

Adaptation of Primary Service Functions of Public Health Centers as Early Handling of Covid-19 on a Community Scale

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Abstract—In recent months the world has been faced with the Covid-19 outbreak. The existence of this virus has a severe impact on aspects of human health and well-being. In Indonesia, primary health facilities include The Public Health Centres have a fundamental role in controlling and preventing the spread of the virus. The rapid screening process is a crucial step in detecting Covid-19 affects changes in the overall function of space and architecture at the Puskesmas facilities. To improve the Public Health Centre's function in handling the Covid-19 pandemic has a high urgency value in preparing primary health facilities that are responsive to the global pandemic. This study aims to provide design solutions for the City Government in improving and developing health facilities as public services in the future. This research uses deductive-explorative research methods with a rationalistic approach by bringing Grand Theory to find and explore cases in the field. Then create a research framework, process, and analyse data and formulate results qualitatively. The results of this research are implemented in the design solutions of the Public Health Centre as follows: 1) Configure the shape and space; 2) Creating a model space; 3) Create a space atmosphere.

Keywords—*health-facility, space, model*

I. INTRODUCTION

Currently, the world is busy with the emergence of the Corona Virus pandemic or better known as Covid-19. This pandemic is an emerging infectious disease and has attacked many countries. It is inseparable Indonesia, which has plagued this disease in all provinces. The Indonesian government, especially the Ministry of Health, has made efforts to prepare all preventive and treatment for this disease. Health facilities and other facilities have been trying to be prepare, but in fact, the rapid spread of the Covid-19 has not been matched by complete readiness for handling the disease. Many facilities that are not standard have been temporarily transferring for emergency treatment before being referred to the hospital.

The development of the Covid-19 disease in West Kalimantan, especially in Pontianak City, has spread to all sub-

districts in Pontianak City [1]. In the health system in Indonesia, the Public Health Centre (*Puskesmas*) is the leading health facility for the first level of health services in the community [2]. Promotive and Preventive Role in the Public Health Centre that acts as a centre for information and disease prevention for the community [3]. The need for strengthening the Public Health Centre is a starting point for treatment (curative and rehabilitative) for the prevention of Covid-19 in the community [3]. Promotive steps in the Public Health Centre are in the form of approaches to the community to know the signs and symptoms of Covid-19. Preventive measures to screen and collaborate with doctors and nurses in monitoring people without symptoms, people under surveillance, and patients with mild symptoms [4]. Other efforts are curative with initial treatment without going to hospital and rehabilitative by providing counselling for sufferers [4].

The Siantan Hilir Public Health Centre is a 24-hour health centre that facilities can use for initial treatment. The increased function still maintains the primary role. In other words, it is necessary to study spatial separation, spatial models, patterns of movement or circulation, and a study of standards for improving the function of the Public Health Centre to accept Covid patients. The Siantan Hilir Public Health centre, although classified as a health facility that has met the standards, has not specific able to accommodate the current global pandemic case. Several architectural problems have risen such as the absence of special access or circulation, as well as a responsive layout for the currently pandemic outbreak. For this reason, it is necessary to conduct a study on the improvement of the function of the Siantan Hilir Community Health Centre to provide optimal services to the community. This increase function is in the form of adaptation and adjustment to the design of the Public Health Centre as the initial handling of Covid 19 on a community-scale.

Current conditions require us to adopt a healthy lifestyle "New Normal" with pandemic response health protocols. The public facilities as places of service for the community must also be improving. One of them is a health facility at the

district level, in this case, the Siantan Hilir Health Centre. This research, with the limitation of the scope of improving the functions of the Public Health Centre in handling pandemic response, has a high urgency value in preparing a health facility that responsive to a global pandemic. In other words, the urgency of this research is to provide design solutions for the City Government in improving and developing public service facilities in the future.

II. RESEARCH METHODS

A. Method of Collecting and Analysis Data

This study uses a rationalistic approach by using deductive-exploratory research methods. It brings the Grand Theory to find and explore cases in the field and then create a research framework, processing and analysed data for formulating qualitative results [5]. Method of collecting data [6]:

- Evaluation of primary data: the research team makes direct observations into the field through field observations, buildings measuring, get direct information, and get data from the object to be studied and evaluated.
- Evaluation of secondary data is supporting data such as building design work drawings, space usage schedules, prototype drawings, and others.
- Literature review: as theoretical reference material to see applicable references and standards.
- Performance issues: building performance issues are obtaining using an open questionnaire given to respondents to assess building use.
- Interview: to find out more about performance issues through interviews with respondents related to the object of the building understudy.

Data Analysis Method [6]:

- Functional and technical evaluation: observation method by mapping and analysing observations of building function zones, circulation, and space settings as a place for activities or activities by users, both managers (medical team) and visitors (community).
- Dialogue with respondents through questionnaires and interviews: analysing the results of sampling questionnaires and interviews to get responses about the level of building performance and improved functions, which include comfort, convenience, security from the user's side.
- Formulate strategies and applications for improving the aims of public health centres with spatial separation, interior layout, outdoor layout, circulation access.

B. Existing Data

The existing plan of the Siantan Hilir Public Health Centre building divides into two entrances. The first entrance is on the right side of the building, and the second one is on the left side. Building Zones was centralized where the service setting in the middle of the building. Access to the building itself consists of the main staircase, a ramp in the middle, and an emergency staircase placed in the back area of the building on the right corner. Most of the waiting rooms are in the entrance area and along the corridor (figure 1).

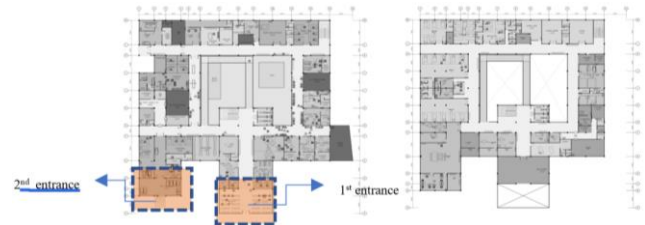






















Fig. 1. Existing floor plan of the Siantan Hilir public health care.

III. RESULTS AND DISCUSSION

Health facilities have a complexity consisting of many functions and variations in occupant competencies [7]. Health facilities form of hospitals, clinics, community health centres, and specialty care centres such as delivery centres, nursing homes, and psychiatric centres [8]. These days, health care facilities do not satisfy functional requirements but consider many aspects that affect the psychological and user's social life. It is necessary to avoid uncomfortable conditions and stimulate responsiveness to patient disease [9]. Spaces in health facilities are created and formed as a performance of social rights and not political practice [10]. In health facilities, the doctor-patient relationship plays the primary role in explaining that the physical environment affects user behaviour [9].

Space configuration is a set of spaces arranged in a specific order to perform the programmatic and aesthetic needs of architectural projects [11]. The space configuration is an aspect that mainly affects the relationship between people psychologically and socially [10]. In highly programmed buildings with high complexity in health facilities, the spatial configuration is the main factor in planning and has been a research challenge for a long time [12]. The spatial planning strategy is a systematic method in designing health facilities but emerged as the view that an optimal spatial configuration can save more patient lives and increase user productivity [13]. The following is a description of the existing condition of the Public Health Centres based on room functions. Existing Condition of The Siantan Hilir Public Health Centre (table 1).

TABLE I. EXISTING CONDITION OF THE SIANTAN HILIR PUBLIC HEALTH CENTER

The Spaces and Condition			
			
Main Hall	Corridor	Poly Waiting Room	Nutrition Poly and MCH
In the waiting room for drug collection and the registration area, the conditions are closed and the sitting position is close together	The atmosphere of the corridor is very quiet, and the less lighting	The atmosphere of the poly lounge was crowded, and close together. Lack of waiting chairs	The condition of poly nutrition and MCH lighting is good, but the service position is too close together
			
Elderly and general poly	Emergency Room	Ramp	Delivery room
Furniture in both rooms is minimal, lack of the air	The condition of the emergency room was quite good, with good light and air conditioning	Visitors rarely pass the ramp. The ramp pattern is inefficient, and the slope is not gentle	The delivery room is very clean, the separation from the waiting room for patients and visitors is very good. Minimal light and air movement
			
Kitchen	Postpartum and Laundry Room Corridor	Inpatient Room for Children	Inpatient room
The condition of the kitchen is quite clean, only lacking natural ventilation, and insufficient lighting.	The area is rather quiet, access stairs are not very visible and are not connected to emergency exits	the condition of the room is quite clean, the walls are covered with wallpaper so that it is not monotonous	The ward for men and women is quite clean, natural lighting is sufficient. The drawback is the lack of chairs to sit for visitors or the patient's family
			
Children poly and immunization room	Hall	Islamic prayer room	Linen
The atmosphere children's poly room was dark. Immunization room is a little cramped	The hall is large enough to hold workshops or health seminars.	The prayer room is large enough to accommodate worshippers.	Room condition of linen was clean enough
			
Offices	Gym for pregnant woman	TB-Room	2nd floor corridor
The condition of the office is quite roomy and clean. Sufficient lighting and air conditioning.	The gym room for pregnant women is quite light	The TB room is not sterile because it is directly adjacent to the outer corridor.	The 2nd floor corridor is quite wide. There is very little activity in this area. Lighting is also a bit lacking

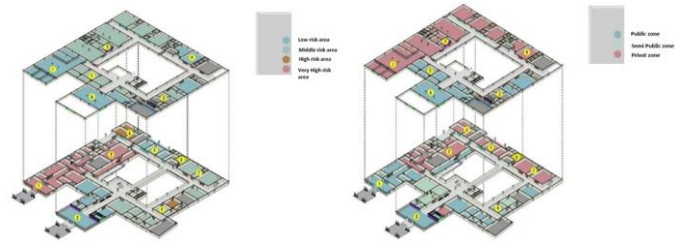


Fig. 2. Zoning based on risks level and activities.

Zoning grouping is needed to control The Public Health Centre activities against various degrees of importance, users, prevention of nosocomial infections, and medical services (figure 2). The installations within the Public Health Centres are classifying in varying levels according to the zoning grouping. The setting with the same degrees will place in the same zone as the control form described previously. The physical plant of the building represents everything related to the effort to determine the work location of each work unit in the form of a zoning plan or a group plan for spatial designation and or a Public Health Centre building block plan under the floor area and its function to meet the primary and supporting needs. The following are recommendations for room prototypes based on existing problems in existing conditions.



Fig. 3. Prototype of ideal poly room towards lighting and air flow.

The room model pays attention to the furniture layout, the sitting position of the patient and medical staff, and the placement of windows and doors in one direction. Use mechanical ventilation to allow through air movement out of the room. The principle of performance is the same in the clinic and treatment room. Service facilities in a Public Health Centre are facilities are prioritizing sterility and space efficiency in supporting service activities. Under the character of the

activities, the arrangement of functions and zoning at the Public Health Centre expecting to complete the principles of public-private zones separation as an effort to maintain spatial sterility and easier achievement. Service functions with close and related characteristics are planning to be in one zone to facilitate service operations. The most optimal strategy to respond to this complexity is to group similar functions in spatial proximity. In this case, the decent functional arrangement is closely connecting to a proficient zoning arrangement. With proper zoning planning, in the beginning, service functions with close and related characters should be in one zone. It is supposed to facilitate service operations, as well as facilitate visitor orientation, and minimize circulation conflicts.

It is necessary to separate the sick with healthy areas flow in the building (Area for the sick for general patients, and the healthy areas for mothers and children services). The reception room serves as the initial screening for The Public Health Centre visitors. Receiving room as a visual triage. Separation of access or circulation for sick patients, medical personnel, and health centre staff. The shape of the building mass is dividing by central courtyard as a guide for air circulation. The activity pattern plan in the Public Health Centre building is the group with the activities of each party, building requirements, and infrastructure. The basic concept for grouping and activity patterns compiling a zoning system based on the level of risk of disease transmission, privacy, interconnecting and mutually supportive services. It produces health services that meet medical and environmental requirements and are safe, comfortable, and easy for the Public Health Centre users.

The most suitable architectural development for this building is a contextual and functional architectural design in the sense that Public Health Centre as a health facility requires a place with a high enough level of cleanliness so that patients in the healing process are not disturbed or obstructed. Also, air circulation and good lighting too.

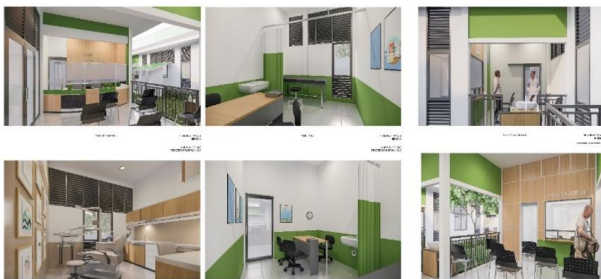


Fig. 4. The atmosphere of the open space and lighting.

Make space connectivity related to the outside directly. The materials that for space are easy to clean and avoiding direct touch. The dominant use of opening grilles for indoor airflow and placement of the furniture is in the same direction as the doors and windows of the building. Apart from being physical, the following is the view of spatial conditions as an ideal measure of space for handling Covid-19 on an initial scale at the Public Health Centre.



Fig. 5. Questionnaire results of spatial condition in The Siantan Hilir Public Health Center.

IV. CONCLUSIONS

What needs to consider in the process of adapting and adjusting the design of the Public Health Centre as handling of Covid-19 are:

- Form and Space Configuration (building composition, zoning space, and plot). Pay attention to the flow of service activities by differentiating access for sick and healthy outpatients, the flow of medical personnel and visitors to the Public Health Centre, and the composition of the masses with the courtyard for air-flow movement.
- Model space. Pay attention to the room layout and space components.
- The atmosphere of the space. Pay attention to the type of furniture, space elements, and space materials.

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