



## THE ROLE OF PLAYGROUND FACILITIES ON PRESCHOOL CHILDREN'S PARTICIPATION IN OUTDOOR PLAY ACTIVITIES IN MOMBASA COUNTY, KENYA

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### Abstract:

This study sought to establish playground facilities factors that influence preschool children participation in outdoor play activities. The dependent variable was active participation by preschool children in outdoor play activities, while independent variables were types, safety and age appropriateness of playground facilities. The target population was preschools in Mvita sub-county. Simple Random Sampling was used to select the preschools to participate in this study. Purposive Sampling technique was used to sample respondents who were teachers handling young children between five and six years. The sample consisted of 21 pre-schools. Questionnaires for the preschool teachers and observation schedules were used to collect data. Descriptive statistics was employed to analyse data. The results showed that children's general participation in outdoor play activities was not influenced by availability or lack of adequate playground facilities. Further findings revealed that playground facilities in all schools sampled had issues with safety checks. The study suggests that schools should provide children with safe playground facilities so that children can participate in outdoor activities in a conducive and comfortable space.

**Keywords:** preschool children's participation, playground facilities, in outdoor play activities

### 1. Introduction

Outdoor play activities are essential in childhood as they give young children opportunities to use their whole body. Research on play illustrates that children tend to have a preference for playgrounds that are more challenging and complex. They learn

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on multiple levels with every outdoor adventure. (Burdette & Whitaker, 2005). As children slide, it contributes to vestibular stimulation which stimulates the ear canal and the fluids in the ear helping develop a sense of balance. Swings allow children to develop coordinated movement as they propel themselves (Strickland, 2016). Children's physical development is improved this includes, body coordination, locomotion and balancing skills. Their fine motor is developed as they run, jump and push each other on the swings (Frost, Pei, San, Sutterby & Thornton, 2004). A higher degree of high self-esteem, confidence and independence is exhibited with children that have well developed physical development. Action and movement are important for a child's development, as they are naturally active and full of energy (Olds, 2001).

Research by the WHO (2003) indicated that a wide range of physical, social and mental advantage can be gotten from a physically active lifestyle. For children to learn and enjoy life, they need to be healthy. Viruses and bacteria spread faster in young children in preschools. The fresh air in the playground enables children to get out and freely exercise and be less confined in the classroom (Johnson, Christie & Wardle, 2005). Research on play illustrates that children tend to have a preference for playgrounds that are more challenging and complex (Fjortoft, 2001). Use and access to outdoor space can also increase interaction and that too can have a positive effect on health wellbeing (Cohen & Flinch, 2008).

The Surgeon General Report (2010) revealed that almost 33% of the American children are obese or overweight. Studies on children's play pattern worldwide and their findings suggest that children in England, Japan and Canada spent limited time outdoors (Clements, 2004). According to Howard (2007), for many years now, the United States has been reducing children's opportunities to engage in play. This is true in many other countries. This could be due to busy schools schedules and poor play environment. The basic children's right to play has become sidelined, mostly seen as unaffordable luxury (Elkind, 2007). Majority of the preschools have put more emphasis on academic work and disregard outdoor play activities. Currently children's play is facing threat in most preschools as priority is given to early acquisition of academic skills (Zigler & Bishop, 2009). Our education system is more academic oriented making most stakeholders to emphasis more on attainment of academics over the benefits of outdoor play.

Research has pointed to a link between levels of parental fear of outdoor and public space and a reduction in time spent outside by children (Mackett & Paskins, 2004). Parents increasingly put restriction on children's independent mobility in outdoor environment (Veitch, Bagley, Ball & Salmon, 2005). Society has negatively influenced the time children spent outdoors. This is informed by its concern over crime and children's safety in the public playgrounds. These fears have led to a decrease in the time spent outdoors and so is the vision of childhood (Sutton, 2008). Many recreation parks post the "keep off the grass" sign. These posts have limited children's free interaction in the parks. The parks have been left for admiration and not played in (Clement, 2000). Most parents nowadays feel more settled with their children at home than playing in the outdoors.

The situation on children's participation in outdoor play is not different in Africa. The Daily Monitor (2007) issued a plea for parents to allow their children out into the outdoors. It feared that many Ethiopians will reach adulthood with very little experience of outdoor. In most developing countries, urbanization has affected children's involvement in outdoor play. The young ones are in many ways most profoundly affected by the pressures and hazards of urbanization (UNICEF&UNDP, 2000). For instance, in Tanzania, most children in urban areas play in heaps of garbage littered with dangerous and even toxic materials (UNICEF, 2012). Children's love for outdoor play makes them play anywhere and at every given opportunity. This brings up the need to find out to what extent children participate in outdoor play activities.

In Kenya, studies on play that have mainly focused on the extent of children's participation in physical education, games and play, purport that involvement in outdoor has been on decline. In recognition of the importance of outdoor play the government, through the implementation of the Early Childhood Development Service Standard Guidelines (2006), allocated more time for outdoor play than any other area in the early childhood syllabus. Precisely (KIE, 2008) has allocated five outdoor play lessons each of thirty minutes in a week. Despite these efforts by the government, there has been low involvement in play among children (Waithaka & Wanderi, 2012). According to DICECE (2009), low involvement in play among young children in Emuhaya sub county has been confounded by lack of a safe and rich play environment. A study by Macharia (2012) in central division, Naivasha district on the influence of school playground safety on the participation of preschool children in outdoor activities revealed that children tend to comfortably engage in play in an environment where they feel safe. However, the study did not focus on factors of playground facilities that played some role on children participation in play. This study sought to find out the role of playground facilities on preschool children's participation in outdoor play activities in Mombasa County.

## **2. Results Problem**

In African countries, many children do not get ample outdoor experience due to emphasis on academic and playground related challenges. In Kenya, studies have established that children involvement in outdoor play has been adversely affected by emphasis on academic work. This situation could be mainly due to pressure from parent and the preschool administration on classroom grades, inadequate resources especially in public preschools, leave most playgrounds unattended to. In addition, lack of awareness on the importance of well-maintained playground facilities in regard to children's involvement in outdoor play. In addition, some school owners start preschools purely for profit making with disregard of children's needs for play and hence see no need to maintain and equip the playground. Thus, this study sought to examine playground facilities factors, namely availability, type, safety and age appropriateness and children's participation in outdoor play activities and ultimately their growth and development.

## **2.1. Research Objectives**

1. To establish the extent to which children participate in outdoor play activities.
2. To identify the types of playground facilities available in preschools.
3. To examine the safety of playground facilities on children's participation in outdoor play activities.
4. To determine the influence of playground facilities on children's participation in outdoor play activities.

## **3. Results Methodology**

Descriptive research design was used in the study. The dependent variable was active participation by preschool children in outdoor play activities. The independent variables were types, safety and age-appropriateness of playground facilities. The target population was preschool in Mvita sub-county. Simple Random Sampling was used to select 27% (21) preschools from the sub-county. Through the random sampling 66.7% (14) of the preschools were private while 33.3% (7) were public. Interview Questionnaires for pre-school teachers and Observation Schedules were used to collect data. The researcher pretested the instruments in two preschools (one public and one private), which were excluded in the final study. Item analysis was used to test the content of validity of the instruments. Cronbach's Alpha Correlation was used to test the reliability of the instruments which was found to be 0.71 reliable. Descriptive statistics involving frequency and percentages were calculated. Results from data analysis were presented using tables.

## **4. Results and discussions**

The study focused on factors that playground facilities have on children's participation in outdoor play activities.

### **4.1. Children Participation in Outdoor Play Activities**

The study sought to establish the extent to which children participate in outdoor play activities. To achieve the objective, teachers were asked to indicate in the questionnaire the kind of outdoor play activities that children participate in and the total number of preschool children participating in each of the outdoor activities. This was then corroborated with the observation schedule that the researcher and teachers used during the outdoor play activities by the children. Here, the researcher analysed data based on the number of playground facilities a school had and the total number of children participating in various outdoor activities as shown in Table 1 below.

**Table 1: Playground Facilities and Children Participation**

Outdoor Play Activities by Children	Frequency	Percent
Swinging	135	27.1%
Sliding	151	30.3%
Balancing	107	21.4%
Climbing	86	17.2%
Crawling	10	2.0%
Propelling	10	2.0%
<b>Total</b>	<b>499</b>	<b>100%</b>

From Table 1, it is evident that one in every three children preferred sliding, slightly over a quarter the children preferred swinging, while over a fifth preferred balancing, followed by climbing which was preferred by almost a fifth. The least outdoor play activities that only a handful child participated in were crawling and propelling. The study revealed that a preference on a particular outdoor play activity was necessitated by the availability of the type of playground facilities in a school. Previous studies done indicate that outdoor play is important for all age-groups especially early childhood. Therefore, it can be concluded that even though the availability of playground facilities a school had greatly influenced the level of children participation in outdoor play activities, the level of participation did not decrease if a school had lesser and/or fewer variety of playground facilities.

The Researcher also sought the views of teachers on how often children participate in outdoor play activities and the duration taken while playing during the outdoor play activities and the findings were revealed respectively in Table 2 and 3 below:

**Table 2: Frequency of Outdoor Play Activities**

Frequency of Outdoor Play Activities	Frequency	Percent
Daily	7	33%
Twice a week	6	29%
Three times a week	6	29%
Weekly	2	9%
Monthly	0	0%
<b>Total</b>	<b>21</b>	<b>100%</b>

The study found that a third of schools have a schedule whereby children participated in outdoor play activities daily, while nearly a third of schools had a schedule of twice a week or thrice a week of outdoor play activities by children. Only a tenth of the schools had a weekly schedule for outdoor play activities. The study also revealed that almost half of schools had either a 25 minute or 30 minute duration of outdoor play activities by children, while only almost a quarter of the schools in the study had a 20 minute duration. This implies that the minimum duration allocated for outdoor play activities in preschools from Mvita Sub County was 20 minutes, while the maximum duration was 30 minutes as shown in table 3 below;

**Table 3:** Duration Allocated by Schools for Outdoor Play Activities

Duration of outdoor play activities	Frequency	Percent
10 minutes	0	0%
15 minutes	0	0%
20 minutes	5	24%
25 minutes	8	38%
30 minutes	8	38%
Total	21	100%

#### 4.2. Types of Playground Facilities

In the second objective, the researcher sought to identify the types of playground facilities available in preschools. To achieve this objective, data collected from the observations made was organized in terms of types of play facilities found in the schools sampled and the state of the playground facilities. Playground facilities offer opportunities for imaginative, physical and cognitive development. Commonly found playground facilities include climbing structures, swings, slides and spring riders. The Researcher analysed the data which were collected with the help of observation schedules as shown below;

**Table 4:** Types of Playground Facilities Available in School

Playground Facilities	Frequency	Percent
Swings	17	27%
Slides	17	27%
See saw	15	23%
Climbing Frames	13	20%
Playhouse	1	2%
Merry-go-round	1	2%

From table 4 above, it is evident that slightly over a quarter of the schools sampled had swings and/or slides. This is in agreement with a study done by (Early Headstart National Resource Centre, 2013) that states that swings provide children with firsthand knowledge and experience of cause and effect and understanding spatial learning such as up and down, back and forth. They also get a chance to see the world from a new perspective. Almost a quarter had see-saw, whereas a fifth had climbing frames. Only a minority had playhouse or merry-go-round. From the finding, it is clear that none of the schools sampled had more than one of each type of playground facilities. The findings agree with previous studies that found playground facilities to include climbing structures, swings, slides and spring riders (Karim & Paul, 2014).

The researcher sought to find out the state of playground facilities available in each school as shown in table 4. Data was collected to find out the state of playground facilities available in each school. The researcher observed the state of each playground facilities in terms of the presence or absence, and data collected from schools that registered presence of attractiveness, suitability, barriers installed, shades installed, safe surfacing and variety of facilities, was analysed as shown below

**Table 5: State of Playground Facilities**

State of Playground Facilities	Frequency	Percent
Attractiveness	17	81%
Suitability	20	95%
Presence of Barriers	18	86%
Presence of a Shade	8	38%
Safe Surfacing	9	43%
Variety of Facilities	13	62%

The study revealed that most schools have maintained good state of their playground facilities, with almost all having suitable playground facilities, almost nine tenth having presence of barriers on their playground facilities, and slightly over a quarter having attractive playground facilities. According to Pica (2003), the attractiveness of playground facilities appeals to young children and hence makes them interested to interact with them. Nearly two thirds had variety of playground facilities. Just below a half of the schools had presence of a shade and almost a half had safe surfacing on their playground facilities.

### 4.3. Safety of Playground Facilities

In the third objective, the researcher sought to examine the safety of playground facilities on children's participation in outdoor play activities. Here the Researcher analysed data collected through observation schedule and recorded findings in terms of number of schools with safety checks on playground facilities a school had. Teachers were also interviewed in reference to supervision of children during outdoor play activities and the maintenance of playground facilities.

The researcher examined playground facilities using a checklist of safety checks that each playground facilities ought to have and analysed the findings as shown below;

**Table 6: Safety of Playground Facilities**

Safety Checks	Frequency	Percent
Broken equipment such as loose bolts, missing end caps	1	2%
Cracks	5	12%
Broken glass and other trash	0	0%
Loose anchoring	4	9%
Insects damage	2	5%
Displaced loose-fill surfacing	2	5%
Holes, flakes, and/or buckling of unitary surfacing	2	5%
User modification (such as ropes tied to parts or equipment rearranged)	1	2%
Vandalism	0	0%
Worn out parts – loose parts	1	2%
Damaged	2	5%
Missing parts	8	19%
Rusted or corroded metals	7	16%
Rot	7	16%

The findings revealed that all schools sampled had safety issues on their playground facilities, whereby almost a fifth playground facilities had missing parts, just under a fifth had playground facilities with either rusted or corroded metals, or rot, while slightly more than a tenth had playground facilities with cracks, while almost a tenth had loose anchoring on their playground facilities. A few of the schools sampled had their playground facilities either damaged, with holes, flakes and/or buckling of unitary surfacing, insects damage, or displaced loose-fill surface. Only a small number of the schools sampled had either broken playground facilities, playground facilities with user modification, or worn out parts. None of the schools sampled had experienced vandalism on their playground facilities. It can therefore be concluded that out of the 21 schools sampled, 17 schools (81%), which represents slight more than three quarters had aspects of unsafe playground facilities.

Safety measures of playground facilities go hand in hand with regular maintenance (Outdoor play area Standard Manual, 2006). The researcher therefore sought to establish who was responsible for the maintenance of playground facilities and space in each school and the results are shown in Table 7.

**Table 7: Maintenance of Playground Facilities**

Responsibility	Frequency	Percent
Care Taker	6	29%
School Management	7	33%
Others	8	38%

It is evident that none of the teachers interviewed had any responsibility in the maintenance of the playground facilities. Just over a quarter of the schools had assigned the maintenance responsibility to the caretaker, while a third had the School Management taking responsibility for maintenance. Almost a half of teachers interviewed mentioned that there was someone responsible for the maintenance of playground facilities but did not specify who in particular.

The main role of a playground supervisor is to ensure the safety and welfare of children. A supervisor's approach on playground supervision may influence children's physical safety and opportunities to develop emotionally, socially, cognitively and physically. To find out whether supervision of children during outdoor play activities enhances their safety, the respondents were asked if they supervise children during their outdoor play activities and how they do it.

Teachers participating in the study mentioned that they were undertaking supervision of children during their outdoor play activities. The following is a list of teachers' supervisory roles as stated by them:

- Turn-taking with children among teachers
- Making sure they don't hurt themselves
- Grouping then assigning a group leader
- Keeping a close watch
- Doing rounds as they play & play together with them



- Engaging in the activities with them
- Guiding them as they play
- Ensuring that they take turns in play equipment

#### 4.4. Age Appropriate Playground Facilities and Children Participation

The study sought to determine the influence of age appropriate play facilities on children's participation in outdoor play activities. The Researcher sought to find out teachers' perception on how age-appropriate playground facilities promote children's participation in outdoor play activities by asking them to either agree or disagree on various aspects of playground facilities. Views of those undecided were also taken into consideration as shown in Table 4.10 below.

**Table 8: Various Aspects of Playground Facilities**

Aspects of playground facilities	Highly agree %	Agree %	Undecided %	Disagree %	Highly disagree %
Availability of playground facilities enhances participation in outdoor play	29	71	0	0	0
A variety of playground facilities enhance participation in outdoor play	0	100	0	0	0
Underneath playground facilities surfacing and participation in outdoor play activities	33	67	0	0	0
Shade on playground facilities enhances participation of children in outdoor play activities	81	19	0	0	0
Barriers on raised playground facilities enhances children participation in outdoor play activities	0	100	0	0	0
Teacher's supervision of children enhances participation of children in outdoor play activities	38	62	0	0	0
Age appropriate playground facilities enhance participation in outdoor play activities	57	43	0	0	0
Attractiveness of the playground facilities enhances participation in outdoor play activities	14	86	0	0	0
<b>Total</b>	21	100%			

Table 8 indicates that over three quarters of the teachers highly agreed that "shade on playground facilities enhances participation of children in outdoor play activities", while slightly more than half highly agreed that "age appropriate playground facilities

enhance participation in outdoor play activities". All of teachers agreed that "a variety of playground facilities enhance participation in outdoor play", and that "barriers on raised playground facilities enhances children participation in outdoor play activities". It was followed by the aspect that "attractiveness of the playground facilities enhances participation in outdoor play activities". Almost all of the teachers indicated that they agreed with that aspect of playground facilities while just about a tenth highly agreed. Finding also shows that none of the teachers interviewed disagreed or were undecided when giving their perception about aspects of playground facilities in relation to age appropriateness of children participation on outdoor play activities.

When teachers were asked whether they prepare children before they go for outdoor play activities, all stated that they do and gave varied preparatory tasks as indicated below;

- Trying out a skill before they do it outside
- By performing the outdoor activities
- Reminding them to be in sports shoes
- Ensure they're in correct clothing
- Ensure that the playground is safe for children
- Practice a skill before they try
- Give them instructions regarding the activities

## 5. Conclusion

This study came up with four conclusions. First, that children participation in outdoor play activities is not determined by the availability, type or number of playground facilities a school had. All schools sampled had available playground facilities, a defined schedule and time allocation for outdoor play activities – factors that had greatly enhanced children participation in outdoor play activities. This is in tandem with previous studies that indicate that outdoor play activities are important for all age groups especially early childhood.

Second, the study found that most schools had installed suitable playground facilities that had a presence of barriers and were attractive but did not consider safe surfacing or the presence of a shade on their playground facilities as important. The relationship between type and/or state of playground facilities and level of children's participation in outdoor play activities was however found not to be significant.

Third, the study revealed that most schools sampled had their playground facilities not meeting safety requirements and even though almost all of teachers supervised children while playing, they did not have a clear understanding of their roles and none ensured that playground facilities were safe before the children started playing. The study however did not find any connection between children participation in outdoor play activities and safety of the playground facilities.

Fourth, the study found that aspects of playground facilities, including age appropriate playground facilities highly promote children participation in outdoor play activities.

## 6. Recommendations

Based on the findings of this study, recommendations for the different stakeholders were made as follows:

### (i) Preschool Teachers

There is need for preschool teachers to attend seminars, workshops and refresher courses to fully understand the role they can play in the provision and maintenance of playground facilities as well as supervision of children during outdoor play activities with an aim of promoting participation by preschool children.

### (ii) County Government Department of Education

Routine inspections should be carried out by the County Government Department of Education to ensure that preschools have safe playground facilities to ensure that children's safety during outdoor play activities is guaranteed.

### (iii) Other Agencies

Non-Governmental Organisations (NGOs) need to come in and support in the provision and installation of playground facilities. Schools should map out NGOs in their area and approach them for funding. This will enable schools to have adequate number of playground facilities proportionate to the population in the school.

## 7. Recommendations for Future Research

There is need to conduct a study that investigates why preschools do not employ male teachers and preschool teachers' roles in the provision and maintenance of playground facilities. Another study should also be done to find out reasons why some children prefer other forms of outdoor play activities that do not involve playground facilities since findings from this study revealed that not all children were participating in outdoor play activities.

## References

1. Burdette, H., & Whitaker, R. (2005). *Resurrecting free play in young children*. Arch Pediatric adolescent. 159, 46 - 50. doi:10.1001/archpedi.159.1.46
2. Clements, R. (2000). Playworkers: Creating opportunities for children's play. *Dimensions of early childhood*, 28 (4), 9 – 13.
3. Clements, R. (2004). An investigation of the state of outdoor play. *Contemporary issues in early childhood*, 5(10), 68 – 80.
4. Cohen, D. & Flinch, B. (2008). The built environment and collective efficacy. *Health and Place*, 14 (2) 198-208
5. Elkind, D. (2007). *The power of play: Learning what comes naturally*. Cambridge: Dec Capo Press

6. Fjortoft, I. (2001). The natural Environment as a playground for children: the impact of outdoor play activities in pre-primary school children', *Early Childhood Education Journal*, 29(2), 111-117
7. Frost, J.L, Brown P., Thornton, C.D., Sutterby, J.A., Therrell, J. & Wisneski, D. (2004). *The Developmental Benefits of Playgrounds* Onley, MD: Association of Childhood Education International
8. Howard, P.C. (2007). *Children at play, An American History*. New York: New York University press.
9. Johnson, J.E., Christie, J., & Wardle, F. (2005). *Play, Development and Early Education*. Boston: Allyn& Bacon
10. KIE, (2008). Ministry of Education. *Early Childhood Development and Education Syllabus* Nairobi. KIE
11. Macharia, K.H. (2012). Influence of school playground safety on the participation of preschool children in outdoor activities in Central division, Naivasha District, Kenya. University of Nairobi Unpublished Thesis.
12. Macket, R., & Paskins, J. (2004). Increasing children's volume of physical activity through walk and play. Contribution to the department of culture, Media and sports and department of Health consultation on choosing health, Choosing activities. [http://eprints.ucl.uk/1347/1/2004\\_40.pdf](http://eprints.ucl.uk/1347/1/2004_40.pdf)
13. Olds, A.R. (2001). *Child care design guide*. New York: McGraw Hill
14. Outdoor play area standard Manual for Centre Based Child Care (2006). Department of Health and Community Services. New Foundland: Queens Printers
15. Pica, R. (2003). *Your active child: how to boost physical emotional and cognitive development through age appropriate activity*. New York: McGraw Hill
16. Strickland, E. (2016). *What Children Learn through Outdoor Play*. Retrieved from <https://www.scholastic.com/teachers/articles/teaching-content/eric-strickland-phd-what-children-learn-through-outdoor-play>
17. Sutton, L. (2008). The state of play: disadvantage, play and children's wellbeing. *Social Policy and Society*, 7 (4) pp. 537 – 549
18. UNICEF Annual Report (2012). *Cities and Children. The challenge of Urbanization in Tanzania*. Dares Salaam, UNICEF
19. Veitch, J., Bagley, S., Ball, K., & Salmon J. (2005). Where do Children usually play? A qualitative Study of parents perceptions of influence of children active free play health and place, 12 (4), pp.383–393.
20. Waithaka, E.N. (2010). *Children's involvement in informal play and games*. Marburg: Tectum Verlag
21. Waithaka, E. N. & Wanderi, M. P. (2012). Children's involvement in informal play and games. *Journal of the International Society for comparative physical education and Sport*. Vol. 34 Number 2 2012, 35-41.
22. World Health Organization (2003). *The world health report. Shaping the future*. Final Report. Retrieved from <http://www.who.int/whr/2003/en/>

23. Zigler, E.F. & Bishop-Josef, S. J. (2009). Play under siege: A historical perspective' *Zero to Three*, 30, 1, 4-11 Washington DC

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