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MATERIALS ON THE HISTORICAL DEMOGRAPHY OF LITHUANIA IN THE 14ᵗʰ—18ᵗʰ CC

The demographical problems of Lithuania in the 2nd half of the 2nd millenium A.D., important for the examination of the population structure and, consequently, for the solution of some questions of ethnical anthropology of Lithuania as well as for the elucidation of the demographical phenomena in the neighbouring countries and in East Europe in general, have hardly been investigated at all. Scanty papers describe the natural dynamics if inhabitants on the basis either of church registration (Biržiška V., 1922) or manor inventories and peasant house registration (Morzy J., 1965) data. R. J a s a s and L. T r u s k a (1972) have published very valuable summary tables of the 1790 census of population in the Grand Duchy of Lithuania, however, the analysis of longevity has not been done. So far, there have been no paleodemographical characterization of skeletal populations in Lithuania at all.

MATERIALS AND METHODS

The aim of the present publication is to give the demographical characteristics of the 14th—18th cc. Lithuania on the basis of the osteological materials from the 14th—17th cc. cemeteries and of the summary tables of the 1790 census in the Grand Duchy of Lithuania, and to ascertain to what degree the real demographical situation was reflected by the two principally different sources of information as well as to look for the ways that would enable to compare the results obtained from the sources.

The examination of the 14th—17th cc. cemeteries gives unique material for the study of burial customs, material culture, anthropology and demography of the rural people in Lithuania. Under peculiar circumstances, Lithuania was the only state in Europe, that had officially practiced paganism up till the beginning of the 15th c. A.D. Christianity was introduced in the eastern part of the state in 1387, and in the western one as late as 1413. Baptism was only a formal capaign which did not change essentially the people's mentality; the great majority of the baptized people remained heathen, the rural population professed its ancient religion during the 15th and the 1 st half of the 16th c. and observed nearly all pre-Christian customs, including burial rites, out of which cremation was the first to be abandoned. This rite existed in Lithuania for nearly a thousand years and vanished completely in the middle of the 15th c. It is at this time that osteological materials reappear in Lithuania. No written sources of the historical period can serve as a substitute for the results of the anthropological and paleodemographical analysis of the materials.

The present paper deals with the skeletal populations of six cemeteries that were excavated by the archaeologists of the Institute of History, of the Lithuanian Academy of Sciences, in 1968—1974. The craniological analysis of the materials was published separately (Č e s n y s G., 1976), the publication containing detailed archaeological references as well. The dead were buried in quadrangular graves in wooden coffins with their heads oriented westward. Not all the material was preserved enough to estimate the sex and age (Table 1). Some burial sites were partially destroyed even before the excavations. G é l u v a is the largest and best examined cemetery from this period, si-

TABLE 1

TABLE 1 — *Age and sex structure of the 14th—17th cc. Lithuaninan skeletal populations*

Cemetery	Number of skeletons used		Age distribution of non-adults (%)						Number of adults (20—)				Sex ratio ♂/♀
									♂		♀		
	N	%	0	0—1	0—6	7—14	15—19	20—	N	%	N	%	
Géluva	349	96.94	18.62	24.21	32.96	8.89	1.41	56.74	95	27.22	103	29.51	0.9223
Jakštaičiai	188	87.44	12.50	34.00	25.63	11.80	2.97	59.60	50	26.60	54	28.72	0.9259
Skrebinai	121	85.62	1.86	2.89	9.21	7.49	3.95	79.35	61	50.41	35	28.92	1.7428
Liepiniškes	92	92.00	8.42	16.89	32.12	15.05	4.52	48.31	28	30.43	16	17.39	1.7500
Uliunai	48	68.57	4.17	7.30	19.80	7.29	4.16	68.75	22	45.83	11	22.92	2.0000
Ruseiniai	43	72.88	8.14	9.30	12.92	10.91	4.06	72.11	24	55.81	7	16.28	3.4285
Pooled sample	841	87.88	12.37	18.08	26.11	9.67	2.62	61.60	280	33.29	226	26.87	1.2389

TABLE 2 — *Longevity and reproduction rates in the 14th—17th cc. Lithuaninan skeletal populations*

Cemetery	Mean age at death		Life expectancy				Number of new borns per female (15—)	Number of children(0-14) per female (15—)	Number of non-adults per female (20—)	Reproduction rates	
	♂	♀	e_0^0	$e_{20}^0\male$	$e_{20}^0\female$	$e_{20}^0\male\female$				R_{pot}	*R_0
Géluva	48.31	43.27	27.43	28.32	23.28	25.23	0.613	1.417	1.366	0.846	1.966
Jakštaičiai	45.85	40.27	26.51	25.85	20.28	22.45	0.412	1.304	1.407	0.732	1.806
Skrebinai	46.31	43.21	37.22	26.31	23.21	24.63	0.061	0.479	0.714	0.820	2.732
Liepiniškes	43.03	40.31	23.36	23.03	20.31	21.93	0.456	2.741	3.000	0.712	1.490
Uliunai	49.77	44.54	32.81	29.99	24.54	27.27	0.167	1.273	1.364	0.866	2.526
Ruseiniai	43.02	41.42	32.22	23.02	21.43	21.77	0.437	1.428	1.714	0.732	2.230
Pooled sample	46.57	42.34	28.54	26.56	22.35	24.17	0.439	1.347	1.447	0.799	2.035

* $U_c = 8$

tuated some 50 km north-west of Kaunas. It occupied the churchyard of a Calvinist church that was several times burnt down and destroyed by the Catholics (Chodynicky K., 1928) during the Counter Reformation, but was rebuilt and functioned till the end of the 17th c. The more prominent members of the Calvinist community were buried in the church, and the common people in the churchyard, where 360 graves were excavated in 1974. The great amount of graves, the narrow scope of functioning time (the 16th—17th cc.) and the completeness of excavation distinguish Géluva from the synchronous Lithuanian burial grounds, especially in a demographical sense. By the way, the 16th c. graves were scanty and found outside the cemetery, and the great majority of the graves belong to the 17th c. In general, the cemetery had been functioning for about a hundred years. *Jakštaičiai* is a cemetery located some 15 km to the south from Šiauliai where 215 graves were unearthed in 1972. Jakštaičiai is one of the largest and best examined burial grounds, dating from the 15th—17th cc. The cemetery of *Skrebinai* is situated 10 km west of Jonava, and 153 graves were excavated in it in 1970, dating from the very end of the 14th c. and the 17th c. The burial site was in a poor state: a part of the graves had been destroyed by soil erosion because the territory was used as arable land, another part of the area was occupied by more recent graves, that is why the cemetery was not fully investigated. *Liepiniškés* is a cemetery situated some 10 km east of Utena, where 100 graves were unearthed in 1971. The cemetery, dating from the 15th—17th cc., was examined only partially because it merged into a more recent (the 19th c.) burial ground. The 16th—17th cc. cemetery of *Uliunai* is located 15 km south of Panevėžys on a partially destroyed mound, where 70 graves were dug up in 1971. The *Ruseiniai* cemetery lies some 50 km north of Kaunas. Its excavation was started in 1939 and continued in 1968—1969, when 59 graves were unearthed, dating from the very end of the 14th — the 17th cc. Part of the old graves were destroyed when digging pits for the more recent (the 19th c.) ones, another part was washed down from the hill into the river.

Thus the majority of the cemeteries are scattered in the central part of Lithuania and belong to the 15th—17th cc.; only scanty graves belong to the very end of the 14th c., that is why the skeletal materials of these cemeteries are considerer to be a fairly homogeneous demographical source.

The second part of the present paper deals with

the data of 1790 census in the Grand Duchy of Lithuania that are taken from R. Jasas and L. Truska book (Jasas R., Truska L., 1972). According to the authors, all the material of the census represents nearly half of the citizens of the former state. Only the data on the three administrative regions (pavietas) that are within the borders of the present Lithuanian SSR (Šiauliai, Ukmergé and Trakai) were selected for demographical analysis; the data on the Byelorussian and Ukrainian regions that had once belonged to the Grand Duchy of Lithuania, were not used. Thus the material of the census used in this paper represents about 42 % of the Christian population that lived in the ethnographical Lithuania in 1790.

The palaeodemographical life tables by G. Acsádi and J. Nemeskéri (1970) were used in the analysis of skeletal materials. In addition, the mean age at death was calculated directly. The population reproduction rates were estimated after M. Henneberg (1975), the reliability of life expectancy estimations was calculated after M. Henneberg and J. Strzałko (1975); the methods by G. Acsádi and J. Nemeskéri (1970) as well as those by N. G. Gejvall (1960) were used for the reconstruction of population size.

In the analysis of the census materials we used standard life tables (Merkov A. M., 1965). Naturally, the different principles of the construction of life tables in osteological and census materials do not allow to compare the results of the tables. That is why the mortality data on Šiauliai, Ukmergé and Trakai administrative regions were treated as if all the dead had been buried in one cemetery, i.e. the "paleodemographical version" of life tables was constructed after G. Acsádi and J. Nemeskéri (1970), opposite to the common "demographical version".

RESULTS AND DISCUSSION

The skeletal populations from the 14th—17th c.c. Lithuanian cemeteries vary considerably in sex and age structure (Table 1). The low percentage of new-borns and infants is evident especially in the burial sites that were partially destroyed and incompletely excavated. The most real amount of new-borns and infants seems to be in Geluva and Jakštaičiai, i.e. in the largest and most representative cemeteries. Consequently, the percentage of 0—14-year-old children equals to 41.85 in Géluva, and 37.43 in Jakštaičiai. I. Popovici and M. Udrescu (1974) have estimated 34.65 % of children of that age in a synchronous Straulesti cemetery (Romania), and M. Stloukal and H. Hanáková (Stloukal M., Hanáková H., 1974; Stloukal M., 1962) 35.6—47.5 % in older (the 9th—10th cc.) Czechoslovakian burial grounds. Children (0—14) make up 41.5 % in the 10th—12th cc. Hungarian demographical model (Acsádi G., Nemeskéri J.). The non-adults (0—20) constitute an especially large part (62.8 %) in the skeletal population from the 19th c. Szczepanowo in Poland (Henneberg M., Strzałko J., 1975). Thus

the death rate of children and especially of new-borns is too low even in the most representative cemeteries of Géluva and Jakštaičiai. Apparently, young bones are not fully calcified and may tend to disintegrate faster than adult bones. Some of children skeletons buried not so deep as the adult ones may have been destroyed by soil erosion. However, with some reservations, the skeletal materials from these cemeteries, especially those from Geluva, can serve for the explanation of children mortality in the 14th—17th cc. Lithuania.

The sex ratio of adults also differ in Lithuanian burial grounds (Table 1). D. R. Brothwell (1971) notes that sex ratio usually is scattered near 100 : 100 line, but the predominance of males appears quite frequently in ancient cemeteries. The predominance of males was noticed in the early medieval Slav cemeteries (Stloukal M., 1962). In this sense, sex ratio seems to be real in Geluva, Jakštaičiai, and in the pooled skeletal population of six Lithuanian cemeteries. A quite different situation is in the rest of four cemeteries. A striking predominance of males may be explaned by the fact that those burial sites were excavated incompletely. Thus N. G. Gejvall (Brothwel D. R., 1971; Gejvall N. G., 1960) showed that men had been buried more on one side of a church, women on the other side, and children had been evenly distributed throughout the territory of the medieval Westerhus cemetery (Sweden). If there was unearthed only part of the burial ground, a great sampling error might be made. On the other hand, the predominance of males, the small amount of new-borns, and the repeated defficiency of children, according to G. Acsádi et all. (Acsádi G., Harsányi L., Nemeskéri J., 1962), may indicate the immigration of young adult men into a population. Such a picture appears in Skrebinai, Uliunai, and in a less clear way in Ruseiniai (Table 1). Nevertheless, a probable immigration into these cemeteries cannot distort considerably the sex and age composition of the pooled skeletal population because of the small size of the above cemeteries. On the contrary, pooling reduces a sampling error. The indices of fertility remain quite the same in the pooled population (Table 2) as in "the pure" ones of Geluva and Jakštaičiai, and are quite similar to those stated by A. Kozintsev (1971).

Indices of longevity differ considerably in Lithuanian cemeteries (Table 2). It is especially true of life expectancy at birth (an interval is of 14 years), and this is apparently connected with different frequencies of new-borns in the populations. Life expectancy at 20 years fluctuates moderately (circa 5 years). In general, it is possible to calculate life expectancy at birth as 28 years and that of adults as 24 years in the 14th—17th cc. Lithuania. The life span of females is from 1.59 years (Ruseiniai) to 5.57 years (Jakštaičiai) and on the average by 4.21 years shorter than that of males. A similar sex difference in longevity was noted by other authors (Alexeev V. P., 1972; Angel J. L., 1969; Modrzewska K., 1958; Stloukal

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TABLE 3

*Life table
of the 14th—17th cc.
cemetery in Géluva*

X	D_x	d_x	l_x	a_x	L_x	T_x	e_x^0
Both sexes							
0	65	18.63	100.00	0.1863	90.68	2743.20	27.43
1—4	39.6	11.35	81.37	0.1394	302.78	2652.52	32.59
6—9	27.7	7.94	70.02	0.1133	330.25	2349.74	33.58
10—14	13.75	3.93	62.08	0.0633	300.57	2019.49	32.53
15—19	4.95	1.41	58.15	0.0242	287.22	1718.92	29.56
20—29	27.5	7.87	56.74	0.1387	528.05	1431.70	25.23
30—39	31	8.88	48.87	0.1817	444.30	903.65	18.49
40—49	49	14.05	39.99	0.3513	329.65	459.35	11.48
50—	90.5	25.94	25.94	1.0000	129.70	129.70	5.00
	349	100.00			2743.20		
Males							
20—24	3	3.15	100.00	0.0315	492.10	2831.85	28.32
25—29	6.5	6.84	96.85	0.0706	467.15	2339.75	24.15
30—34	3.5	3.68	90.01	0.0408	440.85	1872.60	20.80
35—39	4.5	4.73	86.33	0.0547	419.80	1431.75	16.58
40—44	12	12.64	81.60	0.1549	376.40	1011.95	12.40
45—49	11.5	12.11	68.96	0.1756	314.50	635.55	9.31
50—54	20	21.06	56.85	0.3704	231.60	321.05	5.64
55—	34	35.79	35.79	1.0000	89.45	89.45	2.49
	95	100.00			2831.85		
Females							
20—24	11	10.67	100.00	0.1067	473.30	2328.00	23.28
25—29	7	6.79	89.33	0.0760	429.65	1854.70	20.76
30—34	6.5	6.31	82.54	0.0764	396.90	1425.05	17.26
35—39	16.5	16.02	76.23	0.2101	341.10	1028.15	13.48
40—44	12	11.65	60.21	0.1934	271.90	687.05	11.41
45—49	13.5	13.11	48.56	0.2699	210.00	415.15	8.54
50—54	12.5	12.14	35.45	0.3424	146.90	205.15	5.78
55—	24	23.13	23.31	1.0000	58.25	58.25	2.49
	103	100.00			2328.00		
$E_{e_0}^0 = \pm 1.36$			$\delta\ E_{e_{20}}^0 = \pm 1.43$			$\female\ E_{e_0}^0 = \pm 1.43$	

M., 1974; 1962). The tables of standard errors by M. H e n n e b e r g and J. S t r z a ł k o (1975) were used in order to estimate the reliability of sex difference in longevity. Values were read from the tables of the Hungarian model, the age distribution in Géluva, Jakštaičiai and the pooled sample being the most similar to that of the Hungarian model. Sex difference at adulthood (e_{20}^0) is significant (P 0.05) only in Géluva and the pooled sample; it is accidental in the rest of burial sites, possibly due to the small size of the samples. Life expectancy of females is reduced by a higher mortality at a young age (d_x in Tables 3—5). On the contrary, male life tables show an excess at an old age. It is necessary to agree with the common opinion that this does not prove the biological feebleness of women. Often complications of pregnancy and child-bearing at a young age shortened the lives of females. Thus K. A. B e n n e t (1973) points out that life expectancy of females at birth is 1.5 years longer than that of males, and R. M o d r z e w s k a (1958) finds a higher percentage of elderly women in the investigated by her skeletal population. The above statements conform to the well known phenomenon that female organism is relatively more mature

(T a n n e r J. M., 1960), and women are biologically tougher than men.

The gross reproduction rate (R_{pot} in Table 2) is identical in all six cemeteries, and the net reproduction rate (R_o) differs greatly because it depens on children and subadult (0—14) mortality that fluctuates in the samples considerably (Tables 1—2). The estimated reproduction indices are quite akin to those calculated by M. H e n n e b e r g (1975) for the Hungarian model, and indicate a high potential capacity for natural increase. It can be said in general that the average number of births per couple of adult individuals during their lifetime (R_{pot}) equaled 0.8 and the average number of adult descendants per adult individual of the parental generation (R_o) equaled 2.0 in the 14th—17th cc. Lithuania.

Finally, it was of some interest to reconstruct the size of the population that left the largest completely investigated cemetery in Géluva. Taking into consideration that the cemetery has functioned for about 100 years, the result of calculation after G. Acsádi and J. Nemeskéri formula (A c s á d i G., N e m e s k é r i J.: 1970) is 106 individuals when calculating after N. G. G e j v a l l (1960) and

*Life table
of the 15th—17th cc.
cemetery in Jakštaičiai*

X	D_x	d_x	l_x	q_x	L_x	T_x	e_x^0
Both sexes							
0	23.5	12.51	100.00	0.1251	93.74	2651.28	26.51
1—4	17.7	9.41	87.49	0.1075	331.14	2557.54	29.23
5—9	18.05	9.60	78.08	0.1229	366.40	2226.40	28.51
10—14	12.75	6.78	68.48	0.0990	325.45	1860.00	27.16
15—19	12	6.38	61.70	0.1034	292.55	1534.55	24.87
20—29	20.5	10.91	55.32	0.1972	498.65	1242.00	22.45
30—39	22.5	11.96	44.41	0.2693	384.30	743.35	16.74
40—49	24	12.77	32.45	0.3935	260.65	359.05	11.06
50—	37	19.68	19.68	1.0000	98.40	98.40	5.00
	188	100.00			2651.28		
Males							
20—24	4	8.00	100.00	0.0800	480.00	2585.00	25.85
25—29	2	4.00	92.00	0.0434	450.00	2105.00	22.88
30—34	3	6.00	88.00	0.0681	425.00	1655.00	18.81
35—39	6	12.00	82.00	0.1463	380.00	1230.00	15.00
40—44	4	8.00	70.00	0.1142	330.00	850.00	12.14
45—49	8.5	17.00	45.00	0.2741	267.50	520.00	8.39
50—54	8.5	17.00	45.00	0.3777	182.50	252.50	5.61
55—	14	28.00	28.00	1.0000	70.00	70.00	2.50
	50	100.00			2585.00		
Females							
20—24	7	12.96	100.00	0.1296	467.60	2027.79	20.28
25—29	7.5	13.89	87.04	0.1595	400.47	1560.19	17.92
30—34	6.5	12.04	73.15	0.1645	335.65	1159.72	15.85
35—39	7	12.96	61.11	0.2120	273.15	824.07	13.48
40—44	5	9.26	48.15	0.1923	217.60	550.92	11.44
45—49	6.5	12.04	38.89	0.3095	164.35	333.32	8.57
50—54	3.5	6.48	26.85	0.2413	118.05	168.97	6.29
55—	11	20.37	20.37	1.0000	50.92	50.92	2.46
	54	100.00			2027.79		
$E_{e_0}^0 = \pm 1.67$			♂ $E_{e_{20}}^0 = \pm 3.33$			♀ $E_{e_{20}}^0 = \pm 3.33$	

considering the possible deathrate in the 14th—17th cc. Lithuania to be as high as 30—40 (*see Table 6*).

According to the data of the 1790 census in the Grand Duchy of Lithuania, 353,215 Christians inhabited the three administrative regions (Šiauliai, Ukmerge and Trakai) of ethnographical Lithuania, 194,342 out of them being males and 158,873 females, thus 1,223 men versus 1,000 women. The data of church registration were partially used in the census (Jasas R., Truska L., 1972), and such data were by no means exact, as it was shown by B. Urlanis (1941). Nevertheless, the birthrate (*n in Table 6*) seems to be quite high in Lithuania against the background of synchronous Europe. This is not true of deathrate (m). The summary tables of the census contain no column of new-born mortality at all, although R. Jasas and L. Truska (1972) suppose that some part of dead new-borns might have been included into the 0—18-years column. If so, this part was obviously not numerous because deathrate (2.24) is extremely low and natural increase rate (1.63) unbelievably high against the background of Europe when calculated from the raw data of the census. The same results occur when deathrate (2.59—2.82) and natural increase rate (1.60—2.04) are calculated from the data

on the inhabitants of the Vilnius diocese in 1783, 1784 and 1786, according to the bishoprical reports (Biržiška V., 1922). It must be emphasized once more that church registration data, especially those on mortality, should be used with caution in demographical generalizations. The mortality of new-borns was 26.6—27.5 % in the European part of Russia in 1867—1895 (17.26) and 23 % in Ostrava region (Czechoslovakia) in the end of the 18th c. (Dokoupil L., 1974), thus it could not be lower even in West Europe in the 18th c. Let us assume that 30.25 and 20 % of all new-borns died just after birth in the 1790 Lithuania, and compare death and natural increase rates of the three hypothetical populations with the analogous indices of the neighbouring countries and the whole Europe (*Table 6*). The correction of 20 % new-born mortality seems to be by no means too small because some part of dead new-borns could have been included into the 0—18-years column of the census tables. We shall commit a smaller error making such a correction than entirely neglecting new-born mortality.

Sex ratio is almost the same in the living population and in the dead. Men excel in number: masculinization index is correspondingly 1.223 and

TABLE 5

Life table of the pooled Lithuanian skeletal sample (the 14th—17th cc.)

X	D_x	d_x	l_x	q_x	L_x	T_x	e_x^0
Both sexes							
0	104	12.37	100.00	0.1237	93.81	2883.86	28.84
1—4	86.25	10.26	87.63	0.1170	330.00	2790.05	31.83
5—9	74.05	8.80	77.37	0.1137	364.85	2460.05	31.79
10—14	41.05	4.88	68.57	0.0711	330.65	2095.20	30.55
15—19	29.65	3.52	63.69	0.0552	309.65	1764.55	27.70
20—29	86	10.22	60.17	0.1698	550.60	1454.90	24.17
30—39	82	9.75	49.95	0.1951	450.70	904.30	18.10
40—49	125.5	14.93	40.20	0.3713	327.30	453.60	11.28
50—	212.5	25.27	25.27	1.0000	126.30	126.30	4.99
	841	100.00			2883.86		
Males							
20—24	18	6.42	100.00	0.0642	483.95	2657.35	26.57
25—29	17.5	6.25	93.58	0.0667	452.25	2173.40	23.22
30—34	13.5	4.82	87.33	0.0551	424.55	1721.15	19.71
35—39	21	7.50	82.51	0.0908	393.80	1296.60	15.71
40—44	32	11.43	75.01	0.1523	346.45	902.80	12.04
45—49	42.5	15.17	63.58	0.2385	279.95	556.35	8.75
50—54	48.5	17.33	48.41	0.3579	198.70	276.40	5.71
55—	87	31.08	31.08	1.0000	77.70	77.70	2.50
	280	100.00			2657.35		
Females							
20—24	28.5	12.61	100.00	0.1261	468 45	2234.60	22.35
25—29	22	9.73	87.39	0.1113	412.60	1766.15	20.21
30—34	16.5	7.30	77.66	0.0939	370.05	1353.55	17.43
35—39	31	13.72	70.36	0.1949	317.50	983.50	13.98
40—44	23	10.17	56.64	0.1795	257.75	666.00	11.76
45—49	28	12.39	46.47	0.2666	201.35	408.25	8.79
50—54	22	9.74	34.08	0.2857	146.05	206.90	6.07
55—	55	24.34	24.34	1.0000	60.85	60.85	2.50
	226	100.00			2234.60		

$E_{e_0}^0 = \pm 0.83$ | $\male \; E_{e_{20}}^0 = \pm 1.36$ | $\female \; E_{e_{20}}^0 = \pm 1.67$

TABLE 6. *Birthrate (n), deathrate (m) and natural increase rate (e) in Lithuania, 1790, against the background of Europe*

	n	m	e
Lithuania (1790)			
1. without any correction	3.87	2.24	1.63
2. 30 % correction of new-born mortality	3.87	3.41	0.46
3. 25 % correction of new-born mortality	3.87	3.21	0.66
4. 20 % correction of new-born mortality	3.87	3.02	0.85
Europe /1775—1800/*	3.90	3.19	0.71
Europe /1801—1810/*	3.85	3.21	0.64
England /1781—1790/*	3.77	2.86	0.91
Prussia /1765—1786/*		2.92	
Finland /1786—1790)*	3.75	3.19	0.56
Sweden /1781—1790/*	3.19	2.79	0.40

* B. C. Urlanis, *Rost naselenija v Evrope. M., 1941.*

1.250. It was possible to judge about reproduction possibilities of the population indirectly calculating the number of christenings per 100 marriages in church. This index was 381 in Lithuania versus 474 in the neighbouring Prussia in 1765—1786 (B. Ur-lanis, 1941). B. Urlanis (1941) points out that the church registration of christenings and marriages was far from being precise, that the ratio between births and christenings is 1.317, and that between all marriages and church ones is 1.0537. Thus the former figure becomes 476 after a simple calculation.

The analysis of age composition and longevity of the population was carried out for men only because of lack of age distribution in the census tables for women. The age composition of male population *(Table 7)* seems quite real in comparison with that in the 17th c. Bohemia adduced by E. Maur (1974). The distribution of deaths is also regular: the rise of mortality falls on infancy and old age, and the fall on the age of 18—50 years.

The construction of an extended life table was possible for men only *(Table 8)* according to an age grouping in the census materials. The results of calculation allow to say that life expectancy at birth (e_0^0) was 29.88 years in Lithuania, 1970, and that at the age of 18—29 years (e_{18-29}^0) 34.13 years. These figures seem quite real. According to G. Acsádi and J. Nemeskéri (1970), e_0^0 for men was 23.37 in France, 1795, 33.20 in Sweden, 1755 to 1776, 30.98 in Austria, 1870—1880.

TABLE 7. *Age distribution of men in the Grand Duchy of Lithuania (GDL) according to the 1790 census*

		0	1—17	18—29	30—49	50—	Total
Number of living in 3 regions of GDL	N	7.187	75.754	47,301	46,347	17,753	194.342
	%	3.70	38.98	24.34	23.85	9.13	100.00
Number of living noblemen in the regions of Šiauliai and Trakai	N		3,591	2,267	2,397	1,308	9,563
	%		37.55	23.70	25.07	13.68	100.00
Number of living townsmen in the regions of Trakai and Šiauliai	N		1,244	~ 627	906	431	3,208
	%		38.77	19.54	28.25	13.44	100.00
Number of living peasants in the regions of Trakai and Šiauliai	N		39,864	23,812	23,347	8,571	95,684
	%		41.67	24.89	24.49	8.95	100.00
Number of the dead in 3 regions of GDL	N	1,437*	2,009	533	713	1,159	5,851
	%**	24.56	34.34	9.11	12.18	19.81	100.00
	%***	19.99	2.65	1.13	1.54	6.53	3.01

* 20 % of the total number of births (7,187)
** of all the dead
*** of all living in the same age group

TABLE 8. *Life table (demographical version) of men in the Grand Duchy of Lithuania according to the 1790 census (with 20% correction of new-born mortality)*

X	Number	D_x	m_x	q_x	p_x	l_x	d_x	L_x	T_x	e_x^0
0	7,187	1,347	0.19994	0.18177	0.81823	100,000	18,177	88,185	2,988,404	29.88
1—17	75,754	2,009	0.02652	0.36791	0.63209	81,823	30,104	1,135,107	2,900,219	35.44
18—29	47,301	533	0.01127	0.12667	0.87333	51,719	6,551	581,322	1,765,112	34.13
30—49	46,347	713	0.01538	0.26600	0.73400	45,168	12,042	782,940	1,183,790	26.21
50—	17,753	1,159	0.06528	0.78993	0.21007	33,126	26,167	400,850	400,850	12.10
	194,342	5,851						2,988,404		

It would be of some interest to compare life expectancy in various strata of the society. Unfortunately, there are no mortality data for different estates in the census tables, that is why it was not possible to construct life tables for the noblemen, townsmen and peasants separately. However, longevity is reflected indirectly in age composition of the estates in the administrative regions of Šiauliai and Trakai *(Table 7)*. For example, there are more younger individuals and less elder ones (especially over 50 years of age) in the peasant groups comparing with noblemen and townsmen which means that a smaller percentage of peasants used to reach an old age. Indeed, the mean age (without newborns) is 24.89 years for peasants against 27.30 and 27.54 years for noblemen and townsmen correspondingly. Thus the latter used to live for almost 3 years longer. It indicates the influence of social inequality on demographical processes. Attention must be paid to the social structure of the community when comparing the demographical data of different countries. By the way, it must be noted that the great majority (88.22 %) of inhabitants in two large administrative regions of the Grand Duchy of Lithuania in 1790 were peasants. Such a predominance of peasants might have been characteristic of the entire state.

The direct comparison of the demographical indices obtained from cemeteries and census materials was impossible due to following reasons: 1. the methods of construction of life tables were different; 2. complete life tables were constructed for men only in the census materials and for both sexes together in osteological materials; 3. the number of newborns is evidently too low in skeletal populations and this affects life expectancy at birth. Taking into account the above circumstances, the following transformations of the material were carried out: 1. paleodemographical life tables were constructed from the mortality data of the census *(Table 9)* in such a way as if the dead in 1790 had been buried in one burial site, and in this way, the methods of life tables construction were unified; 2. a complete life table for men was constructed in the skeletal population *(Table 10)*, assuming that an almost equal number of males and females died at the age of 0—19 years (M. Stloukal, 1962 and N. G. Gejvall, 1960, have done the same), thus the second circumstance was unified; and finally, 3. the percentage of new-borns was raised to 24.0 in the life table of skeletal population *(Table 10)*, i.e. to the value of d_0 in the paleodemographical version af the census life table *(see Table 9)* on the ground

TABLE 9.

Life table (paleodemographical version) of men in the Grand Duchy of Lithuania according to the 1790 census (with 20 % correction of new-born mortality)

X	D_x	d_x	l_x	q_x	L_x	T_x	e_x^0
0	1,437	24.56	100.0	0.2456	87.72	2232.95	22.33
1—17	2,009	34.34	75.44	0.4551	990.59	2145.23	28.44
18—29	533	9.11	41.10	0.2216	438.54	1154.64	28.09
30—49	713	12.18	31.99	0.3807	518.00	716.10	22.38
50—	1,159	19.81	19.81	1.0000	198.10	198.10	10.00
	5,851	100.00				2232.95	
18—29	533	22.16	100.00	0.2216	1067.04	2809.44	28.09
30—49	713	29.64	77.84	0.3807	1260.40	1742.40	22.38
50—	1,159	48.20	48.20	1.0000	482.00	482.00	10.00
	2,405	100.00				2809.44	

$$E_{e_0}^0 = \pm 0.75 \qquad E_{e_{18-29}}^0 = 0.45$$

TABLE 10.

Transformed life table of the 14th—17th cc. Lithuanian male skeletal population (half of the non-adults were considered males, percentage of new-borns raised to 24)

X	D_x	d_x	l_x	q_x	L_x	T_x	e_x^0
0	125	24.04	100.00	0.2404	87.98	2669.27	26.69
1—4	43	8.27	75.96	0.1088	287.30	2581.29	33.98
5—9	37	7.11	67.69	0.1050	320.67	2293.99	33.89
10—14	20.5	3.94	60.58	0.0650	293.05	1973.32	32.57
15—19	14.5	2.79	56.64	0.0492	276.22	1680.27	29.67
20—29	35.5	6.83	53.85	0.1268	504.35	1404.05	26.07
30—39	34.5	6.63	47.02	0.1410	437.05	899.70	19.13
40—49	74.5	14.32	40.39	0.3545	332.30	462.65	11.45
50—	135.5	26.07	26.07	1.0000	130.35	130.35	5.00
	520	100.00				2669.27	

$$E_{e_0}^0 = \pm 1.05 \qquad E_{e_{20}}^0 = \pm 0.82$$

TABLE 11.

Life expectancy according to the data of the 14th—17th cc. Lithuanian cemeteries and the 1790 census in the Grand Duchy of Lithuania

Life expectancy	without any correction	percentage of new-borns raised to 24	with 20 % correction of newborn mortality		with 25 % correction of newborn mortality		with 30 % correction of newborn mortality	
			d	p	d	p	d	p
$e_0^0 \male\female$	28.84	25.04						
$e_0^0 \male$	30.96	26.69	29.88	22.33	29.23	21.13	28.15	19.93
$e_{18-29}^0 \male$			34.13	28.09	34.13	28.24	34.18	28.09
$e_{20}^0 \male$	26.56	26.07						

d- a demographical version of life tables
p- a paleodemographical version of life tables

of the supposition that new-born mortality could not have been less in the 14th—17th cc., than that at the end of the 18th c. (a similar correction was earlier made by M. S t l o u k a l, 1974 in medieval Czechoslovakian materials), thus the third circumstance was taken into account.

The transformed materials are approximately suitable comparison. The figures in the summary table (*Table 11*) show different values of life expectancy when census materials are calculated by means of a different model of a life table: e_0^0 is by 8 and e_{20}^0 by 6 years lower when using the paleo-demographical model. Life expectancy of adults (e_{20}^0) changes very little due to the transformations in the new-born mortality. In our case, this index is the most suitable comparison. Adult men lived by 2.02 years longer in 1790 ($e_{18-29}^0 \male$ 28.09) in comparison with the 14th—17th cc. population ($e_{20}^0 \male$ 26.07). The difference is reliable (P < 0.05), as its standard error is ÷ 0.93, calculated from E (*Tables 9—10*) of the Hungarian model.

A 4-years-longer life expectancy at birth in the 14th—17th cc. looks rather strange in comparison with 1790 ($E_{e_0}^0$ is correspondingly ÷ 1.05 and

÷ 0.05). One would expect a somewhat longer life expentancy at birth at the very end of the 18th c., taking into account that there must have been some progress in health care and sanitary conditions in comparison with the earlier times, though this progress might not have embraced all strata of the society. We confine ourselves to the statement of the phenomenon and abandon generalizations because we do not know exactly how many dead newborns might have been included into 0—18-years column of the census summary tables. It is not unlikely that a 20 % correction of new-born mortality was too high for the census materials. On the other hand, a rather gross age grouping of children could have affected adversely e_0^0 of the census materials. However, despite to some reservations, both skeletal and census materials seem to reflect a real demographical situation in the 14th—18th cc. Lithuania.

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