FAMILY STUDIES IN THE EASTERN HEALTH DISTRICT: VI. FAMILY STRUCTURE AND ITS CHANGING PATTERN[1, 2]

PART II. MATCHED COHORT STUDIES, EVALUATION OF TIME STUDY METHODS IN FAMILY SOCIOLOGY, SUMMARY, AND CONCLUSIONS

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MATCHED COHORT STUDIES OF FAMILY STRUCTURE

COMPARISON of distributions obtained in successive censuses in the Eastern Health District afford an opportunity to obtain cross-sectional and cohort estimates of time trends in several household attributes for generations born during the period 1860–1911.

In this section, changes in family attributes are determined by the matched cohort technique. These estimates will then be compared with the cross-sectional and cohort findings and the differences analyzed. The variables investigated by the matched cohort method will be family size, occupational status of the head, and composition of the household. In addition to describing the mean trend of a cohort of families in respect to these characteristics the experience of individual units will also be given.

FOLLOW-UP METHOD AND EXPERIENCE

The mechanics of following specific family aggregates in large population groups, depend upon a definition of the family unit itself, the exposition of a set of rules which determine in all but a few cases whether a family is considered present from one census to another and a coding scheme which permits the employment of electronic machines to collate information for a given unit over a defined interval of time.

The definition of the household as used in this investigation

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Table 21. Follow-up experience with families in the Eastern Health District, by periodic censuses.

Census Year	1922 Cohort[1]				1933 Cohort[2]			
	Years Following Initial Enumeration	Total	White	Colored	Years Following Initial Enumeration	Total	White	Colored
	NUMBER ENUMERATED							
1922	—	7,256	6,069	1,187	—	—	—	—
1933	11	2,969	2,603	363	—	10,734	8,229	2,510
1936	13.5	2,551	2,257	294	2.5	7,427	5,916	1,511
1939	17	2,312	2,071	241	6	5,511	4,335	1,176
1947	25	1,407	1,255	152	14	3,782	3,013	769
	PER CENT ENUMERATED							
1922	—	100	100	100	—	—	—	—
1933	11	41	43	31	—	100	100	100
1936	13.5	35	37	25	2.5	69	72	60
1939	17	32	34	20	6	48	53	47
1947	25	19	21	13	14	35	37	31

[1] Families originally enumerated in 1922.
[2] Families originally enumerated in 1933.

has been previously provided. A family was considered present from one census to another if the head of the household was enumerated at both censuses or if his spouse in the earlier census was recorded as the household head in the later census. The identification of an individual from one census to another was made in general on the basis of consistency in the following characteristics; name, color, sex, and age.

In order to assemble all of the available information on a given family, data from matched "head of household" cards were reproduced into a summary card.

The households followed up consist of families originally enumerated in 1922, whom we shall call the 1922 cohort, and households originally enumerated in 1933 (1933 cohort). The maximum possible period of observation for the 1922 cohort is twenty-five years, and the equivalent figure for the 1933 cohort is fourteen years.

A review of the available literature indicates that there are few follow-up studies of substantial population groups which have run the length of twenty-five years. The number of families which have been followed in the Eastern Health District is shown in Table 21 for the 1922 and 1933 cohorts.

Utilizing the data available from the 1933 cohort for short term follow-up estimates and the material from the 1922 cohort for long term experience, it is found that the usual type of attrition curve of the negative exponential type $y = e^{a-bt}$ does not give a proper fit. The actual experience is one of sharper decline in the early years and a flatter slope in the later years than the negative exponential possesses. Empirically it is found that an extraordinarily good fit is provided by the curve $y = a - b \log (t + 1)$. In Figure 8 is shown the observed experience in the follow-up of white families and the fitted curve $y = 100 - 54.1 \log (t + 1)$. Values determined from this curve have been obtained for each year following the date of initial enumeration and are available upon request. These values may prove of some aid to persons planning to engage in follow-up studies of household aggregates. The curve describing the ex-

Table 22. Follow-up experience with white families by age of household head, 1922 cohort.

Age of Head 1922	Number Present In					Per Cent Present				
	1922	1933	1936	1939	1947	1922	1933	1936	1939	1947
Total	6,069	2,603	2,257	2,071	1,255	100	43	37	34	21
Under 25	195	57	52	51	41	100	29	27	26	21
25–29	631	232	215	222	162	100	37	34	35	26
30–34	854	396	356	357	244	100	46	42	42	29
35–39	884	443	409	390	271	100	50	46	44	31
40–44	739	367	338	315	194	100	50	46	43	26
45–49	710	367	315	281	168	100	52	44	40	24
50–54	674	307	260	228	112	100	46	39	34	17
55–59	478	201	153	121	39	100	42	32	25	8
60–64	404	128	97	69	14	100	32	24	17	3
65–69	242	75	43	25	7	100	31	18	10	3
70–74	135	16	11	3	–	100	12	8	2	–
75 and Over	88	7	3	3	–	100	8	3	3	–
Unknown	35	7	5	6	3	100	20	14	17	8

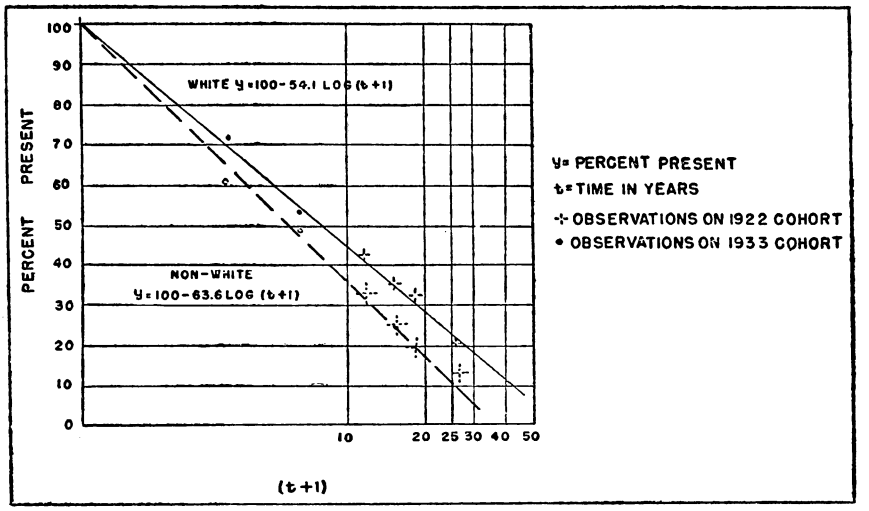

Fig. 8. Follow-up experience with families in the Eastern Health District.

perience of non-white families is also shown in Figure 8 and indicates the greater loss involved with this segment when compared with the white families.

After a quarter-century, 21 per cent of the original white families were still under observation. This experience varies with the age of the household head as is evidenced by the data shown in Table 22. In the analysis of this material, the following findings are of interest:

1. For short term follow-up (eleven years) the percentage remaining at the end of the interval is lower at both extremes of the age scale and reaches a maximum in the age group 40–49.
2. For long term follow-up (twenty-five years), the proportion remaining of an original age cohort does not differ appreciably for groups below fifty years of age and drops markedly for older groups.

These findings for short term follow-up are consistent with Luykx's determinations based upon a three-year follow-up experience. Some of the variables associated with stability exclusive of age have been previously investigated in detail and will be discussed in a later section.

Table 23. Mean size of white households for specified developmental levels according to generation group; based on matched cohort studies in the Eastern Health District.

Generation (Year of Birth of Head)	Source of Data			Developmental Level of Family Expressed as Age of Household Head[1]											
	Cohort	Age Group	Number Families	Under 25	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79
1911	1933	25	32	2.8	3.5	3.7	3.8								
1906		25–29	195		3.6	4.2	4.3	4.3							
1901		30–34	363			4.1	4.5	4.5	4.1						
1900	1922	25	34	3.2	4.0	4.9	5.0	4.6	4.2						
1895		25–29	142		3.9	4.5	5.0	4.8	4.4	4.0					
1890		30–34	221			4.3	4.9	4.9	4.6	4.1	3.7				
1885		35–39	238				4.8	5.1	4.9	4.3	3.7	3.1[r]			
1880		40–44	174					5.2	4.9	4.5	4.0	3.6	3.2		
1875		45–49	148						5.3	4.7	4.1	3.8	3.4	3.0	
1870		50–54	98							4.9	4.3	3.7	3.3	3.0	2.7
1865		55–59	34								4.6	4.0	3.4	3.1	2.9
1850		60–64	12									4.0	3.6	3.1	2.9

[1] Procedures used in preparation of table

1. Only families present continuously were employed.
2. For 1922 cohort:
   1933 data were regarded as an observation 10 years following initial data of enumeration
   An arithmetic average of the 1936 and 1939 indices was regarded as an observation 15 years following initial date of enumeration.
3. For 1933 cohort:
   1939 data were regarded as occurring 5 years following data of initial date of enumeration
4. Linear movement was assumed over 10 year intervals in which it was necessary to insert values at the five year mark.

The distortions involved in procedures 2 and 3 are made in order to obtain observations at 5 year intervals following the date of initial enumeration. They do not produce serious biases.

Size of Family

Based upon cross-sectional studies, it has been previously shown that the size of a family has proved to be one of the most variable characteristics of the household structure. Marked decline has been found in the average family size as one comes forward in time from 1922 to 1947 and wide interage differences have been characteristic in white families.

Matched cohort studies of this parameter of family life result in a unique series of observations on the manner in which size of family varies in individual family units as they age, on the historical trend in this type of maturation, and on the long range size patterns which families assume.

Most of the data which will be shown represent observations on the cohort of white families of 1922 which has been followed successfully to 1947. Because of the small number of non-white families which were originally available and the less favorable follow-up experience, no separate analysis of this latter group has been attempted.

In Table 23, the mean sizes for various groups of stable families followed continuously during the interval 1922–1947 are shown in successive rows. Thus, the twenty-five year recorded history of families with household heads born in 1860 is given on the final row and younger cohorts are shown in higher rows. To develop as comprehensive a picture as the available data would permit, observations on a group of younger families followed since 1933 have been added.

Analysis of this table gives a clear understanding of a dramatic change which has been developing in the family structure over the past quarter century. At each age level, the family has become smaller with succeeding generations. Maximum size for any specific generation is reached when the household head is from 35–44 years of age. The variation of size of family with generation is accounted for by a similar trend in respect to minor children present in the household. Thus, if the number of such individuals in the household is subtracted from the

	Age of Household Head (Years)					
	35–39	40–44	45–49	50–54	55–59	60–64
Cross-Sectional Estimates	4.8	5.2	5.3	4.9	4.6	4.0
Matched Cohort Observations	4.8	5.1	4.9	4.3	3.7	3.1

Mean size of family of generation of 1885 according to cross-sectional data and matched cohort observations.

total size, the variation between rows is reduced to an insignificant order.

The discrepancy introduced when cross-sectional data are used to provide information on the nature of events associated with aging is shown in the accompanying table. Taking the families headed by the generation born in 1885 (age 35–39 in 1922) we find that the 1922 observations for each five-year group (cross-sectional data) fail to give an accurate story of the average developmental course which families of a given group would pursue as they aged.

The variation which individual family units show relative to change in size is not apparent from the previous analysis, which was concerned with mean trends. In Figure 9, the change in household size for successive generations is shown for two eleven-year periods, 1922–1933 and 1936–1947. A few words of explanation may be necessary before studying the figure in detail. On the left hand side, we have plotted changes in size over the eleven year period 1922–1933, for cohorts of families arranged according to the age of the household head in 1922. For instance, families with heads aged 50–54 years are further identified as belonging to the generation of 1870. The graph on the left hand side shows that approximately 32 per cent of these families lost two or more members during the interval 1922–1933, 30 per cent lost one member, 20 per cent exhibited no change, etc. For this same group of families, the changes in size experienced during the interval 1936–1947 are shown on the right hand side of the figure opposite to the graph described above.

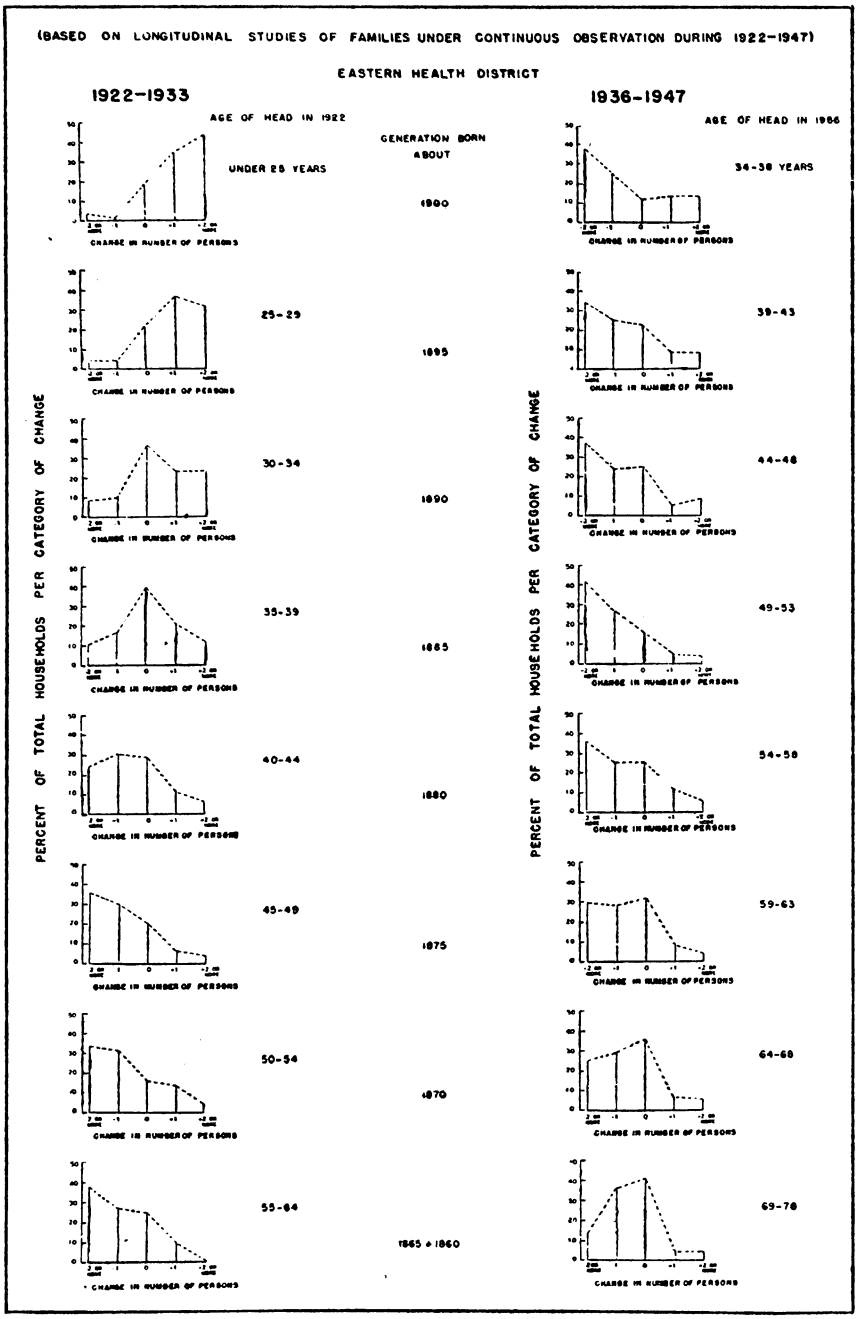

Fig. 9. Changes in family size during specified periods according to year of birth of household head.

	Age of Household Head (Years)					
	35–39	40–44	45–49	50–54	55–59	60–64
Cross-Sectional Estimates	4.8	5.2	5.3	4.9	4.6	4.0
Matched Cohort Observations	4.8	5.1	4.9	4.3	3.7	3.1

Mean size of family of generation of 1885 according to cross-sectional data and matched cohort observations.

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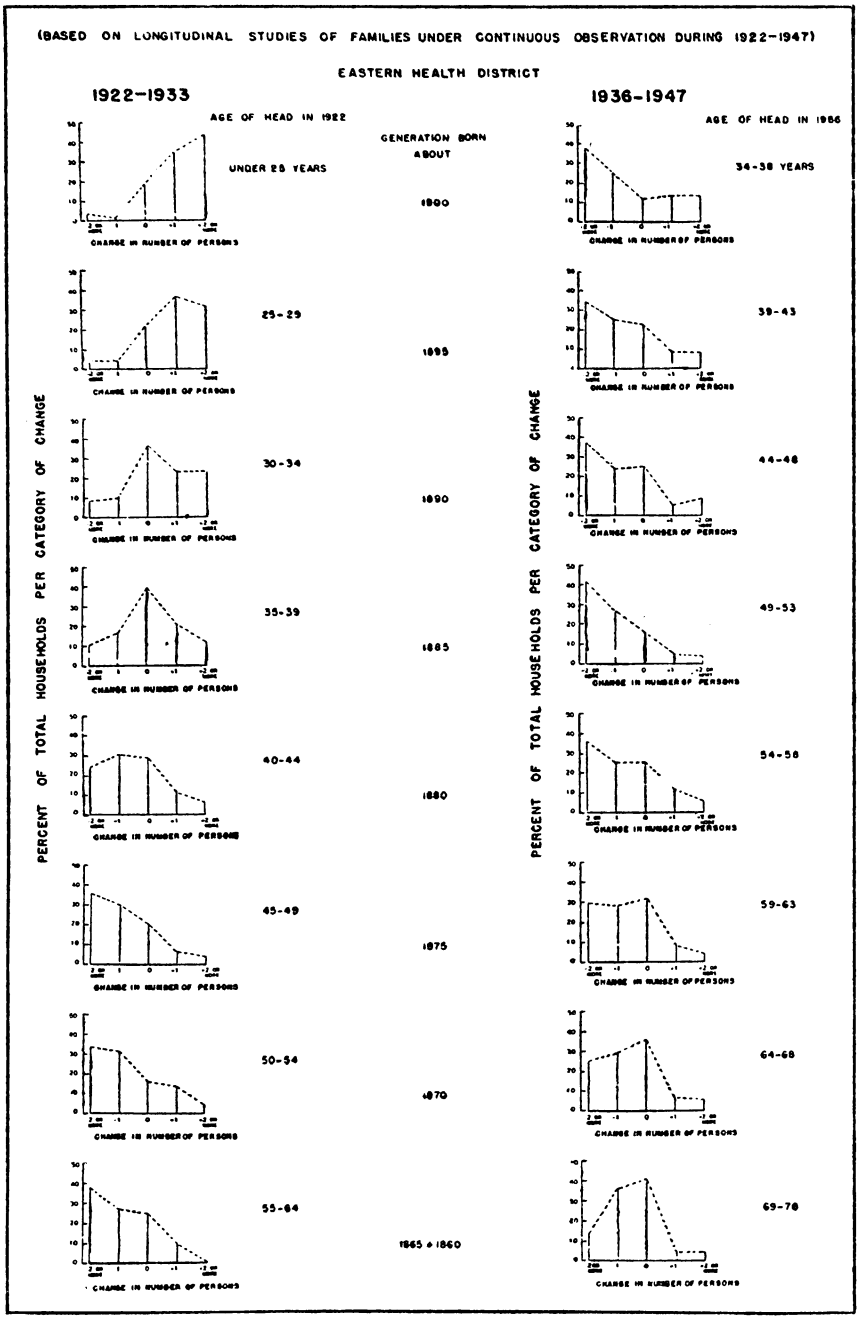

Fig. 9. Changes in family size during specified periods according to year of birth of household head.

The following are the principal points to note on examination of this figure:

1. At all age levels, there is considerable diversity in the pattern of change evidenced by families of equal maturity.
2. In the series of graphs covering the interval 1922–1933, the modal category of change and the character of the distribution exhibit systematic movement from concentration about the class of maximum addition (+2 or more persons) to the class of maximum loss (−2 or more persons), as one proceeds from young families to older units.
3. For specific generations, the frequency distribution in respect to change in family size shows marked reversal as young families age, and there appears to be some evidence of a move towards stable structures among late middle age families as they move into age groups above sixty years (note trend exhibited by generations of 1870 and 1865).

Changes in Size and Mobility

An important consideration in interpretation of these data is the question of how representative of a universe of families are these observations on a cohort which has shown marked stability, having remained in a limited area for a minimum period of twenty-five years. The solution to this problem can best be obtained by observing (if possible) the changes ensuing

Table 24. Changes in family size for several groups of families of equal maturity but differing as to mobility.

Family Groups[1]	Change in Size During Interval 1933–1939					Total Families
	Decrease		No Change	Increase		
	2 or More Persons	One Person		One Person	2 or More Persons	
Present 1922–1947	48	84	84	16	6	238
Present 1933–1947	68	87	109	19	13	296
Present 1933–1939	36	43	57	12	7	155
Total	152	214	250	47	26	689

[1] All groups have head of households whose age in 1933 was between 45–49 years.

over an interval of time in a group of families which have moved and by comparing such observations with data describing the changes recorded in a stable group. As noted parenthetically the feasibility of maintaining serial observations on mobile family groups is an unknown factor, and one upon which this investigation cannot throw light.

As an alternative design for a study of the association of family change with mobility, we may compare the change noted among families of uniform maturity but who differ as to their mobility by reason of the varying length to which they have remained in the area of the Eastern Health District. In Table 24, the frequency with which given patterns of change in family size are distributed is shown for three groups of families of equal maturity and which have remained (a) continuously present for twenty-five years (b) present for fourteen years (c) present for six years only.

An application of the X^2 test indicates that the several family groups are similarly distributed in respect to the categories of change. The analysis shown is representative of similar comparisons at other age groups. Therefore, for families which differ in respect to long-range stability but which have all evidenced a minimum of six years stability in residence, we find that there are no demonstrable differences in patterns of change in family size.

Long Range Family Size Patterns

During the twenty-five year interval 1922–1947, families which have been continuously present have been enumerated on five different occasions. At each enumeration, the family size has been described in terms of the number of individuals present. Thus, one among the numerals in the series 1, 2, 3 . . . 9.0 has been assigned to followed-up families each time the household was surveyed.

The history of a given family unit in respect to size may, therefore, be summarized by employment of a five digit number. For example, the family of John Smith followed for

twenty-five years may have the pattern 5, 7, 5, 4, 3. This would indicate that this family consisted of five members in 1922 and on successive enumerations was found to have 7, 5, 4, and 3 persons respectively. The number of possible patterns is 10^5 or 100,000. Obviously not all of these patterns would occur but there would be too many to permit of any rational analysis.

Suppose then a family is classified in each census into one of three categories as follows:

Number of Family Members	*Code*	*Type*
1–2	S	Small
3–4	M	Moderate
5 or more	L	Large

If we have five observations, there would be a possibility of getting 3^5 or 243 classes which remain too many to be used in analytical schema. It is proposed, therefore, that three observations be used, as obtained from the 1922, 1936, and 1947 surveys, and further that a family receive an appropriate coded entry for each observation made. The possible patterns will number 3^3 or 27 in number which may then serve as an initial basis for stratifying followed-up families according to long range size patterns.

In Table 25, a master distribution of white households is given according to the long-range size patterns evidenced over the interval 1922–1947 and according to the age of the household head at the start of the period. Of the possible 27 classes, frequencies of one or more were noted for 24 types. Of the total of 1,140 families classified, 433, or 38 per cent, had a history of predominantly moderate sized households for a quarter century, 409, or 36 per cent, of the families were large throughout the period, 183 were predominantly small and 115 ran a variable course. The long range pattern varies with the age of the household head at the start of the observation period.

In order to study further the characteristics of the size complex, the manner in which various ethnical groups distribute themselves in respect to this variate has been investigated. In

Family Size Pattern	Age of Household Head (1922)							
	Total	Under 25	25–29	30–34	35–44	45–54	55–64	65 and Over
Total	1,140	37	146	229	423	252	47	6
Predominantly Small	183	3	5	25	63	65	20	2
SSS	55	—	3	12	18	16	6	–
SSM	12	—	1	1	6	2	1	1
SMS	16	3	—	4	4	3	1	1
MSS	77	—	1	7	30	31	8	–
LSS	23	—	—	1	5	13	4	–
Predominantly Moderate Sized	433	19	76	100	135	86	15	2
SMM	16	1	7	4	4	—	—	–
MSM	14	1	—	1	8	4	—	–
MMS	115	3	19	21	45	23	3	1
MMM	114	4	20	31	36	20	3	–
MML	40	3	10	17	7	3	—	–
MLM	65	7	18	17	15	6	2	–
LMM	69	—	2	9	20	30	7	1
Predominantly Large	409	12	56	89	117	66	8	1
MLL	51	7	20	17	5	2	—	–
LSL	2	—	—	—	2	—	—	–
LML	10	—	1	3	4	1	—	1
LLS	59	1	4	8	36	10	—	–
LLM	159	1	14	28	81	30	5	–
LLL	120	—	15	31	48	23	3	–
Variable	115	3	9	15	48	35	4	1
SML	6	1	1	3	—	1	—	–
MSL	4	—	—	2	2	—	—	–
SLM	3	2	—	—	1	—	—	–
MLS	15	—	5	4	5	1	—	–
LSM	7	—	1	—	3	3	—	–
LMS	80	—	2	6	37	30	4	1

Table 25. Long range white family size patterns according to age of head of household, Eastern Health District 1922–1947.

1936, in conjunction with statistical studies on personality disorders in the Eastern Health District, several definable segments of the population were classified in respect to national background. Specifically, these groups were Hebrew, Czech, Pole, and Italian. Since the families included in our study of long-range size patterns were coded in this process, the distribution shown in Table 26 became possible. The Czech and Italian segments appear to have a higher proportion of household units in the "large family" category than is found among the remainder of white family units. An examination of the age dis-

Family Size Pattern	Total	Czech	Hebrew	Italian	Other White
	NUMBER				
Total	1,140	250	31	40	819
Predominantly Small	183	23	2	4	154
Moderate Sized	433	81	9	8	335
Predominantly Large	409	114	11	25	259
Variable	115	32	9	3	71
	PER CENT				
Total	100	100	100	100	100
Predominantly Small	16	9	7	10	19
Moderate Sized	38	32	29	20	41
Predominantly Large	36	46	35	63	31
Variable	10	13	29	7	9

Table 26. Distribution of white households according to long range family size patterns and ethnic groups.

tributions of the several ethnical groups fails to provide evidence that they differ as to age composition. Thus the difference in size distributions between ethnical groups is not associated with differences in age distributions.

The data available permit an examination of the possible association of size patterns with the occupational class of the family unit. Shown in Table 27 is a distribution of size patterns for each of seven occupational classes and a remaining unknown group. Comparing the percentage distributions for each class one is impressed with the similarity of these ratios. Whatever differences exist between occupational class ratios and comparable figures for the total population are accountable as sampling variation. It is probable, therefore, that there exists very little association between occupational class and that characteristic of family life described by the long range size pattern.

Composition of the Family

The changing character of the family in terms of its head structure, the presence of children, and the presence of rela-

Table 27. Distribution of white households according to long range family size pattern and occupational group.[1]

Family Size Pattern	Total	Professional	Proprietor	Clerk	Skilled Worker	Semi-Skilled Worker	Other Laborer	Servant Class	Unknown
	NUMBER								
Total	1,140	24	122	143	533	207	49	51	11
Predominantly Small	183	8	19	20	82	35	9	9	1
Moderate Sized	433	7	44	59	203	75	16	25	4
Predominantly Large	409	6	50	44	189	84	20	12	4
Variable	115	3	9	20	59	13	4	5	2
	PER CENT								
Total	100	100	100	100	100	100	100	100	100
Predominantly Small	16	33	16	14	15	17	18	17	9
Moderate Sized	38	29	36	41	38	36	33	49	36
Predominantly Large	36	25	41	31	35	41	41	24	36
Variable	10	13	7	14	11	6	8	10	19

[1] Occupational classification is based upon the occupation of the head of household recorded in the 1922 census.

tives or lodgers can be precisely documented by longitudinal studies of family aggregates.

Confining attention to the stable group of white families which have been present continuously for twenty-five years, one obtains a general picture of the changing composition of families from inspection of Table 28. For the 1,109 white units followed, the relative frequency in each of six family classes is shown for the successive enumerations. As the families age with time, the principal type of structure, the married couple-child complex, is replaced with increasing numbers of female headed units and with modest increases in male headed households.

The frequency of the married couple-child grouping will be examined at each age level for successive generations. The relevant data are shown in Table 29 which is similar in form

Table 28. Household type of white families (cohort of 1922) followed for a period of 25 years Eastern Health District.

Household	1922	1933	1936	1939	1947
	NUMBER				
Total[1]	1,109	1,109	1,109	1,109	1,109
MFC	914	803	754	671	424
MF	141	154	169	203	300
WC	27	98	110	136	177
W	11	25	36	43	105
MC	10	21	27	42	76
M	6	8	13	14	27
	PER CENT				
Total	100	100	100	100	100
MFC	82	72	68	61	38
MF	13	14	15	18	27
WC	2	9	10	12	15
W	1	2	3	4	10
MC	1	2	3	4	7
M	1	1	1	1	3

[1] MFC — Married couple with children.
MF — Married couple without children.
WC — Female head with children.
W — Female head without children.
MC — Male head, wife absent, with children.
M — Male head, wife absent, without children.

Table 29. Per cent of total families in the married couple-child category by age of head according to generation group.[1]

Generation (Year of Birth of Head)	Source of Data			Age of Household Head											
	Cohort	Age Group	Number of Families	Under 25	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79
1911	1933	25	32	53	88	85	81								
1906		25–29	195		77	89	91	84							
1901		30–34	363			85	86	81	76						
1900	1922	25	34	74	85	97	91	80	68						
1895		25–29	142		85	87	89	85	72	60					
1890		30–34	221			84	85	82	78	65	52				
1885		35–39	238				86	79	75	70	53	36			
1880		40–44	175					83	78	72	57	44	31		
1875		45–49	148						83	70	57	51	40	28	
1870		50–54	98							78	63	48	35	25	
1865		55–59	34								70	53	32	32	24
1860		60–64	12									58	42	17	8

[1] See Table 23 for outline of procedures employed in preparation of generation tables.

Table 30. Experience of white families in respect to the relative frequency of married couples at various age levels, Eastern Health District.

Generation (Year of Birth of Head)	Per Cent of Total Families With Married Couple as Head Structure by Age of Head According to Generation Group												
	Number of Families	Age of Head (Years)											
		Under 25	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79
1911	32	100	100	97	91								
1906	195		96	97	97	92							
1901	363			97	97	93	90						
1900	34	100	100	100	94	88	82						
1895	142		98	96	94	91	88	85					
1890	221			98	95	92	92	86	81				
1885	238				96	93	89	84	76	68			
1880	175					97	94	91	83	71	60		
1875	148						93	87	81	74	65	55	
1870	98							85	77	68	60	49	38
1865	34								88	74	56	50	38
1860	12									83	75	42	17

and has been prepared in the same manner as Table 23 dealing with generation trends in family size.

When variation between generations is considered, no systematic trend is found except in the age levels between 50 and 64 years of age. For example, in the column in which the age of the household heads is 35–39, one notes that the percentage of households with a married couple-child group remains approximately constant for the several generations for which data are given. A similar result holds for all columns for which the age of the household head is below 50 years. When the age of the head is between 50 and 64, the relative frequency of the married couple-child family type declines in more recent generations. The decline averages approximately twenty per cent over twenty-five years.

It is of interest to inquire into the factors associated with the between-generation drop in percentage of the married couple-child family type. Table 30 gives the experience of white families in the Eastern Health District in respect to the relative frequency of the married couple in followed-up units at various age levels. It may be noted that there are no differentials of significance to be found between generations. The trend among the followed-up families in respect to the presence of one or more children is shown in Table 31. In contrast to the previous table, there are significant differences between generations in the percentage of families with children at age levels 50–64 years. It is believed that this trend is a consequence of a decline in the number of children present at earlier age levels, a development which manifests itself by a reduced frequency of families with children present in later middle adult ages.

In view of the failure to find significant intergeneration variation in respect to the relative frequency of married couples at given age levels, the experience of the several generations has been pooled. As a result a distribution of stable households according to category of head structure is shown in Table 32 for successive five year age levels. The data are graphically presented in Figure 10. The married couple family type remains the

Table 31. Per cent of total families with one or more children present by age of head according to generation group.

Generation (Year of Birth of Head)	Number of Families	Age of Head (Years)											
		Under 25	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79
1911	32	53	88	88	88								
1906	195		78	91	91	89							
1901	363			87	89	86	83						
1900	34	74	85	97	94	88	79						
1895	142		85	89	93	93	81	69					
1890	221			85	87	90	86	77	68				
1885	238				87	87	86	81	69	58			
1880	175					85	83	79	70	63	56		
1875	148						88	80	72	70	62	55	
1870	98							90	81	71	64	58	52
1865	34								82	74	68	68	65
1860	12									75	75	68	58

Table 32. Percentage distribution of families by class of head structure and age of household head.

Head Structure of Family	Age of Household Head											
	Under 25	25–30	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79
Total	100	100	100	100	100	100	100	100	100	100	100	100
Married Couple	100	97.5	97.1	95.7	92.8	90.6	86.4	79.7	70.9	61.4	51.7	36.1
Female, No Husband	—	1.4	1.6	4.8	5.4	6.9	9.7	14.2	21.2	29.4	39.2	46.9
Male, No Wife	—	1.1	1.3	.5	1.8	2.5	3.9	6.1	7.9	9.2	9.1	17.0

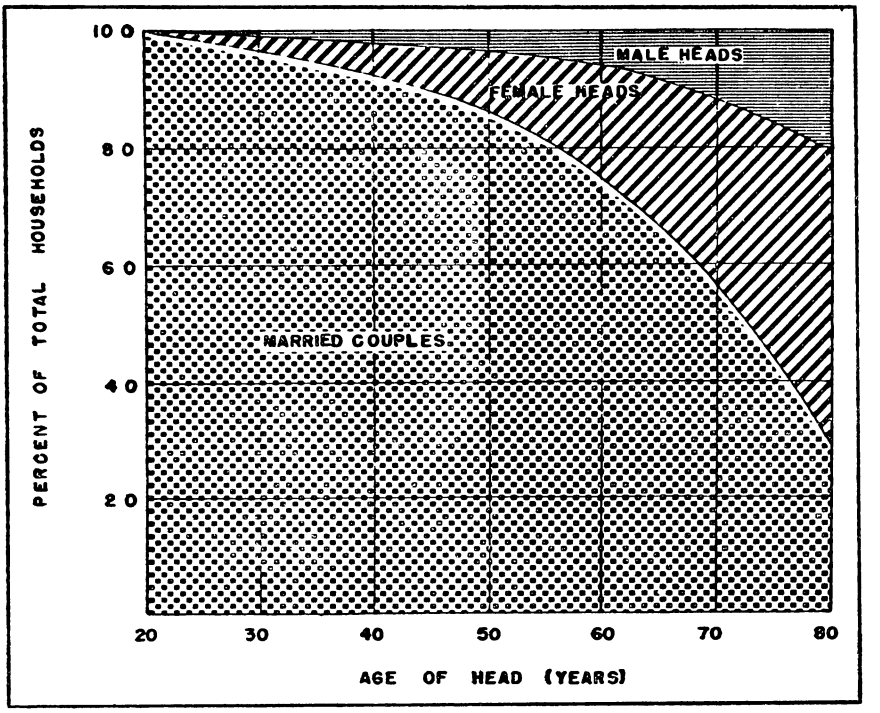

Fig. 10. Relative frequency of households according to head structure and age of head of household, white families, Eastern Health District.

dominant category of household to about 50 years of age. From this point on, as the joint lifetime of the marital partners declines rapidly, the married couple family type is replaced in increasing measure by the female headed family, and to some extent there is a concomitant rise in the percentage of male headed families (no wife being present).

Status of Relatives in the Household

Earlier cross-sectional studies gave indication that there had been little change in the frequency with which relatives occur in white household units enumerated in the Eastern Health District during the period 1922–1947. Further information on this constant feature of family life is provided by a longitudinal study of family units.

Table 33 presents a series of ratios describing for various generations the frequency of families with relatives present in the

Generation (Year of Birth of Head)	Total Families	Age of Head (Years)						
		Under 25	25–29	30–34	35–39	40–44	45–49	50–54
1911	32	6	3	3	6			
1906	195		17	14	15	17		
1901	363			16	19	21	23	
1900	34	6	9	12	3	18	30	
1895	142		17	20	23	19	26	31
1890	221			19	16	14	20	28
1885	238				19	22	24	24
1880	174					25	25	24
1875	148						14	21
1870	98							28
1865	34							
1860	12							

Table 33. Per cent of white families with relatives present by age of head according to generation group.

household. At each age level, there appears to be neither systematic nor statistically significant variation between generations. Therefore, in order to obtain the most stable estimate of the trend in this attribute as the family ages the experience of the several generations has been combined and is shown in Table 34.

With increasing age, the proportion of households which in-

Table 34. Per cent of white families with relatives present by age of head (consolidated experience of stable cohorts.)

Age of Head (Years)	Total Families	Families With Relatives Present	
		Number	Per Cent
Under 25	66	4	6.1
25–29	403	61	15.1
30–34	987	161	16.3
35–39	1,225	216	17.6
40–44	1,367	268	19.6
45–49	1,320	296	22.4
50–54	1,021	261	25.6
55–59	913	260	28.5
60–64	704	207	29.4
65–69	466	144	30.9
70–74	292	83	28.4
75–79	144	41	28.4

5–59	60–64	65–69	70–74	75–79
35				
26	27			
25	28	32		
28	34	32	30	
30	32	29	27	26
21	26	29	24	32
	17	25	33	41

clude relatives rises consistently from 15 per cent when the household head is aged 25–29 years to 30 per cent at the time the household head reaches 65 years of age. The types of relatives present can be conveniently classified into four broad categories and are shown in Table 35.

The presence in the household, of parents of the household head, rises to a maximum frequency of 8 per cent during the period that the head is aged 30–39 years of age. A gradual decline in this frequency takes place, dropping to 1 per cent at 65 years of age. The family of a married child of the head (which may include her spouse and/or children) appears in significant numbers when the household head reaches 45 years, and rises to a maximum of 16 per cent in families whose head has reached 65 years of age. With the exception of the extreme ages, there is a relatively constant proportion of families amounting to 8 per cent which include relatives other than parents, married children, or grandchildren. The presence of grandchildren only, in the household, is at a relatively low order below the age of 50 years. However, in the older age levels, the relative frequency reaches 5–6 per cent of all such households.

The Occupational Class of the Household

The concept of progressing steadily until the pinnacle is reached in the society of men is an ideal of life in democracy and is, of course, possible for any family unit. In a dynamic description of family life, one is concerned with assessing the frequency with which social mobility takes place as well as its direction.

If one proceeds to measure change, a suitable indicator of movement must be utilized. In the characterization of the social status of families, the highest educational level attained

by the household head may be employed as one possible index. It is apparent, however, that a family classified according to this index can show no change in social status with the flow of time. Family income would be a measure of social-economic status capable of change, but it is difficult to obtain and diffi-

Table 35. Distribution of white families with relatives according to type of relative present and age of head.[1]

Age of Head	Total Families	Families With Relatives	Type of relationship[2]			
			Parent (s) of Head	Family of Married Child	Grandchild Only	Other[3]
	Number of families					
Under 25	66	4	—	—	—	4
25–29	403	61	27	—	—	34
30–34	987	161	80	—	—	81
35–39	1,225	216	98	5	4	109
40–44	1,367	268	91	45	15	117
45–49	1,320	296	77	91	18	110
50–54	1,021	261	44	112	24	81
55–59	913	260	28	132	35	65
60–64	704	207	12	99	40	56
65–69	466	144	2	76	28	38
70–74	292	83	1	37	15	30
75–79	144	41	—	17	8	16
	Per cent of families					
Under 25	100	6.1	—	—	—	6.1
25–29	100	15.1	6.7	—	—	8.4
30–34	100	16.3	8.1	—	—	8.2
35–39	100	17.6	8.0	0.4	0.4	8.8
40–44	100	19.6	6.7	3.3	1.1	8.5
45–49	100	22.4	5.8	6.9	1.4	8.3
50–54	100	25.6	4.3	11.0	2.4	7.9
55–59	100	28.5	3.1	14.5	3.8	7.1
60–64	100	29.4	1.7	14.0	5.7	8.0
65–69	100	30.9	0.4	16.3	6.0	8.2
70–74	100	28.4	0.2	12.7	5.2	10.3
75–79	100	28.4	—	11.8	5.5	11.1

[1] Consolidated experience of stable cohorts.

[2] In a small number of cases (approximately 1 per cent), where relatives were present, there were two types. Only one was included in this classification, priority being given to parent and family of married child categories.

[3] Includes siblings of the head or of his spouse, nieces and nephews, aunts and uncles, and cousins.

cult to interpret when collected over a long interval of time. The occupational class of the household head, therefore, is considered as the best index by which the migration of an individual family from one social level to another can be approximated in these data.

Our occupational classification being of a qualitative character and involving seven classes, it has been found expedient to work with ten-year cohorts rather than with five-year groups in a longitudinal study of families relative to their occupational status. In Table 36 will be found a summary of observations made on three cohorts of families who were in the age groups 25–34, 35–44 and 45–54 at the initial census in 1922. For three classifications, "professional workers," "clerks and kindred workers," and "other laborers" there is no significant change noted with aging for a given generation. Several changes are worthy of note. In each generation, there is a parallel trend of decline from 1922 to 1936 in the percentage of families in the skilled worker class and a subsequent rise over the period 1936–1947. If each generation were studied separately, it might be concluded that these were real age effects. However, the trends occur in similar form in generations which differ quite markedly in age. Furthermore, we cannot find significant "between generation" differences in the percentage of skilled workers at a given census. These two results suggest that the trends observed with age for a specified generation are not essentially age effects, since they occur in identical form at different age levels. One explanation for the uniform decline in all generations may be that the trend was associated with the depression and affected all segments of the population without respect to age.

A more direct approach to the question of mobility in the occupational status of the family aggregate is obtained by a study of individual family performance in respect to this attribute. In Table 37, the twenty-five year history of families followed throughout the period 1922–1947 is classified into an eight category classification of long range occupational pat-

Table 36. Percentage distribution of families by occupational class according to age of head and generation group.

Year of Birth of Head	Year of Census	Age in Census Year	Number Families	Occupational Class of Household							
				Total	Professional Persons	Proprietors Managers Officials	Clerks Kindred Workers	Skilled Workers	Semi-Skilled Workers	Other Laborers	Servant Class
1892	1922	30	363	100	2.3	10.1	13.9	48.3	19.9	4.9	0.6
	1933	41	363	100	1.9	16.7	11.1	40.3	21.4	6.9	1.7
	1936	44	363	100	3.1	15.6	12.4	36.3	25.7	5.0	1.9
	1939	47	363	100	1.9	15.0	11.6	38.8	23.5	7.5	1.7
	1947	55	363	100	1.9	10.0	12.8	43.3	24.2	7.2	0.6
1882	1922	40	412	100	2.5	11.9	12.4	51.2	17.4	3.8	0.8
	1933	51	412	100	2.7	15.6	13.7	41.6	19.1	5.4	1.9
	1936	54	412	100	2.9	15.0	13.7	35.7	25.6	4.4	2.7
	1939	57	412	100	2.9	13.4	13.2	37.7	24.1	5.7	3.0
	1947	65	412	100	2.9	8.7	15.5	40.9	25.4	2.0	4.6
1872	1922	50	246	100	1.3	11.5	10.6	49.8	21.3	3.8	1.7
	1933	61	246	100	1.7	14.7	11.8	41.1	21.8	5.5	3.4
	1936	64	246	100	2.6	14.1	13.7	39.2	21.8	4.3	4.3
	1939	67	246	100	2.6	10.2	13.1	36.3	26.3	6.4	5.1
	1947	75	246	100	2.6	10.5	13.2	42.4	24.1	2.7	4.5

Table 37. Long range patterns in respect to occupational class (based on longitudinal studies of white families in the Eastern Health District 1922–1947).

Occupational Class Pattern	Age of Household Head in 1922 (Years)													
	Total	Under 25	25–34	35–44	45–54	55–64	65 and Over	Total	Under 25	25–34	35–44	45–54	55–64	65 and Over
	Number							Per Cent						
Total Families	1,109	34	363	413	246	46	7	100	100	100	100	100	100	100
I. No Significant Change	772	17	261	295	160	33	6	70	50	72	71	65	72	86
1. Same Class Throughout	399	9	151	156	65	12	6	36	26	42	38	26	26	86
2. Same Class in Two Observations with a Minor Change in the Third	315	8	100	121	71	15	—	29	24	28	29	29	33	—
3. Same Class in Two Observations with No Occupation or Unknown in the Third	58	—	10	18	24	6	—	5	—	2	4	10	13	—
II. Significant Change in Class	337	17	102	118	86	13	1	30	50	28	29	35	28	14
4. Steady Rise	16	—	7	6	3	—	—	1	—	2	2	1	—	—
5. Steady Decline	7	—	2	3	2	—	—	1	—	1	1	1	—	—
6. Variable Status	91	2	33	22	30	4	—	8	6	9	5	12	9	—
7. Same Class in Two Observations with a Major Change in the Third	208	15	60	82	43	7	1	19	44	16	20	18	15	14
8. No Occupation on Two Observations and a Classification on the Third	15	—	—	5	8	2	—	1	—	—	1	3	4	—

terns. The method employed was similar to that used in the preparation of the long range size patterns. Each family was given a three digit number designating its occupational rank in 1922, 1936, and 1947. Depending upon the combination obtained, the family was assigned to an appropriate classification as follows:

Occupational Pattern Number	*Type of Pattern*	*Type Combination Included*
1	Same Class Throughout	222; 333; 555
2	Same Class in Two Observations with a Minor Change in the Third	223; 322; 232 443; 434; 344
3	Same Class in Two Observations with No Occupation or Unknown in Third	22–; –22; 2–2
4	Steady Rise in Class	357; 345; 234; 123
5	Steady Decline in Class	753; 543; 432; 321
6	Same Class in Two Observations with a Major Change in Third	224; 336; 363; 242
7	Variable Status	243; 132; 634; 425
8	No Occupation in Two Observations with a Classification in the Third	4––; 5––; –3–; ––3

Seventy per cent of the families studied did not show a significant change in their occupational status over a period of 25 years. (Categories 1, 2, and 3 which are defined above were grouped to form a class of patterns which is essentially stable.) This estimate, aside from sampling variation is constant for all age groups, among families whose heads were aged 25 years or over at the start of the observation period. The frequency of families whose occupational class showed constant change, represented by the pattern designated "variable status" averages 8 per cent for all families.

It may be argued that this characteristic of stability is peculiar to families which evidence little residential mobility, and it is not unreasonable to suppose that more mobile families may have a radically different distribution of patterns than those shown. The design of the Eastern Health District studies did not include provision for the follow-up of mobile family units.

However, as indicated in our studies of family size, it is possible to study the patterns of change over a given interval as a function of the subsequent history of the mobility of the family. We have repeated this type of analysis for occupational status, the results of which are shown in Table 38.

Dividing the families whose heads were 25–34 years of age in 1933 into groups distinguished by their variable length of permanency of residence in the Eastern Health District, their behavior over the interval 1933–1936 is shown. For all families approximately seventy per cent evidence no change in occupational status. The remaining thirty per cent are equally distributed in the direction of the recorded change in occupational status. This general trend appears to satisfactorily describe each of the family groups in spite of the fact that these groups differ markedly in their history of permanency.

Table 38. Changes in occupational class of household head for several groups of families of equal maturity but differing as to mobility.

Family Group[1]	Type Change During Interval 1933–1936					
	Movement Downward of		No Change	Movement Upward of		Total
	2 or More Classes	1 Class		1 Class	2 or More Classes	
	NUMBER					
Total	85	94	790	73	88	1,130
Present 1933–1947	40	39	389	42	43	553
Present 1933–1939	31	30	224	16	19	320
Present 1933–1936	14	25	177	15	26	257
	PER CENT					
Total	7.5	8.3	69.9	6.5	7.8	100
Present 1933–1947	7.2	7.1	70.3	7.6	7.8	100
Present 1933–1939	9.7	9.4	70.0	5.0	5.9	100
Present 1933–1936	5.4	9.7	69.0	5.8	10.1	100

[1] All groups have heads of households whose age in 1933 was between 25–34 years.

Generation (Year of Birth of Head)	Number of Families	Age of Household Head (Years)					
		Under 25	25–29	30–34	35–39	40–44	45–49
1911	32	1.3	1.2	1.3	1.4		
1906	195		1.1	1.2	1.4	1.7	
1901	363			1.1	1.2	1.6	1.9
1900	34	1.1	1.1	1.1	1.2	1.5	1.9
1895	142		1.2	1.1	1.1	1.5	1.8
1890	221			1.2	1.2	1.3	1.8
1885	238				1.3	1.5	1.7
1880	175					1.8	1.8
1875	148						2.3
1870							
1865							
1860							

Table 39. Mean number of wage earners in white households by age of head according to generation group.

Wage Earners in the Household

In a description of the social-economic position of the family, the information derived from a study of the occupational class of the head can be supplemented by a study of the number of

Table 40. Mean densities (persons per room) of white households by age of head according to generation group.

Generation (Year of Birth of Head)	Number of Families	Age of Household Head					
		Under 25	25–29	30–34	35–39	40–44	45–49
1911	32	.64	.73	.76	.77		
1906	195		.74	.82	.84	.84	
1901	363			.81	.86	.86	.81
1900	34	.69	.80	.92	.93	.88	.82
1895	142		.78	.86	.93	.90	.85
1890	221			.84	.92	.91	.88
1885	238				.90	.94	.92
1880	174					.95	.91
1875	148						.97
1870	98						
1865	34						
1860	12						

50–54	55–59	60–64	65–69	70–74	75–79
2.1					
2.0	1.9				
2.0	1.8	1.6			
1.7	1.8	1.7	1.5		
2.0	1.7	1.8	1.6	1.2	
2.4	1.9	1.5	1.5	1.3	1.0
	2.1	1.8	1.4	1.4	1.0
		2.2	1.7	1.3	1.3

wage earners[4] in the household at various censuses. In Table 39 the average number of wage earners per family unit is shown for the several generations according to the age of the household head. Variation with age for a given generation follows a systematic pattern of increase from approximately 1.15 workers per family at age 25–29 to 2.0 workers at age 50–54 with a gradual decline from this point. Evidence of consistent between generation differences in the middle adult ages is not apparent although changes would be expected from the decline in the family size previously demonstrated. A probable hypothesis is that the proportion of family members employed has increased and compensated for a decline in the number of members present.

Note on Density of the Household

In view of the close and consistent relationship which density has shown in respect to size of household, the manner in which density varies in a family unit as it ages has been reconstructed by obtaining density equivalents for the mean size values shown in Table 23 by use of the regression $Y = .264 + .133\ X$ where Y = density and X = size of household. The resulting time trend chart is shown in Table 40.

50–54	55–59	60–64	65–69	70–74	75–79
.80					
.81	.76				
.84	.76	.68			
.86	.80	.74	.69		
.89	.81	.77	.72	.66	
.92	.84	.76	.70	.66	.62
	.88	.80	.72	.68	.65
		.80	.74	.68	.65

As the family grows in size, the density or crowdedness factor in the household increases. At its beginning and in the very late ages, the family circle enjoys the maximum space per

[4] Defined in this investigation as all persons employed in a gainful occupation at the time of the census.

individual. In the interval during which the age of the household head is 35–44 years of age, the family reaches its maximum density in respect to the living space available.

Discussion

This study was undertaken with the primary objective of describing several aspects of the dynamics of family life. Such an investigation is principally concerned with changes which take place in family structure rather than with its status at a particular point in time.

The material employed has been the data secured in successive enumerations of the population of households in the Eastern Health District. The records of these censuses have permitted us to study family change at three levels. At the level of the community, it has been possible to describe the changing characteristics of a population of families in a defined area. For given classes of families grouped according to the year of birth of the household head, matched family records provided information on the changing characteristics of a cohort of families as they age. In addition, data have been available to investigate the historical trends which are operating in the pattern of aging exhibited by successive cohorts. At the level of the individual family unit, variations in the developmental patterns have been described.

Interpretation of Time Differences

In the conduct of successive enumerations over a long period, there is danger that differences developing with the course of time may be spurious effects associated with changes in interviewing procedures and character of the field staff. When employing several groups of interviewers involved in a simultaneous operation, the technique of interpenetration may be employed to evaluate interviewer differences. However when a time element separates two groups of interviewers, it is difficult to obtain an accurate determination of differences which may be attributed to the field workers themselves. The extent of

this variation was minimized in the Eastern Health District surveys by:

a. Comparative stability in supervisory personnel.
b. Employment of field workers of equivalent education.
c. Standard training programs.

The control of variation associated with coding and classification matters was assured by the employment of uniform instructions and schedules throughout all censuses.

Statistical data in the field of family sociology are relatively recent in origin. Definitions have changed somewhat from one survey to another, and the detail provided has not remained constant. As a result, comparative studies utilizing the cohort technique are difficult to make, and matched cohort investigations, with few exceptions, have not been done. Estimates of age trends in respect to family attributes have thus been made as a matter of convenience from cross-sectional data. The findings of this investigation make possible a comparison of estimates of family changes with age as determined by the three basic time study methods.

In comparing the estimates of time change in family attributes, we are unable to specify which of the indicated trends is the true one. Each of the methods is capable of producing an accurate statement of change if the appropriate conditions, which have been previously cited, are satisfied. Furthermore, although a given method may furnish extremely inaccurate information on one variable, it may nevertheless serve as a good estimating procedure for another.

It will be recalled that our objective in studying mean developmental patterns was to describe, for an original group of families, the manner in which several of their attributes change with time. Since time and age are exactly correlated for individual units, the time change could be directly translated into age change.

The ideal situation would, therefore, be one in which the original sample of units all remained under observation for the desired period of time. However in working with human

populations, one deals with units which are characterized by extensive mobility.

In the present investigation of family aggregates, marked attrition of the number of units kept under study was found at all age levels. The percentage of families followed for twenty-five years is shown in Table 41 in two ways. The number of matched families have been related to the number of units enumerated at the first survey, and are shown in Column 4. Since this procedure fails to take into consideration the fact that family units are "legitimately" lost due to death of both marital partners in the case of a married couple unit or due to the death of the head alone whenever an individual constitutes the head structure, the number of matched units has also been related to the estimated number of units still alive. Such percentages are shown in Column 5.

The families kept under observation for twenty-five years represent 29 per cent of the total families estimated to be alive at the end of this interval, based upon the concept of joint

Table 41. Per cent of white families followed for twenty-five years Eastern Health District 1922–1947.

Age of Family Head (1922)	Number Present in 1922 (1)	Number Present in 1947 (2)	Families[1] Intact in 1947 (3)	Number Followed as Per Cent of	
				Number Present in 1922 (4)	Number Intact in 1947 (5)
Total	6,069	1,255	4,287	.21	.29
Under 25	195	41	194	.21	.21
25–34	1,485	406	1,444	.27	.28
35–44	1,623	465	1,463	.29	.32
45–54	1,384	280	903	.20	.31
55–64	882	53	241	.06	.22
65–74	377	7	13	.02	.54
75 and Over	88	—	—	.00	indef.
Unknown[2]	35	3	29	.09	.10

[1] Estimated on assumption that families cease existence solely on basis of joint mortality in married couple or death when head is an individual male or female.

[2] Assumption made that heads of unknown age are 45 years of age (mean age of head in 1922.)

survivorship of a married pair and the survival of an individual head. However families cease to exist under circumstances other than the joint failure to survive of a head and spouse. The death of the head or his spouse may make it impossible for the family to survive; the separation of the head and his spouse legally or by common consent may leave fragments which fail to survive as a family entity as defined in this study. Finally the household may merge with another unit and lose its individual status as separate unit.

We may conclude then that the number of white families under observation at the end of the twenty-five-year period is a minimum of 29 per cent of the total families intact at that time. It must be concluded also that a substantial proportion of families alive at the end of the study interval have not been covered by our observations.

COMPARISON OF TIME STUDY METHODS

In Table 42, age trends are given for several family attributes as estimated by the cross-sectional, cohort, and matched cohort methods.

With respect to family size, three findings are noteworthy:

1. The cohort method provides time-specific estimates which are uniformly lower than the matched cohort estimates.
2. Cohort and matched cohort methods provide trends (time changes) which are similar in character.
3. The cross-sectional estimates provide a mean trend in family size which is grossly distorted in respect to the cohort and matched cohort figures. The difference in time specific estimates between the cross-sectional and cohort methods increases as one proceeds from the initial enumeration.

These observations may be interpreted as follows:

1. The agreement of cohort and matched cohort trends results from the existence of two conditions.
   a. The trend of change exhibited by the matched fraction is approximately parallel to the trend experienced by the non-matched fraction of the original cohort.
   b. At the time of enumeration following movement, immi-

grants to the cohort are unbiased in mean size of family relative to the outmigrants.

2. The consistent difference in size between the time-specific estimates given by the cohort method and the matched cohort procedures is due to an essential bias which exists in the stable fraction of the original cohort. Non-mobile families are larger than their companions of the same generation.

3. The cross-sectional estimates are probably inaccurate because they are based on comparisons between different generations, and there has been a consistent and marked decline in the mean family size in successive generations.

The presence of children in the household is an attribute

Table 42. Changes with age in several characteristics of family structure according to three time study methods.

Method Employed	Age of Head of Household (Years)						
	25–29	30–34	35–39	40–44	45–49	50–54	55–59
	Mean size of white households						
Cross-Sectional[1]	3.6	4.2	4.5	4.7	4.7	4.6	4.4
Cohort	3.6	4.0	4.4	4.4	4.0	3.5	3.3
Matched Cohort	3.9	4.5	5.0	4.8	4.4	4.0	3.6
	Per cent of white households with children present						
Cross-Sectional[1]	73	82	81	81	79	78	77
Cohort	73	78	83	82	74	66	57
Matched Cohort	85	89	93	93	81	69	60
	Per cent of white households with married couple as head structure						
Cross-Sectional[1]	96	94	90	89	85	72	67
Cohort	96	91	86	85	79	72	68
Matched Cohort	98	96	94	91	88	85	80
	Mean occupational class rank of white households						
Cross-Sectional[1]	4.2	4.3	4.3	4.2	4.0	4.1	3.9
Cohort	4.2	4.1	4.0	4.2	4.0	3.9	3.9
Matched Cohort	4.1	4.1	4.1	4.1	4.1	4.2	3.9

[1] Estimates given are intended to describe the experience of families whose heads were 25–29 years of age in the 1922 census. Thus the cross-sectional data are for 1922.

closely associated with mean family size. It is not unexpected, therefore, that the relationships which have been outlined for family size estimates appear to be generally true for this variate.

For the characteristic "per cent of households with married couple as head structure," the estimates given by the matched cohort are consistently higher than those provided by the cohort and cross-sectional methods. The differences become more marked as one moves from the initial point of enumeration to later periods. It is believed that the differences noted, result from the more favorable experience of a non-mobile fraction, the matched cohort, in respect to break-up of the marital partnership, since any change in the head structure of the family is likely to require an adjustment including movement.

The problem of determining an accurate age trend for the attribute under consideration may be further investigated by proposing a reasonable model for the manner in which married couple families move into some other category of head structure with the passage of time. Consider the fraction of the original cohort (l_o) which has a married couple head structure. Let us assume that the principal factor causing a decline in the members of the fraction, without causing death of the units themselves, is the death of one or the other of the members of the marital pair, but not of both.[5]

Then at any point in time x, the proportion of families remaining as married couples will be

$$l_x = l_o[1 - ({}_xq_o - {}_xq_o' - 2{}_xq_o\,{}_xq_o')]$$

where

l_o = proportion married at beginning of observation
${}_xq_o$ = proportion of husbands failing to survive to x
${}_xq_o'$ = proportion of wives failing to survive to x

[5] The probability of divorce or separation should be entertained in an exact treatment of this problem. We feel that the frequency of this event is extremely small in the group under consideration. The cohort was originally observed when the head was in the age range 25–29. A sample drawn from this group indicated that the age at marriage was 24 years, and it is estimated therefore that these families had been married for an average of 3.5 years and were past the peak risk. Furthermore, the divorce and separation rate at the time these families were passing through the age interval considered at greatest risk, was not of the same order as it is at present.

Method of Estimation	Age of Head of Household (Years)						
	25–29	30–34	35–39	40–44	45–49	50–54	55–59
Attrition by Mortality (l_x)	96	93	90	85	80	73	65
Cross-Sectional	96	94	90	89	85	72	67
Cohort	96	91	86	85	79	72	68
Matched Cohort	96	96	94	91	88	85	80

Estimates of per cent of households with married couple head structure.

In the accompanying table, the l_x values are based on the 1940 life tables and are given for successive 5 year age intervals. Shown also for comparative purposes are the estimates provided by the several time study methods. Both cross-sectional and cohort methods provide age trends which agree quite well with the estimates developed on the basis of the mortality model described. The matched cohort procedure gives increasingly biased results as one moves from the initial enumeration point to later periods. This finding supports the thesis that non-mobile fractions of family aggregates provide observations which lead to overestimates of the relative frequency of stable patterns in the composition of the head structure of the family.

MEAN OCCUPATIONAL CLASS OF HOUSEHOLDS

Similar estimates are provided by the three study methods for age changes in the mean occupational rank of families. The impression given is that there is essentially little change in this attribute with aging. However it must not necessarily be concluded that agreement among the several estimates indicates that an accurate statement of the age trend has been obtained. If an area attracts families of a given social stratum, none of the methods may be sensitive to change in the mean occupational rank of the original cohort. Thus:

a. Families remaining in the area (matched cohort) will present a stable pattern relative to occupational rank.

b. Families which move from one social stratum to another are likely to leave the area. These units will constitute the non-matched fraction of the original cohort.

c. Families replacing the mobile fraction (inmigrants) will be of the same stratum as the outmigrants before they manifested social mobility. The cohort method will, therefore, produce an estimate of change which is negligible and which is in fact not consistent with the course of events in the original cohort.

d. If the above situation maintains itself over a suitable length of time, successive cohorts will not show any change with age and the cross-sectional method will similarly fail to show change.

GENERALIZATIONS ON TIME STUDY METHODS IN FAMILY STUDIES

Based upon a study of the properties of the methods for studying time trends and a review of their performance with respect to several family attributes, the following generalizations may be made:

1. The matched cohort method for determining age trends in characteristics of the family is the most precise of the several procedures available.

2. The matched cohort method provides unbiased estimates of time trends when

   a. Follow-up includes all (or practically all) of the surviving members of the original cohort or

   b. Follow-up involves a representative sample of the original cohort and is not constrained in area.

3. The matched cohort method provides biased estimates of time specific values of family characteristics when the followed-up fraction is initially biased with respect to the original cohort.

4. The cohort method is less precise than the matched cohort technique when positive correlation exists between successive observations on matched units.

5. The cohort method estimates are unbiased when

   a. Follow-up includes all (or practically all) of the surviving members of the original cohort or

   b. Inmigrant families present time trends equivalent in order and direction with those experienced by outmigrant units.

6. The cohort method is biased when families which are lost

Table 43. Time trends in several parameters of family structure, Eastern Health District 1922–1947.

Parameter of Family Structure	Mean Values					Comments on Trend
	1922	1933	1936	1939	1947	
	WHITE					
Age of Head (Years)	45	47	47	47	48	Consistent but Not Marked Increase
Size[1]	4.3	4.0	3.9	3.6	3.5	Marked Decline of 19 Per Cent over 25 Years
Density[2]	.83		.78	.77	.73	Decline of 12 Per Cent over 25 Years
Occupational Rank[3]	4.1	4.0	4.0	4.0	4.0	No Significant Change
Percentage with Children	77	73	72	67	63	Consistent Decline involving All Ages
Percentage with Relatives	24	24	23	21	24	No Significant Change
Percentage with Lodgers	5	4	4	5	5	No Significant Change
Percentage with Married Couple as Head Structure	81	76	77	76	74	Decline of Less Than 10 Per Cent over 25 Years
	NONWHITE					
Age of Head	42	40	41	42	44	Gradual but Not Marked Increase
Size	4.6	4.3	4.2	4.0	4.2	Decline of less than 10 Per Cent in 25 Years
Density	.85	*	.85	.93	.99	Marked Increase of 16 Per Cent
Occupational Rank	2.4	2.2	2.3	2.3	2.4	No Significant Change
Percentage with Children	61	61	63	58	57	
Percentage with Relatives	27	30	29	28	32	No Significant Change
Percentage with Lodgers	24	18	18	17	16	Consistent Decline
Percentage with Married Couple as Head Structure	75	70	70	68	69	Decline but Less Than 10 Per Cent over 25 Years

[1] Number of persons in household.
[2] Number of persons per room.
[3] See Figure 7 for method of ranking.
* Not available.

due to death differ in respect to the remainder of the cohort, with respect to the attribute measured.

7. Bias in the four variables of family structure investigated, occurs less often in the cohort estimates of time trends than in the matched cohort approximations.

8. The cross-sectional estimates of age trends are unbiased when age specific values for family variates remain constant with time.

a. Estimates made by this method may, therefore, be biased when considering size of family, per cent of families with one or more children, and density of household since these variables have been found to show considerable change among successive cohorts.

b. Cross-sectional estimates of change will probably be fairly accurate when working with the occupational level, type of head structure and percentage of families with relatives, since these attributes have been found to remain relatively constant at given age levels.

9. The matched cohort method is the only procedure which is capable of determining developmental patterns for individual units and providing estimates of their relative frequency.

10. When the matched fraction gives evidence of bias with respect to the original cohort, the matched cohort method may fail to provide an accurate determination of the frequency of individual patterns and may not reveal the existence of types which are highly associated with mobility.

Summary

The changing structure of the family has been investigated at three levels. Secular trends in the distribution of families in the Eastern Health District have been demonstrated by a series of cross-sectional studies based upon five special censuses during the period 1922–1947. Time trends noted are summarized in Table 43.

Mean developmental trends exhibited by families as they age have been determined by matched cohort studies of households originally identified in 1922. This phase of our investigation has been confined to white units, since the number of

non-white families proved to be too small. Some of the principal findings are:

1. The general pattern of growth below 35 years, a maximum size during the age interval 35–44 years and a subsequent decline is characteristic of the developmental pattern of successive generations. Although the aging trends are approximately parallel, the size of families has declined in successive generations at all age levels, the order of decline being most marked in the 40–64 year age interval.
2. The decline in size between generations is principally associated with a decline in the number of children present in the family at various age levels.
3. White households vary little in the type of members present over the interval during which the household head is 25–44 years old. From this point on, there is noticeable decline in the percentage of households with children present, a decline in the percentage which have both husband and wife present, and an increase in the percentage with relatives present.
4. No significant between-generation difference is found in respect to family composition except in the matter of a decline in the percentage of families with children present in the age interval 50–64 years of age.
5. The mean occupational rank of white families does not vary as a cohort of families ages. This finding holds constant for successive generations.

Developmental patterns have been presented for individual family units in respect to size and occupational status. Families may be classified into 24 categories with respect to their twenty-five-year history in size development. Families grouped into occupational strata do not differ significantly in long-range family size patterns. When families are classified relative to their national backgrounds, Czech and Italian units appear to have a higher proportion in the predominantly large category than do the remainder of the white units. Approximately 70 per cent of the families evidence no significant change in occupational status over a twenty-five-year interval. Of the remaining 30 per cent, one-half give indication of a rise in the

occupational scale, and the other one-half suffer a decline.

Three methodological questions have been clarified. In a consideration of the choice of family unit, the household has been found to represent the most appropriate aggregate for investigations which are concerned with the description of the immediate social environment of the individual. Relationships between the household, social family, and primary family unit are given.

The basic methods for study of time changes have been analyzed. Although its precision is high when dealing with measurements which are positively correlated, the matched cohort technique may be associated with severe bias when the procedure for maintaining serial observations is dependent upon a periodic survey of a small geographic area. This type of follow-up fails to provide observations upon the considerable fraction of an original cohort which is mobile.

A procedure has been proposed for classifying families according to long-range developmental patterns. The classification scheme consists of summarizing observations for an individual family by a series of digits. These numerals constitute a unique combination which describes the developmental pattern for a given family. The numbers are then assembled into a manageable sequence of classes which have some sociological meaning.

An empirical curve has been found which describes closely the attrition experienced in the follow-up of family aggregates over a long period of time.

Out of a total of 6,069 white households present in 1922, 1,255, or 21 per cent, were identified in 1947, twenty-five years later. Of these families, 1,109 were enumerated in each of the five censuses. The curve of attrition for both white and nonwhite families is of the form $y = a - b \log t$.

Conclusion

1. The data accumulated during the five special censuses in the Eastern Health District provide useful demographic mate-

rial on the structure of family units. In particular, the procedure of matching the records of families enumerated in two or more censuses furnishes information of an unusual nature on time trends in individual family units and cohorts of families.

2. The biases in the matched cohort method, when follow-up is constrained to a limited area, would appear to be worthy of critical consideration in future planning of longitudinal studies. The inferences which may be possible from observations secured in a given plan of follow-up should be carefully assessed prior to heavy investment in a proposed procedure.

3. In spite of the biases in the matched cohort data presented in this investigation, the material may be exploited with benefit by internal analysis. We have found wide variation in long-range family patterns in respect to size. Although stable for a given family, the occupational status differs widely between families. The extent to which such variations may be associated with the prevalence of specific disease entities or with the adaptive behavior of individuals to chronic disease constitute examples of problems in which this data may be of value.

4. From a medical and a sociological point of view, the determination of the effects of the decline in family size, the decline in density of housing in the white segment, and the increase in density of housing in the non-white population would appear to be fruitful areas for further inquiry.

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