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Abstract

Nowadays, cities are human's dominant habitat. Green spaces should be considered during city planning, since researchers indicate that gardens have positive effects on human health and wellbeing. This paper aims to ameliorate the physical health of kids as a main concern, which will consequently enhance their mental health. It also investigates different green spaces, especially public gardens, located in Tripoli, Lebanon. This paper uses observation, designed questionnaire and direct interviews to analyze the current condition of one of the city's gardens that is devoted mainly for kids. The outcome of this paper is a list of recommendations for having healthier gardens and community in the future.

Keywords

Kids' gardens, improve kids' health, kids' physical health, green spaces.

RECOMMENDATIONS FOR DESIGNING HEALTHIER KIDS' GARDENS: IN TRIPOLI, LEBANON

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ABSTRACT: *Nowadays, cities are human's dominant habitat. Green spaces should be considered during city planning, since researchers indicate that gardens have positive effects on human health and wellbeing. This paper aims to ameliorate the physical health of kids as a main concern, which will consequently enhance their mental health. It also investigates different green spaces, especially public gardens, located in Tripoli, Lebanon. This paper uses observation, designed questionnaire and direct interviews to analyze the current condition of one of the city's gardens that is devoted mainly for kids. The outcome of this paper is a list of recommendations for having healthier gardens and community in the future.*

KEYWORDS: Key words: Kids' gardens, improve kids' health, kids' physical health, green spaces.

1. INTRODUCTION

Nowadays, studies show numerous health benefits of gardens and green spaces that improve physical, mental, psychological and social health (Davies, Devereaux, et al., 2014). This paper focuses on physical and mental health since there is a correlation between them (Hull, 2012). Practicing physical activity affects positively on human mood. A link between optimum physical health and natural environment exists, therefore performing activities in a good natural environment, such as in gardens, helps humans to be physically healthier. Also obesity reduced by doing physical activity, consequently cancer and heart disease decrease (Davies, Devereaux, et al., 2014). In addition, the improvement of mental health and wellbeing can affect positively on person's life (Department of Health, 2010), such as increasing productivity, increasing of life expectation and reducing crime. Stress is increasing in the world (Davies, Devereaux, et al., 2014), and it is causing illnesses, therefore it should be reduced to improve human health. Visiting garden could reduce the stress by viewing green spaces and by involving people in the nature, which increases the connection of people with nature and develops the social networking (Mayer, 2008). Also researches show that people who access gardens have less stress per year than those who do not access it (Stigsdotter and Grahn, 2004, Stigsdotter, 2005).

The physical and mental benefits of gardens affect positively on different stages of human life cycle, including childhood, adolescence, early middle and late adulthood. This paper focuses on the early and middle childhood stage; the first one is ranging from three to six years, while the second one is ranging from six to eight years (Armstrong, 2008). Paying attention to human health from early life stages could improve Tripoli's community health in the future.

The methodology starts with literature that reviews the physical and mental health benefits of gardens. Then collecting data on kids' gardens guidelines, and investigating different gardens' located in Tripoli, Lebanon, using Geographic Information System (GIS). The next step is designing questionnaire, conducting interviews and conducting field observation concerning the facilities and main users of the case study (garden), in Tripoli, to define their problems. The final step is suggesting a list of recommendation to design healthier kids' gardens (physically and mentally).

2. POSITIVE EFFECTS OF GARDENS ON PHYSICAL AND MENTAL HEALTH

Exercising is essential to develop adults and children's abilities, and to improve their memories (Wolf, 2016). Gardens and green spaces have impacts on physical and mental well-being of persons (Mercola, 2014). Connections of people with the nature help to relief dementia symptoms, which is a damage for the memory, the thinking or the communication (Macgill, 2016). Studies show that people who visit gardens regularly have between 36% to 47% lower dementia risks than those who do not access gardens, since the combination of physical and mental activities found in gardens can affect positively on human mind (Mercola, 2014). If parents and children spend their time in gardens and practice physical activities regularly, then children's health will be improved automatically and be protected from lots of diseases in the future such as the dementia. Also spending time in nature increases children's concentration (Casandra, 2016).

Green spaces improve microclimate and reduce air pollution (Jonker, van Lenthe, et al., 2014). In addition, the greater the level of greenery, the lesser the rate of mortality (Maheswaran & Lee, 2010). Practicing physical activities in outdoor environment, such as in green spaces and gardens, is more encouraging than in indoor environment (Mayo Clinic, 2016). The availability of green spaces gives chances for achieving numerous activities like walking (Maheswaran & Lee, 2010), which reduces risks such as heart disease and diabetes; and consequently improves kid's physical health (Mayo Clinic, 2016). The access to a garden reduces tension, improves quality of life and upgrades mental health. In addition, it develops social connection between people, and enhances children's communication skills. In gardens, children meet new friends and participate in various activities, which will maintain mental well-being. (Casandra, 2016). The improvement of children's mentality, will increase their happiness and prevent their depression. In addition, a study in Netherland shows that the presence of green spaces in urban zone affects positively on human health (Maheswaran & Lee, 2010).

3. GENERAL GUIDELINE FOR DESIGNING KID'S GARDENS

There are principles and guidelines that should be respected during designing kids' gardens, such as shadings, plants, fences, colors; playing areas for disabled and non-disabled children, and others. These guidelines are important for planning a successful kids' garden and for having healthier one.

3.1 Shades

Minimum 50% of kids' playing area in gardens should be exposed to sunlight. Optimizing vitamin D level is very essential especially for kids, because it fights infections, ameliorates the immune system, and destroys viruses (Mercola, 2014). Providing shading areas in gardens and play yard is also very important, because in the summer and at noon sun radiations are harmful for kids. Covering 30% of the hard surfaces by shadings will be suitable, since it protects kids from ultra violet radiations (UVR). Shadings can be located around water, asphalt and sand features. These materials absorb many radiations and become hot in summer, thus kids could be

burned. Pergolas and umbrellas function as shading systems in gardens, however using natural shadings might be more useful, since they have longer period investment and more environmental profits (Campbell, 2013). Also natural shadings, such as trees, allow kids to be more connected to the nature as shown in Figure1.



Figure 1 shows trees used as shading system in Venice, Italy (source: author)

3.2 Pathways And Materials

Balance between hard and soft surfaces in kids' garden is important. Materials' variations are also significant and stimulate kids' curiosity, because kids are closer to the ground than adult. Numerous materials could be used for walkways such as concrete, asphalt, interlocking brick and others. Be careful to use materials and colors that reduce sun's reflection and glare. There are many types of pathways such as tunnels and bridges paths, which are important and provide kids' challenges. The following criteria are recommended for designing pathways (Campbell, 2013):

- Designing pathways that intersect;
- Creating a diversity in path's choices, to improve kids' exploration and investigation;
- Putting benches and sitting areas along paths;
- Designing specific paths for disabled people, such as putting ramps and making pathway's width 220cm for two wheelchairs;
- Providing pathways that permit the continuous circulation of people as shown in Figure2.



Figure 2 shows the circular pathway for having continuous circulation in Italy, Rome (source: author)

3.3 Hard Surfaces (Fence, site furniture and lighting)

Playing areas in gardens could be enclosed, to have safer environment for kids, especially when garden is located near a main street. The height of the fence could be 183cm when the view into the garden is allowed, a shorter fence is also acceptable but in a way that adults could not reach over it. Plants or landscaping items could also serve as garden's fence. It is preferable to use recyclable materials for fences, such as recycled wood or plastic. Providing seating areas for parents and kids is essential in a garden, for permitting parents to observe their children during playing. Also designing specific kids' sitting zone is important for enhancing children's social relationship and communication (Moravec, 2003). Lighting fixtures are located in gardens for having clear visibility and good security. In addition, lighting allows safer circulation for parents and their children. It is more sustainable to use eco lights that could be charged from the sunlight during the day to illuminate the garden at night (Nasoi, 2016).

3.4 Playing area

Having playing area in kids' garden is very essential, since it allows children to express their ideas in a real physical way, permits kids to investigate their physical abilities and enhances their social skills. In addition, successful gardens offer an entertaining playing area for disabled and non-disabled kids at the same time, considering that not all equipment are accessible to all of them. Also Kids' garden could focus on equipment that are accessible by wheelchair, such as "The Diana, princess of wales memorial playground", which is a garden located in London. This garden is designed for serving various children's abilities, even those who have special needs (Shackell, Butler, et al., 2008). Various types of playing areas exist in gardens such as the following motor play area and sandy surfaces as shown in Figure 3.



Figure 3 shows sandy surface in al Azem school in Tripoli, Lebanon (source: author)

Colors and Textures

Colors and textures are both important and have great influence on kids' health, because the senses of touch and sight are connected to children's mental development. Colors could be grouped and combined in a harmonious way. It is valuable to use color wheel principles, during designing children's garden, like using analogous color schemes, split compliment, triadic or tetradic color schemes (Krzywinski, 2003) as shown in Table1. Blue, green and purple colors are categorized as cool colors, which create relaxing effects for human, while warm colors such as yellow, red and orange create enthusiastic and enjoyment effects. These colors could be used for plants, flowers, shades, equipment, or any other elements in the garden (Moravec, 2003).

Table 1 shows different color schemes and their description (source: Krzywinski, 2003)

Colors schemes	Description
Analogous	Use three adjacent colors from the color wheel
Split compliments colors	Use three colors, two of them are adjacent tertiary colors of its complement
Triadic	Use three spaced colors from the color wheel
Tetradic colors	Use from the color wheel two complementary pairs

3.5 Plant's types and watery

It is healthier to use nontoxic plants and vegetation that control pest, with minimum toxic ways possible. It is desirable to use plants that display seasonal variations. Avoid planting trees with low hanging limbs, because children could climb on them, which is unsafe. Also, avoid using plants that are poisonous. Vegetation could serve as visual barrier, shadings, and wind protector. It is preferable to design sensory garden, which is a garden that stimulates the five senses and provides experiences for strengthening smell, touch, taste, sight and hearing. This type of garden improves physical and mental health. Some sensory gardens could be dedicated only for one sense. In addition, during designing kids' gardens, many sensory could be improved (Worden & Moore, 2011), such as:

- Developing the sense of smell, by placing some plants, which have strong odor and please many people, such as gardenia, jasmine and lemon trees. Thus, Children could differentiate between diverse plant's smells.
- Improving humans' sound when the wind is rushing through leaves, such as palm trees, grass rustle and others. Adding that fountain and waterfalls also improve sound sense.
- Enhancing sight sense, by putting different kind of trees that some of them have large leaves and others small one. Thus, kids could improve their perception and differ between various trees' types.
- Stimulating taste sense, by using plants that do not have a limited production like strawberries and mint leaves.
- Increasing touch sense, by encouraging kids to touch plants. Also Planting soft flowers, fuzzy leaves plants and succulent plants, educates children and pleasures their tactile.

Watery in garden, can cool it down and make it an amusement space for enjoyment (Nasoi, 2016). Fountains or water elements create relaxing sound, which is pleasant for gardens' users. Based on the literature review these mentioned guidelines could be divided into two categories as shown in Table2.

Table 2 shows guidelines' influences and categories (source: author)

Guidelines	Categories
Shades	Physical influence
Pathways and materials	
Hard surfaces	
Motor play area (playing area)	Physical and mental influence
Sandy surfaces (playing area)	
Color and texture	
Plants' types and watery	

4. CASE STUDY

Tripoli contains three main gardens, which are King Fahd garden (in Al Maarad with area 18411m²), Al Biaa garden (in Dam and Farez with area 18153 m²) and Al Menchiyeh garden (in Al Tal with area 8861m²), as shown in Figure 4. King Fahd garden has the largest area. In addition, the three gardens are accessible from different roads. King Fahd garden is the most reachable one, since it is linked to important nodes such as Al Nour square and connected to Al Maarad road, which is a very accessible as shown in Figure 4.

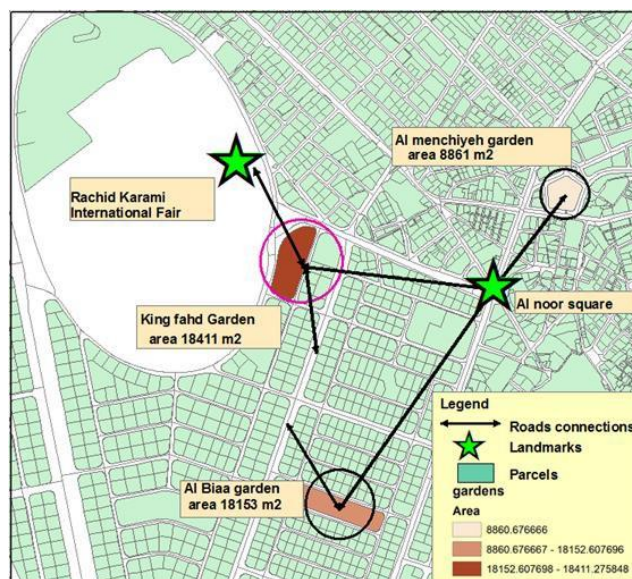


Figure 4 shows Main Tripoli's gardens location, areas and accessibility using GIS software (source: author)

4.1. Questionnaire and survey

Questionnaire, observation and interviews were conducted with the main stakeholders: kids and their parents. The observation was important for proposing a list of recommendations and solutions to achieve a healthier garden dedicated for kids. The performed questionnaires and interviews investigated the average ages of the children visiting the garden, revealed the existing problems and presented parental suggestions for ameliorating the current state of the garden. Even though the percentages presenting people’s visits to the two gardens are almost close (King Fahd garden 52% and Al Biaa garden 49%), as shown in figure 5.

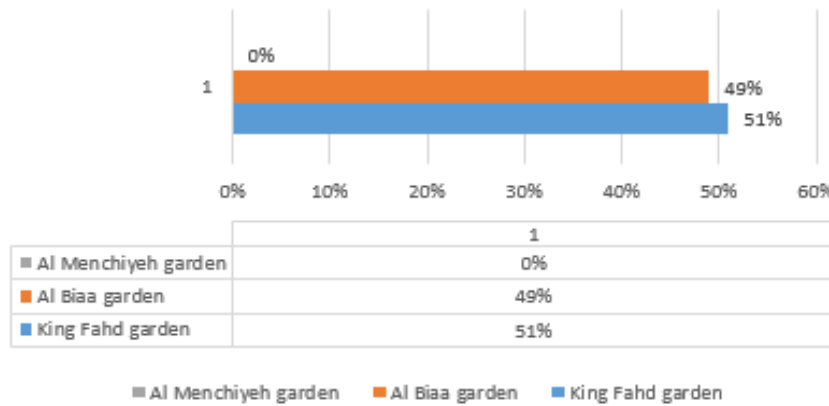


Figure 5 shows the percentage of the most visited garden in Tripoli (source: author)

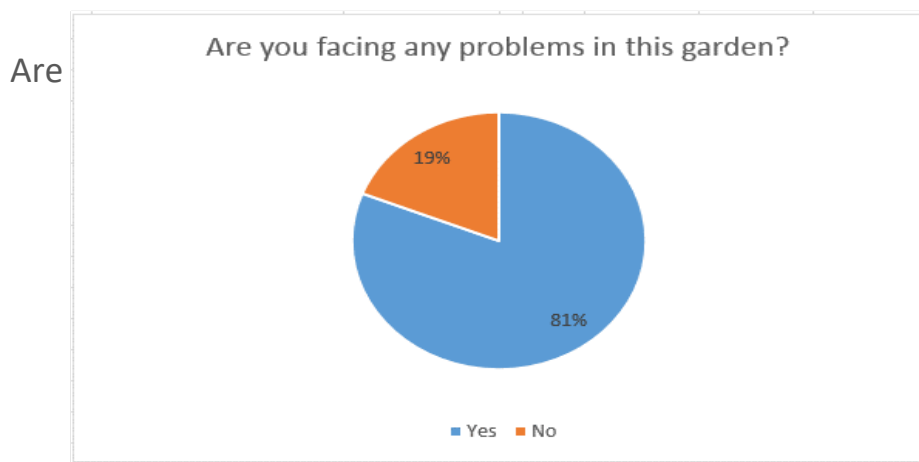


Figure 6 shows the percentage of people agreeing the existing of problems in King Fahd garden (source: author)

81% of people are facing numerous problems in King Fahd garden, as shown in figure 6. Which are related to lighting, safety in playing areas, and garden. On the contrary, people visiting Al Biaa garden did not suffer from many problems. Based on these results the nominated garden for investigation is King Fahd garden. Questionnaires’ outcome shows that the low quality of games, and the inadequate age separation in the categorization of the games are the most common problems in the garden, followed by other problems such as cleanness and safety, lack of seats, shadings and lighting features as shown in Figure 7. Similarly, the result of the interviews shows that gardens’ problems are consecutively low quality and variety of games, in addition to insufficient age’s separation. In addition, the lack of shadings, seats, safety, colorful items, and nonappearance of drawing zones are other noticed problems as shown in Figure8.

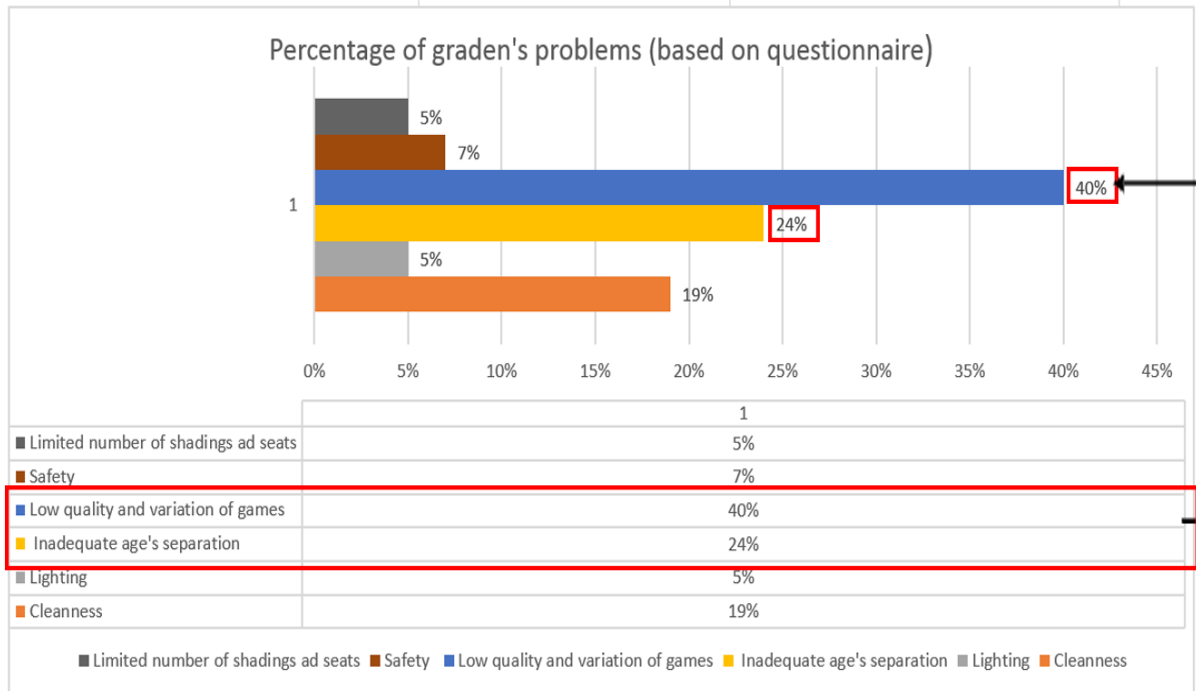


Figure 7 shows King Fahd garden's problems based on the designed questionnaire (source: author)

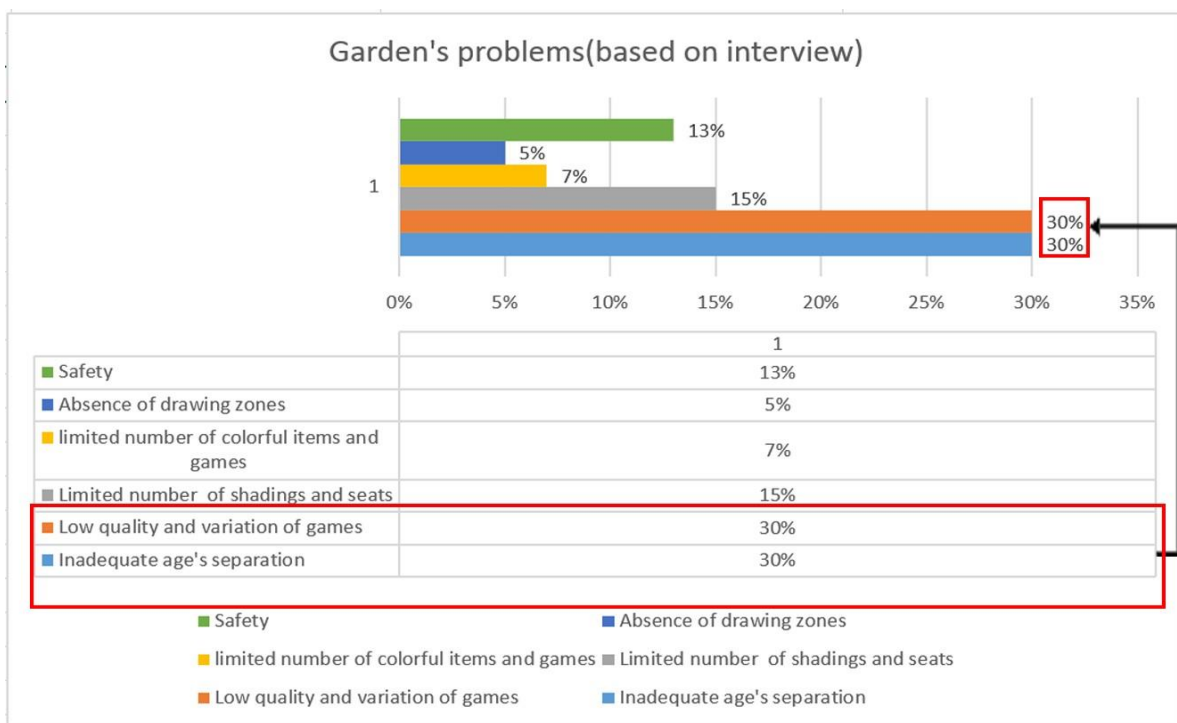


Figure 8 shows King Fahd gardens' problems based on the interview (source: author)

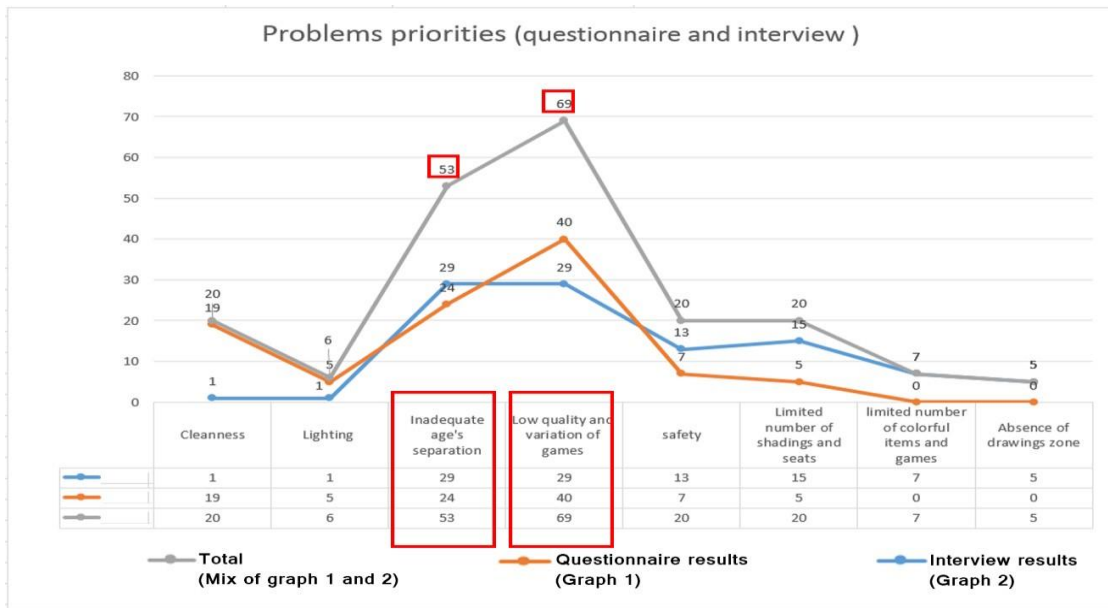


Figure 9 shows problems' priorities based on questionnaire and interview (source: author)

Problems priorities are detected from the two sources, the closed questionnaire send it digitally and the interview, as shown in Figure 9. Which are consecutively: The low quality and variety of games, the inadequate age's separation, the limited shades and seats number, the lack of cleanness and safety, the inadequate number of colorful features, the absence of drawing zone, and the non-sufficient number of lighting fixtures. The suggested list of recommendation for having healthier gardens devoted to kids should consider these problems prioritization.

4.2. Existing problems and some suggested solutions in King Fahd garden

King Fahd garden contains many facilities such as open spaces, watery features and two play grounds, which are located at the end and the beginning of the garden as shown in Figure 10.

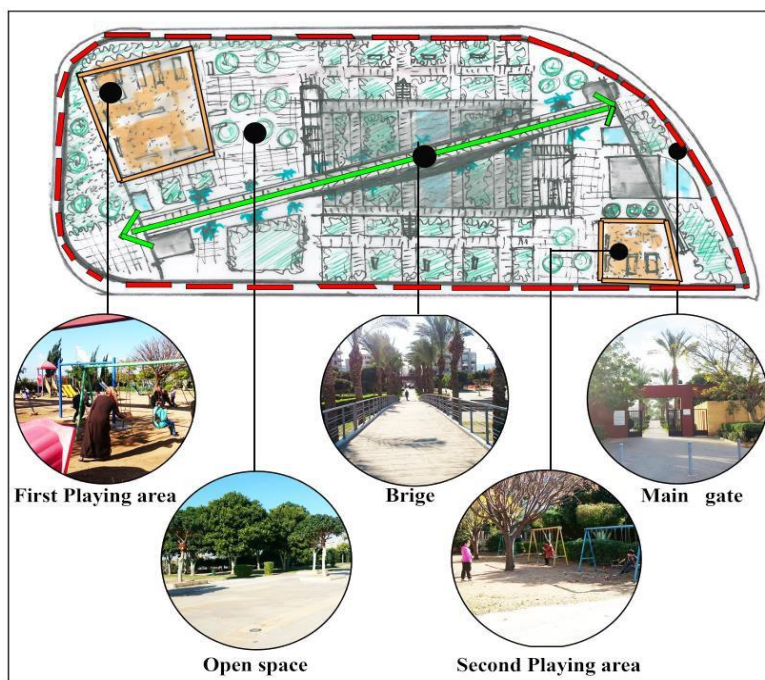


Figure 10 shows sketch for the layout of King Fahd garden and its main components (source: author)

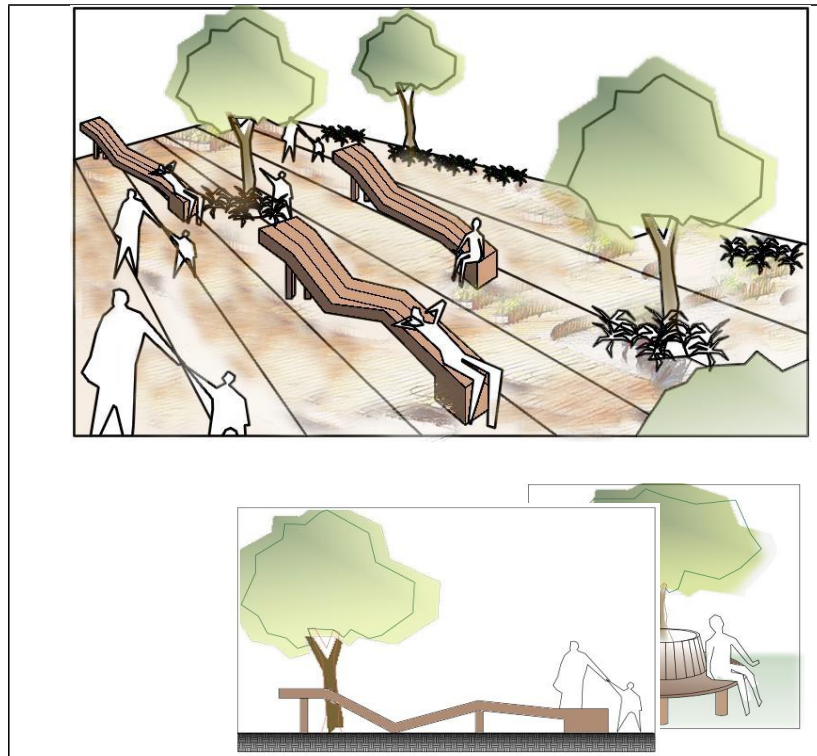


Figure 11 shows suggestion for seats' designs and location in the garden (source: author)

One of the main detected problems in King Fahd garden was the lack of seats' number devoted for children and their parents, especially in the open space zone located near kids' playing area. The proposed solution for solving this problem was putting numerous seats having different shapes and dimensions, in the open spaces that already contain trees (natural shadings) as shown in Figure11. In addition, these designed seats are pleasant and comfortable for different human's scale such as children's and adult's scale.

During the garden's observation, another important problem was perceived, which is the accessibility of motorcycles into the garden. This is definitely not acceptable and safe, since the garden is devoted to children as main users. The best solution for this problem is to forbid motorcycles from entering the garden. In addition, biking paths can be added to encourage children to ride their bikes safely, as shown in Figure12, thus having the opportunity to be more active and energetic.

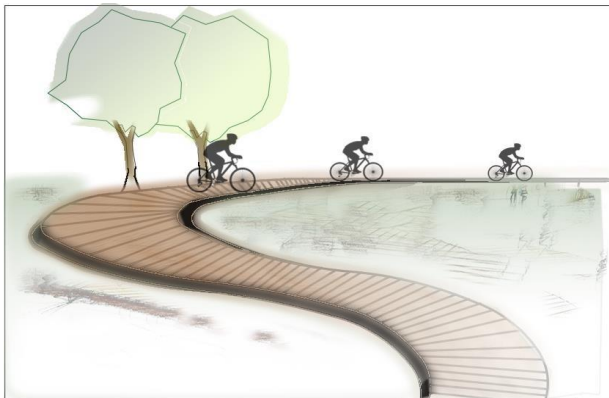
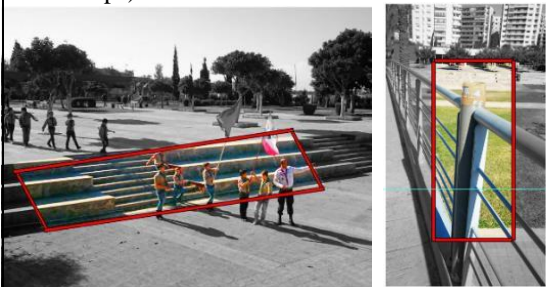
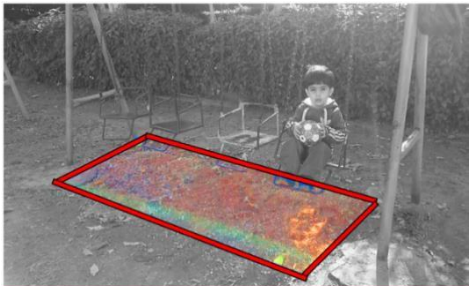
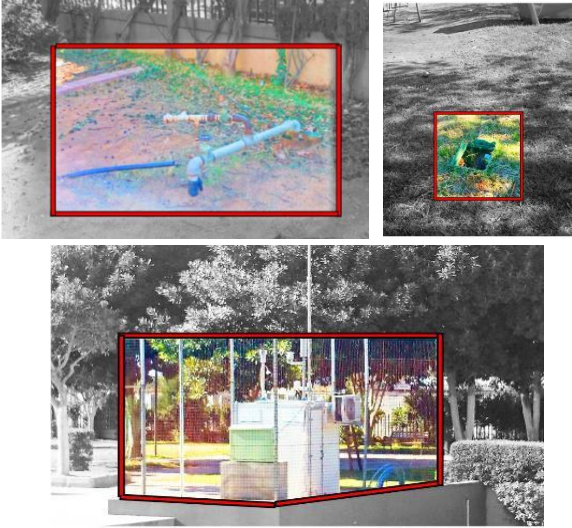



Figure 12 shows the suggestion of adding biking path in the garden (source: author)

During garden' observation, many problems are detected as shown in Table 3. Various solutions are suggested for solving them. Garden's problems are categorized in the following table, based on users and criteria, which are important for designing kids' gardens.

Table 3 shows the existing problems in King Fahd garden and some suggested solutions based on many criteria
(source: author)

Category	Criteria	Existing problems	Suggested solutions	Users	Weighting factor	Existing factor
Physically	Shades and seats	<ul style="list-style-type: none"> • Insufficient shaded zones • Lack of seats numbers (Just 21 seats) 	Adding more shading elements such as trees and pergolas and increasing the number of seats especially near the playing zones	Kids and Parent	10	7
	Hard surfaces (fences, and lighting)	<ul style="list-style-type: none"> • Inadequate number of lighting features(just 15 lamps) 	<ul style="list-style-type: none"> • Adding more lighting features, in the open zone, in the playing area, on the stair and on the bridge 	Kids and parent	3	2
	Safety a) Pathway and material	<ul style="list-style-type: none"> • The use of metal material for kids' game, which burn children when it is exposed to sunlight • The use of gravel under some games as shown in the above picture (which could be dangerous when kids fall down) 	<ul style="list-style-type: none"> • Replacing metal material by plastic material • Planting grass putting sand or rubber under games instead of gravel 	kids	3	1
Category	Criteria	Existing problems	Suggested solutions	Users	Weighting factor	Existing factor
Physically	b) Garden equipment and services (water supply and	<ul style="list-style-type: none"> • The location of the electrical generator (near the playing area) • The presence of non covered water supply equipment for the garden 	<ul style="list-style-type: none"> • Putting cover for the electrical generator • Covering the water supplies equipment 	Kids and parents	7	3

	electrical one)	<ul style="list-style-type: none"> The existence of holes in many zones such as in the playing zone 	<ul style="list-style-type: none"> Removing holes from all zones, especially from the playing zone 			
	Cleaness	<ul style="list-style-type: none"> Lack of hygiene in the spaces 	<ul style="list-style-type: none"> More carefulness 	Kids and parents	10	8
Physically and mentally	Color and textures	<ul style="list-style-type: none"> Lack of Colorful features 	<ul style="list-style-type: none"> Using more colorful equipment for games, site furniture and others 	Kids	4	3
	Lack of drawing zone	Absence of drawing zone devoted to kids	<ul style="list-style-type: none"> Creating drawing area for kids 	Kids	2	0
Category	Criteria	Existing problems	Suggested solutions	Users	Weighting factor	Existing factor
Physically and mentally	Age separation	Lack of games separation based on kids' ages	Splitting games based on children's ages	Kids	26	11
	Playing area (sandy surfaces and motor play area)	<ul style="list-style-type: none"> Destroyed playing equipment and low quality of games limited games types (it contains just two types) Absence of motor playing area 	<ul style="list-style-type: none"> Bringing new playing equipment with better quality Bringing other games types such as games that help kids for thinking Putting motor playing area (adventure zones) such as jumping and climbing zones 	Kids	35	20
TOTAL					100	55

As presented in the table3, the current state of the garden according to the weighting factors was 55/100. This grade can increase in case the suggested solutions are applied.

5. RECOMMENDATIONS AND CONCLUSION

In order to have healthier kids' gardens, various recommendations are suggested. These recommendations are categorized physically and mentally based on problem's prioritization the suggested physical recommendations are:

- Putting games with different levels of difficulties, in order to encourage kids to explore and develop their physical abilities, such a putting climbing walls with different heights.
- Splitting playing areas based on children's ages (early childhood stage zone 3-6 years, and middle childhood stage zone 6-8 years.)
- Designing seats that are comfortable for both children and parents, and locating them near kids' playing area. Covering them with a shading system, especially natural shading such as trees.
- Avoiding the accessibility of vehicles through the garden such as motorcycles.
- Locating the electrical and water supply equipment away from the kids' facilities to avoid any accident such as fire.
- Designing some wide paths (not less than two meters) to allow the access of emergency vehicles.
- Treating the problems of the different finishing materials (replacing metal with rubber for safety)
- Designing comfortable stairs (with suitable riser and tread related to kid's proportion) and putting ramps to allow the circulation of handicap kids.
- Creating bicycle and tricycle paths, to encourage children to engage in more physical activities and sports. Illuminating these paths by lighting features.

Regarding the mental health of the children, other recommendations are proposed for planning children's gardens, such as:

- Including games that allow children to develop their mental thinking such as mazes.
- Designing kids' seats in a circular way and fitting their scale, to improve their social interaction.
- Inserting flexible furniture, to allow kids to make changes depending on their needs, and consequently to develop their imagination.
- Using harmonic colors for equipment based on function need (using hot colors in the activity zones to activate their dynamic energy and using cold colors to provide relaxation in the sitting zones)
- Specifying drawing zones, based on children's suggestions in the interviews, to paint in order to express their feelings and develop their artistic skills.
- Putting sandy surfaces (60cm of sand) to allow kids to activate their imagination.
- Inserting labels on different plants' types with a small description on each one to enrich children's knowledge.

This paper discusses garden's benefits on kids' health. It also examines and studies one of the main kids' gardens located in Tripoli. The examination is based on observation, interviews and designed questionnaires which is targeted to the main users of the garden (kids and their parents). Several problems were detected. Many possible solutions and interventions are suggested to solve these problems and to improve the state of the garden. This paper also proposes a list of recommendations, based on different problems' priorities that are categorized physically and mentally for a healthier children's garden.

These suggestions should be taken into consideration for future implementation. Even though the proposed recommendations are relevant but they vary according to weighting factors that change from culture to another.

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