

Back and Forth

Commuting for Work in Israel

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 Internet edition

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Haim Bleikh*

Abstract

Commuting has recently become more of an issue as traffic loads are increasing despite government efforts to ease congestion. On the whole, commuting should make things easier as it gives workers flexibility in their choice of both workplace and residence. The data indicate that the majority of commutes are short distances and in private cars. The result is that congestion is greater and the burden on the infrastructure has increased. At the same time, more and more workers have begun using trains as their major mode of transport to work. Even though they only represent 3.5 percent of the workers, from a long-term perspective, this is an important change in commuting behavior.

An examination of the factors that influence choice in commuting mode of transport shows that the size of the residential locality plays an important role. The distribution of modes of transport shows that the patterns are similar for the Jewish population in large localities (more than 50,000 residents) and for Arab Israelis living in mixed localities. Both of these population groups make considerable use of public transportation. On the other hand, there are major differences in the distribution of modes of transportation between small Arab Israeli and Jewish localities. In both cases, there is little use of public transportation although in the Jewish localities the vast majority of workers commute in private cars while the Arab Israelis use organized transport. The low use of public transportation in Arab Israeli localities is, to a great extent, the result of poor infrastructure, as highlighted by the low satisfaction levels of Arab Israeli residents with the condition of the roads in their areas. In fact, their satisfaction levels are very much lower than those of Arab Israelis living in mixed localities.

Special attention is given to commuting patterns among Arab Israeli women. Arab Israeli women in the North testify to a lack of employment within close proximity of their residential areas. This serves as a geographic obstacle for many of those women who would like to enter the labor force.

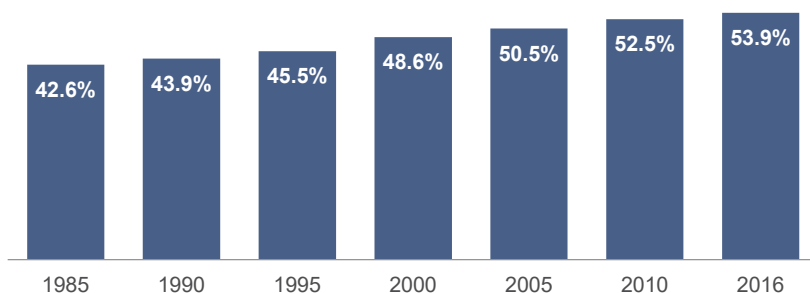
* Haim Bleikh, Researcher, Taub Center. The author wishes to thank those who read and commented on this work: Professors Gil Epstein, Eric Gould, Alex Weinreb, and Avi Weiss. Additional thanks to Ram Geffen, the Madlan Company, for access to data; Yifat Shani Abuhazira, CBS, for access to migration data.

Introduction

As road congestion levels continue to rise with the increasing number of commuters, the subject of commuting has attracted more and more public attention.¹ As shown in Figure 1, over the past 30 years, the share of commuters has increased by 12 percentage points.² It is worth noting that during this time period, the population of the country has doubled while the number of commuters has tripled.

Figure 1. Share of workers working outside of their residential area

Workers ages 25-64



Source: Haim Bleikh, Taub Center | Data: CBS, *Labor Force Survey*

This increase in commuting has been marked by an increased use of private cars, making it the main mode of transportation among workers (Figure 2). There are a variety of reasons for the increased use of private cars. Gronau (1997) points to a period during the second half of the 1980s that saw a decline in the operating costs of private cars, with increases in public transportation tariffs. At the same time, an increase in incomes led to a rise in the value assigned by individuals to their time and level of comfort.³ In

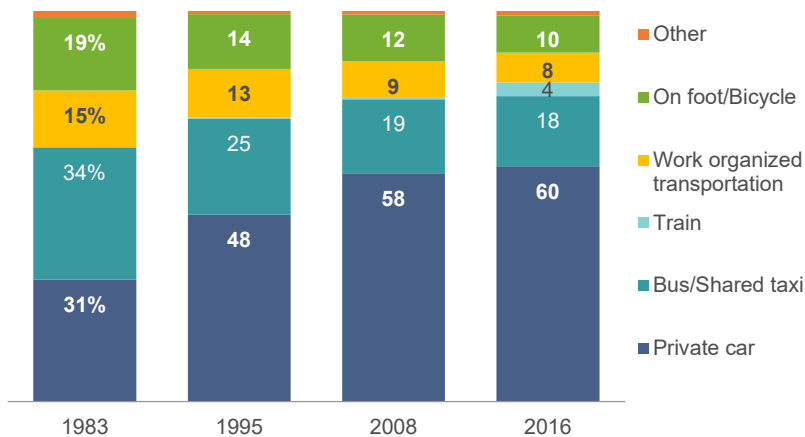
1 In this study, commuters are those who regularly travel from their home to their place of work which is located outside of their residential area.

2 The share of commuters with a permanent place of work has increased over the years, and most substantially between 1985 and 2000. The group of workers with a non-permanent place of work grew significantly from the beginning of the millennium from 3 to 8 percent.

3 The term “comfort” includes individual needs for privacy. For example, traveling on public transportation causes a loss of privacy.

addition, the common practice of employers providing their employees with “company cars” also contributed to encouraging a culture of commuting to work by private car. In 2017, about 10 percent of salaried workers received a car from their workplace (Ministry of Finance 2017).

Figure 2. Modes of transportation to the workplace



Note: 1983, 1995, and 2008 data are from the Population Census and are for workers ages 15 and older. The 2016 data are from the *Social Survey* and are for ages 20 and over.

Source: Haim Bleikh, Taub Center | Data: CBS, Population Census (1983-2008), *Social Survey 2016*

The rapid growth of private vehicle ownership has been a major factor in increased infrastructure loads. Over the years, various governments have made efforts to increase the supply of roads, through increases in the length and the area of roads, the latter by increasing the number of lanes. Despite these efforts, vehicle use has increased faster than the supply of roads (Central Bureau of Statistics 2018).

Alongside the increase in commuting to work by car and investments in infrastructure, public transportation is undergoing changes. The recent rise in the use of rail as a means of commuting to work is notable (3.5 percent).⁴ In addition, in recent years there have been substantial changes in the public transportation tariff structure that have contributed to lowering prices for users. However, the impact of these public transportation changes on individual travel patterns over the long term should be monitored.

⁴ The data do not include the influence of the opening of the Karmiel rail station.

The connection between place of residence and place of work raises a variety of issues such as differences in labor market participation rates among population groups as a result of their geographic distribution. One such issue relates to the theory of spatial mismatch (Kain 1968). According to the theory, population subgroups, like women and ethnic groups, are subject to spatial constraints that diminish their access to employment opportunities, resulting in more joblessness and lower incomes among these groups. Thus, according to this theory, disadvantaged populations are disproportionately harmed by spatial mismatch.

In the national context, the integration of Arab Israeli women into the labor market is a considerable challenge facing the economy. The existing spatial mismatch, with the geographic separation of the Arab Israeli populations far from large employment centers, increases commuting costs for women, limits their access to employment centers, and makes the task of their labor force integration even more difficult. However, this challenge holds great potential for the benefit of the economy. Proper handling of the spatial issue may contribute to economic growth, reducing poverty and inequality, reducing dependence on social assistance, and strengthening social cohesion.

This study seeks to contribute to the discussion by examining the underlying factors and processes that lead to the currently observed commuting patterns. Accordingly, the study will be divided into several parts. The first section presents the main trends and commuting patterns in Israel. This section describes commuting patterns along several dimensions: commuting flows of workers from different geographic areas, distances, commuting times, and modes of transportation used by workers. The next section presents an in-depth look at the factors associated with commuting by different transport modes. Travel behavior of workers is extremely complex since it is affected by the interaction of different personal and geographic (e.g., origin and destination) characteristics as well as structural issues (e.g., the quality of infrastructure). The third section of this paper will deal with the connections between commuting, internal migration and housing. The final section focuses on the commuting patterns of Arab Israeli women. Special emphasis is given to spatial constraints placed by residential location on employment opportunities for this population.

Literature review

In modern society, commuting involves much more than just covering the distance between home and work. It has different implications for individuals and society. Spatial variation in wages and/or housing prices as well as differences in locality characteristics create a complex system of push and pull factors that affect the decision of where to live and where to work. Together, these factors determine commuting distance and acceptable commute time and may influence individual decisions about whether to move or stay in a location.

Reitsma and Vergoossen (1988) distinguish between migration with a change in workplace and migration without a change in workplace. Commuting can be a substitute for migration or vice versa. In the broader context, migration is a major and complex decision. When individuals weigh options of migration against commuting, many lifestyle aspects are to be considered. Beside housing prices and employment opportunities, other factors have an influence on an individual's willingness to relocate, like personal costs for other family members, child-rearing considerations, social connections and friends, quality of schools, amenities, and tax benefits (Shuai 2012).

It is widely accepted that commuting imposes significant social costs. Road congestion, noise and air pollution, and loss of time are just some of the issues that are associated with increased commuting (Svärdh 2009). On the other hand, commuting may play a significant role in reducing regional disparities in wages and unemployment, by allowing workers from "dormitory" communities to work in more central ones (Monfort 2009).

On an individual health and life satisfaction level, commuting may impose psychological costs on some commuters while others may benefit. Time spent waiting for a train or bus or sitting in traffic can be considered an unpleasant or stressful experience. In the literature, commuting has also been linked to stress (Novaco and Gonzales 2009). In particular, commuting can be more stressful when people are not in control of factors that arise during the commute to work, such as traffic congestion or time pressures (Haider, Kerr, and Badami 2013). At the same time, other research shows that individuals can actually derive utility from the time spent on the road. Some drivers simply enjoy driving, other commuters adjust to commuting time and engage in activities such as listening to music or the news or talking on the phone, and as a result make the travel more enjoyable and/or productive. For some commuters, being on the road may be used as a time to decompress or unwind, and as a necessary transition between home and work (Redmond and Mokhtarian 2001).

Labor commuting in Israel has been analyzed by different researchers in the last ten years. The work of Arnon and Presman (2006) examine commuting trends and flows between geographic subdistricts between 1991 and 2004. They found, among other things, that a 10 percent increase in the distance between the target area and the area of origin leads to a 16 percent decrease in the number of commuters between the regions. Frish and Tsur (2008) examine the effect of investment in roads and rail on commuting patterns between regions. Using the gravitation model, they found that overall investment in transport infrastructure between 1992 and 2004 accounted for about two-thirds of the increase in the number of commuters. Another comprehensive study that examines the characteristics of commuters was carried out by Amar (2013) using 2008 census data.⁵ This study also took into account commute times, which contributed to a better understanding of the characteristics of commuters. She found, for example, that among commuters, men spend more time on the roads than do women, and this is true for all ages and religions.

A recently released study examines accessibility to work by public transportation (Suhoy and Sofer 2018). This study offers a focused perspective on patterns of use of public transport and organized transportation at the locality level. Their study finds that in the periphery, and in particular among the Arab Israeli population, there is a noteworthy low use of public transportation, and this is accompanied by high use of organized transportation provided by employers. It is important to note that the current study also presents findings on the distribution of modes of transportation by selected locality groups. This study places greater emphasis, though, on the differences between the Jewish and Arab Israeli localities as part of a broader discussion examining the differences in infrastructure quality and commuting patterns among Arab Israeli women.

Data

Information regarding the locality of residence and employment were determined using the Central Bureau of Statistics (CBS) *Labor Force Surveys* for 2012 to 2016. Distances were determined by the shortest route between city centers, as calculated by the GIS unit of the Hebrew University. Real estate data for various localities were obtained from the Madlan Company. All other data came from the CBS *Social Survey* for various years.

5 The advantage of the census data relative to *Labor Force Surveys* is the degree of accuracy for calculating distances between place of residence and workplace. *Labor Force Survey* data make it possible to estimate average distances between localities only, while census data allow for more precise identification through the use of addresses.

1. Commuting patterns

Factors such as demographic changes, internal migration, housing prices, and infrastructure changes are associated with changes in commuting patterns that have occurred over the years. Tables 1 and 2 summarize the trends related to the distribution of employment and commuting flows within various regions. In Table 1, in-commuting is defined as the percentage of workers in an area who do not reside in that area (as a percentage of all workers working in the area), and out-commuting is the percentage of the working population residing in an area and working outside of that area (as percentage of all workers residing in the area). The country and central government is divided into seven districts and then further divided into sixteen subdistricts (including Judea/Samaria).

A number of points are noteworthy:

- Due to an imbalance in employment locations, certain areas serve as employment hubs (e.g., the Tel Aviv subdistrict), while others serve as “bedroom communities” (e.g., Judea and Samaria area) (Table 1).
- The Tel Aviv subdistrict, which is characterized by high in-commuting and low out-commuting flows, has remained stable over the years (Table 1). However, the growth rate of employed persons in the Tel Aviv district was lower than in the Central region. As a result, the share of employed persons in the Tel Aviv district, and particularly in the Tel Aviv subdistrict, declined at the expense of an increase in the share of persons employed in the Central region (Table 2).
- The Jerusalem region, which is relatively far from other districts, is characterized by relatively low commuting flows in both directions. Over the years, the in-commuting and out-commuting flows have increased, in particular between 1995 and 2005 (Table 1). The main commuting movement is concentrated around the city of Jerusalem. In general, due to its political and economic importance, the number of workers coming from other localities to the capital is higher than the number of workers who work outside the city.
- Like the Jerusalem region, the Southern region and parts of the Northern region are characterized by relatively lower in-commuting and out-commuting flows than the center of the country (Table 1). This is due, in part, to the fact that these regions are geographically isolated and function largely as independent labor markets.

Table 1. Commuting patterns**Workers ages 25-64**

		Commuting patterns					
		1995		2005		2016	
		OUT	IN	OUT	IN	OUT	IN
Jerusalem	Jerusalem	13%	19%	18%	28%	20%	28%
North district	Safed	27%	33%	35%	40%	49%	48%
	Kinneret	21%	33%	41%	42%	50%	44%
	Jezreel	35%	33%	46%	52%	60%	57%
	Akko	48%	35%	50%	44%	58%	42%
	Nazereth	46%	29%	44%	27%	54%	30%
	Golan	36%	31%	51%	31%	53%	36%
Haifa	Haifa	41%	49%	45%	50%	51%	51%
	Hadera	51%	44%	52%	45%	61%	46%
Center	Sharon	47%	34%	49%	45%	58%	45%
	Petah Tikva	57%	46%	59%	59%	65%	61%
	Ramla	57%	63%	67%	70%	75%	74%
	Rehovot	56%	45%	57%	46%	67%	53%
Tel Aviv	Tel Aviv	34%	64%	37%	62%	41%	64%
	Ramat Gan	65%	63%	64%	66%	68%	65%
	Holon	68%	44%	66%	49%	73%	53%
South district	Ashkelon	31%	4%	34%	29%	46%	37%
	Beersheba	23%	24%	29%	30%	38%	31%
Judea/ Samaria	Judea/Samaria	65%	33%	64%	36%	65%	33%

Note: In-commuting is defined as the percentage of workers in an area who do not reside in that area (as a percentage of all workers working in the area), and out-commuting is the percentage of the working population residing in an area and working outside of that area (as percentage of all workers residing in the area).

Source: Haim Bleikh, Taub Center | Data: CBS, *Labor Force Survey*

Table 2. Employee distribution by subdistrict
Workers ages 25-64

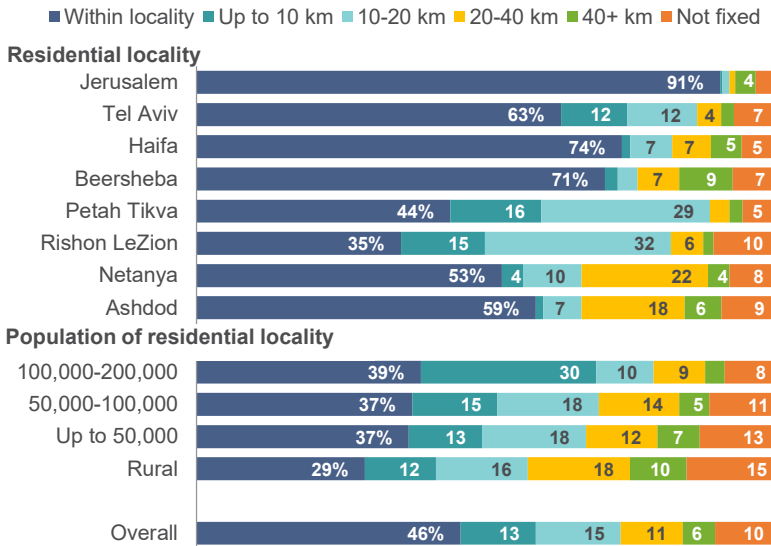
	1995	2005	2016
Jerusalem	10.9%	10.7%	11.2%
North	12.3%	12.6%	12.7%
Safed	1.6%	1.3%	1.3%
Kinneret	1.3%	1.4%	1.3%
Jezreel	3.2%	3.2%	2.9%
Akko	4.5%	4.8%	5.2%
Nazareth	1.4%	1.6%	1.5%
Golan	0.3%	0.4%	0.5%
Haifa	14.0%	12.8%	8.1%
Haifa	11.1%	9.3%	8.1%
Hadera	2.9%	3.5%	3.6%
Center	20.0%	24.4%	24.8%
Sharon	3.8%	4.9%	4.7%
Petah Tikva	7.2%	9.0%	9.2%
Ramla	3.5%	4.3%	4.6%
Rehovot	5.5%	6.2%	6.4%
Tel Aviv	29.5%	25.4%	24.7%
Tel Aviv	19.6%	16.6%	16.0%
Ramat Gan	6.2%	5.5%	5.7%
Holon	3.7%	3.3%	3.0%
South	11.9%	11.8%	12.7%
Ashkelon	5.4%	5.4%	6.1%
Beersheba	6.5%	6.4%	6.6%
Judea/Samaria	1.3%	1.9%	2.3%

Source: Haim Bleikh, Taub Center | Data: CBS, Labor Force Survey

Distance, time, and mode of transportation

Distance and travel time are among the main components of commuting. As shown in Figure 3, most workers engage in short distance commuting: 59 percent of workers travel on average no more than 10 kilometers in each direction.⁶ The major share of these individuals works and resides in the same locality. In four regional economic centers (Tel Aviv, Jerusalem, Haifa, and Beersheba), the proportion of short distance commuting is much higher than the average. On the other end, medium and longer commuting is more prevalent in large cities like Ashdod, Netanya, and among other periphery areas and smaller localities that surround major economic centers.

Figure 3. Distribution of workers by length of daily commute to work, 2015-2016
Workers ages 25-64



Source: Haim Bleikh, Taub Center | Data: CBS, Labor Force Survey

⁶ For the nearly negligible percent of workers whose locality of work is not known, the information on district or sub-district of work locality was used. Thus, in the category of distance of 40 km or more, additional workers were included — those who are definitely traveling long distances (for example, residents of the Northern region who work in the Tel Aviv and Central regions). Lack of information regarding the locality of workplace is more common among men, especially among the Arab Israeli population.

In order to obtain a more complete picture, mode of transportation and commuting time were examined in selected localities. In terms of time spent by workers on the road, the data indicate a number of patterns (Table 3). About 60 percent of workers spend no more than half an hour traveling to work. At the other end, some 10 percent of workers spend more than an hour on the road in each direction. Overall, the car is the most frequently used mode of transportation at 62 percent (including carpooling), followed by public transportation at 17 percent.⁷ In addition, 10 percent of workers commute by non-motorized means (by bicycle or by foot) and 8 percent use organized transportation from their workplace. Regional differences between means of arrival are particularly important since they reflect the combination of personal preferences with different policies and adjustments made by central government, local authorities, and employers. For example, among workers residing in Jerusalem, a relatively high share of workers (33 percent) travel between 30 and 60 minutes in each direction. This is most likely related to the size of the city and a relatively high use of public transport within the city (which may be associated with the socioeconomic characteristics of the population). In Petah Tikva, on the other hand, there is a similar rate of workers arriving to work within 30 to 60 minutes, but the proportion of passengers in private cars is much higher – and about 90 percent of travel is within a 20 kilometer range. In this case, travel time is most likely associated with higher levels of traffic congestion due to the high use of cars. The problem of multiple short-distance trips for that create traffic congestion is typical of other cities as well. In contrast, Tel Aviv is notable with a relatively high proportion of workers (68 percent) that arrive to work within a short period of time. The city council encourages and actively promotes the use of bicycles, which results in relatively high percentage of workers arriving to work on bicycles (6 percent).⁸ The decision to live near the workplace is reflected in the relatively high rate of workers who come to work by foot (11 percent). This situation may reflect different types of decision making: those who seek employment close to their home and others who choose to move to Tel Aviv or to move closer to the city to be near their place of employment.

7 Carpool estimates include individuals without a driver's license, drivers with a license who do not own a private vehicle, and drivers who do not drive to work on a regular basis.

8 The flatness of the city contributes to this as well.

Table 3. Distribution of workers by commute time to work and mode of transportation, 2014-2016

By residential district and the district population, workers ages 25-64

	Car	Bus/ Shared taxi	Train	Organized transport	Bicycle	On foot	Carpool	Up to 30 minutes	30-60 minutes	Over 60 minutes
Jerusalem	50%	26%	2%	4%	1%	10%	3%	55%	33%	10%
Tel Aviv	47%	21%	2%	1%	6%	11%	4%	68%	23%	5%
Haifa	52%	22%	3%	7%	1%	8%	3%	70%	23%	5%
Beersheba	51%	18%	1%	16%	0%	7%	3%	66%	24%	8%
Petah Tikva	63%	20%	1%	5%	2%	3%	4%	52%	37%	8%
Rishon Le'Zion	64%	22%	1%	5%	1%	3%	3%	54%	31%	10%
Netanya	56%	20%	5%	7%	1%	7%	1%	57%	33%	9%
Ashdod	46%	20%	5%	16%	0%	6%	3%	64%	22%	11%
100,000-200,000	54%	22%	3%	6%	1%	8%	3%	57%	30%	9%
50,000-100,000	60%	13%	3%	9%	1%	6%	4%	56%	30%	10%
Up to 50,000	61%	9%	2%	12%	1%	7%	5%	61%	26%	9%
Rural	70%	3%	2%	3%	4%	8%	3%	60%	24%	10%
Total	58%	15%	2%	8%	2%	8%	4%	60%	28%	9%

Note: Due to incomplete data, numbers do not sum to 100%.

Source: Haim Bleikh, Taub Center | Data: CBS, Social Survey

Factors that influence the choice in mode of transportation to work

As shown in Table 3, the use of private cars among workers increases significantly in smaller localities at the expense of public transportation usage. These figures should be viewed in the demographic context, since about 73 percent of the Arab Israeli population resides in localities with a population of less than 100,000 compared to half of the Jewish population. The remaining part of the Arab Israeli population, for the most part, reside in East Jerusalem, and another smaller part reside in mixed cities with a Jewish majority. For these reasons, and subject to the limitations of the data, the choice of means of transportation for work trips is examined for four groups: (1) Jewish localities above 50,000 residents; (2) the Arab Israeli population in mixed localities with a Jewish majority; (3) Jewish localities with fewer than 50,000 residents; (4) Arab Israeli localities. The data is presented in Table 4.

Overall, there are only slight differences in the distribution of modes of transportation between Jews in larger localities and Arab Israelis in mixed localities (Rows 1 and 2). Among Jews, the use of private cars is more prominent, while among Arab Israelis there is slightly more frequent travel by organized transportation and cooperative travel, but the differences are negligible.

The main differences between the Jewish and Arab Israeli populations are evident in the smaller localities. The attractiveness of public transportation decreases in relation to the use of private cars mainly due to increased commuting costs from the individual perspective.⁹ Jewish residents living in smaller localities still use public transportation at a higher percentage than Arab Israeli residents, but at a much lower rate than in the larger localities. Overall, Jews in these localities rely more on private cars. On the other hand, in the Arab Israeli localities, there is greater use of workplace organized transportation alongside carpooling.

These results are largely explained by the spatial configuration of suitable employment opportunities relative to the location of residence. That is, the geographic concentration of economic activities creates an uneven spatial distribution of jobs among different sectors, which then affects commuting patterns and, this, in turn, influences the choice of transportation mode. For example, jobs in the financial or industrial sectors might be concentrated in specific geographic areas, while jobs in health care and education are more widely dispersed. Thus, workers in some employment sectors might be more spatially mobile than those in other sectors.

⁹ According to Suhoy and Sofer (2018), the use of cars and organized transportation increases significantly among workers who work outside their locality of residence.

Table 4. Modes of transportation to work, 2014-2016
By sector and locality size, workers ages 25-64

	Car	Carpool	Public transport	Organized transport	Non-motorized
Jews/localities over 50,000	57%	3%	24%	7%	10%
Arab Israelis/mixed localities	51%	5%	25%	9%	11%
Jews/localities under 50,000	69%	4%	11%	8%	9%
Arab Israeli localities	60%	8%	5%	19%	9%
Jews	61%	3%	19%	7%	10%
Arab Israelis	58%	7%	9%	17%	9%

Source: Haim Bleikh, Taub Center | Data: CBS, *Social Survey*

In order to provide an in-depth picture of how personal characteristics influence the choice of means of transportation, a multivariate analysis was performed using a multinomial logistic (MNL) regression. The calculations are based on three separate equations: two equations for Jewish localities, above and below 50,000 residents, and one equation for the entire Arab Israeli population controlling for types of localities (Arab Israeli localities and mixed localities). This is done because of the relatively small size of the Arab Israeli working population in the mixed localities. Also, MNL regression coefficients are difficult to interpret as they do not provide an intuitively meaningful scale of the extent to which the variables affect the choice of a particular mode of transportation. Therefore, the results for each type of locality (as shown in Appendix Tables 1A-1D) refer to the predicted probabilities of given predictors controlling for individual characteristics such as age, gender, level of education, and occupation.

Findings should be interpreted with care due to the possibility of self-selection bias. For instance, someone with a preference for using public transport, walking, or riding a bicycle to work may choose to live in the city center of a large city, like Tel Aviv, rather than in a nearby suburb like Ramat Gan. It is not difficult to think of any number of individual, unobservable characteristics that are difficult to measure or quantify, which, nevertheless, are likely to influence an individual's choice of mode of transportation as well as other explanatory factors. Thus, any findings must be interpreted with caution with respect to direction of causality.

A number of key points stand out from the multivariate analysis:

- Gender differences are notable. The tendency of men to use private cars is higher than for women. This is largely attributable to the tendency for men to work farther from home and the higher share of men with driver's licenses (Appendix Table 2). This is true across all type of localities. Women, especially in larger cities, tend to use public transportation at higher rates, mainly because the larger cities are characterized by greater employment opportunities, allowing women to work closer to home. In the smaller cities, where the employment diversity and public transportation supply are lower, women are increasingly using private cars alongside other alternatives derived from employment characteristics, as will be explained later on.
- In the Arab Israeli localities, the predicted probability of commuting by car (as a driver or a carpool passenger) is higher among those employed in the education and social service fields. However, here, too, there are gender differences. While men in these industries tend to arrive by private vehicle (as drivers), women are more likely to use carpools. This is due, in part, to the fact that men are much more likely to work outside the locality of residence than women.
- In the manufacturing industry, which is characterized by a male majority, a high percentage of workers arrive to work by employer organized transportation. This is true for both Jews and Arab Israelis, with higher rates for Arab Israelis. Possible reasons for this increased use of organized transportation are the preponderance of shift work in this industry, the provision of transportation for workers who are geographically distant and those with limited access to public transportation, and the geographic isolation of the workplace with limited access to public transportation.¹⁰ In addition, large employers can reduce their spending on travel reimbursements to their employees by organizing it in this way. Relatively high use of organized transportation was also found for Arab Israeli men in the construction industry.

¹⁰ The proportion of shift workers in the manufacturing industry stands at 15 percent (based on responses to a question from the CBS Social Survey 2016). In addition, 42 percent of shift-work employees in the manufacturing industry arrive at work by organized transportation. This is compared with 18 percent of the non-shift-work employees.

- A look at the predicted probabilities for Jewish population groups indicates a wider use of public transportation among Haredim (ultra-Orthodox Jews) and new immigrants relative to non-Haredi Jews, and in particular among women (Appendix Figure 1). This applies to both larger and smaller localities. These figures appear to reflect socioeconomic differences, since the use of public transportation is more common among those with lower incomes. In the case of the Haredi population, the rate of driver's license holders is substantially lower relative to other population groups both among men and women (Appendix Table 2). The geographic dispersion of the Haredi population also contributes to this: 55 percent of this group live in large localities and centralized areas which naturally have more developed public transportation systems.¹¹ The data also reflect to some extent specific accommodations made for this population (such as increased frequencies on specific bus routes). As for the women immigrant population, it can be assumed that this also reflects, to a certain extent, intergenerational differences. This supposition is further reinforced by an examination of the share of women with driver's licenses (Appendix Table 2). Among older immigrant women, that is, those who lived the majority of their lives abroad, the rate of licensed drivers is significantly lower than the rate for the younger generation. These intergenerational differences among immigrant women are significantly larger in comparison to non-Haredi Jewish women.

As discussed previously, choice of transportation mode is influenced by a range of social, economic, cultural, and geographic factors. From the data presented, the low use of public transportation among the Arab Israeli population stands out. The low rate of use of public transportation in Arab Israeli localities stems mainly from the low supply of these services. The main explanation for this situation is the lack of appropriate infrastructure for public transportation. For example, the mountainous topography of some localities creates natural constraints that impede mobility. The result is a significant shortage of public transportation routes within Arab Israeli localities. For those who work outside their residential locality, the solution to this problem is through integrated bus routes that include a limited number of stops within the localities. However, these routes increase travel time and offer only partial coverage of localities (Naali-Joseph and Cohen

¹¹ This data account for the following cities: Jerusalem, Bnei Brak, Tel Aviv, Haifa, Netanya, Petah Tikva, and Ashdod. This is based on a publication of the Knesset Research and Information Center.

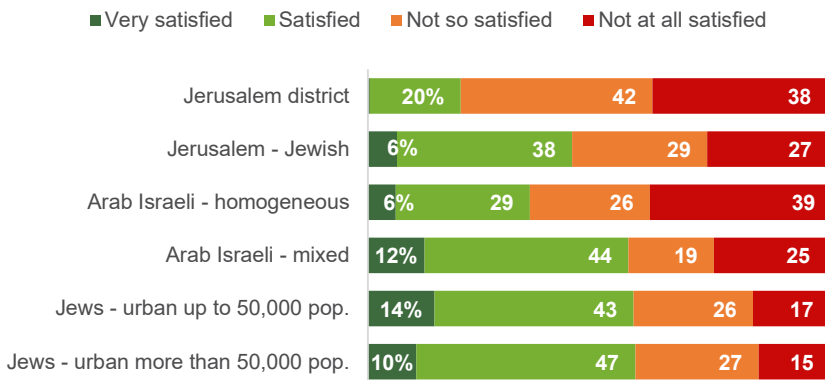
2012).¹² This results in a weakening of public transportation as a viable option.

The poor quality of transportation infrastructure in the Arab Israeli localities can be seen in responses to the CBS *Social Survey* questions on residents' satisfaction with road conditions in their residential area. Figure 4 shows that the level of satisfaction with roads is lower in Arab Israeli localities than in Jewish ones. The degree of satisfaction in East Jerusalem is the lowest followed by that in the other Arab Israeli localities. The level of satisfaction among the Jewish residents of Jerusalem is also lower compared to other Jewish localities. At the same time, on average, the level of satisfaction among Arab Israelis living in localities with a Jewish majority is higher than in Arab Israeli localities, and is no different from that in Jewish localities (not including Jerusalem). Among the residents who express the highest level of dissatisfaction are the Arab Israeli residents in all types of localities. It is possible that in the mixed cities this figure reflects, to some extent, intra-urban gaps between neighborhoods, in part due to a non-random dispersal of residents within the locality.

Figure 4. Residents' satisfaction levels with residential area roads, 2014-2016

By locality type, ages 25-64

How satisfied are you with the condition of roads and sidewalks in your area? Consider the width of the roads, sidewalks, adequate lighting, signage, and so forth.



Source: Haim Bleikh, Taub Center | Data: CBS, *Social Survey*

¹² Another reason for the reduced use of public transportation among the Arab Israeli population is related to cultural characteristics and the way in which the society perceives the use of public transportation.

Alongside these data, results that examine the extent of residents' satisfaction with the distance from the nearest bus stop to their place of residence are not surprising. Among public transportation users, 82 percent of the Jewish population is satisfied with the level of accessibility to the bus stop, compared to 63 percent of the Arab Israeli population.¹³ The sample for Arab Israeli residents of cities with a Jewish majority is not large, but their level of satisfaction is similar to that of the Jewish residents of that locality.

Overall, this picture is a direct result of a failure to deal with issues of infrastructure and transportation in the Arab Israeli sector over the past decades; finding solutions and implementing them will be long-term processes. Kasir (Kaliner) and Tzachor-Shai (2016) show that following government policy changes, there was an increase in public transportation services to Arab Israeli localities from 2009 to 2016 (from 60 percent of localities to 89 percent). However, there are other challenges related to the quality of public transport, which relate, inter alia, to transportation frequency and increases in the number of final destinations. Most recently, the government has adopted Government Resolution 922, which deals with the economic development of the Arab Israeli population. One of the decisions was to allocate at least 40 percent of total investment in local authority infrastructure to the development of road infrastructure in Arab Israeli localities.

It is important to emphasize that continuing to increase the accessibility of public transportation not only facilitates the arrival of workers to workplaces, it also helps to meet individuals' various socioeconomic and cultural needs. In other words, increasing public transportation serves to equalize accessibility for all residents.

2. Commuting, migration and housing

The standard model of Alonso (1964) represents the overall dominant view that links housing prices and workplace locations. Its framework assumes a single employment center located in a central business district. The main result of the model is the existence of a trade-off between the journey to work and housing prices. That is, the loss of utility for households living further from the main center would be "compensated" by lower housing expenditures. At the same time, not all urban or regional areas are monocentric. Therefore, the interaction between housing and labor markets is more complex, and evaluating it requires careful empirical research. The

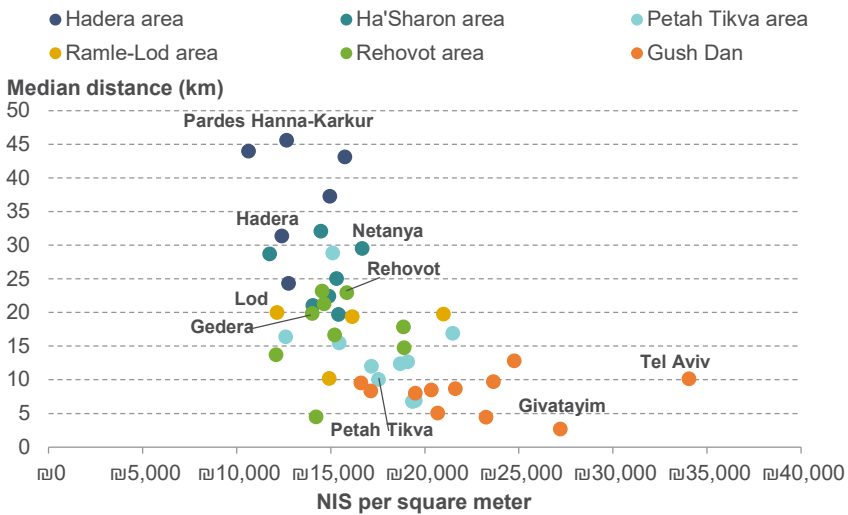
13 For those who have used public transport services in the past 12 months (based on responses to a question from the CBS *Social Survey 2015*).

current analysis examines the relationship between actual commuting distances and housing prices among the Jewish localities in the “Gedera-Hadera” area, which includes the Central and Tel Aviv regions and the Hadera subdistrict.¹⁴ Overall, based on data availability, the analysis includes 71 percent of the commuters residing in that area.

As can be seen in Figure 5, there is a negative correlation between the level of housing prices in an area (cost per square meter of housing) and the median distance commuted by residents of that area. In other words, those living in localities closer to central employment areas pay on average a higher price for housing, while workers who are forced to travel longer distances receive “compensation” in the form of cheaper housing prices.

Figure 5. The relationship between distance to workplace and housing prices

By area, median distance to workplace locality and housing price per square meter in locality, Gedera-Hadera district, workers ages 25-64



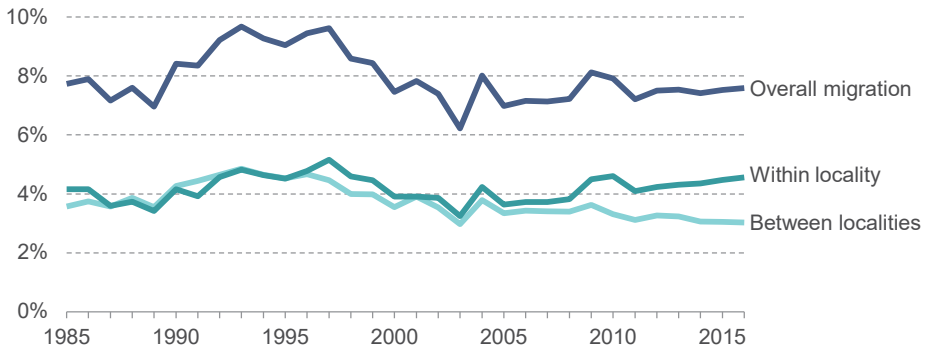
Source: Haim Bleikh, Taub Center | Data: CBS, Labor Force Survey; Madlan

14 Arab Israeli localities were not included in this analysis because the data are either non-existent or of poor quality. The Central region of the country contains the majority of urban localities. In addition, the data in urban localities are based on dwellings only, which constitute the largest part of the transactions. In the local councils, the data are based on all properties, including private homes and duplexes, due to their high proportion of total sales.

As noted, regional differences in housing prices and the spatial distribution of jobs and the resulting opportunities in the labor market may represent push and pull factors in residential decision making. Therefore, commuting can lead to a better match between workers and workplace, while allowing workers to live where they want and at a price they can afford. In the case of the “Gedera-Hadera” area, short distances between localities as well as the proximity to the Tel Aviv region and other central but smaller cities (e.g., Herzliya, Rehovot, Petah Tikva) might encourage longer commutes rather than the alternative of migration to localities that are closer. Overall, in the whole country, the rate of internal migration within and between localities ranged between 6 and 9 percent of the total population for over three decades (Figure 6).¹⁵ It is also likely that when individuals change residence, they prefer to remain relatively close to their original residence. Justman and others (1988) found a negative effect of distance on the probability to migrate; Portnov (1998) presents major motives for migration as well as motives for remaining in the residential environment. For example, the motive of maintaining community-based social and economic ties is considered to negatively affect incentives to migrate. In the last few years, about 60 percent of address changes occurred within localities, leaving migration between localities at less than 3.5 percent.

The population density of the “Gedera-Hadera” area has many socioeconomic advantages (e.g., proximity to employment, cultural centers, and leisure areas) that naturally encourage migration, especially to the Central region. For decades, the net migration to the Central region has been positive (Central Bureau of Statistics 2018). This fact, together with individual preferences to stay close to a familiar residential area, may also indicate that lower housing prices in the periphery relative to central parts of the country has a limited effect on the ability to attract residents.

15 The vast majority of migration takes place within the Jewish sector.

Figure 6. Migration rates within and between localities

Source: Haim Bleikh, Taub Center | Data: CBS

3. Commuting patterns among Arab Israeli women

Increasing the labor force participation rate of Arab Israeli women is an important challenge facing policy makers. For years, employment rates among Arab Israeli women have been rising. The government decision of 1994, adopted in 2010, in which the Israeli government set its employment targets for 2020, included an employment rate of 41 percent among Arab Israeli women in the 25-64-year-old age group. According to Fuchs and Friedman Wilson (2018), the employment rate of Arab Israeli women in the 2017 age group stands at 34 percent.

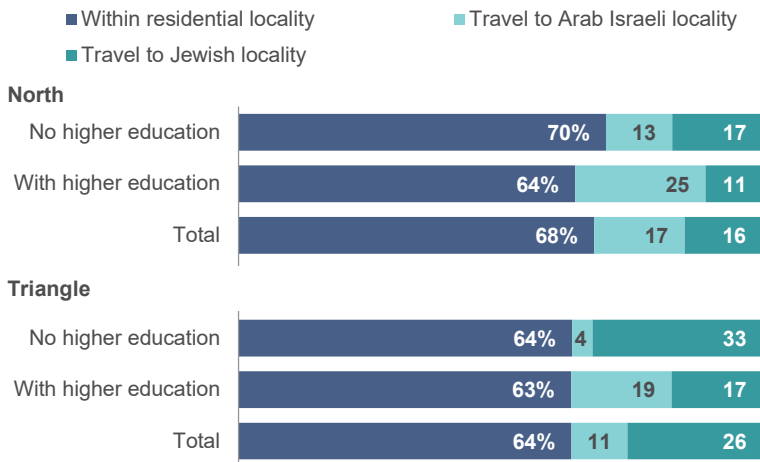
The spatial distribution of the Arab Israeli population alongside the commuting patterns of Arab Israeli women shows another aspect of the structural employment problems of this group. In particular, commuting patterns in Arab Israeli localities in two main regions are the subject of the following analysis.¹⁶ The North, which includes localities in the Northern region, and localities in the Haifa subdistrict excluding the city of Haifa, and what is commonly referred to as the “Triangle,” which includes localities in the Hadera subdistrict, and localities in the Central region. These two areas include about 74 percent of employed Arab Israeli women (about

16 The division of the regions is based on the book *Arab Society in Israel* (2018), Van Leer Institute.

50 percent in the North and 20 percent in the Triangle). Figure 7 shows commuting patterns among Arab Israeli women by locality of employment: (a) employment in the locality of residence; (b) travel to work in an Arab Israeli locality; (c) travel to work in a Jewish locality.

Figure 7. Employment localities for Arab Israeli women, 2015-2016

By education level and residential area, employed women ages 25-64



Source: Haim Bleikh, Taub Center | Data: CBS, Social Survey

A number of findings are especially noteworthy:

- In the two areas, the majority of women work in their area of residence.
- In the Triangle region, the share of women commuting to Jewish localities is higher than the share traveling to another Arab Israeli locality. In the North, the distribution is relatively equal between traveling to work to an Arab Israeli or Jewish locality.
- The tendency to work in Jewish localities is higher among women without an academic degree. This is seen especially among women from the Triangle area where a third is employed in Jewish localities.

- Women with an academic degree in the North tend to commute to Arab Israeli localities. In the Triangle, the distribution is relatively equal between traveling to work to an Arab Israeli or Jewish locality.
- Despite the small sample size, among those with academic degrees who travel to Jewish localities, there is a relatively high concentration of certified midwives and nurses, as well as teaching staff.¹⁷ Among women without higher education, there is a high share of sales workers, personal caregivers, cleaning workers, and assistants.

Table 5 adds additional information by including data on distances traveled by Arab Israeli women working outside their residential locality. In order to give a clearer picture, the table shows the distances that women travel as both an average and in percentiles. For example, 75 percent of Arab Israeli women with an academic degree in the North travel distances of up to 23 kilometers and 25 percent travel more than that distance. Data on distances for Jewish women were added to the table to provide more perspective on these regional differences.

As can be seen, the variability between groups is very high, and there are a number of points that stand out:

- The distances traveled by Arab Israeli women in the Triangle are higher than those in the Northern region. This is the case for women with and without an academic degree. In addition, women from the Triangle travel farther than Jewish women in both areas.
- For Arab Israeli women from both areas, traveling to work in Jewish localities involves traveling farther than traveling to work in Arab Israeli localities.
- The distances traveled by Arab Israeli women in the Triangle are higher relative to Jewish women in the Central region. This is the case for women with and without an academic degree. In the North, the differences are not substantial.

¹⁷ Blass (2014) also pointed to an existing but very limited phenomenon of Arab Israeli teachers working in Jewish schools.

Table 5. Distance traveled by type of locality, 2015-2016
By percentiles, women ages 25-64

	Arab Israeli women				Jewish women			
	Percentile				Percentile			
	25	50	75	Average distance	25	50	75	Average distance
Higher education, North district								
Arab Israeli locality	4	11	20	18				
Jewish locality	12	13	27	35				
Overall	5	13	23	23	10	16	29	24
Higher education, Triangle (for Jewish women: Gedera-Hadera excl. Tel Aviv)								
Arab Israeli locality	8	18	25	32				
Jewish locality	18	26	39	43				
Overall	12	21	34	37	9	16	25	19
No higher education, North district								
Arab Israeli locality	5	11	20	14				
Jewish locality	9	14	21	20				
Overall	7	15	20	18	10	11	20	18
No higher education, Triangle (for Jewish women: Gedera-Hadera excl. Tel Aviv)								
Arab Israeli locality	7	11	26	16				
Jewish locality	12	17	27	23				
Overall	11	17	27	22	8	13	19	15
North overall	7	13	21	20	10	13	24	21
Triangle overall	11	19	29	29	9	15	22	18

Source: Haim Bleikh, Taub Center | Data: CBS, Labor Force Surveys

The distance data should be interpreted carefully. In general, the North is characterized by more limited and less diversified employment opportunities (Appendix Figure 2). Geographic proximity between Arab Israeli localities to Jewish localities (e.g., Karmiel, Nahariya, and Afula) enables a relatively small share of Arab Israeli women access to employment, mainly because these are still fairly small peripheral localities. It is not clear, however, that these women can travel the “extra distance” beyond these small Jewish localities for other employment options. The largest employment hub is the Haifa area which is a considerable distance from localities in the North. Given a systemic shortage of public transportation, the possibility of traveling this far might not be considered a viable option for a significant number of women due to the increased commuting costs this would entail.

The situation of women in the Triangle is somewhat different. Apart from employment within the Arab localities, the relevant employment area is the Central region which is geographically smaller and denser in population terms. Therefore, it allows for a wide range of employment. Not surprisingly, among those who work outside their place of residence, 20 percent of women from the Triangle area are employed in large cities (over 100,000 residents), compared to only 9 percent in the North.¹⁸ Thus, despite the geographic isolation of the Triangle area relative to the Center region, many women are ready to travel farther and spend more time on the roads.¹⁹ This may be due to a combination of two push and pull factors: a long commute that is still considered reasonable due to increased employment opportunities, and a shortage of employment in the Triangle area, which is forcing many women to work in more remote places.

Another way to look at the negative impact of spatial constraints and their effect of reducing employment opportunities is by examining the data for women who have not sought employment in the previous four weeks, are not in the labor force, but are interested in working (Figure 8). As can be seen, a significant proportion of Arab Israeli women tend to stay at home to care for their household or family members. This tends to be more the case for women in the North than for those in the Triangle. The figure also indicates that this reason for not seeking employment is significantly higher among Arab Israeli women compared to Jewish women. According to Malki (2011), if these women could return to the labor market, it is quite possible that they would prefer to work closer to home. In addition, among those who

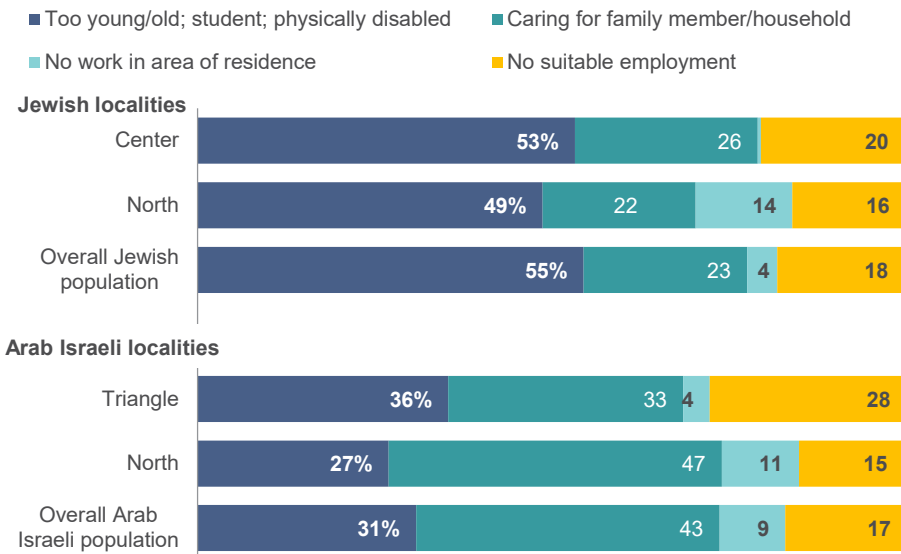
18 Based on the *Social Survey* for 2014 to 2016.

19 Among those who work outside their place of residence, women from the Triangle area tend to spend more time traveling than women from the North.

were not working and did not seek employment for at least one month, the percentage of those who mentioned a shortage of work in their residential area is even more prominent among the women in the North, both Jewish and Arab Israeli.

Figure 8. Distribution of the reasons that women have not sought employment, 2013-2016

Among women who have not sought employment in the previous 4 weeks and are not in the labor force but are willing to work, by sector and residential area, ages 20 and over



Note: No suitable employment includes issues of wages, interests, hours, experience levels, skills, and language difficulties.

Source: Haim Bleikh, Taub Center | Data: CBS, *Social Survey*

The data point to the significant role of geographic barriers facing Arab Israeli women entering the labor market. Providing more employment opportunities to this population requires linking job locations more closely with potential workers. This can be done in three ways (Kain 1968): (1) through incentives to create new employment centers closer to Arab Israeli population residential areas; (2) by closing “spatial gaps” through better transportation options; (3) by moving residences closer to workplaces through internal migration. Given the limited internal migration possibilities among Israeli Arabs, and given the fact that a large part of this population lives in the periphery, the solution is likely to focus on the first two options.

In a broader context, the employment rates of Arab Israeli women ages 25-64 from the North and Triangle regions are quite similar at around 33 percent in recent years.²⁰ This may mean that were it not for geographic barriers, employment rates in the North would likely be higher. In mixed localities (excluding East Jerusalem), where there is more access to employment, the employment rates among Arab Israeli women reach about two-thirds. Nevertheless, these rates are lower than those of Jewish women. Therefore, employment rates for women from the Triangle area and mixed cities indicate that it is important to consider that there are additional barriers that affect employment patterns of Arab Israeli women — barriers such as a lack of fluency in Hebrew and English, unofficial discrimination by employers, and a shortage of appropriate daycare solutions.²¹ Alongside these, there are social norms that influence a woman's choice to enter the labor market; these are of significance and must also be given proper weight.

Summary

This work provides a comprehensive picture of commuting characteristics in Israel. Commuting has both social costs and benefits. Commuting can lead to a better match between workers and workplaces, while allowing workers to live where they want and at a price they can afford and work in a workplace that suits them. With this, the data show that most commuting trips are over short distances. About three-quarters of workers travel within a maximum range of 20 kilometers, and the majority of trips are in private cars. This creates a burden on the infrastructure and imposes social costs. This finding may become more significant as the population of Israel grows, particularly if it continues to converge towards the already crowded Central region of the country. However, the past few years have seen increased train use for transportation to work. In the long term, this represents a significant change.

Accessibility to employment opportunities largely depends on the spatial match of employment relative to residential location. This spatial match has an important role in shaping commuting patterns, and also on the choice of transportation mode. Naturally, the use of public transportation is lower in smaller localities compared to larger ones. Also, with regards to commuting

20 The calculation of employment rates is based on Arab Israeli localities only, not including the Arab Israeli population living in Jewish localities. Calculations are by the author and based on CBS *Labor Force Survey* data.

21 For further details see Simon (2016), Kasir (Kaliner) and Yashiv (2018).

between localities the attractiveness of public transportation relative to private cars decreases mainly due to the increase in commuting costs from the individual's perspective. With this, the lowest use of public transportation among the Arab Israeli localities stands out. This is to a large degree a result of poor infrastructure, mainly caused by inadequate planning over decades as well as topographical constraints in some localities. At the same time, in many areas in the periphery there is substantial use of employer organized transportation – a result that is largely derived from a combination of both geographic concentration of economic activities and adjustments made by the employers for the mobility needs of their employees.

Regarding the commuting patterns of Arab Israeli women, this paper shows additional evidence of geographic barriers that may inhibit their entrance into the labor market. The data indicate that in the Northern region, where the largest share of the Arab Israeli population resides, the absence of suitable employment near residential areas is more prevalent than in the Triangle area. Considering that the Arab Israeli population constitutes about half of the North's population, this poses a serious challenge for the Northern region as a whole.

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Hebrew

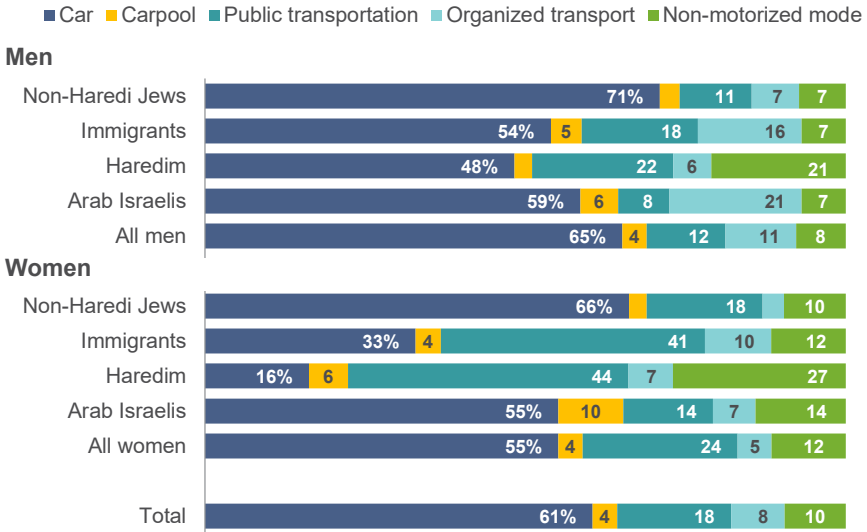
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Appendix

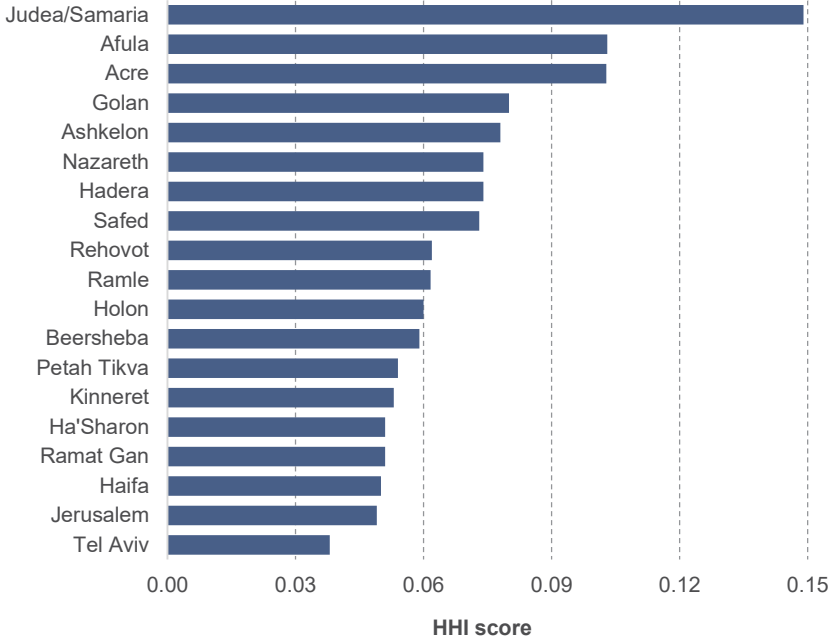
Appendix Figure 1. Modes of transportation to work, 2014-2016
By population groups, workers ages 25-64



Source: Haim Bleikh, Taub Center | Data: CBS, Social Survey

Appendix Figure 2. Employment diversity by subdistrict

HHI score



Note: Herfindahl-Hirschman Index score is between 0 and 1. The lower score is indicative of higher employment diversity. When all workers are employed in a single industry category, the value of the index is 1.

Source: Haim Bleikh, Taub Center | Data: CBS, Labor Force Survey

Appendix Table 1. The influence of worker characteristics on the choice of transportation mode

Expected probabilities of choosing a specific mode of transport controlling for explanatory variables (multinomial logistic regression)

A. Jews – localities of more than 50,000 residents

Selected variables	Car	Carpool	Public transport	Organized transport	Non-motorized
Men	61%	3%	18%	7%	10%
Women	52%	3%	29%	6%	10%
Without higher degree	52%	4%	26%	7%	11%
With higher degree	63%	2%	21%	5%	8%
Non-Haredi	64%	3%	19%	6%	8%
Immigrant	44%	4%	34%	8%	10%
Haredi	25%	5%	38%	9%	22%
Other	60%	3%	20%	7%	10%
Manufacturing	55%	4%	16%	18%	7%
Wholesale/retail/repairs	62%	4%	22%	3%	9%
Information/communication	55%	4%	30%	3%	8%
Finance/insurance	59%	2%	29%	3%	7%
Professional services/science/technology	53%	2%	28%	3%	13%
Public administration	61%	6%	26%	3%	4%
Education	54%	4%	25%	4%	13%
Health/welfare/nursing	55%	1%	29%	4%	11%

Appendix Table 1. The influence of worker characteristics on the choice of transportation mode

Expected probabilities of choosing a specific mode of transport controlling for explanatory variables (multinomial logistic regression)

B. Jews – localities of less than 50,000 residents

Selected variables	Car	Carpool	Public transport	Organized transport	Non-motorized
Men	72%	3%	9%	7%	8%
Women	65%	4%	12%	9%	10%
Without higher degree	65%	4%	12%	9%	11%
With higher degree	75%	3%	10%	6%	7%
Non-Haredi	73%	3%	9%	7%	9%
Immigrant	56%	6%	15%	11%	12%
Haredi	46%	7%	23%	10%	13%
Other	72%	4%	8%	7%	9%
Manufacturing	65%	4%	7%	18%	6%
Wholesale/retail/repairs	76%	3%	11%	3%	8%
Information/communication	66%	7%	16%	4%	7%
Professional services/science/technology	67%	4%	14%	4%	10%
Public administration	68%	4%	15%	7%	6%
Education	70%	4%	9%	4%	13%
Health/welfare/nursing	64%	2%	16%	4%	14%

Appendix Table 1. The influence of worker characteristics on the choice of transportation mode

Expected probabilities of choosing a specific mode of transport controlling for explanatory variables (multinomial logistic regression)

C. Mixed localities

Selected variables	Car	Carpool	Public transport	Organized transport	Non-motorized
Men	54%	4%	23%	9%	10%
Women	44%	8%	29%	6%	13%
Without higher degree	49%	5%	24%	9%	13%
With higher degree	55%	4%	26%	10%	6%
Non-religious	53%	5%	24%	8%	10%
Religious	49%	5%	25%	10%	11%
Other	47%	3%	32%	6%	12%
Manufacturing	56%	5%	13%	14%	11%
Construction	56%	7%	17%	18%	2%
Wholesale/retail/repairs	49%	4%	24%	6%	18%
Transportation/warehousing/post/delivery services	50%	5%	27%	10%	8%
Administration/management	52%	7%	27%	10%	5%
Education	57%	7%	25%	1%	11%
Health/welfare/nursing	53%	4%	30%	3%	10%

Appendix Table 1. The influence of worker characteristics on the choice of transportation mode

Expected probabilities of choosing a specific mode of transport controlling for explanatory variables (multinomial logistic regression)

D. Arab Israeli localities

Selected variables	Car	Carpool	Public transport	Organized transport	Non-motorized
Men	63%	6%	4%	20%	7%
Women	56%	13%	6%	15%	11%
Without higher degree	58%	8%	5%	19%	10%
With higher degree	63%	6%	5%	21%	5%
Muslim	61%	8%	5%	18%	9%
Christian	71%	4%	4%	16%	5%
Druze	49%	8%	6%	27%	9%
Non religious	62%	8%	5%	17%	8%
Religious	58%	7%	5%	21%	9%
Other	62%	6%	7%	14%	10%
Manufacturing	58%	6%	2%	25%	8%
Construction	56%	10%	3%	30%	2%
Wholesale/retail/repairs	61%	7%	5%	13%	15%
Transportation/warehousing/post/delivery services	59%	8%	6%	21%	7%
Administration/management	60%	10%	5%	20%	4%
Education	72%	11%	6%	1%	9%
Health/welfare/nursing	70%	7%	7%	7%	9%

Source for Appendix Tables 1A-1D: Haim Bleikh, Taub Center | Data: CBS, Social Survey

Appendix Table 2. Driver's license holders, 2014-2016

	Non-Haredi	Immigrant	Haredi	Arab Israeli
Men				
25-34	95%	82%	57%	90%
35-44	96%	89%	60%	92%
45-54	95%	83%	64%	87%
55-64	93%	80%	63%	81%
Women				
25-34	89%	66%	30%	65%
35-44	93%	62%	36%	58%
45-54	85%	46%	34%	46%
55-64	75%	28%	33%	21%
Overall population				
25-34	92%	74%	43%	77%
35-44	94%	74%	48%	75%
45-54	90%	63%	49%	67%
55-64	84%	52%	50%	49%

Source: Haim Bleikh, Taub Center | Data: CBS, *Social Survey*