

Covid-19 Unified Information System for Fiji

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Abstract—Even though the world is moving more towards a technological era, capturing data, processing it into useful information, and making correct use of it in terms of decision making is still a major problem faced across the globe. While many publications discuss the need for information systems in the healthcare sector. The Novelty of this study is it will discuss the development of a Unified information system how it will assist to tackle Covid-19 in Fiji. Firstly, the study will discuss what is an information system, types of information system and characteristics of a good information system, secondly it will review current information systems used by other countries through literature review, and finally with the assistance of data collected a Unified Information System will be developed that can be utilized in Fiji to have all information stored at one centralized database. The result of the study will assist Researchers, the Healthcare sector and Information Technology personnel improve how information systems can perform better in the health sector.

Keywords— Computing, Covid-19, Health System, Information System, and IS.

I. INTRODUCTION

Information systems are one of the most vital tools in the operation and management of every organization either public or private sector [1]. Since the establishment of information systems in human life, it has led to changes in all phases of life [2]. The Information system has surfaced as a vital public health tool. These days, information systems provide immediate data to guide public health decisions [4]. An information system is a critical aspect for an organization, similarly, this research will be based on the current pandemic (Covid -19) the world is facing and how information systems can assist this in Fiji to have proper reports kept in place and an accurate and useful decision can be made. Covid-19 is believed to be one of the most severe threats that the Global Health system is facing currently. Coronavirus was reported on the last day of the calendar year 2019 in Wuhan City [5]. As of 0100 hours of the 11th day of August 2021, there are approximately 204 million cases recorded, 16.5 million active cases, and 4.3 million deaths recorded worldwide. [6]. The first wave struck Fiji in early 2020, according to The Fijian Government [7] Fiji recorded its first Covid-19 case in the early hours of the 19th day of March 2021, the number of cases escalated in the coming days, but this was well managed with lockdowns and contact tracing. Fiji marked two hundred days without any community transmission on 05th June 2020 [8]. As Fiji Marked its 1st Anniversary for the Final Case of Coronavirus outside of the border quarantine facility, a worse wave was waiting at the shore and as confirmed by the Prime Minister of Fiji, a maid employed in the border quarantine facility was tested positive of the virus [9]. The

cases intensified quickly and as of the 11th day of August, Fiji has recorded 37,512 cases and 315 deaths [10].

II. LITERATURE REVIEW

A. What is Information System

Information System is an application designed for a particular scenario that integrates several modules which allows for data collection, storage of data, processing it, and making it accessible to the users in terms of making decisions [11] [12]. There are many uses for information systems, be it Business Houses, Government, Healthcare, Education, Agriculture, or Tourism Industries. The majority of organizations rely heavily on information systems to achieve their daily operations, interact with the target audience, and compete to stay on the top [12]. Furthermore, there are six major categories of Information Systems, these are Transaction Processing Systems, Office Automation Systems, Knowledge Management Systems, Management Information Systems, Decision Support Systems, and Executive Support Systems [13]. Each type of Information System is used by different groups in an organization, for Operation, Tactical, and Strategic Management. Moreover, each type of information system has its fictionalities, firstly looking at Transaction Processing System, is a system that business use that involves the collection, modification, and retrieval of a transaction, it is also called real-time processing. It is accountable for inventory control, handling payments, and processing transactions and salaries, an example of Transaction Processing System, is when an online user uses the online portal to book his cinema seat, the system reserves the seat for him and blocks any other customer from booking the same seat [14]. The second type of information system is Office Automation Systems, these are specifically designed to increase the efficiency of workers in a workplace to improve communication, some examples of Office Automation Systems are e-mail and multimedia systems and video conferencing tools [15]. The third type of information system is the Knowledge Management System, which allows to store and retrieve the knowledge to enhance the level of understanding, association, and process. An example of a knowledge management system is online forums such as Stack Overflow [16] [17]. Fourthly, Management Information Systems is a collection of procedures that gather data from several sources and is compiled and presented to management for decision making, example of management information systems is accounting software such as SAGE or Epicor [18]. Looking at the fifth type of information system is Decision Support System, it is a system that assists businesses with an upcoming strategy such as predicting the projected sale for the financial year [19]. The last type of information system is Executive Support Systems, which is a system that permits the conversion of enterprise data into enterprise statements. This system is used by top-level management precisely to

assist in strategic management. An example of an Executive Support system is a digital dashboard that displays the financial position of a business [20]. A good information system should assist in quality decision making. Some of the characteristics of a good information system are it should be cost-effective, up-to-date, accurate, user friendly, reliable and should meet the requirement of an organization [21].

III. INFORMATION MANAGEMENT SYSTEM USED FOR COVID-19

The current Covid-19 pandemic has taken the Healthcare system from over the world to a head-on fight. However, the Healthcare system and Government across the globe have invested significantly in information systems to help them keep up and fight against the pandemic. Below are some of the information systems that are used by the Government and the healthcare sector in the fight against Covid – 19 Pandemic:

A. Telehealth

Telehealth involves technological and telecommunication system to oversee the healthcare of patients who is geographically apart, for example, consultation of a person via video calls [22]. Telehealth is an electronic record that was used in China after its rising number of cases in Wuhan. With the number of patients increasing in Wuhan hospitals, the Government built new hospitals in a few weeks however only a few percentages of healthcare personnel were deployed out of thousands sent by the Government, this is where telehealth played a significant part to aid the employed personnel. The one-to-one support agreement made telehealth services easier, mainly between two hospitals [23].

B. Covid -19 Heat Maps

Johns Hopkins University developed an interactive map that provides real-time tracking. The Heat map was built as an ArcGIS dashboard, the map pulls in information from a wide range of sources to be able to provide frequent daily updates. shows cumulative confirmed cases, active cases, incidence rate, and the case-fatality ratio [25]. A similar Geographic Information System is used in Fiji named GIS Dashboard. The dashboard displays total cases, active cases, total deaths, totally recovered, new cases, samples tested, and it also shows nearby screening clinics and health facilities [26].

C. Contactless delivery of services

One of the key systems that play a vital part in the fight against Covid-19 is the online Sales and delivery system. In China, Healthcare services were provided to people with the assistance of WeChat, a mobile application that has a financial function linked with the Chinese National ID number. Citizens used this platform to purchase items, seek medical assistance, book appointments and this was also used by agencies and healthcare to reach out to the maximum audience [23].

D. Health QR Codes

The most used type of system across the world is the Health QR Codes, it has played a huge role not only to eliminate the spread of the virus but also to enable people to return to work. Individuals are required to scan their Health QR Code when entering or existing public places. The

Health QR Code helps to identify if a person is either a primary contact, suspected case or confirmed case, this helps the Healthcare Agencies easily locate infected people and take precautions and eliminate the spread of the virus [23]. In Fiji, similar QR Codes are used known as CareFiji QR Code [24].

IV. FINDINGS AND ANALYSIS

After thorough research, interviews, and observation it was found out that Fiji should consider having a centralized information system that can be used by Health works on the field while they are Swabbing close contacts, the healthcare officials who test these samples at Testing Centre and most importantly the public at large who can view their tested results. At present, there is an information system that is only used by the personnel that are testing the swab samples at the Testing Centre, however the field personnel who carry out Swab tests record the patient's information manual on a hardcopy paper, which is then passed with the sample to the Covid-19 Test Centre, the patients also receive their test results via email or hardcopy, which seems to be a lengthy and time-consuming process.

After a survey, eighty percent of the healthcare workers interviewed believed that a centralized information system will assist them in many ways such as it will eliminate Human Error, will help them be more productive, will save them time, and will enable information to be stored safely. Twenty percent of the sample interviewed opposed the system as they believed it will be costly and patients' information can be leaked.

Another survey carried out with the recent positive and primary contacts revealed that hundred percent of the sample believed that the centralized information system will assist healthcare officials to eliminate human error, will also allow them (Patients) to get timely reports on their test results and as well as obtain reports which they can forward to their employers as evidence of their health status in terms of Covid -19 test results are concerned.

A. Recommendation

To overcome the problem currently being faced in Fiji by healthcare personnel and the public at a large face, a web-based centralized information system is developed as part of this study. The application will assist healthcare personnel who are on the ground to conduct the swab, it will also assist the Test Centre and the Citizens of Fiji. For instance, when a person is classified as a primary contact, the health officials contact the individual and advise him/her to stay home and the official will visit them to carry out Swabs. Once the Health Care officials who are on the field to conduct Swabs are notified, they proceed to the residence of the Primary Contact, with the help of a Smart Phone, Tablet or Laptop, the Health Care official feeds in basic information about the person as shown in Fig 1, does swab test and submits the data, once submitted the record is stored in the database.

Covid-19 Swab Details

Fig. 1. Swab Details Page

Once the Test Centre receives the Swab Sample with the reference number (Birth Certificate Number) on the swab sample the official can access the information about the person from the system and enter the Test Result of the Sample that is either Negative or Positive as shown below in Fig 2 & Fig 3.

Birth Certificate Number	Name	Date of Birth	Phone	Address	First Test Result	Edit Entry
777-77-7777	Tina Nair	06/28/1995	(679) 893-9923	1 Kermode Road, Lautoka, BaFiji		Edit Entry

Fig. 2. Swab Record Page

Fig. 3. Swab Record Edit Page

Approximately 24 – 48 hours after the Swab is done, the Patients record should then be updated by the Testing Centre and the patient can view the reports, download the report, print out the report as well as email it all from the same portal as shown below in Fig 4.

Birth Certificate Number	Name	Date of Birth	Phone	Address	First Test Result
888-88-8888	Jashnil Kumar	06/28/1995	(679) 946-5554	1 Kermode Road, Lautoka, BaFiji	Positive

Fig. 4. Swab Result

After the mock application was created the same sample that is the HealthCare Official and Patients were provided to use the system, and the response received was overwhelming. Hundred percent of the Health Official sample believed that the system is user friendly, information stored will not be lost, minimal human error will enable them to save time and increase productivity, also, on the other hand, the Patients also found the system easy to use and their records timely available with few clicks rather than making numerous phone calls and follow up for the reports.

B. About the Application

The application was created by PHP Programming language and MySQL database was used for storing data, and a local server was created to host the site. The application is fully web-based and is responsive to be used by either Laptops, Desktops, Tablets or Smart Phone.

CONCLUSION

To conclude, Covid-19 will be around in Fiji and the rest of the world, we have to adapt to it and move on rather than having Covid – 19 as an excuse, we cannot eliminate the virus however there are ways in which we can tackle the virus, and with the development of Centralized Information System, it will provide a major boost for the Healthcare System in Fiji, as this will be a single application that will be used by more than half the population of Fiji, to access information about their health status from the web rather than visiting or call Health Officials, and to top it all the same application will be used by Patients and Healthcare Officials.

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