Urban poverty response management during pandemic using geographic information system

S A Hamim\textsuperscript{1}, F Usman\textsuperscript{2}, H N Gumano\textsuperscript{1} and F Jamil\textsuperscript{3}

\textsuperscript{1}Universitas Indo Global Mandiri, Jalan Jenderal Sudirman 629 Km 4 Palembang, 30129, Indonesia
\textsuperscript{2}Institute of Energy Infrastructure, Universiti Tenaga Nasional, Kajang 43000, Selangor, Malaysia
\textsuperscript{3}BAPPEDA LITBANG, Palembang, Indonesia

Abstract. COVID-19 pandemic had influenced various aspects of community activities such as health, education and socio-economic. The effect of economic activities had caused many people to experience a decrease in income and loss of work due to the laid-off of informal workers. Overall, this unprecedented situation had led to an increase in the new poverty rate. In Palembang, based on the Non–DTKS (Integrated Social Welfare Data) data, the number of new poor affected by COVID-19 pandemic was 30,765 people. Therefore, the new poor needed to be responded immediately, and the aid distribution needed to be followed up. This paper presents the development of a web-based operation dashboard in Geographic Information System to map the distribution of people categorized in poverty and new poor affected by the pandemic. The operational dashboard functioned as aid distribution activity monitoring. The type of aid, the number of people receiving the aid was recorded using the geo-tagging capabilities. By having this system, the community centres set up by the sub-district office would have an operational dashboard to monitor activities and examining the aid distribution.

1. Introduction

COVID-19 pandemic has disrupted lives, community, economy, and business throughout the world, and then it affected global poverty [1]. It has affected every aspect of life. COVID-19 has turned the world upside down [2]. Fundamentally, the COVID-19 pandemic increased an awareness that the disease does not have a nationality and that we are all connected as one 'global nation' [3]. World Bank assumed that in 2020 there could be around 71 million people would become extremely poor. With the unprecedented pandemic. It led the world's poverty rate in 2019 climbed from 8.23% to 8.82% below the basic scenario or 9.18% below the downside scenario. People with new extreme poverty would scatter in the countries that currently have high poverty rates. Covid-19 had caused an instantly extensive impact on employment [4]. Surprisingly, in this current quarter, the global working hour
plummeted up to 10.5%; this was equivalent to 305 million full-time labours with 48 working hours per week [2]. World Bank also estimated that the declining economic output due to Covid-19 triggered the appearance of 9.6 million new poor in Indonesia. As a result, Indonesia's poverty rate increased by 3.6% [4].

Related to the outbreak of the COVID-19 epidemic, the number of poor affected has increased. Measures have been in place to break the COVID-19 chain and prevent the virus spread, and the city government issued a policy to restrict community activities and movement. The underlying protocols such as staying or working at home, physical and social distancing, self-isolation of the suspected cases, practising good hygiene and avoiding large gatherings would significantly reduce the infections and spread of the disease [1]. Many businesses would incur productivity losses and business closures, these businesses tried to dismiss their employees to avoid the possibility of virus spreading. If a business failed, many employees would have become unemployed [5]. Besides health, education, socio-economic, religious activities, culture and by many other sectors of life are also affected. The Mortality rate increased due to limited health facilities, infrastructure, and medical workers. The schools were also closed for an extended period could have detrimental social and health consequences for children living in poverty and be likely to exacerbate existing inequalities [6]. Also, shops, groceries, restaurants, hotels, tourism businesses and travel agencies may close or encounter a significant decline in demand. Additionally, sufficient food availability, its production, and supply had been disrupted by the restricted movement measures. This situation had led to rising food costs causing it difficult for an unprivileged individual to survive [1]. Government and communities were required to support the financial aid, food, medicines, health, and other basic things people needed for themselves and the new poor.

Palembang, a city with an area of 369.2 km\(^2\), has a population of 1,615,658 people with an average population growth rate of 1.47% [7], [8]. Poverty in Palembang is still one of the problems that become the priority of alleviation [9]. The government has the responsibility to ensure the distribution of aid provided to the community quickly, and on the target directly, a database system is necessary to inform the recipients' location as well as the type of assistance received. The role of Geographic Information Systems in this project was to monitor the distribution of aid to avoid corruption and mismanagement. This paper presents the development of the web-based GIS of an operational dashboard called Urban Poverty Response Management Information System to monitor the aid distribution to the poor and new poor affected by the pandemic.

2. Study area and method

The study area is in Palembang City, a capital in South Sumatera Province consisting of 18 districts. Figure 1 shows the distribution of population at 118 sub-districts of Palembang City. In this study, the development of the Urban Poverty Response Management Information System used the Environmental Systems Research Institute's (ESRI) platform in two stages. In short, the sequential stages are started on site by aid distribution and reporting. After the distribution of the COVID-19 humanitarian response to the recipients is accepted, officers must report the precise details. Type of aids, the recipient ID, photos, and geo-tagging of recipient locations (i.e. by name and by address) are recorded through the Digital Survey 123 (in Survey of COVID-19 Response of Palembang City). The system is operated on a mobile phone. Figure 2 presents the process of community economic defense response during the COVID-19 pandemic, which is included in the GIS COVID-19 Portal section of Palembang.
In Figure 2, stage A, the reports from field officer are directly stored in the GIS COVID-19 Portal database, in real-time. The geo-tagging information allows the information to be displayed spatially through the web map viewer. The map view is integrated with Operation Dashboard that displayed the spatial data visualization in a web map viewer with graphical data (i.e. tables, number indicators, charts, photos) were integrated. In stage B, the reports that were stored in the GIS COVID-19 Portal database are analyzed for further application in the ArcGIS Hub. The ArcGIS Hub is a portal with content management system (CMS) where the various developed applications using ESRI platform are integrated.

Furthermore, to reach the complete information and to relate it to the various features in Portal GIS COVID-19 of Palembang, the web-based portal is built with open data sharing capabilities. Therefore, the reporting results can be accessed in real-time through this Website Hub-Page as well. Because the platform could manage open data, it was very suitable for various parties to download and to utilize the data for further analyses according to their individual needs.

Finally, the Operation Dashboard Output has progress monitoring functions in stage A. The Output directly available on the open data hub website. The output in stage B can be useful for reporting, monitoring material and evaluating for the policymaking. Hence, the field condition is more optimal and achieved the main objective of responding to the economic resilience of the community during the pandemic COVID-19 era in Palembang.
3. Analysis and result

3.1. New poor distribution

There were 30,785 new poor in Palembang City in the first two months of the pandemic based on Non–DTKS 2020. The new poor spread in 107 sub-districts of Palembang as in Figure 3. The new poor people were spread at Talang Betutu Sub-district, Kebun Bunga Sub-district, Sukarami Sub-district, 20 Ilir D. II Sub-district, Pahlawan Sub-district, Sialang Sub-district, Sri Mulya Sub-district, Sei Selayur Sub-district, 3 Ilir Sub-district, Tangga Takat Sub-district, 16 Ulu Sub-district, Kemas Rindo Sub-district, Kemang Agung Sub-district, Karang Anyar Sub-district, and Bukit Lama Sub-district. In comparison, the highest number of new poor was at Kemang Agung Sub-district with 898 people. As for the urban area, no new poor people were spreading in 3 districts, namely Bukit Kecil District at 24 Ilir Sub-district, Kemuning District at Pipa Reja Sub-district and Plaju District at Komperta Sub-district.

Figure 2. Workflow urban poverty response

Figure 3. The Distribution new poor people in Palembang City
3.2. The urban poverty response management information system

As a response to the increasing number of poor people due to the economic downturn of the community during the COVID-19 pandemic, the elements of the city government had prepared socio-economic assistance directly to the affected communities. The various types of assistance distributed consisted of Direct Cash Assistance (BLT), food, medical services, medicines, mask, environmental detention, hand washing facilities, and other assistance that were provided and ready to be distributed, as shown in Figure 4.

![Figure 4](image_url)

*Figure 4. The aid COVID-19 distribution for new poor people in Palembang City*

However, process of distribution of the aid was different from the conditions before the COVID-19 pandemic. According to the COVID-19 protocol, it is prohibited to have mass crowding at one location. The distribution of the aid carried out without causing a mass gathering. The aid is distributed to each recipient's home, at the same time it is ensuring that the aid is on target. Thus, it encouraged the development of a management information system response to ensure and to monitor the procedure for channeling assistance by following the COVID-19 protocol, reach the targeted recipients precisely (i.e. by name by address) and reported in real-time. In Figure 5, various types of...
assistance are shown in the operational dashboard that displays results of the aid distribution in real-time. On the map, symbolization was based on the distribution of aid that had been distributed. The pop-up information is represented by the name, address, type of aid, and photo documentation of assistance by the filed officers.

**Figure 5.** The pop-up information of aid recipient

### 3.3. Monitoring and evaluation of urban poverty response dashboard

Figure 6 shows the Web app called Monitoring Distribution of Aid and Activities of Palembang's COVID-19 Response. The monitoring dashboard is updated from assistance distribution activities on site. The process of reporting is more compatible with mobile devices. The dashboard displayed the activities and progress of social assistance distribution, and it is published immediately after the submission report by the field officer. There is some information such as graphical indicators and other figures related to each other at the time of operation and other tools to see further information.
Figure 6. Distribution new poor community in Palembang City

Figure 7 displays layers that showed the number of new poor communities and clusters by the level of amount of distribution of assistance have distributed. It can be seen on the map, based on reported activities from 1st May until 30th May 2020, the concentration of distribution aid had been conducted. Still, it had not yet reached the priority entire of the new poor people in the 15 sub-districts. It can be seen that the type of aid that had been distributed is mostly food packages (sembako) and followed by Direct Cash Allowance/BLT (IDR 600,000 per person) given to the affected communities and those who were worthy of receiving. In addition to the sembako and BLT, The Palembang City Government also provided health assistance, however, the reports had been distributed in small amounts.

Figure 7. Clusters by assistance distributed in the new poor area

4. Conclusions

Two monitoring systems and data collection systems had been developed as a response to the pandemic in Palembang City to the affected community. The two web-based Geographic Information Systems were the Urban Poverty Response Management Information System and Monitoring and Evaluation of Urban Poverty Response Dashboard. Through these systems, the distribution of aid
should be regulated/re-evaluated according to the pattern of priority levels. So that, the benefits would be perceived, and it led changes at least ensuring the most vulnerable people in economic would become resilient.

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