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Geographical distribution of doctors' clinics and their impact on traffic congestion in the city of Samawa

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Abstract
The irregular and unstudied geographical distribution of doctors' clinics, which are types of health uses within cities, has led to the emergence of the problem of traffic congestion within the city of Samawah. As a result of the increase in the direction of vehicles to this area, which is closely linked to the rise in the destination and crowding of pedestrians coming to these clinics for examination, treatment, etc. It is directly related to the presence of these clinics, including laboratories, warehouses, and pharmacies, so the goal of the research was to demonstrate the extent of the impact of the distribution of clinics and their connection to traffic congestion and the effects and to attempt to develop methodological proposals. The scientific vision has expanded to examine all the different dimensions of the problem, including the economic dimensions that will be the subject of research interest; The research will focus on identifying the economic factors resulting from traffic congestion, the most important of which are the cost factors that the vehicle driver will bear, and the nature of the demand for private vehicles, concerning other non-economic factors that complement them, as well as the effects that result from that, such as air, visual, and noise pollution, and then try In developing appropriate solutions that can be achieved according to ranges, whether short or long-term, through which optimal vehicular traffic can be achieved in the streets of the study area, such as constructing specialized medical complexes that are specific to their location, widening streets, establishing garages, and isolating pedestrian traffic from vehicles.

Keywords: Capacity, traffic congestion, doctors' clinics

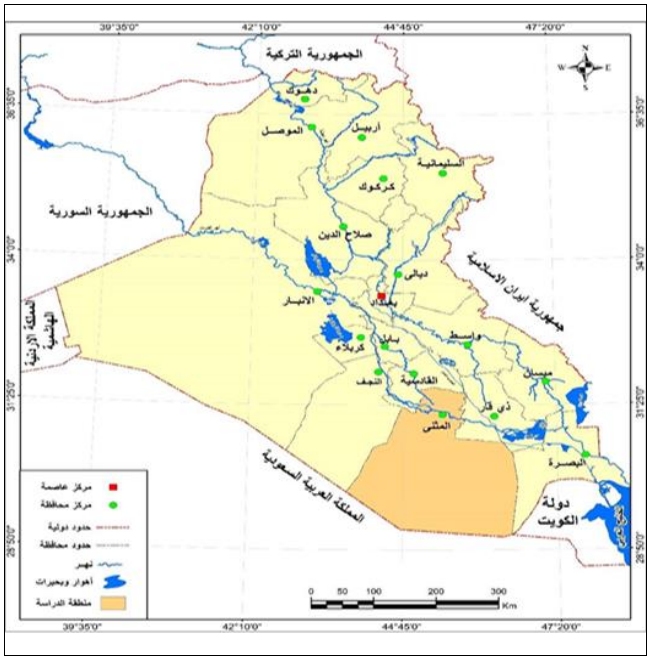
Introduction
Traffic congestion is one of the most important transportation problems that cities in the world suffer from, and it is a result of the development taking place in transportation methods, which was accompanied by a large increase in the number of vehicles of various types. It is a problem whose complexity increases day after day with the amount of this development and the amount of increase in the number of vehicles, especially in the study area, the amount of increase in the number of vehicles is not consistent with the basic design of its streets, most of which still have their basic design and basic capacity, which cannot bear or absorb this amount of increase in the number of vehicles while they are in their optimal condition, that is, when they are devoid of any other use. Of the uses of the city that overlap with the transportation uses performed by those streets, what is the case when those streets are overlapping with other uses such as commercial, industrial, residential, and health uses, then they are in this case. It will have an impact on the transportation uses that these streets specialize in, and thus affect the movement of vehicles, leading to traffic congestion, delaying the movement of vehicles, and the resulting in many negative effects that will be discussed during the research. The focus of this research will be on the uses of the health city represented by clinics. Doctors interfering with transportation uses within the study area and causing traffic congestion therein.

- **Research problem:** Does the geographical distribution of doctors' clinics cause traffic congestion in the city of Samawa?
- **Research hypothesis:** The irregular geographic distribution of doctors' clinics has caused increased traffic congestion in the city of Samawa.

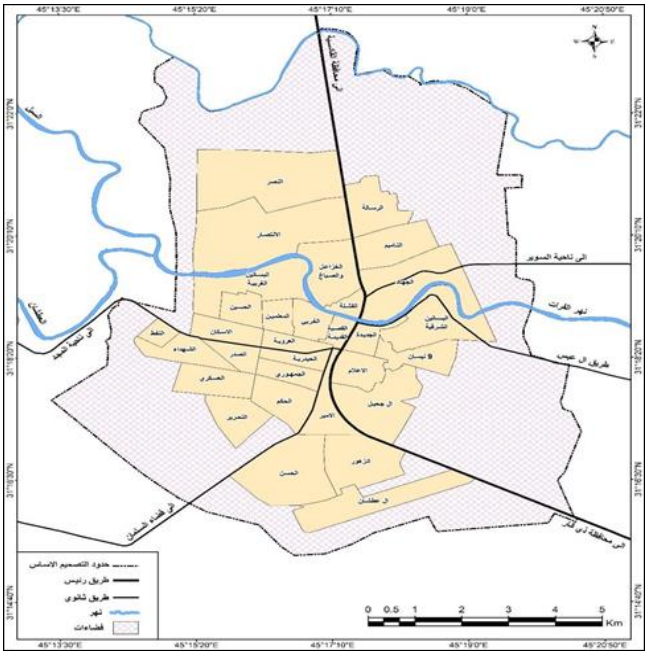
- **Search goal:** The research aims to demonstrate the extent of the impact of the geographical distribution of doctors' clinics on pedestrian movement and the resulting traffic congestion here.
- **Research Methodology:** The research relied on a descriptive approach in presenting the causes of traffic congestion.

Search limits

Spatial boundaries: Al-Muthanna Governorate is located astronomically between two circles of latitude (05 29° and 42 31°) north and between an arc of longitude (50 43° & 32°46) east, Geographically, it is located in the southwestern part of Iraq and is bordered to the south by the Kingdom of Saudi Arabia and its governorate Al-Qadisiyah from the north and northwest, while Najaf Governorate borders it from the west, Dhi Qar Governorate from the east and northeast, and finally Basra Governorate from the east, map (1). The study area is represented by the city of Samawah, which is the center of Al-Muthanna Governorate, specifically the streets (Bata, hotels, cinema, Housing) in which doctors' clinics are concentrated, map (2, 3).



Map 1: The geographical location of Al-Muthanna Governorate in Iraq



Map 2: Location of Samawah city

Map 3: The study area

Research Methodology

The research consists of two sections:

- **The first topic:** Discussing the concepts of traffic congestion and its types, in addition to the causes of traffic congestion as well as the effects resulting from it traffic congestion in the study area.
- **The second topic**: The research dealt with pollution resulting from traffic congestion, as well as the results, recommendations, and ways to address congestion traffic.

2. The first topic

Traffic congestion concept

Traffic congestion is defined as the situation in which the speed of vehicles is as low as possible due to the high volume of traffic, as the means of transport are inefficient in terms of speed of arrival and comfort and result in secondary problems such as pollution and traffic accidents [1]. It also means that the actual traffic volume in a section of the road or street exceeds the design and engineering capacity of that section [2]. The phenomenon of traffic congestion causes the occurrence of many traffic accidents, which result in health effects represented by injuries (injuries, deaths) to which street users are exposed, whether they are passengers or pedestrians. Also, the use of these vehicles with the horn during traffic congestion and the pollution it causes Audio pollution for residents and pedestrians, which is called noise pollution, as well as air pollution resulting from the exhaust of these vehicles, the effect of which increases during times of traffic congestion. There are also other effects, represented by the delay in the arrival of immediate ambulances and civil defense vehicles that pass through those streets.

First: Types of traffic congestion in the study area

1. Traffic congestion caused by vehicles

The increase in the number of vehicles is a tax on the prosperity that the world is witnessing and the increase in traffic congestion that this increase has caused. Countries are suffering from this problem at present, and it is becoming more severe day by day raising the concern of all countries' governments because of the effects that result from it, represented by air and noise pollution, and these vehicles have begun to head to the study area in large numbers, with a pendulum-like movement, which led to the accumulation of these vehicles in a crowded area near and around these clinics, picture [1-4].

2. Traffic congestion caused by pedestrians

One of the results of the great development in vehicle ownership is that it has become a significant element in city planning, and indeed an important and influential element in the uses of the land, the distribution of its uses, and the extent of its regions and development. The importance of the vehicle in movement, transportation, time, comfort, and enjoyment cannot be overlooked, all of this was at the expense of the efficiency, enjoyment, and security of pedestrian movement in cities, or in other words, it was at the expensing of the people's freedom of safe movement separate from the movement of vehicles and the daily movement of children, or what is called the pendulum movement from home to school and vice versa, on foot, and the movement of the elderly on a morning walk followed by a quiet session. Away from the noise and environmental pollution resulting from the expansion of vehicle use, as well as the freedom to shop in commercial centers away from the dangers of traffic. In this regard, the urban planner suffered in his planning of the pedestrian traffic network from two conflicting issues [6]:

- **The first:** Is how to determine the location of the nearest access point by vehicle from the residence or workplace
- **The second:** Is how to provide safe surfaces for pedestrian traffic and in paths that are completely or somewhat isolated from vehicular traffic.

Second: Reasons for traffic congestion in the study area

1. Increase in the number of vehicles

Transportation affects the pattern of land use and the trends in the development of cities, and the vehicle plays an active role in this, which is the expansion of cities. This expansion has a role in increasing the problems of transportation and traffic in the City conclusion, of the increase in its population and the high level of income, which contributed to increasing the purchasing power of vehicles and thus the increase in their number. Its use as a means of transportation led to thus an expansion in its use without being accompanied by a similar expansion in other means of transportation. The problem appears more complex after the streets have failed in their reality. The current increase in transportation requirements is not met by this increase, in addition to the number of people transported, which confirms the extent of congestion and traffic congestion in cities, due to the narrow streets and their failure to accommodate the large increases in the number of vehicles [7].

Fig 1: Traffic congestion in front of doctors' clinics in Samawah city caused by the high number of vehicles

Fig 2: Accumulation of cars near Bata and Cinema streets, illustrating limited road capacity.

Fig 3: Pedestrian crowding around medical clinics, showing interference with vehicular movement.

Fig 4: Mixed traffic of private vehicles, taxis, and pedestrians in the study area

Fig 5: On-street vehicle parking reducing road width and contributing to congestion.

Fig 6: Visual pollution from random clinic signboards and advertisements in central Samawah

2. Pedestrian movement

Pedestrian movement is a type of transportation with biological propulsion. It is an integral part of the study of transportation. In traffic laws, we always find a path designated for pedestrians to cross the road, as is the case for other means of transportation [8]. Pedestrian traffic increases within the central areas of cities with high density, and most of them do not use sidewalks, bridges, and pedestrian overpasses when crossing, especially those built near schools and universities. Also, shop owners and street vendors often use pedestrian sidewalks to display their products. Rather, they bypass the sidewalks and display their products. On parts of the same street, which forced them to go down to the street river and mix their movement with the movement of vehicles, in addition to being exposed to run-over accidents, as the percentage of accidents caused by pedestrians and passengers in Iraq reached 7.5% for the year 2019 [9].

Third: Effects resulting from traffic congestion

Preserving the environment and its components is one of the most important goals of many planners and environmental specialists, especially at present when countries around the world organize and enact laws concerned with protecting the environment from pollution, because the world is becoming more advanced in all fields, it has become necessary to provide environmental information and data. Monitoring financial resources on an ongoing basis; makes it possible to take the appropriate decisions dispensable to preserve the environment and protect it from the dangers of pollution [10].

One of the reasons that affect the productivity and performance of individuals is traffic congestion, as it leads to loss of time, physical fatigue, delay in appointments, and the inability to submit and complete work on time, thus decreasing their performance and weakening the productivity of organizations in general [11].

3. The second topic

Pollution caused by traffic congestion

The pollution resulting from traffic congestion is of the following types:

1. Air pollution caused by vehicle exhausts

When their engines start running, vehicles release types of air pollutants, the degree of which increases when the number of these vehicles increases and their movement in a certain place decreases. These pollutants include lead, which is one of the toxic elements that can cause convulsions, coma, even death, mental retardation, birth defects, and miscarriages in women. These pollutants also cause diseases in the human body, such as respiratory diseases like asthma, pneumonia, bronchitis, sinusitis, and cancerous diseases. The source of carbon monoxide is incomplete fuel

combustion, which also causes heart disease and atherosclerosis. The degree of pollution resulting from it depends on the maintenance of the vehicle and the type of engine used in it for some time. The combustion of fuel inside it and the density of traffic, as well as the climatic conditions and topography of the area in which the vehicle is traveling [12]. Air pollution is one of the most dangerous types of pollution, as it is one of the serious problems facing humans and threatening their lives. If it is possible to repair the soil from pollution and treat the water after it is polluted, it is not possible to live for 3 minutes in polluted air [13], The problem of pollution is one of the problems associated with vehicle movement, as its danger increases with the increase in fuel combustion, especially in areas with high population density [14].

It is related to the density of these vehicles and the extent of their concentration in a specific area, so the distribution of traffic is concentrated in the study area, therefore the amount of gases emitted from the exhausts of these vehicles will be high compared to the rest of the other areas of the city.

2. Noise pollution

It is defined as a set of sounds, both in type and quantity that are out of the ordinary and have a physiological effect that disturbs the hearing, excites the nerves, and leads to physiological diseases in the human body, such as high blood pressure, and many hearing diseases [15]. Noise has become a distinctive characteristic of the present, it continues throughout the days and hours, and a person encounters it wherever he is, as it accompanies him when he wakes up and sleeps. Studies indicate that noise negatively affects a person's psychological state and the functional performance of his body organs, and this effect appears when he is exposed to loud sounds that increase in intensity. About (90 decibels) for a certain period, and this effect is most severe if adequate protection for the ear is not available, and this leads to a gradual deterioration in the sense of hearing that may end in permanent deafness [16], Some recent studies have focused on the impact of noise from vehicles, which are annoying, unwanted sounds that increase in intensity in places that witness vehicular traffic congestion [17]. One type of environmental pollution known as noise is any sound that disturbs or harms people. Any undesired sound is considered noise, regardless of its frequency components' quality, sound pressure level, or impact on listeners. Every sound comes from any source that disturbs a person's mood or disturbs the comfort of the ecosystem. It is considered noise pollution [18], it has harmful and negative effects on humans through psychological discomfort, anxiety, and ear diseases, and this conflicts with human requirements for calm and psychological comfort. The study area has suffered and continues to suffer from noise resulting from traffic congestion due to the accumulation of vehicles in it due to the presence of doctors' clinics, and the largest part is. The noise in vehicles comes from their engines, which represents the gases that result from combustion and internal explosions that make them self-combust, as well as the friction that occurs between their tires and the asphalt surface of the street, the squealing of brakes and their use of stimulants (horns), as well as the sounds of motorcycles that are increasingly present within the study area. Its noise comes from its engines and exhausts since the engines are completely exposed and come out directly.

3. Visual pollution

The city, its structure, its architectural designs, the shape of its spaces, and the architectural style that can be observed by the naked eye and what lies above the space are a reflection of its aesthetic image. Everything that affects those views of distortion and randomness is considered to affect the aesthetic sense of the city and is considered visual pollution [19], Therefore, visual pollution can be defined as everything that causes harm to sight, including ugly, inconsistent, and inconsistent views that distort the aesthetic appearance of the urban pattern of the environment at different levels [20], the absence and non-enforcement of the law is one of the fundamental reasons that Iraqi cities in general and the study area, in particular, have suffered and are still suffering from, as random images and visual pollutants in various forms have become well-known features that characterize the city of Samawah and the study area in particular. Neglect and lack of planning at both the governmental and popular levels. It has become an influential factor in increasing visual pollutants in the city center, and the use of billboards for doctors' clinics to spread randomly has increased the sources of visual pollution in the city. The wrong use and random locations of these advertisements have become visual pollution in the eye of the beholder of the city spaces and have caused boredom and dissatisfaction, over the years these advertisements have become one of the polluted views of the urban landscape, as in the pictures [6-1]. The human eye works like a mirror reflecting the appearance of the city. The more organized and beautiful its views are, the more the amount of satisfaction and pleasure it brings. In the same way as the recipient, in contrast to the distorted and ugly scenes that cause dissatisfaction and boredom, which leads to the human nervous system being exposed to fatigue. There are also other indirect private and public effects and costs of traffic congestion, represented by the damage to road users who are over the age of 60, as it is expected that 12 out of every 100 people will suffer a heart attack as a result of a bad mood and pollution resulting from vehicle exhausts, pollution, and noise, in addition to the resulting economic damage due to what it causes. The loss of fuel, costs, and time negatively affects work, production, and income, and then will reflect on the consumer and society because the time lost as a result of congestion has value. Productivity and income, in addition to obstructing the arrival of ambulances and civil defense vehicles, and damage to vehicles due to their delayed operation while they are parked [21].

Fourth: Ways to address traffic congestion

- **Determining the number of vehicles:** Despite the urgent need to acquire vehicles in society and the extent of the service provided by these means for one family, their increase, which is not in harmony with the streets and their carrying capacity, has made it a contemporary problem that causes traffic congestion and many of the problem that accompanies it, so it is necessary to Following a new policy to determine the number of these vehicles in a way that addresses this problem.
- The main reason for traffic congestion in the study area is the presence of doctors' clinics, their random distribution, and their mixing with other urban land uses such as commercial, industrial, and residential

functions. Therefore, the destination of vehicles and pedestrian elements has become concentrated in this area. Thus, the dimensions of doctors' clinics and their gathering within unified medical complexes within the suburbs. The city will eliminate these traffic congestions, and at the same time there will be isolation between city uses, giving each use privacy.

- Preventing and eliminating encroachments on streets and sidewalks, and holding store owners who transgress strictly accountable in a way that enables pedestrians to walk on the sidewalks only without any obstruction from the goods displayed on the sidewalks.
- Establishing multi-story garages within areas that witness frequent and daily crowding.
- Constructing a pedestrian tunnel on Corniche Street, continuing with the currently constructed pedestrian bridge, as well as another on Bata Street opposite the covered market, and isolating pedestrian traffic from vehicular traffic using a barrier at the end of the sidewalk in a way that forces the pedestrian element to walk on the sidewalks and not go down to the street and mix its movement with the vehicular movement with Establishing locked outlets at certain distances designated for civil defense vehicles in the event of fire and other incidents.
- Establishing pedestrian bridges to ensure security and safety for pedestrians when crossing the streets from the other side, especially the elderly and children, and to prevent their movement from interfering with the movement of vehicles and to prevent run-over accidents.
- Activating the role of traffic guidance for road users through traffic lectures in schools and universities, social media, or distributing awareness posters.
- Widening the streets in a method commensurate with the growing number of vehicles.

Results

- The random and irregular distribution of doctors' clinics causes a traffic problem, which is traffic congestion.
- Traffic congestion in the study area causes other problems such as air, visual, and noise pollution.
- Traffic congestion varies in the study area depending on the cause: Traffic congestion caused by vehicles and another caused by pedestrians.
- The causes of traffic congestion in the study area are the increased growing number of vehicles and pedestrian traffic that go to these clinics and the associated pharmacies and side laboratories.
- The mixing of pedestrian traffic with vehicular traffic causes traffic congestion in the study area. This is due to violations by shop owners who display their products on street sidewalks and even on the streets themselves, which forces pedestrians to enter the street while walking.
- The narrow streets and their inability to accommodate this large number of vehicles and street users.
- Lack of open, multi-story garages, which led to an increase in parking of vehicles on the streets.

Suggestions

- Removing doctors' clinics and gathering them within unified medical complexes within the city's suburbs in a way that leads to the elimination of traffic congestion. At the same time, there will be isolation between the uses of the city and give each user privacy.
- Determine the number of vehicles by following a new policy that addresses this problem.
- Remove encroachments on streets and sidewalks in a way that enables pedestrians to walk on them without any obstruction.
- Establish multi-story garages in the central area and streets that witness traffic congestion.
- Construct pedestrian tunnels within Corniche Street and Bata Street, in a way that isolates pedestrian traffic from vehicle traffic.
- Spread traffic culture among members of society, especially in schools, kindergartens, and universities.
- Expand the streets within the study area in a way that ensures the movement of vehicles without obstruction or traffic congestion.

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