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HUMAN GENETICS

Population Structure Dynamics of Belgorod Oblast: Ethnic Composition

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Abstract—The results of an analysis of the dynamics of the ethnicity of spouses in Belgorod oblast from 1890–1910 to 2016–2018 are presented. A fairly homogeneous ethnic composition has been established with a predominance of Russian ethnicity (more than 90% among both men and women) in all time periods. Over the 130-year period, the share of Russian ethnicity decreased slightly (1.1 times among both men and women), while the shares of Ukrainians (from 0.99 to 5.05% for men and from 0.57 to 5.38% for women) and other ethnicities (from 0 to 4.03% for men and from 0.20 to 2.74% for women) increased. The ethnic marital assortative index shows constancy for Russian ethnicity, a stable decline for Ukrainian ethnicity (both in the city and in the countryside), and a decrease in the urban population and an increase in the rural population for other ethnicities.

Keywords: ethnic structure, ethnic marriage assortativity

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INTRODUCTION

An important component of genetic studies of the modern population is the study of the structure of the ethnic composition and its dynamics. Active migration processes among the population lead to changes in marital and demographic characteristics and the ethnic composition of populations, increasing genetic diversity. The uneven distribution of ethnic groups across a territory leads to subdivision (stratification) of the population gene pool. As noted by O.L. Kurbatova et al., "in terms of population genetics, the territorial subdivision of a population according to a genetically significant trait, such as belonging to an ethnic group, leads to effects similar to inbreeding" [1].

Numerous studies devoted to the analysis of the ethnic composition of the modern population indicate geographical and temporal variability of this indicator. Features of the ethnic composition have been established in Kursk and Kemerovo oblasts, in the population of Yakutia, the North Caucasus, the republics of Kazakhstan, Karachay-Cherkessia, North Ossetia, in a number of cities in Russia, etc. [1–19]. A significant factor in the population structure is the presence of ethnic marital assortativity among the population, the degree of expression and dynamics of which have characteristics in different ethnoterritorial groups of the population [2, 14, 16, 19].

These studies are of particular significance for the Central Black Earth Region, which is the southern outskirts of the original area of residence of Russians. Both Russian and Ukrainian ethnic groups had a significant influence on the formation of the ethnic composition of the region, which began in the 16th–17th centuries. The region was populated due to the migration influx of various territorial groups of Russian central provinces of Russia and settlers from Right Bank Ukraine [20]. Changes in the ethnic composition of the region, which has long been bi-ethnic, occurred under the influence of many factors in different time periods. The most significant changes occurred at the turn of the century.

The purpose of this work in connection with the above is to study the dynamics of the ethnic composition of the population of Belgorod oblast. This report completes the series of works [21–24] to study the dynamics of population–demographic indicators in the population of the south of Central Russia.

MATERIALS AND METHODS

The object was the population of district populations of Belgorod oblast: Belgorodsky, Grayvoronsky, Korochansky, Novooskolsky, and Starooskolsky districts (*uezds*), which were part of Kursk province, then Kursk oblast, and after 1954 were transferred to Belgorod oblast. Biryuchansky (later Krasnogvardeysky and partially Alekseevsky districts) and Valuysky districts (*uezds*) until 1954 were part of Voronezh province, then Voronezh oblast, and after 1954 they became districts of Belgorod oblast. The selection cri-

teria and characteristics of the study areas are outlined in previously presented works [21, 22]. The analysis was carried out for five periods: 1890–1910 and 1951–1953 (before the formation of Belgorod oblast in 1954, from certain districts of Kursk and Voronezh provinces) and 1978–1980, 1991–1993, and 2016–2018 after the formation of Belgorod oblast. As a source of information about the ethnicity of spouses, records of parish books from the Civil Registry Office Archive of Belgorod oblast of the late 19th century were used (1890–1910, 4923 marriage records as well as acts of civil status of the oblast Registry Office Archive for 1951–1953 (5128 records), 1978–1980 (10 991 entries), 1991–1993 (4508 records), and 2016–2018 (5467 entries). The overall volume was 31 017 entries. When studying the ethnic composition of the population, the following groups were identified: Russians, Ukrainians, and other ethnicities. The analysis was carried out at the regional level of population structure organization [25]. To assess the degree of marital assortativity by ethnicity, we used the marriage assortativity coefficient H [26]. When $H = 0$, the population is panmictic, $H > 1$ means positive marital assortativity, and $H < 1$ is negative marital assortativity. To qualitatively assess the degree of non-randomness of the formation of a marriage union, we used the index of marital assortativity modified O.L. Kurbatova, A' [3, 27, 28]. Index values of A' can vary from 0 with panmixia to 100% in the case of complete positive marital assortativity. Information was processed using Excel (10), Statistica (v10).

RESULTS

Ethnic Composition of the Population of the South of Central Russia

(1) *1890–1910.* Study of the ethnic composition of the population of the *uezds* of Kursk and Voronezh provinces in 1890–1910 showed sufficient homogeneity (Table 1). The main ethnicity of the spouses was Russian (99.02% of men and 99.42% of women), with slight variability by region. The proportion of people of Ukrainian ethnicity was insignificant (0.99% among men and 0.57% among women), with variability across *uezds* of more than 10 times (11.78 times among men and 10.17 times among women). Other ethnicities were found only among women in Kursk province with a frequency of 0.2%. On average, in the *uezds* of Voronezh province, the proportion of men and women of Ukrainian ethnicity is higher than in Kursk province by 1.7 and 3.3 times, respectively (Table 1).

There were no significant differences in the distribution of men and women of Russian ethnicity between cities and villages, while the share of men of Ukrainian ethnicity was on average 4 times higher than the same indicator among women in cities and 1.4 times in villages.

At the end of the 19th century panmixia was observed among residents of Russian ethnicity without differences among the urban and rural populations ($H = 0.999$) (Table 1).

(2) *1951–1953.* By the mid-20th century, the districts of Kursk and Voronezh oblasts maintained sufficient ethnic homogeneity. The share of Russian ethnicity (with slight variability by district) decreased slightly (by 4.8% among men and by 4% among women). The share of spouses of Ukrainian ethnicity increased (5.4 times among men and 7.6 times among women), with variability across the districts of more than 5 times (5.32 times among men and 6.70 times among women). On average for districts of Voronezh oblast, the share of both men and women of Ukrainian ethnicity is 1.5 times higher than in Kursk oblast (Table 2).

There were no significant differences in the distribution of spouses of Russian ethnicity between cities and villages, while the share of men of Ukrainian ethnicity was on average 1.4 times higher than the same indicator for women in cities and 1.2 times in villages. Other ethnicities occurred with an average frequency of less than 0.5%, more often among men (1.4 times) than among women, and predominantly among the urban population (Table 2).

Positive marriage assortativity based on ethnicity by the middle of the 20th century was more pronounced compared to the end of the 19th century, without significant differences between urban and rural areas (Table 2).

(3) *1978–1980.* The main ethnicity of the spouses in 1978–1980 was Russian (93.49% of men and 92.71% of women), with slight variability by district (Table 3). The share of Ukrainian ethnicity reached 5–6% (4.95% for men and 6.08% for women), with variability across districts of more than 5 times (5.87 times for men and 5.39 times for women). Other ethnicities occurred with an average frequency of more than 1%, more often among men than among women (Table 3).

There were no significant differences in the distribution of men and women of Russian and Ukrainian ethnicities between urban and rural areas. Other ethnicities were found on average more often among men (2.2 times) than among women and mainly in the population (Table 3).

Ethnic marriage assortativity decreased slightly by 1978–1980 and was more pronounced in the rural population (Table 3).

(4) *1991–1993.* By the end of the 20th century, the population of Belgorod oblast retained sufficient homogeneity of its ethnic composition. Despite a slight decrease in the share of Russian ethnicity (by 3.25% for men and 3.41% for women), it remained predominant among spouses with slight variability by district (Table 4). The share of people of Ukrainian ethnicity increased slightly (less than 1%), amounting

Table 1. Ethnic composition of spouses of Kursk and Voronezh provinces in 1890–1910

Populations		*N*	Men						Women						$H_{Russian}$ (*A*')
			russians		ukrainians		others		russians		ukrainians		others		
			n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	
Uezds of Kursk province	Belgorod *uezd*	844	838	99.41	5	0.59	–	–	841	99.76	1	0.12	1	0.12	0.999 (–0.60)
	urban	253	248	98.02	5	1.98	–	–	253	100.00	–	–	–	–	1 (–)
	rural	591	591	100.00	–	–	–	–	589	99.66	1	0.17	1	0.17	1 (–)
	Starooskolsky *uezd*	795	792	99.62	3	0.38	–	–	795	100.00	–	–	–	–	1 (–)
	urban	167	164	98.20	3	1.80	–	–	167	100.00	–	–	–	–	1 (–)
	rural	628	628	100.00	–	–	–	–	628	100.00	–	–	–	–	1 (–)
	Novooskolsky *uezd*	726	725	99.86	1	0.14	–	–	723	99.58	1	0.14	2	0.28	0.999 (–0.42)
	urban	302	302	100.00	–	–	–	–	301	99.67	–	–	1	0.33	1 (–)
	rural	424	423	99.76	1	0.24	–	–	422	99.52	1	0.24	1	0.24	0.999 (–0.47)
	Korochansky *uezd*	364	358	98.35	6	1.65	–	–	363	99.73	–	–	1	0.27	0.999 (–1.68)
	urban	162	157	96.91	5	3.09	–	–	162	100.00	–	–	–	–	1 (–)
	rural	202	202	100.00	–	–	–	–	201	99.50	–	–	1	0.50	1 (100.00)
	Grayvoronsky *uezd*	789	782	99.11	7	0.89	–	–	784	99.37	4	0.51	1	0.12	0.999 (–0.90)
	urban	320	318	99.38	2	0.62	–	–	319	99.69	1	0.31	–	–	0.999 (–0.63)
	rural	469	464	98.93	5	1.07	–	–	465	99.15	3	0.64	1	0.21	0.999 (–1.08)
	Average for the province	**703**	**699**	**99.27**	**4**	**0.73**	–	–	**701**	**99.69**	**2**	**0.26**	**1**	**0.20**	**0.999 (–0.720)**
	urban	**240**	**238**	**98.50**	**4**	**1.87**	–	–	**240**	**99.87**	**1**	**0.31**	**1**	**0.33**	**0.999 (–0.126)**
	rural	**463**	**461**	**99.74**	**3**	**0.66**	–	–	**461**	**99.57**	**2**	**0.35**	**1**	**0.28**	**0.999 (19.69)**
Uezds of Voronezh province	Valuysky *uezd*	820	808	98.54	12	1.46	–	–	810	98.78	10	1.22	–	–	1 (8.66)
	urban	190	186	97.89	4	2.11	–	–	189	99.47	1	0.53	–	–	0.999 (–2.15)
	rural	630	622	98.73	8	1.27	–	–	621	98.57	9	1.43	–	–	1 (11.23)
	Biryuchansky uezd	586	580	98.98	6	1.02	–	–	583	99.49	3	0.51	–	–	0.999 (–1.03)
	urban	259	256	98.84	3	1.16	–	–	259	100.00	–	–	–	–	1 (–)
	rural	327	324	99.07	3	0.93	–	–	324	99.61	3	0.39	–	–	0.999 (–0.93)
	Average for the province	**703**	**694**	**98.76**	**9**	**1.24**	–	–	**697**	**99.14**	**7**	**0.87**	**–**	**–**	**0.999 (3.815)**
	urban	**225**	**221**	**98.37**	**4**	**1.64**	–	–	**224**	**99.74**	**1**	**0.53**	**–**	**–**	**0.999 (–1.075)**
	rural	**478**	**473**	**98.90**	**6**	**1.11**	–	–	**473**	**99.09**	**6**	**0.91**	**–**	**–**	**0.999 (5.150)**
Regional average		**704**	**697**	**99.02**	**7**	**0.99**	–	–	–	**99.42**	**5**	**0.57**	**1**	**0.20**	**0.999 (0.576)**
urban		**236**	**230**	**98.44**	**5**	**1.76**	–	–	–	**99.81**	**1**	**0.42**	**1**	**0.33**	**0.999 (–0.397)**
rural		**467**	**467**	**99.32**	**5**	**0.89**	–	–	–	**99.33**	**4**	**0.63**	**1**	**0.28**	**0.999 (15.536)**

For Tables 1–5: *H* is marital assortative coefficient; *A*' is index of marital assortativeness.

Table 2. Ethnic composition of spouses in Kursk and Voronezh oblasts in 1951–1953

Populations		*N*	Men						Women						*H* (*A*')		
			russians		ukrainians		others		russians		ukrainians		others		russian	ukrainian	others
			n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%			
Districts of Kursk oblast	Belgorodsky district	1170	1108	94.70	51	4.36	11	0.94	1129	96.50	37	3.16	4	0.34	1.01 (15.01)	3.10 (9.57)	53.20 (49.53)
	urban	404	366	90.59	31	7.67	7	1.74	379	93.81	21	5.20	4	0.99	1.01 (16.11)	1.90 (7.16)	28.90 (49.12)
	rural	766	742	96.87	20	2.61	4	0.52	750	97.91	16	2.09	–	–	1.00 (9.67)	4.80 (10.15)	– (–)
	Starooskolsky district	675	659	97.63	14	2.07	2	0.30	663	98.22	10	1.48	2	0.30	1.00 (23.18)	14.5 (28.52)	– (–0.30)
	urban	197	192	97.49	4	2.03	1	0.48	191	96.95	4	2.03	2	1.02	1.01 (38.12)	24.6 (48.96)	– (–1.03)
	rural	478	467	97.70	10	2.09	1	0.21	472	98.75	6	1.25	–	–	1.00 (14.70)	8.00 (14.89)	– (–)
	Novooskolsky district	645	570	88.37	71	11.01	4	0.62	574	88.99	64	9.92	7	1.09	1.09 (69.72)	6.70 (70.15)	23.00 (24.18)
	urban	102	94	92.16	7	6.86	1	0.98	97	95.10	3	2.94	2	1.96	1.03 (56.60)	9.70 (64.21)	– (–2.00)
	rural	543	476	87.66	64	11.78	3	0.56	477	87.84	61	11.23	5	0.93	1.10 (70.62)	6.30 (70.27)	36.20 (32.71)
	Korochansky district	633	613	97.15	16	2.53	2	0.32	619	98.10	12	1.90	–	–	1.01 (39.95)	16.40 (40.15)	– (–)
	urban	156	150	97.40	2	1.30	2	1.30	152	98.70	2	1.30	–	–	0.99 (–2.67)	– (–1.32)	– (–)
	rural	477	463	97.06	14	2.94	–	–	467	97.90	10	2.10	–	–	1.01 (48.49)	17 (48.49)	– (–)
	Grayvoronsky district	643	616	95.80	22	3.42	5	0.78	623	96.89	17	2.64	3	0.47	1.01 (47.81)	13.75 (45.18)	214.30 (66.41)
	urban	112	102	91.07	6	5.36	4	3.57	102	91.07	8	7.14	2	1.79	1.03 (34.12)	4.70 (28.21)	56.00 (100.0)
	rural	531	514	96.80	16	3.01	1	0.19	521	98.12	9	1.70	1	0.18	1.01 (58.68)	22.1 (65.63)	– (–0.19)
	Average for the oblast	**753**	**713**	**94.73**	**35**	**4.68**	**5**	**0.59**	**722**	**95.74**	**28**	**3.82**	**3**	**0.44**	**1.02 (39.13)**	**10.89 (38.71)**	**58.10 (27.96)**
	urban	**194**	**181**	**93.74**	**10**	**4.64**	**3**	**1.61**	**184**	**95.13**	**8**	**3.72**	**2**	**1.15**	**1.01 (28.46)**	**8.18 (29.44)**	**16.98 (29.22)**
	rural	**559**	**532**	**95.22**	**25**	**4.49**	**2**	**0.30**	**537**	**96.10**	**20**	**3.67**	**1**	**0.22**	**1.02 (40.43)**	**11.64 (41.89)**	**7.24 (6.50)**
Districts of Voronezh oblast	Valuysky district	724	681	94.06	43	5.94	–	–	682	94.20	41	5.66	1	0.14	1.02 (31.66)	6.20 (32.58)	– (–)
	urban	193	183	94.82	10	5.18	–	–	187	96.89	5	2.59	1	0.52	1.01 (29.69)	7.70 (36.72)	– (–)
	rural	531	498	93.78	33	6.21	–	–	495	93.22	36	6.78	–	–	1.02 (34.99)	5.80 (34.99)	– (–)
	Alekseevsky district	638	586	91.85	50	7.84	2	0.31	602	94.36	36	5.64	–	–	1.05 (78.83)	10.30 (78.90)	– (–)
	urban	295	279	94.58	14	4.75	2	0.67	289	97.97	6	2.03	–	–	1.00 (11.89)	3.50 (12.52)	– (–)
	rural	343	307	89.50	36	10.50	–	–	313	91.25	30	8.75	–	–	1.09 (92.55)	8.90 (92.55)	– (–)
	Average for the oblast	**681**	**634**	**92.96**	**47**	**6.89**	**1**	**0.16**	**642**	**94.28**	**39**	**5.65**	**1**	**0.07**	**1.04 (55.25)**	**8.25 (55.74)**	– (–)
	urban	**244**	**231**	**94.70**	**12**	**4.97**	**1**	**0.34**	**238**	**97.43**	**6**	**2.31**	**1**	**0.26**	**1.01 (20.79)**	**5.6 (24.62)**	– (–)
	rural	**437**	**403**	**91.64**	**35**	**8.36**	**–**	**–**	**404**	**92.24**	**33**	**7.77**	**–**	**0.00**	**1.06 (63.77)**	**7.35 (63.77)**	– (–)
Regional average		**733**	**690**	**94.22**	**38**	**5.31**	**4**	**0.47**	**699**	**95.32**	**31**	**4.34**	**2**	**0.33**	**1.03 (43.74)**	**10.14 (43.58)**	**41.50 (19.97)**
urban		**208**	**195**	**94.02**	**11**	**4.74**	**2**	**1.25**	**200**	**95.78**	**7**	**3.32**	**2**	**0.90**	**1.01 (26.27)**	**7.44 (28.07)**	**12.13 (20.87)**
rural		**524**	**495**	**94.20**	**28**	**5.59**	**1**	**0.21**	**499**	**95.00**	**24**	**4.84**	**1**	**0.16**	**1.03 (47.10)**	**10.41 (48.14)**	**5.17 (4.65)**

Table 3. Ethnic composition of spouses in Belgorod oblast in 1978–1980

Populations	*N*	Men						Women						*H* (*A*')		
		russians		ukrainians		others		russians		ukrainians		others				
		n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	russian	ukrainian	other
Belgorodsky district	4737	4246	89.63	285	6.02	206	4.35	4395	92.78	279	5.89	63	1.33	1.01 (12.90)	2.32 (8.47)	3.65 (12.05)
urban	3378	3027	89.61	176	5.21	175	5.18	3154	93.37	177	5.24	47	1.39	1.01 (14.81)	2.49 (8.26)	3.29 (12.49)
rural	1359	1219	89.70	109	8.02	31	2.28	1241	91.32	102	7.50	16	1.18	1.01 (9.30)	1.96 (8.33)	8.22 (16.85)
Starooskolsky district	3315	3043	91.79	166	5.01	106	3.20	3067	92.52	150	4.52	98	2.96	1.01 (13.02)	3.99 (15.78)	3.83 (9.35)
urban	2165	1933	89.33	140	6.47	91	4.20	1962	90.67	118	5.45	84	3.88	1.01 (11.33)	3.14 (14.83)	3.11 (9.28)
rural	1155	1110	96.44	26	2.26	15	1.30	1105	96.00	32	2.78	14	1.22	1.01 (16.16)	8.30 (20.88)	5.48 (5.92)
Novooskolsky district	1120	1018	90.87	92	8.24	10	0.89	1011	90.24	100	8.95	9	0.81	1.03 (33.73)	4.61 (35.53)	24.82 (21.52)
Korochansky district	1034	982	94.97	44	4.26	8	0.77	981	94.87	47	4.55	6	0.58	1.01 (18.92)	4.00 (14.29)	21.54 (16.02)
Grayvoronsky district	613	590	96.25	18	2.94	5	0.81	553	90.21	49	7.99	11	1.80	1.00 (8.43)	2.09 (9.43)	11.15 (18.54)
Valuysky district	1837	1765	96.08	54	2.94	18	0.98	1703	92.71	117	6.37	17	0.92	1.01 (11.61)	2.91 (12.98)	13.61 (16.83)
Krasnogvardeysky district	1145	1123	98.08	17	1.48	5	0.44	1122	97.99	19	1.66	4	0.35	0.99 (−2.05)	0.00 (−1.69)	0.00 (−0.44)
Alekseevsky district	1013	914	90.22	88	8.69	11	1.09	915	90.33	88	8.69	10	0.98	1.04 (41.19)	5.49 (42.75)	18.42 (140.44)
Average for the oblast	**1852**	**1710**	**93.49**	**96**	**4.95**	**46**	**1.57**	**1718**	**92.71**	**106**	**6.08**	**27**	**1.22**	**1.01 (17.22)**	**3.18 (17.19)**	**12.75 (29.29)**
urban	2772	2480	89.47	158	5.84	133	4.69	2558	92.02	148	5.35	66	2.64	1.01 (13.07)	2.82 (11.55)	3.20 (10.89)
rural	1257	1165	93.07	68	5.14	23	1.79	1173	93.66	67	5.14	15	1.20	1.01 (12.73)	5.13 (14.61)	6.85 (11.39)

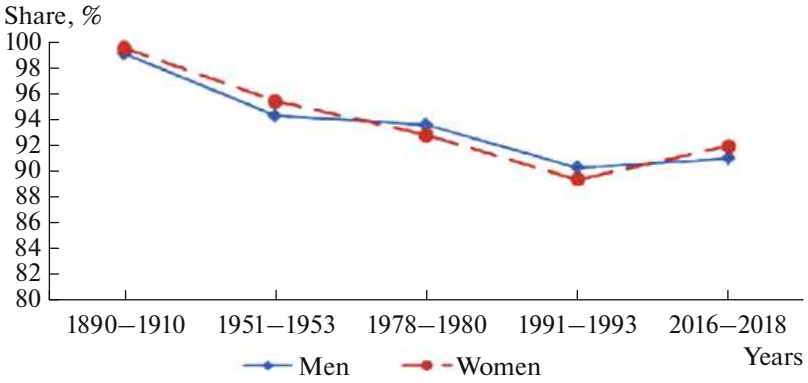

Fig. 1. Dynamics of the share of spouses of Russian ethnicity in Belgorod oblast.

to 5.81% for men and 6.70% for women, with pronounced variability by district (11.6 times for men and 2.5 times for women). The share of other ethnicities increased by 2.5 times among grooms and 3.3 times among brides, occurring on average with a frequency of 4% in both men and women with greater variability among women (1.5 times), especially in rural areas (Table 4).

In the urban and rural parts of the population, no significant differences were found in the distribution of men and women of Russian ethnicity. The share of grooms of Ukrainian ethnicity in cities and villages did not differ, and the share of brides was 1.7 times higher in villages. Other ethnicities were more common in cities than in villages, both among men (2.4 times) and women (1.9 times) (Table 4).

By the end of the 20th century, positive marriage assortativity by ethnicity remained in all studied populations, more pronounced for Ukrainian ethnicity among urban residents, and for other ethnicities among rural residents (Table 4).

(5) *2016–2018.* In 2016–2018 in eight districts of Belgorod oblast, the main ethnicity of the spouses was Russian (90.93% among men and 91.88% among women), with slight variability by district (Table 5). The share of people of Ukrainian ethnicity was about 5% (5.05% for men and 5.38% for women), with significant variability across districts (4.5 times for men and 4.7 times for women). Other ethnicities occurred with an average frequency of less than 5%, more often among men.

There were no significant differences in the distribution of Russian and Ukrainian ethnicities of spouses between urban and rural areas. Other ethnicities were more common among grooms in cities (2.2 times) than in villages; no differences were observed among brides (Table 5).

By the beginning of the 21st century, positive marriage assortativity by ethnicity remained in all studied populations, more pronounced for Ukrainian ethnicity in cities (Table 5).

Trends in the Dynamics of the Ethnic Composition of the Population in the South of Central Russia

In analyzing the dynamics of the ethnic composition of spouses from 1890–1910 to 2016–2018, the following trends were identified across five periods.

First, the main ethnicity of spouses in the south of Central Russia for 130 years was Russian ethnicity, which accounted for about 90% of both men and women (Fig. 1).

Second, over the 20th century, the share of the Russian population decreased (among men, from 99.02 to 90.93%, among women from 99.42 to 91.88%) (Fig. 1) and the proportion of Ukrainians increased (5 times for men, 9.4 times for women) (Fig. 2), just like the share of people of other ethnicities, especially among women (4 times for men, 13.7 times for women) (Fig. 3).

Third, no significant differences in the dynamics of men and women of Russian ethnicity between urban and rural areas have been established (Fig. 4). While the share of women of Ukrainian ethnicity from 1890 to 2018 increased on average by 7.5 times in cities and 6 times in villages, among men of Ukrainian ethnicity, a greater increase was observed in the village (on average 4 times) than in the city (2 times on average) (Fig. 5).

Fourth, during the analyzed period there was an increase in the share of other ethnicities (other than Russian and Ukrainian): among women both in the city (5 times) and in the village (6 times); men have more intensive growth in the city (5 times) than in the village (2 times) (Fig. 6).

Fifth, positive marital assortativity was observed for Russian ethnicity, with no differences between the city (Fig. 7) and the village (Fig. 8) in all periods studied. Marriage selectivity for Ukrainian ethnicity decreased over 130 years (both in the city and in the village), and for other ethnicities it decreased overall in cities, but increased in villages (Figs. 7, 8).

Table 4. Ethnic composition of spouses in Belgorod oblast in 1991–1993

Populations	*N*	Men						Women						*H* (*A*')		
		russians		ukrainians		others		russians		ukrainians		others				
		n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	russian	ukrainian	other
Belgorodsky district	1654	1495	90.39	102	6.17	57	3.44	1528	92.38	96	5.80	30	1.82	1.01 (11.32)	1.35 (2.31)	8.71 (27.50)
urban	1350	1223	90.59	78	5.78	49	3.63	1260	93.33	66	4.89	24	1.78	1.01 (12.92)	0.79 (1.91)	6.89 (22.18)
rural	304	272	89.47	24	7.90	8	2.63	268	88.16	30	9.87	6	1.97	1.01 (7.84)	1.27 (2.92)	19.0 (48.65)
Starooskolsky district	1052	962	91.44	45	4.28	45	4.28	986	93.73	41	3.90	25	2.37	1.00 (7.21)	2.85 (8.27)	1.87 (12.25)
urban	665	593	89.17	32	4.81	40	6.02	619	93.08	24	3.61	22	3.31	1.01 (9.80)	3.46 (12.45)	3.02 (22.62)
rural	387	369	95.35	13	3.36	5	1.29	367	94.83	17	4.39	3	0.78	1.00 (0.41)	1.50 (3.45)	0.00 (–1.31)
Novooskolsky district	408	356	87.25	35	8.58	17	4.17	361	88.48	33	8.09	14	3.43	1.03 (24.41)	2.12 (10.50)	17.14 (70.19)
Korochansky district	479	411	85.80	30	6.26	38	7.94	408	85.18	39	8.14	32	6.68	1.08 (46.48)	4.09 (27.42)	8.27 (18.54)
Grayvoronsky district	310	279	90.00	18	5.81	13	4.19	252	81.29	27	8.71	31	10.00	1.04 (36.80)	3.19 (20.89)	15.33 (67.78)
Valuysky district	893	844	94.51	28	3.14	21	2.35	821	91.94	48	5.38	24	2.68	1.01 (13.43)	0.00 (–5.68)	17.72 (46.17)
Krasnogvardeysky district	620	597	96.29	6	0.97	17	2.74	582	93.87	25	4.03	13	2.10	1.01 (30.79)	8.27 (30.53)	19.64 (52.55)
Alekseevsky district	712	614	86.24	80	11.24	18	2.52	623	87.50	68	9.55	21	2.95	1.06 (41.37)	3.80 (35.39)	26.37 (77.10)
Average for the oblast	**766**	**695**	**90.24**	**43**	**5.81**	**28**	**3.95**	**695**	**89.30**	**47**	**6.70**	**24**	**4.00**	**1.03 (26.48)**	**3.21 (16.20)**	**14.38 (46.51)**
urban	1008	908	89.88	55	5.30	45	4.83	940	93.21	45	4.25	23	2.55	1.01 (11.36)	2.13 (7.18)	4.96 (22.40)
rural	346	321	92.41	19	5.63	7	2.00	318	91.50	24	7.13	5	1.38	1.01 (4.13)	1.39 (3.19)	9.50 (23.67)

Table 5. Ethnic composition of spouses in Belgorod oblast in 2016–2018

Populations	*N*	Men						Women						*H* (*A*')		
		russians		ukrainians		others		russians		ukrainians		others				
		n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	russian	ukrainian	other
Belgorodsky district	2001	1859	92.90	70	3.50	72	3.60	1897	94.80	70	3.50	34	1.70	1.01 (11.17)	4.08 (11.18)	4.84 (15.13)
urban	1009	924	91.57	35	3.47	50	4.96	961	95.24	32	3.17	16	1.59	1.01 (15.83)	5.41 (15.83)	5.05 (21.09)
rural	991	934	94.25	35	3.53	22	2.22	936	94.45	38	3.83	17	1.72	1.00 (7.4)	2.98 (7.9)	5.30 (9.76)
Starooskolsky district	1952	1744	89.34	88	4.51	120	6.15	1793	91.85	72	3.69	87	4.46	1.01 (7.8)	3.39 (11.28)	1.87 (5.70)
Novooskolsky district	519	477	91.83	25	4.86	17	3.31	488	93.97	24	4.67	7	1.36	1.00 (5.15)	0.86 (–0.73)	4.32 (11.35)
Korochansky district	448	410	91.52	11	2.46	27	6.02	423	94.42	13	2.90	12	2.68	1.01 (47.55)	12.53 (34.46)	12.44 (73.40)
Grayvoronsky district	411	339	82.48	46	11.19	26	6.33	331	80.54	56	13.63	24	5.83	1.02 (10.32)	1.76 (11.91)	2.64 (11.04)
Valuysky district	1225	1138	92.97	62	5.06	24	1.97	1124	91.76	74	6.04	26	2.2	1.01 (18.96)	2.40 (9.02)	9.81 (19.12)
Krasnogvardeysky district	656	600	91.45	37	5.63	19	2.92	600	91.45	39	5.95	17	2.60	1.02 (78.52)	2.40 (8.86)	14.68 (45.31)
Alekseevsky district	911	865	94.95	29	3.18	17	1.87	877	96.27	24	2.63	10	1.10	1.01 (25.66)	5.24 (13.93)	32.15 (59.24)
Average for the oblast	1015	929	90.93	46	5.05	41	4.03	942	91.88	47	5.38	27	2.74	1.01 (25.55)	4.08 (12.49)	10.34 (30.06)

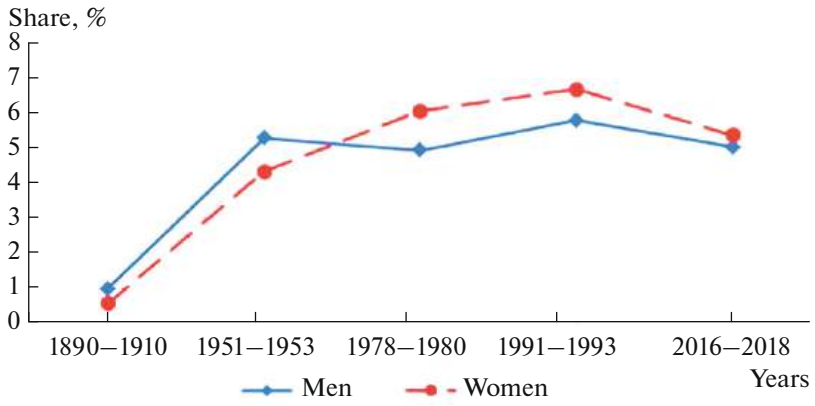

Fig. 2. Dynamics of the share of spouses of Ukrainian ethnicity in Belgorod oblast.

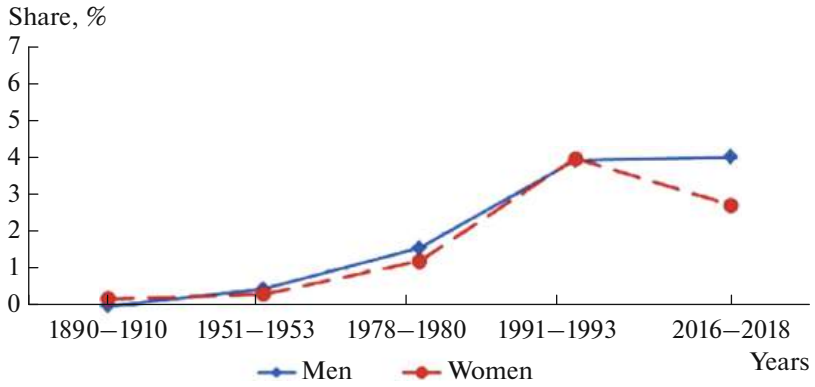

Fig. 3. Dynamics of the share of spouses of other ethnicities in Belgorod oblast.

DISCUSSION

The information we obtained in the course of our population–demographic study about the ethnic composition of spouses in Belgorod oblast in the context of five periods reflects the historical processes of previous decades. The formation of the ethnic composition of Belgorod oblast is a complex historical process, its roots dating back to the 16th–17th centuries. This was the period of development of the southern borders of Russia and the settlement of these territories by residents from Central Russia and Right Bank Ukraine, known as the colonization of the sparsely populated lands of the "Field" by Great Russians and Little Russians. As a result of joint resettlement at the end of the 17th century, vast territories of Ukrainian and Russian settlements were formed with the preser-

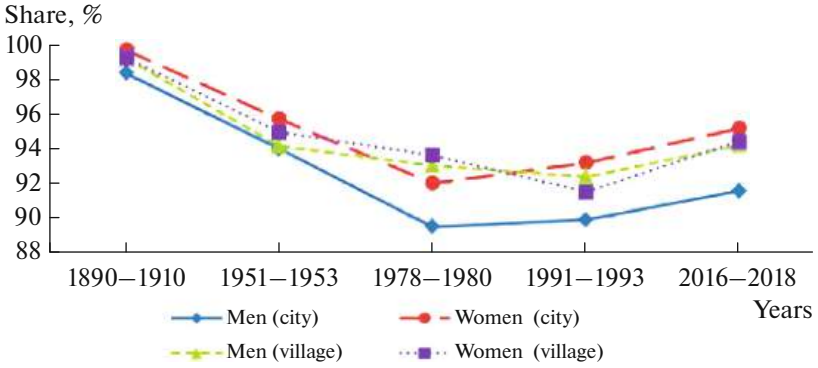

Fig. 4. Dynamics of the share of Russian ethnicity in the urban and rural population of Belgorod oblast.

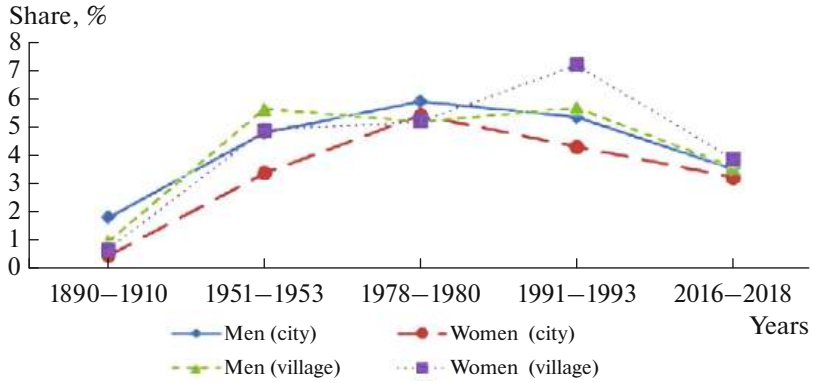

Fig. 5. Dynamics of the share of Ukrainian ethnicity in the urban and rural population of Belgorod oblast.

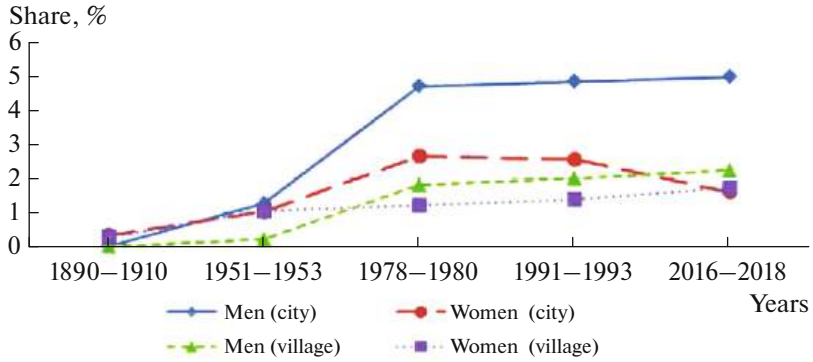

Fig. 6. Dynamics of the share of other ethnicities in the urban and rural population of Belgorod oblast.

vation of linguistic and cultural traditions in Kursk and Voronezh provinces [29]. From the beginning of settlement until the 1930s, this territory was predominantly inhabited by Russians and Ukrainians. Other ethnic groups at the turn of the 19th–20th centuries were less than 0.5% [20, 30], which corresponds to our results. However, the assimilation of the Russian and Ukrainian populations practically did not occur, except for fortified cities, until the period of industrialization and urbanization of the 1960s–1970s. As noted by A.I. Dudka and I.G. Onoprienko [31], "in an effort to preserve their traditions and pass on cultural experience to the next generations of compatriots, they [Russians and Ukrainians—*Authors*] tended to marry within their ethnic groups." In 1926 (according to the census), Russians occupied the city of Belgorod

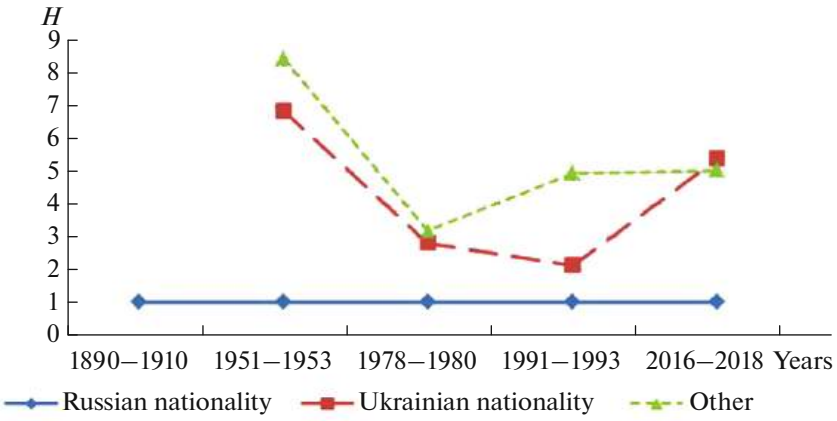

Fig. 7. Dynamics of the indicator of ethnic marital assortativeness (*H*) in the urban part of the Belgorod population.

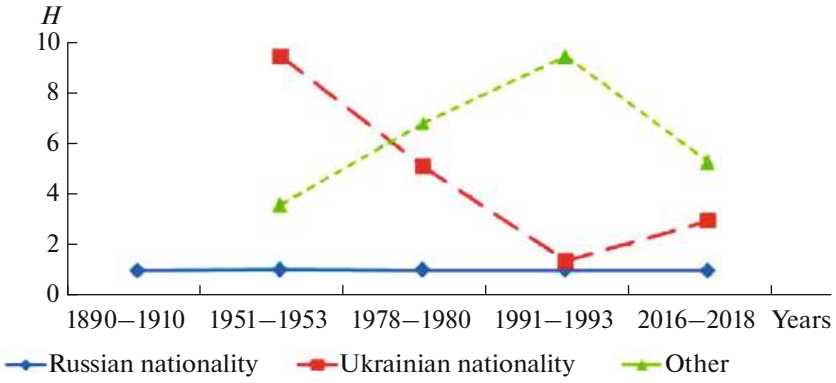

Fig. 8. Dynamics of the indicator of ethnic marital assortativeness (*H*) in the rural part of the Belgorod population.

and mainly the northern part of modern Belgorod oblast; these are the territories of modern Ivnyansky, partially Prokhorovsky, Starooskolsky, Korochansky, and partially Novooskolsky districts. The maximum share of Ukrainians was noted in the border area with Ukraine; this is the territory of modern Rovensky, Alekseevsky, Veidelevsky, Krasnoyaruzhsky, and Grayvoronsky districts and Borisovka settlement [32, 33]. Until the 1930s, the assimilation of the two ethnic groups proceeded rather slowly in two directions: in settlements with a predominance of Russians, Ukrainians (mostly women) were assimilated; in settlements with a predominance of the Ukrainian population, Russians were assimilated. Significant changes in the national composition of Belgorod oblast occurred in the 1920s–1930s as a result of economic (Holodomor) and sociopolitical transformations. The Ukrainian population declined sharply, and the oblast actually became monoethnic. Thus, in 1939–1959 the number of Ukrainians decreased by 2.5 times [32]. As noted by V.V. Bublikov [32], in the postwar period, the "autochthonous Ukrainian population of Belgorod oblast" moved to large cities, actively assimilating (by 1960–1970), and the growth of new ethnoterritorial population groups was observed. In 1940–1950, the share of Belarusians, Armenians, Georgians, Moldovans, Chuvash people, etc. increased, due to the redistribution of labor and personnel resources in the territory of the former Soviet Union. According to Bublikov and V.V. Markova [30], "the absence until the 1970s any significant 'All-Union construction projects' on the territory of Belgorod oblast led to a relatively slow growth rate of ethnic differentiation in the oblast."

Administrative–territorial transformations of the 20th century; the growth of the oblast's population; and changes in the effective population size and active migration processes, the causes and characteristics of which in different periods were mentioned in previous works [21–24], contributed to a slight decrease in the proportion of the Russian population (among men, from 99.02 to 90.93%, among women from 99.42 to 91.88%) and an increase in the proportion of Ukrainians (among men, from 0.99 to 5.05%, among women from 0.57 to 5.38%) and people of other ethnicities (in men, from 0 to 4.03%, in women from 0.20 to 2.74%). Throughout the entire 130-year period, no significant differences in the dynamics of men and women of Russian ethnicity between the city and the village were established. While the share of women of Ukrainian ethnicity from 1890–1910 to 2016–2018 increased on average of 7.5 times in the city and 6 times in the village, and the share of men of Ukrainian ethnicity increased more in the village (4 times on average) than in the city (2 times on average). During the analyzed period, there was an increase in the share of other ethnicities (other than Russian and Ukrainian) among women both in the city (5 times) and in the village (6 times), while among men a more intense increase was observed in the city (5 times), than in the village (2 times).

Note that positive ethnic marriage assortativity was observed, with no differences between urban and rural areas in all periods studied for Russian ethnicity. Marriage selectivity for Ukrainian ethnicity decreased over 130 years (both in the city and in the village), and for other ethnicities it decreased overall in cities but increased in villages.

Previously L.A. Atramentova and O.V. Filiptsova, when studying the ethnic composition in the Belgorod population for 1960, 1985, and 1995, found that Russians were the native ethnic group, slightly exceeding 90% of the population [19], which is consistent with the results of our research. In all analyzed years, there were more Russian women than Russian men who got married. The next largest ethnic group were Ukrainians, whose percentage decreased from 7.3 to 4.8 between 1960 and 1995. The percentage of people from other ethnic groups almost doubled (from 0.73 to 1.21). The authors note that positive indices of assortativity marriage were the highest for ethnic minority groups and the lowest for Ukrainians [19].

The monoethnicity of the ethnic composition was established earlier for the neighboring Kursk oblast: in 1987–1990, the main ethnicity of the spouses was

Russian (95.86% among grooms and 94.20% among brides) [9]. The share of Ukrainian ethnicity accounted for an average of 2.14% among men and 4.14% among women. Other ethnicities accounted for 1.99% among men and 1.61% among women. Russian same-ethnic marriages predominated in the marriage structure (on average 90.04%). In contrast to the Belgorod region, the population of the Kursk region was characterized by low marriage selectivity by ethnicity (0.244). Over a 30-year period (from 1960–1963 to 1987–1990), there was a decrease in the proportion of same-ethnic marriages in most district populations of Kursk oblast and an increase in marital assortativity by ethnicity in all analyzed districts [9].

A decrease in the value of the ethnic marital assortativity index (from 96.92 to 80.98%, respectively) over two generations (from 1940–1945 to 2000–2005) was noted in Kemerovo oblast [14]. Positive marriage assortativeness by ethnicity has been established among the rural population (especially among indigenous peoples) of the republics of Sakha (Yakutia), Chuvashia, Karachay-Cherkessia, Mari El, Bashkiria, North Ossetia, etc. [11–13, 17, 34–42]. In these populations, there was an "ethnic minority effect" [11, 13, 35–38]. It was noted that when different peoples live in the same territory, ethnic assortativity is highest among representatives of small ethnic groups for a given population. For example, North Ossetian Kumyks live compactly on the territory of the republic, occupying certain areas, and their ethnic marriage assortativity is 3.3 [43]. In areas with a multiethnic population of the republics of North Ossetia–Alania and Karachay-Cherkessia, a high degree of interethnic marriages is recorded among the newcomer population (Armenians, Azerbaijanis, Ukrainians), both among men and women (more than half) [12].

A correlation analysis between previously studied population–demographic indicators (structure of marriage migrations, parameters of isolation by Maleko distance, age at marriage) [21–24] in Belgorod oblast in the context of five periods showed that the increase in the root-mean-square distances between the places of birth of spouses considering long-distance migration led to an increase in the proportion of men of other (other than Russian and Ukrainian) ethnicities ($r = 0.90$, $p = 0.037$) and the share of women of Ukrainian ethnicity ($r = 0.90$, $p = 0.037$), and an increase in the root-mean-square distances between the places of birth of spouses without considering long-distance migrations led to a decrease in the proportion of men ($r = -0.90$, $p = 0.037$) and women of Russian ethnicity ($r = -0.90$, $p = 0.037$) and an increase in the share of women of other ethnicities ($r = 0.90$, $p = 0.037$). Also, an increase in distances between the places of birth of spouses, both with and without long-distance migrations, led to an increase in the share of heterolocal marriages and a decrease in the share of isolocal marriages. Note that active migration processes in recent decades and an increase in the number of mixed marriages can lead to an increase in the genetic diversity of populations.

The study of ethnic composition, in addition to revealing the history of migration flows of the population, can be of practical importance for predicting possible genetically determined diseases. Numerous studies have shown that the frequency and prevalence of hereditarily determined human diseases varies in certain ethnic groups [10, 12, 17, 37, 40, 44]. Marital assortativity in relation to ethnicity and places of birth of spouses can have a significant impact on the formation of the genetic structure [13, 15, 16, 41, 42]. The study of the ethnic composition of the population, along with other marriage and migration indicators, must be carried out when planning population genetic and medical genetic studies [45–58].

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ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This work does not contain any studies involving human and animal subjects.

CONFLICT OF INTEREST

The authors of this work declare that they have no conflicts of interest.

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