MAPPING OF POSYANDU SERVICES FOR YOUTH USING ArcGIS: SPATIAL ANALYSIS OF POSYANDU FOR YOUTH IN BATAM CITY

Eka Fitri Amir* , Asep Marzuki , Septi Maisyaroh Ulina Panggabean, Yola Abdila Sianipar

Awal Bros University, Batam
Abulyatama Street, Subdistrict Belian, Batam City, Indonesia

e-mail : ekafitri@univawalbros.ac.id

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ABSTRAK

Latar belakang Remaja merupakan kelompok yang rentan terhadap masalah Kesehatan akibat perilaku buruk. Hadirnya posyandu remaja ditengah tengah masyarakat nyatanya belum menjamin tercapainya tujuan Kesehatan nasional, banyak kendala dalam pelaksanaannya.Tujuan penelitian ini adalah untuk mengetahui pengaruh sumber informasi dari website dengan pengetahuan remaja terhadap kegiatan posyandu remaja. Penelitian ini menyediakan data berupa peta visualisasi menggunakan website berbasis ArcGIS sehingga pengguna website dapat mengetahui informasi lokasi dan program posyandu remaja yang ada di Kota Batam. **Metode** yang digunakan dalam penelitian ini adalah penelitian campuran dengan melakukan pengembangan Sistem Informasi Geografis (GIS) menggunakan ArcGIS yaitu aplikasi pemetaan dan visualisasi informasi lokasi, sarana prasarana, serta efektifitas program posyandu remaja di Kota Batam dan pengujian data kuantitatif analitik observasional dengan rancangan cross sectional study. Sampel dalam penelitian ini adalah data posyandu remaja di Kota Batam dan remaja yang ada di wilayah kerja posyandu remaja. Data dikumpulkan dengan melakukan survei dan studi literatur kemudian melakukan identifikasi pola spasial dan pengujian data kuantitatif menggunakan chi square. **Hasil** Penelitian berdasarkan hasil pengembangan dan survei maka diperoleh jumlah posyandu remaja yang ada di Kota Batam adalah Posyandu Remaja yang tersebar di 12 Kecamatan dan 21 Puskesmas di Kota Batam. Untuk uji chi squre didapatkan P-value 0.005. **Kesimpulan penelitian** terdapat hubungan yang signifikan antara sumber informasi dengan pengetahuan remaja terhadap kegiatan posyandu remaja di Kota Batam serta Data posyandu remaja telah dinterpretasikan ke dalam ArcGIS dan dapat ditampilakan dengan pilihan visualisasi open stret Maps, google Maps maupun visualisasi data satelit posyandu remaja di Kota Batam.

Kata Kunci : arcgis, pemetaan posyandu remaja, pengetahuan, website

ABSTRACT

Background: Adolescents are a group that is vulnerable to health problems due to bad behavior. The presence of adolescent posyandu in the community has not guaranteed the achievement of national health goals, there are many obstacles in its implementation. **Objective**: The purpose of this study was to determine the influence of information sources from websites with adolescent knowledge of adolescent posyandu activities. This study provides data in the form of visualization maps using an ArcGIS-based website so that website users can find out information on the location and adolescent posyandu programs in Batam City. The method used in this study is mixed research by developing a Geographic Information System (GIS) using ArcGIS, namely a mapping application and visualization of location information, infrastructure, and the effectiveness of the adolescent posyandu program in Batam City and testing observational analytical quantitative data with a cross-sectional study design. **Method**: The sample in this study was adolescent posyandu data in Batam City and adolescents in the adolescent posyandu work area. Data were collected by conducting surveys and literature studies, then identifying spatial patterns and testing quantitative data using chi square. **Results:** based on the results of development and surveys, the number of adolescent posyandu in Batam City is obtained, namely the Adolescent Posyandu spread across 12 Districts and 21 Health Centers in Batam City. For the chi square test, a P-value of 0.005 was obtained. **Conclution**: The conclusion of the study is that there is a significant relationship between information sources and adolescent knowledge of adolescent posyandu activities in Batam City and adolescent posyandu data has been interpreted into ArcGIS and can be displayed with a choice of visualization of openstreet Maps, google Maps or visualization of adolescent posyandu satellite data in Batam City.

Keywords: arcgis, mapping adolescent posyandu, knowledge, website

INTRODUCTION

The adolescent Posyandu program is a program initiated by the government through the Health Service which has been implemented in several Puskesmas areas including in Batam City. The adolescent Posyandu was formed with the hope of being able to answer the health challenges of adolescents in the Puskesmas area. Teenager is vulnerable groups to Health problems due to behavior at risk . Teenagers is a transitional period between lifetimes child children and time growth and development biological and psychological and have Lots challenge Good from self Alone and also from environment (Cahyo Wulandari et al., 2024; Shrestha, 2019)

Supervision efforts to grow flower teenagers and become receptacle knowledge on Adolescent Health . Progress technology the rapid follow give impact to problem teenager , start from problem Which sensitive And Also to matter Which nature negative. Various Disease contagious and disease No contagious in teenagers appear as reason main number death And disability teenager ,gap social teenager,pressure blood tall , smoking , diabetes mellitus as well as consumption food No healthy (Andolina et al., 2023; Cini et al., 2023; Hakim et al., 2016; Vermita w et al., 2019)

Student Health Risk Factors age 12 -18 years in a way national there are 41.8% men man san 4.1 % Woman Once confess smoking , 32.82 % man man And 2.6% man man Onceconsume drugs . Other risk factors include behavior sexual as many as 8.28 student man male and 4.17% students Woman Once relate sexual . One of the Effort which is conducted For prevent incident the is with to form integrated health service post teenager Which considered method preventive And promotive (Parker, 2020). Formation

integrated health service post teenager expected can become receptacle For facilitate teenager in understand adolescent health problems , found alternative breakdown problem ,to form group support teenagers , expanding range health services especially for teenagers who have limitations access in reach service Health (Fitriani & Setiana, 2023; Parker, 2020)

The presence integrated health service post teenager in the middle middle public in fact Not yet ensure achievement national health targets , there are Lots constraint in its implementation between constraint the is participation teenager Still low, mentor integrated health service post Noin accordance with his expertise, cadres No always present in activity integrated health service post teenager , the size information related timetable implementation integrated health service post, method integrated health service post with lecture make teenager not enough interested For participate, so Also problem Health teenager Which Not yet can resolved in a way effective(Ifalahma et al., 2021; Larasaty & Hasna, 2021; Pandawa & Djama, 2024)

Data visualization techniques in form GIS mapping is expected can become solution effective For convincing taker policies at various levels of administration For determine priority Health problems and determine what Health program is most appropriate For implemented including breakdown Reproductive Health Problems teenagers .

Development system information geographical make it easier access everyone towards map, with existence analysis spatial so phenomenon distribution Health problems at Posyandu teenager can immediately detected (Agrawal & Gupta, 2020)

Visualization mapping integrated health service post teenager using ArcGIS can identify location optimal integrated health service post teenager with analysis cluster And analysis distance nearest , help placement integrated health service post teenager in a way optimal so that problem teenager in the form of risk health can minimized in a population (Sumarni et al., 2022a) Data visualization techniques in form GIS mapping is expected can become solution effective For convincing taker policies at various levels of administration For determine priority Health problems and determine what Health program is most appropriate For implemented . (Ernawati et al., 2014; Sumarni et al., 2022b)

Technology System Information Geographic Information System (GIS) is a technology geographical Which own ability in gather , manage , manipulate And visualize related spatial data with position on the surface earth on A map in accordance with position surface earth Which Actually with point the coordinates. Based on this, the purpose of this study is to conduct mapping so that it can help allocate efficient resources by knowing the location and distribution of adolescent health posts and ensuring that adolescent health posts are easily accessible to the target population of health posyandu.(Donya et al., 2020; Sumarni et al., 2022b)

RESEARCH METHOD

The method used in this study is a mixed research by developing a Geographic Information System (GIS) using ArcGIS, namely a mapping application and visualization of location information, infrastructure, and the effectiveness of the adolescent posyandu program in Batam City and testing observational analytical quantitative data with a cross-sectional study design. The sample in this study was adolescent posyandu data in Batam City and adolescents in the adolescent posyandu work area there are 78 teenager. Data were collected by conducting surveys and literature studies, then identifying spatial patterns and testing quantitative data using chi square.Method Collection data on study This is with conduct survey development And direct identification at adolescent

integrated health posts spread across the Batam City area for obtain information on adolescent risk factors, identify specific areas, and demographic data. others related to adolescent health. Researchers use the Information System Geographical for do Mapping to Integrated Health Service Post teenager And factor risk Health teenagers who There is in City Batam, Development System with make visualization mapping using the ArcGIS application, implementing the data that has been obtained into map which are already made Then Making Website use application Visual Studio Code with code program HTML. Research This has get recommendation eligibility ethics in the Committee Ethics Awal Bros University Research with number 0151/UAB1.20/SR/KEPK/07.24 Protocol: UAB240010

RESULT AND DISCUSSION

Mapping of adolescent posyandu in Batam City was carried out by collecting secondary data at the Batam City Health Office to confirm the permits for the establishment of adolescent posyandu spread across Batam City and then conducting a direct survey to the registered adolescent posyandu spread under the working area of the Health Center in Batam City, then the data for taking the location points and images of the Posyandu will be entered into ArcGIS and will be processed into a map. The following is a table of the number of adolescent Posyandu in Batam City in 2024

First table data, it can be seen that the number of adolescent Posyandu spread across Batam City has an uneven distribution pattern for each Health Center, this is influenced by the level of population density in one sub-district in Batam City. The number of adolescent Posyandu in Sagulung District is Sei Langkai and Sei Lekop Health Centers with a total of 27 adolescent Posyandu, each of which is 25 in the Sei Lekop area and 2 in the Sei Langkai Health Center area. For the Batam City area itself, there are 2 Health Centers and a total of 6 adolescent Posyandu with 2 adolescent Posyandu each in the Botania Health Center and 2 adolescent Posyandu in Baloi Permai. Bengkong District has 2 Health Centers and 5 adolescent Posyandu, 2 each in the Tanjung Buntung area and 3 in the Sei Panas area. Sekupang District has 3 health centers and a total of 13 adolescent Posyandu, namely Sekupang Health Center 3 Posrem, Mentarau Health Center 8 Posrem, Tiban Baru Health Center 2 adolescent Posyandu. Nongsa District consists of 11 adolescent Posyandu, each of which is located in the working area of the Jabi village health center 5 Posrem, Kabil Health Center 5 Posrem and Sambau Health Center 1 Posrem. Sei Pancur Health Center has 2 adolescent Posyandu. Batu Aji District consists of 4 adolescent Posyandu, each 2 Batu Aji Health Center and 2 in Tanjung Uncang Health Center

Table 1. Number of Adolescent Posyandu

No	Name of Health Center	Amount Post Office
1	Sei Lekop Community Health Center	25
2	Bulang Health Center	6
3	Batu Aji Health Center	2
4	Tanjung Buntung Health Center	2
5	Tanjung Uncang Health Center	2
6	Sei Panas Health Center	3
7	Kampung Jabi Health Center	5
8	Health Center Sambau	1
9	Kabil Health Center	5
10	Lubuk Baja Health Center	2
11	Health Center Sekupang	3
12	Sei Pancur Community Health Center	2
13	Baloi Permai Community Health Center	4
14	Tiban Baru Health Center	2
15	Sei Langkai Community Health Center	2
16	Health Center Mentarau	8
17	Botania Health Center	2
18	Galang Health Center	1

19	Health Center Rempang Cate	1
20	Tanjung Sengkuang Community Health Center	4
21	Belakang Padang Health Center	1

The first stage carried out is the development of a system with several flows such as making maps using the GIS application then implementing the data obtained into a map that has been made in GIS and then creating an open source website that can be accessed through the website platform using the web address https://posrembatam.com Researchers also added information related to adolescent reproductive health and the function of forming adolescent Posyandu and the latest news column containing activities at one of the adolescent Posyandu. The following is a display of the map application that can be accessed via the website

Figure 1: Main Website View

The Main Display contains *Widgets* on the website application that has been connected to ArcGIS which can function properly according to the display and functions that have been set previously. If data changes are needed, the latest information on the website application provided will be updated *on* the ArcGIS page. The Home Display contains the latest news information that can be added based on activities at the Youth Posyandu.

Figure 2: About Menu

On the about menu or about the website column *widget* , there is information about adolescent posyandu including information about the role of adolescent posyandu in general. The appearance and information on this page can also be updated if necessary.

Building Map Applications with ArcGIS

ArcGIS is defined as a complex computer system for entering, storing, managing,, modeling, and mapping digital spatial information. In conjunction with modern information technology, GIS enables new forms of communication between people, not only in the field of research but also throughout society.

The display that is easy to understand by the reader and simple makes ArcGIS designed as a personal map that is needed to be able to find out information related to adolescent posyandu. The following is the result of a map application created using ArcGIS

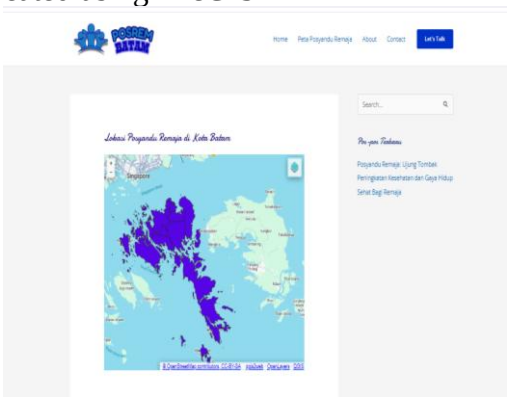

Figure 3: Map application created using ArcGIS

The application display in Figure 2 shows the boundaries of Batam City which have been adjusted to the data of adolescent posyandu points which are divided based on the District and have been *uploaded* to the adolescent posyandu map menu on *the widget* . This menu can be accessed and *updated* if there is a change in data.

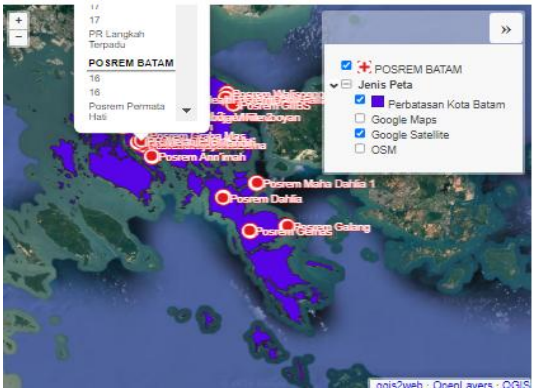

Figure 4: *Layer* Menu in ArcGIS

On the map menu displays the function of the Map type *widget* , users can select a map display on the main screen with the *Google Maps visualization menu* , satellite view and *open street Maps*

Correlation Sources of Information and Knowledge

Based on the results of the study, the source of information about adolescent posyandu, it is known that out of 78 respondents studied, 65.54% of respondents visited the adolescent posyandu website in the past week and 34.46% did not open the adolescent posyandu website. This shows that adolescents get a lot of information through the internet.

The level of knowledge of the respondents was 78 respondents with a level of knowledge in the good category of 60.23% and 39.77% were in the category of poor knowledge. This shows that the majority of respondents have a good level of knowledge related to adolescent posyandu information.

Tabel 2 : Uji chi square

Variabel	P-Value
Correlation Sources of Information and Knowledge	0.005

Based on the results of the chi square statistical test, the Asym.Sig P value is 0.005, so it can be concluded that there is a relationship between information sources and adolescent knowledge about adolescent posyandu. In line with research conducted by Rozan (2022) who conducted structured interviews with respondents and obtained several categories of adolescent internet users. The first category is blind to the internet and the category of mastering but not being relied on, the third category is the internet is not the main one and has partial information literacy skills, the category of relying blindly, relying but not mastering and the category of mastering the internet. Overall, adolescents are included in the category of users who state that they are helped because of the information available and their ability to use the internet is very good (Rozan & Dewi, 2022; Wulandari & Netrawati, 2019)

Research on the relationship between information sources and levels of knowledge conducted by Utario (2022) found that respondents who tend to obtain information tend to have broad knowledge in line with the intensity of the respondents to open up information around them (Utario & Khorini, 2022)

CONCLUSIONS

Based on results making ArcGIS application mapping of adolescent posyandu in Batam City, the author can conclude that this study is in the form of data presentation in the form of information visualization results using GIS or Geographic Information System which contains information about the location of adolescent posyandu, adolescent posyandu activities, adolescent targets and

documentation of facilities and infrastructure of adolescent posyandu in Batam City totaling 78 adolescent posyandu spread across Batam City under the guidance of the Puskesmas work area in 2024. The first stage carried out is System Development with several flows such as making maps using the GIS Application then implementing the data obtained into a map that has been made in GIS and then creating a website to visualize and spatially analyze the location of adolescent posyandu. And there is a significant relationship between sources of information and adolescent knowledge about adolescent integrated health posts in Batam City.

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