RAHVASTIKU-UURINGUD
POPULATION STUDIES

* * *

FERTILITY TREND AND REGIONAL DIFFERENCES IN ESTONIA

KALEV KATUS

RU Series B No 12

EESTI KÕRGKOOLIDEVAHELINE
DEMOUURINGUTE KESKUS

ESTONIAN INTERUNIVERSITARY
POPULATION RESEARCH CENTRE

FERTILITY TREND AND REGIONAL DIFFERENCES IN ESTONIA

KALEV KATUS

RU Series B No 12

TALLINN 1991

During the last year and a half the population of Estonia has been expierencing a rapid decrease of fertility. This trend could represent the 20 years late changes known as second demographic transition [van de Kaa 1987] or the trend could be proved to be only a fluctuation, especially connected with the present economic difficulties. Such general questions important now in carrying out demographic and social policies may be given more appropriate answers when the present fertility situation is compared with previous fertility trend and with the development in other European countries.

European fertility transition is thoroughly studied by Princeton Project. Measuring fertility with the general unified indices the province level study covers most of the European countries. The study of Russia and Soviet Union carried out by Ansley Coale, Barbara Anderson and Erna Härm includes also the data on Russian gubernias covering the territory of Estonia for the years 1870 and 1897 and on Estonia for 1926 [Coale, Anderson & Härm 1979]. However, to be comparable with research done on other European countries the study of Estonia must take a county (maakond) as a regional unit of research. Summing up of the county data gives also the more proper average of all-Estonian figures: Russian gubernias had not followed the ethnic boundaries and thus the data was not consistent with the all-Estonian situation.

Using the methodology of Princeton Project the fertility indices are calculated for Estonia at eigth census years, 1881-1989. The availability of the analoguous data for most of the European countries enables to estimate the Estonian fertility well in the European context. For the same purpose total fertility rate (TFR) of the recent period is also presented.

County data is valuable in regard to creating more solid basis for the all-Estonian trend estimation but also as the source of research of regional differences of Estonian fertility. These differences, both historical as well as present, are discussed in the second part of the paper.

The Estonian fertility indices for 1881-1934 have previously been reported in the paper for the Symposium on Demographic Processes in the USSR in the Context of the European Experience, Tbilisi within the framework of the comparative study of fertility trend in the Baltic states [Katus 1990a]. The updated set of fertility indices had been included to the report for US-USSR Population Symposium, Washington to create a background of the modern fertility tendencies [Katus 1991]. The present paper is devoted to the Estonian-centered presentation of the Estonian fertility indices discussed at the level of regional differences.

1. DATA AND METHOD

The fertility indices used in European Fertility Project are general measures of fertility rate standardized to maximum fertility schedule (Hutterites schedule). The mathematical formulations of these indices are the following:

index of overall fertility	$I_f = B/\Sigma h_x * W_x$,
index of marital fertility	$I_g = B_m/\Sigma h_x * M_x$,
index of illegitamate fertility	$I_h = B_u/\Sigma h_x * U_x$,
index of proportion married	$I_m = \Sigma h_x * M_x/\Sigma h_x * W_x$,

where B is the total number of births, B_m and B_u the number of births to married and unmarried women, correspondingly; W_x is the number of women in age x, M_x and U_x the number of married and non-married women, correspondingly; h_x is the fertility rate of married Hutterites at age x [Coale, Treadway 1986].

The calculation of these indices is based on relatively simple information: the number of births by married status of mother and the age distribution of married and non-married women of reproductive period. The needed data on female age-structure makes the census years the most advantageous time-points for calculating the indices. The 5-year age-groups are used for the calculations presented in the report.

The set of fertility indices (full or partial) are calculated for the Estonian counties in every local census year of 1881, 1897, 1922, 1934, 1959, 1970, 1979 and 1989. Some necessary data adjustments are made, the general aspects of which as well as changes of county boundaries are discussed below.

Female population by 5-year age-groups is available for every census on county level, however, it is not the case for the married/not-married women. The 1881 and 1897 censuses make the distribution of married women available by 10-year age-groups and the group of 15-19; in the 1934 census the first three 5-year age-groups are followed by groups of 30-39 and 40-49. In case of availability of 10-year age-groups of married women, the Hutterites fertility schedule is adapted to the same aggregated age intervals when calculating I_g, I_h and I_m.

Vital registration is not providing the number of live births around the 1881 and 1897 censuses. The number is calculated by reverse-survival method [Indirect... 1983, p.179-182] for five years proceeding the census, correspondingly 1876-1880 and 1892-1896. Single age-groups of census data and the corresponding life table up to age 5 has been used. The latter is calculated by ICM program, Mortpak-Lite for 1881 and based on mortality parameters of Estonia for 1880-1884

[Rahvastikuprobleeme...1937, p.140]. The probabilities of dying for 1897 are directly derived from life-table for Estonians, calculated by Mihail Ptuha [1960 p.252].

In oder to estimate the possible error in the calculation of annual birth cases by counties, the results were tested. The total number of births by 9 Estonian counties in 1881 and 1897 could also be calculated by making use of the crude and general (per 1000 women of fertile age) fertility rates available for the entire Estonia [Rahvastikuprobleeme...1937, p.109]. These numbers are compared to the sum of birth cases by counties calculated by reverse-survival method. All three numbers of births match well:

Method used	Number of annual births 1881	1897
CBR	27 761	27 328
GFR	27 961	27 893
Reverse-survival	28 040	27 111

For later dates under research the average of 5 annual sets of numbers of births by counties around the corresponding census is used with the exception of the 1922 census, when the average of 3 years (1922, 1922 and 1923) is used.

The post-war vital statistics is not supplying the data on births by mother's marriage status on county level. Thus, I_g and I_h are not calculated for 1970 and 1979 censuses. However, the data is available for the last census.

The boundaries of Estonian counties had changed several times during the hundred years under observation. Directly comparable are the boundaries between census years 1881 and 1897; 1922 and 1934; 1970, 1979 and 1989. Two periods of changes, between 1897-1922 and between 1934-1970 are more important and will be shortly discussed.

The comparison of county boundaries in 1897 and 1922 censuses reveals that by 1922 two new counties had been added: Petserimaa and Valgamaa. Petserimaa was a part of Pihkva gubernia, Russia in 1897 and not counted among 9 Estonian counties of the time; Valgamaa was formed by parts of Tartumaa, Viljandimaa, Võrumaa and Valgamaa (mostly Latvian of the time) counties. Virumaa was enlarged towards the East including also Narva city in 1922.

In 1970 there were 15 counties instead of 11 in 1934. Hiiumaa was separated from Läänemaa, Raplamaa was formed from the parts of Harjumaa, Läänemaa and Pärnumaa, Jõgevamaa included the Northern part of Tartumaa and North-East of

Viljandimaa, Pôlvamaa was formed from Tartumaa and Vôrumaa, previous Virumaa was devided into Western and Eastern Virumaa with the territorial reduction of the latter to the advantage of Russia. Previous Petserimaa was almost entirely included to Russia. There had been also some less important boundary changes.

In 1959 there were 24 counties having no historical background and being non-comparable to earlier and/or later administrative distribution. The fertility indices are not calculated for the counties of 1959 census.

2. ESTONIAN FERTILITY TREND IN THE EUROPEAN CONTEXT

2.1. Fertility Level in 1881

Figure 1 presents the comparison of overall and marital fertility indices of different European countries with the corresponding Estonian level in 1881. The European figures have been taken from Princeton Project for the closest year available to the Estonian datum [Coale, Treadway 1986]. In case the indices were available only for the datum closer to 1897, the comparison had been made with the corresponding Estonian level.

In 1881 I_f was clearly lower only in France and Ireland compared to Estonia. The Estonian level was close to that of Latvia, Sweden, Switzerland and Norway. All of the Eastern European countries demonstrate more than 20 per cent higher I_f, the index in Russia exceeds the Estonian level even 80 per cent. The Finnish level is also higher of the Estonian one, ca 15 per cent.

As Estonia had higher proportion of married women compared to Northern and Western countries, except for France, the Estonian I_g was relatively even lower than I_f in this very comparison. Ireland, Sweden, Switzerland Norway and to lesser extent Latvia (the countries of close I_f to Estonian level) demonstrate up to 20 per cent (Norway) higher I_g than that of the Estonian.

In comparison with the Eastern, Central and Southern European countries the proportion married creates the opposite effect. Thus, marital fertility is close to Estonia, for excample, in Italy, Spain and Austria. In general, the gap between Estonia and Eastern and Southern Europe occured to be lower if measured by I_g in comparison of I_f. The index of marital fertility in Hungary is even lower than in Estonia. As a leading country of fertility transition France is the only European country with having both lower I_f and I_g compared with Estonia.

Compared to its neighbours Estonia had considerably lower fertility than Russia (including the immediate neighbouring Pihkva gubernia). Both indices are also clearly higher in Finland. Among the neighbours Sweden bears the highest resemblance to the Estonian case, however, Swedish marital fertility remains a little but countinously higher in the following decades.

The relatively low fertility level in Estonia presumably refers to the fact that the fertility transition had been already in progress in 1881. The Princeton Project had used the 10 per cent decrease of the marital fertility as a criterion of the start of fertility transition. Such decrease may be considered accomplished in Estonia by the time. The remarkably low level of pre-transitional natural fertility could present an alternative possibility. However, no data on the previous periods support this hypothesis. Making use of the family reconstruction data by Heldur Palli enables to calculate the fertility indices for Otepää parish in the 18th century [Palli 1988]. In 1765 I_f equaled to 0.4613 and I_g to 0.7596, in 1780 to 0.4546 and 0.9520 correspondingly. Occassionally the value of I_g is too high in 1780 because of limited number of cases (and very low level of registered illegitamate birth rate), however, it distinctivly refers to much higher fertility than in 1881. In such a case relatively low fertility indices in 1881 refer to the fact that the fertility transition had been already in progress, presumably for 2–3 decades.

This conclusion could be supported by other data, including the case study of Viljandi county, the pioneering region of fertility transition in Estonia [Nôges 1925]. In Viljandimaa the crude birth rate (CBR) demonstrate some rise during the 1820–30s. The continuously decreasing trend began after this fluctuative uprise in the 1840s. It was feeble for the first two decades gaining speed since the 1860s. The similar growth of CBR is typical to other Estonian counties for slightly later period. John Knodel also found similar growth of marital fertility in German villages [Knodel 1986, p.358–360]. In some treatments increase in fertility is related to the beginning of the fertility transition. In such a case it would be quite possible that the start of the Estonian family limitation dates back to the 1850s or evidently to the 1860s.

2.2 Development of Fertility in 1881–1934

The dynamics of absolute and relative values of fertility indices is presented in Figures 2 and 3. The declining trend of I_f and I_g up to the under-replacement fertility level in the 1930s seems to have been near to linear. During the period of 1881–1934 the decline of both indices was approximately twofold. The decrease of I_m had been also linear but moderate. Since 1922 census I_m demonstrated a slight increase. Noticable fluctuations are characteristic only of I_h: increase between 1881–1897, decrease in 1897–1922 and the following new decreasing trend.

The fertility decrease seems to be, taking also into account the trend previous to 1881, a relatively slow process, not a revolutionally cut-down in one or two generations. The same is true for the most countries which experienced the European type of marriage. The forerunners of the demographic transition had the fertility decline nearly parallel to the similar trend in mortality and, as a consequence, the transitional population growth had been smaller compared with nations experiencing later demographic transition.

In 1930s Estonia may continuously be found among the countries with the lowest level. Figure 4 presents a comparison analoguous to 1881 between Estonia and other European countries. The Eastern and Sothern European countries in general had become even more different from Estonia than half a century earlier. Especially high fertility was still characteristic of the Eastern neighbour Russia (USSR), it was clearly higher also in Finland. Swedish fertility indices were slighlty lower by the time demonstrating the close trend to Estonia during half a century.

The values of the fertility indices presented in the paper do not excactly coincide with the same indices of the Princeton Project calculated by Ansley Coale, Barbara Anderson and Erna Härm [1979]. The Princeton Project presented the set of indices for 1870 making use of indirect estimation. My earliest calculations are carried out on the bases of the 1881 census data. These two sets of indices are not comparable to each other. For 1897 the Priceton Project's calculations demonstrate slightly higher I_g and I_m in Estlandia and Livlandia gubernias compared to my calculation on the average of 9 Estonian counties for the same time. In general the differences are minor. However, they proved to be much larger for the 1920s. All the indices by Princeton Project for 1926 (census year in Soviet Union), except I_h, are higher than presented in this report for 1922. Taking into account the short baby-boom of the early 1920s which had ceased by the middle of the decade the differences between two sets of indices are considered even greater than reported.

2.3 Development of Fertility in 1934–1989

Figures 5 and 6 present the absolute and relative changes of fertility indices in 1934–1989. I_f demonstrates minor changes. This must be considered remarkable that no fluctuations and/or decrease but even a slight increase could be figured out. Marital fertility index I_g, however, has declined slowly up to 1979. I_h has, on the contrary, increased, most rapidly in 1980s. The proportion married I_m has also increased expressing the vanishing of European type of marriage. Contrary to European trend no decrease of I_m could be figured out in the recent decades.

The whole set of indices is not available by two large nationality groups (Estonians and Non-Estonians) with the exception of the latest 1989 census. Nevertheless, the dynamics of I_f and I_m are sufficient for demonstrating the remarkable non-

synchronized, occasionally even opposite trend. Figure 7 presents the dynamics of these indices compared to the level of 1959. The relative trend of I_f has been to the contrary in two population groups. Changes towards the same direction are demonstrated only in the 1980s. The relative trend of the I_m has been more homogeneous, however, the increase of the Estonians' index has been considerably more rapid in the 1960s. The down-going trend emerged in the 1980s compared to the continuous increase of I_m among the Non-Estonians.

The next Figure fixes the difference between the two population groups in 1989. The Estonians' I_f and I_g are higher compared to the level of the Non-Estonians; the illegitamate fertility index is approximately twice that high. On the other hand the Non-Estonians demonstrate a higher proportion of the married.

In oder to carry out the European comparison the total fertility rate (TFR) is preferred to fertility indices. In my early papers it has been stated that the post-war Estonian fertility trend differs principally from the general European one: fertility had remained under the replacement level up to the middle of the 1960s but had then increased [Katus 1990b; 1991]. Such a trend has resulted in contrary fertility situation in Estonia compared to the European countries. The situation is presented in Figures 9 and 10. Total fertility rates for the European countries are derived from [Klinger 1988; Recent... 1990; Sardon 1990].

Only Hungary demonstrated lower fertility compared to Estonia in the early 1960s. In 1950s Estonia had, probably, been characterized by the lowest fertility level in Europe. The situation has totally changed by the second half of the 1980s. The Estonian fertility has been one of the highest in Europe, considering also the USSR European republics. The only known exceptions in the late 1980s are Albania, Cyprus, Moldova and Turkey.

The dissynchronity of such an extent seems much more important in regard to the previous fertility trend in Estonia similar to the development in Northern and Western European countries. Post-transitional dissynchronity and high level of fertility in 1970-1980s cannot be explained by specific fertility transition and/or different timing of it.

3. REGIONAL FERTILITY DIFFERENCIES

3.1 Regional Differences at Early Stages of Fertility Transition

The regional homogeneity of fertility indices in 1881 and 1897 is noticable. The difference between the minimum and maximum values of I_f by counties was only

0.0474 in 1881 and 0.0619 in 1897; 0.0825 and 0.0863 correspondingly for I_g. The standard deviation of fertility indices demonstrates the same situation (see Table 2). It refers to rather similar fertility level in counties before the transition as well as relatively homogeneous timing and processing of the transition itself. The Princeton Project has demonstrated that the opposite situation has been typical for many European nations. It is also true for the Estonian neighbouring countries. The extreme regional variations has been characteristic for Russia [Coale, Anderson, Härm 1979]. Finland has demonstrated the noticable regional differences in timing of fertility transition [Strömmer 1969; Notkola 1989]. Neither Latvian population has been homogeneous in the process.

Estonian regional fertility differences could not to be directedly compared with those typical to territorially larger countries, nevertheless, Estonia is bigger than Denmark or Belgium, for excample. One direction of speculation in respect to the possible causes of regional homogeneity of fertility transition leads to the statement of relative social homogeneity of the Estonian population in the middle of last century. Ruled by Germans and Russians Estonians had no national upper-class at that time. The social environment of urban areas was also mostly non-Estonian at the beginning of fertility transition. The social differences between rural population were already remarkable but they were repeated from county to county. The relative social homogeneity could have had some kind of connection with regionally rather a simultaneous spread of family limitation behaviour.

Nevertheless, some regional differences existed (see also Figures 11 and 13). It was stated earlier that the pioneering county in fertility transition seems to be Viljandimaa. No doubts that the Eastern counties, Virumaa in the North-East and Vôrumaa in the South-East of Estonia followed the forerunners with some time-lag. (Petserimaa represented the special case with the mostly Russian population.) The Western regions of Estonia, especially clearly Saaremaa, also demonstrated later and slower fertility transition. In general, it could be concluded that the fertility transition had begun in the central regions of Estonia where the local population experienced relatively fewer possibilities of international contacts. Viljandimaa was also almost rural at that time. The two other leading counties in fertility decline were Harjumaa and Tartumaa. Both of them were the most urbanized regions and their local capitals – Tallinn and Tartu – had the state-wide functions.

3.2. Dynamics of Regional Differences

The dynamics of fertility differences by counties could generally be described by the trend of increasing variety up to the 1920s and the following trend of variety decrease. Figure 12 demonstrates the corresponding dynamics by the trend of standard deviation of fertility indices in 1881-1989. The county variations from the average Estonian I_f is also plotted on Figures 13-19. The highest variation is presented by the index of marital fertility, the differences measured by I_f were more balanced. Only the index of

illegitamate fertility has had the continuous trend of increasing county variations up to the present time.

Estonia is distinguished by the maximum territorial differences in fertility at the end of fertility transition. The average fertility level has been rather low by the time, under the replacement level in the 1930s, and, thus, the possible difference seems to have more limits than in earlier periods, nevertheless, the real situation has been the opposite. The level of urbanization has had a significantly greater effect on fertility level at the end of fertility transition than the starting period of the process. The post-war decreasing trend of territorial fertility differences has been not altered even by great immigration from the East and the following very uneven regional distribution of immigrants but, undoubtedly, the process was slowed down.

Figure 20 compares the trend of I_f in four Estonian counties. Viljandimaa is the forerunner of fertility transition, Harjumaa is the most urbanized region and Saaremaa and Võrumaa represent the counties slightly lagging others in fertility development, situated in Western and Eastern Estonia, respectively. Harjumaa had experienced the largest changes: the fertility decline as well as the following increase had been more outstanding compared to other counties. However, the present level remains distinctively lower than in other counties. Viljandimaa had undergone all the important changes in fertility trend somewhat earlier than other counties. The trend in Võrumaa and Saaremaa is far from being a coincidance. Fertility trend in Saaremaa demonstrates the most even dynamics during the last century.

Dynamics of I_f for every Estonian county for the last period of 20 years is compared in Figure 21. The general direction of changes has been the same in most cases: fertility decrease in the 1970s and the increase in the following decade. However, in some counties, like Järvamaa and Võrumaa for excample, the increase has been considerably higher than in Põlvamaa or Lääne-Virumaa. Ida-Virumaa, the county with the highest proportion of immigrants had experienced increase during the both decades (as well as some other counties) and its fertility level exceeds the one in Harjumaa by now.

3.3 Regional Differences in Period of the Highest Average Fertility

Within the framework of Fertility Research Project the Estonian vital statistics on births 1988-1989 is tabulated in oder to receive the number of births by age and marital status of mother on county level. The data enables to calculate the regional total fertility rates. In the present report the index is used to conduct the comparison between the regional levels of fertility. The nationality difference is also being observed. The named period corresponds to the Estonian highest average fertility during the last 80 years (TFR equaled to 2.36 for Estonians) and the data is also a good starting-point to study of the following sharp fertility decrease.

Figure 22 presents the deviation of the county fertility levels from the average TFR, also by two main national groups: Estonians and Non–Estonians. There are only three counties with lower level of fertility compared to the average: Harjumaa, Ida–Virumaa and Tartumaa. The same is true for the Estonians, the Non–Estonians have lower than their average level only in Harjumaa. Such a situation simply refers to the overconcentration of the population, particularly concerning the Non–Estonians of the named counties. In all counties, except for Tartumaa, the smallest deviation is demonstrated by the Estonians. The Non–Estonian fertility deviation from their average level is reaching very high values in some counties of their low representation (Hiiumaa, Pôlvamaa etc). The standard deviation of county TFR is 0.234, but 0.197 for the Estonians and 0.338 for the Non–Estonians.

Figure 23 gives direct comparison of TFR of the both population groups. Counties in the Figure are ranked in decreasing order of the proportion of the Estonians in the total number of local population. The Non–Estonian fertility is absolutly higher in five counties, in Hiiu, Jôgeva, Pôlva, Rapla and Saare. However, the proportion of the Non–Estonians is rather low in these counties. The Estonians' fertility notably exceeds the level of the Non–Estonians in Harju, Pärnu and also Ida–Viru. The very difference in Harjumaa and the highly uneven distribution of the Non–Estonians in Estonia are the two important factors describing the general fertility differences between these population groups.

Another important feature of the present county fertility differences is the variation of marital and out–of–wedlock fertility. This fenomenon is also closely related to the national characteristics of the population. Figure 24 presents the marital and illegitamate fertility indices by counties. In general the values of the indices are rather close to each other. In Hiiumaa and Raplamaa the illegitamate fertility is even higher than the marital fertility, the levels are similar in Viljandimaa and Läänemaa. Only three counties, namely Harju, Ida–Viru and Tartu (Vôrumaa could also be added) experience the traditional difference of these indices. These counties have the highest proportion of the Non–Estonian population. It should not be taken for a joke only while concluding that the Estonians' fertility exceeds the level of the Non–Estonians and three counties experience low fertility compared to the average is reasoned by the Estonians' habit to have more out–of–wedlock babies and the Non–Estonians' different behaviour.

TABLE 1. FERTILITY INDICES BY COUNTIES, ESTONIA, CENSUS YEARS 1881-1989

1881

County (Maakond)	If	Im	Ig	Ih
Virumaa	0.3573	0.5119	0.6682	0.0318
Järvamaa	0.3471	0.5345	0.6159	0.0389
Harjumaa	0.3112	0.4933	0.5984	0.0317
Läänemaa	0.3307	0.5025	0.6235	0.0349
Saaremaa	0.3269	0.5019	0.6120	0.0397
Pärnumaa	0.3363	0.5169	0.6181	0.0349
Viljandimaa	0.3110	0.4764	0.6124	0.0372
Tartumaa	0.3099	0.4699	0.6239	0.0319
Võrumaa	0.3553	0.4932	0.6809	0.0387
Estonia	0.3279	0.4947	0.6278	0.0346

1897

County	If	Im	Ig	Ih
Virumaa	0.3253	0.5140	0.5966	0.0386
Järvamaa	0.3218	0.5245	0.5707	0.0478
Harjumaa	0.2845	0.4799	0.5520	0.0381
Läänemaa	0.2918	0.4906	0.5530	0.0405
Saaremaa	0.2875	0.4483	0.5891	0.0427
Pärnumaa	0.2858	0.4800	0.5556	0.0370
Viljandimaa	0.2634	0.4571	0.5283	0.0409
Tartumaa	0.2841	0.4612	0.5712	0.0387
Võrumaa	0.3114	0.4727	0.6146	0.0401
Estonia	0.2924	0.4778	0.5691	0.0397

continued

1922

County	If	Im	Ig	Ih
Virumaa	0.2027	0.4513	0.4211	0.0231
Järvamaa	0.1764	0.4423	0.3683	0.0242
Harjumaa	0.1575	0.4513	0.3219	0.0222
Läänemaa	0.2160	0.4301	0.4611	0.0310
Saaremaa	0.2358	0.3791	0.5549	0.0409
Pärnumaa	0.1987	0.4463	0.4149	0.0245
Viljandimaa	0.1728	0.4173	0.3765	0.0269
Tartumaa	0.1830	0.4259	0.3952	0.0256
Võrumaa	0.2041	0.4263	0.4411	0.0281
Valgamaa	0.2028	0.4227	0.4487	0.0229
Petserimaa	0.3424	0.5599	0.5956	0.0203
Estonia	0.1943	0.4417	0.4079	0.0253

1934

County	If	Im	Ig	Ih
Virumaa	0.1847	0.5007	0.3395	0.0295
Järvamaa	0.1893	0.4879	0.3435	0.0424
Harjumaa	0.1091	0.4397	0.2246	0.0185
Läänemaa	0.1933	0.4832	0.3595	0.0378
Saaremaa	0.2111	0.4258	0.4370	0.0434
Pärnumaa	0.1713	0.4773	0.3205	0.0352
Viljandimaa	0.1651	0.4608	0.3128	0.0389
Tartumaa	0.1540	0.4339	0.3173	0.0288
Võrumaa	0.1873	0.4546	0.3723	0.0331
Valgamaa	0.1714	0.4525	0.3369	0.0346
Petserimaa	0.2542	0.5824	0.4126	0.0335
Estonia	0.1642	0.4646	0.3189	0.0300

continued

1959

	If	Im	Ig	Ih
Estonia	0.1627	0.5804	0.2392	0.0569
Estonians	0.1592	0.5372	...	...
Non-Estonians	0.1701	0.6702	...	...

1970

County	If	Im	Ig	Ih
Harjumaa	0.1554	0.6227	...	...
Hiiumaa	0.2249	0.6324	...	...
Ida-Virumaa	0.1397	0.6796	...	...
Jôgevamaa	0.2116	0.6576	...	...
Järvamaa	0.1812	0.6479	...	...
Läänemaa	0.1846	0.6529	...	...
Lääne-Virumaa	0.1893	0.6695	...	...
Pôlvamaa	0.1935	0.6200	...	...
Pärnumaa	0.1769	0.6428	...	...
Raplamaa	0.1988	0.6285	...	...
Saaremaa	0.2036	0.6436	...	...
Tartumaa	0.1718	0.5763	...	...
Valgamaa	0.1900	0.6555	...	...
Viljandimaa	0.1969	0.6200	...	...
Vôrumaa	0.1847	0.6372	...	...
Estonia	0.1679	0.6338	0.2275	0.0647
Estonians	0.1785	0.6076	...	...
Non-Estonians	0.1492	0.6799	...	...

continued

1979

County	If	Im	Ig	Ih
Harjumaa	0.1503	0.6187	...	...
Hiiumaa	0.1953	0.6915	...	...
Ida-Virumaa	0.1497	0.6798	...	...
Jõgevamaa	0.1904	0.6760	...	...
Järvamaa	0.1979	0.6598	...	...
Läänemaa	0.1874	0.6947	...	...
Lääne-Virumaa	0.1794	0.6708	...	...
Põlvamaa	0.1850	0.6582	...	...
Pärnumaa	0.1724	0.6612	...	...
Raplamaa	0.2044	0.6704	...	...
Saaremaa	0.2055	0.6907	...	...
Tartumaa	0.1679	0.5802	...	...
Valgamaa	0.1819	0.6809	...	...
Viljandimaa	0.1934	0.6434	...	...
Võrumaa	0.1793	0.6556	...	...
Estonia	0.1648	0.6411	0.2135	0.0778
Estonians	0.1700	0.6137	...	...
Non-Estonians	0.1571	0.6817	...	...

continued

1989

County	If	Im	Ig	Ih
Harjumaa	0.1591	0.6274	0.2016	0.0877
Hiiumaa	0.2306	0.6778	0.2176	0.2578
Ida-Virumaa	0.1639	0.6945	0.2011	0.0794
Jõgevamaa	0.2168	0.6540	0.2271	0.1973
Järvamaa	0.2068	0.6498	0.2175	0.1869
Läänemaa	0.1983	0.6880	0.2034	0.1870
Lääne-Virumaa	0.1932	0.6577	0.2066	0.1674
Põlvamaa	0.1965	0.6618	0.2104	0.1693
Pärnumaa	0.1982	0.6471	0.2094	0.1777
Raplamaa	0.2109	0.6572	0.2076	0.2170
Saaremaa	0.2297	0.6535	0.2440	0.2027
Tartumaa	0.1824	0.5801	0.2445	0.0965
Valgamaa	0.2085	0.6640	0.2260	0.1737
Viljandimaa	0.2087	0.6352	0.2135	0.2005
Võrumaa	0.2133	0.6274	0.2451	0.1600
Estonia	0.1782	0.6404	0.2111	0.1196
Estonians	0.1921	0.5942	0.2258	0.1429
Non-Estonians	0.1589	0.7043	0.1939	0.0753

TABLE 2. STANDARD DEVIATION OF COUNTY FERTILITY INDICES, ESTONIA, CENSUS YEARS 1881-1989

Year	If	Ig	Ih	Im
1881	0.0177	0.0260	0.0031	0.0188
1897	0.0191	0.0250	0.0030	0.0240
1922	0.0472	0.0762	0.0054	0.0423
1934	0.0342	0.0531	0.0067	0.0414
1970	0.0204	...	...	0.0239
1979	0.0165	...	...	0.0292
1989	0.0199	0.0475	0.0151	0.0268

TABLE 3. TOTAL FERTILITY RATE BY NATIONALITY, ESTONIAN COUNTIES, 1988/1989

County	Total	Estonians	Non-Estonians
Harjumaa	2.014	2.143	1.921
Hiiumaa	2.824	2.815	3.149
Ida-Virumaa	2.157	2.298	2.142
Jõgevamaa	2.716	2.716	2.752
Järvamaa	2.578	2.600	2.555
Lääne-Virumaa	2.429	2.470	2.415
Läänemaa	2.512	2.548	2.416
Põlvamaa	2.425	2.407	2.810
Pärnumaa	2.492	2.543	2.302
Raplamaa	2.648	2.634	2.923
Saaremaa	2.799	2.786	3.006
Tartumaa	2.145	2.193	2.070
Valgamaa	2.646	2.672	2.602
Viljandimaa	2.646	2.652	2.571
Võrumaa	2.654	2.655	2.623
Estonia	2.234	2.367	2.072

FIGURE 1 COMPARISON OF FERTILITY INDICES
If and Ig of European countries compared
to Estonian level, 1881

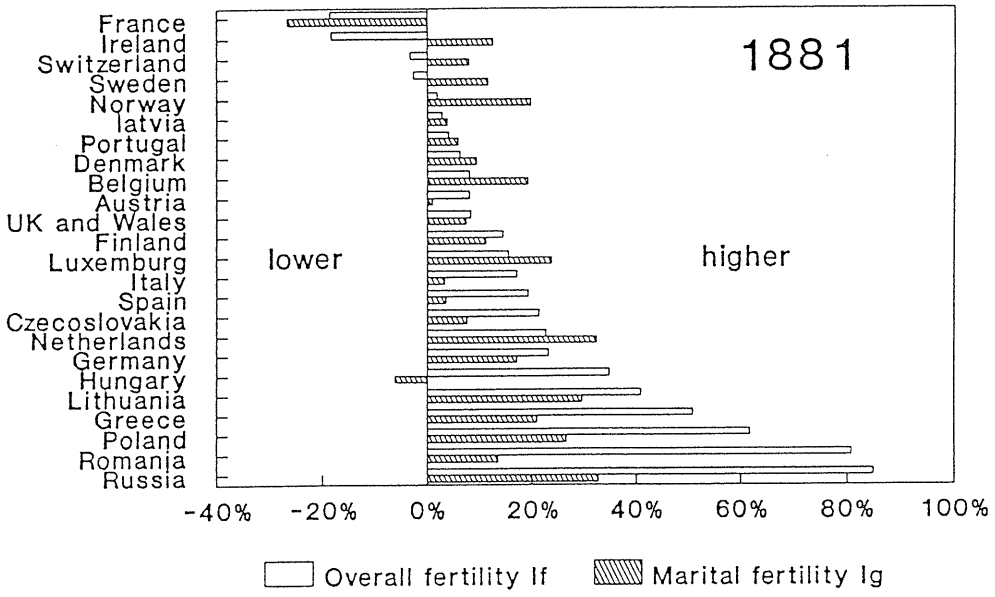


FIGURE 2 DYNAMICS OF FERTILITY INDICES
Estonia, 1881-1934

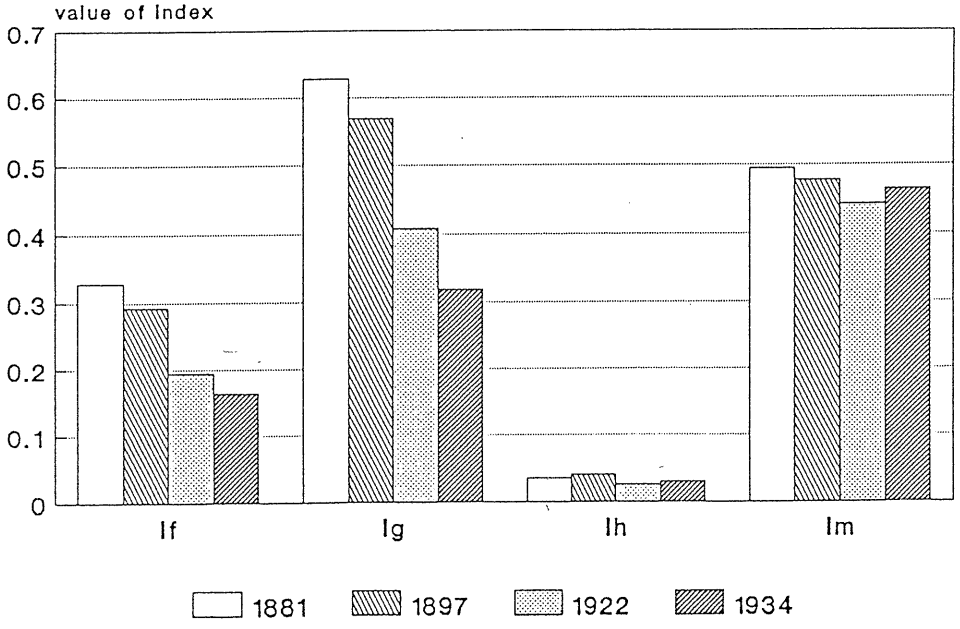


FIGURE 3 DYNAMICS OF FERTILITY INDICES
Estonia, 1881-1934

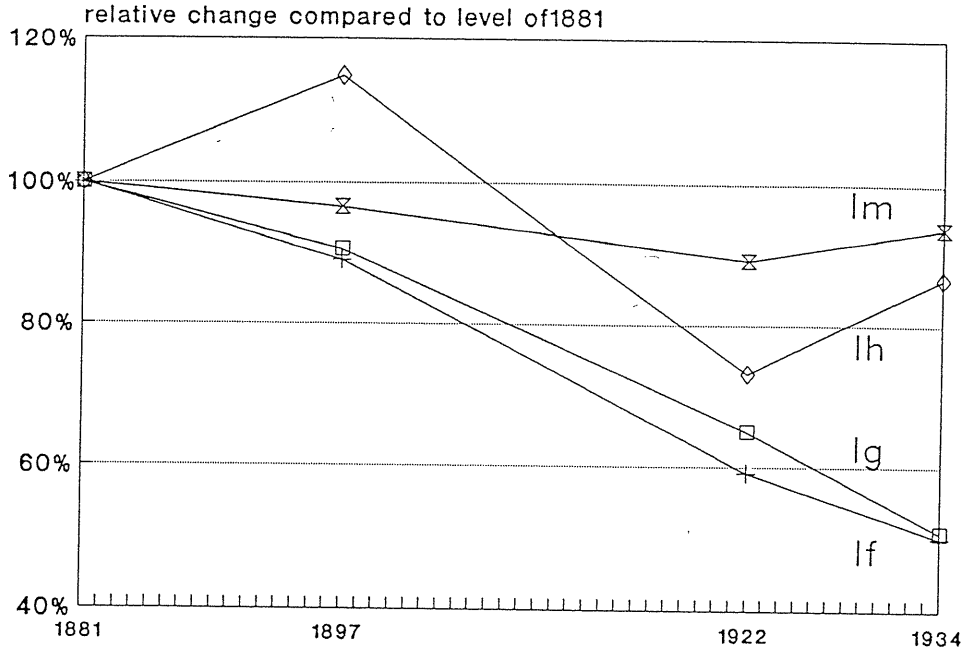


FIGURE 4 COMPARISON OF FERTILITY INDICES
If and Ig of European countries compared
to Estonian level, 1934

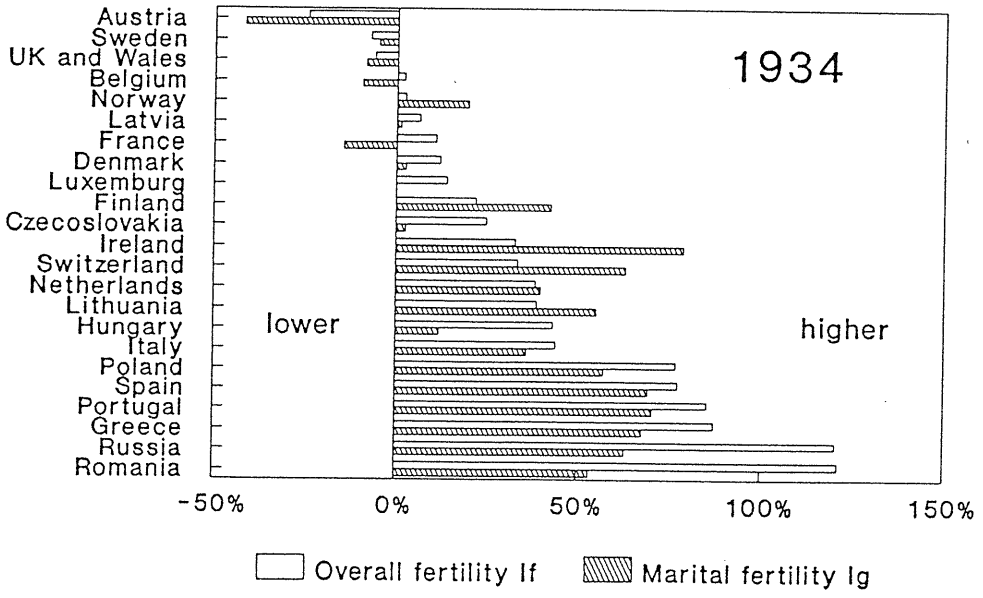


FIGURE 5 DYNAMICS OF FERTILITY INDICES
Estonia, 1934-1989

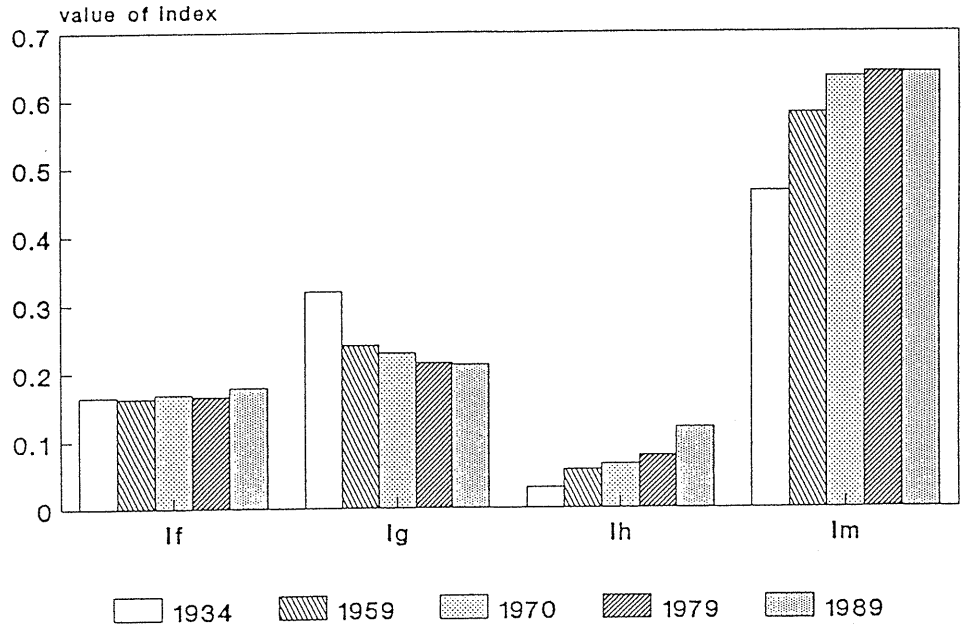


FIGURE 6 DYNAMICS OF FERTILITY INDICES
Estonia, 1934-1989

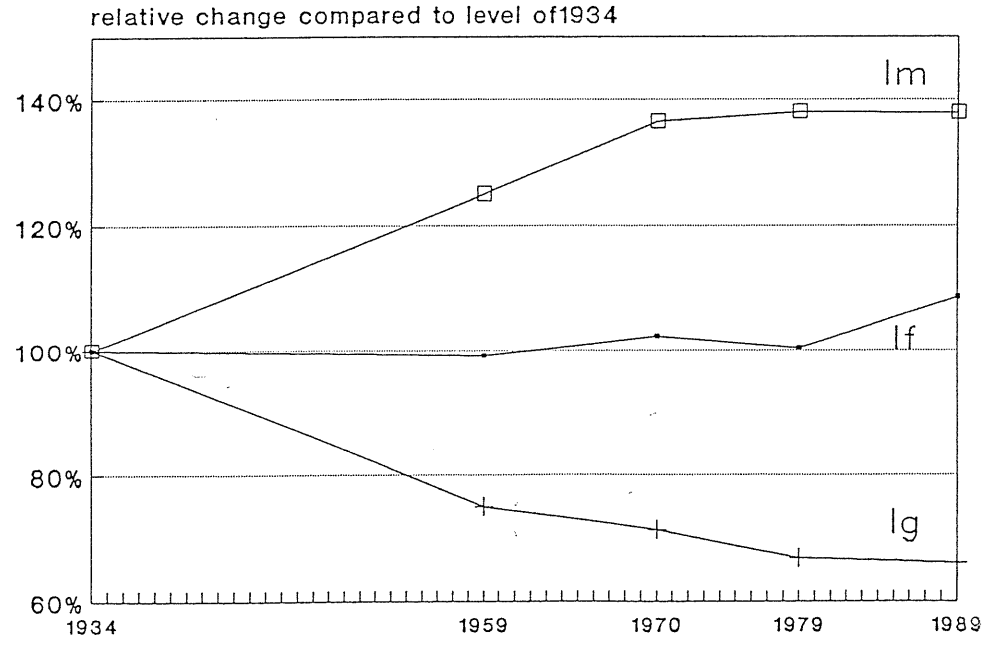


FIGURE 7 DYNAMICS OF FERTILITY INDICES
Estonia, Estonians and Non-Estonians,
1959-1989

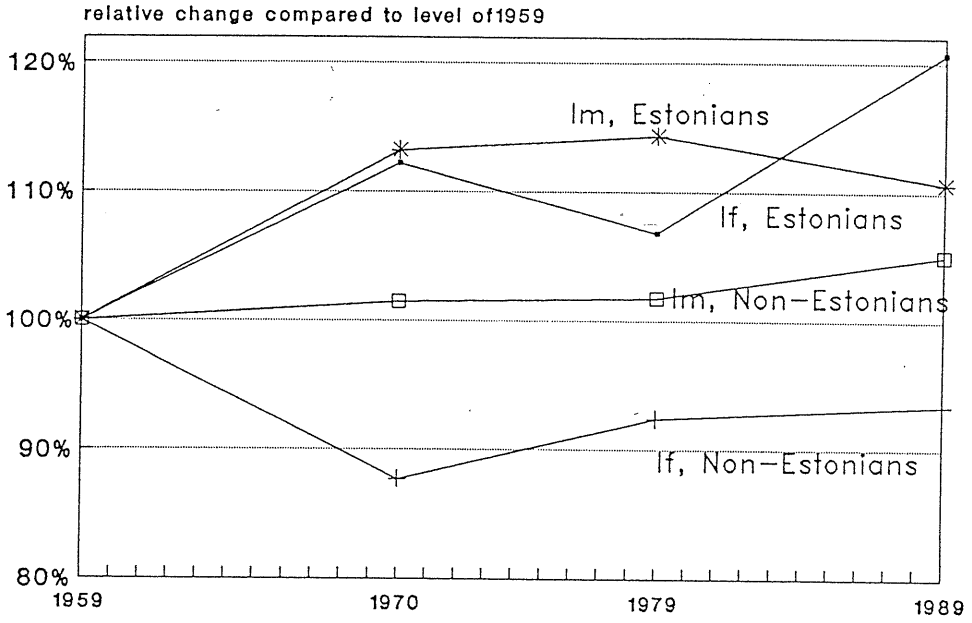


FIGURE 8 FERTILITY INDICES OF ESTONIANS
AND NON-ESTONIANS
Estonia, 1989

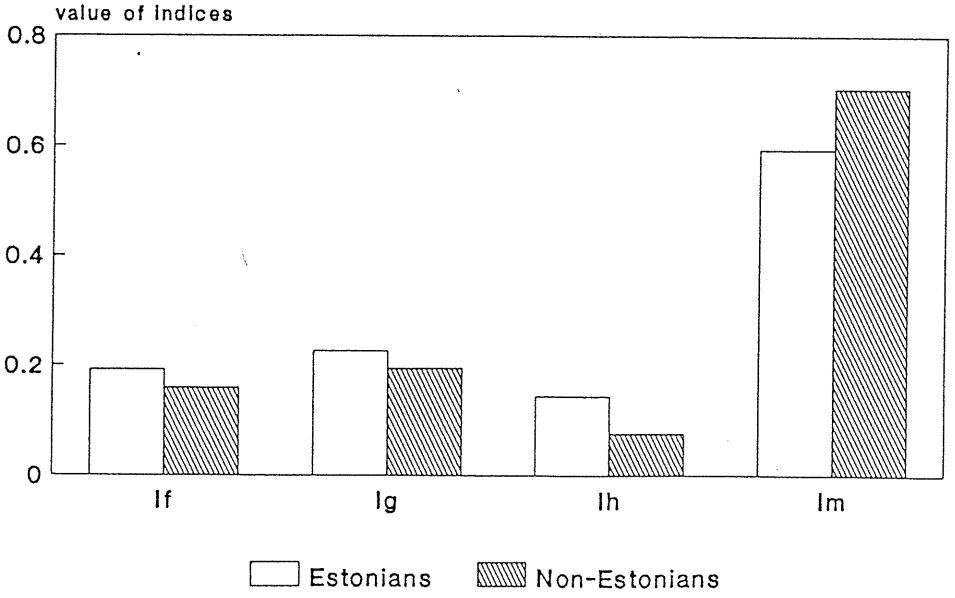


FIGURE 9 COMPARISON OF TOTAL FERTILITY RATES,TFR of European countries compared to Estonian level, 1960-1964

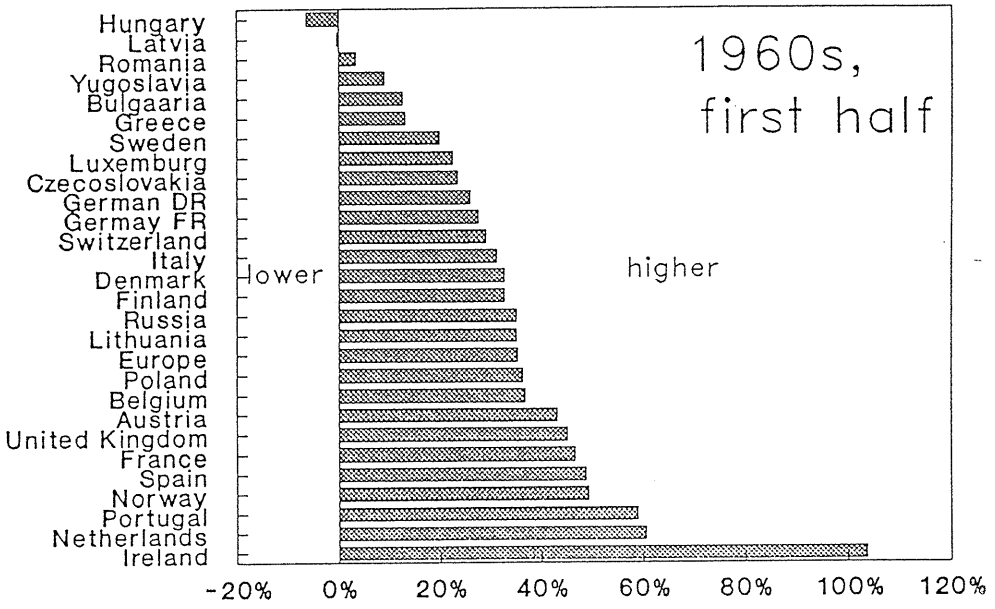
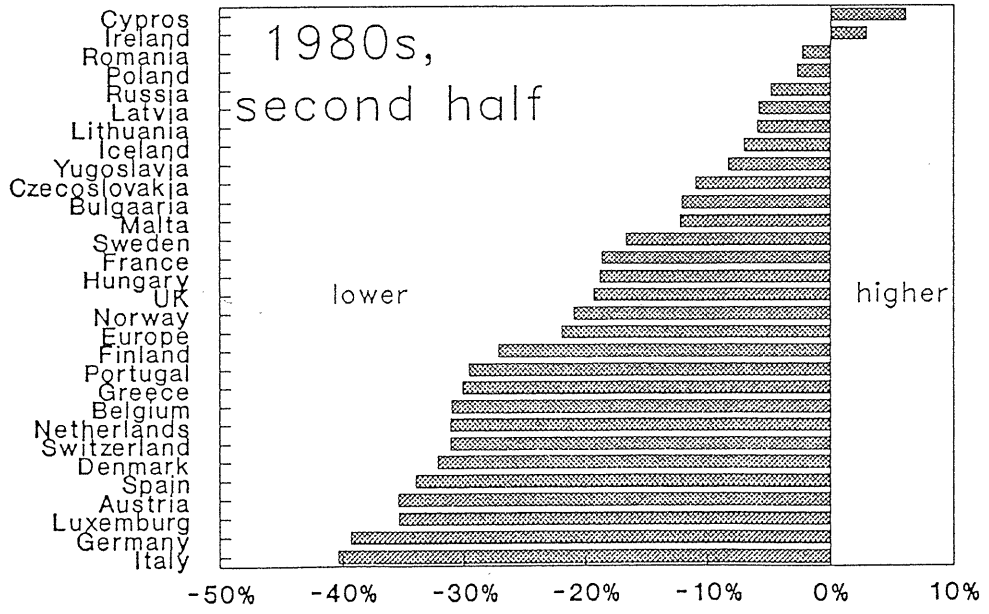


FIGURE 10 COMPARISON OF TOTAL FERTILITY RATES,TFR of European countries compared to Estonian level, 1985-1989



FIGUR 11 OVERALL FERTILITY BY COUNTIES
Estonia, 1881 and 1897

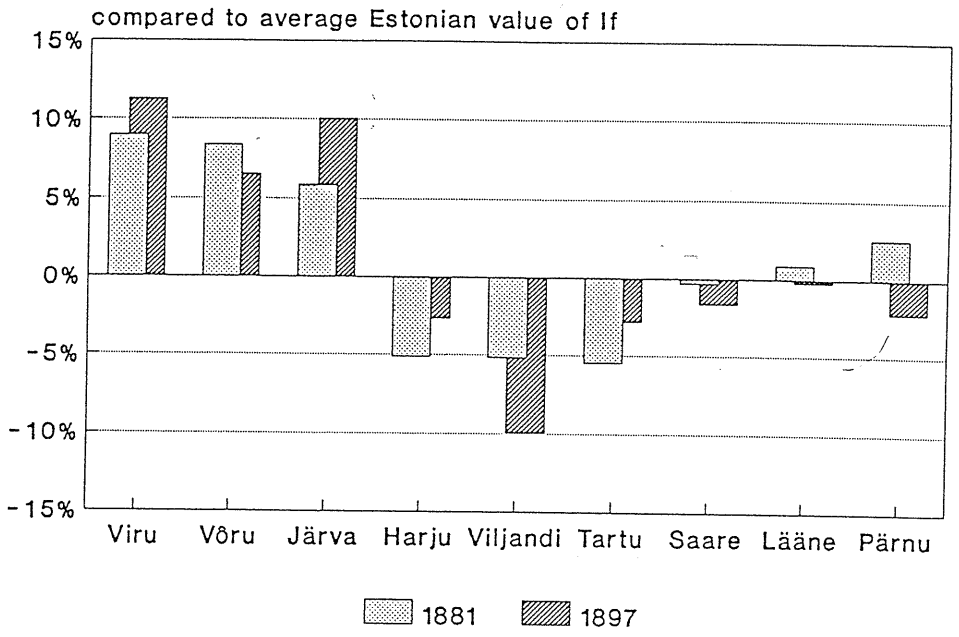


FIGURE 12 DYNAMICS OF STANDARD DEVIATION
OF COUNTY FERTILITY INDICES,
Estonia, 1881-1989

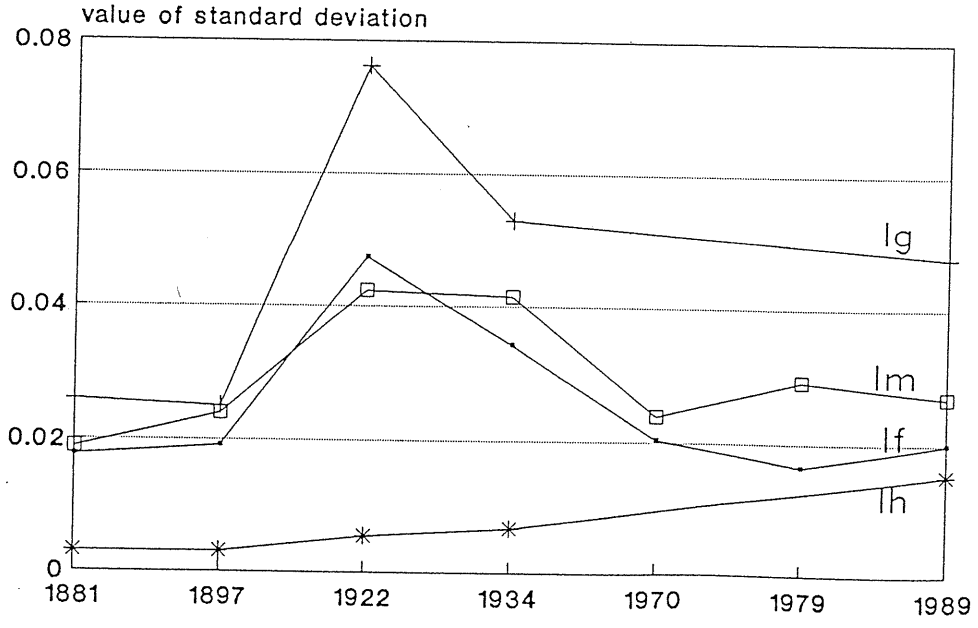


FIGURE 13 OVERALL FERTILITY INDEX

Estonian counties, 1881

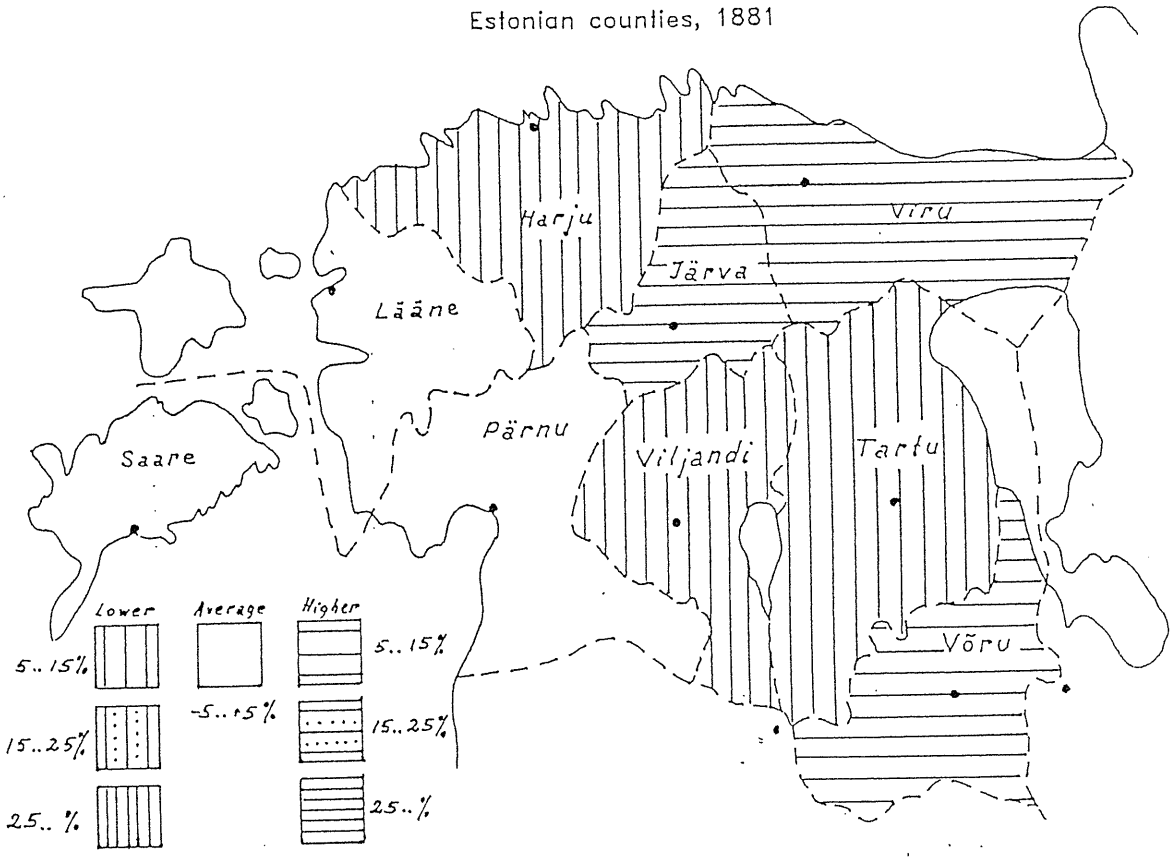


FIGURE 14 OVERALL FERTILITY INDEX

Estonian counties, 1897

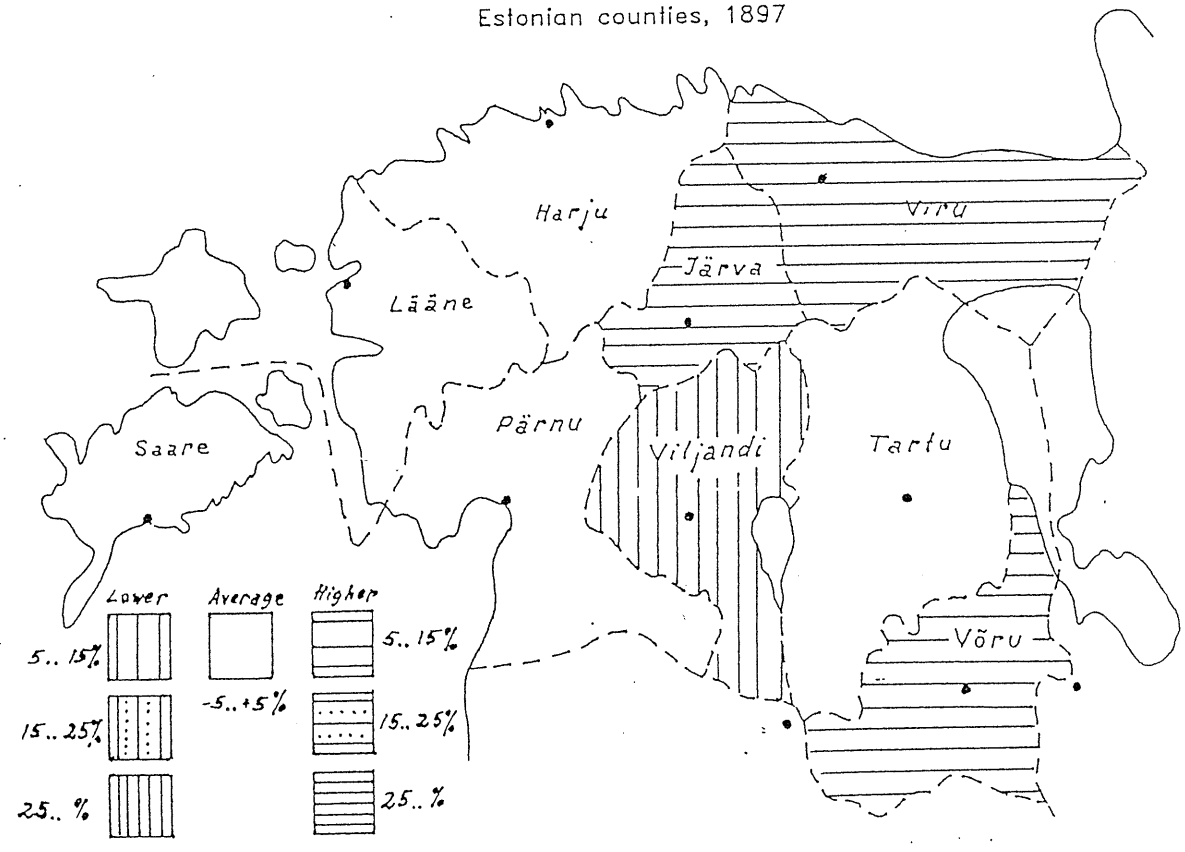


FIGURE 15 OVERALL FERTILITY INDEX

Estonian counties, 1922

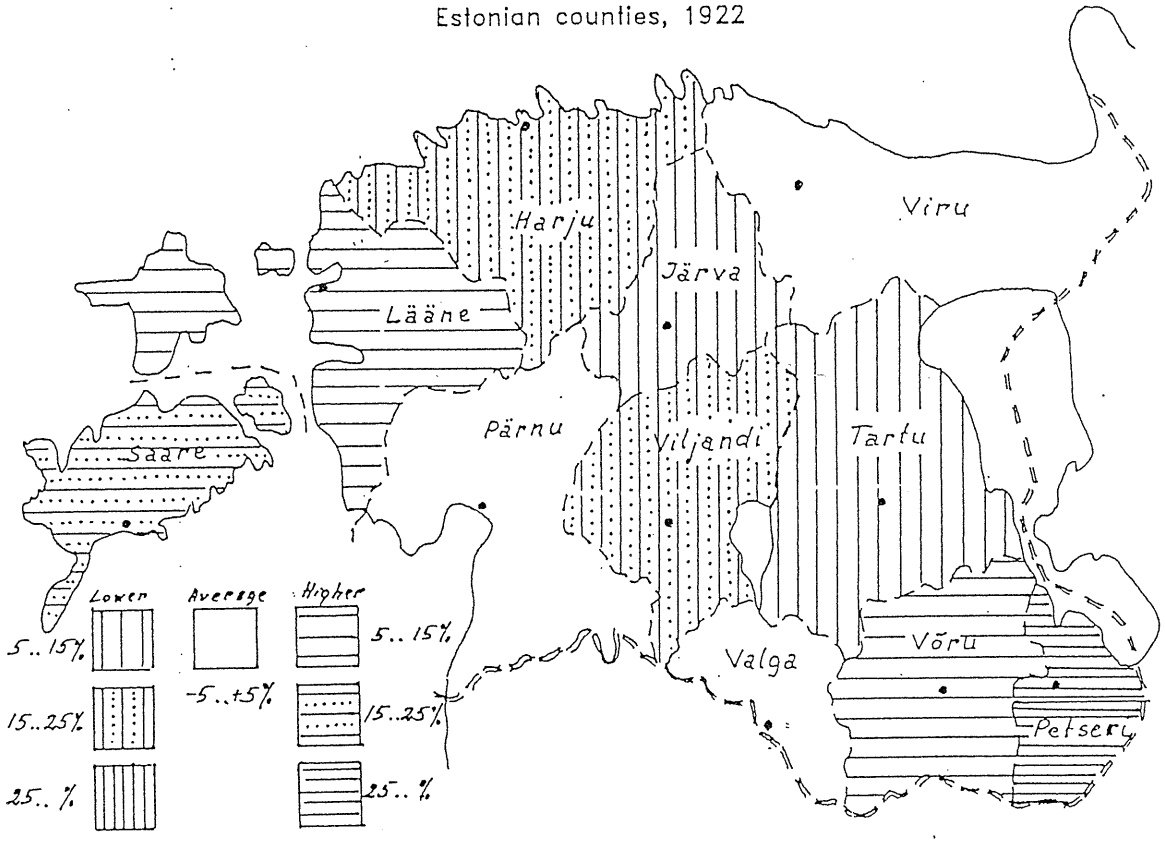


FIGURE 16 OVERALL FERTILITY INDEX

Estonian counties, 1934

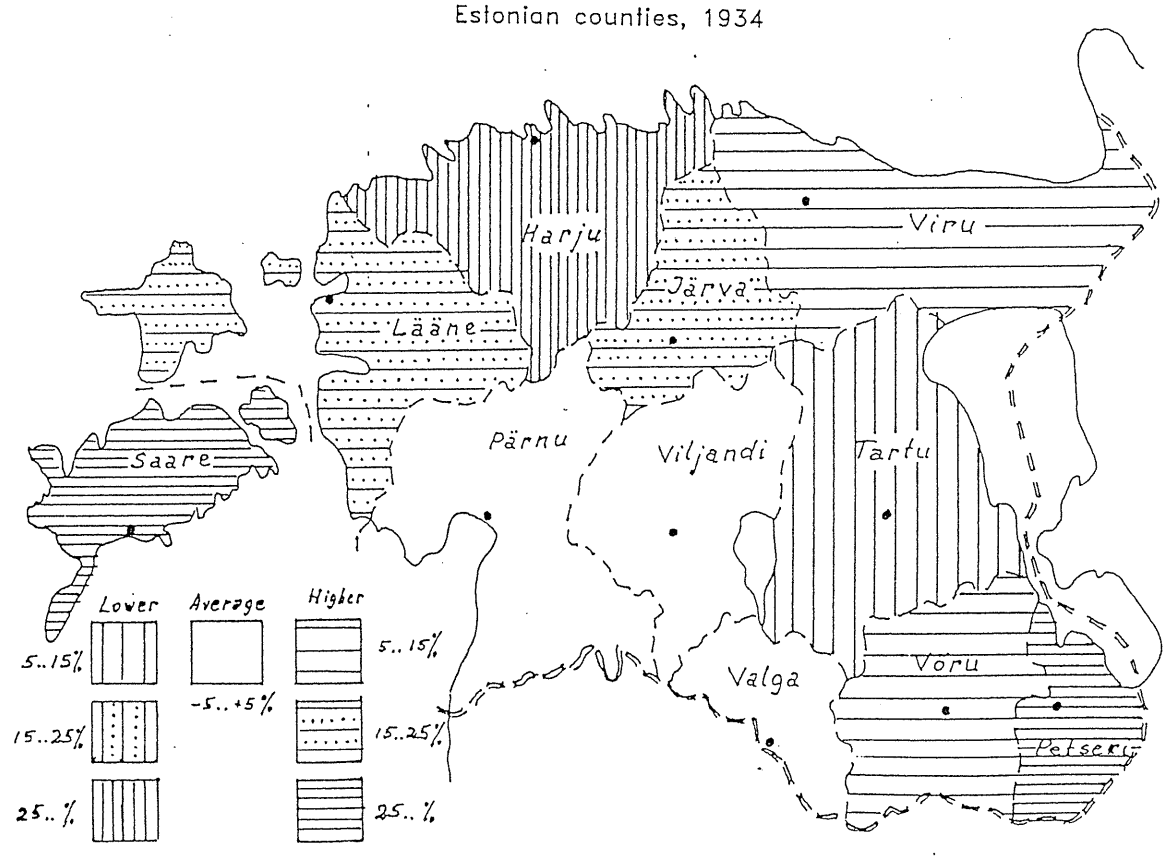


FIGURE 17 OVERALL FERTILITY INDEX

Estonian counties, 1970

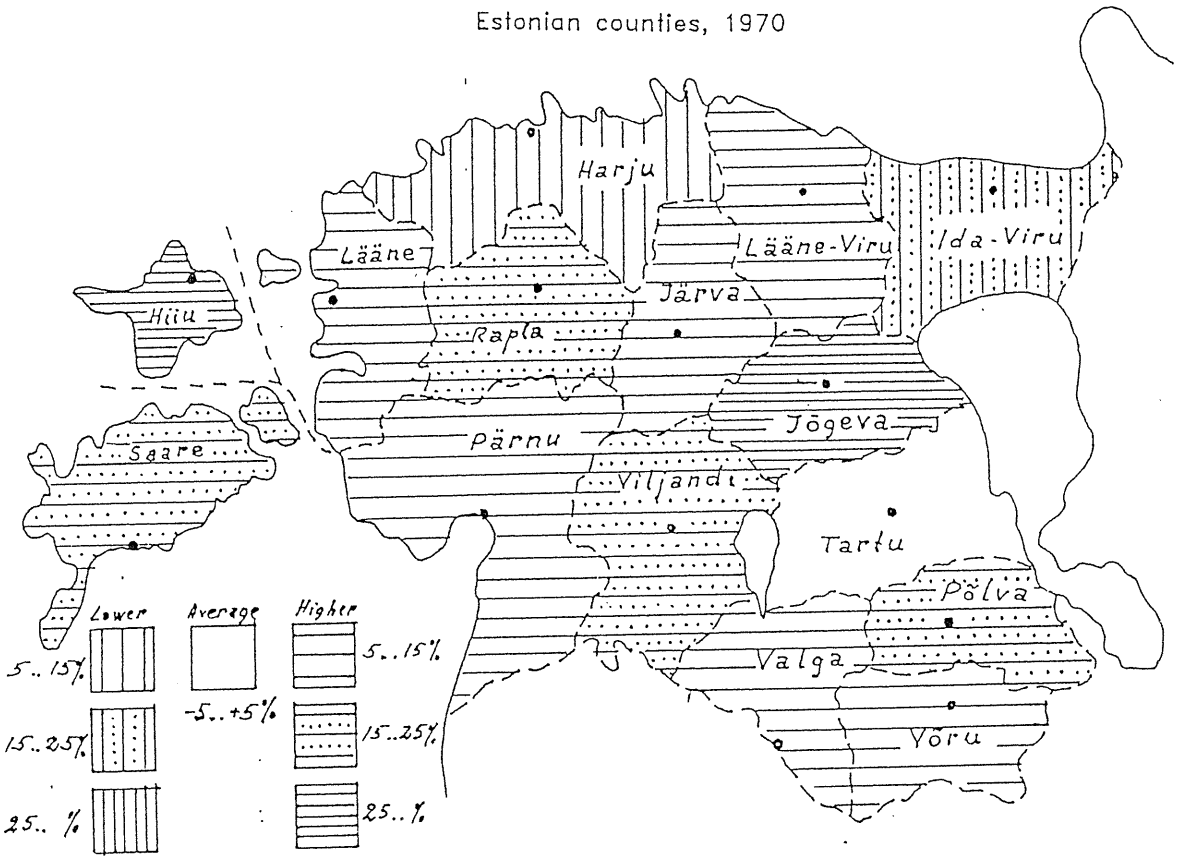


FIGURE 18 OVERALL FERTILITY INDEX

Estonian counties, 1979

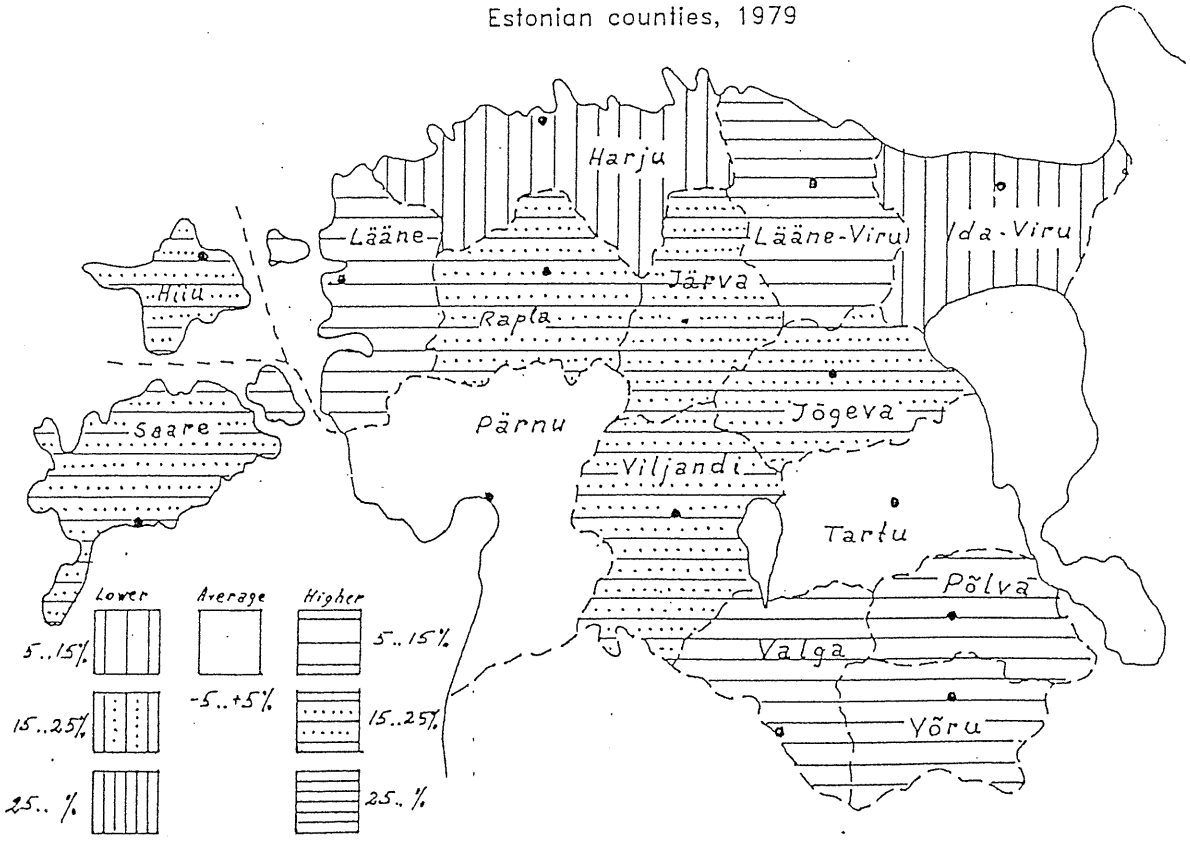


FIGURE 19 OVERALL FERTILITY INDEX

Estonian counties, 1989

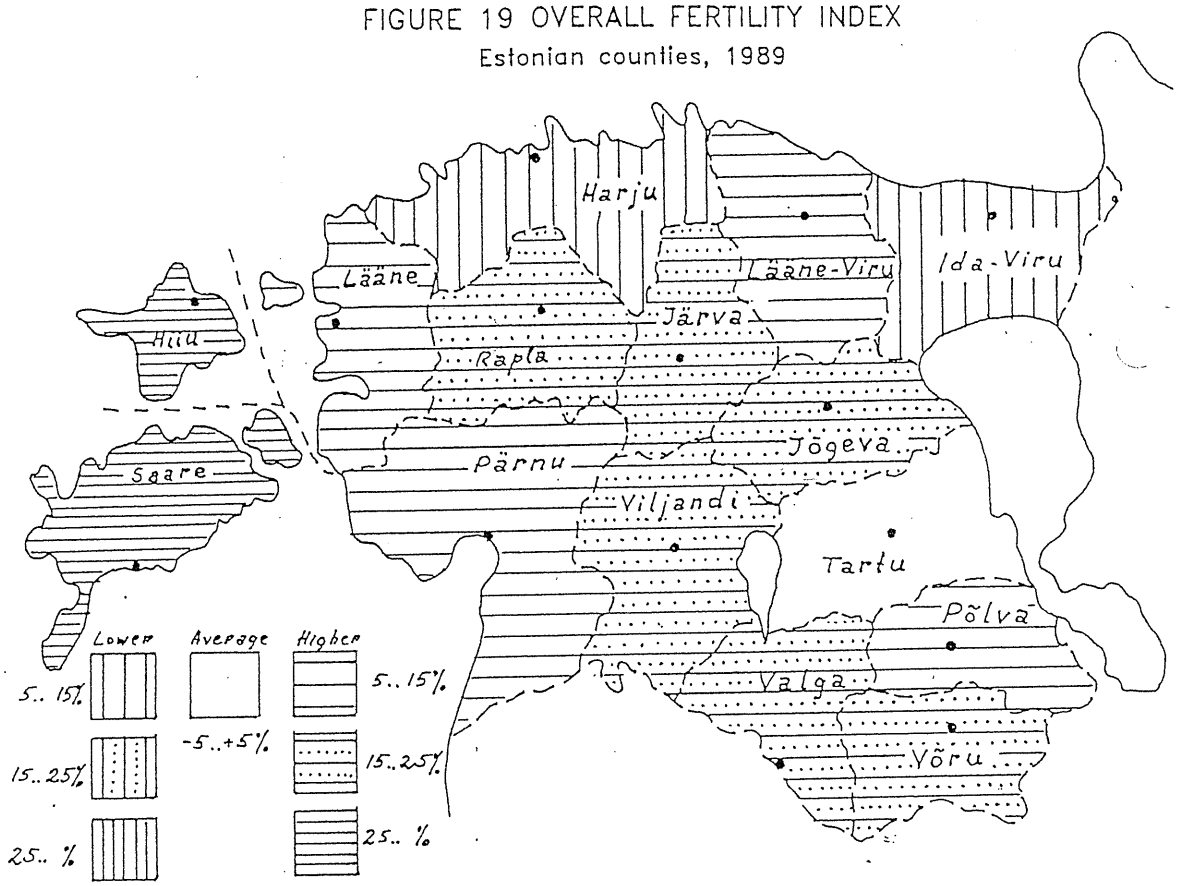


FIGURE 20 DYNAMICS OF If

Estonian counties, 1881-1989

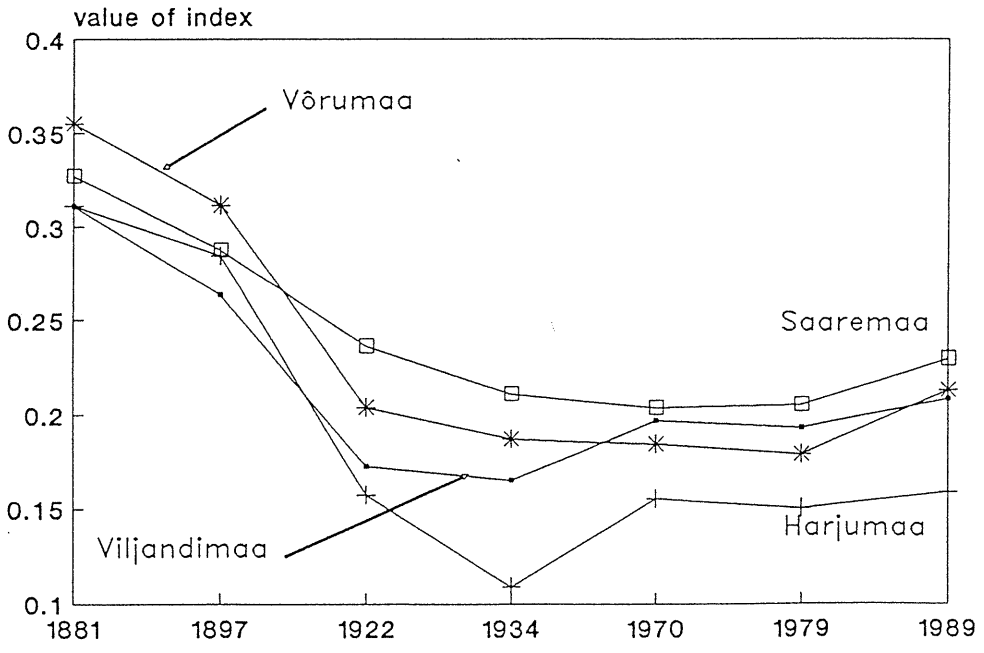


FIGURE 21 DYNAMICS OF OVERALL FERTILITY
Estonian counties, 1970-1989

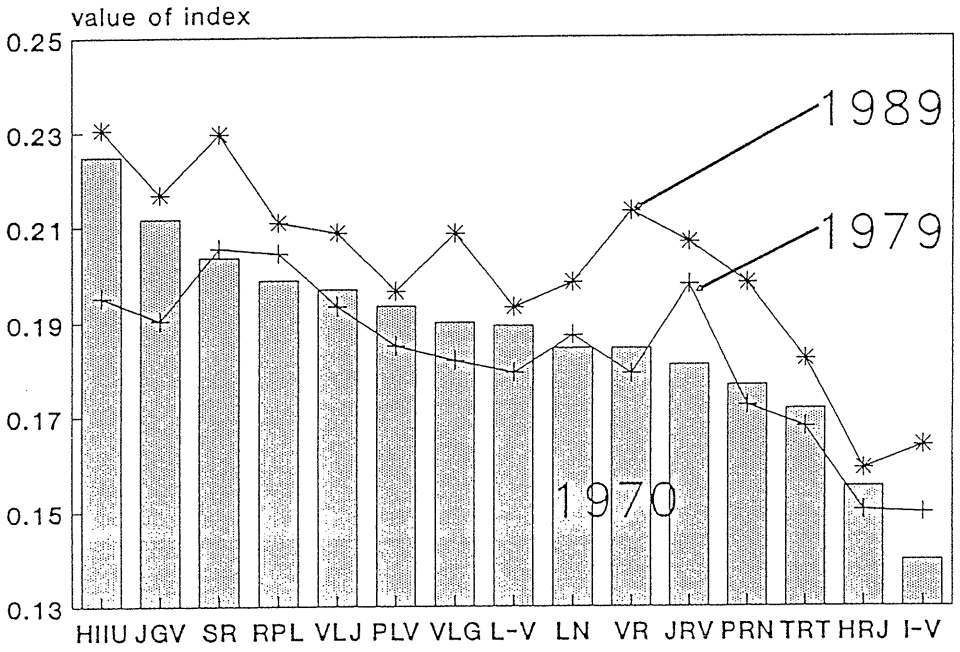


FIGURE 22 COUNTY DIFFERENCIES IN TFR
Estonia, 1989

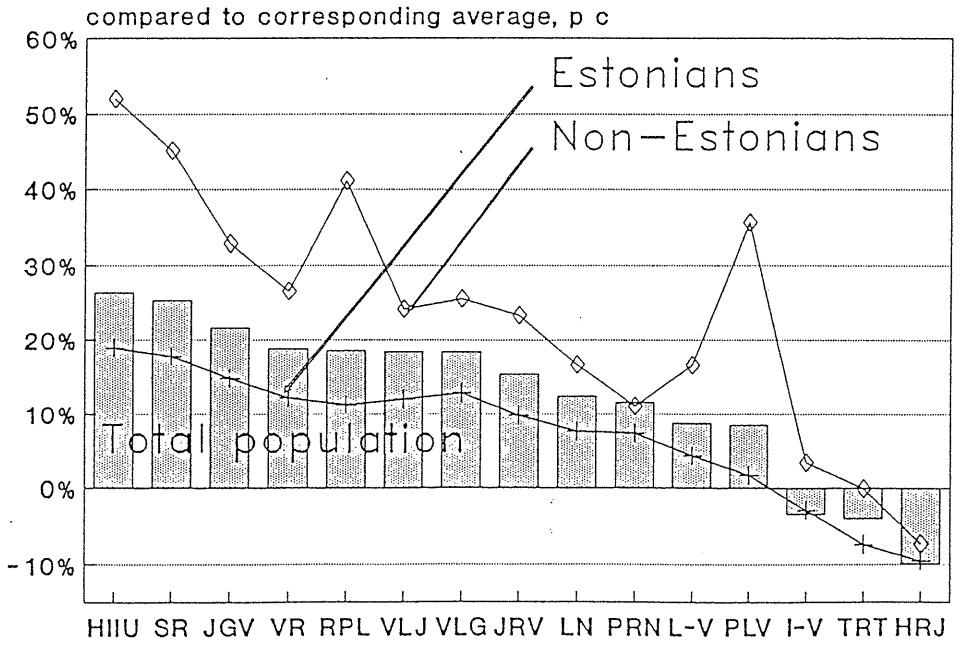


FIGURE 23 COMPARISON OF TOTAL FERTILITY RATE (Non-Estonian compared to Estonian)
Estonia, 1989

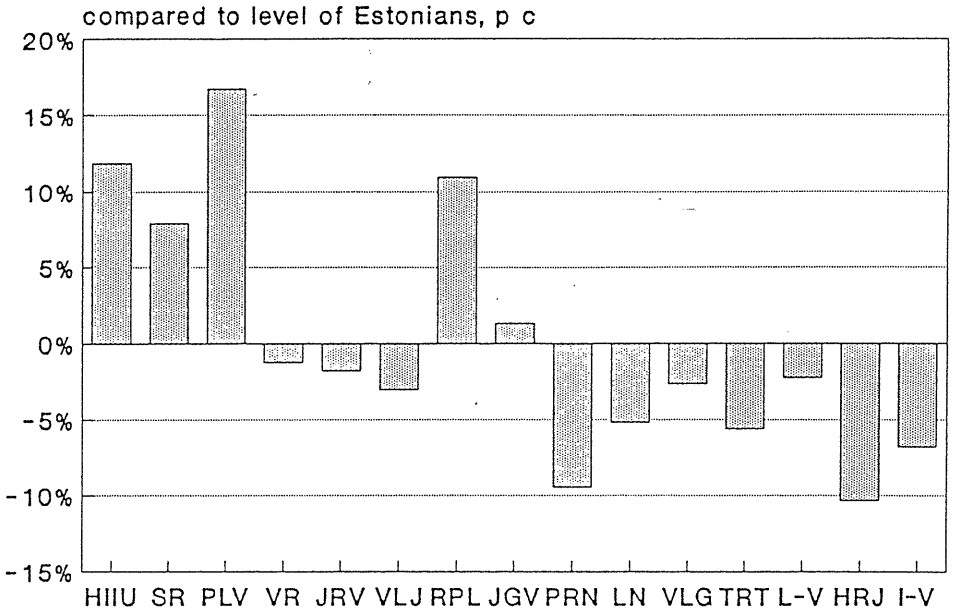
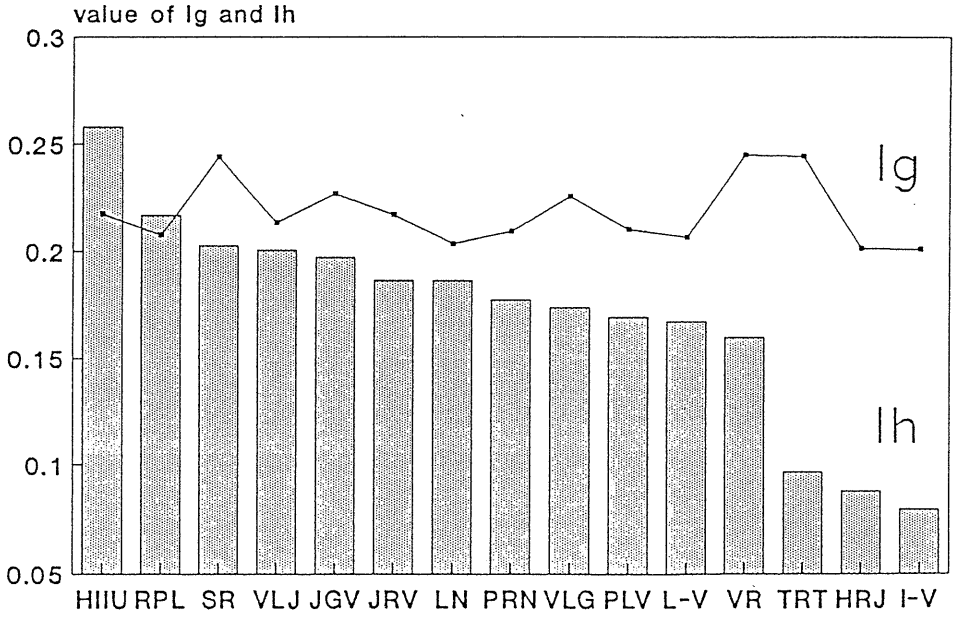


FIGURE 24 MARITAL AND ILLEGITAMATE FERTILITY INDICES BY COUNTIES
Estonia, 1989



REFERENCES

Coale A.J., B.Anderson, E.Härm (1979). Human fertility in Russia since the nineteenth century. – Princeton.

Coale A.J, R.Treadway (1986). Summary of the changing distribution of overall fertility, marital fertility and the proportion married in the provinces of Europe. – *A.J.Coale and S.C.Watkins (Eds.) The decline of fertility in Western Europe.* – Princeton, pp.31–181.

Indirect techniques for demographic estimation (1983). – New York.

Kaa van de D.J. (1987). Europe's Second Demographic Transition. – *Population Bulletin*. Vol.42, No.1.

Katus K. (1990a). Fertility transition in the Baltic states. Paper presented to the Seminar on Demographic Processes in the USSR in the Context of the European Experience. – Tallinn.

Katus K. (1990b). Demographic trends in Estonia throughout the centauries – *Yearbook of Population Research in Finland.* – Helsinki, vol.28, pp.50–66.

Katus K. (1991). Estonian high fertility on historical background. Paper presented to the US–USSR Population Symposium. – Tallinn.

Klinger A. (1988). The future of reproduction. – *Future changes in population age structures. IIASA Conference Papers.* – Laxenburg, pp.63–97.

Knodel J. (1986). Demographic transition in German villages. – *A.J.Coale and S.C.Watkins (Eds.) The decline of fertility in Western Europe.* – Princeton, pp.337–389.

Notkola I.–L. (1989). Luonnollisesta hedelmällisyydestä lapsirajoitukseen. – Kuopio.

Nôges M. (1925). Rahvamuutused Viljandi maakonnas 1801–1923. Demograafiline töö. – Viljandi.

Palli H. (1988). Otepää rahvastik aastail 1716–1799. – Tallinn.

Ptuha M. (1960). Otcherki po statistike naselenia. – Moscva.

Rahvastikuprobleeme Eestis (1937). 1.III 1934 rahva–loenduse andmed. Vihk IV. – Tallinn.

Recent demographic developments in the member states of the Council of Europe and in Yugoslavia (1990). – Strasbourg

Sardon J.–P. (1990). Le remplacement des generations en Europe depuis le debut du siecle – *Population*, vol. 45, No.6, pp.947–967.

Strömmer A. (1969). Väestöllinen muuntuminen Suomessa. – Tornio.