Accessibility indicators from a gender perspective

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Abstract. Accessibility is an important parameter that expresses how to access everyday activities. The research assumes that accessibility varies according to a number of variables (economic, social, age, gender, etc.) thus, the research focuses on interpreting the concept of accessibility in relation to gender. It aims to analyze the four accessibility components (land-use, transportation, temporal and individual) according to the gender perspective to achieve suitable access for all.

The multiplicity of women's destinations according to their different needs at all levels of the city and the attempt to balance the different tasks creates a kind of confusion, the accessibility parameter organizes this confusion and works to ease the achievement of various activities by organizing land use in a way that achieves the shortest time, less cost and more comfort.

The research concluded that accessibility can be assessed from a gender perspective and at the level of daily activities through measures such as: Service Access Distances, Convergence of services, the presence of elements or areas strengthens the concept of accessibility.

At the field level, a study area has been selected and a sample of women has been selected to test and determine the daily tasks and patterns of urban activity to emphasize the importance and necessity of taking into account women's roles in assessing accessibility parameters. And then assess the reality of the study area according to the criteria that reached in the theoretical research.

Keywords
Accessibility, Gender, Daily activities

1. Introduction
Accessibility, a concept used in a number of important scientific fields such as: transport planning, urban planning and geography plays a very important role in policy making. Indeed, finding an accessibility concept that is functional and theoretically sound is really difficult and complex. As a result, land-use and infrastructure policy plans are often evaluated with accessibility measures that are easy to view for scholars and policy makers, such as traffic levels or trip speed on the transport network.

Several writers have written research articles on accessibility measures, many going to focus on certain perspectives, just like destination accessibility or economic accessibility advantages, our review varies from current research articles in the primary purpose that is to evaluate the portability of accessibility measures in social impact assessments (gender relations and gender roles). In our study
Accessibility measures are seen as indicators of the influence of developments in land use and transport and policy plans on society's structure in general and women in particular.

2. Concept of accessibility with a social dimension
Accessibility refers to the ease with which individuals may overcome the distance separating places, and thus exercise their right as citizens.

The relative ease with which a distance is overcome is a variable that relates to the physical characteristics of a space, the opportunities for use of certain activities and the individual characteristics of citizens. For these reasons, besides being a territorial dimension, accessibility is also an individual characteristic with regard to the number of options that the different citizens have for accessing places and activities [1].

Accessibility needs to be analyzed in specific, individualized settings, by measuring the efficiency of territorial organization with respect to the means of each citizen. All this means rejecting analyses that are excessively generic or consolidated, which describe spaces according to their accessibility without taking into account the diversity of citizens’ characteristics and options, and re-examining the analysis of accessibility with regard to citizens’ opportunities to participate in activities, and to make use of the supply of goods and services that are available in urban territory.

3. Accessibility with a gender perspective
The right to the city, understood as the opportunity to participate in activities that are offered by the urban environment, and as the inclusion of people into the different urban spheres (productive, commercial, leisure, associative, etc.) can only be real if there is acceptable access to the offered goods, services and activities [2].

Thus, acceptable access related to the analysis of basic components in relation to gender. These components can be defined based on a search of "Geurs, and van Wee, 2004" (land-use, transportation, temporal and individual.) [3].

According to the concept of gender, the fourth component (individual) is the basis that affects the other components. Which is the idea of research illustrated by the figure ( ) Figure number is not given

![Diagram](image-url)

**Figure 1.** Illustrates the concepts related to accessibility and the research orientation.

*Source: Researcher*
4. Analysis of the Three components of Accessibility from a gender perspective

At the beginning of this part, it is necessary to clarify the concept of individual characteristics and how different gender, Gender is (sex + social role).

The individual component reflects the needs (depending on age, biological side, roles, responsibilities, household situation, etc.), abilities (depending on people’s physical condition, availability of travel modes, etc.) and opportunities (depending on people’s income, travel budget, etc.) of individuals and may strongly influence the total aggregate accessibility result.

Besides the differences in the physical and biological aspects of male and female structures that should be observed, the roles of both sexes differ. Caroline Moser’s work has developed the concept of gender roles. She explains the following concept [4]:

- Reproductive role: responsibilities for childcare and household tasks
- Productive role: Paid work done by both men and women
- Private role: Activities related to personal and intellectual development of each person. It includes social life, sports, entertainment, leisure, hobbies, etc.
- Community role: Working for the establishment and maintenance of society. It creates conditions for the continuity of generations.

Gender planning realizes that women are playing a triple role in many societies especially with the increased participation of women in the labor force that's what led Women to be engaged in managing reproductive, productive and community activities, while men are primarily engaged in productive and private activities. In everyday life, women have focused on trying to balance the role of the family and the productive role [5].

Differences in gender roles and the multiplicity of tasks and responsibilities of women have an impact on the other three components of accessibility: land-use, transportation, temporal.

4.1 land-use component:
The family work that women do to maintain daily life is not confined to the domestic space of homes, but is a real work happening in the urban space in the sense that it occurs in places where various tasks of family care are carried out. Thus, women's work is related to the following land uses: education, health, sports, entertainment, shopping, administrative procedures, etc. As well as workplaces, all this requires a great physical and emotional effort [6].

Thus, women in modern life use the urban area as a production unit different from men, making women's trips multiple according to multitasking, often referred to as trip-chins. Each of these tasks takes place in a different location in the city and as part of a chain in which women are forced to move at the lowest cost, shortest possible time and more comfort [7].

4.2 transportation component:
As a result of the multiplicity of tasks performed by women in their dual roles in the public sphere and in the private sphere, patterns of mobility differ from those of men. At the level of spatial patterns of trips, studies have indicated that men's travel patterns tend to be linear between work and housing. While women's journeys follow multi-rib spatial patterns, they connect many trips to perform tasks between different parts of the city. Data on travel distances show that most journeys by women take place within the neighborhood or between neighborhoods, while men's journeys take place between residential and other areas [8]. And, in relation to the mode of transport Empirical evidence it shows a high rate of private transportation among men in all countries and a high rate of walking and public transportation among women. This is largely due to the distances between women's journeys within
the neighborhoods and the low economic capacity of women, which does not allow private car ownership [9].

4.3 The temporal component:
Women are constrained in their movement because they need to combine work and family times between transport schedules with schedules of services (kindergartens, schools, health, etc.). The presence of children is important in interpreting gender differences, suggesting that domestic responsibility is a constraint, and reduce the distance between trips.

The purpose of gender differences is to consider this difference in city planning and location of daily services and adopt a standard of accessibility that is convenient for everyone. The research in the next section will address some of the criteria identified by cities that have taken into account gender considerations in their planning and design.

5. Accessibility indicators from a gender perspective
Studies related to the city and gender have shown that accessibility can be measured by: determining the distances between housing and the places where daily activities are performed, this distance should be suitable for all people that are desirous of performing daily activities on foot and without difficulty. Within the framework of the development project (Nord Westbahnhof) from a gender perspective, the conditions of the competition provided Accessibility standard as shown in the table (1) [10].

| Source: Vienna Guide |
|----------------------|
| **Table 1.** Accessibility criteria based on the (Nord Westbahnhof) development competition. Source: Vienna Guide |
| **Land use** | **Criterion** |
| Short distances between residential blocks and public open | Reach distances by (local, district, sector) |
| Short distances between residential blocks and social Infrastructure | (under 400 m, 400-600 m, over 600 m) |
| Short distances between residential blocks and public transport stops | (under 400 m, 400-600 m, over 600 m) |

According to the Manual for Gender Mainstreaming in Vienna, access to important services for day-to-day walks was determined as in the table (2) depending on the previous source

| Source: Vienna Guide |
|----------------------|
| **Table 2.** Gender-sensitive accessibility standards adopted by the city of Vienna |
| **Land use** | **Access distance** |
| 1 commercial services | Within a radius of 300 m |
| 2 elementary schools, Social infrastructure | Within a radius of 300 m |
| 3 Open public spaces | Different walking speeds must be taken account of. Young children, elderly persons and persons with special needs cover about 300 to 400 m in 10 minutes. The public transport stops can be reached on foot and without physical barriers within a distance of 500 m (Underground) and 300 m (tram and bus) |
| 4 Connecting to public transport stations serving residential areas | |


In addition to identifying distances as an indicator of accessibility, gender studies have indicated that accessibility can be achieved through: [11]

- The importance of following a strategy of convergence among different activities by establishing a network in which all daily activities are linked, for example, open spaces with children's play areas and kindergartens next to schools.
- The importance of having comfort zones that promote the principle of accessibility. The distance may be short but the multiple tasks of women, such as shopping with children, give the feeling that the distance is far away. This can be achieved through the relationship between services and the surrounding environment.

6. Practical study

In this part of the research, a residential area will be selected and accessibility indicators evaluated to compare the reality with the standard.

6.1 Method of field work:

Fieldwork relies on the evaluation of the Gender Accessibility index on an elected study area to demonstrate the achievement of the indicator. The practical part includes two aspects:

1- The first aspect revolves around interviews with a number of women within the study area to ask them about tasks, responsibilities and daily patterns of urban activity to select the daily activities frequented by females within the designated area.

2- The second aspect is to identify the locations of the activities and to draw them on a satellite image and to find the scope of service for each activity using the analysis tool (Buffer), within the analysis tools for the program ( Arc map GIS) at a distance of 300 m, according to the standard adopted for the gender-sensitive accessibility index.

6.2 Description of the study area

The boundaries of the study area are located at Residential neighborhood (304) of the Maghrib quarter, which is located in the southern part of the Adhamiya district Figure (2). The population of the residential neighborhood (15,000) and the number of residential units (925)

![Figure 2. Study area Location](image)

6.3 Analysis the practical part

6.3.1 Results of interviews and questionnaire. When the women were asked during the interview about the daily tasks and activities and the mode of transport used to perform tasks. It was found that:

- The largest proportion of women is paid, and the workplace is outside the residential area.
The largest proportion of women has three children, ages between 1 to 12 years.

The largest proportion of women is those who do most of the work associated with homework and day care.

Women referred to the daily patterns of urban activity including:
1- A Trips to kindergartens
2- A trip to a primary school
3- Production work trips
4- Shopping trip
5- Children's entertainment trip
6- Health Center Trip (Monthly)

Based on the responses, it is clear that there are many responsibilities and roles of women, and that most roles are directly related to urban space and are accompanied by children. As a result of their productive and reproductive roles, they need to balance and reconcile tasks.

Thus, the residential neighborhood should achieve a portion of this balance through appropriate access distances to activities and the convergence of activities to achieve the lowest cost, shortest possible time and more comfort.

6.3.2 Activity location Results. The land use map was adopted from Adhamiya Municipality for the year 2018.

1- Child Care: There are no childcare places (kindergarten,) in the specific residential area (304). And some residential units are serviced by 300 m depending on the child care site in the neighboring area (306) as shown in Figure (3).

2- Elementary School: There is one primary school within the residential neighborhood (304), there are a number of residential units serving 300 m from the primary school located in the neighboring residential area (306) as shown in Figure (4).

3- Open space for children's entertainment: There is one open space located in the middle of the two residential units (304,306), so there are a number of units that achieve a distance of 300 m to reach the open area. As shown in Figure (5). At the interviews, women indicated that the open area was not suitable for children and mothers, so most women have to go to a park outside the quarter which was accessible by private car or public transport.

4- Shopping service: Within the neighborhood there is a commercial street containing many shops for daily shopping. This street was not designated as a commercial street when neighborhood planning was done, but as a result of the population need, the residential land use was changed to commercial and thus became known as the neighborhood market, as shown in figure 6.

5- Health Center: There is no health Centre in the neighborhood. There is a health center in the adjacent neighborhood, to which the neighborhood residents do not have easy access. As shown in figure 7.

6- Access to public transport: The location of the neighborhood is characterized by a number of streets, and although there is no public transport system with waiting stations, it is possible to distinguish specific points in the region form (8) frequented by women and the bus transport buses, where public transport was limited to buses (20 passengers) and (11 passengers).
**Figure 3.** Site and scope of coverage of kindergarten service  
*Source: Researcher*

**Figure 4.** Site and scope of coverage of Elementary School service  
*Source: Researcher*

**Figure 5.** Site and scope of coverage  
Open space for children's entertainment  
*Source: Researcher*

**Figure 6.** Site and scope of coverage Shopping service

**Figure 7.** Site and scope of coverage Health Center  
*Source: Researcher*

**Figure 8.** Site and scope of coverage Access to public transport
According to the index:

- **Convergence between different activities**
  
  With regard to the index of the convergence of activities, it is noticed through the maps of the sites of activities that it is not verified in the neighborhood and the activities are separate from each other.

- **Enhanced Accessibility concept**
  
  When visiting the neighborhood (306) it was observed that the index of the relationship between the services and the surrounding environment was not achieved, there are no rest places, children playgrounds or other activities that contribute to the feeling of comfort and proximity. As shown in figure (9).

### Figure 9. Convergence between different activities and relationship between the services and the surrounding environment

#### 7. Results and Analysis

After the results of the location of the activities and the coverage of each activity are analyzed, it is clear that the majority of daily activities within the locality (304) are not achieved by the standard. An analytical table 3 will be displayed, including:

1. The area covered by each service with an access distance of 300 m compared to the total neighborhood area.
2. A non-serviced area with 300m access to daily activities

Note: Calculations were made based on the area of the neighborhood (774737), and the area of the circle in the radius of 300 m which amounts to (282600).

### Table 3. Areas serviced by the standard of arrival of 300 m and areas not serviced by the standard for the study area

| Land use          | The area that was served by 300m access to the activities | Percentage % | The area that was not served by 300m access to the activities | Percentage % |
|-------------------|----------------------------------------------------------|--------------|----------------------------------------------------------------|--------------|
| Child Care        | 7358 m²                                                  | 9.5%         | 701161 m²                                                       | 90.5%        |
| Elementary School | 423900 m²                                                | 54.7%        | 350837 m²                                                       | 45.3%        |
| Open space        | 14130 m²                                                  | 1.8%         | 760607 m²                                                       | 98.2%        |
8. Analysis and discussion
The results showed that the largest proportion of the neighborhood area (304) is not serviced with an access distance of 300 m and to discuss the results:
There are no clear boundaries for the neighborhood. Neither in the area nor in the population:
In terms of population the criteria set the neighborhood population 2600-3600, and the services were defined according to this population number as in table (4) [12]

| Neighborhood | The population= 2600-3600 |
|--------------|---------------------------|
| Land uses    |                           |
| Child Care   | 1                         |
| Elementary School | 1                       |
| Open space   | 1                         |
| Shopping     | 1                         |
| Health Center| 1                         |

Table 4. Urban Housing standards
Source: Ministry of Construction and Housing Iraq

In fact, the total population of the neighborhood (304) is (15000), which is equivalent to four shops according to the criterion of urban housing.

So, based on urban housing standards (Number of activities according to population), the research in the table illustrates the actual need for daily activities that can be built in the neighborhood to achieve appropriate access distances to the standard of 300 m.

It also explains the actual needs of the activities to achieve the accessibility standard of 300 m according to the coverage area of the radius of 300 m

Table 5. Number of daily services required by the study area based on population size and coverage area (300m radius)
Source: Researcher

| Neighborhood(304) Population= 15000 | Number of actual activities in the neighborhood | Services requirement relative to number of Population | The need for services relative to the coverage ratio |
|-------------------------------------|-----------------------------------------------|-----------------------------------------------------|-----------------------------------------------|
| Child Care=0                        | Child Care= 4                                 | Child Care= 3                                       |                                               |
| Elementary School=1                 | Elementary School=3                           | Elementary School=2                                  |                                               |
| Open space=0                        | Open space=4                                  | Open space=3                                        |                                               |
| Shopping=1                          | Shopping=3                                    | Shopping=2                                          |                                               |
| Health Center=0                     | Health Center=4                               | Health Center=3                                      |                                               |

9. Conclusions and recommendations
- It should be taken into account that the groups of society are different groups (men, women), (children, youth and elderly). And, each category has different needs and requirements. Therefore, the city should be planned and designed to take account of these differences.
- Patterns of urban activity for all groups in society (men, women) should be analyzed to develop policies, programs and projects that are suitable for all.
Take advantage of global experiences to try to integrate gender in planning and design standards.

The standard of gender-sensitive accessibility is an appropriate standard for all.

Failure to consider the standard of convenient access for women and children leads to social and health problems, women may have to cancel many tasks as a result of distance of access to services such as a kindergarten or health center as well as, economic problems as women are forced to use taxis or buy private cars to perform daily tasks and thus have a negative impact on income and the city in general, such as pollution and irrigated congestion.

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