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GENDER DIFFERENCES IN TRAVEL-TO-WORK PATTERNS AFTER A MOVE TO THE SUBURBS
An Israeli case study

1. INTRODUCTION

In the past few decades, women in Western countries have been entering the job market in increasing numbers, raising their percentage in the work force; in Israel, for example, the percentage of women in the labour force increased from 40% in 1988 and to 45.4% in 1995. Women's journey-to-work patterns have been found to differ significantly from men's. This difference has been accounted for by several facts: female employment is usually at a lower level than male, in terms of both salary and responsibility; it is often less career--oriented (and more often part-time) than men's employment; and it is considered to be secondary to women's roles as household managers (Madden, 1981). Women's journey-to-work time is also affected by their lower mobility (access to a car) (Erickson, 1977; Manning, 1978; Cichoki, 1980; Blumen and Kellerman, 1990; Blumen, 1994).

This paper treats the case of Israel. The purpose is to test the hypothesis that moving a household to the suburbs, a trend that is increasingly observed in the major metropolitan areas of Israel, results in adjustments in journey-to-work times: we hypothesise that the new journey times will be longer for men and shorter for women. This hypothesis is based on findings found in previous studies described below, on the subject of women, work and travel.

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The current study is based on a survey of 512 households that had moved some time in the previous five years to selected suburbs in the northern and southern sectors of the Tel Aviv metropolitan area (cf. figure 1).

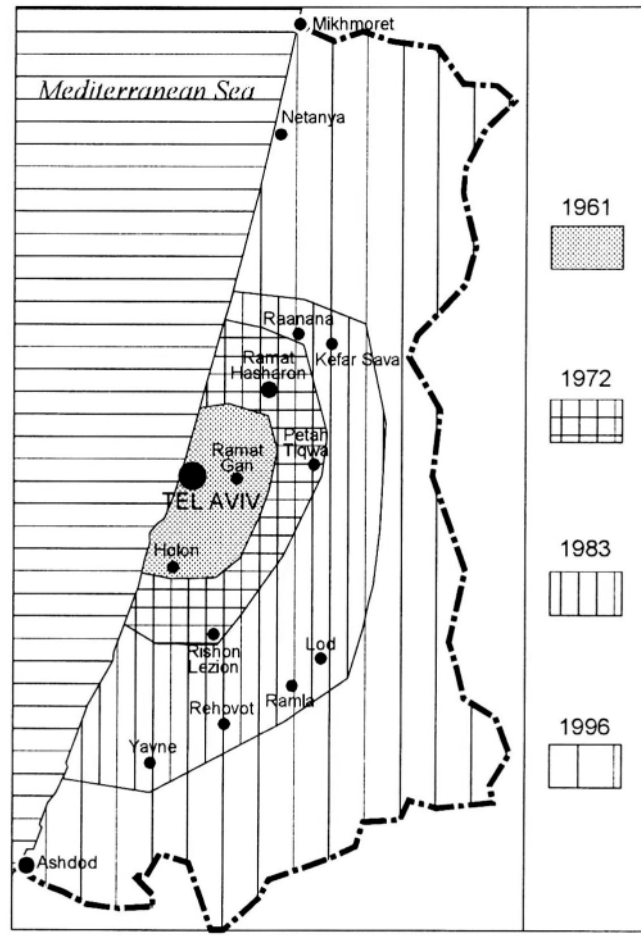

Fig. 1. The expansion of the Tel Aviv metropolitan area

Thus, it is a study of a selected upwardly-mobile population group: 97% of the households interviewed owned at least one car, compared to the national average in 1988 of approximately 65%. Although the sample is socio-economically atypical, it provides a very good case for a comparison study of men's and women's travel behaviour because of the high level of employability of women in this socio-economic group.

2. LITERATURE SURVEY

Urban spatial and transportation structure has historically reflected the needs of the principal worker – usually assumed to be a man working in the city centre (Markusen, 1980; Fox, 1983). The usual spatial arrangement consists of outlying residential suburbs and the bulk of employment activity in the urban centre. Main transportation lines usually concentrate on providing easy access between the two. The long commuting which is due in large part to road congestion from suburb to city, places a heavy burden on the commuter and forces the household to adjust its delegation of responsibility accordingly. In most cases of a two--parent family, the women compromises on her work time and manages the household, while the man adjusts to a longer work journey (Hanson and Hanson, 1981; Madden and White, 1980). Women are more likely to establish their residential location on the basis of factors other than their employment opportunities. They will then confine their job search to shorter distances/journey times in order to be able to fulfil their household roles and functions (Fava, 1984; Madden, 1981; Madden and White, 1980; Madden, 1981; Fox, 1983; Hanson and Johnston, 1985). As a result, the size of the labour market for women, or their number of employment opportunities, is more limited. Because of the constraints imposed on women by their family and social roles, combined with the difficulties in travelling to reach employment opportunities, women's employment opportunities are most often concentrated in suburban communities, where they live, or in the adjacent area (Madden and Chen Chiu, 1989).

Studies linking differences between the sexes in journey-to-work time and employment opportunity have been conducted primarily in the United States (Michelson, 1983; Gordon *et al.,* 1989), Canada (Hecht, 1974), Australia (Howe and O'Connor, 1982) and the United Kingdom (Pickup, 1981; 1985). Data on the subject in Israel were gathered in conjunction with a recent study (Degani and Shefer, 1988) on the hedonic pricing of housing characteristics, the focus being on an upwardly mobile socio-economic group.

The study was conducted in the Tel Aviv metropolitan area, an urban area that has expanded like many other large metropolitan areas: beginning in the 'core' of Tel Aviv, the metropolitan area expanded to the 'intermediate-ring' of residential suburbs, mostly characterised by apartment dwellings. This intermediate ring was surrounded by less dense, more expensive suburbs, in which single-family, detached housing has flourished over the last few decades (figure 1). It is the residents of the current 'outer-ring' who were chosen for this study. The journey-to-work patterns and other findings will be seen to corroborate many of the results obtained in previous studies, thus confirming the hypotheses postulated for this study.

3. TRADITIONAL HOUSEHOLD LOCATION THEORIES

In classical household location theory, which assumes a monocentric urban area, a household locational equilibrium is derived by balancing the journey-to-work time against housing consumption in terms of size and location. It is a 'trade-off' process by which the household's 'bid-rent curve' is determined, and its locational equilibrium derived (Alonso, 1964a; Straszheim, 1987). Given certain budget constraints and preferences (tastes), the household, in order to maximise its utility, will decide to buy either more housing at a greater distance from the urban centre or less housing closer to the centre. This household decision-making process explains the development of inner-city lower-income areas. Lower-income groups, because of their lower mobility and their wish to save commuting costs, opt for smaller, relatively more expensive housing that can be found closer to the city centre (Alonso, 1964b).

The length of the journey-to-work is determined to a large extent by the value of travel time as perceived by a household. Higher-income groups value their time more than do lower-income groups (Beesley, 1970). Thus, all other things being equal, the trade-off between commuting time/costs and housing location usually reflects the value of travel time (Watson, 1974; Miller, 1989). It is important to note that in classic household locational choice theory, one wage earner is assumed to be working in the urban centre. Only the personal tastes of the households differ. These theories do not explain some of the empirically-observed phenomena; moreover, they are often too simplistic and do not account for more important factors, like environmental amenities and the image of a neighbourhood affecting household locational decision-making processes (Stegman, 1969; Shefer, 1986).

Although the extension of the theory from one centre to multi-center urban structures has been dealt with for some time (Anas, 1983), more recent literature, especially feminist literature, has challenged some of the basic theoretical assumptions concerning the singularity of the centre as the location of employment. There has also been reference to the possible effect of multi-wage-earner households in determining household equilibrium location (White, 1977; Markusen, 1980). In fact, the influence of the household manager's shortened non-work journey trips (i.e. for household maintenance and childcare) has also been seen to have great impact on locational decisions (White, 1986). Policies based on narrow assumptions involving only the household-head journey-to-work/housing trade-off promote an urban spatial structure that supports inequality in opportunities for the 'secondary' worker in the household: in most cases, the woman.

Several studies have found that women with children in two wage-earner households commute shorter distances than do women in other social groups,

while men in two-wage households commute the farthest. This upholds the hypothesis that sex differences within households exist in journey-to-work patterns (Madden, 1977; 1981). Often, it is not worthwhile for women to travel far to work because the low pay they would receive would not adequately compensate them for the additional travel and the need that would be created to substitute goods for labour in household production (e.g. purchasing prepared food and paying for childcare facilities).

In fact, women apparently are more unwilling to commute for higher incomes, since they are less willing to spend longer hours at work (Madden, 1981). Since households with children will usually demand more housing space, and thus are more likely to choose a location further from the urban centre, we should expect to find in these locations a lower percentage of women engaged in work in the urban Central Business District (CBD).

4. DATA SOURCE AND ANALYSIS

In 1988, a sample survey was conducted of 512 households who have recently moved to the outer-ring suburbs of the Tel Aviv metropolitan area. Men's and women's responses to questions concerning journey-to-work patterns were analysed. A comparison was made of the sexes and of the communities located in the northern and southern sectors of the Tel Aviv metropolitan area. The sectorial analysis was carried out because of the well-known higher socio--economic population group residing in the northern sector of the Tel Aviv metropolitan area compared to the southern sector.

The Tel Aviv conurbation, which approaches the 2 million population mark, is considered to be the largest, most viable hub of Israel's socio-economic life. The structure of the urbanised area and the temporal changes typifying its evolution closely resembles the changes that other metropolitan areas in the Western world have been experiencing in the course of the past few decades. Data show that close to 42% of the total population of the metropolitan area in 1961 resided in the central city of Tel Aviv; in 1972, this percent declined to 33.3%; to 21.1% in 1983, and in 1993 it dropped further, to 19%. Concomitantly, the communities around the central city of Tel Aviv have been increasing very rapidly; indeed, between 1972 and 1985, some localities more than doubled in population (e.g. Raanana to the north grew by 180%, Rishon Lezion to the south by 112%).

The Tel Aviv metropolitan area has been expanding in typical urban fashion. Beginning in the 'core' of the city Tel Aviv, burgeoned to the 'first ring' of

residential suburbs: this area is mostly characterised by apartment dwellings and is surrounded by less dense, more expensive suburbs.

The second ring, which has flourished more recently, contains mostly single--family, detached housing. It is important to note that the households randomly selected for the present study were limited to those that had moved to this 'outer--ring' of the metropolitan area in the course of the previous 5 years. The average tenure in the current location was only 3.1 years. Furthermore, among the 512 households selected for interview in the sample, one-third were living within the same community in which they had lived before, thus theirs was an intra-urban move. The other two-thirds of the households sampled had made either an outward move to a new community or a move within the same ring but from a different sector. In most cases, the move entailed a change from a flat in an apartment building to a single-family or detached-type of housing. Clearly, a move within the same community considerably reduces the social and psychological costs associated with the move. Schools, friends, workplace, and shopping locations can remain the same as they were in the old place of residence.

The sample represents one of the strongest socio-economic strata in Israeli society. The average household size in the new location was 4.7 persons, whereas in the old location it was only 4.3 persons; i.e., the household size was in the process of expanding. About half of the households counted an addition of one family member since the move. The average age of the head of household was 41 years for men and 38 years for women. The level of education attained averaged 14.6 years of studies for men and 14.1 years for women. Close to half of the male heads of households had completed 15 years of studies (universities) in comparison with 27% of the women. Half of the working men were professionals, many of them self-employed.

5. FINDINGS

Table 1 shows the changes in the percentages of men and women working in the City of Tel Aviv as a result of a move to a suburban location in the outer-ring. As can be seen, the percentage of men working in the city centre remained about the same, about 42%; the percentage of women working in the central city of Tel Aviv dropped significantly, however, from 32.6% formerly 27.3% in the new location, more people living in the northern sector of the metropolitan area work in the City of Tel Aviv compared to those living in the southern sector. This observation may partially be explained by the number and type of employment centres and employment opportunities that exist in each of these sectors.

Table 1. Percentage of workers employed in Tel Aviv

Sectors	Men		Women	
	location			
	new	old	new	old
Northern Sector	45.6	46.6	32.7	32.6
Southern Sector	32.6	30.9	12.8	23.3
Total Sample	41.9	42.1	27.3	32.6

It is interesting to note that the percentage of employed women dropped from 74.6% to 68.8% following a move (table 2), the drop being greater in the southern sector. Thus it can be concluded that as a consequence of the move, some women who worked previously had to quit their jobs, partially because of the greater physical distance imposed on them by having to travel to work from the new place of residence.

Table 2. Change in the percentage of employed women resulting from move to outer suburbs

Sectors	Location	
	new	old
Northern Sector	70.8	76.1
Southern Sector	63.8	71.1
Total Sample	68.8	74.6

In order to overcome the decrease in accessibility that accompanied most of the moves, many households purchased additional cars, thus increasing their rate of car ownership. As can be seen from table 3, the percentage of households owning one car increased by about 7%, however, more interesting is the substantial increase in the percentage of households in the new location that have two cars available to them. This is a very high rate in Israel, where it is estimated that between 10–15% of the households have two or more cars. The increase in the percentage of households with two cars was most pronounced in the northern sector, where it reached 56.7% of the sample. It should be noted in this context that the level of public transport services in Israeli suburbia is very similar to that observed in other western countries. In view of the high rate of car ownership and the sprawling nature of residential development, it became uneconomical for bus companies to run an adequate level of services in these communities.

Table 3. Percentage of households with available car

Sectors	One car family		Two or more cars family	
	location			
	new	old	new	old
Northern Sector	97.5	90.0	56.7	37.5
Southern Sector	96.1	90.8	42.1	33.6
Total Sample	97.1	90.2	52.3	36.3

From table 4, it may be discerned that a significant percentage of women actually quit their jobs as a result of their move to the outer suburbs. This finding apparently combines with another: that a significant increase was registered in the percentage of women employed in their new place of residence compared to the old. The largest increase occurred in the southern sector. Here, too, one may surmise that this phenomenon is associated with the rapid growth in numerous employment centres in this part of the metropolitan area some of these centres catering to the skills and requirements of these women.

Table 4. Percentage of workers employed in their place of residence

Sectors	Men		Women	
	location			
	new	old	new	old
Northern Sector	14.0	12.4	34.6	24.3
Southern Sector	19.6	13.2	42.6	24.3
Total Sample	15.6	12.6	36.8	24.5

Additionally, it might be stressed that since households in the southern sector are not as well off as their counterparts to the north, it is conceivable that households economic conditions and needs may have constrained women to seek employment at new locations even if the jobs did not exactly fit or suit their skills or aspirations.

The move to the new location was associated with a significant change in the place of work. Again this rate of change was more pronounced for women than for men (table 5). In the southern sectors, 35.1% of the working women, compared with only 23.2% of the men, changed their places of work. It is not clear from the data collected whether the move was job-motivated or whether the move triggered a change in job location: i.e., what is the cause and what is the effect. In any case the impact of the move upon the working women appears to be more significant by far than it is on the employed males.

Table 5. Percentage of employees changing their place of work as a result of the move

Sectors	Men	Women	% Difference
Northern Sector	27.3	28.1	-0.8
Southern Sector	23.2	35.1	-11.9
Total Sample	25.6	30.1	-4.5

Women appear to travel by public transportation (bus) and to walk to work more than men do, whereas men are more likely to travel by car (table 6). These findings are consistent with other studies (Hanson and Pratt, 1988).

Table 6. Modes of travel to work

Mode of travel	Men		Women	
	location			
	new	old	new	old
Private car	81.1	80.5	76.9	64.3
Organised transport (by place of work)	8.5	9.0	1.7	3.1
Public transport	9.1	8.0	14.9	22.1
Cycling/walking	1.4	2.6	6.5	10.4

The change in location significantly increases the mobility of working women by private car, from 64.3% to 76.9%. This observation partially explains the rise in the rate of car ownership of these households, particularly that of two--car households (table 3). Concomitantly, women reduce their use of public transport, this usage dropping from 22.1% of total work trips in the former location to 14.9% in the new location. This finding is probably related to the lower level of public transport service provided in these suburban communities.

As a consequence of the move, the average travel-to-work time increased for the sample as a whole as well as in each of the sectors (table 7). The increase in travel time for the working woman was a bit smaller than that for men. This difference can be explained by the fact that a greater percentage of women in the new location travel to work by private car than did in the previous location. In the new location, moreover, a smaller percentage of women travel to work by public transport. These two observations explain the relatively small increase in women's travel-to-work time. It should be noted, however, that at the same time, the distance travelled to work by both men and women increased significantly (table 8) (Hanson and Johnston, 1985).

Table 7. Travel to work – average times
(in minutes)

Sectors	Men		Women	
	location			
	new	old	new	old
Northern Sector	30.9	25.4	23.8	19.8
Southern Sector	25.3	23.0	18.4	16.6
Total Sample	29.3	26.0	22.3	20.0

Table 8. Distance travelled to work in the new location
(in kilometres)

Sectors	Men	Women	% Difference
Northern Sector	20.0	13.3	+6.7
Southern Sector	21.8	11.2	+10.6
Total Sample	20.7	12.6	+8.1

Travel-to-work time is associated with distance as well as the level of congestion that prevails on the road network at the time of travel. To avoid congestion, some workers opt for flexible working hours, if they have the choice. Thus, an early or late departure from one's place of residence or place of work could avoid some of the delay imposed by congestion. Table 9 depicts the options available to the working population, both men and women. Although the percentage of employees with the option of 'flex-time' has increased somewhat, the rise is not very significant in magnitude for either men or women, though women do have a significant lower option in this regard. This may be due to the type of occupation women hold, like teachers in schools, tellers in banks, secretarial jobs, *etc.*, which do not lend themselves easily to flexible work arrangements.

Table 9. Workers having flexible work hours (in percentage)

Sectors	Men		Women	
	location			
	new	old	new	old
Northern Sector	54.0	52.6	28.2	26.7
Southern Sector	29.0	29.3	13.4	14.0
Total Sample	46.6	45.6	24.1	23.2

Furthermore, in order to fulfil their family and household obligations, many women need to care for their young children and perhaps chauffeur them to and from school – a most prevalent duty for a mother living in the suburbs. These duties are undertaken by women more than by men because of the social division of labour within the household (Rosenbloom, 1988; Rutherford and Wekerle, 1988; Rosenbloom and Burns, 1993). Women tend to leave the house later than men, usually after having prepared and taken the young children to child-care centres or to school. Women also tend to return home from work earlier, 57.5% of working women returned home before 2:00 p.m., in contrast to 12.3% of the men. These data confirm the findings in previous studies, in which similar differences in work hours were observed and interpreted as a confirmation of the hypothesis that working women play a dual role as wage-earners and household managers (i.e. childcare/housework responsibility). Paid employment outside the household apparently was found not to reduce significantly women's household duties (Hanson and Hanson, 1981; Fox, 1983).

6. CONCLUSIONS

The findings in this study confirm the hypothesis that working women exhibit similar work-travel and domestic responsibility patterns to those of women in other countries, particularly those in the United States (Erickson, 1977; Madden and White, 1980; Fox, 1983). Thus, women's mobility and spatial range of opportunities in Israel were found to be more limited than those of men's in that, in part, women retain the principal responsibility for household chores.

One lower mobility indicator is that the work journey for women is relatively longer in time than it is for men: although women travel 61% of the distance that men do, it takes them on average 76% of the amount of time. This is partially due to the fact that the women travel to work primarily during peak travel hours, they are less apt to work 'flex-time', and they travel more by public transport, although car access in the Israeli case is not marked by the extreme differences found elsewhere (Pickup, 1981), and in fact is nearly as high as men's after relocation. Men were found to be only 61% as likely as women to travel to work by public transportation. The public transportation system focuses mostly on axes into and out of the central city of Tel Aviv, since the primary workplace in the metropolitan area is considered to be in the Central Business District (CBD), and this system may be inadequate for those travelling within or between suburbs; in many case, it is the between-suburbs work journey that is undertaken by women.

In contrast to men, who are more likely to travel farther to work and to work full time, women have shorter journeys to work, work fewer hours, and take the principal domestic responsibility. The shorter work journey indicates that women do not fully exploit the opportunities offered to them in the spatial labour market of the metropolitan area, and thus limit their opportunities. One of ways to change the relation of women's work to the urban structure, and so increase their opportunities, is to effect spatial changes in urban employment locations and to shift transportation lines so as to allow parallel-commuting (i.e. within or between suburbs) to more opportunities. Such a policy entails relocating employment opportunities, along with providing improved, convenient and more inexpensive childcare facilities; all this requires expenditures on infrastructure, which currently are not given high priority. Although some improvement has been made in this direction, it will still take a long time before the situation is considered satisfactory. Public transportation policies are more flexible, however, and could be re-examined and adjusted to shifting demand. As seen above, a significant number of women ceased employment completely upon moving to a new location (table 2), this phenomenon reaching especially high proportions among women in the more distant Tel Aviv suburbs. Perhaps this group of women would choose to find work if an improved transportation system opened up more opportunities for them by shortening the journey-to-work time.

From the findings presented above, it is abundantly clear that the move of a household to the outer-ring suburbs affected more significantly the travel-to-work patterns of women than of men. Travel-to-work time and distance increased for both, but the increase for women was more striking than for men although travel-to-work time and distance in absolute terms are smaller for women than for men. This conclusion corroborates findings reported in earlier studies (Erickson, 1977; Madden and White, 1980; Fox, 1983; Hanson and Johnston, 1985). As a result of the move to the outer suburban ring, moreover, the rate of car ownership increased, most significantly in two-car households. This increase reduced the rate of women's travelling to work by public transport or by walking, and increased the percentage of women travelling to work by private car.

Because women are less likely to enjoy flexible work time schedules, their travel-to-work time is longer than that of men in relation to the distance travelled. This phenomenon is explained by the type of occupations women hold as well as by their continuation of pre-move household responsibilities and childcare chores. Until now, to the best of our knowledge, no study has been carried out to examine the changes in travel-to-work patterns of men and women belonging to households that had moved to the outer-ring of suburbia. In this respect, therefore, the present study is unique in general, and in the Israeli context in particular.

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