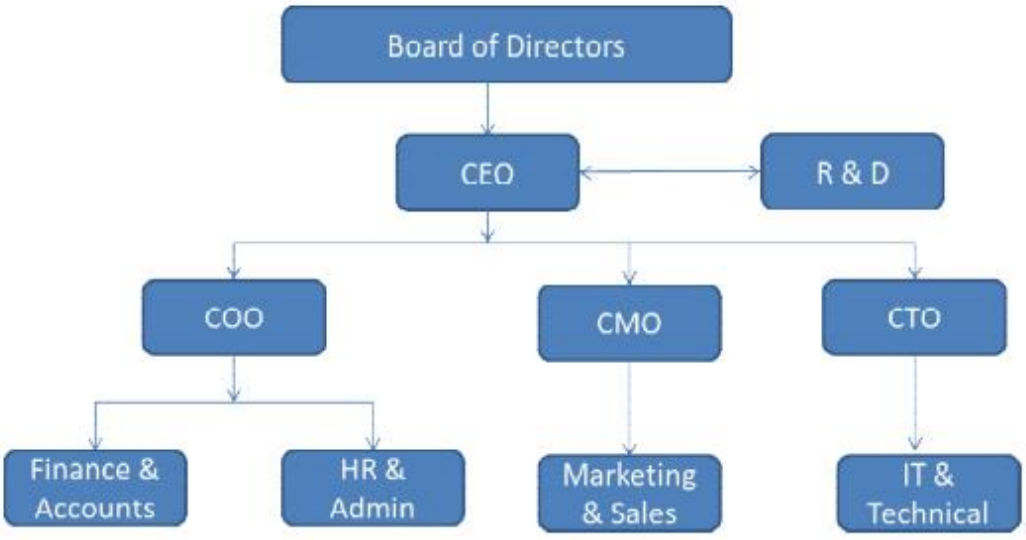


Figure 2.1: CMED Organogram

2.1.4 Mission of CMED

i. To categorize employees' health status as Healthy, Alarming/At-risk and Emergency, based on measurement of vital signs by creating personal health account.
ii. To keep health records for every employee by maintaining a health account and to provide doctor's consultation to those who need immediate attention.
iii. To provide information about the risk factors of die rent NCDs through counseling.
iv. To reduce health risks through preventive healthcare service every month.
v. To develop a sense of healthy lifestyles and prepare healthy diet plans for the employees.

2.1.5 Vision of CMED

The vision of CMED is safeguarding the right to health in workplaces and reduction of health risks within the workforce due to Non-Communicable Diseases (NCDs) all over the country. [2]

2.2 CMED Products

CMED has various products to check your health.

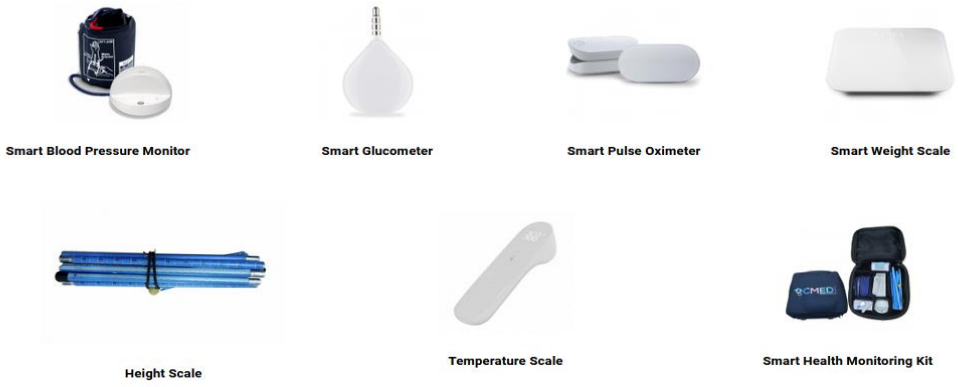


Figure 2.2: CMED Products

2.3 CMED Services

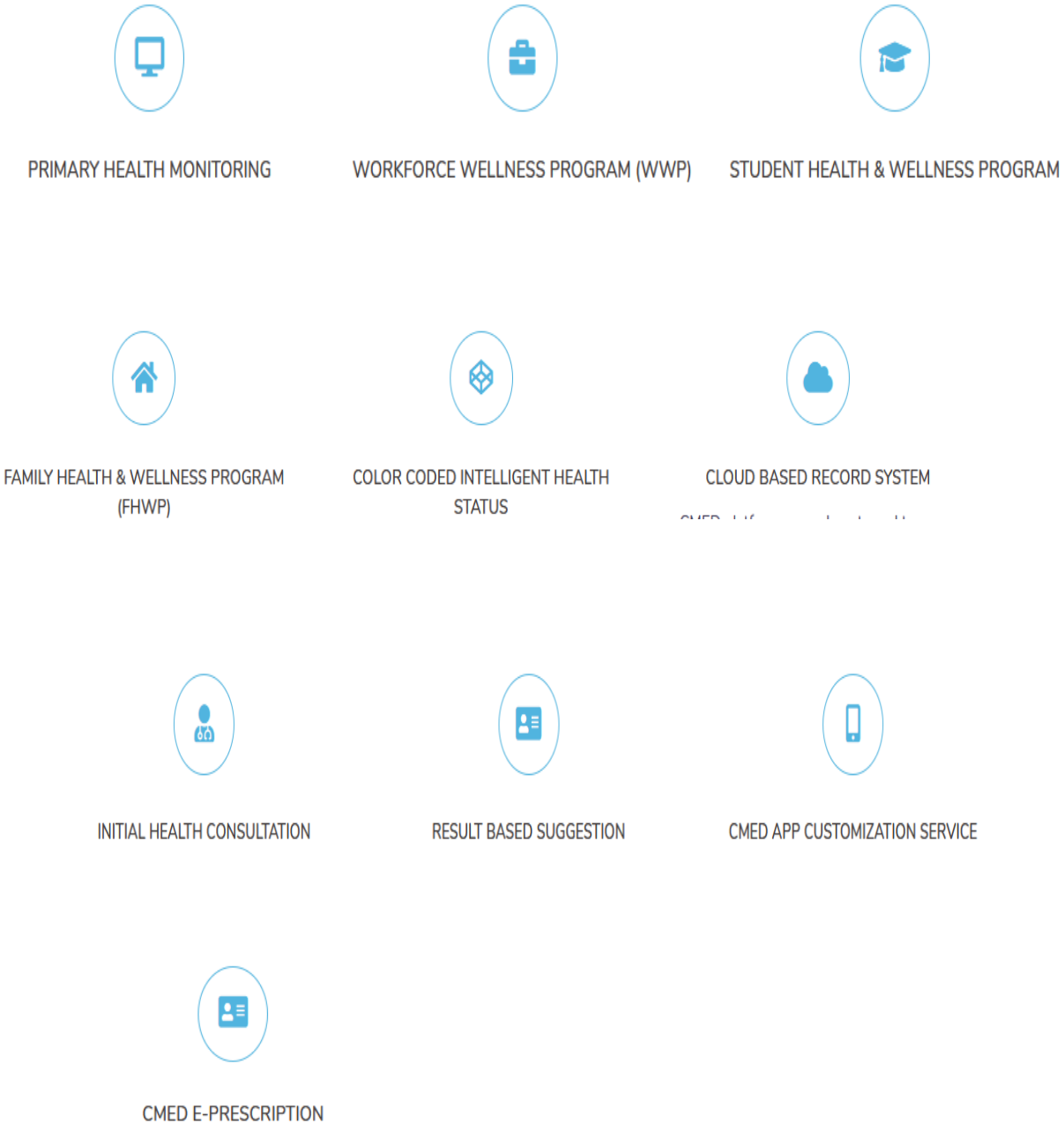


Figure 2.3: CMED Services

CMED Health service includes these offerings to their customers and wellness programs. All of the below tests can be measured through the CMED app with the smart devices.

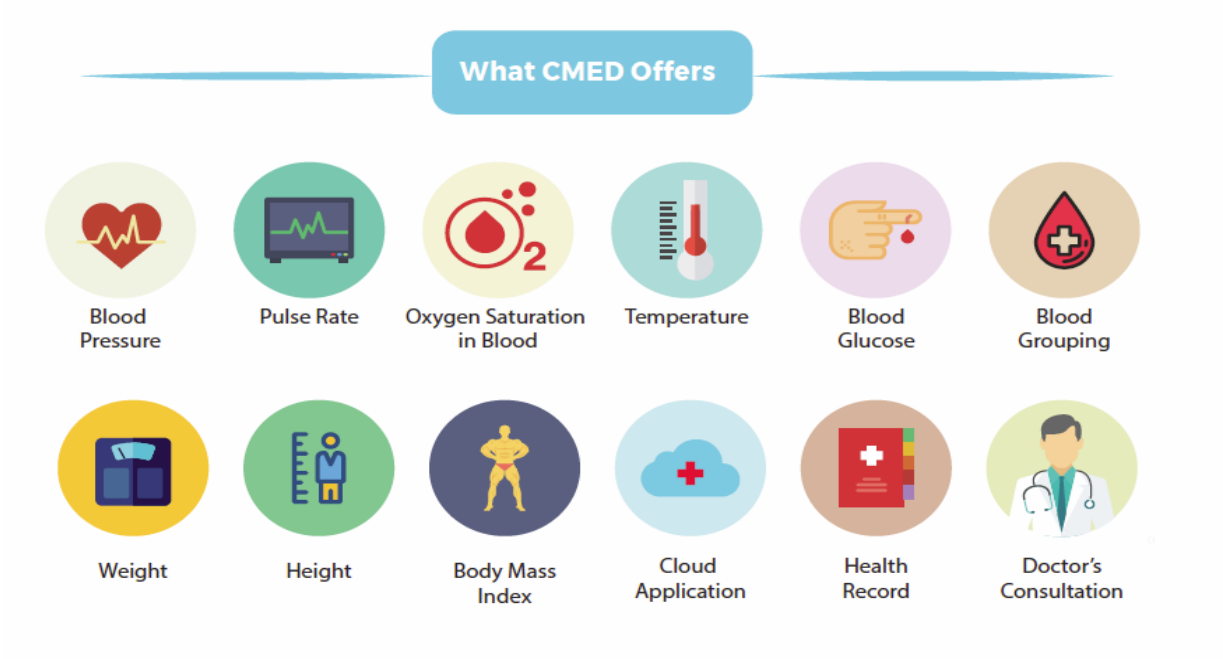


Figure 2.4: Health measurement offered by CMED

2.4 Awards and achievements

i. In this short period of time, CMED got quite a big recognition by winning startup awards such as.
ii. Awarded BDT 10, 00,000 innovation fund by ICT ministry of Bangladesh.
iii. Graduated from GP Accelerator Program (2nd batch).
iv. Received USD 10,000 FB start package from Facebook.
v. Won 1st Place at Seedstars Dhaka 2017
vi. Won 1st place at Basis national ICT awards 2017
vii. Participated in different ICT fairs and events in Dhaka.

CMED also got ISO, FDA, CE certifications for their products which is also a big achievement. CMED got into the eye of Media also as CMED was featured in multiple news source including The daily star, Somoy, The daily observers, Daily sun etc. [2]

Figure 2.5: Awards & Certifications

CHAPTER 3

WORKING PROJECTS

During the period of my internship, I got assigned to several tasks in two major projects; ENRICHed SASTHO and Corona module. In this chapter I will explain the projects I am involved in.

3.1 ENRICHed SASTHO

3.1.1 Project background

Health problem is one of the major problem in current world and absence of healthcare centers and doctors or healthcare experts makes it harder. This problem is more severe in developing countries where populace progression is advanced and health experts are hard to find. With the growing population and diversity of health problems; a smart, automated and secured cloud based regular health monitoring system is a possible appropriate solution for developing countries like Bangladesh. ENRICHed SASTHO focuses on the health monitor of rural areas.

The Palli Karma Sahayak Foundation(PKSF) , It's 52 partner organization, 51 coordinator, 94 health officers and 633 health visitors came together to take part in ENRICHed SASTHO project. This project is going to help take the necessary health measurements and collect survey in the rural areas of Bangladesh. Total 1086 villages in Bangladesh will be served under this project.

ENRICHed SASTHO helps taking necessary health measurements of blood pressure, glucose, temperature, oxygen saturation, BMI from each household member. Also the

project will collect survey data on some necessary elements like if the household has access to safe water, sanitary latrine, electricity etc. With the collective data on the number of sick people of an area, this project can help the government focus on what type of medicine and healthcare is necessary in which area.

3.1.2 Technologies Used

Technology used for both ENRICHed SASTHO and Corona module are,

Design: Adobe Xd Full layout design, prototyping presentation sharing, Adobe Illustrator For Icons and other visual assets.

Web Frontend: HTML, CSS, Angular, Typescript, Javascript, Chartjs, Bootstrap, Google font api etc.

Mobile application: Java, Kotlin , Retrofit, glide, Gson library.

Backend: Spring boot, Spring security Oauth2, Mysql, JWT etc.

3.1.3 Project Design

3.1.3.1 Mobile application (Android) features and UI:

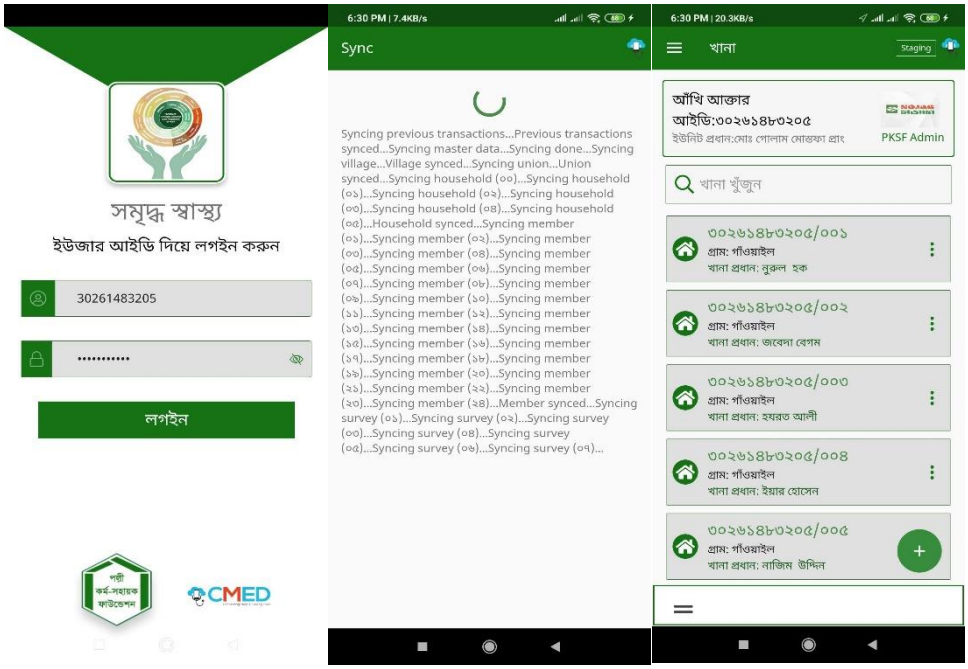


Figure 3.1: Login Page, Homepage

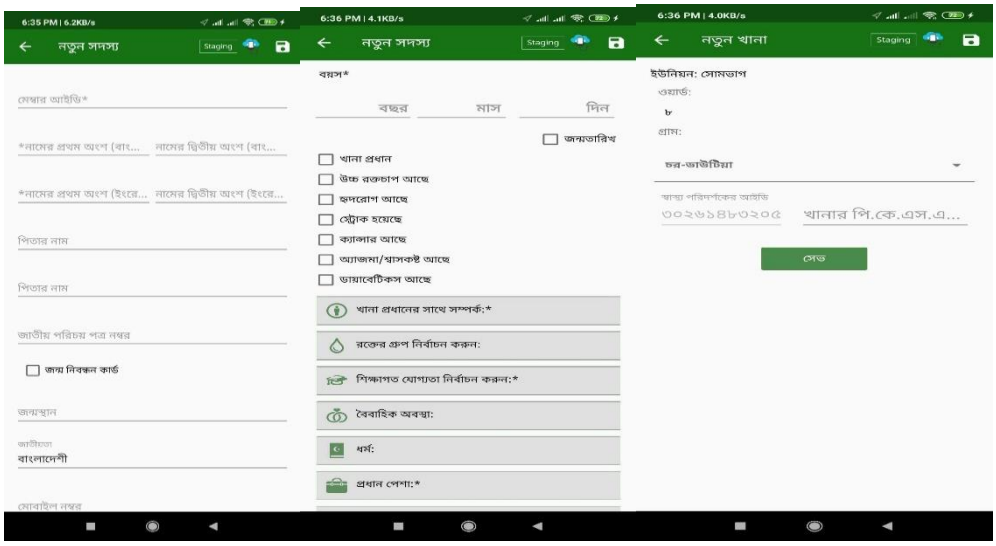


Figure 3.2: Member and Household Registration page

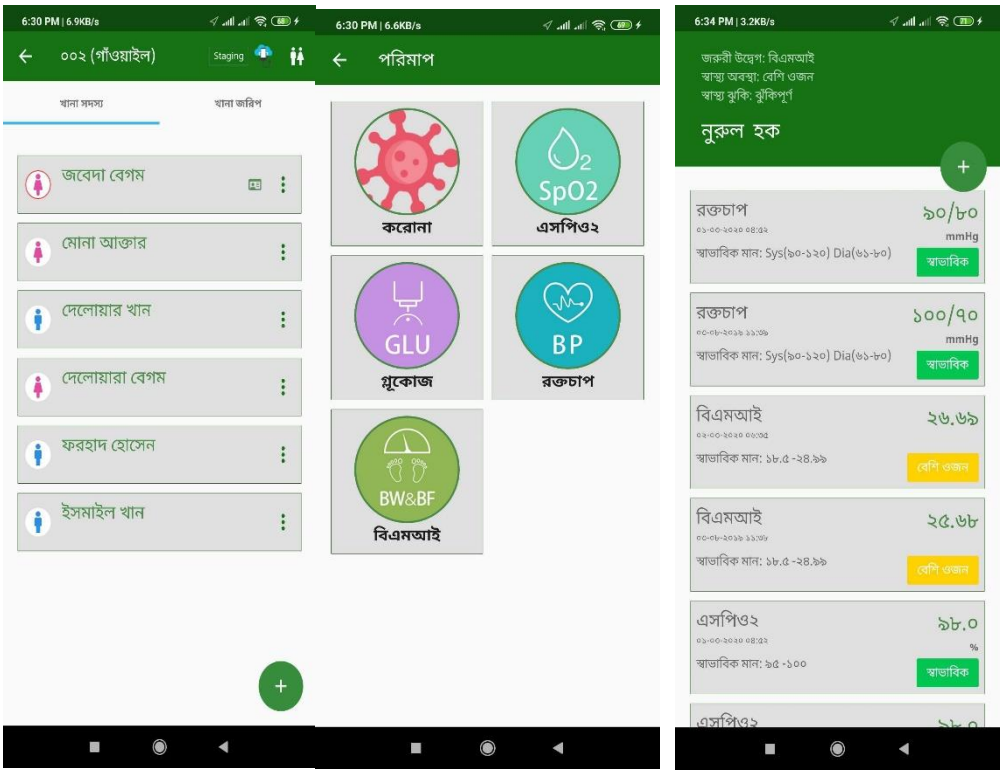
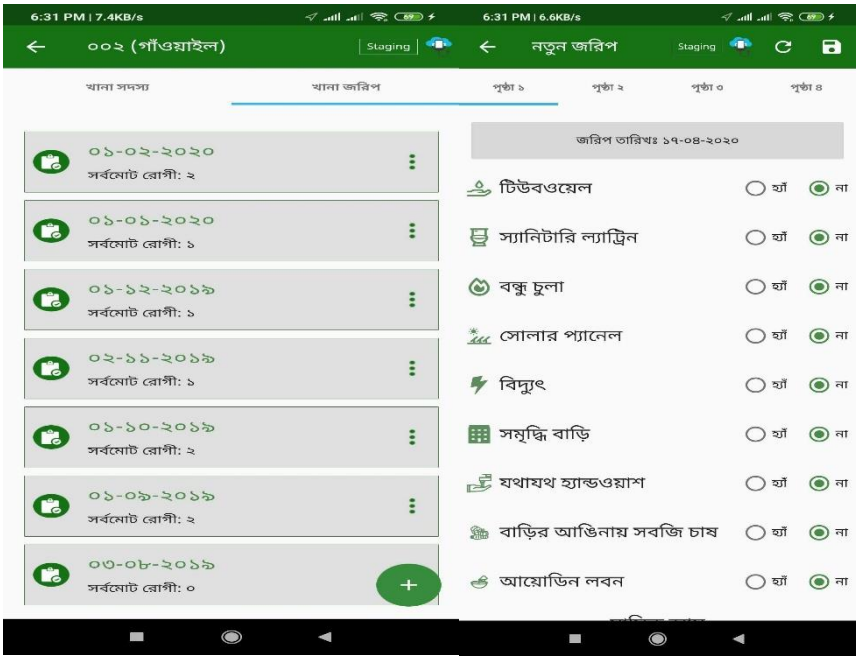


Figure 3.3: Member and Measurement pages



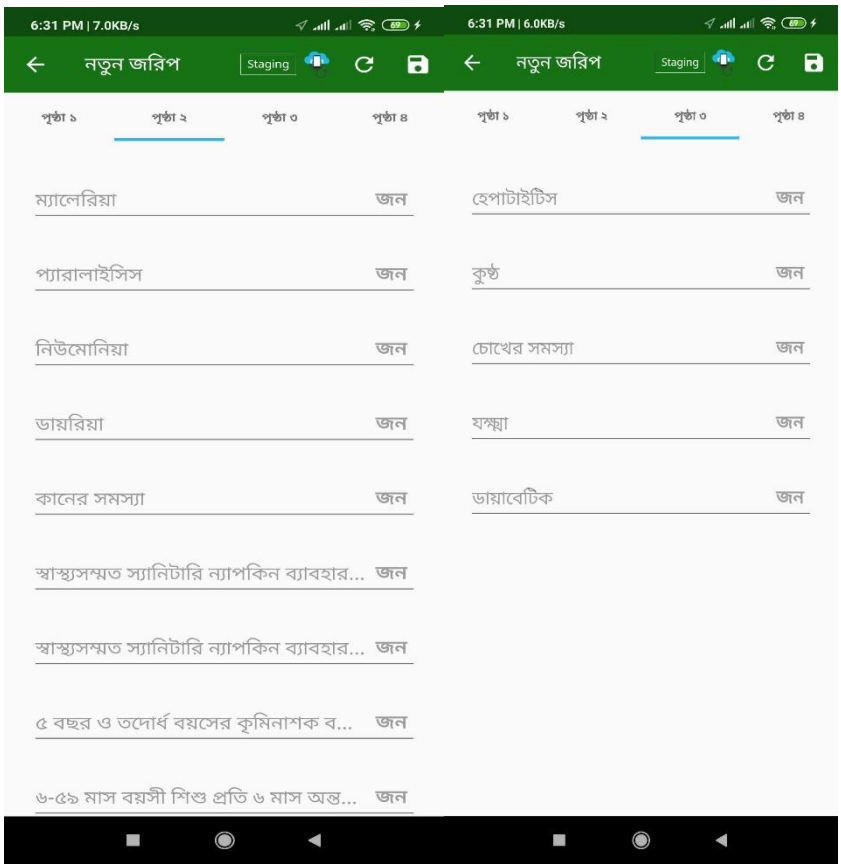


Figure 3.4: Survey pages

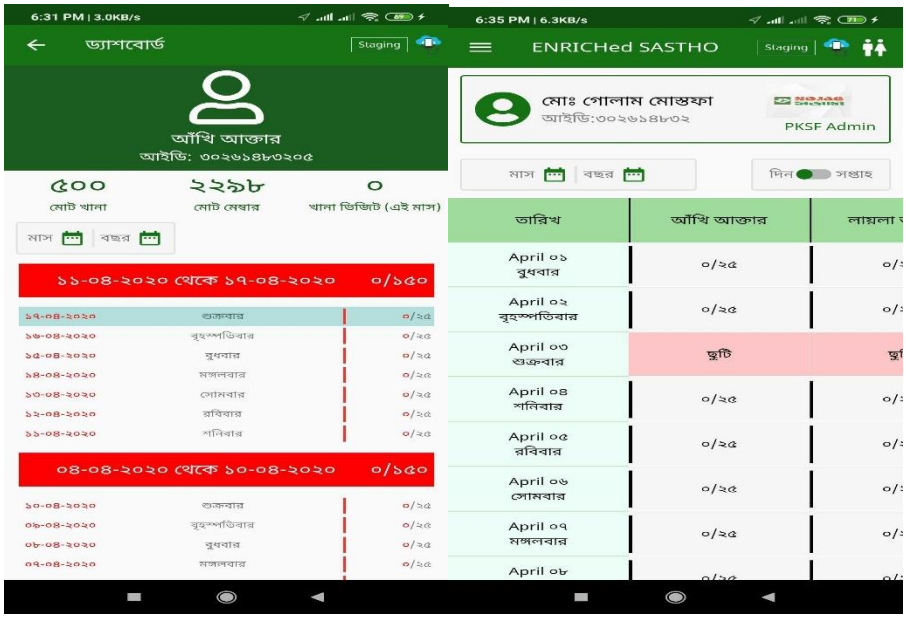
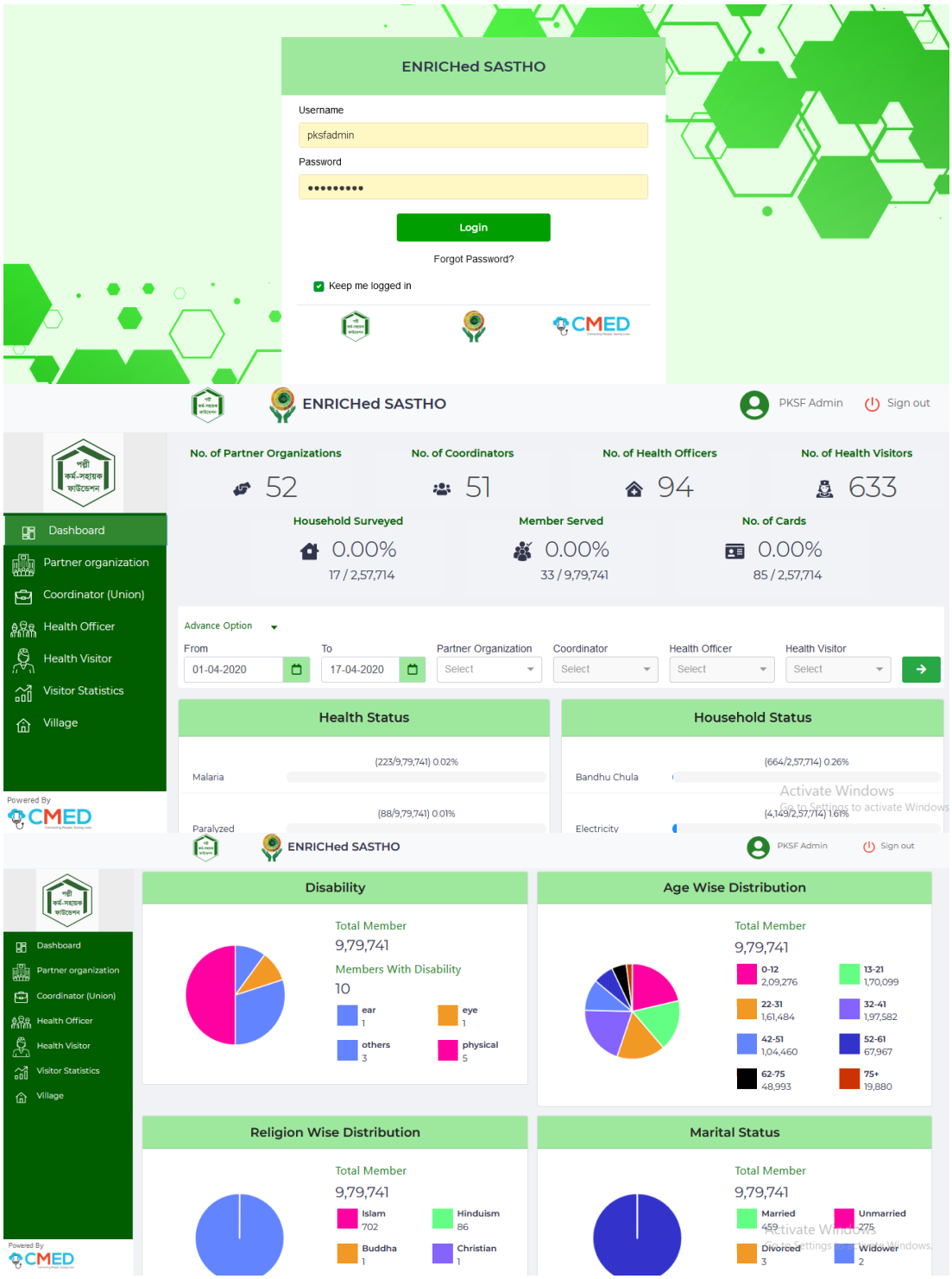
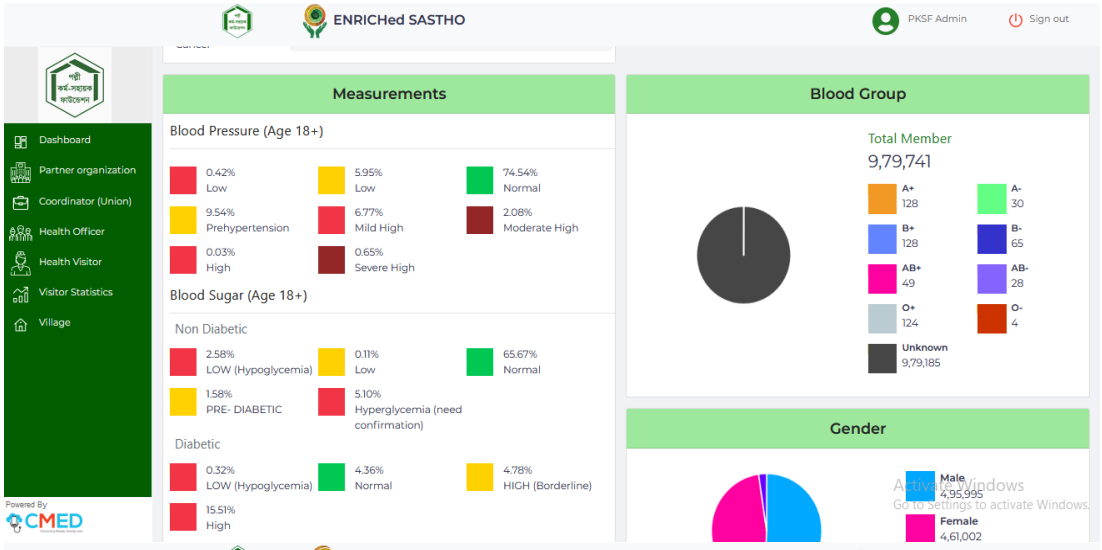
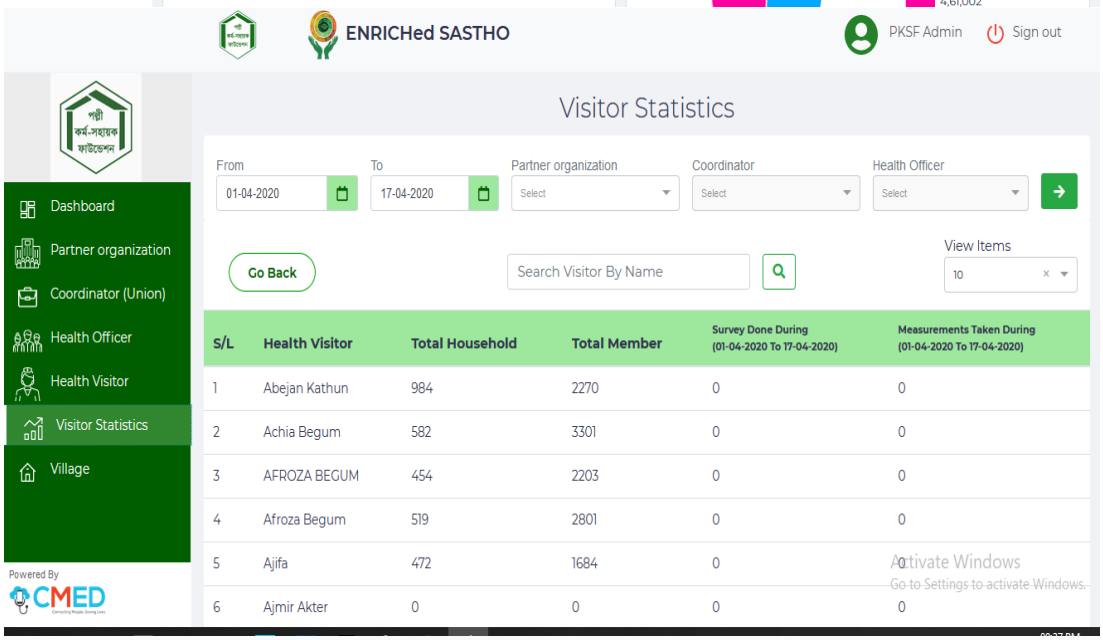


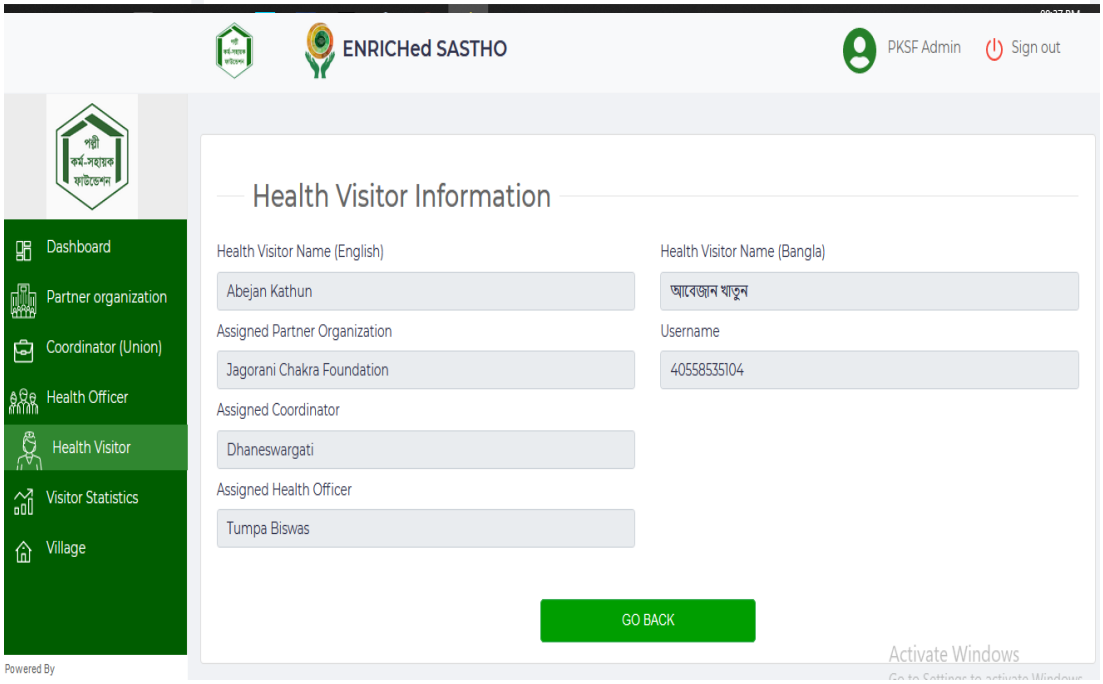
Figure 3.5: Health Visitor and Health volunteer dashboard

3.1.3.2 Web application features and UI:




ENRICHed SASTHO
PKSF Admin
Sign out
Dashboard
Partner organization
Coordinator (Union)
Health Officer
Health Visitor
Visitor Statistics
Village
Measurements
Blood Pressure (Age 18+)
0.42% Low
5.95% Low
74.54% Normal
9.54% Prehypertension
6.77% Mild High
2.08% Moderate High
0.03% High
0.65% Severe High
Blood Sugar (Age 18+)
Non Diabetic
2.58% LOW (Hypoglycemia)
0.11% Low
65.67% Normal
1.58% PRE- DIABETIC
5.10% Hyperglycemia (need confirmation)
Diabetic
0.32% LOW (Hypoglycemia)
4.36% Normal
4.78% HIGH (Borderline)
15.51% High
Blood Group
Total Member
9,79,741
A+ 128
A- 30
B+ 128
B- 65
AB+ 49
AB- 28
O+ 124
O- 4
Unknown 9,79,185
Gender
Male 4,95,995
Female 4,61,002
Powered By CMED


ENRICHed SASTHO
PKSF Admin
Sign out
Visitor Statistics
From 01-04-2020
To 17-04-2020
Partner organization
Coordinator
Health Officer
Go Back
Search Visitor By Name
View Items 10
S/L | Health Visitor | Total Household | Total Member | Survey Done During (01-04-2020 To 17-04-2020) | Measurements Taken During (01-04-2020 To 17-04-2020)
1 | Abejan Kathun | 984 | 2270 | 0 | 0
2 | Achia Begum | 582 | 3301 | 0 | 0
3 | AFROZA BEGUM | 454 | 2203 | 0 | 0
4 | Afroza Begum | 519 | 2801 | 0 | 0
5 | Ajifa | 472 | 1684 | 0 | 0
6 | Ajmir Akter | 0 | 0 | 0 | 0
Powered By CMED


ENRICHed SASTHO
PKSF Admin
Sign out
Health Visitor Information
Health Visitor Name (English)
Abejan Kathun
Health Visitor Name (Bangla)
আবেজান খাতুন
Assigned Partner Organization
Jagorani Chakra Foundation
Username
40558535104
Assigned Coordinator
Dhaneswargati
Assigned Health Officer
Tumpa Biswas
GO BACK
Powered By

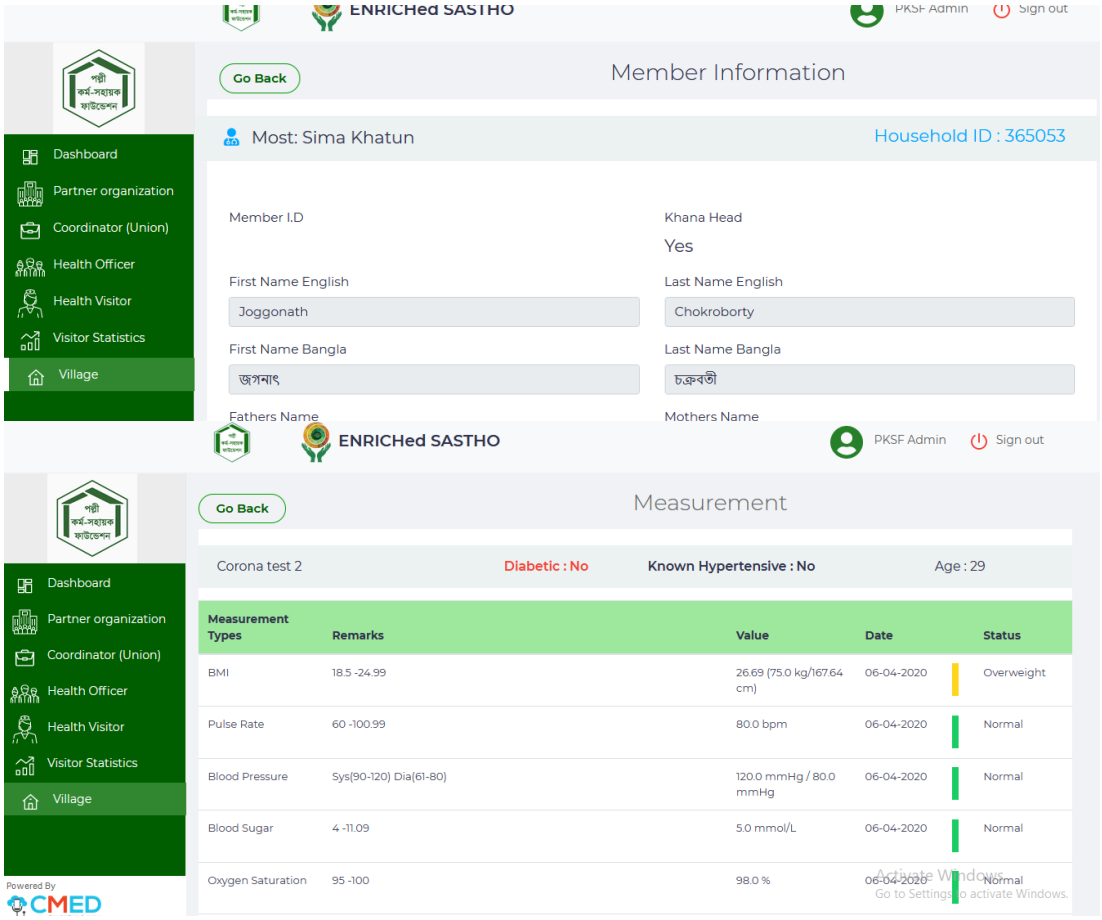


Figure 3.6: ENRICHed SASTHO Web application UI

3.1.4 Functionality and responsibilities of system components

There are three types of users in ENRICHed SASTHO web.

a) PKSF admin
b) Partner organizations
c) Coordinators

There are two types of users in ENRICHed SASTHO mobile application

a) Health officers
b) Health visitors

In mobile application, Health visitors are the main users who work in the field level. Each health visitor is assigned to one or multiple villages. They visit all the household available in their assigned village and enter the member information through the app. This process includes the details of member's relation to each other, age, blood group,

educational qualification, occupation and other necessary information. After taking the member information the health visitor takes a survey of each household that includes the multiple information such as availability of tube well, sanitary latrine, solar panel, electricity, number of sick people, different types of disease history of that household etc. After completing the survey and member information, health visitor takes the basic health measurement of each member of that household. The health officer using the app can track the work done by health visitors assigned under them with the help of the app dashboard.

In web dashboard the Coordinator can track and see the cumulative data of the health officers assigned under them, Partner organization can track the coordinators data and PKSF admin can see the total data of all the users.

3.2 Corona Module

3.2.1 Project background

Currently the world is suffering from corona epidemic. Coronaviruses are a family of viruses known for containing strains that cause potentially deadly diseases in mammals and birds. In humans they're typically spread via airborne droplets of fluid produced by infected individuals. [4]

Just when the corona virus started spreading in Bangladesh, with the support of the Bangladesh Government and IEDCR, CMED started working on a module to add on their existing applications. CMED currently has 132263 registered user for their health applications. This corona module could help these user a lot. This module includes an informative part for the users and an for the health officers, an online screening part where the user can answer a few questions and the app will let them know if they are in risk or not, an emergency contact section and a web dashboard to monitor over the situation.

3.2.2 Project Design

3.2.2.1 Mobile application (Android) features and UI:

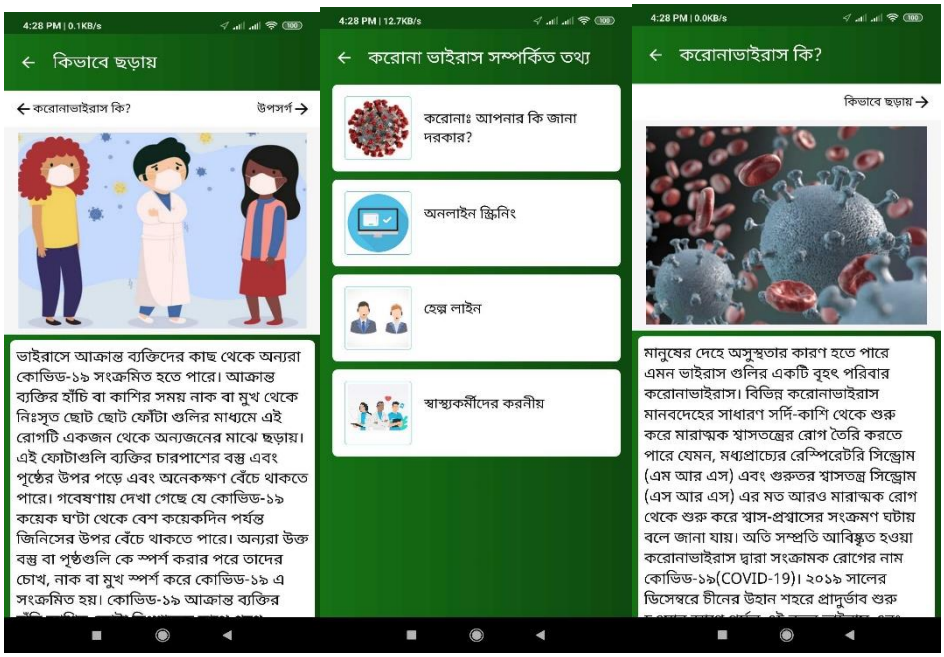
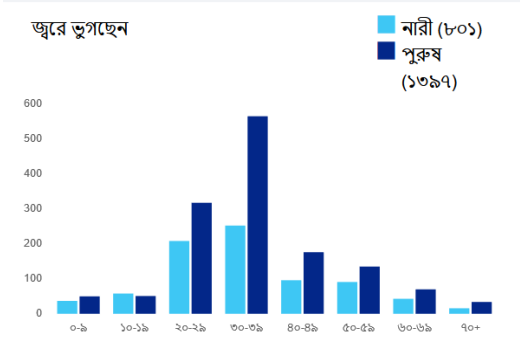
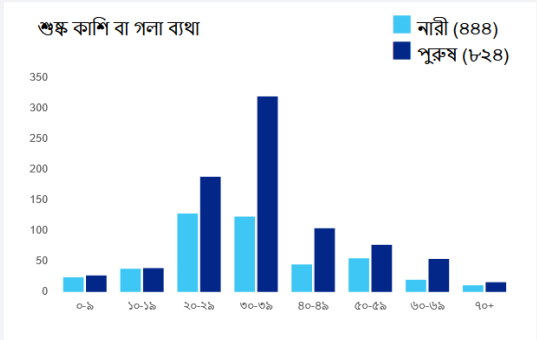
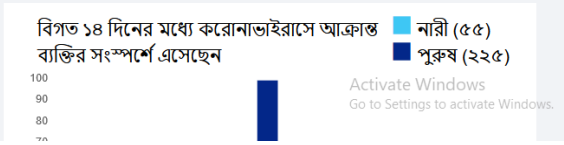


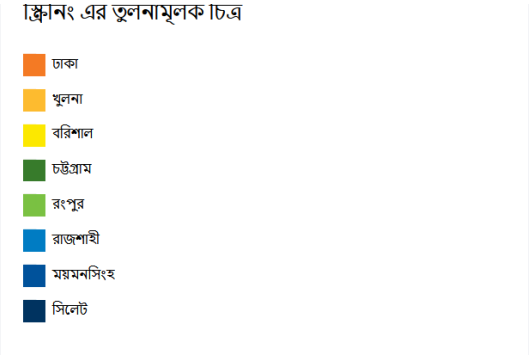
Figure 3.7: Corona module mobile application UI

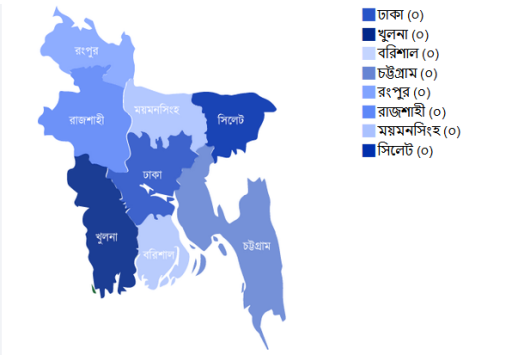
3.2.2.2 Web application features and UI:











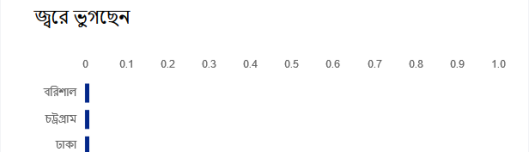


Figure 3.8: Corona module Web application UI

3.2.3 Functionality and responsibilities of system components

This module was added to different application to track the corona test in our country. This will be used by mainly different health worker working under these healthcare institutes. They will take user input and measurement through the app and the data will be shown in web dashboard.

The informative part of the module would be used by both common user and the health visitors. The online screening part will be used by user. In the application, there is option of measurement. That measurement part is used by the health workers. Health workers will collect information with the help of this module.

CHAPTER 4

MY RESPONSIBILITIES

My supervisor assigned me tasks based on my working capabilities. At first he involved me in software testing of ENRICHed SASTHO mobile and web application. While my supervisor found me capable of doing more and my interest to work, he gradually involved me in doing critical tasks. As a whole there are three main tasks I was involved during my internship, which are:

i. Software testing of ENRICHed SASTHO mobile & web application,
ii. Software testing of Corona Module and
iii. Working on swagger for data mismatch checking.

In this chapter, I will explain the projects I am involved, major tasks I have done or still doing as an intern.

As most of my work is focused on software testing, so I would like to clarify what software testing is, how many types of software testing are available, and which techniques my company guided me to follow.

4.1 Software Testing

Software testing is a process, to assess the usefulness of a product application with a goal to discover whether the created programming met the predetermined necessities or not and to recognize the imperfections to guarantee that the item is without deformity so as to deliver the quality item. [5]

4.1.1 Basics of Software Testing

There are mainly three types of software testing approaches

1) Black box testing
2) White box testing
3) Grey box testing

4.1.1.1 Black box Testing

Black box testing is a type of testing that mainly focuses on the input and output of the software. With black box testing we can ignore the internal structure of coding of the software and check the required output for pre decided inputs. System behavior is the main concern here.

4.1.1.2 White box Testing

It is also called as Glass Box, Clear Box, and Structural Testing. White box testing is the opposite of black box testing. In white box testing we have to focus on the internal structure of the coding. Understanding the coding structure and the working of the software is necessary here.

4.1.1.3 Grey box Testing

Grey box testing can be identified as a combination of both white box and black box testing. The tester must have knowledge on both the coding structure and the system behavior.

4.1.2 Types of testing

1. Unit testing
2. Integration testing
3. System testing
4. Acceptance testing

In my assigned projects, I have been using User Acceptance testing mostly

4.1.3 Acceptance Testing

Acceptance testing is the type of testing that ensures the customer requirements. In acceptance testing the tester tries to view the software in customer's eyes. Tester makes sure that the delivered product works as the customer expected.

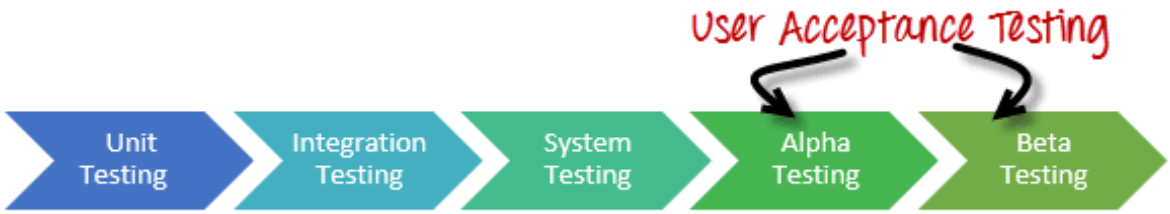


Figure 4.1: User Acceptance Testing

4.2 Software testing of "ENRICHed SASTHO" application

The main task I was given at first on this project was to test the software on android application. I was instructed to do manual testing. The main cause of choosing the manual user testing is the tester can test as a user perspective and can find out user experience errors & bugs. As I progressed into my internship, I was given more critical task by my supervisor. There were three parts of my testing on this project.

1. Testing the mobile application

2. Testing the web application

3. Testing for data mismatch between web and mobile application using swagger

Tests were performed by matching requirement with test cases. Test cases were designed in such a way that meets the requirement of the application. The software was alpha tested. The two main focus of the test cases were to meet the detailed requirement and to prove the accurate response of the functionalities.

Table 2: Test Case prepared for basic measurement testing

Category	Sub Category	Test Case Scenario	Test Case ID	Pre-Conditions	Test Steps	Test Data	Expected Results	Actual Results	Pass/Fail
Measurement list	Name	Check if measurement name is showing correctly	TC0031	# User must be logged in	# Go to home page # Select a household # Click on a member	N/A	Measurement name should display correctly	As Expected	Pass
	Status	Check if member health status is showing correct information	TC0032	# User must be logged in # Measuremet has been taken or mannually inputted	# Go to home page # Select a household # Click on a member # Click on a measurement	Date: Time: Measurement Value:	Member health status matched with corresponding measurement result	As Expected	Pass
	Measurements result	Check if member measurements result is displaying correct information	TC0033	# User must be logged in	# Go to home page # Select a household # Click on a member	Date: Time: Measurement Value:	Measurement list should display correct information	As Expected	Pass
	Edit measurement	Check if measurement is updated when edited	TC0034	# User must be logged in	# Go to home page # Select a household # Click on a member # Select the measurement to be edited # Click edit and change value # Click Done	Date: Time: Measurements	Measurement Data should be updated	As Expected	Pass
	Measurement Date, time, range, status, color code	Check if the measurement date, time, range, status, color code etc. match with the corresponding measuremet data	TC0035	# User must be logged in # Measurements has been taken or mannualy inputted	# Go to home page # Select the household # Click on a member # Look for measurement date, time, range, status, color code	Measurements	Measurement date, time, range, status, color code etc. match with the corresponding measuremet data	As Expected	Pass
	Sync with server	Check if measurement data is auto syncronized when logged in	TC0036	# Must be a registered user	# Login to app and wait for auto sync	New measurements	Data should syncronized automatically	As Expected	Pass
		Check if measurement data is syncronized when clicked sync	TC0037	# User must be logged in	# From home click on burger menu on top right corner # Click on Sync (সিঙ্ক করুন)	New measurements	Should syncronize with updated data	As Expected	Pass
Measurement Page		Check if user is able to access measurement page & take new measurement	TC0038	# User must be logged in	# Go to home page # Select the household # Click on a member	Member info, New Measurements	User is able to access the page and take new measurement	As Expected	Pass

Table 3: Test Case prepared for Blood pressure measurement

Category	Sub Category	Test Case Scenario	Test Case ID	Pre-Conditions	Test Steps	Test Data	Expected Results
Blood Pressure	With Device	Check if user can take BP measurement with Device	TC0046	# User must be logged in # Must have device	# Go to home page # Select the household # Click on a member # Click on the plus (+) icon at top right corner # Click BP # Click connect # Select device type		User is able to connect to device measurement successfully, meas status is shown
	Manually	Check if user can take BP measurement manually	TC0047	# User must be logged in	# Go to home page # Select the household # Click on a member # Click on the plus (+) icon at top right corner # Click BP # Click Manual # Enter manual data # Click done	Date: Time: SYS: DIA: Pulse:	Manual data is added and status shown
	Status	Check if the BP status and it's color is correct after a measurement	TC0048	# User must be logged in	# Go to home page # Select the household # Click on a member # Click on a BP measurement # Or take a new BP measurement	Date: Time: SYS: DIA: Pulse:	Member's BP status and color is
	Advice	Check if proper advice is shown based on Glucose measurement	TC0049	# User must be logged in	# Go to home page # Select the household # Click on a member # Click on a BP measurement # Or take a new BP measurement	Date: Time: SYS: DIA: Pulse:	Proper advice is shown after ever measurement

Table 4: Test Case prepared for glucose measurement

Category	Sub Category	Test Case Scenario	Test Case ID	Pre-Conditions	Test Steps	Test Data	Expected Results
Glucose	With Device	Check if user can take Glucose measurement with Device	TC0046	# User must be logged in # Must have device	# Go to home page # Select the household # Click on a member # Click on the plus (+) icon at top right corner # Click Glucose # Click connect # Select device type		User is able to connect to device measurement successfully, meas status is shown
	Manually	Check if user can take Glucose measurement manually	TC0047	# User must be logged in	# Go to home page # Select the household # Click on a member # Click on the plus (+) icon at top right corner # Click Glucose # Click Manual # Select current time # Enter manual data # Click done	Date: Time: Glucose	Manual data is added and status shown
	Status	Check if the Gluecose status and it's color is correct after a measurement	TC0048	# User must be logged in	# Go to home page # Select the household # Click on a member # Click on a Glucose measurement # Or take a new Gluecose measurement	Date: Time: Glucose	Member's Gluecose status and c
	Advice	Check if proper advice is shown based on Glucose measurement	TC0049	# User must be logged in	# Go to home page # Select the household	Date: Time:	Proper advice is shown after ever measurement

Table 5: Test Case prepared for spo2 measurement

Category	Sub Category	Test Case Scenario	Test Case ID	Pre-Conditions	Test Steps	Test Data	Expected Results
SPO2	With Device	Check if user can take SPO2 measurement with Device	TC0039	# User must be logged in # Must have device	# Go to home page # Select the household # Click on a member # Click on the plus (+) icon at top right corner # Click SPO2 # Click connect # Select device type		User is able to connect to device measurement successfully, meas status is shown
	Manually	Check if user can take SPO2 measurement manually	TC0040	# User must be logged in	# Go to home page # Select the household # Click on a member # Click on the plus (+) icon at top right corner # Click SPO2 # Click Manual # Enter manual data # Click done	Date: Time: SPO2(%):	Manual data is added and status shown
	Status	Check if the SPO2 status and it's color is correct after a measurement	TC0041	# User must be logged in	# Go to home page # Select the household # Click on a member # Click on a SPO2 measurement # Or take a new SPO2 measurement	Date: Time: SPO2(%):	Member's SPO2 status and color
	Advice	Check if proper advice is shown based on SPO2 measurement	TC0042	# User must be logged in	# Go to home page # Select the household	Date: Time:	Proper advice is shown after ever measurement

Table 6: Test Case prepared for survey data

Category	Sub Category	Test Case Scenario	Test Case ID	Pre-Conditions	Test Steps	Test Data	Expected Results
Khana Survey	Create	Check if new survey is created	TC0065	# User must be logged in # Creat inside a household	# From home select a household # Go to Survey s tab # Click on the plus (+) icon # Enter survey details # Click save	Page 01: Page 02: Page 03: Page 04:	New survey should be added to
	Delete	Check if survey is removed from the list when deleted	TC0067	# User must be logged in # Survey already exists	# From home select a household # Go to Survey s tab # Click the dot icon beside the survey that you want to delete # Click delete	Existing survey	Survey should be removed from
	Sync with server	Check if survey data is properly synced	TC0068	# Must be a logged in user	# login again or # From home go to burger menue # Click sync	Existing survey	Survey data should syncronize

After completing mobile application testing I tested the web dashboard. Checked for any data mismatch issues between mobile application and web application.

After testing, If any issue found I posted it on redmine. Redmine is a flexible project management web application. Written using the Ruby on Rails framework, it is cross-platform and cross-database. [6] CMED Health Ltd uses redmine to track the project issues.

The procedure of working in redmine is simple:

i. Whenever I found a bug/issue, I report on redmine issues page with appropriate label and severity.

ii. After posting the issue I assigned the issue to developers.

iii. The development team will get a notification of the report instantly.

iv. After the developers fixed the issue they assigned them back to me

v. Testing and confirming that the issue is solved I assign them to my supervisor and he closes the issue from redmine.

Redmine is very easy to use. With the issue I can add screenshot, short video or any small file so that the developers can easily understand the problem. Also it is easier to track for the management because they can see who assigned the project, who solved it, how long it took to solve, what were the related issues etc.

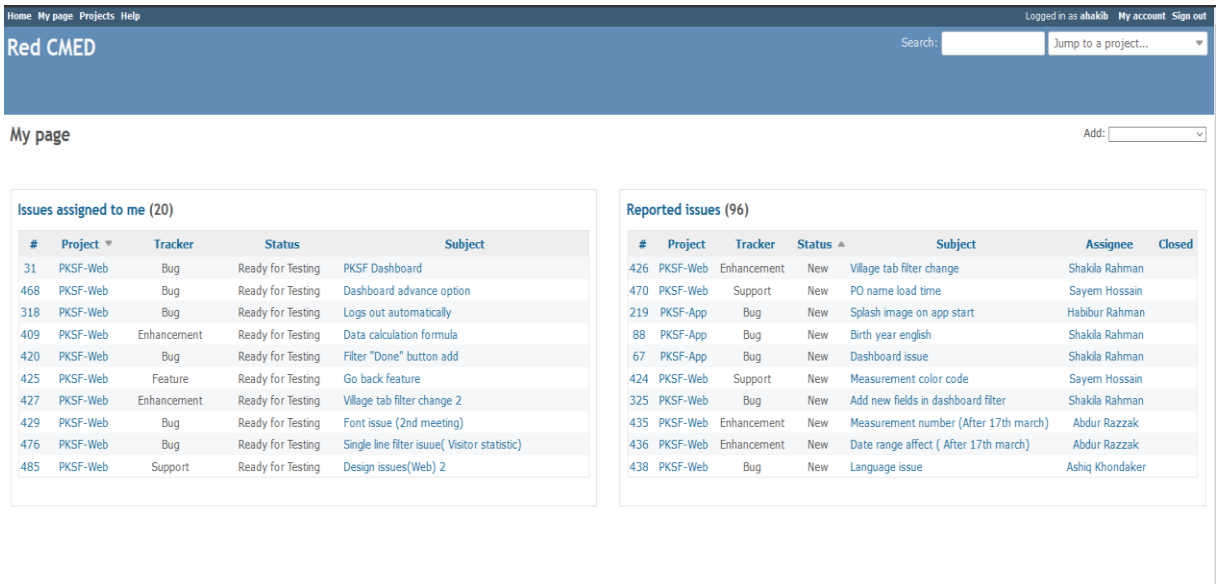


Figure 4.2: Redmine issues I've reported and issues assigned to me

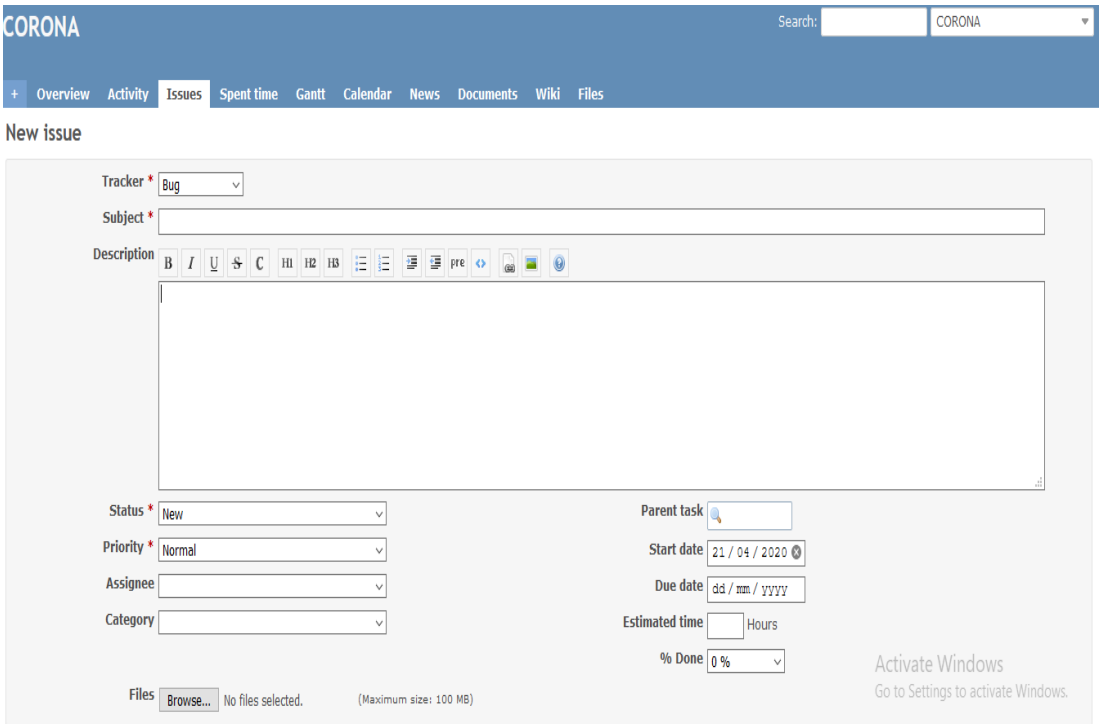
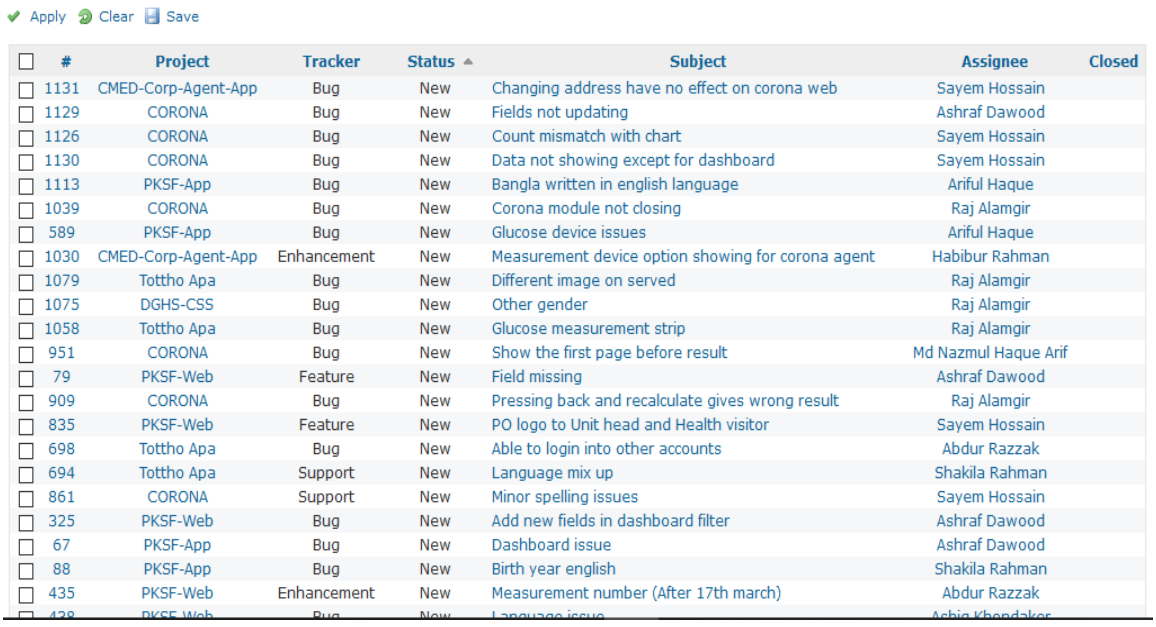


Figure 4.3: Redmine issue creation page



#	Project	Tracker	Status	Subject	Assignee	Closed
1131	CMED-Corp-Agent-App	Bug	New	Changing address have no effect on corona web	Sayem Hossain	
1129	CORONA	Bug	New	Fields not updating	Ashraf Dawood	
1126	CORONA	Bug	New	Count mismatch with chart	Sayem Hossain	
1130	CORONA	Bug	New	Data not showing except for dashboard	Sayem Hossain	
1113	PKSF-App	Bug	New	Bangla written in english language	Ariful Haque	
1039	CORONA	Bug	New	Corona module not closing	Raj Alamgir	
589	PKSF-App	Bug	New	Glucose device issues	Ariful Haque	
1030	CMED-Corp-Agent-App	Enhancement	New	Measurement device option showing for corona agent	Habibur Rahman	
1079	Tottho Apa	Bug	New	Different image on served	Raj Alamgir	
1075	DGHS-CSS	Bug	New	Other gender	Raj Alamgir	
1058	Tottho Apa	Bug	New	Glucose measurement strip	Raj Alamgir	
951	CORONA	Bug	New	Show the first page before result	Md Nazmul Haque Arif	
79	PKSF-Web	Feature	New	Field missing	Ashraf Dawood	
909	CORONA	Bug	New	Pressing back and recalculate gives wrong result	Raj Alamgir	
835	PKSF-Web	Feature	New	PO logo to Unit head and Health visitor	Sayem Hossain	
698	Tottho Apa	Bug	New	Able to login into other accounts	Abdur Razzak	
694	Tottho Apa	Support	New	Language mix up	Shakila Rahman	
861	CORONA	Support	New	Minor spelling issues	Sayem Hossain	
325	PKSF-Web	Bug	New	Add new fields in dashboard filter	Ashraf Dawood	
67	PKSF-App	Bug	New	Dashboard issue	Ashraf Dawood	
88	PKSF-App	Bug	New	Birth year english	Shakila Rahman	
435	PKSF-Web	Enhancement	New	Measurement number (After 17th march)	Abdur Razzak	

Figure 4.4: Redmine issue list

4.3 Software testing of "Corona Module"

During my internship I was assigned with the task of testing the corona module. This corona module is being integrated into several applications including CMED agent, Tottho Apa, ENRICHed SASTHO, CMED user and DGHS Css.

There were few things I had to test in this project.

i. The information pages are working properly

ii. The screening is giving accurate results.

iii. The screening result is updating on database

iv. Screened results are showing on web dashboard.

v. Web dashboard charts are showing accurate result

vi. Integration of the module has no negative effect on the previous feature of the application.

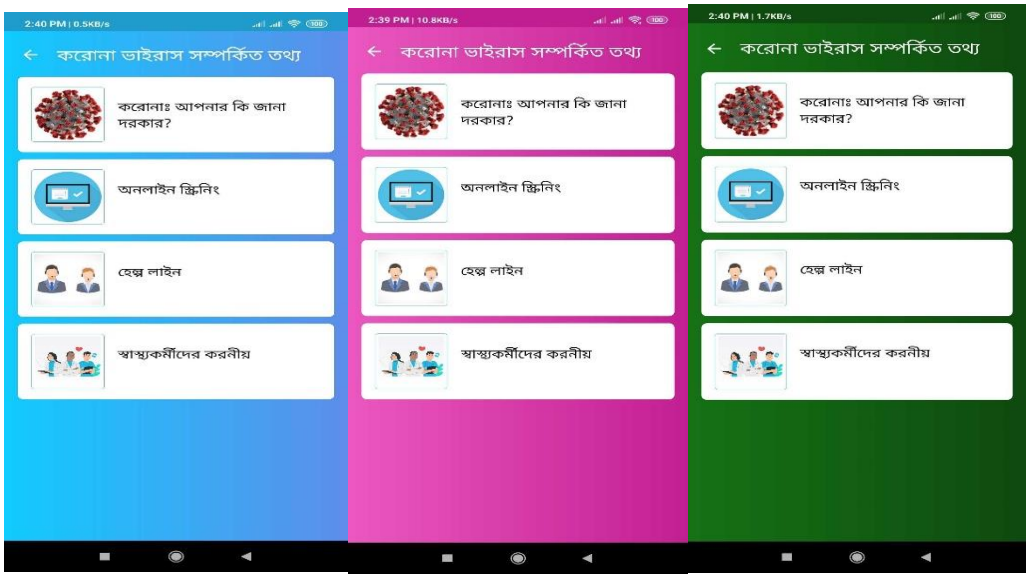


Figure 4.5: Corona module in different applications

I've prepared the list of test cases to test the corona module in all the application.

Table 7: Corona module test cases

			Execution date:	
Category	**Sub Category**	**Test Case Scenario**	**Test Steps**	**Expected Results**
Module Before Login	Responsive test	Check if tapping onto message works	Tap on the pop up corona message in login page	corona information first page should pop up
		Check if swiping is smooth/works or not	Swipe the information	Should be able to swipe front and back betv
		Check if information details show's or not	Tap on any information	Details information would show with next an
		Check if online screening works	Tap on online screening	Should show a message that user need to s
		Chech if "Right way to wash hands" slider works	#Select Right way to wash hands information option #Bottom of the page you'll find another slider for techniques for washing hands	Should be able to slide without any problem
		Check if "Right way to wash hands video" plays	Tap on Watch video option	Video should start playing
		Check if "Symptoms that you're affected by corona virus" slider work	#Tap on the information #Bottom of the page you'll find another slider for symptom list by day	Should be able to slide without any problem
Module after login	Responsive test	Check if online screening starts after login	Tap on online screemning	Should be able to start the screening proce
	Screening	Check if Screening works	keep choosing between the options	App should show the right result after calcu
	Helpline	Check if helpline numbers work	Tap into helpline option	Helpline numbers should pop up with the op
	Instruction for Health visitors	Check if information shows and slider works	Select the "Instruction for Health visitor" option	Details information should show and sliders

CMED provided me a list of question set and a response matrix that will indicate in which case what result the screening would give.

Symptom Risk			
Feaver?	Cough?	Respiratory Distress?	Sevearity
No	No	No	Safe
No	No	Yes	High
No	Yes	No	Mild
No	Yes	Yes	High
Yes	No	No	Mild
Yes	No	Yes	High
Yes	Yes	No	Mild
Yes	Yes	Yes	High

Contact/Epidodomical Risk			
Foreign visit?	C19 Contact?	Symptom Contact?	Sevearity
No	No	No	Safe
No	No	Yes	Mild
No	Yes	No	High
No	Yes	Yes	High
Yes	No	No	Mild
Yes	No	Yes	High
Yes	Yes	No	High
Yes	Yes	Yes	High

Covid Response Matrix				
Symptom Risk	Age Group	Disease History	Epidemic Risk	Response Risk Status
Safe	<60	No	Safe	Safe
Safe	<60	No	Mild	Stay Home/Qurantine
Safe	<60	No	High	Mandatory Quarantine/Followup
Safe	<60	Yes	Safe	Safe
Safe	<60	Yes	Mild	Stay Home/Qurantine
Safe	<60	Yes	High	Mandatory Quarantine/Followup
Safe	>60	No	Safe	Safe
Safe	>60	No	Mild	Stay Home/Qurantine
Safe	>60	No	High	Mandatory Quarantine/Followup
Safe	>60	Yes	Safe	Safe
Safe	>60	Yes	Mild	Mandatory Quarantine/Followup
Safe	>60	Yes	High	Mandatory Quarantine/Followup
Mild	<60	No	Safe	Stay Home/Qurantine
Mild	<60	No	Mild	Stay Home/Qurantine
Mild	<60	No	High	Urgent/Contact with Covid Facility
Mild	<60	Yes	Safe	Stay Home/Qurantine
Mild	<60	Yes	Mild	Mandatory Quarantine/Followup
Mild	<60	Yes	High	Urgent/Contact with Covid Facility
Mild	>60	No	Safe	Stay Home/Qurantine
Mild	>60	No	Mild	Urgent/Contact with Covid Facility
Mild	>60	No	High	Urgent/Contact with Covid Facility

Figure 4.7: Corona module response matrix

With these I also had to test for other features of these application to check if adding the module has any negative effect on the existing features. These application includes health measurement, account creation, online payment, message and email notification and a lot of other features. I had to execute a basic testing of all the major features of these applications.

4.4 Working on swagger

Swagger is the largest framework for designing APIs using a common language and enabling the development across the whole API lifecycle, including documentation, design, testing, and deployment. The framework provides a set of tools that help programmers generate client or server code and install self-generated documentation for web services. [7]

I had to use swagger for multiple tasks.

i. To check for data mismatch issues between web and mobile application

ii. To upload sample agent using API

iii. To find agent or client detail information

iv. Find data between a date range

Different user has different types of authorization. Depending on the API I want to hit, I had to use different accounts.

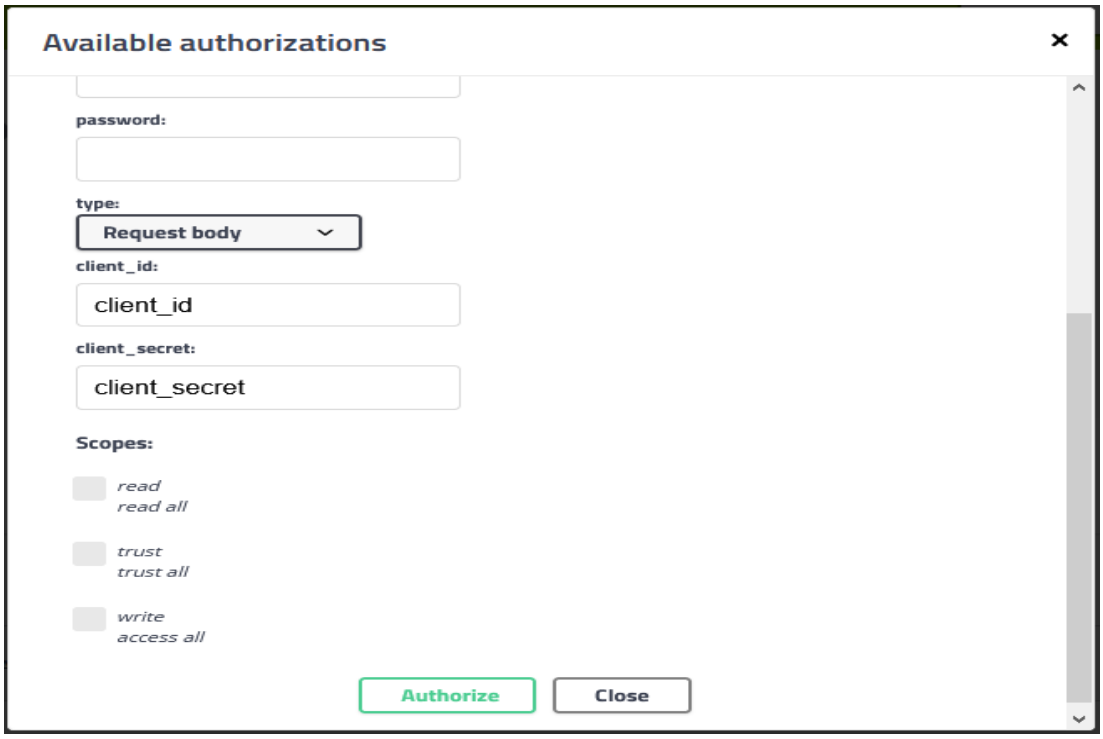


Figure 4.8: Swagger authorization page

CMED backend team have developed a lot of API in swagger for their different projects. I've mostly worked on PKSF and Corona project related API's. After authorized access I had to fill up required parameters before hitting an API.

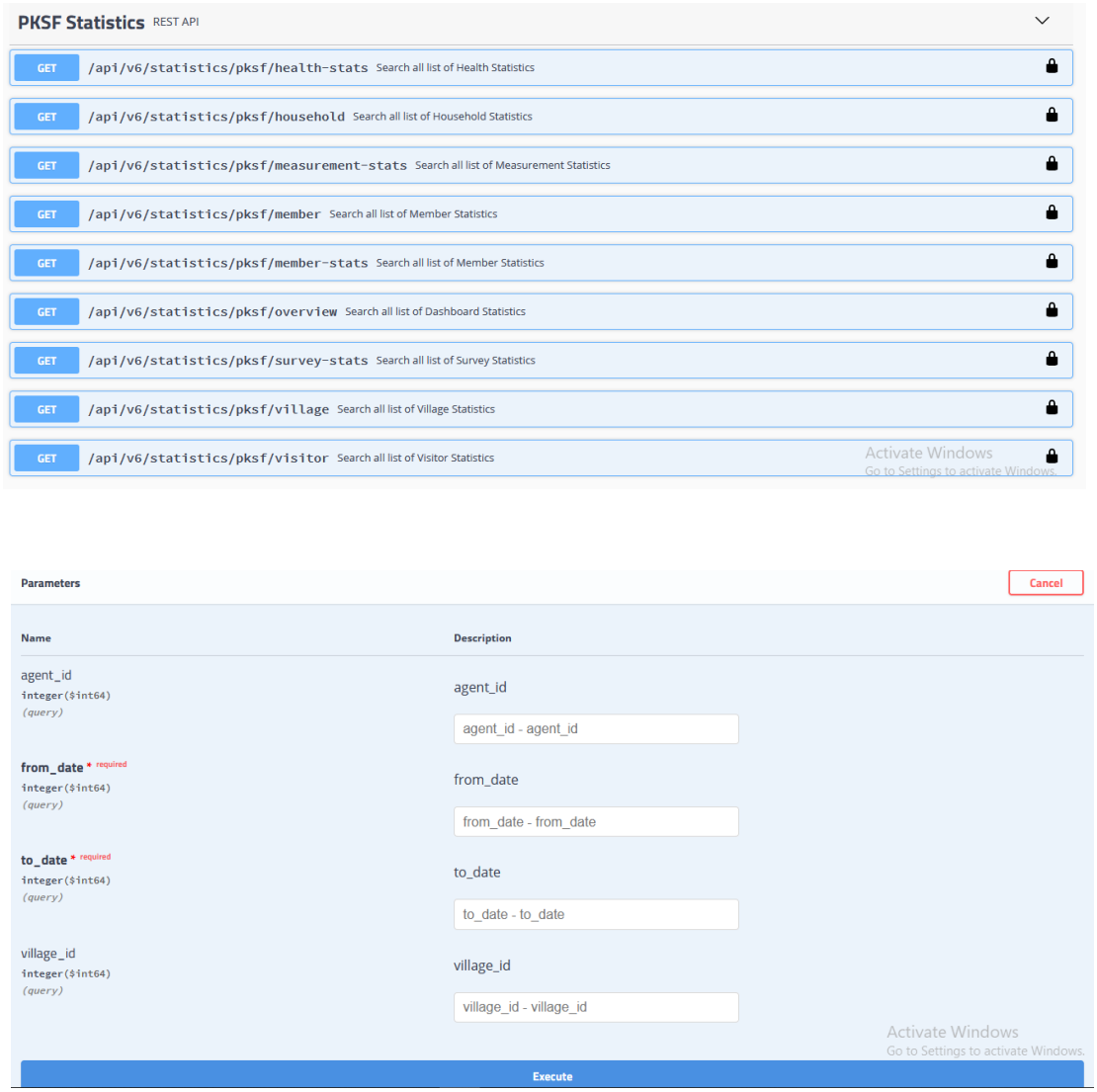


Figure 4.9: Different API and parameters to access them

After hitting the API, it gives me a response with the request url and a response code. By checking these I can be sure that I'm hitting the right API and the response has any error or not.

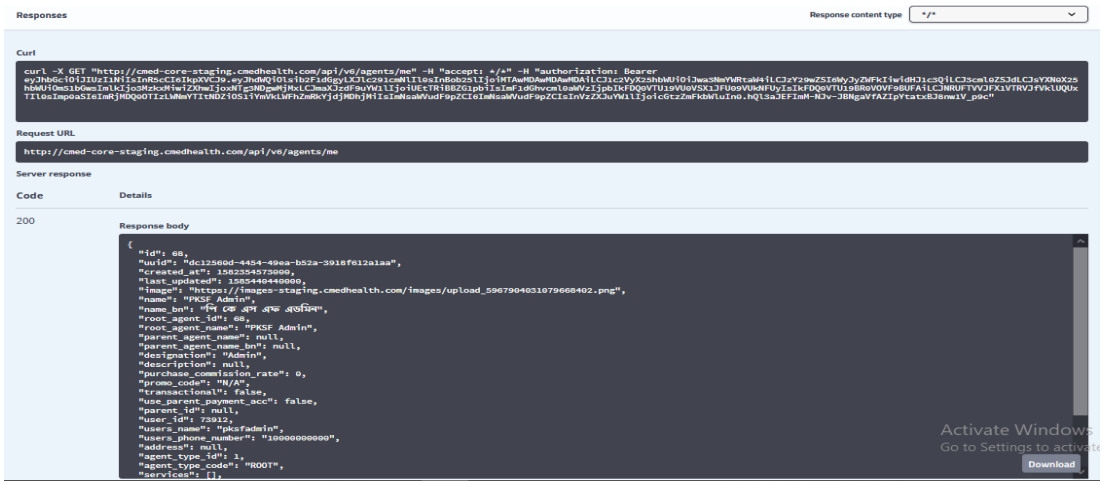


Figure 4.10: Swagger API response example

CHAPTER 5

CONCLUSION AND OUTCOME

I believe that my involvement at CMED Health Ltd as an intern was not only enriched my career but also increased my ability to effect progressive change everywhere and make a valuable influence in the field of Software engineering. I have never worked in a professional environment before, so it was a completely new experience for me & I enjoyed every bit of it. My colleagues and my industry supervisor whom I think as my mentor helped me enormously and I enjoyed many technical and professional things practically through them.

5.1 Outcome of Internship

The Internship provided some delightful memories and technical skills. However, it might take some time to master these skills but it surely can provide self-confidence to work further.

Technical skills:

The internship started with little knowledge in the field of software testing. Working in an organization is always helpful for a student. Since students get hand on experiences at technical aspects, it enhances their potential of getting better in their respective fields.

Initiative:

Initiative plays an important role for any employee. Every company makes small teams and provide them with works. Every person in these teams has their own responsibilities to complete works fully. CMED Health also works in the same way.

Moreover, CMED Health treated their employees like a family. So any work sanctioned for, that was done by out of joy and care.

Building up the relationship with coworkers:

One of the best things of CMED Health is their employees. They were so much friendly and helpful. Whenever someone needed a help, they were the first one to come. Any problem in the software developing or testing, a meeting called right away and suggestion or improvements were called for then.

Punctuality:

Punctuality was a serious issue in CMED Health. It was treated with severe penalty for any employee. CMED Health has a fingerprint attendance system to maintain punctuality and to track employee attendance. However, if there was any possibility of lateness or absence, supervisor had to be informed with a mail formally.

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