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Article

## Characteristics Study of Parking Land of Kuok Public Health Center

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### ABSTRACT

This study aims to determine the characteristics and parking space requirements at the Puskesmas Kuok, located in Kuok District, Kampar Regency. Puskesmas Kuok serves as the main healthcare facility in the area and has experienced a steady increase in visitors each year, making the need for adequate parking facilities increasingly important. The research method used was a field survey, with primary data collected through direct observation of the number of vehicles entering and exiting, parking duration, and vehicle types. Secondary data were obtained from the health center, including information on the number of employees, visitors, and the layout of the parking area. The analysis results showed that the highest parking volume occurred on Monday, with 80 motorcycles and 15 cars. The average parking duration was 2.15 hours for motorcycles and 5.12 hours for cars. The highest parking index reached 90% for motorcycles and 93% for cars, indicating that the parking capacity was frequently exceeded, especially during peak hours. This condition caused disorganized parking and reduced visitor comfort. Based on the research findings, it is recommended that the health center reorganize the parking area by providing marked Standard Parking Spaces and consider expanding the parking area to improve efficiency and user convenience.

## 1. Introduction

Parking facilities are designated areas or locations that serve as a temporary stopping place for vehicles (Directorate General of Land Transportation, 1998). Parking is an integral part of the transportation system (Ilham et al., 2023). Parking Space Needs are the number of spaces required to accommodate vehicles that need parking based on the facilities and functions of a land use plan (Dg Bau & Abdullah, 2022). Parking spaces are important for every vehicle owner, related to the increasing number of vehicle users, so the need for parking space is very necessary (Ilham et al., 2023).

Kuok District is one of the districts in Kampar Regency, Riau Province. The Draft Regional Regulation (Ranperda) concerning the change of the name of Bangkinang Barat District to Kuok District was officially ratified into a Regional Regulation (Perda). Under No. 16 of 2012 concerning the change of the name of Bangkinang Barat District to Kuok District.

Currently, Kuok District has 9 villages: Kuok Village, Empat Balai Village, Merangin Village, Pulau Jambu Village, Lereng Village, Pulau Terap Village, Batu Langkah Kecil Village, Silam Village, and Bukit Melintang Village. The population of Kuok District by gender in 2014 was 12,885 males and 12,237 females, with a total population of 25,122 individuals (Resti, 2013).

The increasing population and the rise in vehicle ownership add to the demand for road space for traffic activities. Parking needs are influenced by the growing activities and users of public facilities such as health service centers, offices, educational institutions, and shopping centers. Therefore, adequate parking facilities are necessary to support users, ensuring safety and comfort for those utilizing these public facilities.

Community Health Centers (Puskesmas) are healthcare service organizations present in all regions. Their role is crucial in providing health services, including patient treatment and community outreach. The effectiveness in achieving these goals requires consideration of various important aspects and is a process (Hariyoko et al., 2021).

Kuok Community Health Center, located at Jl. Bangkinang – Payakumbuh No.44, Lereng, Kuok District, is a public facility whose existence is highly needed by the community. Therefore, adequate parking space and facilities are required for both visitors and employees of

the Community Health Center. The high number of health center visitors will impact the need for parking space and the existing facilities. The parking area on weekdays is highly disorganized. This occurs due to the absence of Parking Space Unit (SRP) markings, both for motorcycles and cars.

This situation often causes discomfort for visitors when they are about to leave the health center area, due to the haphazardly parked vehicles which sometimes make it difficult for visitors to reach their cars.

The method used in this study is by conducting direct field surveys to determine the number of vehicles parked at the location, by recording the vehicle license plate numbers that enter and exit, vehicle type, time, and parking duration. Based on the background problems above, the writer attempts to raise this research with the title Analysis of Parking Land Capacity at Puskesmas Kuok, Kuok District, Kampar Regency. With the aim of knowing the characteristics of parking that exist in the environment of Puskesmas Kuok.

## 2. Literature Riview

### 2.1 Definition and Management of Parking

Parking is the temporary stationary state of a vehicle. A vehicle cannot move continuously; at some point, it must stop temporarily (to unload cargo) or stop for a longer period, which is called parking (Sujarwo & Ratnasari, 2020). As the population of a city increases, it can lead to increased movement to meet needs. This can increase the demand for vehicles.

According to the Directorate General of Land Transportation (1996), parking is the stationary state of a vehicle that is not temporary. Stopping is the temporary stationary state of a vehicle where the driver does not leave the vehicle. Meanwhile, according to Government Regulation No. 43 of 1993, parking is defined as a vehicle stopping at specific places, whether indicated by signs or not, solely for the purpose of picking up and dropping off people. According to Law No. 22 of 2009, parking is the state of a vehicle being stopped or stationary for a while and left by its driver.

### 2.2 Parking terms

Parking is an important component of the urban transportation system that affects traffic performance and land use efficiency. Parking capacity refers to the maximum number of vehicles that can be accommodated in a parking

area, while normal capacity represents the effective capacity that can be optimally utilized. Parking duration and parking length describe the amount of time vehicles occupy parking spaces, which directly influences parking turnover. In addition, parking demand represents the number of parking spaces required in a particular area and is influenced by vehicle ownership levels, land use characteristics, availability of public transportation, and parking tariff policies.

A parking area is a designated zone provided for parking activities, either on-street or off-street, with certain control systems in place. Within a parking area, parking circulation plays an important role in ensuring smooth vehicle movements entering and exiting the facility. Parking management is also related to economic aspects through the implementation of parking fees, which are charges imposed on users as a means of controlling parking demand as well as generating local government revenue.

### 2.3 Types of parking

The Parking Facility Planning and Operation Guidelines (1998) explain several types of parking, including:

- a. on street parking
 

Parking on the road body is a type of parking that utilizes a place along the road body without a special expansion for a parking barrier. This type of parking tends to be detrimental to other transport users, as it occupies a part of the road body, thereby reducing the effective width of the road and disrupting the flow of traffic.
- b. off street parking
 

Parking outside the road is parking that is located outside the road, usually in a special area used by the public for specific purposes, such as at shopping centers or offices. Brief (2018) argues that off-street parking is generally managed by private parties with their own tariffs. This authority can be misused to seek profits if the Local Government does not set a maximum and minimum parking tariff limit.

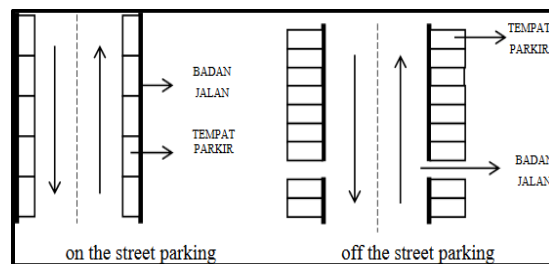


Figure 1. Illustration of parking pattern model

### 2.4 Parking Space Unit

A Parking Space Unit (SRP) is the effective area for parking one vehicle (passenger car, truck, motorcycle) including free space and door opening width (Riyanti Simanjuntak et al., Department of ..., 2020). The Parking Space Unit (SRP) is used to measure parking space requirements.

In a controlled parking area, road surface markings are needed to facilitate parking activities. Additional space is essential for maneuvering, which depends on the parking angle. For certain matters, if not otherwise specified, SRP refers to SRP for passenger cars (Directorate General of Land Transportation 1996).

### 2.5 Parking characteristics

According to Hobbs (1995), there are several aspects to consider when analyzing parking characteristics, including:

- a. Parking Lot
 

Parking volume is the number of vehicles involved in a parking load (vehicles per specific time period, usually per day)(Angestiwi & Nurdin, 2023).
- b. parking accumulations
 

Parking accumulation is the number of vehicles parked in an area at a specific time.
- c. parking durations
 

Parking duration is the range of time (length of time) that a vehicle is parked.
- d. Parking fee change
 

The turnover rate is obtained from the number of vehicles that have used the parking space within a certain time interval divided by the available parking spaces.
- e. Parking capacity.
 

Parking capacity is the maximum number of vehicles that a parking area can accommodate within a specific time period.
- f. parking index
 

Parking index is the percentage of parked

vehicles occupying a parking area relative to the number of available parking spaces in that area.

- g. **Parking Space Requirement**  
KRP is influenced by several factors, such as the level of private vehicle ownership and the difficulty of access to the location.
- h. **Occupancy**  
Occupancy is the total of a parking area used at a certain time compared to the total available parking space, and is expressed as a percentage. (Adi Prayogo et al., 2022).

### 3. Research Methodology

#### 3.1 Research setting

This research was conducted at the Kuok Community Health Center, located at No. 44, Bangkinang-Payakumbuh Road, Lereng Village, Kuok District, Kampar Regency, Riau Province. The research location is focused on the parking area of the Kuok Community Health Center, which consists of two areas: the visitor parking area in front of the building and the staff parking area on the side of the building.



**Figure 3.** Parking Area for Visitors of Kuok Puskesmas

The selection of this location is based on the consideration that the Kuok Community Health Center is the only primary healthcare facility in Kuok District, resulting in a relatively high visit

intensity. Additionally, the poorly organized parking conditions make this location relevant for research regarding the characteristics and needs of parking space.

#### 3.2 Research Location



**Figure 2.** Illustration of SRP Staff Parking Area of Kuok Health Center

### 4. Results and Discussion

#### 4.1 Parking Volume

Parking volume is the number of vehicles that have used parking space in a certain area of parking land at a certain time. In this study, the calculation was grouped into 30-minute intervals. Subsequently, data analysis was conducted to obtain parking volume at the research location for 10 hours. Parking volume was classified according to the type of vehicle surveyed. Based on the results of data processing using the formula, the maximum parking volume of cars and motorcycles entering the Kuok Health Center parking lot was obtained.

Based on the research results, the maximum parking volume occurs on Monday with a maximum volume of two-wheeled vehicles at 80 and four-wheeled vehicles at 15.

#### 4.2. Parking duration

##### a. Two-wheeled vehicle parking duration

Based on the 7-day observation results, the total recorded two-wheeled vehicles amounted to 357 units. The breakdown of parking durations.

**Table 1.** two-wheeled parking duration

Day	Parking Duration (Minutes)				Total
	0-30	31-60	60-120	>120	
Monday	7	12	28	33	80
Tuesday	2	17	24	23	66
Wednesday	5	18	20	20	63
Thursday	6	10	22	33	71
Friday	6	7	8	18	39
Saturday	4	9	6	15	34
Sunday	2	0	0	2	4
<b>Total</b>	<b>32</b>	<b>73</b>	<b>108</b>	<b>144</b>	<b>357</b>

b. Four-Wheel Parking Duration

In addition to two-wheeled vehicles, the parking duration of four-wheeled vehicles was also recorded. The total number of four-wheeled vehicles recorded during the observation period was 51 units.

**Table 2.** Four-Wheel Vehicle Parking Duration.

Day	Parking Duration (Minutes)				Total
	0-30	31-60	60-120	>120	
Monday	0	0	0	15	15
Tuesday	0	0	2	9	11
Wednesday	0	0	0	8	8
Thursday	0	0	1	6	7
Friday	0	0	0	5	5
Saturday	0	0	0	4	4
Sunday	0	0	0	1	1
<b>Total</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>48</b>	<b>51</b>

**4.3 Parking Turn Over**

a. Turn Over Two-wheeled

Parking turnover is an indicator used to determine how often a single parking space is used by different vehicles in one day. The higher the turnover value, the more efficient the use of that parking space, as it indicates a high rotation of vehicles.

It appears that the highest turnover value occurs on Monday, which is 1.5, meaning that in one day, a single parking spot is used by more than one vehicle alternately. Other days with high turnover values are Tuesday (1.2), Wednesday (1.2), and Thursday (1.3). These values indicate that on weekdays, especially at the beginning of the week, parking usage intensity is quite high, and parking spaces are utilized alternately by many vehicles.

On the other hand, the lowest turnover value occurs on Sunday, at 0.07, meaning most parking spaces are used only once throughout the day. This low value is due to the decrease in visits because the health center's services are limited on holidays. Thus, overall, it can be concluded that the parking turnover rate at the Kuok Health Center is quite high on weekdays, while land use efficiency for parking decreases significantly on weekends.

b. four-wheel turnover

It can be noted that Monday recorded the highest parking turnover rate of 1.0, which means one parking slot is used by one vehicle in a day. The turnover rate decreased gradually in the following days, with Sunday recording the lowest figure of 0.07, indicating almost no

vehicle turnover in the parking lot. This is in line with the low visit pattern on the last weekend.

Compared to two-wheeled vehicles, the turnover rate of car parking spaces is generally lower. This is due to several factors, including the smaller number of cars, longer parking durations, and the possibility that car spaces are used by medical personnel or staff for the entire duration of working hours.

**4.4 parking index**

The parking index is an important indicator for assessing the efficiency of available parking space utilization. The parking index value is calculated by comparing the maximum accumulation of parked vehicles in a day to the number of available parking spaces, then multiplying by 100%. A parking index exceeding 100% indicates that the capacity of parking spaces has been surpassed and an overload of the available facilities has occurred.

a. Two-Wheeled Vehicle Parking Index

It is known that the number of motorcycle parking spaces available every day is constant, namely 53. The number of motorcycles parked fluctuates from day to day, affecting the size of the parking index. The parking index is the ratio of the number of parked vehicles to the available capacity, expressed as a percentage (%). Based on the calculation, the highest parking index occurred on Monday with a value of 90%. This value is indeed high mathematically due to the low accumulation number against the constant capacity.

The next highest parking index occurred on Tuesday at 87%, and Thursday at 85%, indicating that the number of parked two-wheeled vehicles on those days exceeded the available parking capacity. This suggests parking congestion and the possibility of vehicles parking improperly, such as outside designated areas or double parking. Conversely, Sunday had the lowest parking index at 4%, followed by Friday (39%), Saturday (41%), and Wednesday (68%). This shows that on early weekdays, parking space usage remained relatively controlled and within available capacity. Overall, the parking index trend increased toward the weekend, particularly on Friday and Saturday. This indicates the need for attention in parking management at the Kuok Community Health Center on those days, such as rearranging parking areas, increasing capacity, or scheduling visits.

b. Four-wheel parking index

The four-wheeled vehicle parking index also shows the same trend. Monday recorded the highest parking index at 93%. This is due to the large fixed capacity but very low service activity on that day. High indexes also occurred on Tuesday (64%), Wednesday (57%), and Thursday (49%), indicating parking overload or parking land use exceeding capacity. This situation can cause internal congestion, double parking, and even disruptions to vehicle entry and exit access within the Community Health Center environment. Indexes that remain within the normal threshold were recorded on Friday (35%), Saturday (28%), and Sunday (7%).

#### 4.5 Dynamic capacity

##### a. Dynamic capacity of the two wheels

Based on the analysis conducted, the dynamic capacity of two-wheeled parking on Saturday is 323 SRP. The capacity of this parking area depends on the average duration or length of time vehicles are parked. If the duration is shorter, the dynamic capacity of the parking area tends to be larger.

##### b. Dynamic Axle Capacity

Based on the analysis conducted, the dynamic capacity for four-wheeled parking on Saturday is 56 SRP. The capacity of this parking area depends on the average duration or length of time vehicles are parked. If the duration is shorter, the dynamic capacity of the parking area tends to be larger.

#### 4.6 Occupancy

##### a. Two-wheeled occupation

Based on field observations during peak hours on Monday, it was recorded that the number of two-wheeled vehicles utilizing the parking area reached 80 units. Meanwhile, the number of parking spaces specifically available for two-wheelers is only 53 slots.

With an occupancy rate of 151%, it can be concluded that each two-wheeled parking spot is used by more than two vehicles in one day. This indicates that the parking area is experiencing very high density and is unable to accommodate parking needs when vehicle volume increases. This condition not only narrows the maneuvering space for vehicles and pedestrians but also increases the potential for spatial conflicts among users and irregularities in parking patterns. Such a situation requires an evaluation of parking management, such as increasing land capacity, optimizing zoning, or

redesigning the parking area to ensure more even and efficient vehicle distribution.

##### b. Occupancy of four-wheeler

Based on field observations during peak hours on Monday, it was recorded that the number of four-wheeled vehicles utilizing the parking area reached 15 vehicles. Meanwhile, the number of available parking spaces is only 14.

These results indicate that the occupancy rate reached 107%, meaning that each parking space is used by more than two vehicles in a single day. This explains the occurrence of high parking density and shows that the current parking capacity is insufficient to accommodate the volume of vehicles during peak hours. This situation risks causing problems such as overlapping parking, traffic disruptions, or inappropriate land use.

## 5 Conclusion

Based on the calculation and analysis results, the conclusion regarding the parking lot characteristics at the Kuok Community Health Center over the 7-day observation period is as follows:

1. Characteristics of the Kuok Puskesmas Parking Space:
  - The highest parking volume occurred on Monday with 80 two-wheelers and 15 four-wheelers.
  - The highest parking accumulation occurs on Monday, with two-wheeled vehicles from 08:00 - 09:00, totaling 48 vehicles. Meanwhile, for four-wheeled vehicles, it occurred on the same day from 09:00 - 10:00, totaling 13 vehicles.
  - From 7 days of observation, it was found that the average parking duration for two-wheeled vehicles is 2.15 hours/vehicle, and the average parking duration for four-wheeled vehicles is 5.12 hours/vehicle.
  - The average parking index for two-wheeled vehicles is 4.97% and for four-wheeled vehicles is 15.98%. From these results, it can be concluded that the parking index values for motorcycles and cars have not exceeded the maximum limit.
  - The highest parking turnover rate for two-wheeled vehicles was 0.03 vehicles/PSP/hour, and for four-wheeled passenger vehicles, it was 0.07 vehicles/PSP/hour.

2. Parking Space Unit (SRP) requirements for two-wheeled and four-wheeled vehicles:
  - Two-wheeled vehicles require more parking spaces than the current capacity (53 slots). The maximum accumulation reaches 48 vehicles, so the actual parking is almost full and even exceeds capacity during peak hours.
  - Four-wheeled vehicles also require an increase in SRP, as the current capacity (14 slots) can only accommodate demand under certain conditions, while the maximum accumulation reaches 13 vehicles and peak day occupancy exceeds 100%.

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