An Investigation Into the Impacts of ICT in the Compacting of COVID-19: A Namibian Context

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Abstract. The study aimed to investigate into the impact of a National COVID-19 Health contact tracing and monitoring system for Namibia. The study used qualitative methods as a research strategy. Qualitative data was collected through zoom meeting and a Google form link was distributed to the participants. The findings of the study revealed that a total of 18 participants responded to the semi-structured questions of which 38.9% represents male while female 61.1%. The age group between 18–25 response rate were 22.2%, age group between 26–35 response rate were 55.6%, age group between 36–45 response rate were 16.7% and the age group between 46 and above response rate was 10% represented in green colour to represent participants who fall in the age group between 46 and above. Therefore, the present study will investigate into the impact of a National COVID-19 health contact tracing and monitoring system and proposed a system which will allow every public member who visits an enclosed public place by capturing their demographic information as well as the date and time the facility was visited. The system replaces the paper-based method of recording the information of people visiting public places with an entrance that allows the coming in and out of people. The proposed system will also allow for real-time monitoring of temperature changes of individuals.

Keywords: ICT, Impact of ICT on COVID-19, COVID-19.

1 Introduction

This chapter offers an introduction to the report and typically introduces the problem, the research question and delimitations.

1.1 Background

Covid-19 is the world’s most recent pandemic that has been encountered in every nation of the world (WHO, 2020). The pandemic has been destroying many of the world’s economies and causing death to many in society (WHO, 2020). As such, this is not an exceptional case for Namibia. In light of the challenges caused by this pandemic, this study proposed a tracing and monitoring system that could trace and capture all the demographic details for public members visiting public places that have entrance and exit points.

The proposed system will allow Namibia’s Ministry of Health and Social Services to easily trace all the public members who visited any public place anywhere and anytime without the social workers having to physically visit public places where the members who would have been diagnosed with the case of Covid-19 would have visited that specific and other public places. The system proposed will allow every public member who visits an enclosed public place by capturing their demographic information as well as the date and time the facility was visited (Premalatha, Keerthana, & Abarna, 2019). The system proposed will replace the paper-based method of recording the information of people visiting public places with an entrance that allows the coming in and out of people. The proposed system will also allow for real-time monitoring of temperature changes of individuals. Moving into a new era of healthcare, new tools and devices need to be developed to extend and improve health services such as remote patient monitoring and risk prevention.

In this concept, the Internet of Things (IoT) and Cloud Computing present great advantages by providing remote and efficient services (Premalatha, Keerthana, & Abarna, 2019). In India, many patients are dying because of heart
attacks and the reason behind some of the deaths is that they are not getting timely and proper help. To give them timely and proper help first there is a need to continuously monitor the patients’ health. The fixed monitoring system can be used only when the patient is on the bed and this system is only available in hospitals. The system has also been developed for home use by patients that are not in a critical condition but need to be constantly or periodically monitored by a clinician or family member. In any critical condition, the SMS is sent to the doctor or any family member. The study done by Chan and Ma (2020) state that the most important insight from the global COVID-19 response to date has been that to successfully slow transmission and protect health systems, it is essential to accurately diagnose and effectively isolate and care for all cases of COVID-19 including cases with mild or moderate disease (in health setting or home setting, depending on the context and degree of illness). Chan and Ma (2020) further, added that as COVID-19 transmission has advanced globally, the primary focus of most countries has been the rapid identification, testing and treatment of patients with serious and severe COVID-19, and the sheltering of individuals at the highest risk of poor outcomes.

Similarly, Ting, Carin, Dzau, and Wong (2020) in their studies pointed out that the IoT provides a platform that allows public-health agencies access to data for monitoring the COVID-19 pandemic. For example, the ‘Worldometer’ provides a real-time update on the actual number of people known to have COVID-19 worldwide, including daily new cases of the disease, disease distribution by countries and severity of disease (recovered, critical condition or death) (https://www.worldometers.info/coronavirus/). Johns Hopkins University’s Center for Systems Science and Engineering has also developed a real-time tracking map for following cases of COVID-19 across the world, using the data collected from US Centers for Disease Control and Prevention (CDC), the World Health Organization (WHO), the European Center for Disease Prevention and Control, the Chinese Center for Disease Control and Prevention (China CDC) and the Chinese website DXY, which aggregates data from China’s National Health Commission and the China CDC (https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#!/bda7594740fd40299423467b48e9ecf6).

Ting, Carin, Dzau, & Wong (2020) state that with the involvement of ICT, tracking a disease may not even require direct human involvement. Smart devices, or the “internet of things,” can aid in the passive recognition of potential epidemics before they become a threat. For years, Kinsa Health, a company which manufacturers smart thermometers, has published an online map of recorded body temperatures which has successfully predicted the onset of the seasonal flu ahead of the CDC’s own systems for the past two years. With over 90% of known coronavirus patients experiencing a fever, such an approach could theoretically be adopted in order to anticipate new localized disease outbreaks and contain them before they grow to reach larger scales. Given the high rate of adoption for wearables such as Fitbit that promote personal fitness in the past five years, the health data which could identify and locate an outbreak in progress may already exist, being collected passively from millions of smartwatch users per day. Research is currently taking place to determine whether the data collected by these devices is sufficient to identify likely cases, possibly even before the onset of symptoms. Furthermore, internet users may generate sufficient data over the course of their ordinary online activities to identify emergent outbreaks, and even previously unknown symptoms of the disease, when analyzed in aggregate. Researchers at University College London have found a strong geographical correlation between Google searches for disease symptoms, such as fever, anosmia, and shortness of breath, and community outbreaks of COVID-19. Most intriguingly, the surges in these search results predated the public identification of these locations as infection clusters, meaning the same passive analytical tools could be applied to anticipate outbreaks and take preventative measures before they spiral into the public eye and out of control.

In the Namibian environment, the current methods used to trace and monitor member of the public entering enclosed public place is manual paper based system. The present study is investigating into the impact of a National COVID-19 Health contact tracing and monitoring system for Namibia and propose a solution to mitigate such challenges.

2 Research Problem

In the Namibian health domain, there is the challenge of public members visiting public places and their demographic information is captured manually which is yet another risk in the spreading of Covid-19. This is because the public members visiting any facility across the 14 regions of the country use one pen that is availed at each facility to write their details and as such this might put public members at risk of contracting Covid-19.

This study proposed a monitoring and tracing surveillance system that can capture all the details of every public member visiting any public place that has an entrance and exit point’s countrywide. Public health surveillance, and by extension the systems used to enable surveillance, is central to the practice of modern public health. Public health surveillance contributes data and information to assess and characterise the burden and distribution of adverse health events, prioritise public health actions, monitor the impact of control measures, and identify emerging health conditions that may have a significant impact upon the population’s health. The core role of surveillance systems within public health practice, and
their concomitant capacity to greatly influence the efficiency and effectiveness of the public health system, has stimulated research to strengthen the scientific basis of public health surveillance. In 1970, only 7% of PubMed articles about surveillance (20/277) focused on methods, but that proportion rose to 60% by 2015 (7,400/12,400) (Groseclose & Buckeridge, 2017).

3 Aim and Research Question

This study aims to investigate into the impact of a National COVID-19 Health contact tracing and monitoring system for Namibia.

What is the impact of a National COVID-19 Health contact tracing and monitoring system for Namibia?

4 Delimitations of the Study

The study only engaged only Covid-19 participants from the Ministry of health and social services in Namibia. The study only covered Khomas region and the unavailability of participants from the 13 regions of the country were excluded.

5 Research Method

The study used a qualitative approach. A qualitative approach was used primarily because it enabled the study to engage the participants through zoom meeting to gather data qualitative data (Jackson, Drummond, & Camara, 2007). The qualitative research method was selected as a strategy. Meaning that qualitative data was collected. This is mainly because the qualitative type of data is expressive, and opinion from involving actors. The study employed a case study approach. This enables the researcher to understand and explore a single unit of analysis in this case the Ministry of health and social services.

6 Data Collection Method

The study used the semi-structured interview to gather qualitative data through zoom meeting and Google link form. The semi-structured interview technique conducted has allowed flexibility during data collection, this included instant probing of participants answers that were obtained as this was done face to face (Adams, 2015). The semi-structured interview used has allowed the flexibility to rephrase and restructure the questions during the interviews. The study used design science research to guide in the development of the prototype.

7 Participants/Sampling/Data Collection Strategy

The study sample size was 30 participants and hence only (eighteen) (18) participants responded to the research questions. The determinant factor of the study sample size was based on Dworkin, (2012), who articulated that in qualitative studies, a target population of 30 is considered as sufficient representative sample and also considers saturation point at which additional data do not lead to any new emergent themes in qualitative studies. The study used purposive sampling because it enabled the researcher to rely on personal judgment when choosing members of the population to participate in this study (Ames, Glenton, & Lewin, 2019).

8 Data Analysis Method

The study employed interpretive techniques to analyse qualitative data. Interpretive techniques were used to enable the researcher to organise, rearrange, categories, summarise and modelling qualitative data in a descriptive format. Interpretive research is a research paradigm that is based on the assumption that social reality is not singular or objective, but is rather shaped by human experiences and social contexts (Elliot & Timulak, 2005).

9 Research Ethics

As stated in the research objectives, and indicated in the research methods section, the research was carried out, using healthcare facilities for MoHSS. Due to the sensitive nature of healthcare data, the ethics of the institution was highly considered. The study abided to the ethics of the Ministry of Health and Social Services (MoHSS), and the specific healthcare facilities that were used. Also, the research ethics of the University of Stockholm, under which this study was conducted, was strictly adhered to throughout this research study.

10 Results

A total of 30 participants engaged in the study and semi-structured questions were distributed to Covid-19 social workers through Google form link in Namibia of which 18 participants responded.

Response Rate

The study was conducted with the Covid-19 social workers from Ministry of health and social services in
Namibia. A total of 18 participants responded to the semi-structured questions of which 38.9% represents male while female 61.1%.

Figure 1 above represent the number of participants that were engaged in the study which means female were the majority to respond with 61.1% response rate while minority were male with a response rate of 38.9%.

The study distributed Google link form to different age group as represented on Figure 2 in a form of age group response rate in percentage. The age group between 18–25 response rate were 22.2%, age group between 26–35 response rate were 55.6%, age group between 36–45 response rate were 16.7% and the age group between 46 and above response rate was 10% represented in green colour to represent participants who fall in the age group between 46 and above.

The above represent the gender, age group and number of participants who were engaged in the study of which female were 11 while male were 7 as depicted in Table 1.

The response rate from age group between 18–25 indicated that in Namibia there are no immediate and readily available centres to test people and thermometer, paper record and register book are used as a methods of tracing and monitoring Covid-19 patients.

The response rate from the age group between 26–35 revealed that the current method used to trace and monitor people in Namibia is a digital thermometer used to check everyone's temperature before entering any enclosed public place.

The response rate from the age group between 36–45 indicated that a thermometer used by capturing everyone's temperature who is entering any enclosed public place.

The response rate from age group between 46 and above revealed that data cannot be retrieved from previous visit such as daily, weekly and monthly since information is traced and monitored manually and also no enough thermometer.

The response rate from the age group between 26–35 indicated that there is an unavailability of thermometer in the Namibian public facilities.

The response rate from the age group between 36–45 pointed out that some people visiting enclosed public place do not write their correct demographic information on the manual paper based system in place at the moment. The participants further indicated that since the Ministry is using a manual paper based system information can easily get lost.

The response rate from the age group between 46 and above revealed that papers sometimes can be missed resulting in storage challenges. The participants further state that even though private companies have registers were public members are registered their demographic information this information is not necessary shared with the Ministry of health. However, most government offices have in place a Covid-19 screening area, the Ministry of health have also identified some health facilities as Covid-19 testing centers, in addition to that there are mobile teams that does active tracing in communities which report such information back to the head office

Table 1. Number of participants in each age group.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age Group</th>
<th>Participants in Each Age Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>18–25</td>
<td>11</td>
</tr>
<tr>
<td>Male</td>
<td>26–35</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>36–45</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>46 and Above</td>
<td>1</td>
</tr>
</tbody>
</table>

Total participants 18
manually as data gathered is not reported back to the head office in real time.

**Why does the Ministry of health use a manual paper based system.**

The response rate from age group between 18–25 this is only method available at the moment.
The response rate from the age group between 26–35 this is the only method available at the moment.
The response rate from the age group between 36–45 this is the only available method at the moment.
The response rate from the age group between 46 this is the only available method at the moment.

Overall the present study discovered in both age groups 18–25, 26–35, 36–35, 36–45 and 46 and above the participants revealed that the Ministry of health and social services in Namibia use a manual paper based system to trace and monitor public members temperature when entering any enclosed public place.

**Recommendations**

The present study recommends the Ministry of health and social services in Namibia to develop a prototype application system that can trace and monitor the temperature for an individual that visits public places in Namibia.

**11 Data Collection and Analysis**

Qualitative data was collected through, sharing Google form link and zoom meeting interviews with the eighteen (18) Covid-19 social workers. Interpretive techniques were used to enable the researcher to organise, rearrange, categories, summarise and modelling qualitative data in a descriptive statistics that enabled the study to present the data in a more meaningful way, which allowed simpler interpretation of the data.

**12 Findings**

The study obtained the data by distributing Google form link to participants who were categorised according to their gender and age group such as 18–25, 26–35, 36–45 and 46 and above. In each age group were asked to respond responded to the following research questions which include what are the participants demographic information?, what were the participant’s age groups?, what are the current methods used to trace and monitor members of the public temperature when visiting any enclosed public place in Namibia?, what are the current challenges encountered by the Ministry of health and social services by monitoring and tracing public member’s temperature when entering enclosed public palace? and the last question was if participants can provide other information related to the topic under discussion.

The findings of the study revealed that a total of 18 participants responded to the semi-structured questions of which 38.9% represents male while female 61.1%. Besides, the study also.

The study distributed Google link form to different age group as represented on the pie chart above in a form of age group response rate in percentage. The age group between 18–25 response rate were 22.2%, the age group between 26–35 response rate were 55.6%, the age group between 36–45 response rate were 16.7% and the age group between 46 and the above response rate was 10% represented in green colour to represent participants who fall in the age group between 46 and above.

**13 Discussion**

In this concept, the Internet of Things (IoT) and Cloud Computing present great advantages by providing remote and efficient services (Premalatha, Keerthana, & Abarna, 2019). In India, many patients are dying because of heart attacks and the reason behind some of the deaths is that they are not getting timely and proper help. To give them timely and proper help first there is a need to continuously monitor the patients’ health. The fixed monitoring system can be used only when the patient is on the bed and this system is only available in hospitals. The system has also been developed for home use by patients that are not in a critical condition but need to be constantly or periodically monitored by a clinician or family member. In any critical condition, the SMS is sent to the doctor or any family member. The present study findings revealed that in both age groups 18–25, 26–35, 35–36, 36–45 and 46 and above the participants revealed that the Ministry of health and social services in Namibia use a manual paper-based system to trace and monitor public members temperature when entering any enclosed public place and the age group between 18–25 response rate were 22.2%, age group between 26–35 response rate were 55.6%, age group between 36–45 response rate were 16.7% and the age group between 46 and above response rate was 10% represented in green colour to represent participants who fall in the age group between 46 and above.

**14 Analysis of the Results**

The study analysed the data through the use interpretive techniques whereby qualitative data gathered through zoom meeting and Google link form were interpreted by rearranging, model the data, summarise and categorise
which enabled the study to cleanse, transforming and modelling data to discover useful information, informing conclusions and support decision making.

The study asked the following questions to the participants and the participant answered that both age groups 18–25, 26–35, 35–36, 36–45 and 46 and above the participants revealed that the Ministry of health and social services in Namibia use a manual paper-based system to trace and monitor public members temperature when entering any enclosed public place and the age group between 18–25 response rate were 22.2%, age group between 26–35 response rate were 55.6%, age group between 36–45 response rate were 16.7% and the age group between 46 and above response rate was 10% represented in green colour to represent participants who fall in the age group between 46 and above.

The qualitative data collected were proven as reliable and credible simply because a saturation point was reached by all the research questions answered from different participants in each gender and age groups their answers were the same which prove that the answers provided by the participants were credible.

15 Future Research

The study is recommending future researchers to consider all aspects that were not covered in this research. Besides, anything that was not included in this research should be considered in future studies. The study proposed future studies to develop a prototype application system that can trace and monitor the temperature for an individual that visits public places in Namibia.

16 Conclusion

In the Namibian health domain, there is the challenge of public members visiting public places and their demographic information is captured manually which is yet another risk in the spreading of Covid-19. The present study proposed a system that can trace and monitor the temperature for an individual that visits public places in Namibia, which includes the temperature for the present day, temperature for last month and also the temperature for the individual for the previous day (yesterday).

References