

SAFETY FACTORS FOR PLAYGROUND EQUIPMENT TO PROMOTE SOCIAL SUSTAINABILITY

Raja Mohd Aizat Akhmal Bin Raja Mohd Rozuan^{1*}, Kharizam Ismail² and Wan Rabiah Wan Omar³,
^{1,2,3} Faculty of Architecture, Planning and Surveying, Universiti Teknologi MARA, Perak Branch, Seri Iskandar Campus, Seri Iskandar,
32610 Perak, Malaysia.
raizatakhmal109@gmail.com*

Abstract - Playground is the place for the children to play and gain some experience, learning a new thing about the environment and makes some new friends. It should become a safe and comfortable place for them in order to smoothen their process of learning. Safe and comfortable are needs of children in order to fulfill the social sustainability. However, the safety of the playground is questionable because there is about 3,000 cases of injuries occurred involved children at the playground. Based on these issues came out with the aim which is to suggest the safety criteria in order to enhance the level of the safety at the playground. The objective is to identify the factors related with condition of playground equipment which contribute to accidents on users at the playground. A qualitative method was used for this research by observing the condition of playground equipment. The outcome of this research is expected to assist the stakeholder Municipal Council, to enhance safety the quality of the playground in residential area in order to widen the social sustainability towards society.

Keywords - Safety, Playground, Residential Area, Social Sustainability

1 INTRODUCTION

The desire to play naturally to all children and its value is undeniable. The process of playing increases a child's self-esteem, opens a young mind to new possibilities, and develops social, verbal and problem-solving skills. When people say playground, the people will imagine the place for children to play. The playgrounds become important place and been created for them to play free and also been a part in recreation and physical's activity (Mani *et al*, 2012). While, Abd Wahab (2015) mentioned, the playground nowadays helps the children to play with their friends, widen their area of social and also by way of an exercise activities. Align with Wood & Martin (2010) said that the uses of the playground not only promote the physical activity, but also for social interaction, creativity and problem-solving as well as the relationship and interaction with the nature too. Since its commencement at the start of the 20th century, playground design in the United States (US) has advanced dramatically from the traditional playgrounds of isolated metal pieces to today's composite structure.

However, the playground nowadays seems questionable. On these days, there are a lot of cases related with the safety issues on the playground. Even though the playground is the place for children to grow and develop their abilities of communications, it is also a place for them to get severe injuries and even worse (Hammond, 2008). Based on the statistic reported by Md Zain (2012) the latest updated data related to the cases of accident on the playground, about 3000 cases such as injury happened every three months in Malaysia. From this data shown that the playground recently is not safe for the children to play.

This issue need to be taken seriously by the local authorities who in charge the playground because it involved the life and safety to the children. From this issue come out with the aim of the research which to suggest the safety criteria in order to enhance the level of the safety at the playground equipment. This aim can be achieving by identified the condition factors of the playground equipment which contribute to accident on users at the playground.

The secure and safety of the playground should become the first virtue (City of Alexandria, 2012). However, the playground nowadays is lacking in supervision for the safety. In addition, there has no specific guidelines for safety of the playground in residential area in Malaysia especially for the playground equipment (City of Alexandria, 2012). As stated by Noriah Mat, a certified playground safety inspector, she saw that there are several types of safety hazards from the playground that we

should be aware and take attention on (Oh, 2017). One of types of safety hazards can be come from condition of playground equipment. Safety of the playground should give more focus on the equipment to reduce any danger which can threaten children in terms of harm, injury and crime (Mani *et al*, 2012). The poor condition of the playground equipment is happen because of the poor maintenance. Injuries happen on the playground caused by insufficient maintenance of playground equipment (U.S Consumer Product Safety Commission, 2015). Poor maintenance probably can give a negative to the aesthetics, the safety's perception functionality and the whole understanding of the quality of the playground (Mani *et al*, 2012). From this issues is come out with the aim which to suggest the safety criteria in order to enhancing the level of safety for the playground equipment and create an environment that will indicate to children and enrich their 'work of play'.

2 LITERATURE REVIEW

When people mentioned the word 'play' it constantly links it with the playground. There are several definition of playground, some called as nature playgrounds, outdoor playground and discovery playground. Russell (2011) defined as a small, publicly owned, small outdoor area with recreational equipment and provide physical activity for children. According to Mani *et al* (2011), playground become an important place which been created for children to play freely and become a part in recreation also activity of physical.

Principally, nature playground can give numerous benefit for children in part of physical, mental and social such as development of motor skills, emotional and risk management. The main issue in designing playgrounds is to provide challenging and fun activities while also providing for the safety of the children using the playground. Nevertheless, playground become significant contributor to accidents and injuries for children, as mentioned by Playground Safety (2017), between 2001- 2008 61% of children injuries caused by playground equipment.

Table 1 provide some details statistic and factors that contribute to playground injuries which had been occur in Malaysia, Australia and United States. Principally, all of the injuries factors are similar which due to the three significant aspect: Design, equipment and materials of the playground equipment

Table 1 Factors contributing to injuries in playground

Malaysia	Australia	United States
<ul style="list-style-type: none"> About 3000 cases of accidents happen at playground every three months in Malaysia. Injuries involve children aged between five to nine years. Factors contributing to injuries is come from playground equipment: broken and height of equipment. (Md Zain, 2012; Nadason 2015) 	<ul style="list-style-type: none"> Every year 120,000 Australian Children injuries due to playground. Most of the injuries involve children aged between one to nine years. Factor contributing to injuries is come from playground equipment: Design, material and surface of equipment (Department of education and early childhood development, 2012; Nasar & Holloman, 2013) 	<ul style="list-style-type: none"> 1,786,008 injuries associated with playground and occur in five to nine years' age category 2691 accidents related to playground equipment such as hazard pattern, damage, design and installation. (O'Brien, 2009; US Consumer Product safety commission, 2015)

This aligned with other study by Fall school workshop (2016), Playsi (2017) and Md Saaid & Hassan (2015) which agreed with the those three significant factors contributing to injuries in playground. Despite of that, another factors as highlighted by them are poor maintenance and vandalism.

2.1 Design of the playground

As in the design of any architectural space, the process of designing a playground should begin with thorough programming to better understand the needs of the owner and how and by whom the playground will be used. The factors of injuries for this category may lead to design failure, improper equipment, poor layout and poor installation. These factors usually involving equipment design and surfacing of the playground. For example:, important pre-design information includes knowing how and from which directions the children might arrive at the playground and the anticipated age range of the children using the playground, which affect many planning and design directions.

According to Playsi (2017) and Northumberland (2014) stated one of the main factor contributing to accident in playground related to improper design of the playground equipment. Referring to study by Judge (2017), 5% of 200,000 children are injured from the flaws equipment design and playground is most important when the range of ages from toddlers to preteens. Evaluating the expected ages of children on the playground is vital in selecting activities that will provide appropriate levels of challenge within acceptable limits of safety for children at various ages. This parallel to Howard (2010), remarks design of the playground is a complex interaction between height and surface of the play environment and should appropriate with level of ages.

While, other factors relay to design matters was improper equipment. Most of the playground equipment that contribute injuries are climbing equipment which comprise height and surfacing of the playground equipment. As mentioned by Howard *et al* (2009) and Loder (2008), fall height is the most determinants risk of fall injury at the playground such as monkey bar height, swings and slides. Furthermore, poor layout also sources to the accidents at the playground, for example fall zones. Playenviro (2017) highlighted, improper zone uses classified as one of the most dangerous condition for the playground such as equipment had been installed closer to the concrete dividers and structures. Besides that, poor installation, rough edges, protruding bolts and loose moving equipment are kind of condition of playground equipment which can end up harmful safety to the users.

2.2 Improprate material

The consideration of choosing material for playground is vital. As mentioned by Fall School workshop (2016), the causes of accidents in playground are lead to unsafe material and improprate materials. There is some material which give the harms for the children, for example, Barnes (2001) quoted that rubber not suitable for playground material due to able to bounce and may lead to serious injured. While ground material surface also can effect to accident due to fall of the shock-absorbing surface which can cause some serious head injuries.




3 METHODOLOGY

The research were undertaken in selected public playground in Seri Iskandar, Perak. Based on the data documentation from Municipal Council of Perak Tengah, there are 17 public playground that built in Seri Iskandar which involve about 76 types of playground equipment. The data had been analysed by observation and the procedure is carried on in one week. The data is collected by using checklist and a camera for capture the image of the playground equipment. This research has been limited to observe the physical condition of the playground equipment. Six types of playground equipment were observing which are sliding, monkey bar, swings, tubes, spring rider and see-saws.

4 RESULTS AND DISCUSSIONS

Based on observation analysis, there has been assumed to be classified into two categories which are “Condition of safe to be play” and “Condition of potential to get injury” as shown and explained in Table 1.

Table 1 : Categories of condition of playground equipment

Categories	Example Figure	Safety criteria
“Condition of safe to be play”		This condition of the equipment are good functional and safe for the children to play. These of condition of equipment fulfil the requirement as stated by Karen & Paul (2014) stated that playground should be friendly and attractive with appropriate equipment and facilities. Benefits from that, the children will feel excitement and enjoyable during playing while the parents will feel secure and safe to let them play at the playground.
“Condition of potential to get injury”		This condition of equipment are good functional but less safe for children to play on. This is because the safety equipment such as surfacing floor has been detached, damaged due to weather condition or has not been installed very well from the beginning of installation. With this condition has highly potential for the children to get injury.
		This condition of the equipment which are very poor and not functional well. From this condition, this equipment not only unfulfilled the safety requirement but also not be able to play well by the children. It because this damage equipment is worst and has dangerous parts such as the unsafe bolt, edges and rotten beam which has potential for children to get injury at the playground.

In Table 2 shown the result of condition of each 76 playground equipment through observation. In this table, “/” is stand for “Condition of safe to be play”, “x” stand for “Condition of potential to get injury” and “-” is stand for the equipment is not available on the playground.

Table 2 : Condition of 76 playground equipment in Seri Iskandar, Perak

No	Playground	Sliding	Swings	See-saws	Monkey Bar	Spring Riders	Tubes
1	“A”	/	/	/	/	/	/
2	“B”	x	/	/	/	/	/
3	“C”	/	/	/	/	/	-
4	“D”	x	/	/	/	x	-
5	“E”	/	x	/	-	-	x
6	“F”	x	x	/	x	/	-
7	“G”	x	x	x	x	-	x
8	“H”	x	x	x	x	x	x
9	“I”	/	/	/	-	-	-
10	“J”	x	x	x	x	x	x
11	“K”	x	x	x	x	x	x
12	“L”	/	-	-	-	/	-
13	“M”	x	x	x	x	x	-
14	“N”	/	-	-	-	-	-
15	“O”	x	x	x	x	x	-
16	“P”	x	x	-	-	x	-
17	“Q”	x	x	-	-	x	-
Total “x”		11	10	6	7	8	5
Total “/”		6	5	7	4	5	2
Total every equipment		17	15	13	11	13	7

The result of the observation in Table 2 have being interpreted through pie chart.

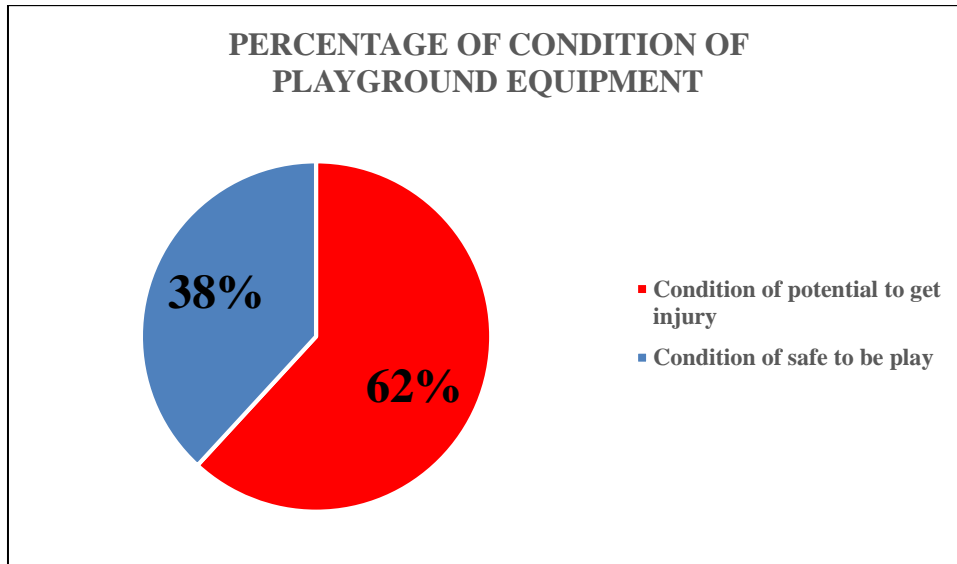


Figure 1 Percentage of condition of playground equipment

Based from the pie chart in Figure 1 above, there are 62% of total playground equipment have potential for children to get injury and only 38% from the total playground equipment are safe condition for the children to play. Based from the observation, every equipment that classified as “condition of potential to get injury” is broke and very harmful for the children to play. This result has been proved by Md Zain (2012) and Nadason (2015) which stated that factor that contributing to injury is broken equipment. From this percentage is clearly shown that local authority should be aware and need to take further action to ensure that those level of safety for every playground equipment can be enhance.

Below is the percentage of each one of the playground equipment to determine which type of playground equipment that should be maintain most. The data and result has be interpret has shown in Figure 2 below:

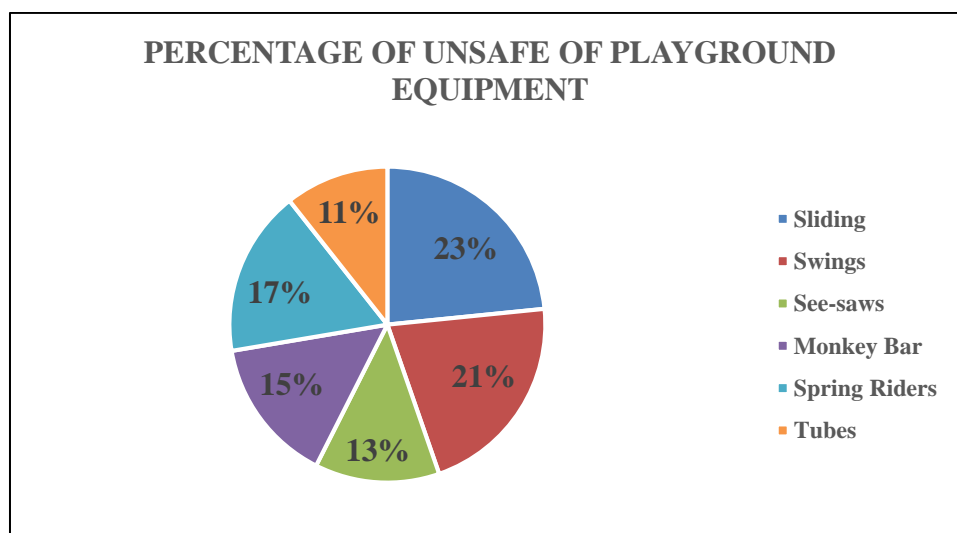


Figure 2 Percentage of unsafe playground equipment

From the Figure 2 above shown that the unsafe equipment should be maintain most are sliding and swings which are 23 % and 21 % respectively. This result shown that the sliding and swings are types of equipment that has safety issues and poor condition. These type of equipment has been proved by Howard *et al* (2009) and Loder (2008) stated that playground equipment such as monkey bar height, swings and slides are the most determinants risk for fall injury to the children. This result should be aware by local authority to ensure that these equipment are being well-fixed and increase the quality of safety in order to allow the children to play safely.

5 CONCLUSION

As a conclusion from this analysis, the condition of the several equipment at the playground mostly are very poor and dangerous to the children. Generally, the playground has the limited life (Department of Education and Early Childhood Development, 2012). However, when the children are available, they will come and play at the playground without considering the condition of the equipment at that time. This situation also happens at Sungai Isap, Kuantan. Even though the playground has less safety features but the resident still use and play (Abd Wahab, 2015). Based on several studies, the risk of injury at the playground of the children will increase and may cause death because of unsuitable condition of the playground equipment (Mani et al, 2012).

Based on these problems, it can determine the level of maintenance towards the playground in Seri Iskandar and it can be assumed and considered that the equipment of these playground has less maintenance and lack of supervision by parties involving local authority. This is because, the condition of several playgrounds are very poor, harmful and inconvenient. There are several equipment which are broken and damaged without any further action taken either to be fixed or installed with a new part. This deterioration equipment have been abandon in a long time. This condition and situation may cause injury to the children in the future.

REFERENCES

- Abd Wahab, D. (2015). Taman permainan uzur. [Online] Sinarharian.com.my. Available at: <http://www.sinarharian.com.my/mobile/edisi/pahang/taman-permainan-uzur-1.449953> [Accessed 12 December 2016].
- Barnes, C. (2001). Playground surfaces not all equal - children and safety. [Online] CHOICE. Available at: <https://www.choice.com.au/babies-and-kids/children-and-safety/toys-and-safety-at-play/articles/playground-surfaces-not-all-equal> [Accessed 6 May 2017].
- City of Alexandria. (2012). Chapter 6: Playgrounds. [Online] Available at: [https://www.alexandriava.gov/uploadedFiles/recreation/parks/06 Playgrounds.pdf](https://www.alexandriava.gov/uploadedFiles/recreation/parks/06%20Playgrounds.pdf) [Accessed 6 May 2017].
- Department of Education and Early Childhood Development. (2012). 1st ed. [ebook] Victoria: Communication Division. Available at: <http://www.education.vic.gov.au/Documents/about/department/201112deecdannualreport.pdf> [Accessed 6 May 2017].
- Fall School Workshop (2016). Towards a Safe Playground. 1st ed. [eBook] Available at: <http://www.doh.wa.gov/Portals/1/Documents/4400/SchoolWorkshop-Playground.pdf> [Accessed 6 May 2017].
- Hammond, A. (2008). Playground Injuries: Statistics and Prevention – Child Safety. [Online] Safety.more4kids.info. Available at: <http://safety.more4kids.info/178/playground-injuries/> [Accessed 6 May 2017].
- Howard, A.W. (2010). Keeping children safe: rethinking how we design our surroundings. Canadian Medical Association Journal, 182(6), 573-578
- Howard, A., Macarthur, C., Rothman, L., Willan, A. & Macpherson, A. (2009). School Playground Surfacing and Arm Fractures in Children: A Cluster Randomized Trial Comparing Sand to Wood Chip Surfaces. PLoS Medicine, [online] 6(12), p.e1000195. Available at: <http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1000195>.
- Judge, A. (2017). Playground Equipment Injuries, Liability & Compensation. [Online] Injury Claim Coach. Available at: <http://www.injuryclaimcoach.com/playground-equipment-injuries.html> [Accessed 6 May 2017].
- Karin, H. & Paul, M. (2014). Quality Outdoor Play Spaces for Young Children. 1st ed. Toddlers and Preschool
- Loder, R. (2008). The demographic of playground equipment injuries in children. Journal of Paediatric Surgery, 43(4), 691-699
- Mani, M., Abdullah, A., Mustafa, R., Jayaraman, K. and Bagheri, A. (2012). The Importance of Well-Designed Children's Play-Environments in Reducing Parental Concerns. *Middle-East Journal of Scientific Research*, 11(9), pp.1176-1184.

- Md. Saaid, A. and Hassan, A. (2015). Children's Playgrounds in Malaysia: Qualitative Observations Upon the Safety and Design Issues. *American Transactions on Engineering & Applied Sciences*, 4(3), pp.179-200
- Md Zain, A. (2012). Playground Safety - PORTAL MyHEALTH. [Online] PORTAL MyHEALTH. Available at: <http://www.myhealth.gov.my/en/playground-safety/> [Accessed 6 May 2017].
- Nadason, M. (2015). Keselamatan taman permainan wajar dipertingkat. [Online] BH Online. Available at: <http://www.bharian.com.my/node/94195> [Accessed 6 May 2017].
- Nasar, J. & Holloman, C. (2013). Playground Characteristics to Encourage Children to Visit and Play. *Journal of Physical Activity and Health*, 10(8), pp.1201-1208.
- Northumberland. (2014). Outdoor Play Equipment. [Online] Available at: [http://www.northumberland.gov.uk/NorthumberlandCountyCouncil/media/About-the-Council/Staff%20Information/Health%20and%20safety/Health%20and%20safety%20manual%20\(schools\)/G5-Play-Equipment-Sept-2014.pdf](http://www.northumberland.gov.uk/NorthumberlandCountyCouncil/media/About-the-Council/Staff%20Information/Health%20and%20safety/Health%20and%20safety%20manual%20(schools)/G5-Play-Equipment-Sept-2014.pdf) [Accessed 7 May 2017].
- O'Brien, C.W., (2009). Injuries and Investigated Deaths Associated with Playground Equipment, 2001-2008. U.S. Consumer Product Safety Commission (CPSC): Washington D.C.
- Oh, I. (2017). More should be done to make our playgrounds safer - Community | The Star Online. [Online] Thestar.com.my. Available at: <http://www.thestar.com.my/news/community/2014/05/01/playing-with-safety-more-should-be-done-to-make-our-playgrounds-safer-by-oh-ing-yeen-ingyeenthest/> [Accessed 7 May 2017].
- Playenviro.com. (2017). Common Playground Safety issues, Play Environments, Inc., Michigan. [Online] Available at: <http://playenviro.com/unsafe.html> [Accessed 7 May 2017].
- Playground Safety (2017). Injuries | National Program for Playground Safety. [Online] Playgroundsafety.org. Available at: <http://playgroundsafety.org/research/injuries> [Accessed 7 May 2017].
- Playsi (2017). Playground Safety/Responsibility. [Online] Available at: <https://www.playlsi.com/globalassets/documents/playguide-bulletin-5--playground-safety.pdf> [Accessed 7 May 2017].
- Russell, L. (2011). The Potential of Safe, Secure and Accessible Playgrounds to Increase Children's Physical Activity. [Online] Available at: http://activelivingresearch.org/files/ALR_Brief_SafePlaygrounds_0.pdf [Accessed 6 May 2017].
- U.S Consumer Product Safety Commission (2015). Public playground safety handbook. 1st ed. Bethesda, Md.
- Wood, L. & Martin, K. (2010). What makes a good play area for children?. 1st ed. [ebook] Australia: Centre for the Built Environment and Health. Available at: http://www.web.uwa.edu.au/__data/assets/pdf_file/0011/1857467/What-makes-a-good-play-area-literature-summaryfeb2011.pdf [Accessed 7 May 2017].