

## THE RELATIONSHIP BETWEEN CAR DEPENDENCY AND USE OF PUBLIC TRANSPORT IN DUHOK CITY- BARRIERS ANALYSIS AND RECOMMENDATIONS

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(Received: May 31, 2020; Accepted For Publication: October 11, 2020)

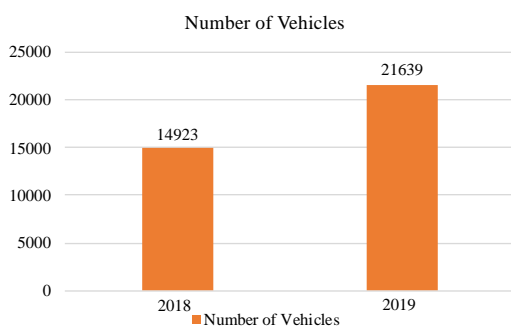
### ABSTRACT

This study was conducted to determine the relationship between car dependency and the use of public transportation in Duhok city. The purpose of this study was to identify the factors that hinder the use of public transportation and the reasons for the absence of public transportation, as well as to determine how to make the young generation change their mobility culture from a passenger car-based system to use public transport. This study was a qualitative study, which consists of Duhok city as a case study for this research, in which purposive, simple random and theoretical sampling was adopted. Two types of Semi-structured interview questions were used one with open-ended questions with governmental experts, the other was open, and the closed-ended question that was used with public people of Duhok city in order to collect the information about transportation situation in Duhok city. This research practiced a qualitative research approach, thus for analyzing data, a thematic coding analysis has been applied. Moreover, for the analysis of close-ended questions, some charts and graphs have been made by utilizing Microsoft Excel Program. This method has been done in order to avoid bias and support data analyzed by other methods of analysis. The study found out that the vehicle or passenger car is the main transport mode in Duhok city, the passenger car provides accessibility and flexibility which public transportation cannot and this is due to the absence of a convenient public transport in Duhok city. In addition, it was pointed out that people can change their minds about favoring the use of public transport over cars, first by developing well-constructed and planned public transport, also with the available of various modes that need to be well integrated with other forms of non-motorized transport, such as pedestrian walkway system, cycling, and taxis.

### INTRODUCTION

Duhok city has developed very quickly as an urbanization included people migrated from rural to urban areas. As day by day, the vast growth of the city has led to an increase in the demand for more passenger car use, the number of private passenger cars is increasing in the small city of Duhok, and people

are forced to use their private passenger cars for daily mobility because it's the only reliable mean of transport in the city. While the streets of Duhok city remained the same and the numbers of vehicles are getting into a higher amount, many roads are now considered as out of its capacity, this makes massive traffic congestion everyday especially during peak hours and special events.



**Fig. (1):** Numbers of registered vehicles in Duhok governorate

**Source:** Directorate of Traffic Police Duhok

**Table (1):** Numbers of accidents and casualties by vehicles in Duhok city Source: Directorate of Traffic Police Duhok

Year	Number of accidents	Number of dead people	Number of injured people
2010	632	88	754
2011	707	83	691
2012	629	129	722
2013	1319	260	4290
2014	1132	189	4213
2015	1220	172	3967
2016	1177	205	4003
2017	1152	145	1658
2018	1091	117	1071
2019	1002	98	1102

### **1.1 Problem Statement, Research Aim, and Objectives:**

In the past decades, dependency on passenger car-based commuting in the Kurdistan region has increased as a result of some indicators such as population growth and economic growth. In addition to that, household income increase and the lack of public transport services in the region influenced people to buy private vehicles. Hence, this approach has led to cause traffic congestion, waste of resources, waste of time, and damage to urban health. The cities in the Kurdistan region mainly consider passenger car usage as a convenient and simple mode of urban transport.

The main aim of this research is to find out the current relationship situation between passenger car dependency and public transport especially for the young generation in Duhok city to explore the challenges of vehicle dependency and public transport services.

The structure of the land use in Duhok city has been built up to be easily accessible by vehicles but not by other modes, which directed the city to be a more passenger car-dependent. Large numbers of vehicles, parking facilities led to widening some roads, which support more passenger cars and traffic that creates a barrier to other public accessibility.

In this research the main research question would be; what is the relationship between car dependency and the use of public transport in Duhok city?

### **LITERATURE REVIEW**

Notably according to documents from the directorate of traffic police in Duhok, nearly 80% of Duhok city's people are depending on their private cars, which is mostly used by the age group between (18-40). In addition, in Duhok the overall number of cars that have been registered in Duhok governorate is 235,000 vehicles until now. However, in Duhok governorate number of registered cars has been increased from 14,923 in 2018 to 21,639 in 2019 as shown in (figure 1). Moreover, from the overall number of registered cars in 2019 that was (21,639) in which 18,636 of them were private passenger cars and the others were other various types of vehicles. Therefore, when the number of cars increases the number of accidents will increase as the table below shows the number of car accidents in the past ten years.

Kodukula, S, (2011), defined automobile dependency as the patterns of land use and transportation that prioritize access for automobiles and provide comparatively inadequate alternatives (in this context, "automobile" refers to vehicles, light trucks, vans, SUVs, and motorcycles). It means that people find it hard to reach the desired destinations such as services and activities without the use of automobiles.

Outer Suburban/Interface Services Development Committee. (2004), explained that vehicle dependency occurs when a city or a part of a city undertakes the use of a vehicle in its decisions on transportation, therefore, other modes become more incidental, minimal or non-existent until there are no viable alternatives for commuting for passenger other than the passenger cars.

According to Litman, T. (2019), dependency on vehicles is a matter of degree. In the world, there are few areas that are entirely dependent on vehicles (that is, driving is the only means of transportation). In addition, places that appear to be heavily dependent on vehicles still have a large amount of walking, biking, and transport travel in certain communities or in certain places; however, the usage of such modes appears to be undercounted by standard transport planning (Measuring Transportation).

According to (Caisarina, I., & bin Mat, H. 2008), one of the reasons for rising the levels of the use of private vehicles in the urban city is the steady increase amount of private passenger car ownership each year.

The public transport problem should be seen as the main focus. One of the reasons that may lead more to the growing usage of private vehicles in many cities is that, the fewer public transportation facilities that do not really cover the needs, expectations, and standards of public transport. Comfort and security that can't be achieved by public transportation have contributed to a change in the usage of private passenger cars for mobility (Tolley and Turton, 1995).

Civilized society relies on transport, product movement from where they are made to where they are required and people move from their homes to where they have to go to fulfill all the life activities, such as work, education, shopping, and leisure. A strong transport network is crucial for the development of a country because the variables that shape a country's development play a significant role in

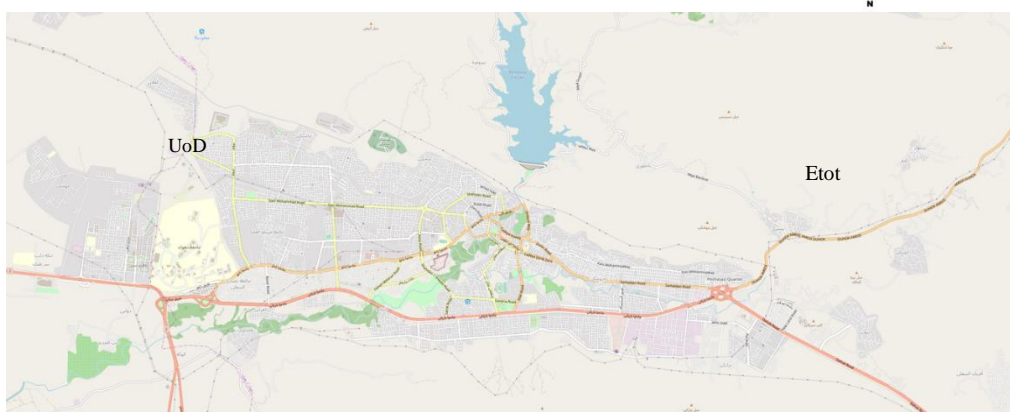
deciding how the transportation system develops.

Inadequate public transportation systems have a negative impact on the economy. If public transport demand would be fulfilled to make it easier for citizens to do business without unnecessary barriers, they will have tremendous benefits. Enhanced public transport services, in particular urban areas, will help minimize commuter's tendency to switch to private vehicles as soon as can be afforded, and so alternatives in local road facilities and developments in public transport would also be carefully evaluated (Iles, R. 2005).

### 3. METHODOLOGY

#### 3.1 Selection of the Case Study:

The study area that was selected for this research has been chosen on the basis of specific points that are of relevance to the research topic. The study area is Duhok city with its all quarters. From the west which covers the University of Duhok until east to Etot quarter. Duhok city has a vast area with many local and foreign people visits around the city, also with different topographical features and many activities as workers and living people to take place in it, it is the reason that has drawn the researcher in selecting the site. Furthermore, the whole city has been chosen because of the focus of the topic to be more comprehensive.



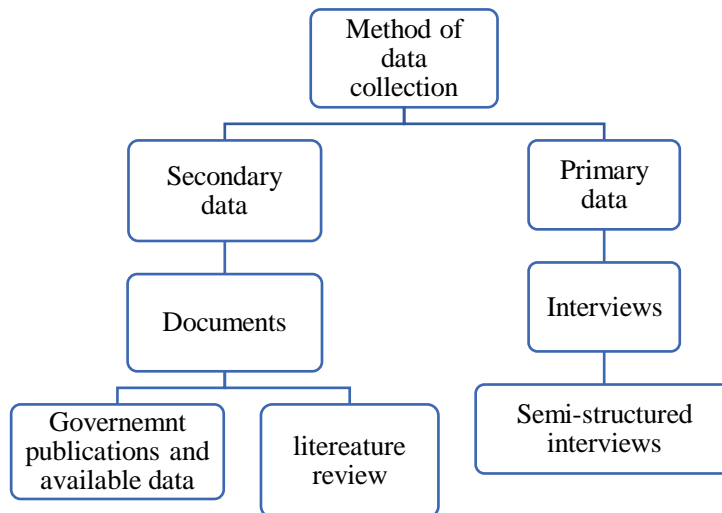
**Fig. (2):** Duhok city map.

**Source:** open street map

#### 4.3.2 Method of Data Collection:

The methods that have been used for collecting primary data were based on semi-structured interviews and reviewing documents and maps of the area that have been collected from the directorates. Interviews have been conducted during the site visits to gather information about the case study and local people's opinions about the passenger car dependency and public transportation in Duhok city, the number of people that have been interviewed is 120 persons from different groups of age and gender, and belong to various districts

in the city of Duhok to ensure the reliability of the results. Semi-structured interviews with open-ended questions have been done with government expertise in 5 different governmental agencies. Additionally, semi-structured interview with open and close-ended questions has been accomplished during interviewing local people of Duhok city to have closer look to the actual situation and to get people perspectives about their opinions on passenger car dependency and public transportation in the city.



**Fig. (3):** Method of data collection  
**Source:** own constructed, 2020

**4.3.3 Method of Data Analysis:**

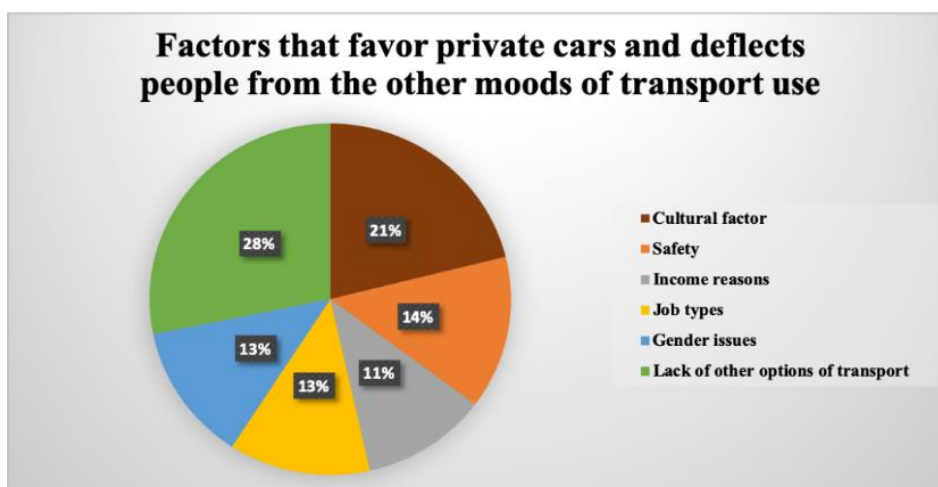
This research adopted a qualitative research approach, thus, for analyzing data from semi-structured interviews and documents from government publications, thematic coding analysis has been used. The thematic coding analysis is a process that focuses on the themes within the data collected. In addition, coding is the method by which the topics are formed and then it is completed by identifying the main points (Guest, MacQueen & Namey, 2012).

**4. RESULTS AND ANALYSIS**

**4.1 Car Dependency in Duhok City:**

The key argument concerning passenger car dependency in Duhok cit is the absence of sufficient modes of public transport, lack of

alternative modes of transport such as non-motorized transit i.e. appropriate sidewalks, crosswalk, cycling lanes, in addition to that the lack of public awareness and knowledge to use suitable options have made people rely on private vehicles. According to the participants as figure 5 shows, the main factors influencing people to depend on passenger cars rather than public transportation is, in the first place, the lack of options of transportation with 28%. The cultural aspect is the second major factor with 21% that has made people extremely be in need of using private passenger cars and so most of the young people intend to have their own private vehicles. Furthermore, safety and gender are also key points of the dependency on passenger cars with 14% and 13% respectively.

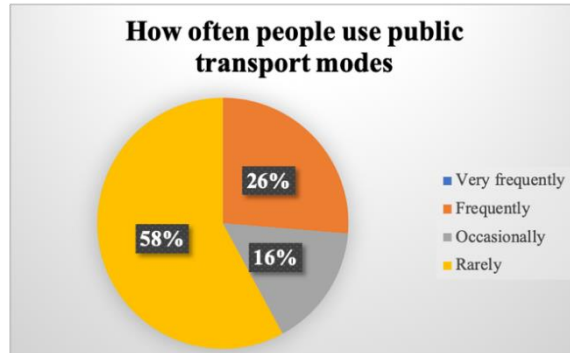


**Fig. (4):** People’s perspective about on Factors that favor private cars over public transportation.

**Source:** author’s construction based on the interview with local people, 2020.

Regarding the safety concerns, it is shown in the graph below that 50% of the participants involved in this research feel commonly safe

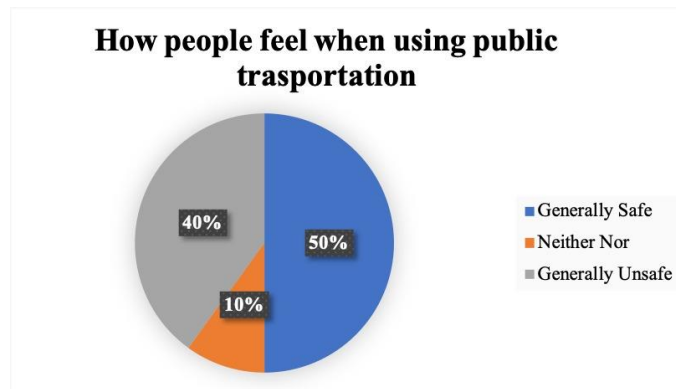
using public transport, but generally, the group who do not feel safe and secure were women.



**Fig. (5):** People’s responds on safety.

**Source:** author’s construction based on the interview with local people, 2020.

Figure 8 presents that the majority of people with 58% rarely use public transport which means most of them depend on private transportation.

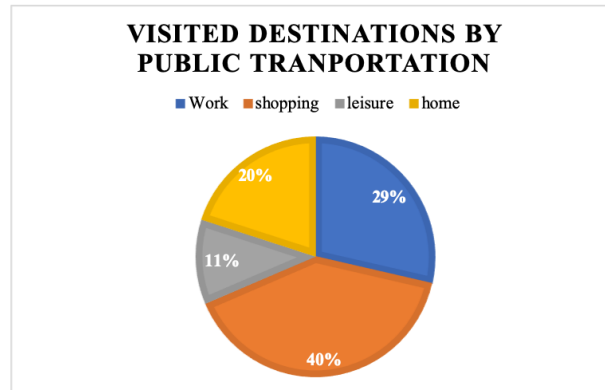


**Fig. (6):** People’s perspective on how often they use public transport modes.

**Source:** author’s construction based on the interview with local people, 2020.

Another point that has been drawn from the results is that the large group of individuals with 40% use public transport mostly for shopping, and this is because it is easier for them as they save more time because they do not need to look

for parking lots, which could be far away from their intended area. The other group of people that was mostly using public transport is to commute for their daily work or study with 29% as shown in figure 9.

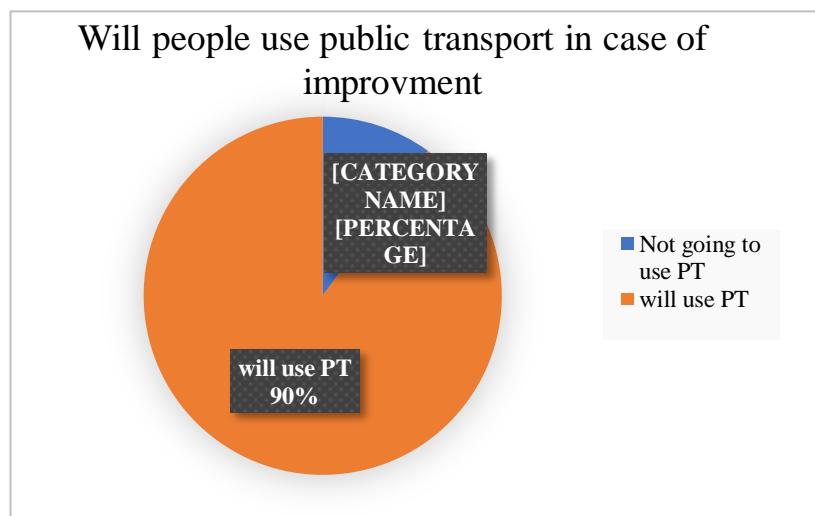


**Fig. (7):** People’s perspective on visited destinations by public transportation.

**Source:** author’s construction based on the interview with local people, 2020

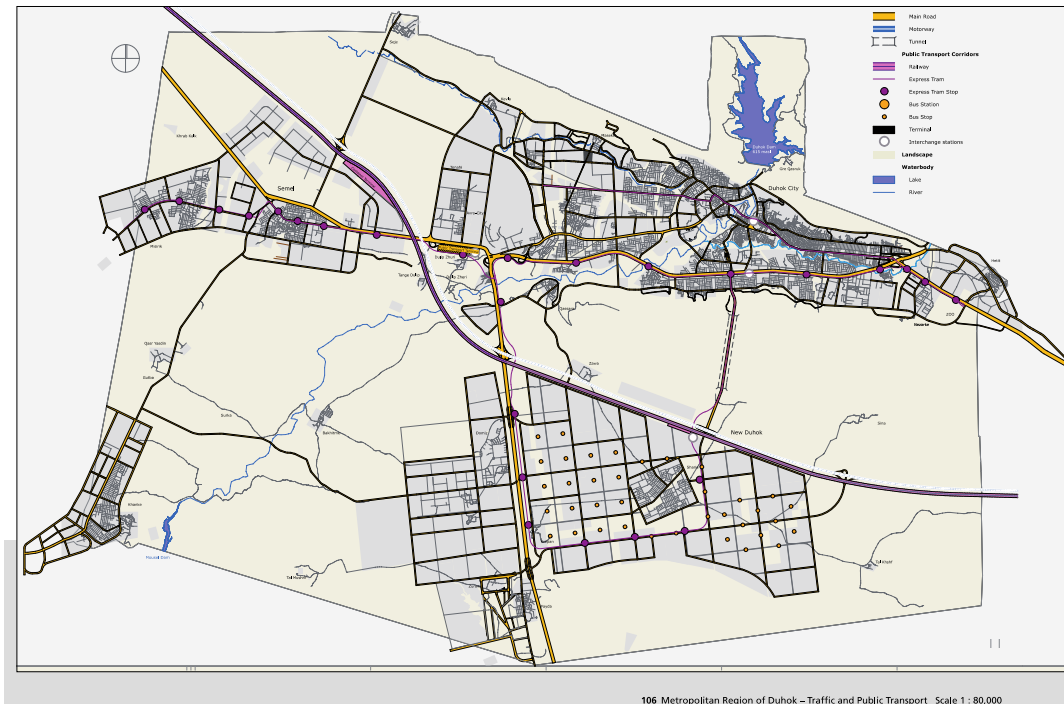
Figure 10 reveals the fact that 90% of the local people are willing to use public transportation if there are various moods of transportation available such as Trams, trains...etc. and if it is more effective and efficient. Most of them indicated that having good accessibility to well-constructed and well-managed public transport will make daily

activities much easier, more convenient for using, faster, also it is more environmental-friendly. However, only 10% of interviewees don’t want to use public transport even if it is improved, some of them because of different reasons that related to job type that needs a private car to commute to specific places



**Fi. (8):** people’s responds on using public transport or not if it is improved.

**Source:** author’s construction based on the interview with local people, 2020.



**Fig. (9):** Road Network of Duhok city.

**Source:** Directorate of urban planning Duhok, Duhok master plan report 2010

#### 4.4.2 Duhok City’s Master Plan:

Duhok Master Plan has a strong link with transportation that is considered as a core element. Figure 11 shows Duhok city master plan for road network until 2032. The main roads, motorway, and the design of the tram with its terminal and stop stations have been developed in the master plan as an option to promote public transport. This was planned since 2012 however until now it is unknown when it will be implemented. Duhok’s master plan is mainly concentrated on public transportation. However, the situation of public transportation about 30% has been changed since the master plan has been developed. This indicates that there is an absence of development and implementation of public transportation in the city, still the focus is only on increasing the number of private cars and taxis, also constructing more road capacity for private

vehicles and not concentrating on making more options for public transport modes. This lack and the uncertainty of implementing and developing occurred due to the economic crisis that the Kurdistan region has faced and the emerge of ISIS in 2014.

#### 4.3 Consequences of the absence of public transport in Duhok city

One of the main consequences of the absence of public transportation is the high rate of passenger car dependency which leads to much more negative impacts, such as congestion and the loss of time. Local people indicated that the daily commuting to and from work or study cause a high level of traffic jam particularly during the peak hours, for instance at the mornings when most of the people commute to work or at the evening after work.



**Fig. (10):** Congestion in mornings at the gate of Duhok University.  
**Source:** Photo taken by the author

In order to accommodate this huge number of private passenger cars in the city, the local government developed a plan in the city center, in which, they changed the assignment of the roads functioned by converting the two-way road into one way in order to increase the capacity of the roads and decrease the level of congestion, and hence, to ensure a better level of service. This is a good approach to some extent for a short term development, but afterwards, it has led to motivating more drivers to come

inside and commute to the city center as can be seen in (figure 13), and so more parks were built in the city center which promoted more passenger car to enter the Central Business District (CBD). Recently, there are more than 20 car parks including multi-floors parking in the city center.

In addition to that, the safety rate has been decreasing because people are facing difficulties while crossing the road from one side to the other side as shown in (figure 14).



**Fig. (13):** City center Bazar congestion  
**Source:** Photo taken by the author



**Fig. (14):** Unsafe crossing on the streets for individuals  
**Source:** Photo taken by the author

## 5. DISCUSSION AND CONCLUSION

- The reasons behind the constant increase in the level of passenger car dependency, is mainly the absence of adequate modes of transportation in the city, cultural factors, and job types that made Duhok governorate has 235,000 registered vehicles until now.
- Significant number of car accidents were registered every year. 1002 accidents occurred in 2019.

- The only means of available public transport according to the local people were taxis and privately owned mini buses, which are used by 50% of people primarily for shopping and work.
- Up to 90% of the individuals and specifically the young generation are willing to use public transport more than private cars if there is a reliable and convenient public transport, thus it would be more beneficial in terms of saving time, saving money, and most importantly preserving the environment.



- Considering rapid development, the transportation system in Duhok city faced major challenges, primarily traffic congestion and a shortage of public transportation system. Duhok city faced unregulated growth in private passenger cars that required parking spaces; hence, there are more than 20 parking lots in the Central Business District (CBD) only.
- The lack of implementation and development of the Duhok Master Plan is due to the rapid urban growth challenges, economic crisis and ISIS. This has caused a huge growth in the quantity of passenger cars and taxis that eventually led to more congestions on the road network.

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## پوخته

ئه ف كه كولينه هاته ئه نجامدان ژ بو ده ستنيشانكرنا په يوه نديي د نافه را بكارئينا نا ئوتوموبيل و كارئينا نا كه گوهاستنا گشتي ل باژيري دهوكي. نارمانجا قئ كه كولينئ ناسكرينا فاكټورين كو ئاسته ننگ هه نه ل بهر كارئينا نا كه گوهاستنا گشتي و ههروه ها ده ستنيشانكرنا كا چه وا ها ولاتي هزراكا باش بكه ت بو كارئينا نا كه گوهاستنا گشتي ل باژيري دهوكي. بو قئ كه كولينئ نمونه ين زانستي و تيوري هاتنه بكارئينا نا. دوو نمونين پرسيارا بين سمى-ستراكچر و پرسين كه كرى هاتنه بكارئينا نا بو پسورين حكومي. و پرسيارين كه كرى و گرتي ب مروقين گشتي بين باژيري دهوكي ري هاتنه بكارئينا نا ژ بو به ره فكرينا ناگه هداريي ده رباري ره وشا كه گوهاستنيدي ل دهوكي. ل قئ كه كولينئ هنده ك نه خشه و گرافيك بكارئينا نا بهرنامي مايكروسفت ئيكسل كه هاتنه چيكرن دا كو ئه نجامين دورست بهر كه فن. ليكولين هاته ديتن كو ئوتوموبيل مودي سه ره كيه بي كه گوهاستني ل باژيري دهوكي. ئوتوموبيل ئاسانتره بو بده ستقه ئينا نا ژ

قه گوهاستنا گشتی دا کو مروقی بگههینته جهن ئارمانج ، ئه قهژی ل بهر نه بونا ره وهشتیا قه گوهاستنا گشتی یا هه سه ن ل باژیروی دهوکی.

لئ ل همی ده ما هاته ده ستنی شان کرن کو مروف دکاریت هزراخو بگهوریت بو پیشبینیا کارئینانا قه گوهاستنین گشتی ل سهر ئوتوموبیلان ئه گهر ره وشا قه گوهاستنین گشتی باشتر لیبهیت بریکا دانانا پلانین باش ب ئاواين جودا وهکی (مترو و ترام) کو دفیت پیکفه بینه پیشفه خستن دگه ل هه می جورین قه گوهاستنا و ریکنین پیادا .

#### الخلاصة

أجريت هذه الدراسة لتحديد العلاقة بين الاعتماد على السيارات واستخدام وسائل النقل العام في مدينة دهوك. كان الغرض من هذه الدراسة هو تحديد العوامل التي تعيق استخدام وسائل النقل العام وأسباب عدم وجود وسائل النقل العام وكذلك تحديد كيفية جعل جيل الشباب يغير ثقافة التنقل الخاصة بهم من نظام قائم على السيارات لاستخدام المواصلات. كانت هذه الدراسة عبارة عن دراسة نوعية تتكون من مدينة دهوك كدراسة حالة لهذا البحث. حيث تم استخدام أخذ العينات الهادف والعشوائي البسيط والنظري. تم استخدام نوعين من أسئلة المقابلة شبه المنظمة ، أحدهما مع أسئلة مفتوحة مع الخبراء الحكوميين والآخر كان مفتوحًا واستخدم السؤال المغلق مع عامة الناس في مدينة دهوك ، من أجل جمع المعلومات حول حالة النقل في مدينة دهوك. استخدم هذا البحث نهج البحث النوعي لتحليل البيانات ، تم استخدام تحليل الترميز الموضوعي. علاوة على ذلك ، لتحليل الأسئلة المغلقة ، تم عمل بعض الرسوم الجرافيكية والرسوم البيانية باستخدام برنامج Microsoft Excel. تم استخدام هذه الطريقة لتجنب التحيز ودعم البيانات التي تم تحليلها من خلال طرق التحليل الأخرى. ووجدت الدراسة أن السيارة هي وسيلة النقل الرئيسية في مدينة دهوك ، فالسيارة توفر سهولة الوصول والمرونة التي لا يمكن لوسائل النقل العام ذلك ، ويرجع ذلك إلى غياب وسائل النقل العام المريحة في مدينة دهوك. كما تمت الإشارة إلى أنه يمكن للناس تغيير رأيهم حول تفضيل استخدام وسائل النقل العام على السيارات ، أولاً عن طريق تطوير وسائل النقل العام جيدة التخطيط والمخطط لها مع أوضاع مختلفة مثل والتي يجب دمجها جيداً مع غيرها من أشكال النقل غير الميكانيكي مثل نظام ممر المشاة وركوب الدراجات وسيارات الأجرة.