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**THE USE OF LOCAL BUS SERVICES**

**by**

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# THE USE OF LOCAL BUS SERVICES

## ABSTRACT

Patronage of local bus services has been falling since at least 1952. This report uses the National Travel Surveys of 1965, 1972/73 and 1975/76 to examine how the use of local bus services has changed since 1965. A declining proportion of bus trips are made to and from work, and an increasing proportion for shopping. Characteristics of bus users with respect to age, sex, area of residence, car ownership, income and the socio-economic group of the user's household are studied. Variation of bus use with time of day and with season is shown. It is found that demand for bus travel by adults has become less peaked, and that by 1975/76 most of the additional peak demand was due to children.

## 1. INTRODUCTION

The number of passengers carried by local stage bus services in Great Britain has been falling since at least 1952<sup>1</sup>. The changes in overall patronage have been analysed by Webster<sup>2</sup>. The present decline forms part of a longer pattern of increase and decrease in the use of public transport that has extended over the past 80 years. Figure 1 shows the estimated use of public transport in London over this period, derived mainly from data in Barker and Robbins<sup>3</sup>.

During the period when public transport use was growing, people were becoming richer and public transport was becoming available to groups who could not previously afford it. This report examines the use of local bus services since 1965 to determine whether the decline in public transport use is a general scaling down of demand, or whether specific groups of passengers are ceasing to use buses. If the market for public transport is becoming more specialised it is of value to appreciate this, so that services can be better tailored to suit future types of demand.

Some similar, but more limited, analyses were reported in reference 4 as part of a study comparing the use of dial-a-bus and conventional bus services. Throughout the report 'bus services' means scheduled stage carriage services: contract services, express, excursion, school and work services are excluded.

## 2. SOURCES OF DATA

There are three main sources of data on bus use. Since at least 1952 estimates have been made of the total number of passengers carried on local stage bus services<sup>1</sup>. These are based on returns from operators. The accuracy of these returns has undoubtedly been affected by the trend towards the use of fareboxes and the non-issue of tickets to passengers. However, they form the only nationwide data and provide a series over a long period. Reference 1 includes data separately for London Transport and for groups of operators such as the PTEs, Municipal operators, National Bus Company, Scottish Bus Group and private operators.

Since 1965 a series of National Travel Surveys has been conducted<sup>5</sup>. These are surveys of the travel by all members of households over a period of one week. In each survey between 15,000 and 30,000 people in 6,000 to 12,000 households were interviewed. These households were selected randomly from clusters spread over Great Britain, and the weeks during which travel was recorded were distributed uniformly within a twelve month period. As shown below in Table 1, three surveys have been conducted to date and a fourth is in progress. These surveys form a consistent time series, but inevitably there are minor differences of technique from year to year, so that very small variations between surveys should not be considered significant. These three National Travel Surveys form the primary source of data for this report.

**TABLE 1**

National Travel Surveys

Period of survey	Number of households with travel records complete	Number of individuals with travel records complete	Number of journey stages*	Number of bus stages
Feb 1965–Feb 1966	8650	23250	291000	89900
April 1972–March 1973	5860	16850	228000	46550
July 1975–June 1976	9670	27900	386000	63000
May 1978–April 1979	≈ 9000 <sup>†</sup>	—	—	—

Figures vary slightly between tabulations so all values are given rounded.

\* Omitting walk stages shorter than 1.6 km.

† About 12000 households have been selected, to give about 9000 completed interviews.

In each survey, travel was recorded for a complete week by each respondent. Travel was taken to consist of one-way journeys to or from a single main purpose, for which a main mode of transport was recorded. Each journey consisted of one or more trip stages, defined as a sub-division of a journey required for each change in the mode of travel or each new ticket needed\*. In general, journeys or stages travelled on foot were only recorded if they were longer than 1.6 km. In the 1972/73 and 1975/76 surveys all walk journeys or stages, however short, were recorded on the last, or seventh, day of each individual's recording period (these days were distributed uniformly through the week)\*\*. Thus data on all travel, including short walk journeys, are only available for a smaller sample than are data for vehicular travel and for travel when walking less than 1.6 km is ignored.

Finally, since 1962, transport studies have been conducted for most of the major urban areas in Britain. These provide detailed travel data for the specific urban areas, but because of differences between surveys and studies they do not provide a comprehensive description of bus travel in Britain. They have not been used in this Report.

\* The word 'stage' is used to denote separately (i) stage-carriage service bus operators and (ii) journey stages, the unit of travel used in the National Travel Survey.

\*\* In 1975/76 no short walks of less than 50 yards were recorded.

### 3. PATRONAGE TRENDS

#### 3.1 National patronage

Between 1952 and 1977 the estimated number of passenger journeys on stage services by local buses, trams and trolley-buses in Great Britain fell from 16004 million to 6833 million. This is a decline from 326 trips per person per year in 1952 to 126 trips per person per year in 1977. The change in patronage over time is shown in Figure 2. Between 1965 and 1975/76 the decline in journey numbers was 35 per cent.

#### 3.2 Variation between areas

During the decade 1965–1975 the National Travel Survey shows a fall in the bus trip rate per person per week from 3.86 in 1965 to 2.23 in 1975/76. This is a larger reduction in bus use than would be expected from the national patronage figures. Most of the discrepancy occurs between 1972 and 1975, and may possibly be due to under-reporting of bus trips in the 1975/76 NTS. In 1965 and 1972 the estimated total patronage from operators' figures exceeded that estimated from the NTS by about 9 and 5 per cent respectively, while in 1975 the difference was almost 13 per cent. Bus trips by tourists and by residents in hotels and institutions were not recorded in the NTS.

Records of trips in the National Travel Survey can be classified by the type of area in which the traveller lives. Figure 3 shows the trip rates by local bus for residents of different types of area. From the figure it can be seen that the decline in bus use has been general to all types of area, though in London the rate of decline appears to have reduced since 1972. Between 1965 and 1975/76 the reduction in trip rate for each area, except London, was between 40 and 46 per cent; for London it was 31 per cent.

The absolute level of bus use, as measured by trips per person per week, is highest in the provincial conurbations and in urban areas of over 100,000 population, and lowest in small towns and rural areas. London has a lower level of bus use than the provincial conurbations, probably because of the contribution of the underground and of British Rail suburban services to public transport in the area.

#### 3.3 Trip lengths

Webster has shown that bus journeys are increasing in length by about 1½ per cent per year<sup>2</sup>. This may in part be a result of express, excursion and contract journeys forming in total an increased proportion of all bus journeys\*: between 1952 and 1976 journeys on these services grew from 2.0 per cent to 8.8 per cent of all public road passenger transport journeys<sup>1</sup>. However, the NTS indicates that there has been an increase in the average length of local bus stages, particularly between 1972/73 and 1975/76. This is shown in Table 2.

TABLE 2  
Bus journey stage lengths (kilometres)

Survey	1965	1972/73	1975/76
London Transport central buses	4.0	4.2	5.5
Other local bus services	5.2	5.3	6.0

(NTS stage data)

\* Passenger journeys on express services were 57M in 1952, 78M in 1962 and 58M in 1976; on excursions 39M in 1952 and 36M in 1976; and on contract services 236M in 1952, 311M in 1962 and 591M in 1976<sup>1</sup>.

Stage lengths of journeys by taxi are almost identical to those for 'other local bus services'.

There is little variation in stage length with area of residence for all the urban areas from the conurbations to towns of 25000 people (Table 3). Residents of small towns and rural areas make bus trips that are about 40 per cent longer than those by residents of other areas. The apparent discrepancy between Tables 2 and 3 with regard to London occurs because not all trips on London Transport buses are by residents of London, and vice versa.

**TABLE 3**

Variation in bus journey stage length (kilometres) with respondents' home area

Type of area	1972/73	1975/76
London	4.3	5.2
Provincial conurbations	5.3	5.2
Towns 100,000–1,000,000	4.6	5.3
Towns 25,000–100,000	5.0	5.7
Small towns and rural areas	7.5	8.0
All areas	5.2	5.8

(NTS stage data)

#### 4. TRIP PURPOSES

The significance for bus services of travel to or from a particular activity can be considered in two alternative ways. Firstly, there is the proportion of all trips to or from an activity that are made by bus and thus the extent to which users of the activity are dependent on public transport. Secondly, there is the proportion of bus trips for all purposes that are made to or from a particular activity. In this and subsequent sections the variations in bus use with factors such as area or residence or car ownership are described. These descriptions should not be taken as implying that all the variation observed is directly due to the factor concerned.

##### 4.1 Trips to or from an activity

The proportion of all travel that is made by bus is falling steadily. Table 4 shows bus trips as a percentage of all vehicular trips and, for 1972/73 and 1975/76, of all trips when all walking trips are included. Walking trips have decreased slightly as a percentage of all trips, while trips by car have increased substantially, both in absolute terms and as a percentage of all trips.

Travel by bus accounts for different fractions of travel to different activities, as measured by the trip purposes recorded in the National Travel Survey. Table 5 shows this for 1972/73 and 1975/76. It can be seen that travel by bus accounts for about 1 trip in 7 to work, shopping or entertainment, but only 1 trip in 50 for travel on employer's business in the course of work.

**TABLE 4**

Bus trips as percentages of all trips

Year	1965	1972/73	1975/76
Bus trips as a percentage of all vehicular trips*	35.1	22.3	18.7
Bus trips as a percentage of vehicular trips* plus walk trips over 1.6 km	30.9	20.5	16.3
Bus trips as a percentage of all trips including short walk trips	—	13.2	9.9

(NTS stage data)

\* Vehicular trips include trips by train and by pedal cycle as well as by motor vehicles.

**TABLE 5**

Percentages of trips to reach different activities that are made by bus

Activity (trip purpose)	To/from work	In course of work	Education	Shopping	Personal business	Social	Entertainment	Total
	Year							
1972/73	20.4	4.5	18.0	13.6	10.9	11.5	16.7	13.2
1975/76	16.0	2.8	17.6	13.2	9.1	9.9	14.3	11.4

(NTS seventh day journey data: short walks included)

The proportion of travel to different activities that is provided by bus differs markedly between people from different socio-economic groups\* and between different types of area. In this report the 17 socio-economic groups are clustered into the four categories listed below in Table 6, to give two broad categories of non-manual workers (A and B) and two of manual workers (C and D). These categories are almost directly comparable to the socio-economic groupings used in the General Household Survey: the main difference is the categorisation in this report of personal service workers, who form 1 per cent of the male population, as junior non-manual workers\*\*.

Table 6 (from reference 4) shows that, except for travel to school, people from households headed by manual workers reach higher proportions of their activities by bus than do people from non-manual households. This probably reflects the higher availability of cars in non-manual households.

\* The socio-economic group of a household is defined by the Registrar General on the basis of occupation of the head of the household, and consists of 17 groups<sup>6</sup>.

\*\* A further difference is that in the GHS the two categories referred to here as A and D are each split into two sub-groups. In this report the sample sizes are insufficient to allow this finer classification to be used.



**TABLE 6**

Percentages of trips to different activities by people of different socio-economic group that are made by bus

Socio-economic group category \ Activity (trip purpose)	Work	Education	Shopping	Personal business	Social	All activities
A (Senior non-manual)	10	20	9	4	6	10
B (Junior non-manual)	19	18	12	8	9	14
C (Skilled manual)	21	15	24	13	11	16
D (Semi and unskilled manual)	28	22	19	20	16	22

(NTS 1972/73 seventh day data: short walks included)

Category A consists of SEGs 1, 2, 13 (employers, managers); 3, 4 (professional workers).

Category B consists of SEGs 5, 6 (intermediate and junior non-manual workers); 7 (personal service workers).

Category C consists of SEG 8 (foremen); 9 (skilled manual workers); 12, 14 (self-employed manual workers).

Category D consists of SEGs 10, 11 (semi and unskilled manual workers); 15 (agricultural manual workers).

Similarly, Table 7 shows that the areas in which buses provide the greatest proportion of all vehicular trips are the provincial conurbations and cities of over 100,000 population: in these areas buses are used for between one-fifth and one-half of vehicular journeys to each major activity. In rural areas the only activity for which buses provide over 15 per cent of the transport is education.

**TABLE 7**

Percentages of vehicular trips to different activities that are made by bus by residents of different areas

Type of area	To/from work	Education	Shopping and personal business	Social	Total (All activities)
London	25.7	44.0	30.8	16.7	23.2
Provincial conurbations	32.8	50.6	36.9	25.5	30.4
Towns 100,000–1,000,000	26.6	44.8	33.4	19.2	24.9
Towns 25,000–100,000	16.1	32.1	22.1	13.6	16.2
Small towns and rural areas	10.8	21.5	13.3	8.2	10.2
Total (all areas)	20.3	33.6	24.6	14.9	18.7

(NTS 1975/76 stage data)

## 4.2 Purposes of bus trips

The proportions of bus trips that are made for different purposes have been changing for at least the last 10 years. Figures 4 and 5 show how the trip rates for different purposes, and the proportion of bus trips for different purposes, changed between 1965 and 1975. The decline in the proportion of bus trips to or from work from 41 per cent to 30 per cent is striking, although this purpose still remains the largest single use for bus trips. Shopping trips have increased from 16 per cent to 24 per cent of all bus trips, though because of the overall decline in bus use the average trip rate for shopping trips by bus has remained approximately constant.

The proportion of bus trips that are made for different purposes differs between different types of area. Table 8 shows that a higher percentage of bus trips are to or from work in large cities than elsewhere.

**TABLE 8**

Variation in the percentages of bus trips for different purposes with type of area

Trip purpose Type of area	percentages of all bus trips					
	To/from work	Education	Shopping	Personal business	Social	Other
London	36.2	10.8	22.0	7.9	15.0	8.0
Provincial conurbations	31.1	11.0	21.8	7.8	18.0	10.3
Towns 100,000–1,000,000	29.9	9.3	24.7	8.5	17.5	10.1
Towns 50,000–100,000	30.5	5.6	26.1	8.5	19.7	9.6
Towns 25,000–50,000	26.4	13.9	23.7	8.5	18.6	9.0
Towns 3,000–25,000	26.7	14.9	23.1	8.6	19.1	7.8
Rural areas	27.6	18.8	24.1	8.3	14.7	6.5
All areas	30.2	11.3	23.6	8.5	17.4	9.2

(NTS 1975/76 stage data)

Reference 4 shows that, as would be expected, the purposes for which buses are used depend on the user. Thus, in 1972/73 about half of all bus journeys by children were to or from school and half of all bus journeys by men were to or from work. For women, about a third of bus trips were for shopping and a third were to or from work.

## 5. BUS USERS: EFFECTS OF AGE AND SEX

At all ages, females make more bus trips per week than do males. For each sex, people aged 16 to 20 have the highest bus trip rate, as is shown in Figure 6. Between 1965 and 1975/76 the bus trip rate fell for all age and sex groups, with the exception of retired people. By 1975/76 the bus trip rate for adults, including retired people, did not vary much with age after an age of 21.

About 60 per cent of all bus passengers are female, and the proportion of passengers that is female has increased slightly since 1965 (Figure 7). Between 1965 and 1975/76 children under 16 accounted for

17 to 18 per cent of all passengers, and young adults aged 16 to 20 for 13 to 15 per cent. During the same period the proportion of passengers who were of pensionable age increased from 11 per cent to 20 per cent of all passengers, and that of passengers aged 21 to retirement age fell from 57 per cent to 48 per cent of all passengers. Passengers of working age still accounted for almost two-thirds of all bus passengers in 1975/76.

During the period 1965 to 1975/76 the age distribution of the British population changed slightly. Those over retirement age increased from 15.5 per cent to 18.1 per cent of the NTS sample, while those aged between 21 and retirement age fell from 54.6 per cent to 52.2 per cent of the sample.

## 6. BUS USERS: EFFECTS OF SOCIO-ECONOMIC GROUP

It has already been shown in Section 4.1 that the socio-economic group of a household (SEG), or some factor related to SEG, affects the proportion of activities that people from that household use buses to reach. Table 9 shows that the average bus trip rate for people from SEG A (senior non-manual) households is about half that of people from SEG D (semi and unskilled manual) households. This variation in average trip rate is mirrored by the variation with SEG of the proportion of people who used a local bus in any one week, as measured by recording at least one bus trip in the week that their travel was surveyed, and shown in Table 10. Over all groups of people, only 42 per cent used a bus in any one week in 1972/73, and only 36 per cent in 1975/76. Presumably, higher proportions of the population would have recorded some bus use in a longer recording period, but the extent of very infrequent bus use is not known.

**TABLE 9**

Variation in the bus trip rate with socio-economic group

SEG category		(bus trips/person/week)				
		A	B	C	D	All
<i>1972/73</i>						
Men	(16+)	1.31	2.29	2.64	3.56	2.46
Women	(16+)	2.21	3.46	3.69	4.31	3.40
Children	(3-15)	1.80	2.16	2.00	2.42	2.08
Total		1.77	2.79	2.85	3.58	2.76
<i>1975/76</i>						
Men	(16+)	0.87	2.08	1.88	2.67	1.87
Women	(16+)	1.63	2.92	3.06	3.88	2.86
Children	(3-15)	1.36	1.75	1.89	1.99	1.77
Total		1.28	2.40	2.31	2.99	2.26

(NTS stage data)

**TABLE 10**

Percentage of people using a bus in any one week

SEG category	A	B	C	D	Total
		<i>1972/73</i>			
Men (16+)	20	30	34	43	32.2
Women (16+)	38	54	55	63	51.3
Children (3-15)	33	39	39	47	39.2
Total	30	43	43	52	41.4
		<i>1975/76</i>			
Men (16+)	16	28	26	37	26.7
Women (16+)	32	48	49	57	46.5
Children (3-15)	26	34	36	37	33.7
Total	24	38	37	45	36.1

(NTS stage data)

It appears that the variation in average trip rate shown in Table 9 is largely the result of differing proportions of each group of people using buses at all. Table 11 shows the average bus trip rate for those people who made at least one bus trip during the survey week. Of the 18 per cent reduction in trip rate between 1972/73 and 1975/76 shown in Table 9, only 6 per cent is due to a reduced trip rate by those recording bus trips. Similarly, the 4:1 variation in trip rates between user groups in Table 9 is caused more by variation in the proportion of the group recording any bus use than by variation in the average trip rate for those recording any bus trips. (In Table 11 the standard error of the average trip rate for a single user group is about 0.4 trips/week.)

**TABLE 11**

Average bus trip rates for people recording any bus use in the NTS

(bus trips/person/week)

SEG category	A	B	C	D	Total
		<i>1972/73</i>			
Men (16+)	6.55	7.66	7.74	8.26	7.64
Women (16+)	5.77	6.42	6.67	6.85	6.63
Children (3-15)	5.54	5.51	5.10	5.17	5.31
Total	5.90	6.56	6.61	6.94	6.67
		<i>1975/76</i>			
Men (16+)	5.61	7.30	7.12	7.14	7.00
Women (16+)	5.14	6.10	6.28	6.83	6.15
Children (3-15)	5.21	4.97	5.24	5.45	5.25
Total	5.25	6.20	6.24	6.69	6.26

(NTS stage data)

Although the average bus trip rate for people who recorded any bus trips was 5 to 7 bus trips per week, the distribution of trip numbers was markedly skew (Figure 8). The majority of men, children and of all people did not record a single bus trip during the survey week (not shown in Figure 8). Of those who recorded bus use, the most frequent number of trips was 1 or 2 per week. Men and children had a secondary peak of bus use at 9 to 12 trips per week, indicating that buses were used for daily trips, probably to work or school. These features were shown by data from both the 1972/73 and 1975/76 surveys; the results from the latter were rather more skewed than those from the former.

The proportion of people who used a bus at least once in the week that their travel was surveyed varies considerably with the type of area in which they live. Table 12 shows the percentage of people recording one or more bus trips, and Table 13 the percentage of people recording seven or more trips, in the 1975/76 National Travel Survey. Both tables show the considerable variation in bus use between areas. The largest proportion of people using buses in the week their travel was surveyed were those living in the provincial conurbations and large towns. For both men and women separately, about twice the proportion of people from SEG category D households had used buses as had people from SEG category A households. There was less variation for children. A higher proportion of women had used buses than had men or children.

Of the people who used a bus at all, about a third used buses regularly, in that they made seven or more bus trips in the week their travel was surveyed. In 1972/73 almost two-fifths of those who used a bus made seven or more trips in the survey week.

**TABLE 12**

Percentage of people recording at least 1 bus trip in week travel surveyed

		<i>Men (16+)</i>					<i>Women (16+)</i>				
SEG category		A	B	C	D	All men	A	B	C	D	All women
Type of area											
London		22	40	32	51	34	35	56	51	64	51
Provincial conurbations		26	41	40	49	39	42	62	61	61	58
Towns 100,000–1,000,000		18	35	34	47	34	43	55	63	67	58
Towns 25,000–100,000		13	24	26	36	25	32	48	48	58	46
Towns 3,000–25,000		13	15	20	26	19	22	35	38	45	35
Rural areas		8	18	11	21	14	20	29	30	43	30
All areas		16	29	26	37	27	32	48	49	57	47

		<i>Children (3–15)</i>					<i>All people</i>				
SEG category		A	B	C	D	All children	A	B	C	D	All people
Type of area											
London		36	39	37	18	35	30	47	40	50	41
Provincial conurbations		34	45	48	36	42	34	52	49	51	47
Towns 100,000–1,000,000		30	44	45	48	42	30	46	47	55	45
Towns 25,000–100,000		20	35	34	42	33	22	37	36	46	35
Towns 3,000–25,000		23	27	32	32	29	19	27	29	35	28
Rural areas		20	19	19	20	20	15	23	20	29	21
All areas		26	35	36	37	34	24	39	37	45	36

(NTS 1975/76 stage data)

**TABLE 13**

Percentage of people recording at least 7 bus trips in week travel surveyed

<i>Men (16+)</i>						<i>Women (16+)</i>				
SEG category	A	B	C	D	All men	A	B	C	D	All women
Type of area										
London	5	20	14	19	14	7	22	19	29	18
Provincial conurbations	11	21	20	28	20	14	26	28	26	25
Towns 100,000–1,000,000	6	14	13	21	13	13	18	21	28	20
Towns 25,000–100,000	2	10	7	11	7	6	14	11	19	12
Towns 3,000–25,000	3	6	5	5	5	2	8	3	13	8
Rural areas	2	6	2	5	3	5	6	5	10	6
All areas	4	12	10	14	10	7	16	15	21	15

<i>Children (3–15)</i>						<i>All people</i>				
SEG category	A	B	C	D	All children	A	B	C	D	All people
Type of area										
London	10	10	14	5	11	7	19	16	20	15
Provincial conurbations	9	9	11	9	10	12	20	20	22	19
Towns 100,000–1,000,000	10	9	10	11	10	10	15	15	21	15
Towns 25,000–100,000	4	11	6	5	6	4	12	8	13	9
Towns 3,000–25,000	4	6	8	7	7	3	7	7	8	7
Rural areas	7	7	3	4	5	4	6	3	7	5
All areas	7	8	8	8	8	6	13	11	15	11

(NTS 1975/76 stage data)

**7. BUS USERS: EFFECTS OF CAR OWNERSHIP**

Webster<sup>2</sup>, Bly and Oldfield<sup>7</sup>, and Jones and Tanner<sup>8</sup> have shown that car ownership leads to a reduction in bus use. Reference 4 deduced that in general buses were used, not from choice, but as a best alternative when a car was not available. Brog<sup>9</sup> has also shown, for travel in a German urban area, that there is relatively little free choice between bus and car use.

Figure 9 shows the variation in bus use with age, sex and car ownership, based on stage data from the 1975/76 NTS. It can be seen that, for each of the seven groups of people, bus use falls with increasing car ownership. This is particularly the case for men aged 21 to 64. For each of the three adult age groups (16–20, 21–59/64, 60+/65+) women use buses more than men do at each level of car ownership, though for people aged 21 or over in no-car households the difference is very small. The use of buses by women in car owning households probably reflects the lower proportion of women than men that hold driving licences, and the well-known tendency of the male employee in a 1-car household to use the car for the journey to and from work. However, the data available to this study do not allow analysis on the basis of car availability to individuals, as opposed to membership of a household with a given number of cars.

Variation in bus use by people from households with different levels of car ownership may in fact reflect differences of travel related to the socio-economic group (SEG) of the household, as SEG and car ownership are correlated. To examine this possibility, the effects of household car ownership and household SEG have been separated. Figure 10 shows the bus trip rate for people from households of different SEG and with different levels of car ownership. The variations with SEG are not statistically significant for children, but they are significant for men in no-car households, for women at all levels of car ownership, and for pensioners in car owning households. Where the variations are significant they indicate a tendency for greater bus use by members of manual than non-manual households, at the same level of car ownership. This may well reflect the greater likelihood of manual households living in areas of higher density housing, which are better served by public transport.

Changes in bus use between 1972/73 and 1975/76 are shown in Table 14. While the overall bus trip rate declined 18 per cent in that period, the rates for particular groups of people, and for people with different levels of car ownership, varied by between +13 and -36 per cent. It will be noted that in Table 14 the variation for several complete groups (adults 16-20, women 21-59, and all groups, for example) is greater than the variations for any of the car ownership sub-groups. The reason for this is that the variation for the complete group includes that due to people moving between car ownership sub-groups. This effect could cause the overall trip rate to fall while the rate for each group separately remained constant or even rose.

The sub-groups in Table 14 show no particular pattern of variation in bus use, except that decline among pensioners is less than that for the other groups. The difference between the 0-car and 1-car sub-groups of the whole population is small, and is similar to the standard error of the estimated variation over the period. Changes in bus use by people from 2+ car households cannot be taken as significant, because of the sizes of the standard errors for these groups. Stratifying the sub-groups in Table 14 by the socio-economic group of the head of the household does not clarify the picture.

Just as the bus trip rate drops with increasing car ownership, so does the proportion of trips made by bus. Table 15 shows the percentage of trips made by men, women and children from households with different levels of car ownership. The reduction in bus use and in walking as car ownership rises is striking. Thus, car use is not a direct substitute for bus use: it substitutes for walk trips as well, and the proportion of trips made by vehicular modes increases as car ownership increases.

Similarly, it can be seen that while lifts in non-household cars are most frequent for adults in non-car-owning households, they compensate only slightly for the trips that would have been made by car if a car had been available. For example, a man in a non-car-owning household makes 7 per cent of his journey stages by car, compared to 54 per cent for a man in a one-car household: for women the comparable figures are 7 per cent and 34 per cent.

**TABLE 14**

Changes in bus trip rates, 1972/73 to 1975/76

Household car ownership	Bus trips/week 1972/73	Bus trips/week 1975/76	Trip rate change, per cent	Estimated standard error of average trip rate change, per cent
	<i>Children, 3-15</i>			
0	2.94	2.49	-15	5
1	1.64	1.54	- 6	6
2+	1.20	1.05	-12	13
All	2.08	1.77	-15	3
	<i>Adults, 16-20</i>			
0	7.50	6.54	-13	5
1	5.27	4.57	-13	6
2+	2.88	2.90	+ 1	15
All	5.81	4.87	-16	3
	<i>Men, 21-64</i>			
0	5.16	4.24	-18	3
1	0.86	0.55	-36	5
2+	0.29	0.28	- 3	21
All	2.25	1.59	-29	3
	<i>Women, 21-59</i>			
0	5.35	4.52	-16	3
1	2.33	1.90	-18	4
2+	1.03	0.87	-16	12
All	3.32	2.59	-22	2
	<i>People of pensionable age</i>			
0	2.90	3.07	+ 6	5
1	1.30	1.23	- 5	11
2+	0.76	0.86	+13	41
All	2.45	2.44	- 1	4
	<i>All groups</i>			
0	4.25	3.72	-12	2
1	1.78	1.50	-16	3
2+	0.99	0.94	- 5	7
All	2.76	2.26	-18	1



**TABLE 15**

Percentage of trip stages made by each mode

*Men (16+)*

Household cars	Stage bus	Walk	Car driver	Passenger HH car	Passenger Non-HH car	Other	Trips/person/day	
							All modes	Bus
0	17	60	1*	0	6	17	3.96	0.67
1	4	33	49	2	3	9	4.63	0.17
2	1	27	59*	3	3	8	4.74	0.05
3+	2	24	58*	3	3	10	4.8	0.1
All car owning	3	32	51	2	3	9	4.65	0.15
Total	8	42	33	1	4	12	4.38	0.36

\* Includes 1 per cent driving non-household car

*Women (16+)*

Household cars	Stage bus	Walk	Car driver	Passenger HH car	Passenger Non-HH car	Other	Trips/person/day	
							All modes	Bus
0	19	69	0	0	7	5	3.33	0.62
1	9	52	12	17	5	5	3.89	0.36
2	5	36	37	14	5	3	4.21	0.22
3+	4	39	30	13	9	5	4.3	0.2
All car owning	9	49	17	17	5	4	3.95	0.33
Total	13	58	9	9	6	5	3.65	0.47

*Children (3-15)*

Household cars	Stage bus	Walk	Car driver	Passenger HH car	Passenger Non-HH car	Other	Trips/person/day	
							All modes	Bus
0	13	77	0	0	4	6	3.19	0.41
1	6	61	0	19	4	10	3.49	0.22
2	6	49	0	29	4	12	3.33	0.20
3+	0	43	0	36	7	14	3.9	0.0
All car owning	6	59	0	21	4	11	3.47	0.22
Total	9	66	0	13	4	8	3.37	0.29

(NTS 1972/73 seventh day stage data – short walks included)

## 8. BUS USERS: EFFECTS OF INCOME

Webster<sup>2</sup> has shown that, at any level of car ownership, bus use increases with rising income up to an income level of at least £30 per household member per week (1972/73 values) (Figure 11). At any level of income the use of buses is lower in households having 1 car than in those having none, and is lower still in 2-car households. The combination of these two effects gives the overall result that raising income leads to an initial increase in the use of buses, but that a further rise leads to a fall in bus use, as the rise in car ownership outweighs the income effect.

## 9. BUS USE: VARIATION WITH TIME OF DAY AND SEASON\*

It is well known that demand for bus services is greatest during the peak periods of 0700 to 0900 in the morning and 1600 to 1800 in the afternoon; typically half of all the passengers using a bus system will do so during these four hours. An analysis of bus trips in the National Travel Surveys shows that between 1966<sup>†</sup> and 1975/76 the demand for bus services became a little less peaked, and the nature of demand during the day changed markedly. Figure 12 shows the distribution through the day of the total number of passengers carried. (Figures 12 and 13 both show data for all seven days of the week combined.) From Figure 12 it can be seen that the proportion of passengers carried between the peaks has increased, the heights of the peaks fallen a little, and that both morning and evening peaks have become earlier by at least 30 minutes.

Figure 13 shows the variation in demand during the day separately for adults up to pensionable age, people of pensionable age, and children. Demand by adults has become less peaked, and between-peaks demand by pensioners has increased considerably as a fraction of total demand. Demand by children has remained peaked in the morning and become more peaked in the evening. Overall, the demand by adults and pensioners together had, by 1975/76, become only slightly peaked between 0700 and 1800, and most of the additional demand in the morning and evening peaks was due to children.

There is a small, but statistically significant, seasonal variation in the overall bus use by residents of all types of area (Figure 14). However, the pattern of variation is not the same in different areas, as is also shown in Figure 14. In the largest cities bus use is reduced in the holiday months of April and August, while in towns of less than 100,000 people and rural areas the reverse is the case.

## 10. DISCUSSION

The implications for the bus industry of some of the findings of this report are considerable. For it is clear that the market for bus travel is not only declining, but also changing. Firstly, travel to and from work, which caused over 40 per cent of all bus journeys in 1965, is being lost more rapidly than is travel for other purposes. It is likely that this is a result of the continuing decentralisation of work places, the spread of suburban residential areas, and increasing car ownership. It is possible that by 1980 shopping will have replaced work as the purpose for which most bus trips are made. This may have implications on the routes operated and, in the longer term, on the design of buses to provide space for the carriage of purchases.

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\* This section is to a considerable extent based on an unpublished Department of Transport paper by G J Hills, whose contribution is acknowledged.

† A small additional survey was conducted in 1966, from which data for this section is taken.

Secondly, concessionary fares schemes to encourage retired people to use buses off-peak have succeeded, and the demand for bus travel by all people aged 16 and over (including pensioners) only shows small peaks (of the order of 30 per cent increase in demand) in the morning and evening relative to the between-peaks period. The majority of extra demand in the peaks is caused by children. Thus efforts to spread the peaks should be directed as much towards schools as towards employers. Furthermore, the size of the secondary school population is expected to drop by more than 25 per cent between 1976 and 1991: this will almost certainly affect demand for bus travel at peak times.

The report shows clearly that bus use is greater among groups who are generally regarded as disadvantaged in one way or another. In general, it appears to be those who do not have a car available to them that use buses, except in cities where traffic or parking difficulties make the use of a car unattractive. In addition, the proportion of bus passengers paying reduced fares or no fares is increasing. Taken together, these trends do suggest that bus services are increasingly developing welfare attributes that they did not have in the 1950s.

No finding in this study contradicts the conclusion, in references 4 and 9, that buses and cars are not serving the same market at one point in time. Travel on foot, on bicycle and by bus is one market, within which modal split can be influenced by fares and service level. Travel by car, and possibly on foot by car owners, forms a separate market which is largely unaffected by changes to bus services. However, when a person obtains the use of a car he transfers from the bus market to the car market for the great majority of his travel, and over a period of years the market for car travel has grown at the expense of that for bus travel.

## 11. CONCLUSIONS

The market for bus travel changed significantly between 1965 and 1975/76, in addition to declining by some 35 per cent. Journeys to and from work fell from 41 per cent of bus trips in 1965 to 30 per cent in 1975/76, while journeys to and from shopping increased from 16 to 24 per cent of all bus trips. Pensioners increased from 11 to 20 per cent of all bus passengers; adults below pensionable age but aged over 21 remained the largest single group of passengers, but declined from 57 to 48 per cent of all passengers. In 1975/76 bus travel accounted for 10 per cent of all trips and 19 per cent of all vehicular trips.

Bus use is highest, in terms of bus trips per week, among people aged 16 to 21. It is higher among females than males for all age groups. It is higher for people from manual than non-manual workers households, and is particularly high for residents of the larger provincial cities.

Variation in bus use between different groups of people primarily reflects the proportion of the group that uses buses at all. In 1975/76 only 36 per cent of respondents to the National Travel Survey made any bus trips in the week their travel was surveyed. The average bus trip rate, for those who recorded any bus trips, was reasonably uniform, 5 to 7 trips per week, though the distribution for individuals was skewed and the most frequent number of trips (after zero) was 1 or 2 per week.

The demand for bus services by people aged 16 and over has become much less peaked, and the peaks have become earlier by 30–45 minutes. By 1975/76 most of the extra demand in the peaks was due to children.

The conclusions noted above are a somewhat selective summary of the results of this study: many other effects have been identified; and are described in the main text of the report.

## 12. ACKNOWLEDGEMENTS

The work described in this report was carried out in the Access and Mobility Division of the Transport Operations Department of TRRL. The author would like to thank G J Hill of the Department of Transport for his analysis of the variation of bus use by time of day, from which the analysis in this report was developed. The author would also like to thank the staff of Statistics Division, Department of Transport, for the production of the NTS tabulations without which this report could not have been written, and Mrs J Grayson and Mr S Divey of TRRL for analysis of some of the NTS data.

## 13. REFERENCES

1. CENTRAL STATISTICAL OFFICE. Annual Abstracts of Statistics 1952–1977. London, (H M Stationery Office).
2. WEBSTER, F V. Urban passenger transport: some trends and prospects. *Department of the Environment Department of Transport, TRRL Report LR 771*. Crowthorne, 1977 (Transport and Road Research Laboratory).
3. BARKER, T C and M ROBBINS. A history of London Transport. Volume one – the nineteenth century. London, 1963 (George Allen and Unwin Ltd).
4. MITCHELL, C G B. Some social aspects of public passenger transport. *Department of the Environment Department of Transport, TRRL Report SR 278*. Crowthorne, 1977 (Transport and Road Research Laboratory).
5. DEPARTMENT OF THE ENVIRONMENT. National Travel Survey 1972/73. A comparison of 1965 and 1972/73 surveys. London, 1976 (H M Stationery Office).
6. CENTRAL STATISTICAL OFFICE. Social commentary: social class. *Social Trends No. 6*. London, 1975 (H M Stationery Office).
7. BLY, P H and R H OLDFIELD. The effect of car ownership and income on bus travel. *Traffic Engineering and Control*, 1978, 19 (8), pp 392–6.
8. JONES, S R and J C TANNER. Car ownership and public transport. *Department of the Environment Department of Transport, TRRL Report SR 464*. Crowthorne, 1979 (Transport and Road Research Laboratory).
9. BROG, W, D HEUWINKEL and K-H NEUMANN. Psychological determinants of user behaviour. *ECMT Round Table 34*, Paris, 1977 (European Conference of Ministers of Transport).

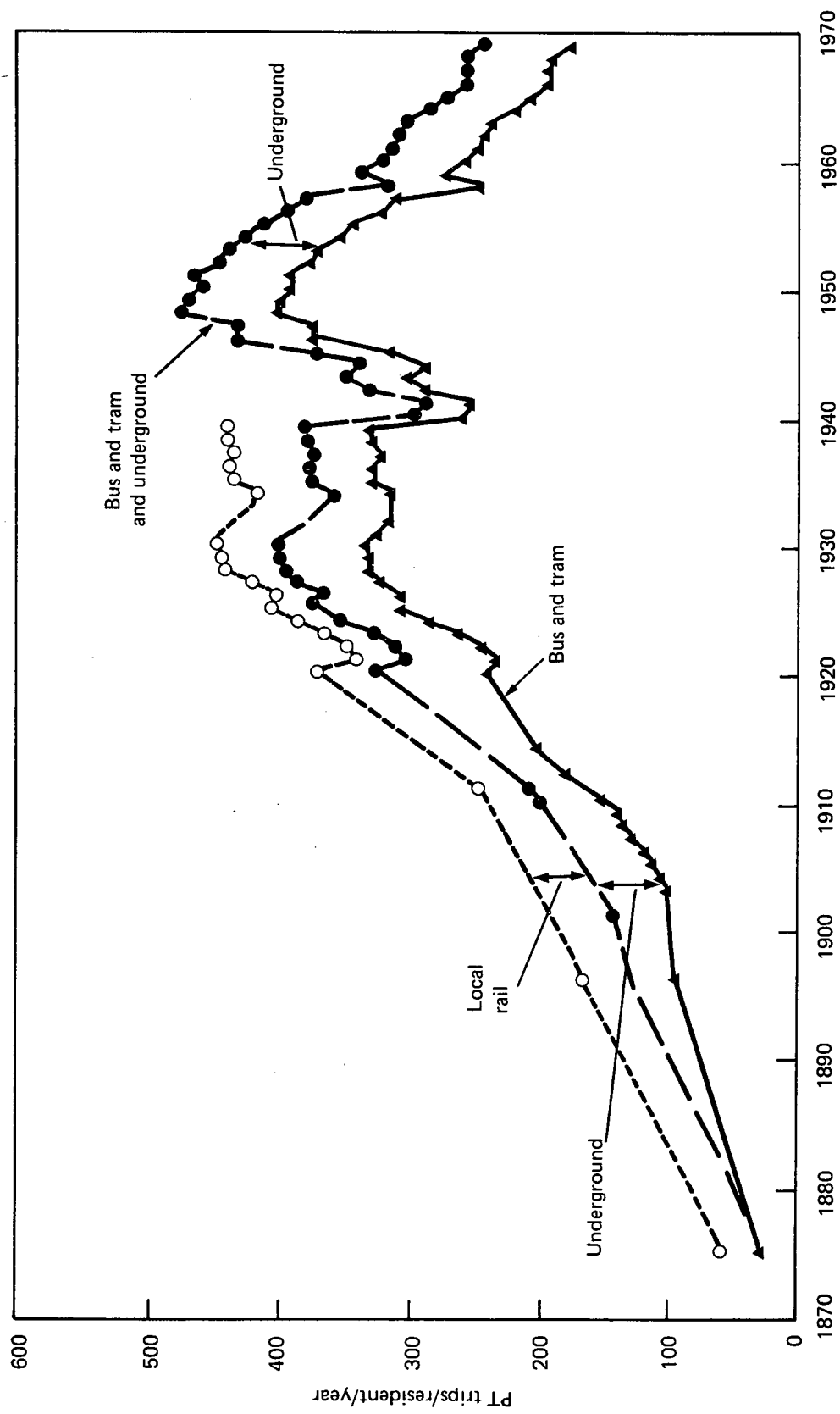
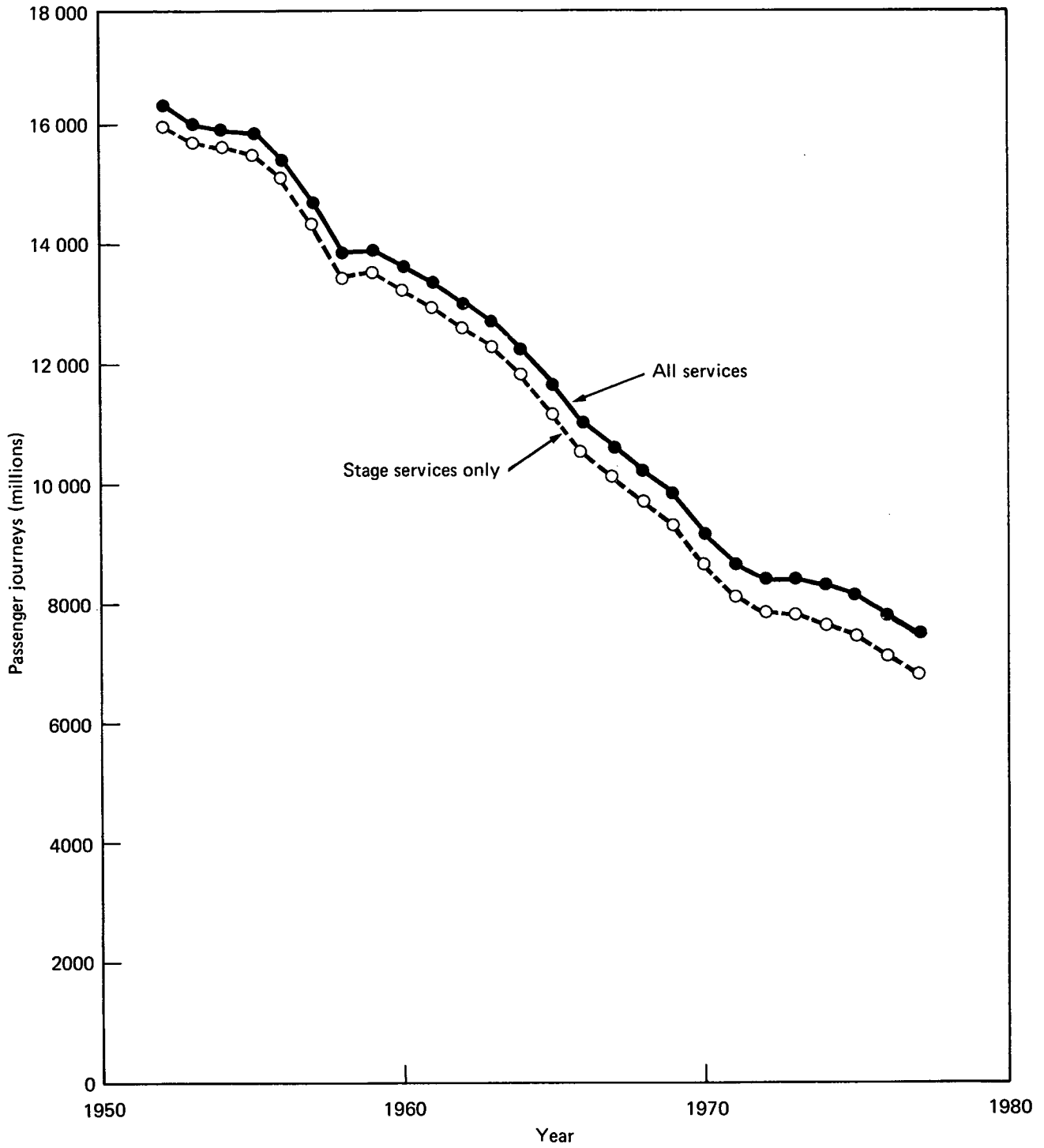
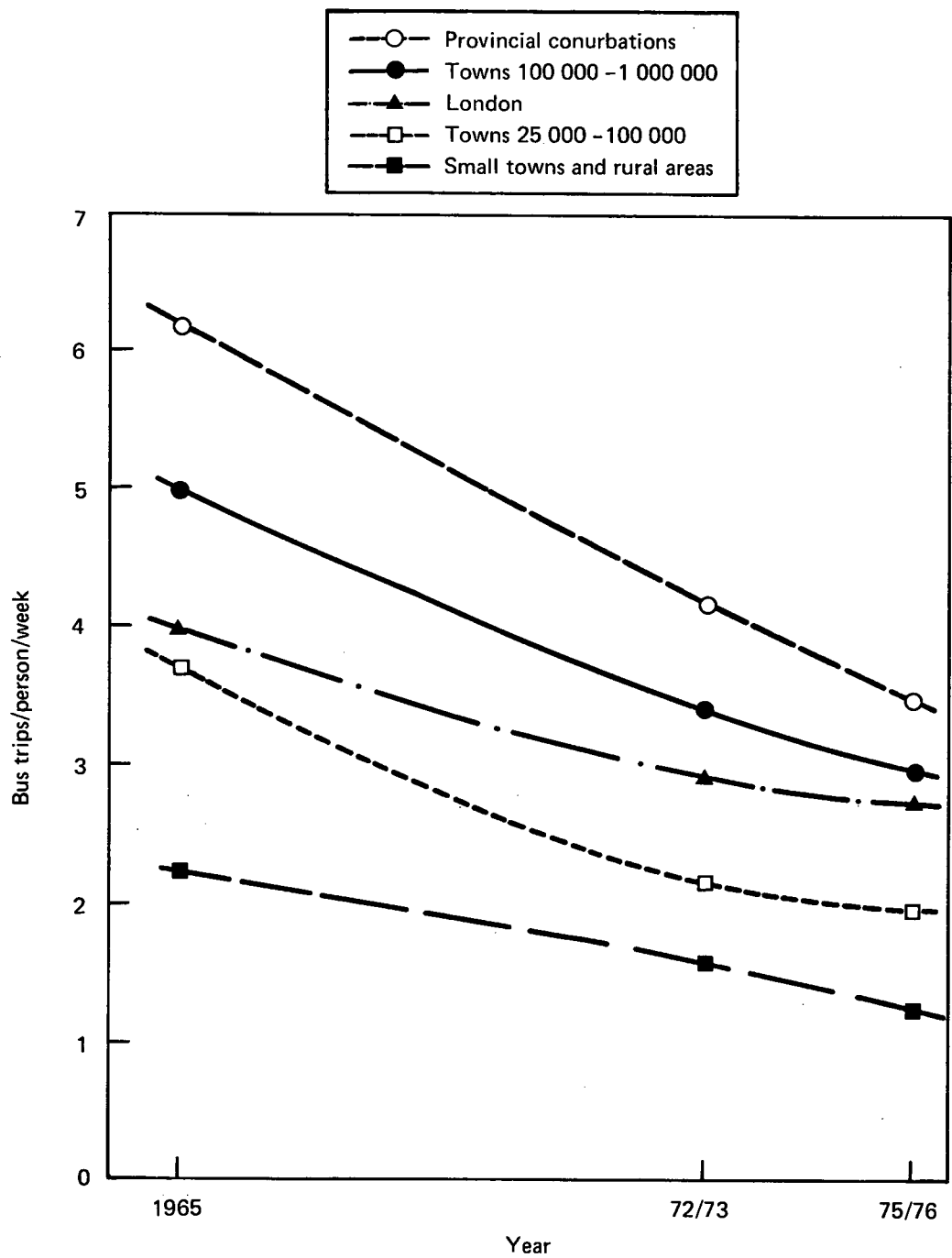


Fig. 1 USE OF PUBLIC TRANSPORT (EXCLUDING TAXIS) IN LONDON  
 (Estimated from references 1 and 3)



**Fig. 2 TOTAL NUMBER OF PUBLIC ROAD TRANSPORT PASSENGER JOURNEYS IN GREAT BRITAIN**



**Fig. 3 BUS TRIP RATE BY RESIDENTS OF VARIOUS TYPES OF AREA (NTS stage data)**

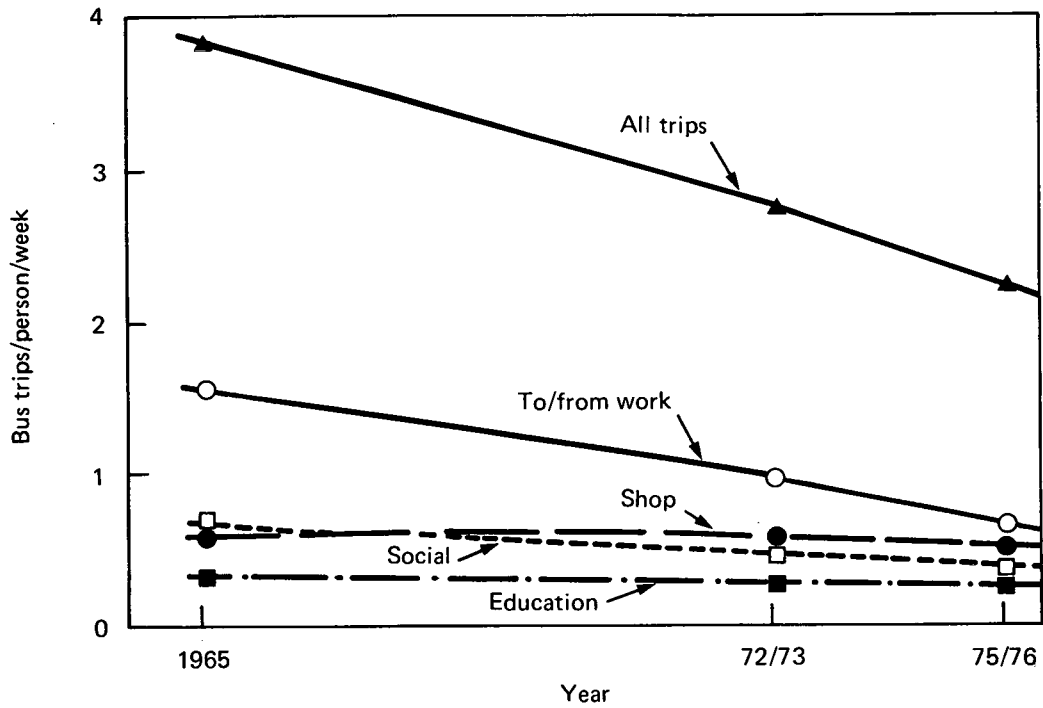


Fig. 4 BUS TRIP RATE TO VARIOUS ACTIVITIES (NTS data)

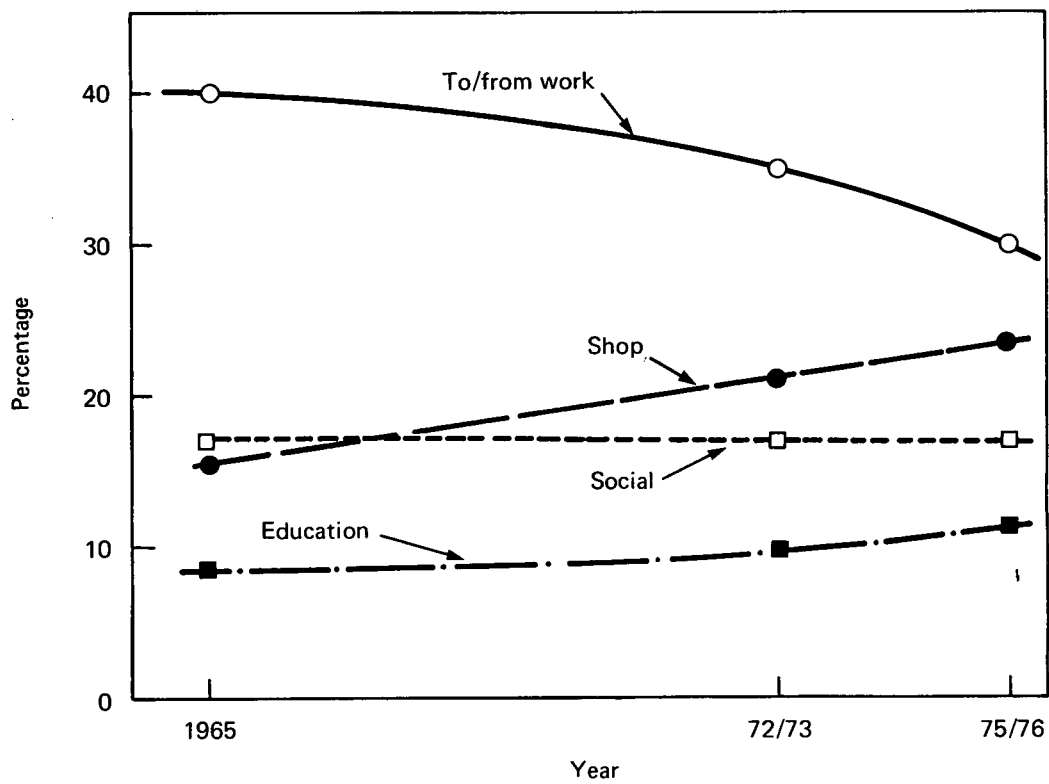


Fig. 5 PURPOSES OF BUS TRIPS (NTS stage data)



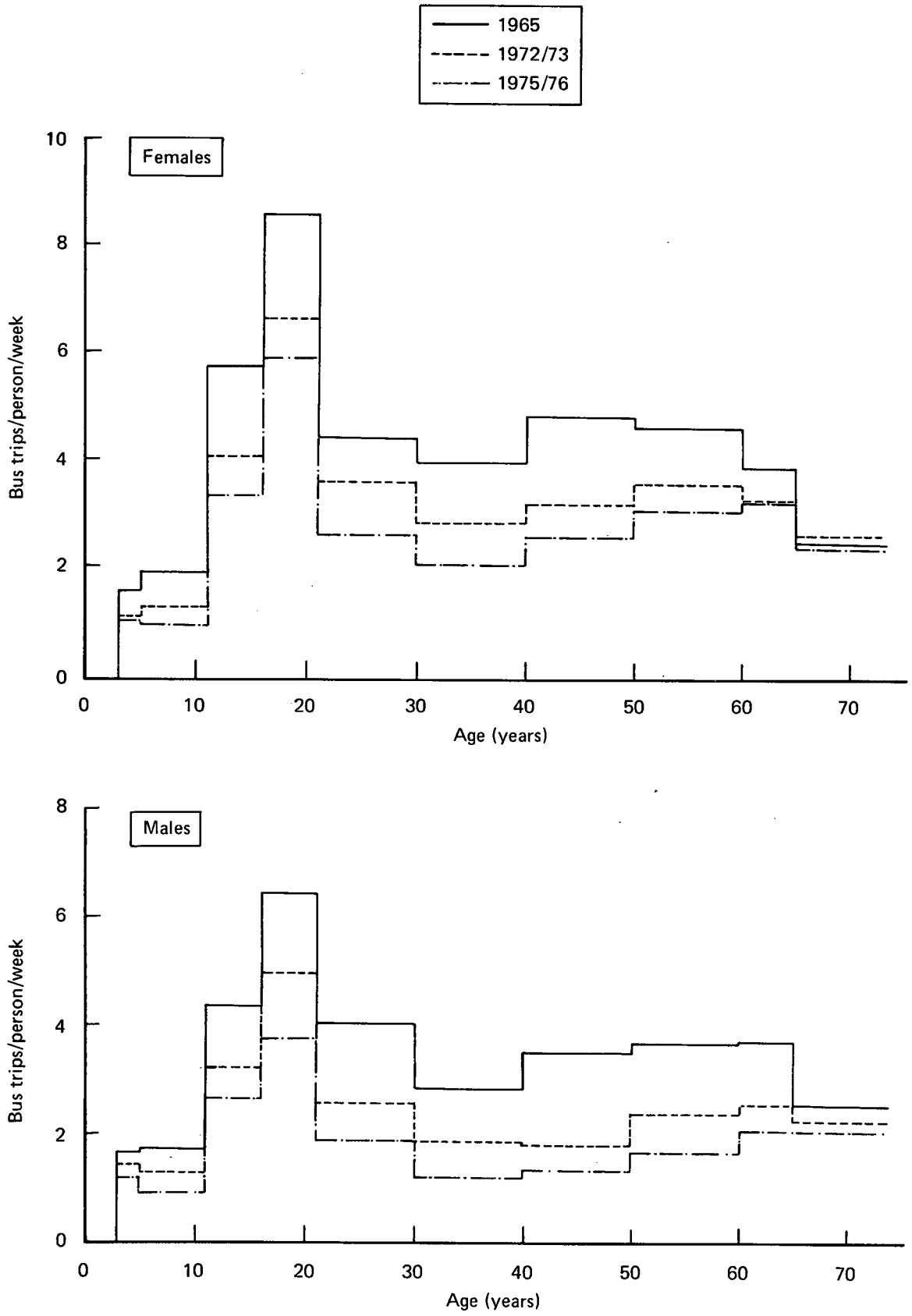


Fig. 6 VARIATION OF BUS TRIP RATE WITH AGE AND SEX

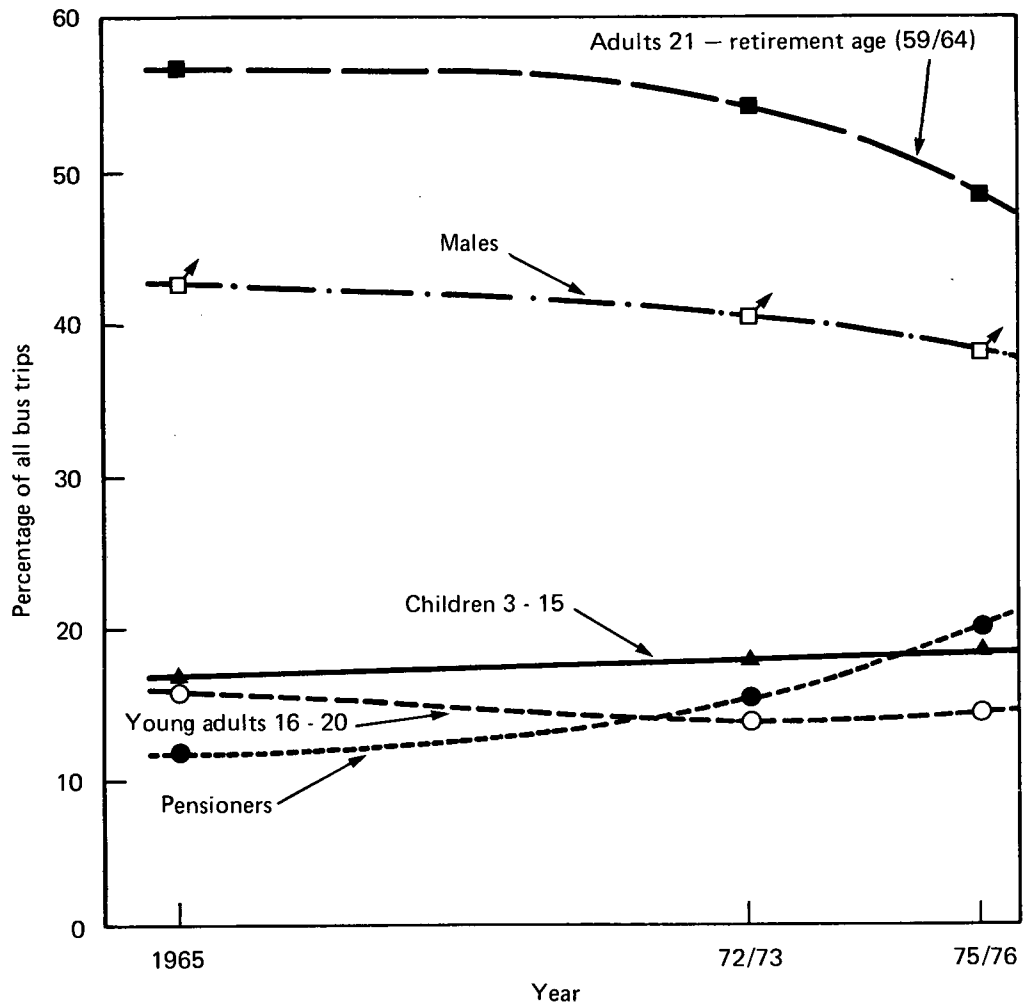
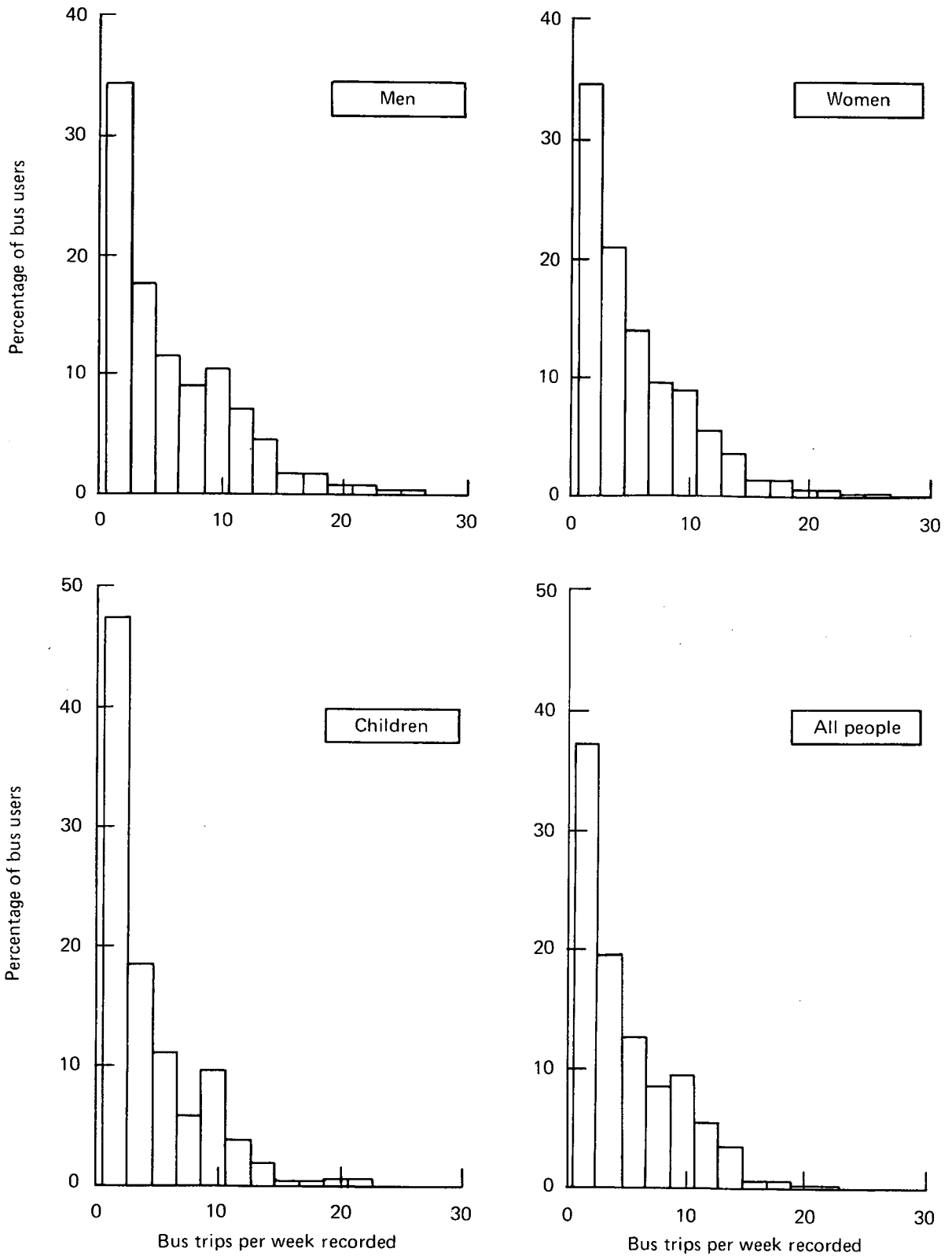


Fig. 7 AGE AND SEX OF BUS PASSENGERS  
(NTS stage data)



**Fig. 8 NUMBER OF BUS TRIPS PER WEEK RECORDED BY RESPONDENTS WHO RECORDED ANY BUS TRIPS (each bar covers people making n or n+1 trips) (1975/76 NTS stage data)**

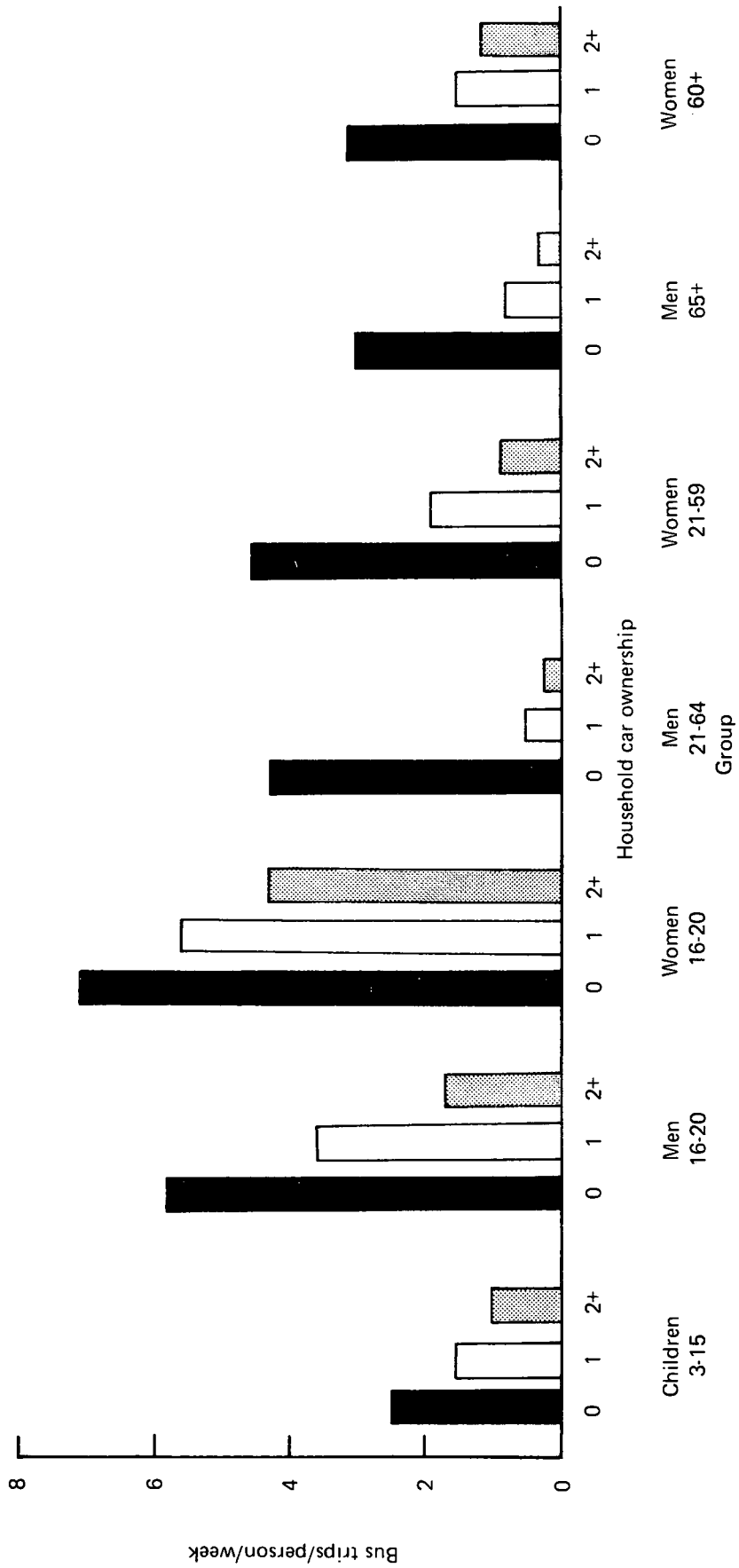


Fig. 9 VARIATION IN BUS USE WITH AGE, SEX AND CAR OWNERSHIP  
(1975/76 NTS stage data)

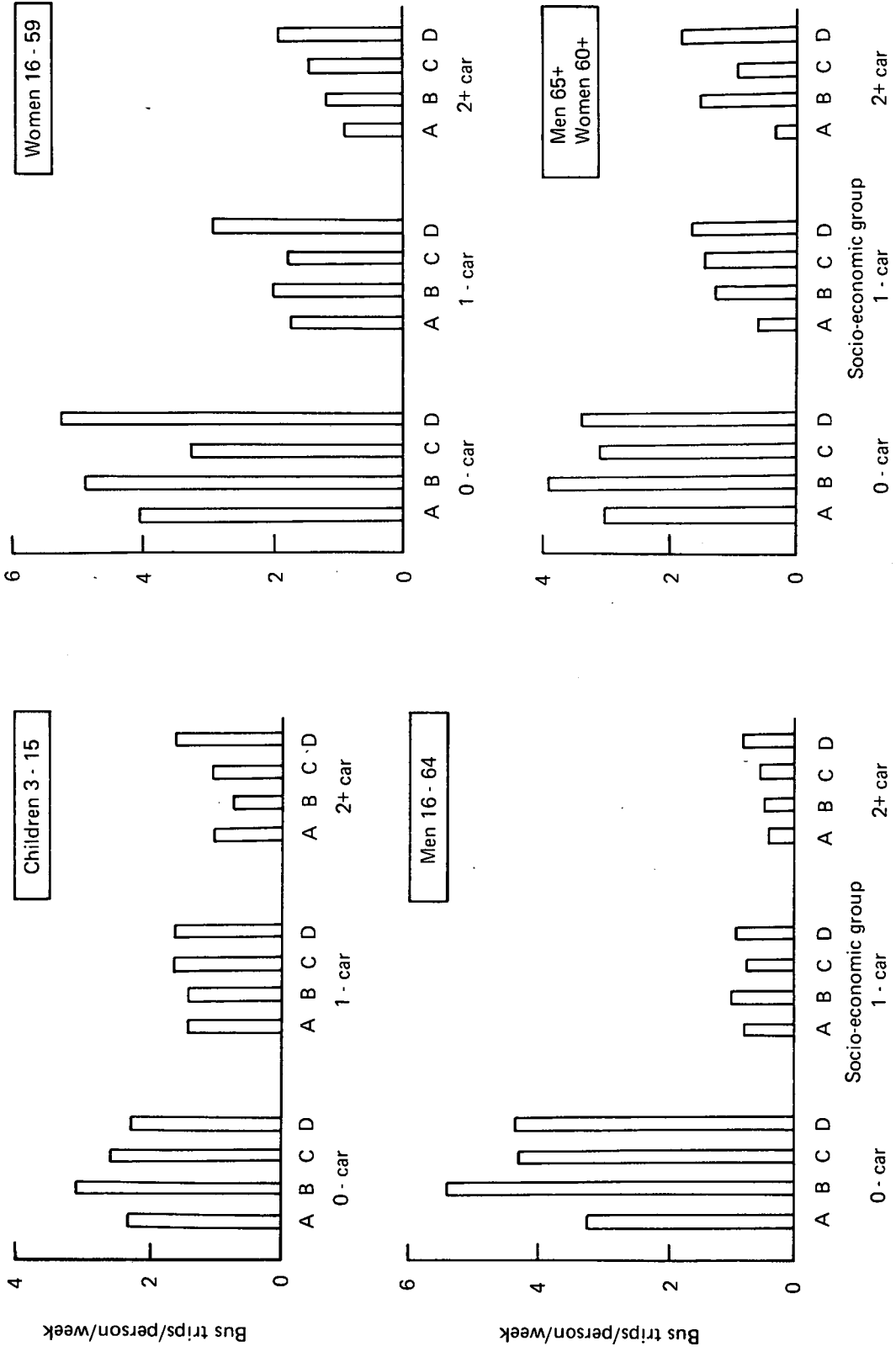
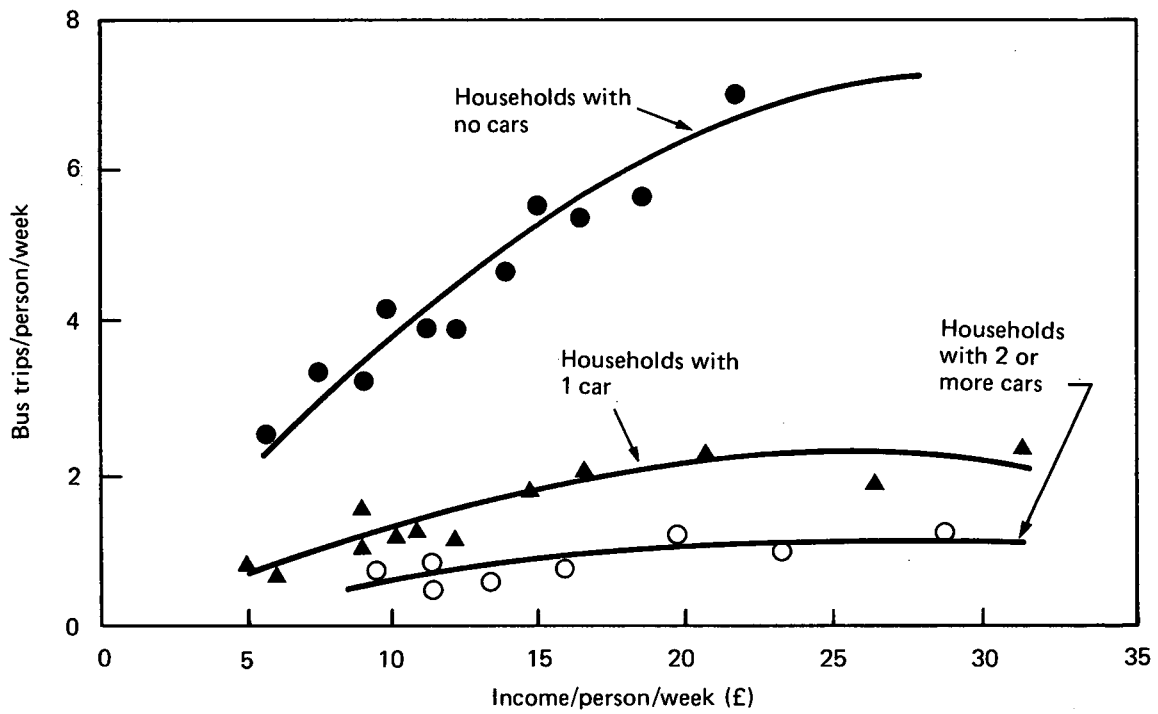


Fig. 10 VARIATION IN BUS USE WITH CAR OWNERSHIP AND SOCIO-ECONOMIC GROUP OF HEAD OF HOUSEHOLD (1975/76 NTS stage data)



**Fig. 11 EFFECT OF INCOME ON TRIP-MAKING BY BUS**  
 (SOURCE: NATIONAL TRAVEL SURVEY 1972/3)

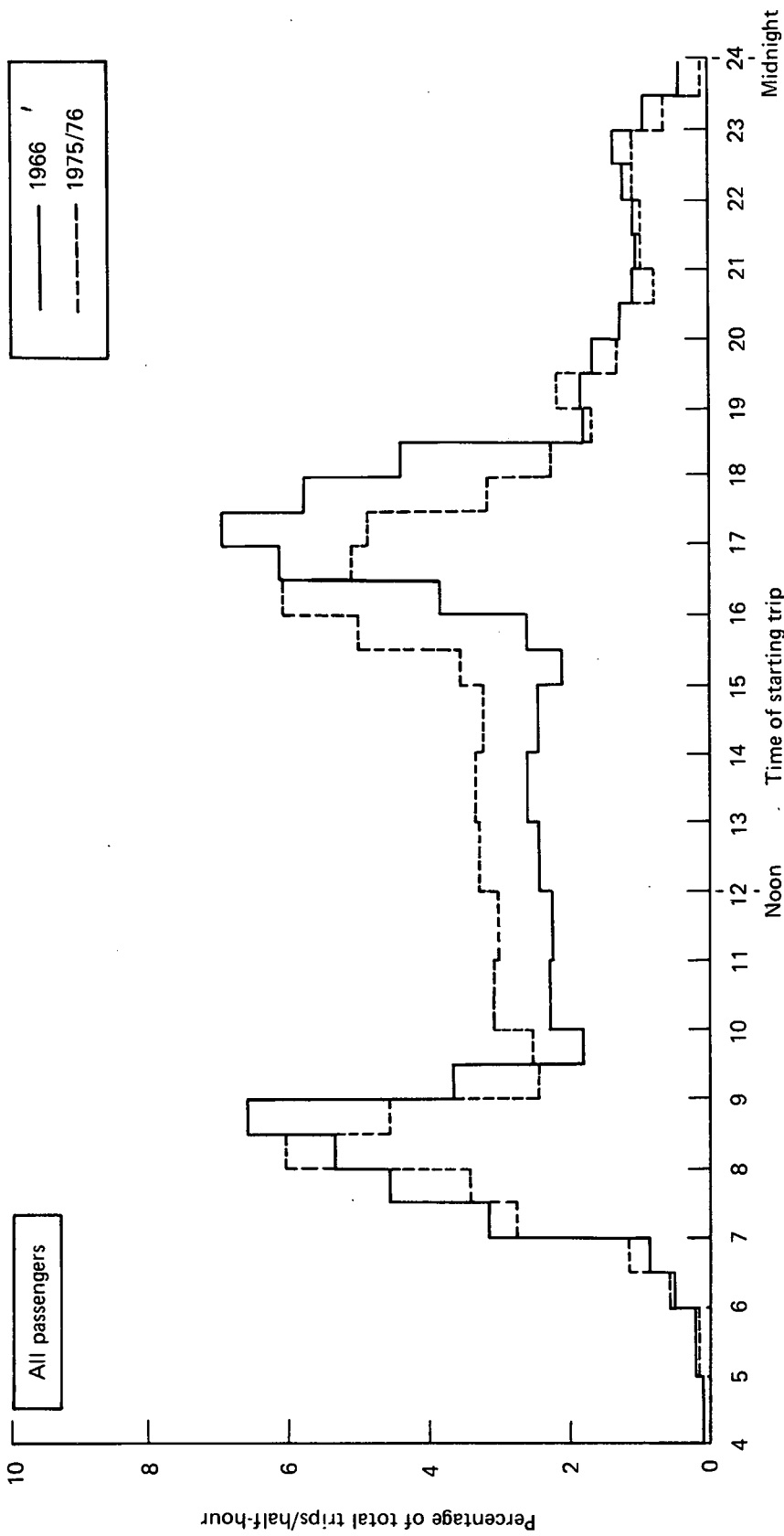
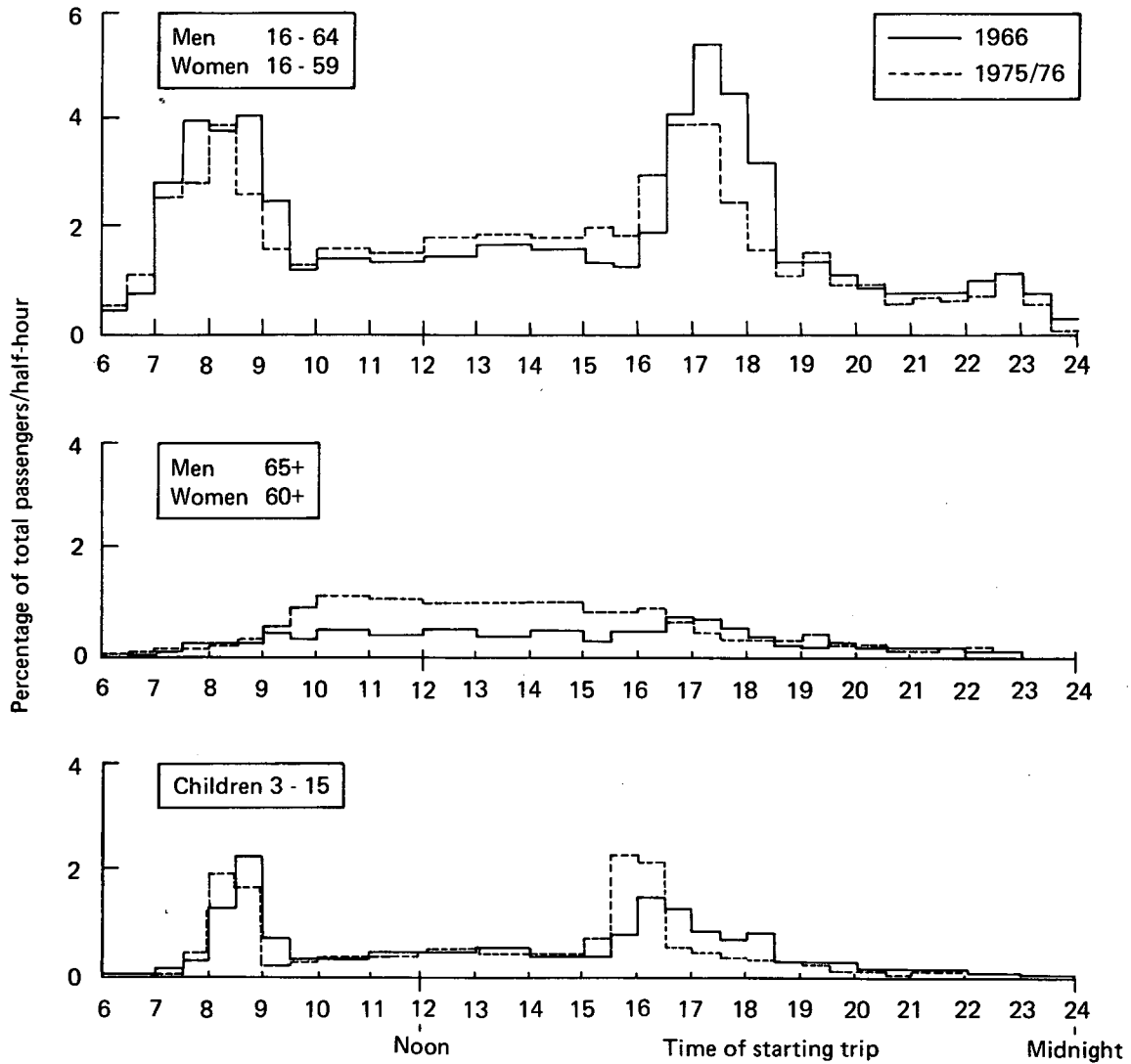


Fig. 12 BUS USE BY TIME OF DAY



**Fig. 13 BUS USE BY TIME OF DAY FOR CHILDREN, ADULTS AND THOSE OF PENSIONABLE AGE**



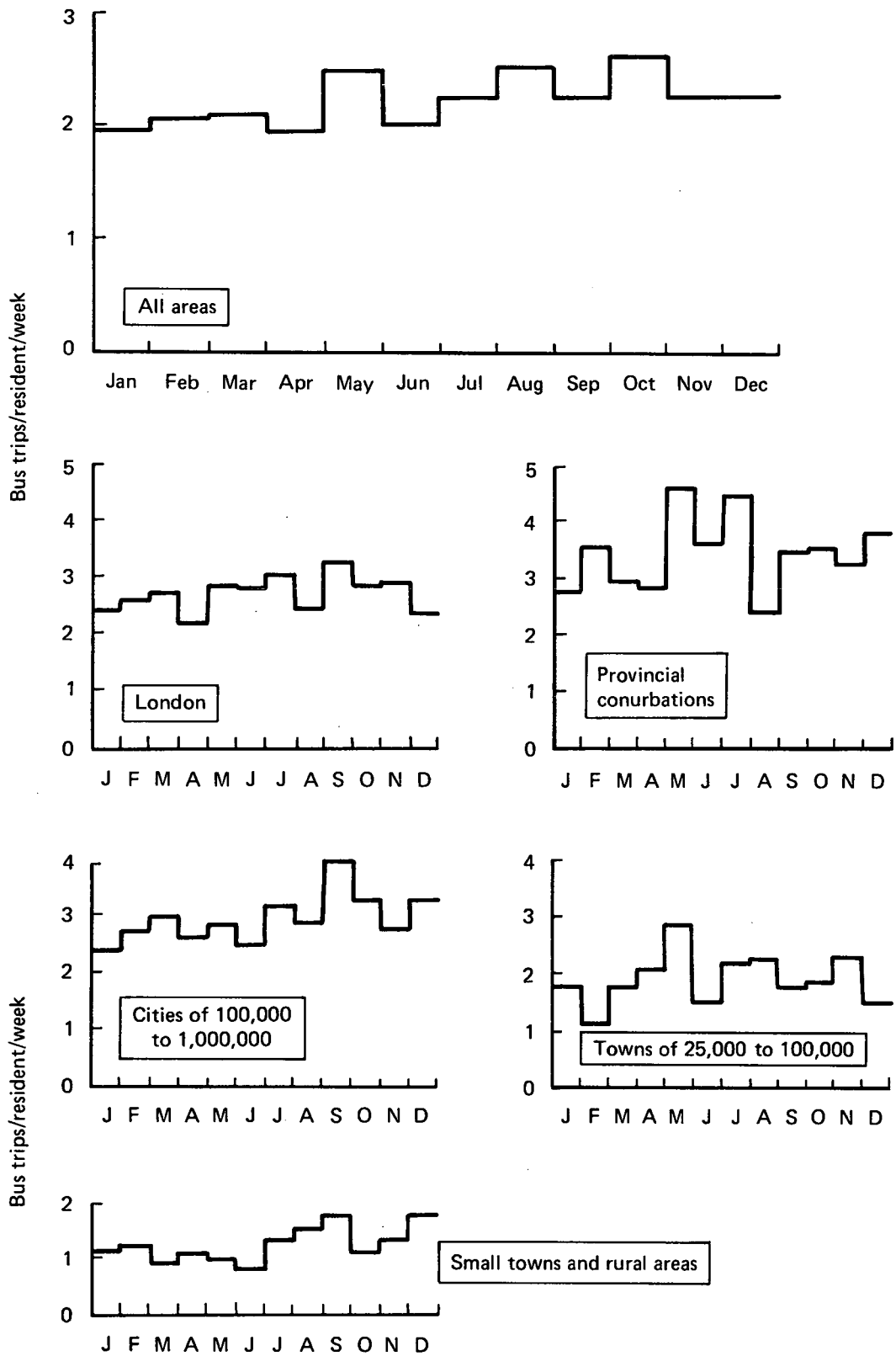


Fig. 14 SEASONAL VARIATION IN BUS USE  
(NTS 1975/76 stage data)

## ABSTRACT

**The use of local bus services:** C G B MITCHELL: Department of the Environment Department of Transport, TRRL Laboratory Report 923: Crowthorne, 1980 (Transport and Road Research Laboratory). Patronage of local bus services has been falling since at least 1952. This report uses the National Travel Surveys of 1965, 1972/73 and 1975/76 to examine how the use of local bus services has changed since 1965. A declining proportion of bus trips are made to and from work, and an increasing proportion for shopping. Characteristics of bus users with respect to age, sex, area of residence, car ownership, income and the socio-economic group of the user's household are studied. Variation of bus use with time of day and with season is shown. It is found that demand for bus travel by adults has become less peaked, and that by 1975/76 most of the additional peak demand was due to children.

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