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Children's play environment in Semarang City, Indonesia

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Abstract: The limited activity and mobility of children in accessing play spaces are some of the problems that occur during the COVID-19 pandemic. Through children's mobility and play activities, children's play environment could be assessed, as in the theory of the Bullerby model. The purpose of this study is to identify the characteristic of children's play environment in Semarang City according to Bullerby model during the COVID-19 pandemic. This study is based on the perceptions and preferences of children who live in Semarang City. A quantitative approach is used to analyse the research data by scoring the questionnaire. The results show that Semarang City has a prison-like and glasshouse-like play environment. This study also found that even in the suburbs with low building density, children could have a prison-like environment due to fewer activities and games realised, even though there are plenty of play spaces available in their environment.

Keywords: Bullerby model; child-friendly; child activity; child mobility; child perspective; child participation; COVID-19; play space; urban density; assessment.

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1 Introduction

Attention to the compliance of children's rights is based on the existence of the Declaration of a Decent World for Children and the Convention on the Rights of the Child in 1989. Indonesia as one of the countries that support this has made it happen through the preparation of several policies related to children. Several policies related to children are formed to achieve the national goal, namely *Indonesia Layak Anak* or IDOLA (Child-Friendly Indonesia) in 2030. The child-friendly city (CFC) program was then applied to every city in Indonesia. Child-friendly cities in Indonesia are rated into five levels, from low to high, namely *Pratama*, *Madya*, *Nindya*, *Utama* and *Layak Anak*.

In 2021, Semarang City received an award as a CFC with Nindya predicate. Some improvements are needed for Semarang City to achieve *Layak Anak* title and create a CFC. One of the Semarang City Government's efforts in carrying out this program is to mobilise the smallest administrative unit in Semarang City, namely at the sub-district level. In early 2020, Semarang City Government encouraged all sub-districts in Semarang City to become child-friendly sub-districts where the commitment of each sub-district was realised by the establishment of a child-friendly sub-district task force (Fajlin, 2020). However, the children's play environment in each sub-district has different conditions.

According to the condition of the residential environment, Dewi (2012) argues that dense housing with the type of small house forces its residents to use the open space around it for activities and playing. This opinion is supported by Ghanbari-azarneir et al. (2015), which state that alleys, dead ends, parks, playgrounds, and surfaces with gentle slopes are some of the most-liked places for children. Witten et al. (2015) state that neighbourhood streets and public spaces are important sites in children's play and exploration. Therefore, the importance of open space as a children's playground needs to be planned properly to create a child-friendly play environment.

Environmental planning that is suitable for children's needs could be realised by knowing the children's daily activities and patterns (Ren and Xu, 2017; Whitzman and Mizrachi, 2012). The mindset of adults and the low value placed on children's play are often the main barriers preventing the environment from becoming more child-friendly (Krysiak, 2019). The main challenge in creating a play environment for children is recognising the importance of children being active members of their community, through play, mobility, and social opportunities. By looking at a child's point of view, an identification could be made through the available play environment around them.

The child-friendly environment has broad criteria to be assessed and studied. Assessment of the children's independence and the affordability of children's play activities could be an alternative that is more focused on assessing children's play environment (Kytta, 2004). These two criteria could explain the conditions of the playing environment in Semarang City through children's daily experiences that could be adapted to current conditions. Meanwhile, in measuring the independence of mobility, it is necessary to pay attention to the culture and level of children's fear (Prezza, 2007). The level of security also affects children in using the space (Huang et al., 2020; Lester and Howard, 2019). A safe environment for children to roam freely is influenced by positive parents and community support (Gheda and Ilmi, 2019). Another research from Kytta (2004) showed that boys were more active than girls in mobility. Children at two different settlement locations could also have different mobility independence (Whitzman

and Mizrachi, 2012). Therefore, several aspects such as safety level, child's fear level, culture, and settlement location affect child mobility independence.

Kytta (2004) considers that a child-friendly environment occurs when the independence of the child's mobility is high so that the affordability of activities is also high. The relationship is then defined in a model called Bullerby model. Kytta (2004) argues that in general, the proportion of the Bullerby type decreases, and the glasshouse type increases as the level of urbanisation increases.

The covariation of actualised affordability and level of independent mobility could be considered a significant indicator in the assessment of a child-friendly environment. The models and measures applied to require further elaboration and testing in different environments and with a more varied range of child groups. After seeing some implementations of the Bullerby model in various environments, the authors decided to use this model as a theoretical tool to identify children's play environments in Semarang City.

Neighbourhood roads and public spaces are important sites in children's play and exploration (Witten et al., 2015). However, during the COVID-19 pandemic, children have limitations in accessing their play spaces. Circumstances that force children to stay indoors for too long could cause symptoms of cabin fever which causes children to feel sad, bored, restless, irritable, and various other negative feelings due to staying in one place for too long and isolated from the surrounding environment. Children need open space in their home environment as a space to play and learn, and Semarang City is no exception.

Studies show that COVID-19 is spread less outdoors (Bhagat et al., 2020), this makes playgrounds an opportunity for children to get outdoors and spend time with friends in a safer environment than playing indoors. According to Sara Bajuyo, MD, a family doctor in South Bend, Indiana (Perry, 2020), outdoor play has been deemed safe after months of study and research into the risks of transmitting COVID-19. Evidence to date suggests that surface transmission of the virus is much less common than thought.

Semarang City Government has encouraged every sub-district to provide public space so that there is a place that could facilitate children's activities in learning, gathering, and playing together with their friends. The provision of optimal children's play spaces could contribute to improving children's development and helping to overcome cabin fever that occurs in children during the COVID-19 pandemic. To create a safer and more comfortable play environment, it is important to know the condition of the playing environment from the point of view of the beneficiaries, namely children (Jansson and Persson, 2010). This study aims to identify the characteristics of children's play environment through the child's perspective.

2 Literature review

2.1 Child-friendly city

The child-friendly cities initiative (CFCI) launched by UNICEF and the United Nations Human Settlements Program (UN-Habitat) in 1996 was the first multi-stakeholder partnership to place children at the focus of the urban agenda. Support for the compliance of children's rights has been carried out in agreements and declarations such as the International Covenant on Economic, Social and Cultural Rights; the Convention on the

Elimination of All Forms of Discrimination against Women; the Habitat Agenda; and Agenda 21, the action plan adopted by the United Nations Conference on Environment and Development in 1992.

Child-friendly cities are the embodiment of children's rights which are manifested in the policies, programs, and laws of a city (UNICEF, 2009). UNICEF (2012) adds that CFC plans and programs based on a governance model based on humanity, principles of non-discrimination, survival, development, and participation have been enshrined in the Convention on the Rights of the Child. Then it was further explained that the Convention on the Rights of the Child, adopted in 1989, was the first international treaty to state that all civil, political, economic, social, and cultural rights belong to children.

According to the Minister of State for Women's Empowerment of the Republic of Indonesia No. 2 of 2009, the definition of CFC is a city that has a development system based on children's rights through the integration of government, community, and business commitments and resources that are planned comprehensively and sustainably in policies, programs, and activities to ensure the compliance of children's rights (KPPRI, 2009). The CFC approach contributes to achieving equitable development goals by making disadvantaged groups more visible and giving all children a voice according to their rights and needs.

2.2 Child-friendly space

Several things need to be considered in providing a child-friendly space. Nordström (2009) argues that there are three dimensions in a child-friendly environment, namely safety and security; urban and environmental quality; and basic services. Another important thing in a CFC according to Björklid (2010) is reducing traffic levels, and the need for access to public spaces, green open spaces, and meeting places.

Child-friendly spaces are threatened by reduced open space, increased traffic, and limited independent mobility (Björklid and Gummesson, 2013; Björklid and Nordström, 2007; Prezza, 2007). Adams et al. (2018) added that the creation of space in a CFC should be easily accessible, create a sense of security, and incorporate elements of the natural environment in it. The provision of an equal natural environment results in good welfare relations between citizens (Pulgar et al., 2020).

2.3 Child participation

A good CFC planning needs to involve children's participation in it (Rismanchian and Rismanchian, 2007). Agreeing with Rismanchian and Rismanchian (2007), Wilks (2010) states that CFC programs enable the involvement of children and young people in an authentic, significant and local way in determining their future. According to him, through participation children could develop the confidence and skills to engage with the places, spaces, resources, and problems of their locality and city.

Children's perspectives can play an important role not only in planning and design but also in ongoing landscape management processes, including providing more variety in local green spaces (Jansson et al., 2016). Children can provide valuable observations and insights about their city (Masri, 2017).

Broberg et al. (2013) suggest that children should be seen as capable and active users of their environment as well as informants who have valuable insight into the possibilities and limitations of different environments. In addition to the importance of children's

opinions, there is a need for community and government collaboration to support CFC programs (Nam and Nam, 2018).

2.4 Bullerby model

Bullerby model is a theoretical tool for assessing child friendliness under various conditions (Spencer and Blades, 2006). 'Bullerby' means noisy sub-district. The term 'Bullerby' was used by Swedish writer Astrid Lindgren in her children's novel which tells the life of a group of children in a Swedish village (Brewer and Jalongo, 2018). Kytta (2004) then chose this name to define the most ideal situation in a child-friendly environment. Kytta (2004) applied this model in eight different neighbourhoods of varying levels of urbanisation (rural, suburban, and urban areas), in Finland and Belarus.

Some other studies using Bullerby model have been carried out. Whitzman and Mizrachi (2012) compared children's environments in public housing and private housing in Melbourne, Australia, and found differences. Broberg et al. (2013) studied how environmental quality conditioned children's environmental friendliness in Turku, Finland, and found that there is no child-friendly environment, but each environment has different uses and meanings. They also found that facilities located in the neighbourhoods could be achieved on their own, whereas those located in the dense downtown area were less self-sufficient.

Bullerby model could be tested empirically, however, although it has been influential in several fields of research, especially in Europe, the significance of this model is still not recognised. Bullerby model could be extended to a variety of environments in which babies, children, teens, and maybe even some adults live. The categorisation of the Bullerby Model is in line with qualitative and quantitative research and may be a diagnostic tool for the child's environment (Brewer and Jalongo, 2018). The explanation of the four environments based on the Bullerby model is as follows:

1 Prison or cell, a place where mobility is limited thus creates low accessibility which tends to reduce children's motivation to explore their environment.

2 Desert or wasteland, is a place where there is a high possibility of independent mobility, but only gives rise to a boring environment.

3 Glasshouses, where the environment appears as a potential source of affordability, but children's mobility is restricted.

4 Child-friendly space or Bullerby, is a child-friendly space or the most ideal, where this environment allows children's independent mobility which gives rise to a lot of affordability of facilities. The realisation of the affordability of this facility encourages children to explore and move around in their environment.

3 Method

This research is using a quantitative approach. According to Widodo (2017), the quantitative approach is a series of research that begins with several theories, which are then deduced into hypotheses and assumptions in the framework of thought that is

described in an analytical model. According to him, quantitative research aims to measure objective facts by focusing on research variables.

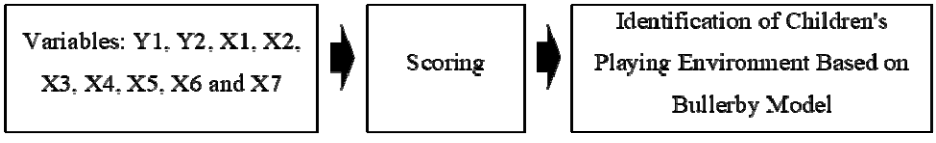
This survey was carried out when the COVID-19 pandemic was happening, the quantitative data collection was taken online through Google forms using the purposive sampling method. The method used allows the researcher to determine the sample from the beginning of the study with certain considerations. This sampling is based on the characteristics of a particular population.

This research population is a group of children aged 5–14 years who are lived in Semarang City. The total population of children aged 5–14 years in Semarang City is 268.832 people. The research variables consist of nine items with a total sample of 224 respondents. The number of samples in each District is divided equally as follows:

$$\text{Respondents each district} = \frac{224 \text{ respondents}}{16 \text{ districts}} = 14 \text{ respondents}$$

The analysis stage begins by scoring the assessment variables. After that, the classification of environmental conditions for children's play in Semarang City was carried out based on Bullerby model. The analysis stages of this research could be seen in Figure 1.

Figure 1 Analysis stages



Source: Author's Analysis (2021)

This research refers to several studies related to child-friendly cities and Bullerby model. Bullerby model which has the main indicators of child mobility and the number of children's activities used to identify children's play environments in Semarang City. Meanwhile, several other studies say that child mobility and the number of children's activities are influenced by several factors such as safety level, child's fear level, culture, settlement location, and children's play location (see Figure 2).

Figure 2 shows the variables used in assessing the playing environment in Semarang City. Based on the literature study, the authors describe the relationship between variables as in Figure 2, which is Y1 influenced by X1, X2, X3, X4, and X5. Therefore, the final result that defines the independence of children's mobility in Semarang City is the average of Y1, X1, X2, X3, X4, and X5. While Y2 is influenced by X6 and X7, therefore the final result that defines the affordability of children's play activities in Semarang City is the average of Y2, X6, and X7.

Identification of a child-friendly play environment in Semarang City is done by giving a score to the questionnaire. The final score is divided into four classes, namely very high, high, low, and very low. Each answer to the questionnaire has a score with a range of 1 to 4 where a score of 4 is the highest score, while a score of 1 is the lowest score. The length of the interval class could be found using the formula below:

$$\text{Interval class length} = \frac{\text{Range (largest score} - \text{smallest score)}}{\text{Number of classes}}$$
$$= \frac{4-1}{4}$$
$$= 0.75$$

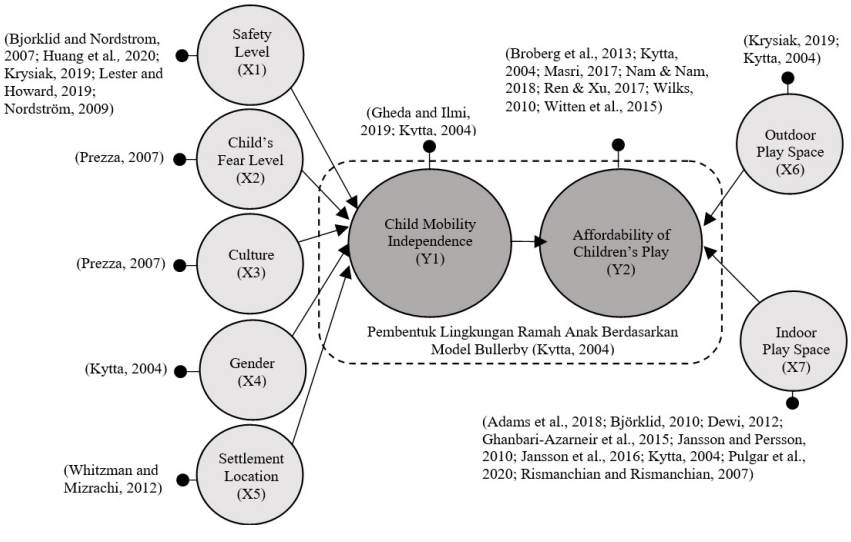
So that the interval class distance between very high, high, low, and very low scores is 0.75. Table 1 shows the score range for each class used:

Table 1 Score range

Score range	*Classes*
1.00–1.75	Very low
1.76–2.51	Low
2.52–3.27	High
3.28–4.00	Very high

Source: Author's Analysis (2021)

Figure 2 Research variables



Source: Author's Analysis (2021)

In Bullerby model, children's environments are divided into four types: prison (cell), desert (wasteland), glasshouse, and child-friendly space (Bullerby). Table 2 shows the grouping of child-friendly play environments based on the Bullerby model.

After scoring, a map overlay was carried out to determine the spatial distribution of children's play environment conditions in Semarang City based on the results of the children's questionnaire. According to Ningsih (2005), the concept of map overlay is a complementary intersection relationship between spatial features. The map overlay also combines spatial data and attribute data from the two data that have been entered. The

overlay method used is the union operation. The union operation is used to create new spatial data by overlaying two polygon spatial data.

Table 2 Bullerby model scoring

		Actualisation of the affordability of children's play activities	
		Low score (1.00–2.51)	*High score (2.52–4.00)*
Independence of child's mobility	High score (2.52–4.00)	Desert (wasteland)	Child-friendly space (Bullerby)
	Low score (1.00–2.51)	Prison (cell)	Glasshouse

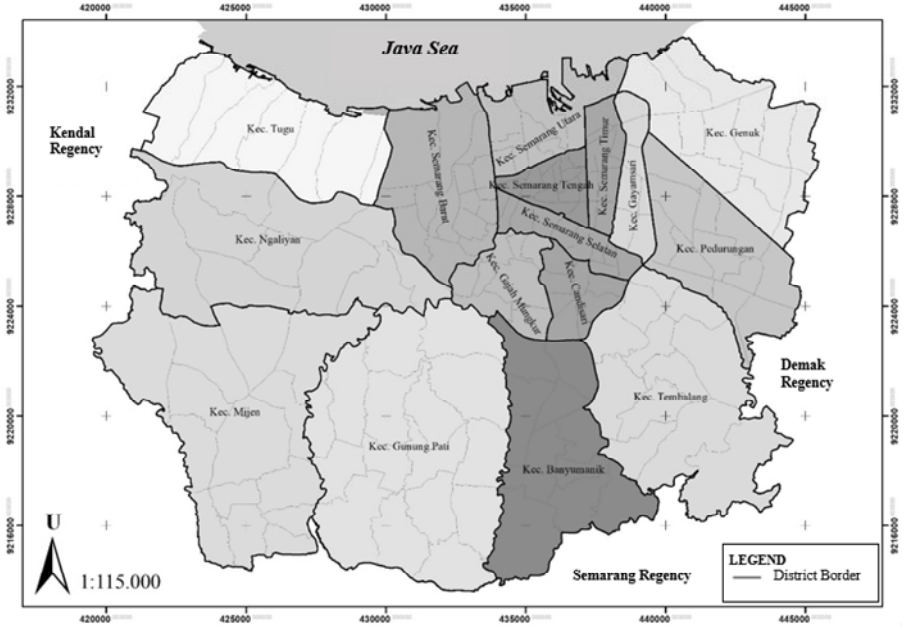
Source: Author's Analysis (2021)

4 Discussion

4.1 Characteristics of Semarang City

The research area is located in Semarang City which is the capital of Central Java. Semarang City is administratively divided into 16 Districts and 177 sub-districts (see Figure 3), with an area of 373.70 km^2. The smallest regional unit of this research is carried out at the district level. The 16 Districts consist of: Mijen, Gunung Pati, Banyumanik, Gajahmungkur, South Semarang, Candisari, Tembalang, Pedurungan, Genuk, Gayamsari, East Semarang, North Semarang, Central Semarang, West Semarang, Tugu, and Ngaliyan.

Figure 3 Semarang City administrative region

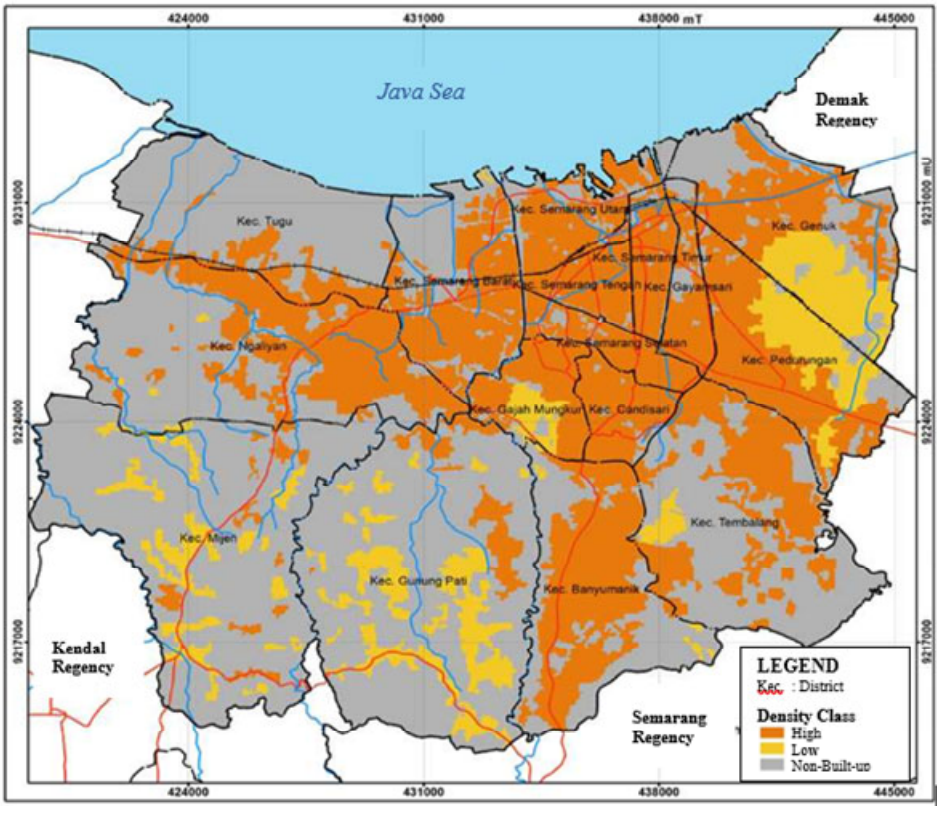


Source: Bappeda Semarang City (2011)

Identification of children's play environments carried out in 16 districts of Semarang City. Identification is done based on the perspective of a child in assessing and choosing a place to play. Each district is represented by children with an age range of 5–14 years. Their assessments show the differences in each district. The scope of the research covers one city of Semarang so that the differences in the child-friendly play environment in Semarang City could be known evenly in each district.

Semarang City has unique topographic characteristics, namely in the form of coastal areas and hilly areas. The topographic elevation is between 0.75 m to about 350 m above sea level. The pattern of building density in Semarang City is influenced by the topography and accessibility of the area. Most of the built-up land is found in flat to sloping topography and has a large road network. The overall pattern of building density is random because each class of building density is in almost every district. Topography and the presence of roads are the main elements that cause the density of an area to be high. Therefore, the density of buildings in Semarang City would be high if the topography is flat and there is more road network and conversely, the density of buildings would be low if the topography is hilly and the road network is less (Puspitasari and Suharyadi, 2016). The building density map of Semarang City could be seen in Figure 4.

Figure 4 Semarang City building density in 2015 (see online version for colours)



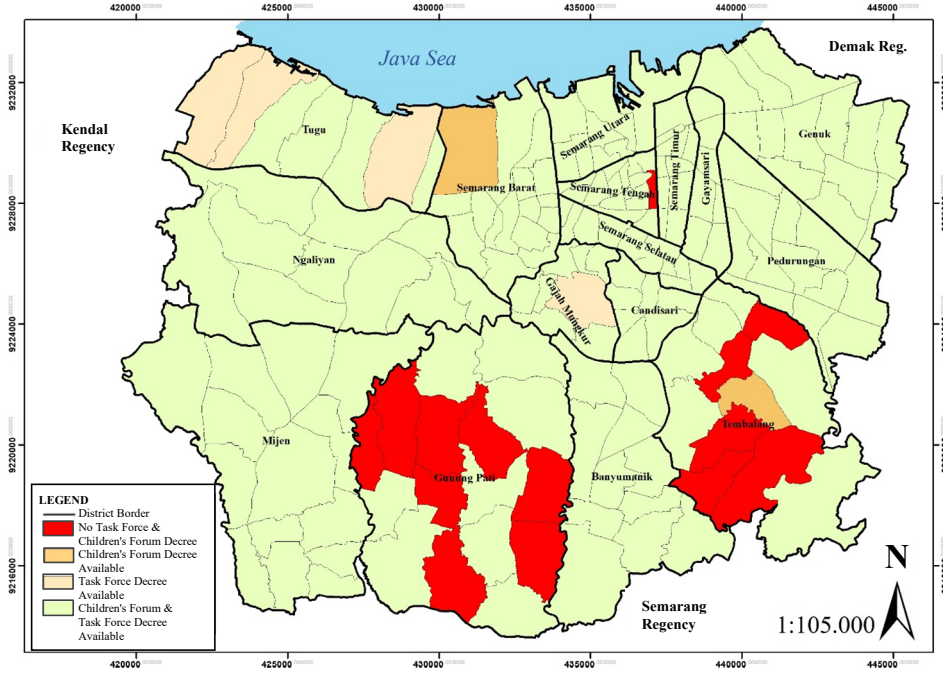
Source: Puspitasari and Suharyadi (2016)

According to Sudarwani and Ekaputra (2017), Semarang City has an unequal distribution of open space, so there are limited open spaces in some areas. A total of 100 active parks have been built by the government to provide a playground for children in Semarang City. One out of 100 active parks in Semarang City, which is Bumirejo Pudakpayung Park, received an award from the Ministry of Women's Empowerment and Child Protection of the Republic of Indonesia as the Pioneer of the Semarang City Child-Friendly Play spaces in 2019 (Habibillah, 2019).

4.2 CFC Semarang

The classification of child-friendly cities in Indonesia is divided into five levels, from low to high, namely *Pratama*, *Madya*, *Nindya*, *Utama*, and *Layak Anak*. In 2021, Semarang City was included in the *Nindya* predicate and still needs improvement in realising a CFC. The government, together with the community trying to improve the performance of child-friendly cities by making improvements at the sub-district, district, and city levels.

Figure 5 Ownership status of task force and children's forum decree in Semarang City (see online version for colours)



Source: DP3A Semarang City (2021)

In early 2020, Semarang City Government encouraged all sub-districts in Semarang City to become child-friendly sub-districts. One way to do this is to declare the formation of a child-friendly sub-district task force, through a decree called task force decree (*SK Gugus Tugas*) (Fajlin, 2020). The purpose of this declaration is to integrate the compliance of children's rights to realise Semarang City as a great CFC. 161 out of 177 sub-districts in

Semarang City have a child-friendly task force decree and 159 sub-districts that have a children's forum decree. Figure 6 shows the commitment of each district to implementing the child-friendly concept in its administrative area. Gunungpati and Tembalang districts are two districts out of 16 districts in Semarang City (see Figure 5) which do not appear to be highly committed to implementing child-friendly concepts in their administrative areas.

4.3 Child mobility independence

One of the main variables in the Bullerby model is the child's mobility independence. Child mobility independence (Y1) is influenced by several other variables such as security level (X1); fear level (X2); culture (X3); gender (X4); and settlement locations (X5). The final result that defines the independence of children's mobility in Semarang City is the average value of Y1, X1, X2, X3, X4, and X5.

Most of the respondents live in residential locations that have access to free play spaces, but their places of residence tend to be in urban areas that have limited open space. The survey results show that there are still many things related to children's playing activities outside the home that do not get parental approval. High scores are only seen on permits to play in the home environment. Parents also tend to be more trust their children to play on their own without assistance if playing activities are carried out in their home environment.

Then for safety conditions, judging from the condition of vehicle traffic, security from social disturbances, and security from the physical location of the area, the children's play environment in Semarang City is in a safe condition. Although the playing environment in Central Semarang District needs to be improved regarding security related to traffic density and Candi District needs to be improved regarding the level of security related to the physical condition of the area.

Even though the survey results show that the security conditions in Semarang City are safe, children in Semarang City are still afraid to play outside the house without any assistance from their parents. The biggest reason that makes children afraid to go out is the COVID-19 pandemic. Children think that their freedom of play is not influenced by culture or gender.

The average independence of children's mobility (the average value of Y1, X1, X2, X3, X4, and X5) in each District of Semarang City is in a low condition. The existence of the COVID-19 pandemic that was happening when this survey was conducted could be one of the causes of the low independence of children's mobility in their environment in the range of 2020–2021.

4.4 Actualisation of the affordability of children's play activities

The next variable that becomes the main variable in Bullerby model is the affordability of children's activities. The affordability of children's play activities (Y2) is also influenced by several other variables such as the number of children's affordability in accessing the outdoor play spaces (X6) and indoor play spaces (X7). The final result that defines the affordability of children's play activities in Semarang City is the average value of Y2, X6, and X7.

Based on the survey results, the number of play activities that children could do both inside and outside the residential area is very low. Some of the games that many children do include cycling, running, and sports games (playing tennis, badminton, or football). Meanwhile, the potential for the affordability of children's play is quite diverse, but the highest score indicates that most children state that there are not many places to play in their environment. Therefore, in general, children in Semarang City have low playability. High potential is in four Districts namely Candisari, Gayamsari Mijen, and Ngaliyan. Meanwhile, the lowest is in Banyumanik.

The availability of outdoor play space is quite diverse. Candisari, South Semarang, and East Semarang Districts have low scores. This shows that not many children in the four Districts have outdoor playgrounds. The Districts of Banyumanik, Gajahmungkur, Gayamsari, Gunungpati, Mijen, Ngaliyan, Pedurungan, West Semarang, Central Semarang, North Semarang, and Tembalang have high scores, and Tugu Districts have very high scores. Therefore, it was found that in 4 out of 16 Districts was necessary to improve and add a child-friendly outdoor play space.

The number of indoor play spaces is also quite diverse. Candisari, Gayamsari, Genuk, South Semarang, and East Semarang Districts have low scores. This shows that not many children in the four districts have indoor play spaces. Meanwhile, the districts of Banyumanik, Gajahmungkur, Gunungpati, Mijen, Ngaliyan, Pedurungan, West Semarang, Central Semarang, North Semarang, and Tembalang have high scores, while Tugu Districts have very high scores. The high score for the affordability of playing activities in Tugu District is because the children there could do more playing activities and are also supported by more choices of playing locations when compared to other districts. Therefore, it was found that in 5 out of 16 districts it was necessary to improve and add more child-friendly indoor play spaces.

Overall, the average results of the actualisation of the affordability of children's playing activities in Semarang City show a low score. The outdoor (X6) and indoor (X7) variables already had a high score, but the affordability variable (Y1) had a low score. Based on the results of the analysis, it was found that the districts of West Semarang, North Semarang, Central Semarang, South Semarang, East Semarang, Gayamsari, Genuk, Candisari, and Gunungpati have low playability. Meanwhile, the Tugu, Ngaliyan, Mijen, Gajahmungkur, Banyumanik, Tembalang, and Pedurungan Districts have high playability. Therefore, it was found that 9 out of 16 Districts needed the addition of a child-friendly play space to increase the affordability of children to play in the area where they lived.

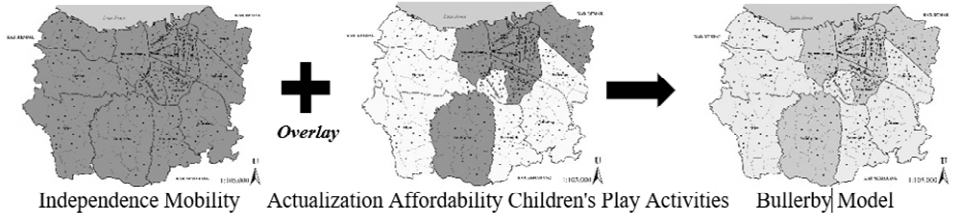
Referring to the survey results, several districts in downtown areas have low affordability of playing activities. According to the measuring indicators, what causes the low affordability of children's play activities in downtown areas is the lack of choice of children's play locations and the low number of play activities that children could do in that area. This could also be due to the lack of open space in the central area of Semarang City, as Sudarwani and Ekaputra (2017) said that there is an inequality in the distribution of open space in Semarang City so children's play activities in downtown areas of Semarang City are lower than in other areas.

4.5 Identify child-friendly play environments

Identification of the children's play environment is done by overlaying the distribution map of mobility independence with the distribution map of the actualisation of the

affordability of children's play activities (see Figure 6). After overlaying, the data were analysed to determine the position of the children's play environment based on Kytta's (2004) opinion in each district in Semarang City.

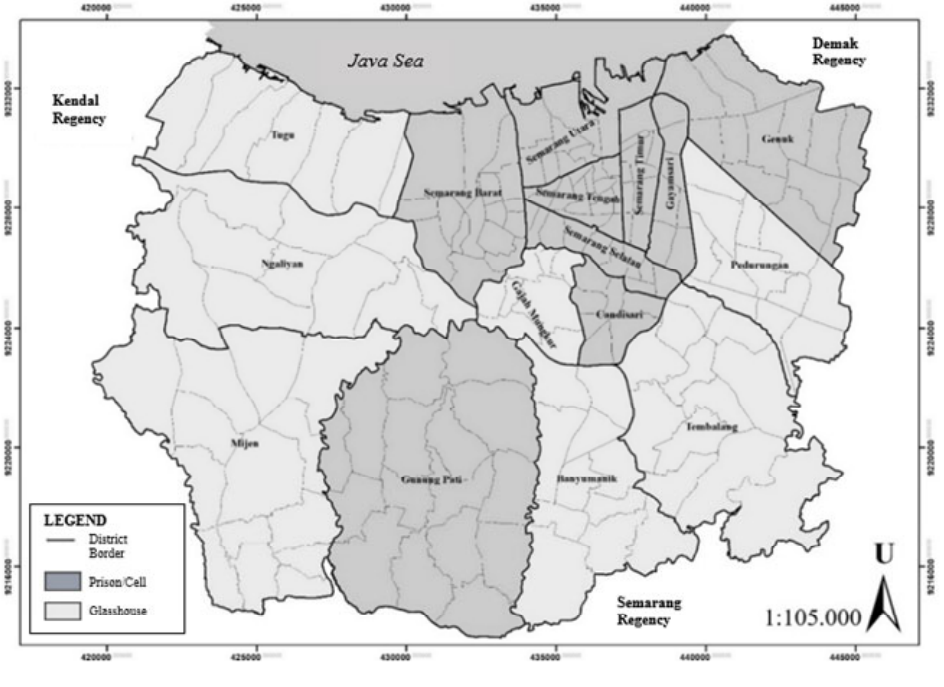
Figure 6 Overlay analysis



Source: Author's Analysis (2021)

The identification results show that there are nine districts with a prison-like environment, the districts include the districts of West Semarang, North Semarang, Central Semarang, South Semarang, East Semarang, Gayamsari, Genuk, Candisari, and Gunungpati (see Figure 7). The prison-like environment shows that the independence of mobility and the actual number of affordable children's play activities are still low. This condition is the worst according to Bullerby model because both variables show low values.

Figure 7 Children's playing environment in Semarang City based on Bullerby model



Source: Author's Analysis (2021)

In Semarang City, the condition of children who are imprisoned in their play environment is due to the limited space for movement, especially during the COVID-19 pandemic. This could be seen from the number of children's activities that many parents are prohibited from doing alone, such as not being allowed to use public transportation alone, cycling alone, playing inside/outside the residential area by themself, and playing until late at night. The limited space for children to move is then coupled with the low affordability of children's play activities so that nine districts are classified as prison-like environments.

Eight of the nine prison-like districts are located in downtown areas that have high building density. According to the assessment indicators, Candisari, Gayamsari, Genuk, South Semarang, and East Semarang Districts, which are located in the downtown area, have low activity affordability because they have a low number of playing activities and do not have many choices of places to play. Meanwhile, the districts of West Semarang, Central Semarang, and North Semarang, which are also located in the downtown area, have low activity affordability, only due to the low number of play activities, but already have many choices of playgrounds in their environment.

There is Gunungpati District which is located in the suburbs where the characteristics of this area have a low building density. However, Gunungpati District has low accessibility to activities due to the low number of play activities, but the children think that there are many choices of playgrounds in their environment. So, although based on a survey in Gunungpati District, there are many play spaces available, due to the low number of play activities that are realised, the affordability of children's play activities in this District is relatively low. Then coupled with the independence of children with low mobility, Gunungpati District is also included in a prison-like environment.

The identification results show that seven districts are like Glasshouses. Districts with a glasshouse-like environment consist of Tugu, Ngaliyan, Mijen, Gajahmungkur, Banyumanik, Tembalang, and Pedurungan Districts (see Figure 7). A glasshouse-like environment shows fairly good condition compared to a Prison-like environment. In this condition, the affordability of children's play activities is better, which means that children's access to their play spaces is better. However, this condition is still not said to be child-friendly because children are still limited in mobilising. The limitations that hinder the mobilisation of children in Semarang City are due to the prohibition of parents from playing alone during the COVID-19 pandemic, so even if there are many playgrounds and facilities in the vicinity, the limitations of children's mobility currently prevent them from accessing the surrounding facilities.

4.6 Government and citizen's role

Based on the identification, there are several things that the government can do to create a child-friendly play environment in Semarang City. First, the government can improve the physical infrastructure such as providing sidewalks, bicycle lanes, and traffic signs in children's travel zones. Zones that need to be considered include school zones, playgrounds, settlements, and public transportation. Second, create and design more playgrounds attractively and innovatively. The third is to use the space around the residential area as a playground so that it is easily accessible.

As for the citizens of Semarang City, first, there is a need for education related to children's independence from an early age so that children's independence can be formed from the start. One way to do this is to give responsibility to children and learn to let

children do their activities. Second, strengthen the community to create a safe and mutually supportive environment. Third, continue to apply health protocols when children play outside, such as wearing masks, maintaining distance, and using hand sanitizers.

5 Conclusions

The identification results based on the perception of children in Semarang City indicate that no play environment is classified as child-friendly, or in this study, there is no Bullerby status. Semarang City has two play environment characteristics, namely prison-like and glasshouse-like environments. Prison-like environments are located in nine districts, namely West Semarang, North Semarang, Central Semarang, South Semarang, East Semarang, Gayamsari, Genuk, Candisari, and Gunungpati. Meanwhile, the glasshouse-like environments are located in seven districts, namely Tugu, Ngaliyan, Mijen, Gajahmungkur, Banyumanik, Tembalang, and Pedurungan Districts. Neighbourhoods such as the desert-like and Bullerby are not found in Semarang City.

Prison-like and glasshouse-like play environments in Semarang City have different characteristics. The prison-like environment is mostly located in the downtown area (except Gunungpati District) which is located in a dense area with flat topography, limited child mobility, and few choices of places to play. While the Glasshouse-like environment is located in the suburbs which are located in a sprawl area with hilly topography, limited child mobility, and more choices of places to play.

Overall, the low assessment of children's play environment in Semarang City is because there are not many play activities that could be done by children. The thing that distinguishes the conditions of the play environment between districts is the number of playgrounds available and children's access to their play spaces. The glasshouse-like environments in seven districts have more play spaces available with easy access, but the low independence mobility of children in Semarang City limits the actualisation number of play activities. Whereas in nine districts with prison-like environments, shows that children still lack a place to play so there are not many games and activities that children could do.

The results of the study are in line with Kytta (2004) which states that in general, the proportion of child-friendly environments (Bullerby) would decrease and glasshouse-like environments would increase along with the increasing level of urbanisation. The condition of the child-friendly play environment in Semarang City also tends to decrease along with the increasing level of urbanisation. However, there is one district (Gunungpati) that has a play environment that is not child-friendly even though it is located in an area with a low level of urbanisation.

The results of this study can be used by the Semarang City government as an evaluation material to provide child-friendly play space and improve the Semarang CFC program. This research is limited to assessing the children's play environment based on the mobility and affordability of children's play in residential locations with different levels of urbanisation. Further research is needed to determine other causes and factors that influence the existence of a play environment that is not child-friendly in the suburban area of Semarang City. It is also possible that different results would be obtained if this study is conducted after the COVID-19 pandemic ends.

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