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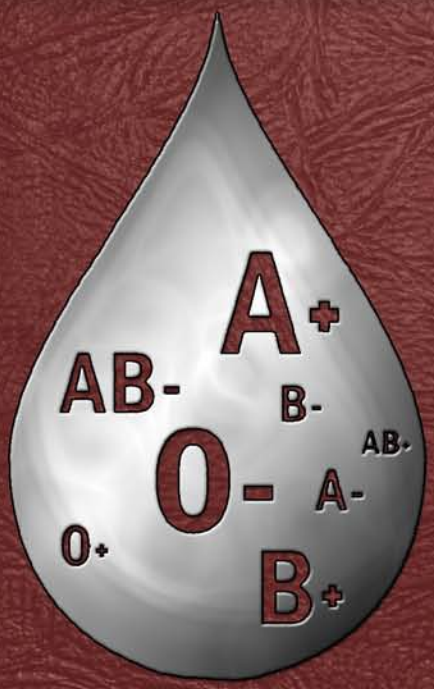
Piotr Chmielewski, Katarzyna Sołkiewicz, Krzysztof Borysławski, Bartłomiej Strzelec



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VARIABILITY IN THE FREQUENCY OF ABO AND RH BLOOD GROUPS IN LOWER SILESIA (POLAND): THE ROLE OF NATURAL SELECTION AND GENETIC DRIFT

ZMIENNOŚĆ CZĘSTOŚCI GRUP KRWI UKŁADÓW ABO I RH NA DOLNYM ŚLĄSKU (POLSKA): ROLA DOBORU NATURALNEGO I DRYFU GENETYCZNEGO

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Summary

Identification of blood group frequencies along with their spatial and temporal changes in a given population has several tangible benefits. Findings from such population-based studies can be useful for the appropriate management of regional blood banks and blood treatment planning as well as for the interpretation of microevolutionary changes. The aim of this study was to evaluate the variability in the frequency and distribution of ABO and Rh blood types in men and women from different Lower Silesian counties and towns. Data on 158,134 adults (including 113,714 men and 44,420 women) were obtained from two electronic databases containing information about voluntary blood donors. The rate and direction of changes in the frequency of blood groups were assessed using linear regression analysis and Pearson's correlation whose significance was assessed with *t*-test. Significant differences in the frequencies of blood groups were found for the analyzed period, but the largest changes occurred in the frequency of A and O blood types. A significant increase in the frequency of the A group along with a decrease in the O group was observed. The frequency of B group rose significantly in both sexes but the increase was more pronounced in men. There was a decreasing trend in the frequency of the AB group in men, while a significant tendency toward the increase in the frequency of this blood type was observed in women. In general, the incidence of the AB group in both sexes was relatively stable. A significant increase in the frequency of the Rh(+) factor along with a decrease in the Rh(–) factor was observed. The comparison of blood group frequencies in Lower Silesia showed minor differences between counties. The role of two main evolutionary mechanisms for these changes is outlined and findings from other seroanthropological studies that have been carried out across the world are discussed.

Key words: blood type, distribution, population studies, Rh factor, seroanthropology

Streszczenie

Określenie częstości występowania grup krwi w danej populacji wraz ze zmianami zachodzącymi w czasie i przestrzeni ma kilka znaczących korzyści. Wyniki takich badań opartych na danych pochodzących z populacji mogą być użyteczne dla właściwego zarządzania regionalnymi bankami krwi i planowania działań w zakresie krwiolecznictwa, jak również interpretacji zmian mikroewolucyjnych. Celem badania była ocena zmienności częstości występowania i rozkładu grup krwi w układach ABO oraz Rh u mężczyzn i kobiet z różnych powiatów i miast Dolnego Śląska. Dane dotyczące 158.134 osób dorosłych (w tym 113.714 mężczyzn i 44.420 kobiet) pozyskano z dwóch baz danych dotyczących krwiodawców. Tempo i kierunek zmian oceniono wykorzystując analizę regresji liniowej oraz obliczając korelacje, których istotność oceniono testem *t*. Dla całego analizowanego okresu stwierdzono istotne różnice, lecz największe zmiany wystąpiły w częstości grupy A i O. Mianowicie, zaobserwowano istotny wzrost w częstości grupy A wraz ze zmniejszeniem częstości grupy O. Częstość grupy B wzrosła istotnie u obu płci, ale zmiana ta była bardziej wyraźna u mężczyzn. Częstość grupy AB malała u mężczyzn, natomiast u kobiet zaobserwowano statystycznie istotny trend polegający na wzroście częstości tej grupy. Ogólnie, częstość grupy AB u obu płci była jednak względnie stała. Zaobserwowano istotny wzrost częstości czynnika Rh(+) wraz ze zmniejszeniem częstości Rh(–). Porównanie częstości grup krwi wykazało bardzo niewielkie i najczęściej nieistotne różnice między powiatami. Przedstawiono w zarysie rolę dwóch podstawowych mechanizmów ewolucyjnych w kształtowaniu tych zmian oraz omówiono pokrótce wyniki innych badań seroantropologicznych przeprowadzonych na całym świecie.

Słowa kluczowe: grupa krwi, rozkład, badania populacyjne, czynnik Rh, seroantropologia

Contents

1. Introduction

1.1. Discovery of ABO blood group system and its scientific importance

In 1901, Karl Landsteiner, an Austrian-born American physician, pathologist, hematologist, and immunologist, randomly combined the serum and red blood cells of his colleagues and discovered that the process of agglutination results from the contact of blood cells and serum that are not compatible with each other (Landsteiner 1901; Levine 1961a; Levine 1961b; Longe 2015; Venes 2017). Prior to this breakthrough, mortality rates after blood transfusions were extremely high, and transfusion-related deaths were caused by both microbial infections and blood group incompatibility. The latter cause was due to the fact that blood with different and incompatible ABO and Rh blood groups was used for transfusions (Avent and Reid 2000). From the different reactions he observed in test tubes, Landsteiner succeeded in identifying the three blood groups, i.e. A, B, and C, which was later renamed "O" (written as the letter O and pronounced "oh"), though in many European countries it is rendered as "0" (zero), which denotes the absence of A or B antigen on the surface of the erythrocytes (Schmidt and Okroi 2001; Daniels and Reid 2010; Longe 2015). In 1902, Adriano Sturli and Alfred von Decastella discovered the fourth blood group (von Decastella and Sturli 1902; Arora et al. 2015; Badge et al. 2017), i.e. AB, which is often considered to be the most recent blood group.

In the subsequent years, it became clear that these blood types are determined by an individual's genetic makeup and cannot be changed. Thus, it was possible to type humans in order to identify their blood groups. These seminal discoveries and their subsequent applications shaped the development of hematology, serology, seroanthropology, forensic serology, population genetics, and immunology. From that time on, humans as well as other primates were typed for ABO blood group based on the presence or absence of surface antigens on the red blood cells (RBCs, erythrocytes) associated with specific glycoproteins and glycolipids of the cell membrane of the erythrocytes (Longe 2015; Venes 2017). These four blood types within the system that Landsteiner and his students described, are encoded by the *ABO* gene located on the long arm of chromosome 9 (Mohandas et al. 1979; Humphray et al. 2004; Daniels 2013a).

In the years 1909-1919, Landsteiner worked at the University of Vienna and performed multiple autopsies. In the year 1911, he was appointed as Associate Professor of Pathological Anatomy in Vienna. During that time, he discovered the polio virus and described the condition known as poliomyelitis (infantile paralysis) as an infectious disease that is caused by this biological factor. In the early 1920s, Landsteiner was sworn in as Professor at the Rockefeller Institute for Medical Research in New York, and throughout the 1920s he worked on the problems of immunity and allergy. In 1927, he described new blood types, i.e. M, N, and P, refining the work he had begun 20 years before, which thenceforth began to be used in paternity suits. His work contributed greatly to the development of serology, immunology, immunochemistry, allergology, virology, and bacteriology. The fortuitous discovery of the ABO blood group system earned him the 1930 Nobel Prize in Physiology and Medicine (Longe 2015).

Thus, it was established that individuals with type A blood have the A antigen on the surface of their erythrocytes, subjects with type B blood have the B antigen, individuals who are type AB, Rh-positive (AB+) (often called "universal recipients" because they can receive blood from every other group) have both A and B antigens on the surface of their erythrocytes, and subjects with type O, Rh-negative (O–) (often called "universal donors" because their blood can be used with all other

types) have neither A nor B antigens on the surface of their red blood cells. Blood plasma from type A blood contains anti-B antibodies, which act against type B antigens, while plasma from type B blood contains anti-A antibodies, which act against type A antigens. Type AB blood has neither type of antibody, whereas type O blood has both anti-A and anti-B antibodies. Later on, it was demonstrated that the genes for the ABO blood group system are on chromosome 9, and the ABO blood group is an example of codominance in that the A and B antigens can be expressed at the same time. It soon became clear that the knowledge of those surface antigens associated with glycoproteins and glycolipids of the cell membrane of the erythrocytes and antibodies that circulate in the serum can be useful for medical procedures such as transfusions and organ transplantation since blood typing and crossmatching tests, which are based on the reaction between the antigens and the antibodies, should be commonly performed tests to ensure that a given person who needs a transfusion will receive blood that matches his own. To avoid such a blood transfusion being recognized as foreign by the recipients' immune system, the blood types of both the donor and recipient must be taken into account, and patients must always receive blood that matches their own blood type, otherwise a serious, or even fatal, in certain circumstances, reaction can occur (Longe 2015). Similarly, parents who are expecting a baby have their blood typed in order to diagnose and prevent hemolytic disease of the newborn (HDN) as Rh-positive babies whose blood group is not compatible with blood groups from the mother (if she is Rh-negative) are likely to develop this condition. It is noteworthy that HDN can be very serious with some blood group differences, while it can be mild with others (Longe 2015; Franchini et al. 2016a). Since children inherit genes from each parent that determine their blood group, blood typing was used in paternity testing. In the past, laboratory technicians used to assess the probability of fatherhood in paternity suits using this method, but current techniques of molecular biology that compare long terminals repeats are much more reliable. To determine whether or not the alleged father could be the biological father, the blood samples of the child, mother, and alleged father were compared. Likewise, legal investigations and suits may still require typing of blood or other body fluids, such as semen or saliva, to identify individuals involved in crimes or other legal matters (Longe 2015). Thus, the clinical significance of ABO blood group is evident, especially in regard to transfusion medicine, pregnancy, and organ transplantation.

1.2. Human blood group systems

Although the ABO blood group system along with the Rh (rhesus) blood type system that was discovered by Landsteiner and his students is of prime importance in blood transfusions and organ transplantation, there are many different erythrocyte antigens that are organized in other blood group systems (Daniels 2013a). The current classification of these blood group systems is presented in Table 1.

Interestingly, although most people have probably never heard of these numerous blood types more than 30 distinct blood group systems representing approximately 400 or even 500 known erythrocyte antigens have been identified to date (Giri et al. 2011; Mitra et al. 2014; Longe 2015), yet only the ABO system along with the Rh (D) blood system is routinely used in clinical transfusion medicine because the ABO blood group antigens are the most immunogenic of all blood group antigens (Dean 2005). These blood group systems other than the ABO and Rh (RH) systems include MNS (MNS), P1PK (P1), Lutheran (LU), Kell (KEL), Lewis (LE), Duffy (FY), Kidd (JK), Diego (DI), Yt (YT), Xg (XG), Scianna (SC), Dombrock (DO), Colton (CO), Landsteiner-Wiener (LW), Chido/Rodgers (CH/RG), H (H), Kx (XK), Gerbich (GE), Cromer (CROM), Knops (KN), Indian (IN),

Ok (OK), Raph (RAPH), John Milton Hagen (JMG), I (I), Globozyd (GLOB), and Gill (GIL), RHAG (RHAG), Forssman (FORS), JR (JR), Langereis (LAN), Vel (VEL), CD59, and AUG (Dean 2005; Fabijańska-Mitek 2007; 2008; Wieczorek et al. 2011; Daniels 2013a; Daniels and Bromilow 2013, see Table 1). However, routine blood typing and crossmatching is usually concerned with and confined to the ABO and Rh blood type systems. Thus, the information on the prevalence and frequencies of these two blood group systems is extremely important in blood banking and transfusion medicine.

The ABO blood group system (ISBT number 001, system symbol ABO) stands out from all other blood types as antibodies against its antigens are constitutively present in the plasma, and they are of prime significance in clinical transfusion medicine and transplantology since naturally occurring anti-A and/or anti-B immunoglobulins constitute a major barrier against incompatible blood transfusions and organ transplantation (Thakral et al. 2005). These are mainly the IgM antibodies whose production occurs without prior contact with the antigen and begins just after birth. Their concentration increases subsequently with a peak at a young age (Pacholczyk et al. 2012), and at age 8-9 years it is similar to that observed in adults (Wolański 2012). Therefore, anti-A and anit-B antibodies are not present in the newborn, but they appear in the first years of life.

The *ABO* gene that is located on the long arm of chromosome 9 (9q34.1-q34.2) determines the ABO blood group system (classified as 001, according to the ISBT terminology). The *ABO* locus is linked to the *AK1* (adenylate kinase) locus as well as the *NP* (nail-patella syndrome) locus (Mohandas et al. 1979; Humphray et al. 2004). The *ABO* gene comprises seven exons, and exons 6 and 7 are responsible for encoding the ABO glycosyltransferases (Rudmann 2005). There are three alleles of this gene, i.e. A, B, and O, and there are four antigens. Remarkably, other primates have also polymorphic ABO antigens. Identification of phenotypically and functionally distinct groups reveals four such types in humans: A (when A oligosaccharide is present on the cell membrane of the RBCs), B (when B oligosaccharide is present), AB (when both A and B oligosaccharides are present), and O (when neither A nor B oligosaccharides can be found in the blood). Thus, the ABO blood types are distinguished by a specific kind of oligosaccharides found on the outer layer of an individuals' erythrocytes where they form a special coating attached to the cell membrane of these blood cells (Newquist 2012). Noteworthy, some of these blood groups are interchangeable, and as stated above, blood group O can always be used with other types, while individuals with blood group AB can use blood from every other type, yet in real life the same blood type is normally used during transfusions to avoid complications. ABO antigens can be found on the outer layer of other blood cells than erythrocytes as well as on the cell membrane of many other types of cells in the body. In soluble forms, they can be found in body fluids and secretions. ABO antigens are not present in the nervous tissue, the cerebrospinal fluid (CSF) , and probably on some types of stem cells as these antigens are not expressed on primitive hematopoietic stem cells (Basu et al. 2015).

Antigens A, B, and H that are present on the surface of erythrocytes are in biochemical terms glycoproteins and glycolipids. The H antigen is a precursor of both A and B antigens. The specificity of the antigens in groups A, B, and H is determined by the sugar molecule that occupies the last position of the oligosaccharide chain composed of D-galactose, *N*-Acetylglucosamine (GlcNAc), L-fucose, and *N*-Acetylgalactosamine (GalNAc). The specificity of the antigen A is determined by *N*-Acetylgalactosamine, whereas the specificity of the B antigen is dependent upon D-galactose. The specificity of the H antigen, which is a precursor of A and B antigens, is determined by L-fucose (Dean 2005; Rudmann 2005).

Interestingly, the ABO group system includes quite a few subtypes, such as A_1, A_1B, A_2, A_2B, A_3, A_x, Ae_1, A_{end}, B, B_1, B_3, B_x, B_{el}, $_{cis}AB$, O, etc. and some of them are very rare. Given the fact that apart from the ABO category and the abovementioned subtypes there is another subgroup based

on the presence or absence of the Rh (rhesus) factor, this list of ABO subtypes is even longer, and the following ABO subtypes were recognized: A_1 negative (A_1, Rh(–)), A_1 positive (A_1, Rh(+)), A_1B negative (A_1B, Rh(–)), A_1B positive (A_1B, Rh(+)), and so forth. Identification of these subgroups is extremely important because in the case of weak subgroups A and B, donors are likely to be mistyped as group O individuals, which can lead to complications and increased mortality if such blood were transfused to O group individuals (Thakral et al. 2005). This is due to the fact that the latter has anti-A and anti-B antibodies in the plasma. Similarly, this risk occurs when the recipient has A_x blood group because these individuals normally have anti-A_1 antibodies in their serum. If this is clinically significant, blood typing that does not take into consideration these ABO subgroups can lead to fatal consequences.

The Rh (rhesus) blood group system (ISBT number 004, system symbol RH) was first discovered in 1937 by Landsteiner and Wiener, but the importance of this fact was realized in 1940, after subsequent findings by Philip Levine and Rufus Stetson who reported the first cases of Rh incompatibility (Levine and Stetson 1939; Landsteiner and Wiener 1940). These researchers were the first to describe a case of a woman who delivered a stillborn child affected by HDN. She received a blood transfusion from her husband and she had a transfusion reaction, even though both of them were O blood type. Further analyses revealed that this woman had become immunized specifically to a factor that she lacked (–) and which her baby had inherited from the father (+). However, no name was specified to this new and unknown type of agglutinin when described for the first time in this case report (Levine and Stetson 1939). For the purpose of the investigations that were carried out to elucidate the role of this new blood groups system, the serum used was produced by immunizing rabbits with erythrocytes from a rhesus macaque (*Macaca mulatta*), a species that is anatomically and physiologically close to humans and therefore was often used in medical and biological research. It has given its name to this human blood group system. Initially, it was thought that the antibodies obtained by immunization of rabbits and guinea pigs with erythrocytes from monkeys recognize the same antigen that is present on the surface of the red blood cells of monkeys and humans. Therefore, this antigen was termed "the Rh factor" after the rhesus monkey (Newquist 2012). Later on, it emerged that animal and human antigens are not the same, so they should not have been named after this monkey. Nevertheless, this traditional terminology has not been changed (Avent and Reid 2000). Thus, a given person either has (+) or does not have (–) this Rh factor, which is known as the immunogenic D antigen, on the surface of the erythrocytes. Thus, the status is indicated as Rh-positive, when this most immunogenic D antigen is present, or Rh-negative, when there is no such antigen. However, apart from the D antigen, there are other antigens of this blood group system that are clinically relevant, including the four antigens, i.e. C, c, E, and e. The biosynthesis of these Rh antigens begins around age 6 months during the fetal period (Pacholczyk et al. 2012).

The Rh blood group system is one of the most polymorphic and immunogenic systems known in humans (Avent and Reid 2000). Because of its potent immunogenicity along with ABO grouping, RhD antigen testing was made mandatory before issuing a compatible blood in transfusion medicine (Avent and Reid 2000; Elsayid et al. 2017). The number of antigens in this blood group system is around 49 (more than 50, according to some sources), including D, C, c, E, and e among the most important antigens which account for most clinical transfusion issues. The Rh antigens are present only on the surface of the red blood cells, and they do not contain sugar residues, which distinguishes them from other blood types. The most important antigen of the Rh system is the D antigen, which is responsible for most cases of HDN in pregnancies in which serologic incompatibility occurs. The genes for the Rh blood group system are located on the short arm of chromosome 1 (1p36.11), where *RHD* and *RHCE* are present. These two genes are closely linked and they were created as result

of duplication. They share approximately 93-98% (96%) homology over all introns and exons, and each of them comprises ten exons which encode 417-amino acid polypeptides, although the N-terminal methionine is cleaved from the mature proteins (Le Van Kim et al. 1992; Rouillac et al. 1995; Daniels 2013b). These two genes are oriented in opposite directions, i.e. 5' *RHD* 3' – 3' *RHCE* 5' (Daniels 2013b), which is also given as (3' *RHD* 5') – (5' *RHCE* 3'), and the *SMP1* gene, whose function remains unknown, lies between them (Pacholczyk et al. 2012). The *RHD* gene encodes the D antigen, while the *RHCE* gene encodes the C, c, E, and e antigens. It has been established that the polypeptides RhD and RhCE have more than 90% sequence identity. In many Caucasian populations, about 85% individuals are RhD-positive, which means that they have the D antigen on the surface of their erythrocytes. The rest of the population (approximately 15%) is RhD-negative, which means that this D antigen is absent. In the latter, the lack of the D antigen results mainly from the deletion of the *RHD* gene, which is a consequence of unequal crossing over that is responsible for this deletion. In other cases, the causes of the RhD-negative phenotype are point mutations or some types of gene rearrangements (Pacholczyk et al. 2012). In black people, mutations in both *RHD* and *RHCE* are found, and the RhD-negative phenotype is very rare (5%). It results mainly from the presence of a pseudogene known as *RHDψ*. In Asians, the Rh(–) phenotype is even less frequent (3%) and roughly 10-30% of D-negative phenotypes are Del. They can have very low levels of the D antigen that cannot be detected using standard typing (Westhoff 2007). Interestingly, the erythrocytes of 0.2% to 1% of white individuals and a greater percentage of African Americans carry reduced expression of the D antigen known as "weak D". This weak D is not detected by routine anti-D reagents, but it can be identified by a more sensitive test. There is no hard and fast line between "normal" D and "weak" D. The erythrocytes that carry this weak form of D are merely ones with a relatively smaller number of D antigens sites that is usually due to some point mutations in the gene encoding the D antigen, i.e. the *RHD* gene (Orkin et al. 2009).

The MNS blood group system (ISBT number 002, system symbol MNS), which was discovered by Landsteiner and Levine in 1927, is second only to the Rh system in its complexity (Reid 2009). It consists of 46 antigens carried on glycophorin A (GPA), glycophorin B (GPB), or hybrids of these glycophorins, which arise from single-nucleotide substitution, unequal crossing over, or gene conversion between the glycophorin genes. Antigens of the MNS system, which are fully developed at birth, are encoded by genes located on the chromosome 4 (4q28.2-q31.1). Neighboring loci *MN* and *Ss* are also referred to as *GYPA* and *GYPB*. The *GYPA* gene encodes GPA, which is the sialoglycoprotein MN and it can be found on the erythrocytes, whereas the *GYPA* gene encodes GPB, which is the sialoglycoprotein Ss. The third gene in this family, the *GYPE* gene, is involved in gene rearrangement, which leads to a great variety of antigens in this blood group system (Pacholczyk et al. 2012). The *GYPA* gene is located on the long arm of chromosome 4 (4q31), while the *GYPB* gene lies just downstream on the same chromosome and is believed to have arisen by gene duplication. The *GYPE* gene lies downstream of GYPB and encodes a 78 amino-acid protein with similarities to GPB (Orkin et al. 2009). Thus, the antigens of the MNS blood group system include M, N, S, s, and U antigens that are carried on sialoglycoproteins on the cell membrane of the erythrocytes. Both M and N are encoded by paired allelic forms of the *GYPA* gene and amino acid substitutions at residues 1 and 5 of *GYPA* are responsible for the formation of these two antigens. M+N+ represents heterozygosity for both genes, M+N– stands for homozygosity for M, and M–N+ denotes homozygosity for N (Orkin et al. 2009). Because of very low immunogenicity, most of the alloantibodies to these antigens are not generally clinically significant, yet antibodies to low-prevalence and high-prevalence MNS antigens can cause HDN (Reid 2009). Like in the case of the Rh system, the antigens of the MNS blood group system are present only on erythrocytes and have not been detected on other cells of the body,

including other blood cells such as nucleated cells or cell fragments, i.e. platelets.

The Lutheran blood group system (ISBT number 005, system symbol LU) comprises 21 identified antigens and belongs to the immunoglobulin family of receptors and adhesion molecules (Table 1). The Lutheran antigen system helps transmit signals between cells. It also constitutes receptors for lamins as well as glycoproteins of the extracellular matrix (ECM). These antigens arise from variations in the *BCAM* gene that is located on chromosome 19 (19q13.2-13.3). As regards blood cells, Lutheran antigens are present only on the surface of the erythrocytes, though they can be found on many other cells in the body. The *BCAM* gene encodes the Lutheran protein and its isoform known as basal cell adhesion molecule (B-CAM). This antigen system is based on the expression of two codominant alleles, i.e. Lu^a and Lu^b. They differ from each other by one amino acid (Pacholczyk et al. 2012). There are three common genotypes termed Lu^aLu^a, Lu^aLu^b, Lu^bLu^b. The frequencies of the pertinent phenotypes Lu(a+b–), Lu(a+b+), and Lu(a–b+), respectively, vary across different populations, and the latter is the most common type in all populations. The phenotype Lu(a–b–) is extremely rare. Although this antigen system develops early in ontogeny and is present in the fetus, it is seldom the cause of HDN.

The Kell blood group system (ISBT number 006, system symbol KEL), which is similar in many ways to the Lutheran system, is extremely complex and consists of at least 28 antigens that are highly immunogenic (Dean 2005). These antigens reside on two transmembrane proteins, i.e. the Kell protein encoded by the *KEL* gene that lies on chromosome 7 (7q34) and the XK protein, and are the third most potent type of antigens, after those of the ABO and Rh blood group systems, which can trigger an immune reaction. The amino acid sequence of the Kell glycoprotein is similar to the sequence of certain endopeptidases, and the Kell protein have a very similar activity to that observed in the case of a zinc endopeptidase. The Kell blood group system comprises at least 25 antigens, 7 of whom (K, k, Kp^a, Kp^b, Kp^c, Js^a, and Js^b) are clinically significant. One of the most important antigens of this blood group system resides on the Kell protein and is called the K antigen. It can be found in approximately 9% of white donors (Orkin et al. 2009). To be more specific, individuals with the *KK* and *Kk* genotypes (K-positive) constitute about 10% of the general population, while individuals with the *kk* genotype (K-negative) comprise about 90% of the general population.

The Lewis blood group system (ISBT number 007, system symbol LE) comprises six antigens, i.e. Le^a, Le^b, Le^{ab}, Le^{bH}, ALe^b, and BLe^b, though the first two are the most common and important types. The *FUT3* and *FUT2* genes, which are located on chromosome 19 (Table 1), are responsible for this antigen system. There are three common phenotypes, i.e. Le(a+b–), Le(a–b+), and Le(a–b–). Individuals with the phenotype Le(a+b+) who also have the *Le* and *Se* genes show strong expression of the Le^a antigen. Although Lewis antigens are present on the surface of the erythrocytes, they are not intrinsic to these blood cells and they are not actually synthesized in these cells. Lewis antigens are also found on the surface of other formed elements such as lymphocytes and platelets (Hillyer et al. 2007). Moreover, they are present in other tissues and organs of the body, such as pancreas, stomach, intestine, renal cortex, adrenal glands, and skeletal muscles. These antigens can also be found in the saliva of Lewis negative individuals. Antibodies to Lewis antigens do not cause HDN. Therefore, they are generally clinically insignificant with respect to erythrocyte incompatibility. Nevertheless, Lewis incompatibility might be clinically important in some types of organ transplantation. Interestingly, the Le^b antigen is a receptor for *Helicobacter pylori* that is responsible for the adherence of this pathogen to the gastric surface epithelium, which can explain why individuals with O blood type (who have only these antigens, unlike individuals with other blood type who can replace this antigen with A or B antigens) are more likely to develop peptic ulcer disease (Hillyer et al. 2007).

The Duffy blood group system (ISBT number 008, system symbol FY) consists of at least 6 antigens that reside on the surface of the erythrocytes as well as many other types of cells in the body but not other blood cells. These antigens can be found in the brain, lungs, and large intestine (Pacholczyk et al. 2012). The gene for the Duffy antigen/chemokine receptor DARC is located on the long arm of chromosome 1 (1q22-1q23). The transmembrane DARC glycoprotein is the product of this gene. This protein is a receptor for chemokines such as MCP-1 and RANTES and cytokines such as IL-8. In this blood group system, there are three commonly expressed antigens, i.e. allelic Fy^a and Fy^b, and Fy3 which is present when either the first or the second one is present. There are also other identified antigens such as Fy4, Fy5, and Fy6. Only Fy^a, Fy^b, and Fy3 are considered clinically important. The alleles Fy^a and Fy^b are codominant, so there are four main phenotypes, i.e. Fy(a+b–), Fy(a–b+), Fy(a+b+), and Fy(a–b–). In white individuals, Fy(a+b+) and Fy(a–b+) are common, whereas the phenotype Fy(a–b–) is very rare. In black individuals, this phenotype can be extremely common (i.e. up to 100% in some African populations). Interestingly, the Duffy antigens that reside on the surface of the erythrocytes act as receptors for merozoites of malarial parasites, e.g. *Plasmodium vivax*. In most nonblack individuals, the erythrocytes have Fy^a, Fy^b, or both, while erythrocytes of most black individuals lack all three Duffy antigens and do not have the Duffy protein. This has led to the hypothesis that the Fy(a–b–) phenotype can protect against malaria, an effect that has already been demonstrated for several species of *Plasmodium*. The absence of the Fy^a and Fy^b antigens may result from the presence of a stop codon in the *FY* gene or a mutation in the promoter region at the GATA-1 transcription factor binding site. Antibodies to these two antigens are mainly immunoglobulins of the IgG class and they can cause transfusion reactions.

With the development of molecular biology techniques, it is now possible to perform blood group genotyping, which is a more sophisticated method than the simple serologic testing. This modern method consists in determining differences in the genetic make-up by examining the individual's DNA sequence using biological assays in order to reveal the alleles that individuals inherited from their parents. It concentrates on the specific changes in the DNA that are responsible for blood proteins and carbohydrates in people with minor blood groups. Specifically, molecular methods for blood group genotyping permit us to genotype blood types in potential blood donors and recipients for more efficient blood therapy, which is especially important to transfusion medicine and the treatment of individuals who receive many transfusions. It should be stressed that blood group genotyping is currently becoming the standard testing method for the determination of minor blood groups. It is more and more commonly performed because it has several important advantages over older methods of the serologic testing. Most importantly, it allows the identification of rare blood types in most large blood banks. Further, it can be especially useful in assessing blood types of fetuses that are at greater risk of developing NHD. Also, in patients with predisposition to formation of alloantibodies and individuals suffering from hemolytic anemia the use of blood group genotyping can have some tangible benefits. As stated above, this method is particularly useful for determining rare blood group antigens. Such type of blood can be used for transfusions in patients with predisposition of excessive immune response. Moreover, the determination of the genetic make-up allows the determination of the frequency of blood types (other than ABO and Rh) at a population level, which is also important to seroanthropology and other fields of study. In current transfusion medicine, only ABO and Rh blood types are determined as they are of key importance because of their high immunogenicity. It should be remembered, however, that other blood group systems, such as MNS and KEL, also have antigens against which the recipient's immune system reacts by producing antibodies, and this immune reaction might be clinically significant in certain cases. Nevertheless, this first blood transfusion in which the donor's blood type and the recipient's blood type are different in terms

of minor blood groups is usually safe and does not lead to any transfusion reaction. However, the risk of such reactions increases in patients who receive many blood transfusions, such as patients suffering from sickle cell disease and thalassemia, and in these cases blood group genotyping is necessary for proper treatment.

1.3. Maternal-fetal incompatibility and types of hemolytic disease

The major importance of the Rh blood group system lies in its application to maternal-fetal incompatibility (Rh incompatibility), a condition which occurs when the fetus has the D antigen (is Rh-positive), and the mother does not have this antigen (is Rh-negative). In the physiological conditions, there are no antibodies against the Rh antigens. Therefore, Rh incompatibility usually is not observed in the first pregnancy. In some cases (1-2%), the fetus that is Rh-positive induces antibodies in the mother (it is estimated that at least 0.1 ml of blood exchange is needed to start the immune response) that can cross the placenta and this can lead to Rhesus HDN (Rh HDN), a severe condition that is usually observed in the second or later pregnancies.

Most of the time, the primary immune response occurs after parturition when there is blood exchange between the mother and her baby. This immune response develops slowly. This process of sensitization can also occur during abortion (both induced and spontaneous) even in early pregnancy, fetomaternal hemorrhage, and invasive procedures for prenatal diagnosis such as amniocentesis, chorionic villus sampling (CVS), fetal blood sampling, and fetoscopy (Lashley 2005). At first, IgM antibodies are produced, and later antibodies are conversed to IgG1 and IgG3 (Pacholczyk et al. 2012). Unlike the latter, the former do not cross the placenta. Since IgM antibodies are produced earlier and they cannot cross this natural barrier, unlike the IgG antibodies, but they are produced much later, serologic (Rh) incompatibility is not usually observed in the first pregnancy. If the process of sensitization occurred during the first childbirth, the anti-D antibodies are most likely to be detected only a few months after the birth of the Rh-positive child. During the next pregnancy, when the fetus is also Rh-positive, the D antigen stimulates the production of anti-D antibodies in the mother, which leads to HDN. As a result, fetal red blood cells are destroyed in the spleen either through phagocytosis with the help of macrophages or mechanisms of antibody-dependent cell-mediated cytotoxicity. These mechanisms lead to lysis of fetal erythrocytes. Consequently, hemolytic anemia with accompanying hyperbilirubinemia occurs in the fetus. The process of extramedullary hematopoiesis develops gradually. In the course of the disease, life-threatening conditions develop, including anemic anoxia, multi-organ damage, and hydrops fetalis. The severity of clinical symptoms and health consequences of HND varies significantly as this disorder can be very serious with some blood group differences, but it can be relatively mild with others (Longe 2015; Franchini et al. 2016a).

The incidence of Rh HND has markedly decreased since the availability of Rh (D) immunoglobulin in the late 1960s. Nevertheless, this disease still poses a threat because not all women who should be receiving this immunoglobulin are actually receiving it. Prevention consists in proper prenatal and antenatal care, including blood typing and a special test for the presence of atypical antibodies in the mother's serum. Rh immunoglobulin should be administered to Rh-negative women who conceive a child with an Rh-positive man and are at risk of Rh incompatibility, e.g. sensitization, maternal anti-D has been confirmed, this is the second pregnancy, etc. (Lashley 2005). As a part of routine antenatal care, the pregnancy should be very carefully monitored for signs of Rh HDN, which involves regular USG scans of the fetus and monitoring of the amount of anti-D in the mother's serum (Dean 2005). In the most serious cases, a blood transfusion may be carried out to correct anemia in the prenatal development. If need be, the child may be delivered earlier using medication

to induce labor or performing cesarean section.

Although Rh incompatibility is of prime importance from a practical clinical point of view, maternal-fetal incompatibility with respect to the ABO system can also be pernicious as it may cause damage and gestational complications. Even though this type of incompatibility is usually not severe in the newborn, it can lead to early embryonic deaths. Moreover, ABO incompatibility is believed to be one of the causes of spontaneous abortion as it is often associated with severe conditions such as erythroblastosis, fetal anemia and ascites (Lashley 2005). Interestingly, there is currently no prophylaxis for HDN caused by incompatibility of other blood group antigens (Dean 2005). Some authors assert that it is generally accepted that ABO HND is not observed during the fetal stage of prenatal development. Unlike anti-D antibodies causing the damage during Rh incompatibility, antibodies of the ABO system do not cause lysis of fetal red blood cells (Pacholczyk et al. 2012). However, ABO incompatibility not only can cause severe injury or early embryonic deaths but it may also be observed in the first pregnancy in contrast to the usual situation existing for Rh incompatibility (Lashley 2005).

Therefore, it should be remembered that maternal-fetal incompatibility is not confined to Rh incompatibility but includes incompatibilities in the ABO and Kell blood group systems. The former involves a situation in which the mother is O blood type and the baby is either A or B blood type. In these cases, pregnant women produce IgG antibodies (usually anti-A and less frequently anti-B) under the influence of fetal group (A, B) antigens. Also, it is theoretically possible that HDN will occur in those pregnancies in which the mother is A blood type and the fetus is B blood type, or it is the other way around. But this is very rarely observed. Women with blood group AB or those whose sexual partners are O blood group are not at risk of this ABO incompatibility (Pacholczyk et al. 2012). Interestingly, ABO incompatibility may to some degree be protective against Rh immunization (Lashley 2005). As stated above, Kell incompatibility can also be responsible for hemolytic disease. Anti-Kell HDN is usually caused by anti-K_1 antibodies, and this is the second most common type of severe HDN. It has been suggested that this condition may be caused by multiple blood transfusions.

1.4. Studying the variability of blood group frequencies in human populations

In human biology, physical anthropology, genetic research, and tracing ancestral relations of humans, frequency distribution of blood groups and their spatial and temporal variability in populations still play an important role (Guzman et al. 2010). The ABO blood types do not exist in equal numbers in different populations or ethnic groups, therefore this blood type system has long been used to categorize human blood based on the presence or absence of ABO antigens on the surface of erythrocytes. Hirszfeld and Hirszfeld (1919a) were the first to demonstrate that the frequencies of blood group A and B differ considerably between populations. Thousands of troops, including many Africans, were tested and striking differences in the proportions of the ABO blood types depending on population and place of origin were observed. These new findings raised further questions regarding the causes of these differences. For instance, were they the result of random genetic drift or the founder effect due to the multiplication and stabilization of the original fortuitous frequencies, or were they the result of natural selection, arising from significant differences in fitness between the various blood groups? (Anstee 2010). Mourant et al. (1978), who summarized these findings, concluded that: “Both processes are operative, but their relative importance remains in question”.

Nowadays we have detailed information on these genes and their alleles giving rise to blood group polymorphisms (Yamamoto et al. 2012). Additionally, recent research on the tracking of Y chromosome and mtDNA haplotypes has provided us with “unprecedented information concerning

the significance of genetic drift and founder effects in determining the genetic background of different world populations. Given this new information, it seems an appropriate time to revisit these questions and ask whether we are any nearer understanding the relative importance of natural selection and founder effects in determining the distribution of human blood groups" (Anstee 2010).

Human populations from different parts of the world have often been phenotypically divided into the ABO and Rh (D) blood types (Venes 2017) and into other blood group systems, including the MNS, Rh (D, LW), Lutheran (LU), Kell (KEL), Lewis (LE), Duffy (FY), and Kidd (JK), and the spatial and temporal changes in the frequencies and distribution of blood types and associated genetic polymorphisms in various human populations have thoroughly been investigated (Hirszfeld and Hirszfeld 1919a; 1919b; Kobyliansky et al. 1982; Marzban et al. 1988; Lyko et al. 1992; Nasidze 1992; Wagner et al. 1995; Gronkiewicz 1996; Susanne et al. 1996; Tęgowska et al. 1997; Omotade et al. 1999; Falusi et al. 2000; Pramanik and Pramanik 2000; Das et al. 2001; Schmidt 2001; Yan et al. 2005; Gauniyal 2006; Subhashini 2007; Dutta and Banerjee 2008; Khan et al. 2009; Nishimukai et al. 2009; Rai et al. 2009; Periyavan et al. 2010; Thakral et al. 2010; Giri et al. 2011; Keramati et al. 2011; Rai and Kumar 2011a; 2011b; Chandra and Gupta 2012; Gupta and Dadwal 2012; Hamed et al. 2012; Liu et al. 2012; Makroo et al. 2013; Sarkar et al. 2013; Garg et al. 2014; Handoo and Bala 2014; Kahar and Patel 2014; Kostovski et al. 2014; Shekhar et al. 2014; Soram et al. 2014; Umbria et al. 2014; Zahra et al. 2014; Ahmad 2015; Anumanthan et al. 2015; Tesfaye et al. 2015; Sah and Sahadalal 2016; Sukumaran et al. 2016; Yu et al. 2016; Lawicki et al. 2017; Rai and Singh 2017).

It is well known that such identification of blood type frequencies along with their spatial and temporal changes in a given population has various benefits from a medical and scientific point of view. For example, findings from such population-based studies can be useful for appropriate management of regional blood banks. Indeed, data on the prevalence of blood groups in different geographic regions can be essential for inventory purposes and effective management of blood banks by relevant medical services. Regardless of their important practical aspects, studies on frequencies and distribution of blood groups and their temporal and spatial changes in a given population or other group of people provide interesting and useful information. The findings from such investigations can be of paramount importance in the fields of epidemiology, population genetics, human biology, and seroanthropology. As stated above, such investigations have also been conducted in the past to resolve medicolegal issues such as disputed parentage.

Blood group antigens of ABO and Rh systems are arguably the most frequently analyzed genetic markers in human populations. It should be remembered that even though there are many other group systems, the ABO and Rh blood group systems have the most important practical implications for medicine and transfusion science. Information on the prevalence of blood groups in different geographic regions is essential for inventory purposes and effective management of blood banks by relevant medical services. Regardless of their practical aspect, studies on the frequency of blood groups and their temporal changes provide interesting data for population genetics and seroanthropology, and in past they have been widely used to resolve medicolegal issues such as disputed paternity. While ABO and Rh (D) blood types are the most important blood group systems clinically and arguably the most frequently analyzed genetic markers in human populations around the world, there is no comprehensive data available concerning spatial and temporal changes in frequencies and distribution of ABO and Rh blood groups in Lower Silesian counties in the second half of the 20th century. Today, interest in investigating the frequency and distribution of blood groups seems to be relatively smaller than before. For example, since the late 1990s, no large national seroanthropological studies have been conducted in Poland, despite significant improvements in research methods in human biology and advances in technology, and thus no sufficiently large reference datasets are available for different parts of

our country such as provinces and counties. Nevertheless, the existing electronic databases operated by blood donor stations open completely new opportunities in this field. Currently, researchers show less interest in this area, which may be associated with intensified migrations, creating an obstacle for this type of analysis. It is known that migrations often obscure regularities in frequencies and distributions of blood groups and trends in different geographical areas.

1.5. The evolution of the human ABO blood group system

From an evolutionary point of view, group O is often viewed as the oldest blood group in humans, and it is estimated that the ABO blood group system evolved approximately 20 million years ago or even earlier (Ségurel et al. 2012; 2013), but the great mystery of the evolutionary origin, the sequence of events, as well as the practical biological purpose of blood types is still to be unraveled. According to more recent views, the hypothesis that group O is the oldest blood group is specious as the oldest blood group is either group A or some type of the forms of group O, or it was a completely different scenario (for a review, see Ségurel et al. 2012; 2013; Farhud and Zarif Yeganeh 2013; Yamamoto et al. 2014). It was suggested that new blood groups could have emerged in response to many factors, related mainly to a diet and lifestyle of a given population, for example the formation of larger communities, type of nourishment, and variable levels of exposure to various pathogens. Therefore, on the basis of evolutionary thinking, different diets based on the ABO system have been promoted over the past decades and it was also hypothesized that this type of diet can improve health and decrease risk of diseases. However, recent findings show that this theory about different diets for different blood types is scientifically unproven as from a scientific point of view these links with ABO blood groups are extremely tenuous (Cusack et al. 2013; Daniels 2014). Furthermore, these ideas may be regarded as pseudoscientific because they have not altered despite contradictory evidence. Many authors have come to the conclusion that the blood type diet is in fact a myth.

Seroanthropological studies in Poland have a long and rich tradition. For example, Halber and Mydlarski (1925), the pioneering researchers, carried out the world's first ever serological survey. Since then, seroanthropological investigations have been conducted all over the world, and many of them have covered whole human populations. In Poland, most of these studies were done in the inter-war period and shortly after World War II. Today, interest in investigating the frequency and distribution of blood groups seems to be smaller than before.

Ludwik Hirszfeld (1884-1954), one of the pioneers of seroanthropological and immunological studies, asserted that the variation of blood groups in people in some sense reflects adaptation to different environmental conditions and the course of epidemics in geographically different populations, though it could also depend on the history of migrations of specific racial or ethnic groups of people. Therefore, the frequency of blood groups differs by geographical region, but also by historic period. It is often assumed that blood type A emerged in the early Neolithic period, when most people switched to a relatively sedentary lifestyle and agriculture and livestock keeping became popular. Modified diet and changes in the gastrointestinal and immune systems probably favored the spread of this blood type. Interestingly, individuals with blood group A tend to be relatively more resistant to infections that occur in densely populated areas. Over time, alleles of this blood group diffused into human populations outside Asia and the Middle East, finally reaching Europe. Today, this blood group is most prevalent in Europe, showing a declining trend from the west to east. In Asia, most individuals with blood group A live in Japan. Some authors have come to the conclusion that blood group B could have emerged and spread across the Himalayan region or the Asian side of the Urals somewhere around 10,000 to 15,000 BC. The development of this blood type could be a response

to significant changes in the climate. Soon after this, the B group became a characteristic trait of the large tribes living in the plains of the Eurasian steppes and India. Today, the largest populations of people with blood group B live in Japan, China, India, Mongolia and other Asian regions up to the Urals. The frequency of blood group B decreases from east to west.

According to the traditional views, blood group AB is the least common and also the most recent one. Only around 5% of the contemporary global population has this type of blood. It has been hypothesized that it emerged as a result of gene exchange in the times of great migrations. It seems that people with this blood group have slightly enhanced immunity, particularly to some bacterial infections.

1.6. Mortality and risk of disorders in relation to the ABO blood group system

It has been established that a specific blood type is more resistant to certain diseases, while individuals with other blood types can be more susceptible to these diseases. For example, individuals with blood group A tend to tolerate better than others a diet rich in animal fat and protein, whereas individuals with blood group B are better adapted to a carbohydrate-rich diet (Wolański 2006). It is well known that the ABO blood group system has an effect on the homeodynamics, being a major determinant of the von Willebrand factor (VWF) and, consequently, of factor VIII plasma levels, and the latter are roughly 25% higher in subjects who have a blood group other than O (Franchini et al. 2007; Liumbruno and Franchini 2013). Interestingly, polymorphisms in the ABO blood type have been associated with susceptibility to a large number of diseases (Ségurel et al. 2013), including coronary heart disease (CHD), venous thromboembolism, type 2 diabetes, some types of cancer (e.g. gastric, pancreatic, skin, ovarian, and lung cancers), infectious diseases, and some personality traits, including those which may contribute to being at risk of developing some types of mental disorders (Cattell et al. 1964; Berger et al. 1989; Annese et al. 1990; Vioque and Walker 1991; Folsom et al. 1997; Garratty 2000; Whincup et al. 2002; Wu et al. 2008; Amundadottir et al. 2009; Wolpin et al. 2009; 2010; Carpeggiani et al. 2010; Edgren et al. 2010; Qi et al. 2010; Xie et al. 2010; Gates et al. 2011; Hobgood 2011; He et al. 2012; Franchini et al. 2013; Jukic et al. 2013; Spiezia et al. 2013; Tsuchimine et al. 2015).

For example, it has been hypothesized that individuals with A blood type are more likely to exhibit psychoticism (Nahida and Chatterjee 2016), even though previous investigations have shown that individuals with A (Rh+) and O (Rh+) are more gregarious and amiable (Gupta 1990). However, more studies suggest that individuals who have A blood type are more agreeable. In some studies, subjects with B blood type were assessed as extroverted compared to their counterparts (Nahida and Chatterjee 2016). In the same analysis, subjects with AB blood type and those with O blood type were more likely to exhibit some traits associated with psychotic behavior.

Although numerous previous studies on blood types in different human populations have focused chiefly on possible associations with blood transfusion complications (O'Donnell and Laffan 2001; Watkins 2001; Yazer et al. 2006; Shastry and Bhat 2010), risk of cancer at different anatomic sites (Aird et al. 1953; 1954; Iodice et al. 2010; Wang et al. 2012; Rizzo et al. 2014; Zhang et al. 2014; Franchini and Lippi 2015; Sun et al. 2015), diabetes mellitus (Buckwalter 1964; Mecafee 1964; Kamil et al. 2010; Qi et al. 2010; Zhang et al. 2015; Shimodaira et al. 2016), osteoporosis (Kaur 2014), vulnerability and susceptibility to other diseases, including age-related conditions, cardiovascular disease, and infectious diseases (Ziółkiewicz 1961; Charzewski et al. 1965; Robinson et al. 1971; Barua and Paguio 1977; Kinane et al. 1982; Anstee 2010; Carpeggiani et al. 2010; Xie et al. 2010; Gates et al. 2011; He et al. 2012; Franchini et al. 2013; Jukic et al. 2013; Liumbruno and

Franchini 2013; Rizzo et al. 2014; Anumanthan et al. 2015; Franchini and Lippi 2015), morbidity, cause-specific, and all-cause mortality (Dentali et al. 2014; Rizzo et al. 2014; Etemadi et al. 2015), life expectancy and long-term survival or even longevity, though the results are mixed (Shimizu et al. 2004; Brecher and Hay 2011; Vasto et al. 2011; Moon 2014; Mengoli et al. 2015; Franchini et al. 2016b), some evolutionarily aspects, including those which are associated with significant differences in Darwinian fitness (Lalueza-Fox et al. 2008; Farhud and Zarif Yeganeh 2013; Yamamoto et al. 2014; Franchini and Bonfanti 2015), and even some personality traits (Hobgood 2011; Tsuchimine et al. 2015), the problem of clinical significance of ABO blood groups in regard to morbidity and mortality as well as the issue of spatial and temporal changes in the frequencies and distribution of ABO and Rh blood groups along with their possible causes, i.e. the genetic drift, founder effects, or natural selection, and their practical consequences have not been dealt with in a systematic way, even though recently numerous studies have been carried out to explore these issues (Dutta and Banerjee 2008; Rai et al. 2009; Anstee 2010; Periyavan et al. 2010; Giri et al. 2011; Rai and Kumar 2011a; 2011b; Chandra and Gupta 2012; Gupta and Dadwal 2012; Hamed et al. 2012; Sarkar et al. 2013; Garg et al. 2014; Handoo and Bala 2014; Kahar and Patel 2014; Kostovski et al. 2014; Moon 2014; Rizzo et al. 2014; Shekhar et al. 2014; Soram et al. 2014; Zahra et al. 2014; Ahmad 2015; Anumanthan et al. 2015; Franchini and Bonfanti 2015; Franchini and Lippi 2015; Tesfaye et al. 2015; Sah and Sahadalal 2016; Sukumaran et al. 2016; Yu et al. 2016).

It is worth mentioning that current research on the links between some blood parameters and all-cause as well as cause-specific mortality is not confined to these interesting associations with the ABO blood group system but involves various biomarkers of senescence and reliable predictors of longevity like age-related changes in indicators of chronic systemic inflammation, such as white blood cells and proinflammatory interleukins (Nilsson et al. 2014; Chmielewski et al. 2016), and it would be interesting to explore these age-dependent changes in inflammatory markers and their associations with long-term survival in individuals with different ABO blood types. The aging process at its core is driven by the accumulation of random molecular damage as well as the development of low-grade systemic inflammation. Senescent cells secrete proinflmmatory cytokines and other factors that stimulate the development of this chronic systemic inflammation. Moreover, local inflammation is part of the complex response to harmful factors and stimuli, such as various pathogens, irritants, oxidative stress, and trauma, and the main biological purpose of this process is to combat infection, which plays an important protective role, yet it also contributes to the self-destruction of the organism in the long run. However, since some studies have found that there are significant differences in levels of inflammatory markers between short- and long-lived individuals (Nilsson et al. 2014; Chmielewski et al. 2016), including changes in white blood cells and IL-6, it is conceivable that the response of subjects with different ABO blood types might be different if there are significant differences in their longevity, but this assumption is highly debatable in the light of current findings (Vasto et al. 2011; Moon 2014; Mengoli et al. 2015).

2. Aims of study

The aim of the present study is to explore changes in the prevalence of ABO and Rh blood groups in men and women from Lower Silesia, Poland. These spatial and temporal alterations in the frequency and distribution of blood types in different Lower Silesian counties in the period under study are assessed separately for both sexes. The role of two main mechanisms (i.e. genetic drift and natural selection) for the spatial and temporal changes over the period under investigation is outlined. Findings from other seroanthropological studies that have revealed some interesting associations between blood groups and diseases or overall mortality are discussed. These associations are not fully understood and they deserve special attention. The current study also aims to explore the possible link between the prevalence of the ABO blood group system and the Rh (D) factor.

3. Materials and methods

3.1. Data collection and study population

For the purpose of the study, data on 216,270 individuals were obtained from two electronic databases containing information on voluntary blood donors living in the whole region of Lower Silesia, Poland. The process of data collection was performed with permission and consent of the Directorates of the Regional Blood Donation and Blood Therapy Centers in Wrocław and Wałbrzych. The database in Wałbrzych was developed in 1995 and the one in Wrocław was established two years later. All data used in this investigation were collected from the inception of the electronic databases to the end of March 2009.

Although there were 216,270 records available, some of them did not meet the necessary inclusion criteria because of missing information etc., and therefore could not be used in the analysis. Moreover, out of the total number of subjects who were registered as voluntary blood donors and for whom all necessary data were available, only data on individuals who were permanently living in Lower Silesia were used, i.e. 158,134 adults, including 113,714 men and 44,420 women, and thus more than 73% of all entries were included in the analysis. 61,811 records came from the Wałbrzych database, and 96,323 came from the Wrocław database. All data were anonymized so as not to divulge any personal or confidential information such as full name, address, phone number, occupation, etc. Because of Polish regulations on the protection of personal data, electronic extracts from databases contained only the exact date of birth, age, sex, and the blood group in the ABO and Rh system of the study subjects. Thus, data used for the study contained the following information:

(i) first six digits of the "PESEL" number;
(to calculate the chronological age of each subject);
(ii) sex;
(iii) blood type in the ABO and Rh blood group systems;
(iv) registered place of living (postcode and town or city).

An important advantage of the study data is that the very same subpopulation has been monitored for approximately 50 years, which undoubtedly boosts the value as well as the reliability of the study sample and the whole analysis. The differences in the frequency of blood groups in different counties of Lower Silesia were minor and generally nonsignificant. Therefore, the statistical analysis was carried out on the whole material from the province. Because of the history of the region, the analysis of trends was limited to individuals born after 1945.

3.2. Software application for the processing of data on blood donors

For the purpose of the analysis, an authorial application for the importation, standardization, and processing of data on voluntary blood donors living in Lower Silesia was designed to resolve certain problems regarding raw data which emerged during the analysis. First, there were some discrepancies between these two databases. For example, one of them was in DBF (dBase Table File) format, while the other was provided as CSV (Comma Separated Values) file. Second, column names were different and positioned in a different order. Third, data from Wałbrzych contained some

superfluous information on the blood subgroups. Further, postcodes were formatted differently. Moreover, data on the age of blood donors from Wałbrzych were missing. As stated above, almost 27% of entries had to be excluded from the analysis because of missing information.

To solve the aforementioned problems, the application was specially designed for the process of data processing and it was used in the analysis. In this process, the following programs and methods were employed:

(i) Java programming language – a general-purpose object-oriented programming language that is used worldwide in many areas and for many different purposes. This multi-paradigm programming language consists in object-oriented (class-based), structured, imperative, generic, reflective, and concurrent paradigms. The object-oriented paradigm is based on the idea of objects which may contain data, in the form of fields, often referred to as attributes, and "code" that can be referred to as methods. The paradigm of class-orientation, which is also known as class-based programming, is a style of object-oriented programming in which inheritance is achieved by defining classes of objects, as opposed to the objects themselves. In Java, however, statements which alter the program's state are used, so this is described as imperative programming that focus on "how" the program operates, as opposed to declarative programming that concentrate on "what" the program should accomplish without specifying how it should achieve the result. This multi-paradigm programming language was chosen because of easy syntax, a large number of libraries, and data connectors available on free and open source licenses. Moreover, Java is a style of programming in which algorithms are written in terms of types to-be-specified-later that are subsequently instantiated when needed for specific types provided as parameters, which is known as a generic paradigm.

(ii) Data access libraries included Java CSV Library (licensed under LGPL) to read CSV data file, JDBF library (licensed under Apache License 2.0) to read DBF database and PostreSQL JDBC level 3 driver (licensed under BSD License) for connection to PostgreSQL database.

(iii) PostreSQL – open source, freely available Relational Database Management System (RDBMS) for storing and querying unified data.

(iv) SQL – a query language for database schema definition, the process of data manipulation, and querying was used.

(v) EclipseLink (former TopLink) – was used as a data access layer from Java code.

(vi) Java Swing – a simple graphical-user-interface (GUI) widget toolkit available as part of Java Standard Library (JSL). It was employed for creation of application of user interface.

The application was composed as a set of steps (i.e. small programs) triggered one by one manually in order to allow the verification of the output of a given processing step.
A more detailed description of each step follows (Figure 1):

1. Initiate destination database - PostgreSQL, an easy to set up RDBMS was used. SQL is a great language for writing *ad hoc* queries which were needed for the process of verification of completeness of data after each stage.
2. Empty destination database - whenever an error was detected in output that required improvement of source code and rerun the destination database was emptied with dedicated SQL script, so all the steps starting from first import were rerun again.
3. Import Wałbrzych/Wrocław database - both imports perform the same number of steps:
   (i) read a record from source database,
   (ii) perform cleansing and unification of data; text data from both databases were trimmed, text case was unified (first letter was set to capital, the rest changed to lower case), character encoding converted to UTF-8, missing or incorrect entries (e.g. too short postcodes) were

marked in a uniform way.
(iii) insert record into the destination database.

4. Import PNA dictionary for Polish postcodes in Lower Silesia ("Pocztowe Numery Adresowe"), which was obtained from the Internet, was imported into a separate table to be used in a next step.
5. Map counties by postcodes - each entry was assigned to a county based on a postcode. When postcode was missing, an attempt was made to create the mapping; it was a frequent situation in the case of Wałbrzych.
6. Remove errant records - the records with missing or incorrect data that could not be matched because of postcodes being located outside of the Lower Silesia Province were removed from the database.
7. Export records grouped by age. All the correct data were selected with SQL queries grouping by age in one case and by age ranges in the other, and then extracted to a CSV files with pgAdmin3 tool.

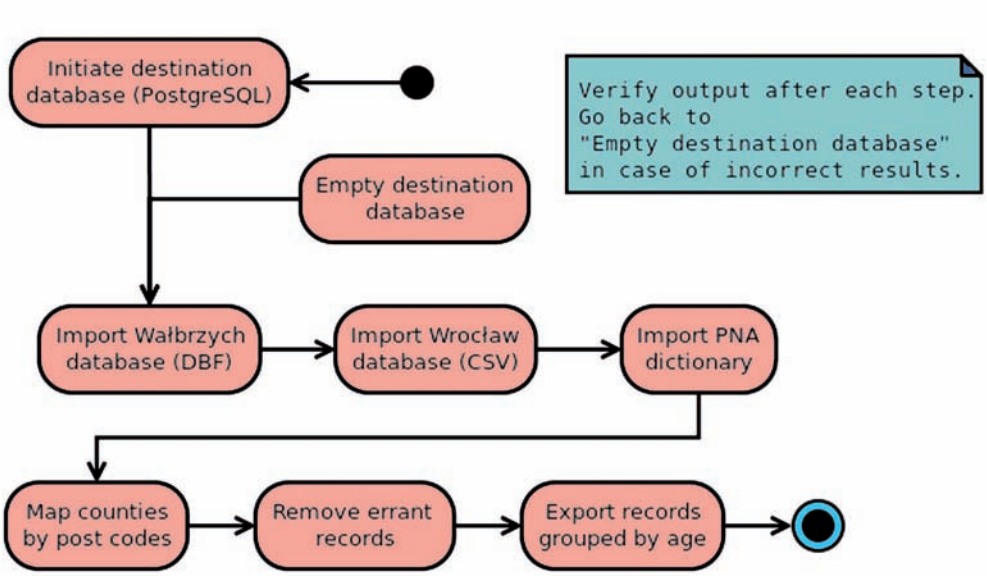

Figure 1. An overview of the processing steps employed in data analysis. A detailed description of these seven consecutive steps is given in the text.

The performance of all the steps together was good enough to be run multiple times, as explained in step 2, on a PC with moderate hardware. This was achieved thanks to batching, i.e. each database transaction was committed after successful predefined number of operations to avoid initialization of transaction for each record as transaction is a costly operation. Files generated in step 7 were used for the further analysis, including pivot operations in spreadsheet programs.

3.3. Statistical methods

The rate and direction of temporal changes was assessed based on linear regression analysis and Pearson's correlation coefficient, whose significance was verified using *t*-test. All calculations were performed using Statistica 9.0, StatSoft and Gretl 1.8.7. software. For the purpose of the study, color maps of the frequency of blood groups for Lower Silesia were prepared in the GIMP graphic editor. The relationships between the ABO and Rh systems were analyzed with the chi-square test.

4. Results

4.1. The frequency and distribution of ABO and Rh blood types in Lower Silesian counties

The temporal and spatial changes in the prevalence of ABO and Rh blood groups in the studied population over the period under investigation are shown in Tables 16-45 and Figures 2-25, which can be found in the Appendix to this volume.

The comparison of blood group frequencies between counties of Lower Silesia has demonstrated minor differences in both sexes. The greatest differences were noted for women (up to 10% for groups A and O) but lower for other combinations of blood groups.

As regards group O, higher frequencies were found in north-eastern counties of Lower Silesia province for men (Table 2, Figure 2) and in northern counties for women (Table 3, Figure 3). The values decreased in the southern direction but were slightly higher near the southern border of the province. The scatter of results for the analyzed trait between counties was greater in women (29.2-39.7%), while the lowest values were noted in the central and eastern regions. Exceptions in the eastern region were Strzelin and Oława counties where, like in Góra and Zgorzelec counties, the analyzed trait attained the highest values, i.e. 38-39.7%.

For group A in men, the lowest incidence rates were recorded in the central part of Lower Silesia, i.e. in Legnica, Środa Śląska, and Wołów counties (Table 2, Figure 3). For group A in women, the highest values were found in southern and central counties, and frequencies of this trait decreased towards the north (Table 3, Figure 7). The highest incidence of group A in men was found in Legnica county (33.9%), but an even higher value was noted for the city of Legnica (39.5%). For women, the difference between the lowest frequency of group A (Góra county, 31.5%), and the highest frequency (Ząbkowice county, 41.5%) was 9.5%.

Variation in the frequency of group B was higher in women than in men (Tables 2 and 3, Figures 4 and 8). In men, the highest values for group B were reported for central counties, which formed a belt stretching from the west to the east. In women, group B was the most frequent in two clusters in the western part of the region (especially in Bolesławiec, Lwówek, Złotoryja, and Lubań counties) as well as in the central part, forming a belt across the Lubin, Wołów, Środa Śląska, and Świdnica counties. The frequency of blood group B was in the range of 18.6-21.4% for men (Table 2) and 17.2-24.0% for women (Table 3).

The variation in the distribution of group AB was higher in women than in men (Tables 2 and 3, Figures 5 and 9). In men, slightly higher values were found in northern counties. In central counties, there was a characteristic belt for the AB group, stretching from east to west, with a frequency of about 7%. In general, the values increased towards the south. In women, lower frequencies of the AB group were also reported for the central and western parts of Lower Silesia. This concerned Jawor, Jelenia Góra, and Lubin counties, which formed a characteristic belt stretching from the south to the north. The belt divided the province into two parts, where the incidence of the analyzed trait was significantly higher.

The analysis focused on the variation in Rhesus factor in individual counties of Lower Silesia has revealed a similar trend as that for the ABO system (Figures 10-13). The frequency range for Rh(+) groups was wider in women than in men (78.4-82.6% for men vs.

75.4-82.3% for women). The frequency of Rh(–) blood types in women was in the range of 17.7-26.4%. For men, there were two clusters with the lowest frequency of Rh(+) blood groups, i.e. in the central part (Legnica and Lubin counties), and in the southern part (Oława, Strzelin, Dzierżoniów, and Kamienna Góra counties, Table 4). The highest incidence of Rh(+) groups in women was recorded in counties near the south-eastern border of Lower Silesia. In the central part, there was a belt covering Góra, Lubin, Środa Śląska, Świdnica, and Kamienna Góra counties, where the frequency of Rh(+) groups was the lowest, increasing towards the west (Table 5). For men, a characteristic inverted S-shape belt covering areas with significantly lower frequencies was observed. The belt divided the province into two parts, i.e. western and eastern, where frequencies of Rh(–) blood types were significantly higher (Table 4). Rh(–) blood groups in women were the most common in the western and central parts of Lower Silesia (Table 4).

4.2. Changes in the frequency and distribution of ABO and Rh blood types in Lower Silesia in the second half of the 20th century

Between 1946 and 1990, weak but steady and significant directional trends were observed in the frequency of blood types in both sexes (Figures 14-25), except for blood group AB in men (Figure 17), whereas the variation in the frequency was low and nonsignificant. Both in men (Table 6) and women (Table 7), there was a clear decrease in the frequency of blood group O, and a simultaneous increase in the frequencies of groups A and B. Variations in the incidence of group O were greater in women (0.8% decrease) than in men (0.6% decrease). A similar trend was found for group A, where greater changes in frequencies were observed in women than in men. The difference in the incidence of group B between men born in 1946-1950 and in 1986-1990 (0.6%) was greater than in women (0.3%). Variation in the frequency of group AB in both sexes was very low and relatively stable within that period. In men the difference between frequencies of group AB in the first and last birth cohort was 0.2%, and the declining trend was nonsignificant. In women the incidence increased, and despite the smaller value (0.1%) than that for men the difference was significant. There was a significant increase in the frequencies of Rh(+) groups and a decrease in Rh(–) groups, with greater differences in women than in men (Tables 8 and 9).

The analysis of relationships between ABO and Rh blood systems in the studied population based on the chi-square test (Tables 10 and 11) revealed a significantly higher coincidence of groups O and Rh(–), particularly in women. For the other three blood groups (A, AB, and B) there was a significant coincidence with Rh(+) factor.

5. Discussion

In Poland, seroanthropology has a long and rich tradition. Halber and Mydlarski (1925a; 1925b) were the first researchers to carry out the seroanthropological study. From that time on, such investigations have been conducted all over the world, and many of them have covered whole human racial or ethnic groups and populations. Most of these studies were done in the interwar period and shortly after World War II. Numerous investigations have concentrated on the frequency and distribution of blood group systems (Halber and Mydlarski 1925a; 1925b; Kelus et al. 1953; Hirszfeldowa 1958; Sabliński 1959; Charzewski et al. 1965; Socha 1966; Tęgowska et al. 1997; Yan et al. 2005; Nishimukai et al. 2009; Thakral et al. 2010; Giri et al. 2011; Keramati et al. 2011; Chandra and Gupta 2012; Hamed et al. 2012; Liu et al. 2012; Makroo et al. 2013; Sarkar et al. 2013; Garg et al. 2014; Kahar and Patel 2014; Umbria et al. 2014; Ahmad 2015; Anumanthan et al. 2015; Tesfaye et al. 2015; Yu et al. 2016) as well as some other important aspects such as epidemiology, ethnology, population genetics, molecular genetics (polymorphism), and evolution of human blood types.

In the past, the idea of voluntary blood donation was not so popular in Poland. Moreover, the blood group distribution in the general population was different from that observed in blood donors, probably because people with O blood groups knew that they are “universal donors” and donated their blood more frequently compared to other people. Some authors suggested that O blood group used to be much more prevalent among blood donors than in the general population (Socha 1966).

Today, thanks to mass media, better education, and increased public awareness of the importance of voluntary blood donation, the situation has improved. The idea of voluntary blood donation has become more popular in our country, especially among younger and more educated people. Many such people donate their blood not only at blood donation centers but also during short-term activities that are organized every now and then at colleges, universities, workplaces, public places, etc. Moreover, a group of family donors was also formed, supplying the group of voluntary donors. These are also random people whose relatives or friends need blood for a specific medical purpose, i.e. for the purpose of an operation. In 2009, such blood donations accounted for approximately 10% of all donations collected the Regional Blood Donation and Blood Therapy Center in Wroclaw (in total, there were 37504 voluntary donors, 3944 of whom were family donors). As a result, blood donors at the present time are random people from different social and professional backgrounds, and the blood group distribution among them reflects well the blood group distribution in the general population. Thus, taking into consideration the abovementioned circumstances, it is reasonable to assume that the study sample can be used to the analysis as it is relatively random, without any known selection factors.

Due to the historical past and the political changes that took place in Poland and specifically in Lower Silesia during the period under investigation, to avoid mixing Polish people with other ethnic groups and population that lived in the region, for example the German population, which would affect the results, the analysis of temporal changes was confined to Polish people and those who were born after 1945 and registered in Lower Silesia. Interestingly, the two oldest old individuals, a man born

in 1918 and a woman born in 1921, had AB blood group, which was most probably a coincidence as current studies show that the alleged relationship of ABO blood group and longevity is extremely weak, tenuous, or caused by some artifacts (Vasto et al. 2011; Moon 2014; Mengoli et al. 2015).

Studies on spatial and temporal changes in the frequency of blood types in a given population are difficult for many reasons. First, current migrations can easily affect the image of the changes in the prevalence of blood groups. Second, it is difficult to determine if changes that are not associated with migrations at the population level are caused by genetic drift, founder effects, or natural selection, and thus any discussion of such results is very often speculative, which is unwelcome in most reputable scientific journals. Therefore, such studies have a number of important limitations and rely on data that are questionable or unsound.

If a given population meets the assumptions of the Hardy-Weinberg's equilibrium (i.e. there are no any evolutionary influences such as selection pressure, genetic drift, mutations, migrations, nonrandom mating, or gene flow, and the population under study has a finite size), alleles and genotype frequencies will remain constant both between and within generations. However, this situation is unreal in nature since there are evolutionary influences that can easily affect this equilibrium. For example, the selection process for blood groups may take place through the elimination of alleles or as a result of certain diseases. Individuals with O blood type are more likely to develop gastric ulcers. It is also commonly believed that people with O blood type have a more efficient immune system than individuals with other blood groups, which can help fight infections, but this can heighten the risk of autoimmune diseases. Similarly, individuals with B blood group are described by some authors as carrying the genetic potential for great malleability and the ability to thrive in changeable or even bad conditions (D'Adamo and Whitney 1996; D'Adamo 2002). Also, they are reportedly able to produce higher cortisol levels in stressful situations. To date, numerous studies have reported that blood group can affect the risk of developing CVD, cancer, and other diseases (see Section 1.6 in the Introduction). Researchers from the Medical University of Silesia in Katowice have conducted an interesting study on ABO and Rh blood groups as factors associated with different risk of developing cholelithiasis. They used data from 3126 individuals aged 18-93 years. It turned out that the number of cases increases with increasing age until 69 years of age, and this pattern is different in older individuals. In subjects with A blood group, the number of cases increases after this age limit, while in people with AB or O blood type it tends to decrease. In older people with B blood type, there were no differences between the period before and after this age limit.

At the present time, population-based studies providing a more detailed empirical examination of possible causes and consequences of temporal and spatial changes in the prevalence of ABO blood groups and Rh factor among adult men and women in the Polish population are rarely performed due to many difficulties and obstacles, including lack of reliable data on direct causes of these changes (natural selection, genetic drift, founder effects, etc.) and the high cost of such long-term analyses at the population level that would cover the period of several decades. Moreover, this topic has not attracted greater attention recently largely because the previous studies have exhausted nearly all of the possibilities within the study area. Paradoxically, there is currently a paucity of information on temporal and spatial variability in the frequency of blood types in the Polish population, not to mention the possible causes of these changes at the genetic and population level. The main purpose of our study was to investigate the changes in the prevalence of ABO and Rh blood types in adult men and women from the Polish population in the years 1946-1990 using data for different regions and counties of Lower Silesia.

As stated in the Introduction, it was originally believed that blood group O was the ancestral blood type in humans as it is extremely common in many human populations around the world

and Rh-negative O blood type could be received by any recipient, regardless of blood type compatibility, and no transfusion reaction was observed. Therefore, type O used to be considered the ancestral and universal blood type. This blood group is very frequent among some populations such as South American Indians. Interestingly, this traditional belief has been challenged recently since it has been demonstrated that even blood type O can cause some serious transfusion reactions. Blood type O negative may be given to any recipient only if there is no possibility of providing the same blood type that the recipient has or the situation is urgent and life-threatening. More recent data suggest that there are several specific mutations that can easily deactivate the genes encoding the A or B antigens, which can turn them into O. It was therefore hypothesized that in our evolutionary past, new blood groups have emerged in response to certain factors, related mainly to the lifestyle of a given population, for example the formation of larger communities, different diets or variable levels of exposure to some pathogens, migrations, and mixing of different groups of people. According to these traditional (but completely erroneous) views, AB blood type is the most recent blood group in humans, while the oldest blood type is O.

There was once a theory that individuals who have different blood types should follow different diets (D'Adamo and Whitney 1996; D'Adamo 2002; 2013). D'Adamo, the most prominent proponent of blood type diets, asserts that: "O is for old and is the original blood group, which evolved at a time when humans thrived on meat. A is for agrarian, which evolved later when humans needed to digest cultivated grains and other agricultural products. B is for balance and evolved in the Himalayan highlands in tribes with a diet of meat and cultivated dairy products. Traditionally, AB is considered to be more modern, resulting from a blending of group B from the East with group A in Europe and elsewhere" (after Daniels 2014). These hypotheses and especially diets based on this line of thinking are a myth. "The A antigen is produced indirectly by the A allele of the *ABO* gene. A antigen is a carbohydrate structure produced by a glucosyltransferase that catalyses the transfer of the monosaccharide *N*-acetylgalactosamine to a precursor oligosaccharide chain. Group O individuals lack the A-transferase and do not produce A antigen because they are usually homozygous for an allele that is almost identical to the A allele, but contains a single nucleotide deletion that shifts the reading frame and introduces the translation stop codon, so that no active enzyme can be produced. Could A have evolved from O?" (Daniels 2014). Thus, the ancestral blood type, which was probably A, has gradually evolved into other blood types and finally O because of certain genetic mutations (Farhud and Zarif Yeganeh 2013). The preliminary results from coalescence analysis have been wrongly interpreted as suggesting that O came first. Actually, it shows clearly that A came first. Subsequently, after about 3.5 million years ago, this *A* gene changed into *B* gene. The same thing happened one million years ago for O blood type. Therefore, the popular assumption that O blood type was the first blood type in humans is no longer current. These findings may seem strange at first since O blood type is the most common one and definitely predominates in most of the world. However, this can result from the fact that O blood type is associated with some fitness advantage (e.g. resistance to malaria) and therefore this mutation spread very fast in the gene pool of the human populations. From an evolutionary and genetic point of view, there are also other possibilities why O is so very frequent nowadays though it was not an ancestral blood type, and some of these explanations do not even require any fitness advantage.

Hirszfeld and Hirszfeld (1919b), the pioneers of seroanthropological studies, suggested that the variation of blood groups reflects adaptations to different environmental conditions and the course of epidemics in geographically different populations but also depends on the history of migrations of specific ethnic groups. Therefore, the frequency of blood groups differs by geographical region but also by historic period because of both natural selection and genetic drift. The founder effect

is also taken into consideration. It was suggested that blood type A emerged in the early Neolithic period, when most people switched to a relatively sedentary lifestyle and agriculture, and livestock keeping became very popular. Modified diets, eating habits, and some consequent changes in the gastrointestinal and immune systems probably favored the spread of this blood group. Interestingly, individuals with group A are probably most resistant to infections that occur in some densely populated areas. Over time, alleles of this blood group diffused into human populations outside Asia and the Middle East, finally reaching Europe.

Nowadays this blood type is particularly prevalent in Europe, showing a declining trend from the west to east. In Asia, most individuals with blood group A live in Japan. Blood group B emerged and spread across the Himalayan region and the Asian side of the Urals around 10,000 to 15,000 BC. The development of this mutation probably constituted a response to significant changes in the climate and some conditions of living. Soon after this, the B group became a characteristic trait of the large tribes living in the plains of the Eurasian steppes and India. Today, the largest populations with blood group B live in Japan, China, India, Mongolia, and some other Asian regions up to the Urals. The frequency of blood group B decreases from east to west. Blood group AB is currently the least common blood type. It was hypothesized that it is also the most recent one. Interestingly, only around 5% of the contemporary global population has this type of blood. It emerged most likely as a result of genetic mutations or gene exchange in the times of great migrations. It seems that people with this blood type have enhanced immunity, particularly to some bacterial infections.

Today, the incidence of blood types in a given geographical region, as well as the issue of temporal and spatial changes, are complex and problematic research topics, and thus rarely investigated because of the limited reliability of data. The main cause of this is the lack of available information that would cover a whole studied population. Furthermore, in most countries intensive migrations are being observed, promoting relatively fast and significant changes, both temporal and spatial, in the frequencies of blood groups. Despite that fact, the increasing mobility of people across the world, and thus accelerated gene flow, even between geographically distant populations, is likely to lead over time to the more equal distribution of blood groups. Nowadays the frequency of the four major blood groups of the ABO system varies significantly in different world regions and countries (Tables 12 and 13). This axiom particularly concerns countries whose populations have mixed-ethnic backgrounds. For example, blood type B is two to three times more common in East Asia than in Europe, while about 100% of South American Indians have blood group O. Interestingly, AB and B groups do not occur in indigenous Australians. In the case of Australian Aborigines, the founder effect is observed, which occurs when a new population is established in another geographical region by a small number of individuals, and Australia, like most oceanic islands, was originally populated by a very small group of colonizers. This founder effect is a special case of genetic drift with respect of mechanisms of changes in the frequency and distribution of blood types. Blood group B is very common in Pakistan (about 33%). In Ukraine, the highest frequency (37%) has been reported for blood group A. Blood group O is most frequent in India and Saudi Arabia (from nearly 40 to over 52%). In many of countries and regions listed in Table 12, there are high frequencies of Rh(+) blood type, i.e. usually within the range of 83.0–96.1%.

The frequencies of ABO and Rh blood groups in Poland are presented in Tables 14 and 15. Table 14 shows that there have been some temporal changes in most blood groups of the ABO and Rh system in Poland. Considering the Rh system, an increase in the frequency of the Rh(+) group (2.1%) with a simultaneous decrease in the Rh (–) group (from 19.1 to 17.0%) is being observed. The frequency of ABO and Rh blood groups in selected regions of Poland is presented in Table 15. Probably the lowest incidence of blood group A was reported for Lublin (32.3%), and the highest

for Silesia (42.3%). Blood group B is the least common in Silesia (18.3%), and the most common in Kraków (20.3%). The frequency of the AB group is the lowest in Poznań (8.0%) and the highest in Białystok (10.2%). Blood group O is the least common (27.3%) in Kraków (Halber and Mydlarski 1925b) and the most common in Lower Silesia (34.5%). The highest frequency of Rh(+) groups was found for Silesia (85.2%) and the lowest for Lower Silesia (78.9%).

It has been generally accepted that it takes a very long time to observe significant changes in the incidence of ABO and Rh blood groups in a large human population, such as a county or a whole country. There is no doubt that within several centuries, the frequencies of blood groups in populations remain relatively stable, which can be noted even in people migrating to a new environment (Mourant 1983). This claim, although not supported by adequate long-term population studies, can be considered correct. The current study has demonstrated significant changes in the frequency of blood groups within the analyzed period. This is particularly clear in women with blood group O (0.8% decrease) and Rh(+) (1.1% increase). If this trend persists for a thousand years, the values would be about 20%, making the change in the frequencies significant and noticeable.

The greatest discoveries helping to understand the selection process within the ABO blood group system have been made through seroanthropological studies carried out by the Hirszfelds who, by coining the concept of homo- and heterospecific pregnancy, stimulated further research on he effects of maternal-fetal serological conflict (Hirszfeld and Hirszfeld 1919b). Hirszfeld and Zborowski (after Socha 1966), in their studies investigating the effects of blood group heterospecificity in the mother and fetus on the course of pregnancy and parameters of infants at birth, pointed out for the first time ever the potential passage of antibodies through the placenta. This process can be responsible for lower parameters at birth, damage to the fetus, and, in extreme cases, fetal death. The results of these studies revealed the markedly lower body weight of heterospecific newborns compared with those whose blood type was compatible to the blood type of the mother. Reduced body weight is particularly evident among children with group A born to mothers with group O. The severity of the serological conflict, as the Hirszfelds claimed, depends on the permeability of the placenta, which can be a constitutional trait linked to the blood group. Following this argumentation, it can be assumed that the anti-A antibodies in the blood of a mother with group O can cross the placenta and reach the fetal bloodstream, causing symptoms similar to HDN related to Rh incompatibility. Presumably, in families where the father is of group A and the mother of group O, fewer children will have group A than in the opposite combination, when the father is of group O, and the mother is of group A. This hypothesis was confirmed in research carried out by Waterhouse and Hogben (Socha 1966). The study of 1189 families with 4139 children proved the assumption on potential intrauterine ABO-related incompatibility similar to that caused by Rh conflict, and its increased incidence in mating between partners with blood groups O and A. In families where the father was of group A and the mother of group O, a 25% deficiency of A children was observed compared to the opposite parental combination. Waterhouse and Hogben also demonstrated that the forces of natural selection strengthen with the number of pregnancies, which can be either associated with increased titer of anti-A antibodies in the blood of O mothers or increased placental permeability, which is also linked with the mother's age. The findings of Waterhouse and Hogben stimulated intense debate among researchers investigating the problems of natural selection and seroanthropology. In 1958, Reed and Kelly, analyzing the core of balanced serological polymorphism, concluded that the processes of natural selection should be investigated in long-term studies covering whole generations. Because finding relevant data was impossible, they decided to survey couples of post-reproductive age. For that purpose, they analyzed 161 couples older than 41 years and gathered data on the number of pregnancies and miscarriages, and the number of liveborn and stillborn children. All this information

was used to compare the number of liveborn children and the mean number of pregnancies from marriages between people with compatible and incompatible blood groups.

Numerous clinical observations have shown that differences in ABO groups between the mother and the fetus can lead to a complicated pregnancy, miscarriage, and neonatal diseases (Fabijańska-Mitek 2007; 2008). Mild to moderate HDN is more frequently caused by ABO-related incompatibility than by incompatibility in the Rhesus system. Therefore, the role of Rh incompatibility in pregnancy pathology and etiology of HDN is as interesting as the ABO-related conflict. The Rh-conflict not only causes HDN but is also a strong selection factor determining serological variations at the population level. It is known that HDN caused by Rh-conflict, unlike ABO-related incompatibility, generally does not occur in the first pregnancy. Reactions between anti-D antibodies of the sensitized mother and fetal red blood cells are observed during the second pregnancy, causing a gradual intensification of symptoms of the conflict. In extreme cases, it can lead to generalized edema, a miscarriage, and even to stillbirth. Clinical observations have also shown that there are families in which an Rh-negative mother gives birth to more than one Rh-positive child compatible in terms of ABO blood group, without any signs of HDN. Such cases could be explained by maternal immune tolerance, resulting from the fact that the mother had a Rh-positive mother. This increases her immune tolerance to the apparently foreign antigen, which is not completely foreign because she was exposed to it during the prenatal development (Levine 1958).

Selection for D and d alleles, which occurs during the fetal or perinatal period, is closely linked to the ABO system. The deficiency of Rh-positive children born to Rh-negative mothers is clear only when the mother and child are compatible in terms of ABO system (Socha 1966). The effects of ABO-related incompatibility on the occurrence of Rhesus conflict must be different for the first pregnancy and for subsequent ones. If the mother has been 'sensitized' during the first pregnancy, children born from subsequent pregnancies will have symptoms of the conflict, regardless of their mother-child compatibility in terms of the ABO system. This proves that the current serological polymorphism of the Rhesus factor results, to a large extent, from selection.

At the present time, serological conflict is associated with much lower risk to pregnancies from incompatible matings than before. Immunoprophylaxis, which has been practiced for more than 40 years, in addition to improved testing methods, and the greater awareness of doctors as well as pregnant women effectively reduce the risk of complications and miscarriage. Pregnant women undergo regular blood tests to detect potential antibodies. This is usually done early in the pregnancy, i.e. about week 12, and late in the pregnancy, i.e. about week 34 if the results from the first test were normal. Women with antibodies detected in the first test have regular blood tests at monthly intervals. This detailed monitoring enables the determination of antibody titers and controls their level. If the first pregnancy was normal but the subsequent one is Rh-incompatible, the mother is vaccinated soon after delivery with anti-D immunoglobulin. This procedure prevents the mother's body from producing antibodies which could put future pregnancies at risk. Immunoglobulin can also be given during pregnancy if needed. When there is a growing titer of antibodies due to Rh or ABO incompatibility, intrauterine transfusions are performed to increase fetal immunity to maternal antibodies. In addition to antenatal immunoprophylaxis, a large role in improving the survival of serologically-incompatible newborns is played by procedures in the first days of life. This mainly includes phototherapy, medication, and exchange transfusion, the latter used today as the last resort because of the high risk of complications.

The increased frequencies of groups A and Rh(+) observed in the presented study can therefore be explained by improvements in the standards of health care achieved over the last few decades and the widespread use of immunoprophylaxis. Better prenatal and neonatal care allow for a reduction

in the number of miscarriages and improve fetal survival in most cases, which was not possible earlier, in the mid-war period or shortly after World War II. The second potential cause of changes in the incidence of blood groups is migration. Lower Silesia is one of the Polish regions with a turbulent history. Before the outbreak of World War II it belonged to the German State, and after the war it was annexed to Poland. In the post-war period lands recovered by Poland received a surge of migrants from the eastern regions of Poland, but also from Lithuania, Belarus and Ukraine (Lviv), where the incidence of blood groups A and O is high (about 40.0% and 36.8%, respectively) (Kelus et al. 1953). Thus, in addition to their own culture, traditions and language, migrants have also brought a higher incidence of group A, which before was generally at a lower level (37.5%) in Lower Silesia (Kelus et al. 1953). The frequency of groups B and AB in the borderland population was 17.2% and 8.0%, respectively (Kelus et al. 1953), which is comparable to that observed in this area before World War II. The higher incidence of group A in the immigrant population, combined with better standards of health care and prophylaxis, could, therefore, have contributed to the increase in the frequency of this blood group in the population of Lower Silesia born after 1946. The further growth in the incidence of group A, with a simultaneous decrease in group O, is rather difficult to explain using data from this study, available seroanthropological literature, or studies on population genetics for Lower Silesia. Perhaps this was caused by an unknown selection factor affecting recessive O alleles, which is even more likely because the decline in the frequency was found only for group O, while for the other two blood groups increasing trends were noted (B) or no apparent change (AB).

It has been well established that spatial and temporal variability of blood group frequencies is shaped by both natural selection acting on genetic variation in a given population and the random process of genetic drift, i.e. changes that are caused by unpredictable fluctuations in allele frequencies from one generation to the next. In the latter process, evolution is due to nothing more than chance, and these effects are most pronounced in small and isolated populations. In nature, the adaptive process of natural selection and the non-adaptive and random process of genetic drift do not act in isolation since both these mechanisms contribute to evolutionary changes over time along with certain other mechanisms such as migration. Another important mechanism that can affect the prevalence of blood group types is the founder effect. This process can be considered a type of genetic drift that occurs when a small group of individuals become isolated from a larger population to form another population whose gene pool composition is not reflective of that of the original population, so in this process a new population is established by a few individuals, or simply a relatively small number of people, and these individuals form a new population with different gene pool composition, which is also due to chance. As a result of the loss of the original genetic variation, this daughter population may be distinctively different from the parent population. The role of natural selection in shaping blood type frequencies at the population level consists in elimination of some alleles from the gene pool that may occur in serious types of blood type incompatibility between mother and baby as well as in certain diseases, or greater vulnerability to some diseases in individuals with different blood types. For example, individuals who are O blood type have a different set of biological characteristics than those with other blood groups. In general, they have a strong and robust immune system but at the same time they are more likely to develop peptic ulcer disease (see Section 1.2 in the Introduction) because the Le^b antigen, which is always present in these subjects, is also an important receptor for *Helicobacter pylori*, whereas in individuals with other blood types the absence of this receptor can help protect against this disease. Consequently, individuals with O blood group are more prone to gastric and duodenal ulcers compared to individuals who are type A, B, or AB. In addition, the strong and robust immune system may contribute to the development of autoimmune disease and some other disorders in later ontogeny such as osteoarthritis. Similarly, individuals who are B blood type have

a good immune system that protects them from many harmful factors. These subjects have the genetic potential for great malleability and the ability to thrive in changeable and unfavorable conditions. Unlike O or A individuals, people who are B blood type have greater malleability and flexibility which enables them to adapt to different living conditions and diets but at the same time they may be more sensitive to the effects of slipping out of balance. Furthermore, it has been hypothesized that these people might be slightly more susceptible to infections caused by streptococci and staphylococci. It has been suggested that this is due to the fact that some of these bacteria have B-antigens and the immune system of these individuals does not recognize them as invaders and enemies. As a result, the organism does not fight the infection properly. All these differences might contribute to differentiated rates of morbidity and mortality among people with different blood types.

The second mechanism that might play an important role in shaping the spatial and temporal variability of blood group frequencies, i.e. the process of genetic drift, consists in changes in allele frequencies in a small or isolated population that are caused entirely by random factors, i.e. factors that are unrelated to the process of natural selection which is never random despite the popular misconception. These factors include accidents and other non-adaptive processes that are able to change allele and genotype frequencies and thus can result in evolutionary divergence. In large populations, such as the study sample, these effects are extremely small and indiscernible. They are completely negligible. However, the role of genetic drift becomes an important factor in determining the fate of alleles in small or isolated groups of individuals. Genetic drift increases the biological differences between small populations and decreases the genetic variability within a given group. The smaller the population size, the faster the decline in heterozygosity. It is important to understand that only chance dictate here which alleles leave more descendents and become more fixed, so this process is non-adaptive.

It is noteworthy that current studies on blood groups are not only aimed at the determination of the frequency of individual blood group phenotypes and their frequency within geographic areas but also at investigating the genetic polymorphism and genetic structure of populations and their spatial and temporal changes with respect to blood group antigens frequencies. Findings from such studies can be very useful for appropriate management of regional blood banks. Such data also allow for the assessment of the risk of HDN and enable the implementation of relevant preventive measures. Since publications on the frequencies of individual blood groups in Poland provide insufficient data on sample size, it is currently impossible to carry out a reliable statistical analysis comparing the frequencies of blood groups in Lower Silesian counties to replicate the findings of the present investigation concerning the period 1946-1990.

6. Conclusions

An increasing temporal trend in the incidence of group A and a decreasing trend for group O were observed in the studied population. The frequency of the AB group in both sexes did not change significantly and was relatively stable over the period under investigation. There was a nonsignificant declining trend in the frequency of the AB group in men, whereas the opposite and significant trend for this blood group was found in women. For the B group, the increase in frequency was significant in both sexes but it proved to be greater and more perspicuous in men. The frequency increased for Rh(+) groups but decreased for Rh(–) groups, and differences were more pronounced in women compared to men. There was a significantly higher coincidence of the O group and Rh(–) factor, particularly in women. Other blood groups (A, B, and AB) coincided significantly with Rh(+) factor. The comparison of blood group frequencies in Lower Silesian counties demonstrated minor and usually nonsignificant differences between individual parts of this studied province of the country. Because publications on the frequencies of individual blood groups in Poland provide insufficient data, it is hardly possible to carry out a reliable statistical analysis comparing frequencies of blood groups in Poland and Lower Silesian counties at the present time. Therefore, further studies on temporal and spatial changes in the frequencies of blood groups in both sexes are required to obtain more complete and reliable information on such trends in Poland and its parts such as provinces and counties.

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9. Appendix

Table 1. The classification of blood group systems according to the ISBT criteria (after Dean 2005; Fabijańska-Mitek 2007; Pacholczyk et al. 2012; Daniels and Bromilow 2013, modified).

ISBT number	Blood group system	Symbol	Number of antigens	Gene symbols	Chromosome
001	ABO	ABO	4	ABO	9
002	MNS	MNS	46	GYPA, GYPB, GYPE	4
003	P1PK	P1	1	A4GALT	22
004	Rh	RH	49	RHD, RHCE	1
005	Lutheran	LU	21	BCAM	19
006	Kell	KEL	28	KEL	7
007	Lewis	LE	6	FUT3	19
008	Duffy	FY	6	DARC	1
009	Kidd	JK	3	SLC14A1	18
010	Diego	DI	21	SLC4A1	17
011	Yt	YT	2	ACHE	7
012	Xg	XG	1	XG, CD99	X/Y
013	Scianna	SC	5	ERMAP	1
014	Dombrock	DO	5	ART4	12
015	Colton	CO	3	AQP1	7
016	Landsteiner-Wiener	LW	3	ICAM4	19
017	Chido/ Rodgers	CH/RG	9	C4A, C4B	6
018	H	H	1	FUT1	19
019	Kx	XK	1	XK	X
020	Gerbich	GE	8	GYPC	2
021	Cromer	CROM	13	CD55	1
022	Knops	KN	8	CR1	1
023	Indian	IN	2	CD44	11
024	Ok	OK	1	BSG	19
025	Raph	RAPH	1	CD151	11
026	John Milton Hagen	JMH	1	SEMA7A	15
027	I	I	1	GCNT2	6
028	Globoside	GLOB	1	B3GALT3	3
029	Gill	GIL	1	AQP3	9
030	RHAG	RHAG	4	RHAG	6
031	Forssman	FORS	1	GBGT1	9
032	JR	JR	1	ABCG2	4
033	Langereis	LAN	1	ABCB6	2
034	Vel	VEL	2	SMIM1	1
035	CD59	CD59	1	CD59	11

Table 2. Frequencies of ABO blood groups in men from different Lower Silesian counties and towns.

Blood group	O		A		B		AB	
County	*N*	%	*N*	%	*N*	%	*N*	%
Bolesławiec	976	33.7	1084	37.4	579	20.0	256	8.9
Dzierżoniów	1251	35.6	1302	37.0	680	19.4	282	8.0
Głogów	1639	34.4	1780	37.3	962	20.2	384	8.1
Góra	369	35.4	386	37.0	200	19.2	87	8.4
Jawor	431	33.0	509	39.0	243	18.6	122	9.4
Jelenia Góra	444	33.0	532	39.5	256	19.0	115	8.5
Kamienna Góra	637	34.9	679	37.1	359	19.6	153	8.4
Kłodzko	2016	34.5	2172	37.2	1174	20.1	476	8.2
Legnica	521	37.4	472	33.9	293	21.0	107	7.7
Lubań	751	33.1	860	37.9	460	20.3	198	8.7
Lubin	1109	33.9	1250	38.2	655	20.1	255	7.8
Lwówek Śląski	741	33.5	825	37.4	473	21.4	170	7.7
Jelenia Góra, town	844	35.1	912	37.9	461	19.2	187	7.8
Legnica, town	919	32.8	1107	39.5	528	18.8	248	8.9
Wrocław, city	9493	34.8	10262	37.6	5271	19.3	2254	8.3
Milicz	375	35.4	403	38.2	196	18.6	82	7.8
Oleśnica	1331	35.4	1410	37.5	732	19.5	284	7.6
Oława	579	33.9	638	37.4	329	19.3	160	9.4
Polkowice	765	33.5	889	39.0	439	19.3	188	8.2
Strzelin	439	34.4	492	38.5	239	18.7	108	8.4
Środa Śląska	427	34.9	445	36.3	261	21.3	92	7.5
Świdnica	2029	33.6	2298	38.1	1193	19.8	517	8.5
Trzebnica	656	36.7	662	37.0	341	19.1	129	7.2
Wałbrzych	6454	32.5	7738	38.9	3959	19.9	1723	8.7
Wołów	655	35.7	677	36.8	364	19.8	142	7.7
Wrocław	772	33.9	850	37.4	457	20.1	196	8.6
Ząbkowice	671	33.6	773	38.7	386	19.4	165	8.3
Zgorzelec	1124	34.3	1274	38.9	626	19.1	252	7.7
Złotoryja	374	32.0	446	38.2	234	20.1	113	9.7

Table 3. Frequencies of ABO blood groups in women from different Lower Silesian counties and towns.

Blood group	O		A		B		AB	
County	*N*	%	*N*	%	*N*	%	*N*	%
Bolesławiec	396	34.4	405	35.2	239	20.8	110	9.6
Dzierżoniów	441	35.4	450	36.0	224	17.9	134	10.7
Głogów	540	35.9	575	38.2	272	18.1	117	7.8
Góra	194	39.7	154	31.5	97	19.8	44	9.0
Jawor	165	37.2	180	40.5	78	17.6	21	4.7
Jelenia Góra	171	34.5	197	39.8	100	20.2	27	5.5
Kamienna Góra	161	32.5	193	38.9	94	18.9	48	9.7
Kłodzko	601	33.9	681	38.4	338	19.0	155	8.7
Legnica	189	35.5	188	35.3	102	19.2	53	10.0
Lubań	233	33.7	256	37.0	149	21.5	54	7.8
Lubin	417	37.9	393	35.7	224	20.4	66	6.0
Lwówek Śląski	346	34.0	374	36.8	215	21.2	81	8.0
Jelenia Góra, town	271	30.4	345	38.8	180	20.2	94	10.6
Legnica, town	336	32.1	394	37.7	222	21.2	94	9.0
Wrocław, city	5367	35.0	5737	37.4	2931	19.1	1305	8.5
Milicz	211	36.1	208	35.6	123	21.1	42	7.2
Oleśnica	587	31.2	753	40.0	375	19.9	167	8.9
Oława	293	37.0	272	34.3	162	20.4	66	8.3
Polkowice	279	34.4	311	38.4	160	19.8	60	7.4
Strzelin	195	39.0	182	36.4	86	17.2	37	7.4
Środa Śląska	161	32.0	175	34.7	121	24.0	47	9.3
Świdnica	691	33.5	771	37.3	425	20.6	177	8.6
Trzebnica	282	35.5	305	38.4	142	17.8	66	8.3
Wałbrzych	1390	34.2	1529	37.7	789	19.4	353	8.7
Wołów	347	35.8	346	35.8	206	21.3	69	7.1
Wrocław	374	32.2	462	39.8	229	19.8	95	8.2
Ząbkowice	227	29.2	318	41.0	163	21.0	68	8.8
Zgorzelec	362	38.1	330	34.8	189	19.9	68	7.2
Złotoryja	112	31.5	144	40.4	73	20.5	27	7.6

Table 4. Frequencies of Rh (D) factor in men from different Lower Silesian counties and towns.

Blood group	Rh (+)		Rh (–)	
County	*N*	%	*N*	%
Bolesławiec	2325	80.3	570	19.7
Dzierżoniów	2804	79.8	711	20.2
Głogów	3866	81.1	899	18.9
Góra	850	81.6	192	18.4
Jawor	1066	81.7	239	18.3
Jelenia Góra	1113	82.6	234	17.4
Kamienna Góra	1440	78.8	388	21.2
Kłodzko	4753	81.4	1085	18.6
Legnica	1107	79.5	286	20.5
Lubań	1816	80.0	453	20.0
Lubin	2601	79.6	668	20.4
Lwówek Śląski	1784	80.8	425	19.2
Jelenia Góra, town	1940	80.7	464	19.3
Legnica, town	2265	80.8	537	19.2
Wrocław, city	21990	80.6	5290	19.4
Milicz	850	80.5	206	19.5
Oleśnica	3060	81.4	697	18.6
Oława	1337	78.4	369	21.6
Polkowice	1835	80.4	446	19.6
Strzelin	1015	79.4	263	20.6
Środa Śląska	1004	82.0	221	18.0
Świdnica	4876	80.8	1161	19.2
Trzebnica	1456	81.4	332	18.6
Wałbrzych	16166	81.3	3708	18.7
Wołów	1473	80.1	365	19.9
Wrocław	1824	80.2	451	19.8
Ząbkowice	1625	81.5	370	18.5
Zgorzelec	2640	80.6	636	19.4
Złotoryja	956	81.9	211	18.1

Table 5. Frequencies of Rh (D) factor in women from different Lower Silesian counties and towns.

Blood group	Rh (+)		Rh (–)	
County	*N*	%	*N*	%
Bolesławiec	910	79.1	240	20.9
Dzierżoniów	990	79.3	259	20.7
Głogów	1184	78.7	320	21.3
Góra	381	77.9	108	22.1
Jawor	363	81.8	81	18.2
Jelenia Góra	393	79.4	102	20.6
Kamienna Góra	380	76.6	116	23.4
Kłodzko	1433	80.7	342	19.3
Legnica	417	78.4	115	21.6
Lubań	545	78.8	147	21.2
Lubin	849	77.2	251	22.8
Lwówek Śląski	816	80.3	200	19.7
Jelenia Góra, town	693	77.9	197	22.1
Legnica, town	826	79.0	220	21.0
Wrocław, city	11987	78.1	3353	21.9
Milicz	462	79.1	122	20.9
Oleśnica	1513	80.4	369	19.6
Oława	634	79.9	159	20.1
Polkowice	638	78.8	172	21.2
Strzelin	401	80.2	99	19.8
Środa Śląska	380	75.4	124	24.6
Świdnica	1607	77.9	457	22.1
Trzebnica	651	81.9	144	18.1
Wałbrzych	3255	80.2	806	19.8
Wołów	765	79.0	203	21.0
Wrocław	915	78.9	245	21.1
Ząbkowice	639	82.3	137	17.7
Zgorzelec	743	78.3	206	21.7
Złotoryja	279	78.4	77	21.6

Table 6. Frequencies of ABO blood groups in subsequent birth cohorts of men from Lower Silesia.

Birth year	O		A		B		AB	
	N	%	*N*	%	*N*	%	*N*	%
1946-50	38234	34.1	42486	37.9	22052	19.7	9311	8.3
1951-55	36810	34.1	40975	38.0	21210	19.6	8967	8.3
1956-60	33825	34.1	37692	38.0	19526	19.6	8255	8.3
1961-65	29828	34.0	33328	38.0	17311	19.7	7249	8.3
1966-70	26407	34.0	29472	38.0	15317	19.7	6422	8.3
1971-75	23098	34.0	25765	38.0	13386	19.7	5593	8.3
1976-80	18644	33.8	21074	38.2	10932	19.8	4520	8.2
1981-85	12788	33.5	14653	38.3	7622	19.9	3185	8.3
1986-90	5698	33.5	6482	38.1	3456	20.3	1380	8.1
r	–0.894		0.775		0.779		–0.645	
p	0.0011		0.0141		0.0133		0.0604	
Regression	y =–0.0160x+65.4		y=0.0070x+24.3		y=0.0123x-4.47		y=–0.0033x+14.8	

Table 7. Frequencies of ABO blood groups in subsequent birth cohorts of women from Lower Silesia.

Birth year	O		A		B		AB	
	N	%	*N*	%	*N*	%	*N*	%
1946-50	15211	34.5	16517	37.5	8653	19.6	3717	8.4
1951-55	14859	34.5	16154	37.5	8461	19.6	3636	8.4
1956-60	14101	34.3	15421	37.6	8067	19.6	3481	8.5
1961-65	13186	34.2	14480	37.6	7582	19.7	3274	8.5
1966-70	12337	34.1	13615	37.7	7140	19.7	3081	8.5
1971-75	113383	33.9	12628	37.8	6626	19.8	2838	8.5
1976-80	9799	33.7	11001	37.9	5785	19.9	2485	8.5
1981-85	7269	33.3	8333	38.2	4326	19.8	1898	8.7
1986-90	3600	33.7	4045	37.9	2127	19.9	914	8.5
r	–0.934		0.894		0.931		0.685	
p	0.0002		0.0011		0.0003		0.0417	
Regression	y=-0.0277x+88.4		y=0.0150x+8.25		y=0.0083x+3.35		y=0.0043x-0.02	

Table 8. Frequencies of Rhesus blood groups in subsequent birth cohorts of men from Lower Silesia.

Birth year	Rh (+)		Rh (–)	
	N	%	*N*	%
1946-50	90559	80.8	21524	19.2
1951-55	87258	80.8	20704	19.2
1956-60	80259	80.8	19039	19.2
1961-65	71033	81.0	16683	19.0
1966-70	62892	81.0	14726	19.0
1971-75	54964	81.0	12878	19.0
1976-80	44834	81.3	10336	18.7
1981-85	31051	81.2	7197	18.8
1986-90	13908	81.7	3108	18.3
r	0.894		–0.894	
p	0.0011		0.0011	
Regression	y=0.0193x+43.1		y=-0.0193x+56.9	

Table 9. Frequencies of Rhesus blood groups in subsequent birth cohorts of women from Lower Silesia.

Birth year	Rh (+)		Rh (–)	
	N	%	*N*	%
1946-50	34807	78.9	9291	21.1
1951-55	34077	79.0	9033	21.0
1956-60	32537	70.2	8533	20.8
1961-65	30580	79.4	7942	20.6
1966-70	28776	79.6	7397	20.4
1971-75	26652	79.7	6778	20.3
1976-80	23297	80.1	5773	19.9
1981-85	17486	80.1	4340	19.9
1986-90	8548	80.0	2138	20.0
r	0.969		–0.969	
p	0.0000		0.0000	
Regression	y=0.0327x+15.3		y=0.0327x+84.7	

Table 10. Relationships between the frequencies of ABO and Rh blood groups in men from Lower Silesia (L_e – expected values, L_o – observed values).

Blood groups	O	A	B	AB	Total
Rh(+)	L_o = 31101 –228 L_e = 31329	L_o = 34990 +160 L_e = 34830	L_o = 18070 +20 L_e = 18050	L_o = 7676 +48 L_e = 7628	91837
Rh(–)	L_o = 7691 +228 L_e = 7463	L_o = 8137 –160 L_e = 8297	L_o = 4280 –20 L_e = 4300	L_o = 1769 – 48 L_e = 1817	21877
Total	38792	43127	22350	9445	113714

df = 3, *chi-square* = 14.13, *p* = 0.0027

Table 11. Relationships between the frequencies of ABO and Rh blood groups in women from Lower Silesia (L_e – expected values, L_o – observed values).

Blood groups	O	A	B	AB	Total
Rh(+)	L_o = 11891 –212 L_e = 12103	L_o = 13270 +150 L_e = 13120	L_o = 6921 +50 L_e = 6871	L_o = 2967 +12 L_e = 2955	35049
Rh(–)	L_o = 3448 +212 L_e = 3236	L_o = 3358 –150 L_e = 3508	L_o = 1787 –50 L_e = 1837	L_o = 778 –12 L_e = 790	9371
Total	15339	16628	8708	3745	44420

df = 3, *chi-square* = 27.67, $p < 0.0001$

Table 12. Frequencies (in %) of ABO blood groups in selected ethnic groups and populations (based on various data, including Mourant et al. 1976; Tęgowska et al. 1997; Fabijańska-Mitek 2007; 2008).

Group	O	A	B	AB
African American	44	42	10	4
Asian	43	27	25	4
Black	49	27	9	4
Aboriginal Australian	61	39	0	0
Ainu	18	32	32	18
Arab	34	31	29	6
Armenian	31	50	13	6
Australian	49	38	10	3
Austrian	36	44	13	6
Bantu	46	30	19	5
Basque	51	44	4	1
Belgian	47	42	8	3
Blackfoot Indian	17	82	0	1
Bororo (Brazil)	100	0	0	0
Brazilian	47	41	9	3
British	44	42	10	4
Bulgarian	32	44	15	8
Buryat (Siberia)	33	21	38	8
Bushmen	56	34	9	2
Chinese (Beijing)	29	27	32	13
Czech	30	44	18	8
Dane	41	44	11	4
Dutch	45	43	9	3
Egyptian	33	36	24	8
Hispanic	45	42	10	3
Hungarian	36	43	16	5
Italian (Milan)	46	41	11	3
Japanese	30	38	22	10
Jewish (Israel)	35	38	19	8
Maya	97	1	1	1
Mexican	55	28	13	4
Peruvian	71	19	8	2
Polish (in the 1990s)	33	39	20	8
Polish (currently)	37	38	17	8
Russian	52	35	10	3
Sami	18	55	15	12
South American Indian	100	0	0	0
Turkish	34	43	16	7
White	44	43	9	4
Weighted mean	*44*	*34*	*17*	*5*

Table 13. Frequencies (in %) of ABO and Rh blood groups in different world regions.

Author	Region (Country, city, sex)		O	A	B	AB	Rh(+)	Rh(–)
Mohammad et al. 2004	Pakistan, Bannu $N = 2581$		25.1	31.0	36.2	7.7	89.2	10.8
Khan et al. 2006	Pakistan, Rawalpindi Islamabad	M	30.3	27.0	33.8	8.9	92.5	7.5
		F	31.9	24.0	32.9	11.2		
Khattak et al. 2008	Pakistan $N = 22897$	M	29.1	27.9	32.4	10.7	91.0	9.0
		F	29.3	28.1	32.3	10.4	87.6	12.4
Mukhin et al. 2003	Ukraine	Gorlovka $N = 2548$	34.2	36.5	19.5	9.7	83.3	16.7
		Mariupol $N = 6392$	34.7	37.2	19.3	8.8	84.3	15.7
		Donetsk $N = 41416$	34.6	37.7	19.5	8.2	83.3	16.7
Umnova et al. 1968	Russia, Moscow $N = 1173$		33.5	37.8	20.6	8.2	85.9	14.1
Khattak et al. 2008	the United Kingdom		46.7	41.7	8.6	3.0	83.0	17.0
Khattak et al. 2008	the United States		46.0	41.0	9.0	4.0	85.0	15.0
Khattak et al. 2008	Nigeria		48.9	24.4	23.9	2.8	95.7	4.3
Khattak et al. 2008	Kenya		47.5	26.2	22.0	4.4	96.1	3.9
Khattak et al. 2008	India		38.8	18.9	32.5	9.9	94.5	5.5
Reddy and Sudha 2009	India $N = 190$		47.4	18.9	25.8	7.9	90.6	8.4
Khattak et al. 2008	Saudi Arabia		52.0	24.0	17.0	4.0	93.0	7.0

Table 14. Frequencies (in %) of ABO and Rh blood groups in Poland.

Author	Sex	O	A	B	AB	Rh(+)	Rh(–)
Halber and Mydlarski 1925b	M+F	40.4	50.6	21.2	9.9	–	–
Kelus et al.1953	M+F	33.4	38.5	19.5	8.6	80.9	19.1
Maj and Mariańska 1988	M+F	33.0	40.0	19.0	8.0	–	–
Tęgowska et al. 1997	M+F	33.1	38.9	19.6	8.4	80.3	19.7
	M	33.0	38.8	19.7	8.5	80.6	19.4
	F	32.7	39.3	19.7	8.4	79.7	20.3
Gołąb et al. 2017	M+F	36.0	38.0	18.0	8.0	83.0	17.0
Fabijańska-Mitek 2007	M+F	33.0	40.0	19.0	8.0	–	–
Szwed et al. 2007	M	32.0	41.9	18.3	9.0	85.2	14.8
	F	30.0	42.3	18.9	8.9	82.8	17.2
The present study	M	34.1	37.9	19.7	8.3	80.8	19.2
	F	34.5	37.4	19.6	8.4	78.9	21.1

Table 15. Frequencies (in %) of ABO and Rh blood groups in selected regions of Poland.

Author	City/Region		O	A	B	AB	Rh(+)	Rh(–)
Halber and Mydlarski 1925b	Białystok $N = 1582$		32.4	35.7	21.6	10.2	–	–
Halber and Mydlarski 1925b	Kielce $N = 1490$		30.3	39.6	20.1	10.0	–	–
Halber and Mydlarski 1925b	Kraków $N = 345$		27.3	40.0	23.7	9.0	–	–
Halber and Mydlarski 1925b	Lublin $N = 463$		33.5	32.3	25.5	8.9	–	–
Halber and Mydlarski 1925b	Poznań $N = 765$		31.2	37.8	23.0	8.0	–	–
Halber and Mydlarski 1925b	Warszawa $N = 1518$		32.9	34.9	22.9	9.2	–	–
Kelus et al. 1953	Wrocław $N = 19063$		33.1	39.3	19.0	8.5	–	–
Socha 1966	Kraków $N = 39006$		31.9	39.5	20.3	8.3	81.6	18.4
Kostaszuk et al. 1973	Poznań $N = 5824$		32.0	38.6	20.8	8.6	82.1	17.9
Szwed et al. 2007	Silesia $N = 3126$	M $N = 1472$	32.0	41.9	18.3	9.0	85.2	14.8
		F $N = 1654$	30.0	42.3	18.9	8.9	82.8	17.2
The present study	Lower Silesia $N = 158134$	M $N = 113714$	34.1	37.9	19.7	8.3	80.8	19.2
		F $N = 44420$	34.5	37.4	19.6	8.4	78.9	21.1

Table 16. Number of blood donors in the consecutive birth cohorts according to blood type.

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	428	130	514	127	234	64	102	32
	F	88	40	89	22	44	11	21	7
1946	M	149	36	148	36	71	15	37	12
	F	31	14	40	8	16	5	7	3
1947	M	187	50	197	51	93	33	49	9
	F	33	14	39	12	17	10	7	3
1948	M	219	54	248	50	129	34	55	13
	F	56	20	50	25	28	4	11	4
1949	M	245	74	288	69	180	32	62	18
	F	60	20	59	22	43	9	14	4
1950	M	328	82	336	88	211	44	69	20
	F	73	31	80	28	47	13	19	9
1951	M	380	96	394	104	223	63	116	24
	F	92	37	97	21	52	12	16	3
1952	M	396	101	514	119	249	62	103	25
	F	94	42	94	42	62	15	25	9
1953	M	488	116	543	128	268	67	97	21
	F	119	37	117	39	55	16	22	6
1954	M	520	117	586	130	296	58	125	32
	F	121	53	128	38	64	21	27	5
1955	M	621	150	620	145	328	70	132	37
	F	126	37	119	38	77	20	33	9
1956	M	598	162	674	173	369	71	169	35
	F	134	46	130	46	79	27	35	10
1957	M	625	187	695	167	383	98	161	46
	F	122	42	148	42	68	18	34	4
1958	M	647	171	758	171	359	91	155	64
	F	140	46	163	48	67	26	31	12
1959	M	653	182	720	170	349	82	149	32
	F	148	38	142	34	71	23	28	7
1960	M	600	172	672	164	328	85	162	33
	F	145	54	153	35	85	21	34	12
1961	M	588	163	661	162	348	75	152	35
	F	122	40	125	36	62	18	29	8
1962	M	531	145	632	137	320	78	136	31
	F	119	59	132	44	54	14	28	6
1963	M	571	139	633	160	331	73	130	38
	F	128	31	145	25	83	23	34	6
1964	M	510	118	591	150	342	64	118	31
	F	113	43	142	33	73	27	34	7
1965	M	528	128	599	131	303	60	117	39
	F	145	49	141	42	68	20	27	14
1966	M	500	113	626	136	299	63	161	31
	F	135	61	134	20	55	16	38	8
1967	M	546	142	605	134	282	82	125	29
	F	135	45	129	43	94	21	34	14

1968	M	514	118	556	145	293	74	117	32
	F	150	50	167	42	86	15	41	9
1969	M	567	124	589	139	316	76	149	31
	F	165	51	177	46	74	29	36	14
1970	M	540	145	641	136	371	75	131	23
	F	153	54	186	43	95	29	40	9
1971	M	607	180	647	160	348	82	165	41
	F	195	72	192	59	96	27	39	16
1972	M	616	170	684	175	361	102	160	29
	F	199	67	205	58	119	42	49	19
1973	M	703	182	752	192	390	96	159	35
	F	232	67	242	59	140	21	56	23
1974	M	759	210	806	201	397	102	178	44
	F	248	87	309	82	135	43	55	13
1975	M	819	208	880	194	482	94	217	45
	F	294	78	318	103	169	49	63	20
1976	M	878	207	923	224	494	108	196	34
	F	371	87	366	69	204	58	92	22
1977	M	941	199	999	230	517	130	225	45
	F	361	114	365	117	193	58	69	13
1978	M	931	226	1006	224	499	126	216	51
	F	394	102	443	92	253	52	89	23
1979	M	980	219	1133	261	567	134	246	46
	F	431	118	442	108	237	63	109	30
1980	M	1045	230	1151	270	606	129	230	46
	F	458	94	542	124	280	61	112	28
1981	M	976	239	1183	278	620	139	248	53
	F	445	119	534	131	269	74	128	25
1982	M	1125	298	1265	304	632	183	274	62
	F	557	158	690	140	330	74	152	36
1983	M	1156	294	1352	317	689	169	323	87
	F	599	144	703	183	391	81	176	44
1984	M	1266	270	1371	295	718	175	288	62
	F	652	178	736	196	405	99	165	35
1985	M	1178	288	1483	323	665	176	331	77
	F	657	160	779	196	388	88	182	41
1986	M	1161	265	1355	291	648	161	264	54
	F	634	175	687	178	379	104	141	33
1987	M	1075	266	1261	300	689	148	303	62
	F	654	183	769	190	404	99	185	33
1988	M	942	197	1113	241	592	137	232	55
	F	614	145	704	142	339	97	165	49
1989	M	909	214	1000	215	529	131	203	38
	F	602	146	690	164	354	99	155	41
1990-1992	M	555	114	586	120	352	69	139	30
	F	347	100	428	93	217	35	80	32

Table 17. Data for Boleslawiec county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB(+)	AB (–)
1945 and before	M	6	1	2	0	0	0	0	0
	F	0	0	0	0	1	0	0	0
1946	M	0	1	1	0	0	0	0	0
	F	0	0	0	0	0	1	0	0
1947	M	0	1	2	1	0	0	0	0
	F	0	0	0	0	0	0	0	0
1948	M	0	0	2	0	0	1	0	0
	F	0	0	1	0	0	0	0	0
1949	M	6	1	1	0	0	2	0	0
	F	0	0	1	0	0	0	0	0
1950	M	1	0	5	1	2	0	1	0
	F	1	0	0	0	2	0	0	1
1951	M	2	0	5	3	4	0	3	0
	F	0	0	0	1	0	0	0	0
1952	M	7	0	10	3	1	1	2	1
	F	0	0	0	0	1	0	0	0
1953	M	5	3	9	4	3	0	1	0
	F	0	0	2	0	1	0	0	1
1954	M	1	3	12	5	5	1	3	3
	F	1	0	4	0	0	1	1	0
1955	M	6	1	9	1	4	0	1	0
	F	1	0	2	1	0	0	1	0
1956	M	6	3	8	1	4	2	6	1
	F	3	0	2	0	1	0	0	0
1957	M	16	2	11	1	7	4	5	0
	F	1	0	1	0	0	0	0	0
1958	M	9	1	12	2	9	2	2	5
	F	3	0	0	0	0	0	0	0
1959	M	6	4	9	5	6	2	4	1
	F	2	0	1	0	0	0	1	2
1960	M	9	2	5	3	7	1	5	3
	F	2	2	3	1	1	0	0	0
1961	M	13	3	12	6	9	4	0	0
	F	2	2	1	0	0	0	0	0
1962	M	10	2	3	0	5	0	3	0
	F	2	0	2	2	1	1	0	0
1963	M	10	6	10	1	4	2	1	0
	F	3	0	0	0	2	0	1	0
1964	M	6	2	14	4	8	2	2	0
	F	2	1	3	0	0	0	0	0
1965	M	8	2	11	3	5	2	1	1
	F	3	0	4	0	2	0	1	1
1966	M	5	3	11	4	3	1	1	0
	F	1	2	3	0	1	0	2	0
1967	M	9	5	10	0	4	0	4	1
	F	6	1	2	0	3	0	1	0

1968	M	8	3	3	1	5	3	0	0
	F	8	0	1	0	1	1	2	0
1969	M	12	6	9	2	2	0	3	0
	F	0	0	1	0	1	0	0	0
1970	M	7	2	7	0	7	2	3	1
	F	3	0	1	1	1	0	0	0
1971	M	16	4	5	1	5	5	4	0
	F	6	1	0	1	1	0	2	0
1972	M	12	2	11	3	9	2	2	0
	F	1	2	2	2	3	0	0	1
1973	M	15	6	13	7	6	4	3	0
	F	2	1	2	1	2	0	2	0
1974	M	14	7	11	1	11	0	3	0
	F	3	4	5	2	4	0	0	0
1975	M	15	5	8	4	7	0	4	0
	F	8	1	3	1	3	3	2	1
1976	M	19	6	23	0	6	2	2	0
	F	6	0	5	1	7	0	0	0
1977	M	15	2	24	1	10	2	8	0
	F	0	2	7	0	2	2	0	2
1978	M	27	6	18	12	10	3	1	3
	F	2	2	8	1	8	0	3	0
1979	M	33	4	19	6	14	3	8	0
	F	6	4	12	2	4	0	1	0
1980	M	43	4	30	10	22	1	7	2
	F	11	0	18	5	16	2	2	0
1981	M	32	8	45	10	20	5	8	2
	F	7	1	8	4	8	2	4	1
1982	M	33	8	46	17	27	6	13	3
	F	6	3	22	3	13	4	6	0
1983	M	46	10	51	15	27	8	12	3
	F	19	6	20	5	11	2	2	3
1984	M	44	10	61	12	31	5	10	1
	F	27	6	24	6	10	5	6	2
1985	M	45	13	74	11	25	5	11	4
	F	29	5	26	6	9	7	4	2
1986	M	58	9	69	16	27	8	21	5
	F	31	1	33	4	13	13	6	2
1987	M	44	8	49	18	33	7	16	2
	F	29	10	31	9	16	5	13	2
1988	M	35	7	53	6	28	7	12	1
	F	30	7	30	5	9	7	6	3
1989	M	42	12	41	10	24	6	13	1
	F	36	7	26	6	12	5	6	3
1990-1992	M	24	8	26	3	17	5	3	0
	F	18	4	16	2	8	0	3	5

Table 18. Data for Dzierzoniów county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	8	5	9	1	3	2	0	0
	F	2	0	5	0	0	0	1	0
1946	M	2	0	5	1	0	1	1	0
	F	0	0	2	0	0	0	0	0
1947	M	4	1	1	3	2	1	0	1
	F	0	0	1	0	0	0	0	0
1948	M	8	1	6	0	5	0	1	0
	F	1	0	0	1	1	0	0	0
1949	M	2	3	5	1	2	1	2	0
	F	2	0	2	0	0	0	0	0
1950	M	15	1	12	5	5	1	4	0
	F	2	0	3	0	1	0	1	0
1951	M	12	0	10	7	12	0	3	0
	F	2	0	1	0	0	0	0	0
1952	M	12	2	11	3	7	0	2	2
	F	1	1	6	0	0	1	0	1
1953	M	14	3	13	1	9	1	3	0
	F	4	3	3	1	1	0	2	0
1954	M	20	2	14	2	11	1	5	1
	F	3	0	1	2	3	1	1	1
1955	M	18	5	11	7	9	3	3	2
	F	5	0	2	1	2	0	0	0
1956	M	19	7	25	5	12	1	8	1
	F	2	0	3	1	0	2	0	0
1957	M	22	2	18	7	16	4	3	1
	F	2	1	3	0	3	0	0	0
1958	M	19	3	20	8	6	7	5	3
	F	4	3	3	0	1	2	1	2
1959	M	22	9	26	2	8	2	2	2
	F	5	0	4	0	5	0	2	1
1960	M	22	4	14	4	6	5	6	1
	F	3	2	3	0	2	0	1	1
1961	M	14	3	14	4	8	1	5	0
	F	0	0	2	0	1	0	0	0
1962	M	15	5	17	3	10	3	3	1
	F	7	1	3	3	2	0	4	0
1963	M	12	5	10	3	10	2	1	1
	F	2	1	3	2	4	0	1	0
1964	M	11	3	17	6	10	1	4	0
	F	6	1	3	1	1	1	1	0
1965	M	18	4	20	5	8	4	1	1
	F	6	0	7	0	1	1	0	0
1966	M	17	8	17	3	12	5	7	1
	F	1	3	7	2	1	0	2	0
1967	M	14	3	22	7	7	2	4	0
	F	3	1	2	0	2	1	0	1

1968	M	22	6	21	5	6	1	4	2
	F	3	1	8	3	1	0	2	0
1969	M	15	1	23	3	8	4	3	1
	F	6	2	6	1	1	2	3	1
1970	M	24	2	15	3	12	2	3	1
	F	4	3	5	0	1	0	3	0
1971	M	20	13	16	4	12	1	1	0
	F	10	4	4	0	2	0	1	0
1972	M	20	6	18	2	8	5	1	2
	F	8	1	2	1	3	0	2	4
1973	M	15	8	17	4	11	4	6	0
	F	9	1	5	3	5	1	0	2
1974	M	22	5	24	5	9	2	7	1
	F	3	0	10	0	3	0	3	0
1975	M	27	11	31	8	10	2	14	0
	F	9	1	5	5	4	0	1	0
1976	M	37	4	23	5	18	4	6	2
	F	18	2	11	2	5	0	1	1
1977	M	31	2	25	5	24	6	3	0
	F	13	7	9	1	7	0	2	0
1978	M	25	5	40	5	16	2	4	1
	F	10	3	12	4	14	1	4	1
1979	M	35	14	30	7	14	6	4	2
	F	8	3	7	4	8	3	2	2
1980	M	36	5	48	4	28	7	7	2
	F	8	0	19	3	8	1	5	3
1981	M	32	12	41	13	23	6	3	2
	F	15	5	16	4	4	1	5	1
1982	M	32	9	53	14	20	4	8	3
	F	26	5	24	1	8	4	3	3
1983	M	48	11	64	15	23	8	14	4
	F	19	5	24	3	10	2	8	1
1984	M	52	12	31	12	21	4	10	2
	F	19	4	20	3	10	4	5	2
1985	M	38	14	46	16	18	11	18	4
	F	19	3	19	5	4	1	5	2
1986	M	42	10	59	9	21	3	8	3
	F	27	8	21	6	14	6	6	1
1987	M	24	13	37	8	22	10	5	2
	F	14	4	24	9	10	3	4	0
1988	M	29	7	30	9	7	5	12	1
	F	13	6	17	7	8	6	5	2
1989	M	26	7	28	3	18	2	7	1
	F	19	2	20	4	9	5	10	1
1990-1992	M	20	3	16	2	4	2	7	0
	F	10	1	7	3	5	0	1	2

Table 19. Data for Głogów county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	11	2	6	0	3	2	1	0
	F	0	0	0	0	0	0	0	0
1946	M	8	1	2	2	2	0	1	1
	F	0	0	1	0	1	0	1	0
1947	M	4	2	6	2	1	1	1	0
	F	0	0	1	0	0	0	0	0
1948	M	0	3	5	3	2	0	3	0
	F	1	0	0	0	1	0	0	0
1949	M	11	1	7	1	2	1	3	2
	F	1	1	0	1	3	0	0	0
1950	M	10	3	13	1	10	0	0	1
	F	1	2	5	0	1	1	0	0
1951	M	17	3	15	3	9	1	4	2
	F	4	1	3	0	3	2	0	0
1952	M	9	2	20	2	11	2	2	0
	F	0	1	4	1	1	0	0	2
1953	M	13	1	13	2	5	1	4	3
	F	3	1	2	2	2	2	0	0
1954	M	14	5	12	3	7	3	2	0
	F	6	0	1	0	3	0	0	0
1955	M	15	6	21	5	12	3	2	2
	F	1	0	2	2	2	0	0	0
1956	M	19	7	17	9	14	2	10	0
	F	2	2	0	3	0	0	1	0
1957	M	21	6	25	6	8	2	6	0
	F	3	1	5	1	1	0	0	0
1958	M	16	5	21	5	10	3	1	1
	F	4	0	2	0	0	1	1	0
1959	M	22	7	25	5	14	0	3	0
	F	4	2	2	1	2	0	1	0
1960	M	13	3	28	8	10	2	4	1
	F	1	0	1	1	0	0	0	1
1961	M	12	3	24	4	7	1	2	0
	F	4	1	5	0	1	0	0	0
1962	M	18	4	15	0	9	2	1	1
	F	3	1	3	0	2	0	2	0
1963	M	21	3	23	3	12	1	5	2
	F	8	0	1	1	5	0	0	0
1964	M	13	9	13	5	14	2	5	1
	F	5	2	5	0	1	0	0	0
1965	M	18	2	15	4	9	0	3	3
	F	4	4	3	0	0	1	1	0
1966	M	18	5	19	3	9	3	6	1
	F	2	2	2	0	0	0	0	0
1967	M	20	8	14	5	10	3	4	2
	F	1	3	7	0	1	1	0	1

1968	M	8	3	19	3	10	3	4	0
	F	3	1	7	2	2	1	1	1
1969	M	14	3	19	2	13	2	3	2
	F	2	1	5	3	2	1	1	0
1970	M	23	7	20	4	15	3	6	1
	F	6	0	3	0	0	0	2	0
1971	M	12	7	25	6	17	1	9	2
	F	6	3	7	0	4	0	1	1
1972	M	18	6	24	3	12	2	6	1
	F	6	3	6	2	3	2	0	1
1973	M	28	5	21	10	19	3	9	1
	F	7	3	6	2	1	0	2	0
1974	M	21	9	32	9	25	5	4	1
	F	6	2	7	0	1	4	2	0
1975	M	35	13	32	5	17	5	6	4
	F	10	0	6	11	4	1	2	1
1976	M	33	7	36	14	28	8	11	2
	F	6	2	9	1	7	2	3	2
1977	M	57	10	57	17	28	8	10	5
	F	11	8	13	3	7	1	4	0
1978	M	39	4	50	11	24	11	13	1
	F	16	4	13	2	7	0	0	0
1979	M	52	8	52	19	31	6	9	3
	F	22	4	12	3	7	2	2	2
1980	M	51	12	52	14	28	7	7	3
	F	14	4	23	4	9	3	1	0
1981	M	51	11	55	8	34	8	14	0
	F	15	5	25	5	11	3	4	0
1982	M	62	18	50	10	28	7	11	2
	F	17	6	22	7	10	1	6	2
1983	M	54	9	67	17	35	4	17	4
	F	15	2	25	6	12	1	8	3
1984	M	67	18	61	14	29	10	15	2
	F	35	9	31	11	16	4	8	0
1985	M	70	8	106	23	30	8	21	8
	F	32	10	33	6	13	1	5	1
1986	M	74	19	65	11	44	8	7	6
	F	30	4	30	10	21	3	3	0
1987	M	65	11	77	17	25	14	17	3
	F	26	3	36	6	16	2	15	1
1988	M	64	9	67	16	42	11	12	5
	F	29	9	35	5	12	5	7	4
1989	M	60	11	69	10	28	6	11	0
	F	27	11	23	9	11	5	6	0
1990-1992	M	51	8	33	8	30	5	9	1
	F	18	5	24	8	12	4	3	1

Table 20. Data for Góra county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	3	1	0	0	1	0	0	0
	F	1	1	0	0	0	0	0	0
1946	M	2	0	1	1	1	0	0	0
	F	0	0	0	0	0	0	0	0
1947	M	4	0	0	0	2	0	0	0
	F	0	0	0	0	0	0	0	0
1948	M	3	1	0	0	0	0	0	0
	F	0	0	0	0	0	0	0	0
1949	M	1	0	1	0	1	0	0	0
	F	0	0	0	0	0	0	0	0
1950	M	2	0	1	0	0	0	0	0
	F	0	1	0	1	0	0	0	0
1951	M	0	0	6	1	0	0	1	0
	F	0	0	0	0	0	0	0	0
1952	M	3	0	3	0	2	1	0	0
	F	0	1	0	0	1	0	0	1
1953	M	2	0	6	1	3	2	0	0
	F	1	0	0	0	2	0	0	0
1954	M	2	0	3	0	2	0	0	0
	F	0	2	2	0	0	0	0	0
1955	M	5	1	5	0	3	0	1	0
	F	1	0	1	0	0	0	0	0
1956	M	8	0	6	0	2	0	1	0
	F	1	0	0	0	0	0	0	0
1957	M	6	2	2	1	3	0	0	1
	F	1	0	0	0	0	0	0	0
1958	M	6	4	3	1	3	2	0	0
	F	1	0	0	0	0	1	0	0
1959	M	8	0	7	0	3	1	0	0
	F	1	0	0	0	1	0	0	0
1960	M	6	2	7	0	4	1	2	0
	F	0	1	2	0	0	0	0	0
1961	M	2	1	4	0	2	1	2	2
	F	0	3	0	0	0	0	0	0
1962	M	7	1	3	1	3	0	2	0
	F	0	3	0	1	0	0	0	0
1963	M	3	1	7	0	3	0	2	1
	F	1	0	0	0	0	0	1	0
1964	M	3	0	2	1	3	0	1	0
	F	0	0	1	0	0	0	0	0
1965	M	5	2	5	1	4	1	0	1
	F	0	0	1	0	0	0	0	1
1966	M	4	2	2	4	2	0	0	0
	F	0	0	1	0	0	0	2	0
1967	M	3	2	4	2	5	0	1	0
	F	0	1	0	0	0	0	0	0

1968	M	3	0	2	0	0	0	0	1
	F	6	0	0	0	0	0	0	0
1969	M	3	2	5	0	2	1	1	0
	F	1	0	1	0	0	0	0	0
1970	M	3	2	8	1	5	0	2	1
	F	0	0	0	1	0	0	0	0
1971	M	3	0	5	1	1	1	0	0
	F	1	0	1	0	1	0	0	0
1972	M	1	1	5	1	1	1	2	0
	F	0	0	1	0	0	0	0	0
1973	M	2	1	10	1	3	0	2	0
	F	3	1	1	2	1	1	0	0
1974	M	4	1	4	2	1	2	1	0
	F	1	1	1	0	1	1	1	0
1975	M	3	1	11	1	2	3	2	0
	F	1	0	3	1	1	0	0	0
1976	M	7	2	10	1	2	0	1	1
	F	3	0	2	0	3	0	0	0
1977	M	4	1	7	2	4	0	1	0
	F	4	0	2	1	0	0	1	0
1978	M	5	1	8	1	3	0	0	0
	F	2	3	2	0	0	2	0	0
1979	M	11	1	2	0	7	2	0	0
	F	4	0	4	0	2	0	1	0
1980	M	3	3	9	0	3	0	2	1
	F	7	1	5	0	5	0	0	1
1981	M	12	1	19	3	8	2	2	1
	F	4	2	5	0	2	1	1	0
1982	M	20	6	23	3	5	6	6	1
	F	16	6	16	3	5	1	2	0
1983	M	30	9	26	2	7	3	9	2
	F	22	3	11	2	7	2	6	1
1984	M	15	5	27	3	9	2	6	1
	F	16	4	17	3	14	2	1	3
1985	M	19	3	17	2	8	4	5	3
	F	18	3	9	4	4	2	4	3
1986	M	13	3	16	2	8	2	3	0
	F	5	1	10	5	5	1	4	0
1987	M	10	6	16	4	12	2	2	3
	F	8	1	7	2	3	2	3	1
1988	M	14	2	8	2	5	2	3	1
	F	8	1	6	3	7	5	3	0
1989	M	14	5	17	1	6	2	2	0
	F	6	2	8	0	6	1	0	1
1990-1992	M	5	1	3	3	2	0	1	0
	F	6	2	4	1	4	0	2	0

Table 21. Data for Jawor county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	1	2	3	0	4	0	1	0
	F	0	0	0	1	0	0	0	0
1946	M	1	0	1	0	0	0	0	0
	F	0	0	0	0	0	0	0	0
1947	M	3	0	1	0	0	0	0	0
	F	0	0	1	0	0	0	0	0
1948	M	1	0	1	0	0	0	1	0
	F	0	0	0	0	0	0	0	0
1949	M	3	1	2	2	0	0	1	0
	F	0	0	0	0	1	0	0	0
1950	M	2	0	0	0	0	0	1	0
	F	1	0	0	0	0	0	0	0
1951	M	4	0	3	0	2	0	4	0
	F	0	0	2	0	0	0	0	0
1952	M	1	0	3	1	3	2	1	0
	F	0	0	0	0	0	0	0	0
1953	M	4	1	6	1	2	0	1	1
	F	2	0	1	0	0	0	0	0
1954	M	4	2	4	0	3	0	0	0
	F	0	1	0	1	0	0	0	0
1955	M	4	3	2	1	2	0	3	1
	F	0	0	0	0	0	0	0	0
1956	M	5	0	6	1	3	0	1	0
	F	1	0	0	0	0	0	3	0
1957	M	1	3	5	1	3	0	2	0
	F	0	0	3	0	0	0	0	0
1958	M	6	4	8	2	1	0	2	1
	F	0	0	2	0	2	0	0	0
1959	M	0	2	6	4	1	2	3	0
	F	0	0	0	0	0	0	0	0
1960	M	5	1	4	1	1	2	1	0
	F	2	0	3	1	0	0	0	0
1961	M	6	0	6	1	6	0	3	1
	F	2	0	0	1	0	0	0	0
1962	M	7	0	8	0	6	0	1	0
	F	0	1	7	0	0	0	0	0
1963	M	6	1	8	0	4	1	0	0
	F	1	0	0	0	0	0	0	0
1964	M	6	1	2	5	1	1	0	1
	F	1	0	0	2	0	0	0	0
1965	M	6	1	10	0	3	0	0	0
	F	0	1	1	1	0	0	0	0
1966	M	7	3	9	1	2	2	3	2
	F	0	0	2	1	1	0	0	0
1967	M	7	1	10	1	2	0	2	0
	F	0	0	0	0	0	0	0	0

1968	M	9	1	3	1	2	1	3	0
	F	3	2	4	0	1	1	0	1
1969	M	4	0	3	2	4	0	2	1
	F	1	0	5	0	0	0	0	0
1970	M	3	0	8	0	0	0	4	0
	F	2	0	0	1	0	0	0	0
1971	M	6	3	7	1	2	1	0	1
	F	1	0	1	0	0	0	1	0
1972	M	13	3	7	2	2	0	2	0
	F	2	0	2	0	0	1	1	0
1973	M	7	2	12	3	9	0	0	0
	F	1	0	2	2	1	0	0	0
1974	M	7	3	12	4	9	2	3	0
	F	0	1	1	3	0	2	1	0
1975	M	8	4	12	5	8	0	2	0
	F	2	0	2	0	1	0	0	0
1976	M	11	0	8	3	5	2	1	0
	F	2	0	3	0	1	0	0	0
1977	M	9	4	17	1	5	3	4	0
	F	2	0	0	0	4	1	0	0
1978	M	1	3	10	0	6	1	0	0
	F	3	0	2	0	1	1	0	0
1979	M	6	4	15	0	5	1	3	0
	F	4	0	2	0	5	1	1	1
1980	M	8	5	15	5	3	1	5	1
	F	3	0	2	0	1	1	0	0
1981	M	7	3	11	0	6	1	2	2
	F	4	2	6	0	2	0	0	0
1982	M	9	2	16	3	9	3	5	1
	F	6	1	5	1	4	0	1	0
1983	M	13	1	25	5	11	3	5	1
	F	11	0	11	0	5	2	1	0
1984	M	20	4	18	4	5	2	10	0
	F	11	2	12	4	3	0	2	0
1985	M	24	6	22	6	14	4	3	0
	F	13	5	18	2	7	0	1	0
1986	M	24	4	30	4	8	1	5	2
	F	9	6	14	1	5	1	0	0
1987	M	17	1	23	4	13	4	7	3
	F	10	5	7	1	7	1	1	0
1988	M	14	4	15	3	8	1	3	2
	F	14	3	9	2	4	2	3	0
1989	M	26	3	19	5	12	2	0	1
	F	11	2	12	3	3	2	3	0
1990-1992	M	7	2	8	2	4	1	0	0
	F	7	1	8	2	3	0	0	0

Table 22. Data for Jelenia Góra county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	3	1	5	2	1	0	1	2
	F	1	0	0	0	0	0	0	0
1946	M	1	0	1	0	1	0	1	0
	F	0	0	1	0	0	0	0	0
1947	M	4	0	3	1	2	0	1	0
	F	0	0	0	0	0	0	0	0
1948	M	0	0	2	0	1	0	0	0
	F	0	0	0	2	0	0	0	0
1949	M	3	0	8	1	2	0	1	0
	F	0	0	0	0	1	0	0	0
1950	M	5	1	9	2	3	0	1	0
	F	1	0	1	0	0	0	0	0
1951	M	2	2	6	2	2	1	2	0
	F	1	0	1	0	0	0	0	0
1952	M	1	0	1	4	3	0	1	0
	F	1	2	0	0	0	0	1	0
1953	M	5	1	9	2	1	0	1	1
	F	1	1	2	1	2	0	0	0
1954	M	8	0	5	0	5	1	3	0
	F	0	0	1	0	1	0	1	0
1955	M	9	0	6	1	2	0	1	0
	F	0	2	1	0	0	0	1	0
1956	M	8	2	19	4	9	1	7	0
	F	2	0	1	1	0	1	1	0
1957	M	5	2	8	1	5	1	4	1
	F	1	1	1	0	0	0	0	0
1958	M	5	2	6	1	6	3	1	1
	F	3	2	3	2	1	0	0	0
1959	M	5	1	1	1	4	2	2	0
	F	0	0	1	0	4	0	0	0
1960	M	8	3	8	0	3	0	3	0
	F	4	1	0	0	0	1	0	0
1961	M	9	5	6	2	7	0	2	0
	F	1	0	1	0	2	0	0	0
1962	M	2	2	8	2	1	0	1	1
	F	3	0	0	0	2	0	0	0
1963	M	5	3	8	0	3	0	1	2
	F	1	1	1	0	0	0	0	0
1964	M	6	1	4	5	4	1	0	0
	F	1	1	0	0	0	1	0	0
1965	M	2	0	6	0	3	0	2	0
	F	1	0	2	1	0	0	0	0
1966	M	5	2	7	3	1	1	1	0
	F	0	0	2	0	1	0	0	0
1967	M	4	3	4	0	4	0	0	0
	F	1	0	0	0	2	1	0	0

1968	M	9	0	6	2	6	0	0	0
	F	0	0	3	1	0	0	1	1
1969	M	8	1	5	0	2	0	2	0
	F	2	0	3	0	1	0	1	1
1970	M	2	0	2	0	2	1	2	1
	F	0	0	3	0	1	0	0	0
1971	M	8	2	12	5	7	0	3	1
	F	5	0	2	2	1	0	0	0
1972	M	12	0	7	2	5	0	1	1
	F	5	1	3	0	2	0	0	0
1973	M	6	2	6	1	4	0	2	0
	F	2	0	0	1	1	0	1	0
1974	M	15	0	9	1	4	1	4	0
	F	3	2	3	1	4	0	0	0
1975	M	10	3	10	5	5	1	2	1
	F	3	1	1	2	2	1	1	0
1976	M	15	4	15	4	2	2	3	0
	F	1	0	7	1	2	0	1	0
1977	M	10	0	11	6	4	1	6	0
	F	4	0	3	0	2	2	1	0
1978	M	8	4	17	2	7	1	2	2
	F	5	1	6	0	1	0	0	0
1979	M	13	3	14	4	6	1	2	1
	F	11	1	1	2	2	0	0	0
1980	M	18	7	17	4	10	2	3	1
	F	3	2	12	2	5	0	3	0
1981	M	8	1	25	5	5	0	3	1
	F	2	0	7	3	3	1	2	0
1982	M	12	2	17	4	11	3	2	0
	F	5	1	8	0	4	1	3	0
1983	M	13	8	16	0	14	2	3	0
	F	9	0	6	2	3	0	2	0
1984	M	16	3	9	2	10	1	3	1
	F	7	3	7	1	2	1	0	0
1985	M	11	1	23	7	7	1	2	0
	F	6	0	10	6	6	1	1	0
1986	M	16	3	13	2	11	1	3	0
	F	14	6	7	2	4	2	0	1
1987	M	16	4	17	1	8	4	2	0
	F	4	3	12	4	4	1	1	0
1988	M	15	1	13	3	9	0	2	1
	F	9	0	14	5	8	2	0	0
1989	M	13	2	15	3	4	1	3	0
	F	6	1	9	1	3	2	1	1
1990-1992	M	3	0	14	2	6	0	4	0
	F	6	3	7	1	5	0	0	0

Table 23. Data for Kamienna Góra county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	3	2	9	2	0	0	1	0
	F	0	0	0	0	0	0	1	0
1946	M	2	1	4	0	0	1	0	1
	F	0	0	0	0	0	0	0	0
1947	M	3	0	0	0	2	2	0	0
	F	0	0	0	0	0	0	0	0
1948	M	6	2	1	0	3	1	0	0
	F	0	0	0	0	0	0	0	0
1949	M	2	1	0	3	3	0	1	0
	F	0	0	0	0	0	0	1	0
1950	M	4	0	3	1	0	1	2	1
	F	1	0	1	0	0	1	0	0
1951	M	9	1	8	0	4	0	3	0
	F	0	0	1	0	1	0	0	0
1952	M	4	2	10	2	3	0	4	0
	F	0	0	0	0	1	0	0	0
1953	M	5	2	11	1	4	2	3	0
	F	2	0	1	2	0	0	0	0
1954	M	9	0	13	2	8	2	2	2
	F	0	0	1	0	0	0	0	0
1955	M	11	2	16	3	1	2	1	1
	F	2	0	1	1	2	0	1	0
1956	M	12	5	8	3	6	0	2	0
	F	1	1	0	1	0	0	0	0
1957	M	4	2	9	6	7	2	2	3
	F	4	0	3	0	1	0	0	0
1958	M	7	3	11	0	5	2	2	0
	F	2	0	1	0	0	2	1	0
1959	M	12	3	9	3	5	2	3	0
	F	3	0	3	0	0	0	0	0
1960	M	12	6	10	6	6	3	6	0
	F	1	1	0	1	1	0	0	0
1961	M	12	2	14	1	4	3	3	1
	F	3	1	1	0	0	1	0	1
1962	M	3	5	8	0	4	1	2	1
	F	3	3	0	2	3	0	0	1
1963	M	10	4	13	4	4	1	3	0
	F	2	0	3	0	1	2	0	0
1964	M	6	0	13	2	5	0	3	0
	F	1	1	0	0	0	1	0	0
1965	M	11	3	12	1	4	2	0	2
	F	2	0	0	0	0	0	1	0
1966	M	9	0	13	0	9	0	4	1
	F	0	0	1	0	3	0	0	0
1967	M	6	1	8	5	6	4	3	1
	F	3	1	1	1	2	0	0	0

1968	M	15	1	7	4	6	0	1	1
	F	0	0	3	1	2	0	0	0
1969	M	14	4	7	4	5	1	2	0
	F	0	0	1	2	1	0	0	1
1970	M	11	2	12	1	7	1	3	0
	F	1	0	3	3	1	0	1	0
1971	M	11	1	14	1	3	2	5	2
	F		2	2	1	2	1	2	0
1972	M	6	3	8	5	4	3	1	1
	F	4	0	2	0	1	0	0	1
1973	M	14	3	8	5	8	1	3	0
	F	2	3	1	0	2	0	2	0
1974	M	7	2	10	0	7	4	1	1
	F	3	0	1	1	1	0	0	0
1975	M	12	1	11	3	7	2	1	0
	F	4	1	4	1	3	1	0	0
1976	M	12	0	12	3	9	2	2	0
	F	7	2	2	1	2	0	0	0
1977	M	13	5	14	3	6	2	3	0
	F	1	1	4	0	3	0	0	0
1978	M	22	3	27	4	15	4	6	1
	F	4	0	9	2	3	0	2	1
1979	M	14	5	9	6	10	2	3	3
	F	4	2	4	1	3	2	1	0
1980	M	22	4	25	6	13	2	1	1
	F	6	0	4	0	3	0	2	0
1981	M	15	4	16	7	5	3	2	2
	F	8	2	3	2	2	0	3	1
1982	M	25	7	27	3	4	0	4	3
	F	5	0	16	5	3	0	4	0
1983	M	16	4	20	3	11	2	0	4
	F	7	0	13	2	2	1	0	0
1984	M	18	3	13	6	9	1	3	1
	F	4	5	8	1	8	1	0	1
1985	M	19	8	19	10	12	3	4	0
	F	9	2	7	1	7	3	0	3
1986	M	18	6	22	3	15	2	4	1
	F	6	2	8	3	4	1	6	0
1987	M	17	11	11	11	13	0	2	3
	F	4	3	6	1	4	3	1	1
1988	M	18	6	20	3	13	5	4	1
	F	5	7	19	2	1	0	3	2
1989	M	16	1	15	1	4	1	4	0
	F	3	0	6	0	1	0	3	0
1990-1992	M	8	1	9	3	6	0	2	3
	F	2	2	8	3	0	0	0	0

Table 24. Data for Kłodzko county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	8	2	7	3	3	1	1	1
	F	2	1	1	0	1	0	1	0
1946	M	4	2	0	0	0	0	3	0
	F	0	0	2	0	0	0	0	0
1947	M	6	2	8	1	4	1	1	1
	F	0	0	2	0	0	0	1	0
1948	M	7	2	10	3	6	3	3	1
	F	0	0	1	0	0	0	0	0
1949	M	10	0	12	1	7	0	4	1
	F	2	0	1	0	0	0	0	0
1950	M	8	5	12	5	8	5	3	1
	F	5	1	1	1	1	0	1	0
1951	M	13	3	19	2	5	2	3	2
	F	2	0	4	1	1	0	1	0
1952	M	17	5	13	5	10	3	3	3
	F	2	1	0	0	0	0	1	0
1953	M	23	4	21	5	13	3	4	0
	F	3	0	2	1	2	1	0	1
1954	M	29	0	27	5	15	3	4	2
	F	6	2	1	0	2	2	0	0
1955	M	33	3	30	6	17	3	6	0
	F	6	2	4	1	3	0	1	0
1956	M	28	6	25	8	19	5	8	2
	F	4	1	7	2	5	2	0	0
1957	M	27	13	31	9	12	7	7	1
	F	3	0	5	2	1	0	2	0
1958	M	26	8	32	4	12	2	7	2
	F	2	2	6	1	2	4	4	0
1959	M	30	6	32	8	23	6	5	1
	F	8	0	3	3	3	0	1	0
1960	M	30	11	38	6	15	4	10	0
	F	10	0	4	1	3	1	1	1
1961	M	20	13	32	9	11	1	7	0
	F	4	3	0	2	2	2	2	0
1962	M	22	10	42	3	19	4	5	1
	F	7	2	6	0	0	0	0	1
1963	M	25	9	19	8	20	2	7	0
	F	4	2	7	1	1	2	2	0
1964	M	42	7	25	4	17	3	3	1
	F	3	1	5	3	3	1	2	1
1965	M	25	6	34	7	18	3	6	0
	F	6	2	4	5	2	1	0	0
1966	M	19	5	32	8	19	4	9	1
	F	5	2	5	0	2	1	4	0
1967	M	31	5	33	6	15	4	5	2
	F	4	0	5	3	3	1	2	0

1968	M	17	5	30	5	14	5	2	0
	F	9	0	8	1	4	1	1	0
1969	M	38	6	24	7	21	6	6	1
	F	10	0	6	3	6	1	2	1
1970	M	21	8	27	4	14	6	3	1
	F	4	4	8	1	4	3	1	0
1971	M	39	10	32	11	16	2	6	0
	F	8	3	8	2	3	2	1	1
1972	M	31	18	29	10	27	3	5	1
	F	9	2	11	3	3	0	1	0
1973	M	26	6	43	8	18	7	5	2
	F	8	1	13	1	5	0	2	0
1974	M	47	8	42	19	17	5	12	1
	F	9	0	12	5	5	2	0	0
1975	M	49	16	40	10	32	4	16	2
	F	14	2	10	3	4	1	3	2
1976	M	46	10	54	12	24	6	12	2
	F	18	4	16	5	9	4	6	2
1977	M	60	14	58	8	25	8	8	1
	F	18	4	13	3	14	5	1	0
1978	M	61	16	57	14	29	7	15	3
	F	15	1	21	5	11	2	2	0
1979	M	49	12	79	16	40	7	19	3
	F	12	3	20	9	9	5	0	1
1980	M	69	15	73	11	36	5	17	4
	F	20	3	28	5	15	3	3	2
1981	M	54	6	77	7	39	7	13	5
	F	23	6	23	5	8	3	5	1
1982	M	67	25	92	17	43	18	14	1
	F	17	7	29	6	13	2	5	2
1983	M	80	22	92	17	42	9	33	2
	F	36	5	23	8	21	3	8	1
1984	M	73	24	91	13	46	9	23	7
	F	26	6	26	9	9	3	7	2
1985	M	55	10	64	14	34	14	23	6
	F	28	3	28	7	16	1	9	3
1986	M	58	18	62	13	31	4	12	4
	F	25	3	40	8	16	1	10	2
1987	M	59	5	77	21	39	13	16	6
	F	27	8	31	11	19	2	8	1
1988	M	53	11	56	6	33	5	7	1
	F	26	8	40	3	13	6	19	1
1989	M	45	12	41	8	23	8	9	3
	F	34	7	37	4	17	3	3	2
1990-1992	M	28	4	28	3	15	1	7	0
	F	15	0	15	5	5	1	3	1

Table 25. Data for Legnica county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	0	0	2	0	0	0	1	0
	F	0	0	0	0	0	0	0	0
1946	M	0	0	2	0	0	0	0	0
	F	0	0	1	1	0	0	0	0
1947	M	1	0	1	0	0	1	0	0
	F	0	0	0	0	0	0	0	0
1948	M	0	0	3	0	1	0	0	0
	F	1	0	1	0	1	0	0	0
1949	M	1	0	1	1	2	1	0	0
	F	0	0	0	1	0	0	0	0
1950	M	2	0	2	1	1	0	0	0
	F	0	1	0	0	0	0	0	0
1951	M	2	1	1	1	0	2	0	0
	F	0	2	0	0	0	0	0	0
1952	M	4	0	3	1	4	1	0	0
	F	0	0	0	1	2	0	0	0
1953	M	2	1	3	0	1	2	0	0
	F	2	0	0	0	0	0	0	0
1954	M	2	1	4	1	2	0	3	0
	F	0	1	1	0	1	0	0	0
1955	M	8	1	1	0	4	0	0	0
	F	1	0	2	0	1	0	0	0
1956	M	1	0	4	0	3	2	2	0
	F	2	1	1	0	0	0	0	0
1957	M	6	0	5	1	6	1	1	0
	F	2	0	0	0	1	0	0	0
1958	M	3	2	8	1	5	3	0	0
	F	1	1	2	0	1	0	0	1
1959	M	5	4	3	1	2	0	0	1
	F	3	0	1	0	0	1	0	0
1960	M	5	1	4	2	3	0	0	0
	F	2	0	0	0	4	1	1	0
1961	M	8	2	6	1	3	0	0	1
	F	0	0	1	0	0	0	1	0
1962	M	7	4	5	1	1	0	0	0
	F	0	2	0	0	1	0	1	0
1963	M	5	3	5	2	1	1	2	1
	F	1	2	4	0	0	0	0	0
1964	M	3	0	4	3	1	0	2	0
	F	0	2	0	0	1	0	0	0
1965	M	9	0	2	0	2	1	0	0
	F	1	1	0	1	1	0	0	0
1966	M	9	2	4	2	4	0	1	1
	F	2	2	3	0	0	0	0	0
1967	M	5	2	2	0	3	1	2	2
	F	0	1	1	0	2	1	0	0

1968	M	3	2	2	3	0	1	1	1
	F	1	0	2	0	0	0	1	0
1969	M	10	1	7	1	1	0	0	0
	F	1	2	0	0	1	0	0	1
1970	M	1	3	6	1	4	1	3	0
	F	0	0	4	0	1	0	0	0
1971	M	4	1	2	2	2	0	3	0
	F	1	0	2	1	1	0	0	0
1972	M	5	4	4	2	3	1	1	0
	F	2	0	1	1	0	1	0	0
1973	M	13	0	7	1	6	1	1	1
	F	2	1	1	0	2	1	1	1
1974	M	7	5	5	0	1	1	3	0
	F	5	1	4	0	0	0	2	0
1975	M	3	5	9	2	9	0	0	1
	F	5	0	3	0	0	0	2	1
1976	M	11	3	7	2	1	2	2	0
	F	2	3	4	0	5	0	1	0
1977	M	24	5	10	2	7	1	1	0
	F	3	0	2	1	0	0	1	0
1978	M	12	5	9	1	8	2	3	0
	F	2	1	4	1	1	1	1	2
1979	M	12	2	8	1	8	2	0	0
	F	9	3	5	4	1	0	1	0
1980	M	14	1	16	3	7	1	2	1
	F	6	0	8	1	4	0	0	0
1981	M	9	7	9	3	9	5	7	0
	F	1	2	4	1	3	0	2	0
1982	M	18	4	19	5	14	3	3	0
	F	11	1	5	2	2	1	3	0
1983	M	17	3	18	4	9	4	5	1
	F	8	0	7	2	4	0	2	0
1984	M	16	7	23	7	11	2	6	4
	F	11	0	7	5	4	0	1	1
1985	M	21	6	32	7	14	2	10	1
	F	10	4	15	4	6	3	4	1
1986	M	22	6	21	6	12	3	7	1
	F	8	2	10	4	5	4	4	3
1987	M	22	10	24	4	19	1	5	0
	F	9	3	9	1	10	2	4	1
1988	M	32	6	29	9	15	4	5	0
	F	12	2	13	4	8	1	2	0
1989	M	21	9	28	6	17	1	4	0
	F	13	1	12	0	7	1	6	0
1990-1992	M	15	2	10	1	11	2	4	0
	F	3	4	9	3	3	0	0	0

Table 26. Data for Lubań county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	4	1	4	2	4	1	2	0
	F	2	0	0	0	0	0	0	0
1946	M	1	0	2	0	0	0	0	0
	F	0	0	0	0	0	0	0	0
1947	M	2	0	2	1	1	2	2	0
	F	2	0	0	0	0	0	0	0
1948	M	1	0	2	0	4	0	1	0
	F	0	0	1	0	0	0	0	0
1949	M	3	3	3	1	1	0	0	1
	F	0	0	0	0	0	0	1	0
1950	M	4	1	8	3	1	1	0	0
	F	1	0	1	0	0	0	0	0
1951	M	2	4	6	3	1	3	3	0
	F	1	1	1	0	1	0	0	0
1952	M	2	0	7	2	3	1	0	1
	F	2	1	2	0	1	0	0	0
1953	M	6	1	6	3	3	0	1	0
	F	0	0	0	0	0	0	0	0
1954	M	8	3	11	0	2	2	1	0
	F	2	1	0	2	0	0	1	0
1955	M	11	1	6	4	4	2	1	1
	F	0	0	1	0	0	0	0	0
1956	M	6	1	9	2	10	1	6	0
	F	0	0	1	0	0	1	0	1
1957	M	6	1	12	3	2	1	2	1
	F	1	1	1	1	1	1	0	0
1958	M	11	3	7	2	5	2	2	1
	F	4	2	3	0	1	0	1	0
1959	M	15	3	5	2	6	0	2	0
	F	2	1	3	0	0	0	1	0
1960	M	11	1	11	2	5	1	3	0
	F	1	0	4	0	0	1	0	1
1961	M	7	3	7	0	1	2	2	0
	F	1	1	1	0	2	0	0	0
1962	M	9	1	4	4	5	0	3	0
	F	0	0	1	1	0	0	0	0
1963	M	5	2	11	5	3	1	3	0
	F	1	0	0	2	0	0	1	0
1964	M	8	1	14	6	2	0	3	0
	F	1	1	1	2	0	0	1	0
1965	M	8	2	5	5	2	2	1	1
	F	1	0	2	1	1	0	0	0
1966	M	4	0	14	4	3	1	3	0
	F	1	1	0	0	0	0	0	0
1967	M	8	6	15	2	3	3	2	1
	F	1	0	0	0	1	0	0	0

1968	M	11	1	6	3	0	2	0	1
	F	1	0	0	0	1	0	0	0
1969	M	8	0	12	1	8	1	3	1
	F	0	0	3	1	1	2	0	0
1970	M	9	2	9	0	4	0	2	0
	F	0	0	3	1	1	0	0	0
1971	M	8	6	20	1	5	2	0	1
	F	2	1	4	2	0	0	0	0
1972	M	13	3	19	3	6	3	1	1
	F	1	1	2	0	2	1	2	1
1973	M	14	2	15	5	14	4	6	0
	F	4	1	2	1	1	0	0	1
1974	M	18	6	12	7	6	1	2	1
	F	3	2	6	1	2	1	1	0
1975	M	22	3	16	5	9	1	6	1
	F	2	0	1	0	1	0	1	1
1976	M	19	2	20	5	10	3	4	1
	F	6	2	6	1	4	2	1	0
1977	M	24	3	16	3	8	4	11	3
	F	4	1	4	0	2	0	0	0
1978	M	29	3	16	3	9	3	1	1
	F	7	1	5	2	4	0	0	0
1979	M	15	6	21	4	15	2	4	0
	F	5	5	6	0	4	1	4	0
1980	M	21	6	23	2	15	3	7	1
	F	7	0	5	1	4	0	2	0
1981	M	30	6	22	6	16	4	6	3
	F	4	3	9	3	4	3	1	0
1982	M	22	6	32	3	19	4	7	0
	F	19	2	13	6	9	3	2	0
1983	M	26	11	36	15	20	6	4	3
	F	9	4	12	5	9	1	6	0
1984	M	31	9	36	8	26	7	5	4
	F	13	0	19	2	12	4	4	0
1985	M	29	6	44	5	23	5	6	1
	F	10	3	9	4	8	1	4	1
1986	M	33	8	39	6	18	2	9	1
	F	8	2	12	3	9	4	1	0
1987	M	24	6	35	10	17	3	12	4
	F	15	4	16	4	8	1	1	0
1988	M	27	4	39	11	25	6	9	4
	F	14	2	12	2	8	4	4	0
1989	M	23	4	11	7	12	2	4	1
	F	14	2	18	4	8	4	4	0
1990-1992	M	10	2	16	5	8	2	6	0
	F	13	2	11	3	3	1	2	2

Table 27. Data for Lubin county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	2	0	1	0	4	1	0	1
	F	0	1	0	0	2	0	0	0
1946	M	1	0	1	1	0	1	1	0
	F	0	0	0	0	0	0	0	0
1947	M	1	0	1	0	1	0	2	0
	F	0	0	0	0	0	0	0	0
1948	M	6	1	2	1	1	0	1	1
	F	0	0	0	1	0	0	0	0
1949	M	5	4	2	0	4	1	1	0
	F	0	1	3	1	1	0	1	0
1950	M	4	2	7	1	2	0	0	0
	F	1	0	1	0	0	0	1	0
1951	M	8	1	3	2	5	0	1	0
	F	2	1	4	0	3	0	0	0
1952	M	4	2	9	0	3	1	3	0
	F	1	1	1	0	2	1	1	0
1953	M	4	2	10	2	7	1	1	0
	F	0	2	1	2	0	1	1	0
1954	M	4	6	6	3	4	1	2	0
	F	1	2	2	2	2	0	0	0
1955	M	12	5	11	1	4	0	1	0
	F	6	2	3	0	0	1	0	0
1956	M	13	1	12	1	4	3	4	1
	F	9	1	4	0	0	1	1	0
1957	M	15	1	17	3	7	3	2	1
	F	1	1	3	1	0	1	1	0
1958	M	10	1	22	4	5	0	3	1
	F	2	1	5	0	0	0	0	0
1959	M	13	5	12	3	8	3	1	1
	F	4	1	0	1	1	0	0	0
1960	M	12	5	8	5	6	0	2	0
	F	2	0	3	0	2	0	1	0
1961	M	15	1	11	7	8	3	2	0
	F	1	1	0	1	3	0	0	1
1962	M	12	3	10	5	7	3	6	3
	F	1	1	1	0	0	0	0	0
1963	M	16	4	15	3	5	2	1	2
	F	6	0	4	0	2	0	0	0
1964	M	15	1	12	3	6	2	4	0
	F	2	1	2	0	0	1	0	0
1965	M	11	4	13	1	9	0	1	2
	F	4	1	2	0	2	0	0	0
1966	M	11	3	6	4	8	3	1	1
	F	3	5	5	0	2	0	2	0
1967	M	12	2	9	3	11	2	5	1
	F	4	1	1	0	1	1	1	0

1968	M	8	3	12	2	7	2	2	1
	F	3	4	5	2	4	1	0	0
1969	M	14	6	17	5	13	5	6	1
	F	5	0	5	0	0	1	1	0
1970	M	14	1	22	4	10	2	5	0
	F	1	0	5	1	4	2	0	0
1971	M	14	5	16	6	9	1	8	4
	F	0	3	7	2	5	1	0	2
1972	M	20	7	28	3	17	3	3	1
	F	4	0	5	1	2	2	1	0
1973	M	16	9	22	4	7	3	2	2
	F	2	2	5	3	3	1	1	1
1974	M	27	10	31	9	18	5	5	1
	F	3	2	11	1	3	1	0	0
1975	M	30	7	32	5	18	3	3	1
	F	7	2	6	3	3	1	4	0
1976	M	34	9	42	9	17	3	5	1
	F	11	1	7	2	9	2	0	0
1977	M	33	7	41	5	12	5	9	1
	F	6	5	19	0	1	3	1	0
1978	M	35	16	36	8	18	5	12	3
	F	12	5	8	2	6	0	3	0
1979	M	34	6	39	15	17	6	11	1
	F	8	4	11	3	4	1	0	0
1980	M	31	13	46	13	21	5	7	0
	F	9	2	5	2	5	2	2	0
1981	M	28	4	36	11	27	6	7	0
	F	8	4	15	1	7	2	1	0
1982	M	35	11	45	16	20	3	5	1
	F	11	2	13	0	6	3	5	1
1983	M	36	10	42	10	31	8	12	2
	F	17	2	12	6	7	2	2	3
1984	M	40	7	49	11	21	10	5	2
	F	24	4	14	5	4	6	4	1
1985	M	37	12	42	9	19	1	5	3
	F	19	3	19	7	9	2	1	2
1986	M	49	9	46	7	22	9	7	1
	F	23	7	11	6	12	1	2	0
1987	M	39	8	52	9	23	3	13	3
	F	24	9	22	2	9	7	3	0
1988	M	25	7	37	12	26	5	3	4
	F	27	4	23	6	12	2	5	0
1989	M	45	11	46	10	18	7	11	3
	F	23	6	22	6	15	8	4	2
1990-1992	M	19	8	30	5	13	2	9	4
	F	16	9	25	3	11	2	2	1

Table 28. Data for Lwówek Śląski county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	2	0	3	0	3	0	0	0
	F	0	0	1	0	0	0	0	0
1946	M	1	1	2	0	0	0	1	0
	F	0	0	0	0	0	0	0	0
1947	M	1	1	5	0	1	0	1	0
	F	1	0	2	0	1	0	1	0
1948	M	5	0	2	1	0	0	1	0
	F	0	0	1	0	0	0	0	0
1949	M	2	0	4	0	6	0	0	0
	F	0	0	1	0	0	0	0	0
1950	M	7	1	5	1	2	1	1	1
	F	1	0	1	0	1	0	1	0
1951	M	2	1	5	3	2	3	1	1
	F	1	0	0	0	1	0	0	0
1952	M	5	0	5	1	4	0	1	0
	F	1	0	1	0	0	1	1	0
1953	M	6	0	4	2	2	2	2	0
	F	0	0	0	0	3	0	0	0
1954	M	5	2	13	1	4	1	2	2
	F	1	1	2	0	2	0	0	0
1955	M	7	0	9	0	5	1	3	0
	F	1	0	1	0	1	0	1	0
1956	M	12	1	12	0	6	0	4	0
	F	0	1	0	1	1	0	0	0
1957	M	9	0	8	2	5	1	3	1
	F	3	1	3	0	2	0	0	0
1958	M	15	3	12	3	2	2	1	2
	F	3	0	3	0	1	1	0	0
1959	M	12	3	9	4	5	1	1	0
	F	2	1	1	0	2	0	0	0
1960	M	5	8	9	1	1	1	3	1
	F	0	2	3	1	2	0	2	0
1961	M	8	2	11	2	3	1	1	0
	F	4	0	0	1	1	0	1	0
1962	M	4	3	11	1	2	2	1	1
	F	2	1	1	1	1	1	0	0
1963	M	8	3	11	5	2	2	1	1
	F	2	0	5	1	4	0	1	0
1964	M	11	1	8	2	5	1	1	1
	F	2	2	0	0	0	3	0	0
1965	M	10	4	9	3	3	1	0	1
	F	2	0	1	0	0	0	1	1
1966	M	7	1	9	1	4	0	0	0
	F	0	2	3	1	1	1	0	0
1967	M	16	3	12	3	2	0	2	1
	F	2	1	0	1	2	0	0	0

1968	M	14	1	2	2	3	0	4	0
	F	3	0	2	1	4	1	0	0
1969	M	4	1	4	1	2	1	1	1
	F	2	2	2	1	0	0	0	0
1970	M	8	3	12	3	7	1	1	0
	F	4	2	2	2	2	0	1	1
1971	M	10	3	11	2	5	0	1	0
	F	5	0	2	0	4	1	1	1
1972	M	11	0	13	2	7	1	6	1
	F	2	1	2	1	1	0	1	0
1973	M	6	2	13	2	4	3	3	1
	F	4	1	5	1	1	0	0	1
1974	M	11	5	13	2	2	1	2	1
	F	1	1	2	1	3	0	1	0
1975	M	14	2	14	5	6	0	1	0
	F	6	2	2	0	1	0	0	0
1976	M	12	4	14	3	8	2	4	0
	F	6	1	6	0	7	0	1	1
1977	M	16	1	17	6	10	2	5	0
	F	8	1	4	2	1	1	0	0
1978	M	11	7	18	3	12	2	3	0
	F	4	0	9	1	3	0	0	1
1979	M	17	0	22	5	11	3	6	0
	F	6	2	6	3	3	0	4	0
1980	M	22	5	27	7	21	5	1	1
	F	7	2	9	3	3	0	0	1
1981	M	27	4	30	10	26	3	4	0
	F	13	1	17	2	8	0	1	1
1982	M	31	10	29	8	23	10	14	1
	F	22	7	22	8	11	2	3	0
1983	M	26	12	39	4	20	11	8	1
	F	16	5	22	2	15	5	8	0
1984	M	35	8	31	10	18	13	4	0
	F	11	5	19	8	9	4	5	0
1985	M	45	19	52	12	33	4	18	1
	F	25	3	41	9	14	2	10	1
1986	M	24	7	32	9	24	5	3	1
	F	19	7	15	8	16	4	4	0
1987	M	29	3	44	11	23	8	8	1
	F	25	8	23	6	18	1	8	2
1988	M	28	7	26	5	17	1	10	3
	F	21	6	25	2	10	4	5	0
1989	M	24	4	21	3	17	0	3	0
	F	22	2	15	7	11	3	3	2
1990-1992	M	9	1	10	2	6	3	3	0
	F	12	3	14	3	9	0	3	0

Table 29. Data for the city of Jelenia Góra

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	8	2	3	1	2	0	3	0
	F	2	1	0	0	0	0	0	0
1946	M	3	0	2	0	1	0	0	0
	F	0	0	2	0	0	0	0	0
1947	M	4	0	4	1	1	2	1	0
	F	0	1	1	0	0	0	0	0
1948	M	2	2	6	0	4	0	0	0
	F	1	1	0	0	1	0	0	0
1949	M	7	2	5	1	1	0	4	0
	F	1	1	2	0	2	0	0	0
1950	M	10	1	5	0	3	1	1	2
	F	1	0	2	2	0	0	0	0
1951	M	5	1	8	3	5	1	0	2
	F	1	0	5	0	0	0	2	0
1952	M	3	3	6	2	1	2	3	0
	F	3	0	3	1	1	0	0	0
1953	M	9	1	10	2	3	1	4	0
	F	2	1	3	0	0	1	0	1
1954	M	9	2	10	3	2	2	3	1
	F	2	0	3	3	0	1	0	0
1955	M	7	4	11	2	6	0	1	0
	F	5	0	2	1	1	0	1	0
1956	M	17	0	9	3	3	0	0	0
	F	0	2	3	0	0	0	0	0
1957	M	20	2	12	6	3	2	1	5
	F	4	1	4	1	2	0	1	0
1958	M	12	8	14	4	10	3	2	1
	F	2	1	7	3	3	0	2	1
1959	M	24	1	13	2	3	1	2	0
	F	2	1	4	0	0	0	0	0
1960	M	11	5	8	1	5	1	3	1
	F	3	2	5	0	1	0	0	0
1961	M	11	3	17	2	7	0	1	1
	F	1	0	3	0	1	0	1	0
1962	M	12	2	14	2	4	0	4	2
	F	3	0	1	0	1	0	1	0
1963	M	8	2	12	1	5	1	2	0
	F	0	1	1	0	1	0	0	1
1964	M	10	1	10	3	8	2	1	0
	F	1	1	1	0	1	0	1	0
1965	M	6	1	9	3	3	3	1	1
	F	2	0	1	1	2	0	2	0
1966	M	7	2	6	3	3	1	0	0
	F	2	0	0	0	0	1	0	0
1967	M	5	0	11	1	5	3	1	1
	F	3	0	2	1	1	2	1	1

1968	M	11	1	8	1	8	2	5	1
	F	2	1	4	1	0	0	0	0
1969	M	19	0	10	4	7	0	8	0
	F	2	1	2	0	2	1	0	0
1970	M	8	2	8	4	7	1	4	2
	F	3	1	0	0	0	0	0	1
1971	M	16	3	12	3	5	1	6	0
	F	3	1	3	2	3	0	1	0
1972	M	12	5	12	1	7	1	1	0
	F	5	0	5	2	3	0	1	0
1973	M	16	5	11	3	4	1	0	2
	F	4	2	13	1	1	0	2	0
1974	M	13	1	20	5	9	1	2	0
	F	3	2	11	0	1	3	0	0
1975	M	25	5	23	7	15	3	7	0
	F	7	2	10	1	4	0	4	1
1976	M	27	2	24	5	13	2	4	1
	F	5	1	5	2	6	0	7	0
1977	M	25	8	27	8	16	5	4	0
	F	6	2	12	2	3	3	1	0
1978	M	24	9	31	8	19	2	7	0
	F	7	3	5	1	7	0	1	1
1979	M	36	6	50	12	21	9	8	1
	F	6	1	13	5	2	3	4	0
1980	M	42	3	46	11	22	7	6	0
	F	9	5	7	2	8	2	4	2
1981	M	33	7	34	6	17	6	11	4
	F	10	4	10	5	9	3	5	1
1982	M	27	9	36	8	9	7	7	0
	F	11	2	13	1	6	0	8	3
1983	M	22	6	26	11	18	7	8	2
	F	14	7	15	10	8	6	6	0
1984	M	24	5	33	9	13	4	4	0
	F	14	4	15	4	14	3	3	3
1985	M	31	3	24	7	16	7	10	2
	F	15	3	13	3	7	1	2	0
1986	M	16	1	33	7	8	4	2	1
	F	11	2	16	5	10	2	6	0
1987	M	28	7	21	7	12	2	6	1
	F	14	5	18	6	8	3	1	0
1988	M	24	3	19	4	11	3	0	1
	F	5	2	13	2	11	1	6	0
1989	M	11	1	12	5	8	5	0	0
	F	5	1	11	3	6	1	2	1
1990-1992	M	5	2	4	1	1	1	4	0
	F	2	1	2	3	4	2	1	0

Table 30. Data for the city of Legnica

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	2	1	4	0	2	0	2	0
	F	1	1	0	0	2	0	0	0
1946	M	1	0	2	0	1	1	1	0
	F	0	0	0	0	0	0	0	0
1947	M	2	0	8	1	1	1	0	0
	F	0	0	0	0	0	0	0	0
1948	M	4	0	3	0	2	0	2	0
	F	0	0	0	1	0	0	0	0
1949	M	3	1	5	0	3	0	2	0
	F	0	0	0	1	1	0	0	0
1950	M	3	2	7	0	2	2	2	1
	F	3	1	1	0	0	0	0	0
1951	M	7	2	7	2	5	2	2	0
	F	2	0	2	0	1	0	0	0
1952	M	8	2	12	3	3	3	2	0
	F	3	0	2	3	4	0	0	0
1953	M	7	2	10	1	6	2	2	0
	F	0	0	1	1	0	1	1	0
1954	M	12	3	12	2	6	0	2	0
	F	1	2	2	2	3	0	0	1
1955	M	12	3	8	2	7	2	6	1
	F	0	1	3	0	2	0	0	0
1956	M	15	2	14	8	6	0	3	0
	F	1	0	1	0	0	2	0	0
1957	M	12	1	14	1	7	0	5	2
	F	2	1	3	1	2	1	0	0
1958	M	8	4	13	5	5	1	3	1
	F	1	0	1	1	1	0	1	0
1959	M	7	6	16	3	3	2	1	0
	F	2	2	3	2	0	0	1	0
1960	M	13	3	10	6	3	3	5	0
	F	2	0	2	1	3	0	0	0
1961	M	12	4	9	2	7	1	4	1
	F	1	2	3	1	3	1	2	1
1962	M	7	4	6	2	7	1	3	0
	F	2	1	0	0	1	1	0	1
1963	M	13	6	10	8	7	1	4	0
	F	2	0	2	1	1	1	3	0
1964	M	14	0	13	0	3	1	1	0
	F	2	1	2	2	2	1	0	0
1965	M	16	2	12	1	6	1	3	1
	F	4	2	4	0	0	0	1	0
1966	M	8	6	12	3	6	1	2	1
	F	5	4	4	1	1	1	0	0
1967	M	16	6	11	3	6	1	2	0
	F	2	1	4	4	3	0	2	2

1968	M	11	2	8	3	3	1	1	1
	F	2	1	2	1	2	0	1	1
1969	M	10	3	8	7	10	0	2	0
	F	2	0	3	2	1	0	0	1
1970	M	11	3	20	5	6	1	3	0
	F	6	2	6	0	1	0	3	0
1971	M	18	2	10	6	7	3	3	0
	F	2	1	5	1	2	0	1	0
1972	M	21	9	21	5	11	1	5	1
	F	1	2	8	1	2	2	1	1
1973	M	18	8	21	6	11	0	6	1
	F	13	0	3	2	2	1	3	1
1974	M	17	5	19	9	15	5	5	2
	F	4	3	7	2	2	1	3	1
1975	M	20	4	28	3	14	0	8	3
	F	5	0	2	2	3	1	2	1
1976	M	22	4	31	6	11	3	6	3
	F	9	1	6	3	5	2	0	2
1977	M	20	7	28	5	19	2	7	0
	F	7	1	10	1	5	1	3	1
1978	M	22	2	27	4	12	4	7	0
	F	11	1	10	1	5	1	0	0
1979	M	19	3	29	9	11	5	2	1
	F	8	1	9	1	2	3	2	1
1980	M	20	7	36	7	16	2	5	3
	F	8	1	13	6	5	1	3	1
1981	M	20	7	38	5	19	3	10	1
	F	11	3	19	1	11	0	4	1
1982	M	34	5	39	13	17	2	8	2
	F	16	1	14	2	9	1	4	2
1983	M	29	10	29	10	19	5	11	1
	F	15	3	24	4	15	3	3	0
1984	M	45	9	38	12	18	3	12	5
	F	18	7	29	6	16	4	4	1
1985	M	29	9	55	8	27	8	13	3
	F	20	3	22	5	11	1	5	1
1986	M	26	7	37	13	20	6	7	0
	F	15	5	19	3	13	0	2	0
1987	M	34	5	46	12	18	5	12	1
	F	14	5	20	5	11	4	4	1
1988	M	30	8	48	6	18	2	8	0
	F	14	4	16	4	7	4	8	0
1989	M	28	9	35	6	16	3	8	1
	F	14	5	19	4	12	4	2	1
1990-1992	M	20	5	22	3	15	1	3	0
	F	14	2	7	2	5	2	2	0

Table 31. Data for the city of Wrocław

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	127	36	130	34	60	18	26	6
	F	43	19	47	14	25	3	10	3
1946	M	38	16	39	7	26	6	5	3
	F	15	8	23	2	11	2	5	2
1947	M	48	20	49	14	27	9	19	1
	F	17	9	17	7	11	4	1	2
1948	M	64	17	61	16	31	10	20	3
	F	34	11	25	11	15	3	7	2
1949	M	56	18	82	22	45	9	17	4
	F	31	11	29	15	15	6	4	3
1950	M	96	24	76	24	55	12	18	6
	F	26	12	38	14	21	6	12	4
1951	M	116	27	88	17	55	15	31	3
	F	37	22	41	7	19	6	4	2
1952	M	108	31	127	33	51	16	18	7
	F	46	18	38	21	30	6	10	4
1953	M	128	34	101	25	57	16	20	4
	F	47	16	54	14	27	7	12	3
1954	M	122	23	128	39	58	10	29	4
	F	47	28	63	14	25	12	13	0
1955	M	129	24	121	35	77	13	33	6
	F	45	19	49	19	26	8	14	5
1956	M	119	28	160	36	68	19	33	13
	F	52	20	43	20	31	12	17	5
1957	M	138	42	135	34	85	23	34	8
	F	42	24	58	15	21	9	17	1
1958	M	147	37	153	35	61	12	34	12
	F	50	15	54	17	29	8	7	6
1959	M	123	42	150	27	70	15	32	8
	F	50	11	67	11	30	9	14	3
1960	M	120	30	129	31	68	17	23	8
	F	42	21	46	10	19	6	10	6
1961	M	129	35	123	35	65	18	23	7
	F	48	15	40	16	24	5	12	2
1962	M	98	31	132	20	53	12	30	5
	F	44	21	47	15	19	3	8	2
1963	M	130	34	120	21	78	12	23	6
	F	39	12	53	10	31	6	12	3
1964	M	86	31	114	34	80	17	27	7
	F	36	12	55	13	34	6	13	5
1965	M	115	27	106	30	68	10	32	3
	F	56	21	48	18	29	10	7	3
1966	M	102	19	125	25	61	13	33	5
	F	52	19	35	7	15	8	13	5
1967	M	106	26	131	32	63	14	31	6
	F	65	18	51	19	35	1	10	3

1968	M	119	28	135	39	59	14	27	4
	F	57	22	57	16	35	8	15	3
1969	M	127	30	141	40	76	18	38	9
	F	69	21	66	18	30	9	12	2
1970	M	131	41	152	39	87	20	30	4
	F	66	18	64	12	41	12	10	4
1971	M	175	52	164	43	89	22	44	10
	F	82	37	76	24	32	9	11	6
1972	M	176	45	186	55	108	28	56	7
	F	78	36	93	27	43	15	24	3
1973	M	236	54	216	54	106	36	42	13
	F	95	30	100	22	62	7	25	8
1974	M	252	59	238	52	113	37	55	18
	F	116	32	119	38	59	13	28	8
1975	M	218	56	278	63	140	34	71	18
	F	118	35	142	40	80	22	22	8
1976	M	237	61	284	67	140	35	53	10
	F	139	37	153	36	71	25	44	7
1977	M	278	54	290	76	144	34	72	12
	F	159	51	157	63	71	26	32	4
1978	M	246	57	286	62	127	40	62	17
	F	169	43	186	42	90	25	41	9
1979	M	288	74	337	70	150	32	65	12
	F	166	43	181	40	106	25	43	13
1980	M	274	60	279	67	155	31	55	12
	F	188	45	220	43	97	28	39	15
1981	M	256	76	281	91	144	33	67	15
	F	174	42	196	45	102	28	45	10
1982	M	290	51	294	64	155	37	63	11
	F	174	60	226	47	115	26	46	15
1983	M	306	76	303	69	143	36	62	20
	F	179	54	242	50	115	23	46	13
1984	M	294	52	309	66	162	36	69	15
	F	184	56	213	59	116	24	65	6
1985	M	281	72	351	78	165	38	76	22
	F	183	47	226	54	110	26	53	10
1986	M	254	57	311	71	139	42	68	12
	F	177	48	193	58	95	33	37	10
1987	M	219	56	259	68	150	26	60	7
	F	161	49	185	42	96	25	48	8
1988	M	179	44	228	43	124	33	44	10
	F	153	43	174	40	81	17	48	18
1989	M	195	44	212	44	116	32	48	4
	F	148	38	153	44	92	24	41	11
1990-1992	M	139	27	170	31	87	20	32	7
	F	76	23	113	12	44	10	24	9

Table 32. Data for Milicz county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	0	1	4	1	0	0	0	0
	F	0	0	1	0	0	0	0	0
1946	M	1	0	0	0	0	0	1	0
	F	0	0	0	1	0	1	0	0
1947	M	0	0	0	1	1	1	0	0
	F	0	1	0	0	0	0	0	0
1948	M	1	0	3	0	1	0	0	0
	F	0	0	2	0	0	0	0	0
1949	M	2	1	3	1	1	0	0	1
	F	2	0	0	0	1	0	1	0
1950	M	3	0	1	0	2	0	0	0
	F	1	1	0	1	1	0	0	0
1951	M	3	0	3	2	1	2	0	0
	F	6	0	3	0	1	0	0	0
1952	M	1	0	3	0	2	1	0	0
	F	0	0	3	0	0	0	0	0
1953	M	3	1	6	2	2	0	2	0
	F	2	0	1	3	0	0	0	0
1954	M	1	4	2	0	4	2	1	0
	F	3	0	0	1	0	0	0	0
1955	M	4	1	2	2	1	0	2	0
	F	1	1	1	0	1	0	0	0
1956	M	4	1	3	1	1	2	0	0
	F	2	0	1	0	0	0	0	0
1957	M	3	1	6	2	1	0	2	0
	F	2	0	0	0	0	0	0	0
1958	M	3	0	3	1	2	0	1	0
	F	1	1	1	1	1	0	0	0
1959	M	4	2	2	1	1	0	1	0
	F	0	1	1	0	0	1	0	0
1960	M	9	5	5	0	1	0	1	1
	F	0	0	3	0	2	0	1	0
1961	M	2	0	3	1	0	1	1	0
	F	1	0	2	1	1	0	0	0
1962	M	5	1	1	1	4	1	0	0
	F	1	0	1	2	0	0	0	0
1963	M	9	0	2	3	1	0	1	1
	F	2	1	4	0	0	1	0	0
1964	M	3	3	6	0	1	0	0	1
	F	0	0	1	1	2	0	1	0
1965	M	2	4	3	1	2	1	0	0
	F	2	0	0	0	4	1	0	0
1966	M	2	0	4	1	3	1	0	0
	F	1	1	2	0	0	0	1	0
1967	M	2	2	7	1	0	0	0	0
	F	0	1	1	0	2	0	1	0

1968	M	2	0	2	2	2	0	0	0
	F	3	2	0	1	1	0	0	0
1969	M	10	0	5	0	2	0	2	0
	F	2	0	4	0	2	0	1	0
1970	M	5	0	7	1	4	0	2	0
	F	1	1	2	2	1	1	0	0
1971	M	3	2	7	0	3	2	3	0
	F	3	1	2	1	2	0	1	0
1972	M	5	1	10	0	4	2	5	0
	F	5	0	1	0	4	0	0	0
1973	M	7	2	5	1	2	2	1	0
	F	4	1	2	0	1	0	1	0
1974	M	6	1	11	3	5	0	3	2
	F	5	1	4	2	4	0	2	0
1975	M	5	3	6	0	4	1	3	0
	F	0	1	3	1	3	1	1	0
1976	M	11	3	7	4	6	2	1	0
	F	8	0	3	2	0	2	1	0
1977	M	6	0	4	2	2	4	1	0
	F	6	1	2	1	1	1	0	0
1978	M	7	4	11	3	4	0	1	1
	F	3	2	1	2	4	2	1	0
1979	M	8	4	11	2	9	0	3	1
	F	4	0	7	2	4	0	0	0
1980	M	11	3	11	2	7	0	2	0
	F	5	1	4	0	4	0	0	0
1981	M	11	3	11	1	4	2	2	0
	F	4	0	3	2	2	0	1	0
1982	M	16	5	8	4	6	1	3	0
	F	7	0	5	2	5	2	0	0
1983	M	22	1	24	6	2	1	4	0
	F	7	1	5	3	2	2	2	0
1984	M	14	1	14	7	6	1	0	1
	F	14	1	9	4	9	0	1	1
1985	M	11	3	13	1	12	3	1	1
	F	2	2	6	1	2		2	0
1986	M	15	4	9	4	6	1	4	0
	F	4	3	4	1	4	2	2	2
1987	M	17	5	17	1	7	1	8	0
	F	12	8	15	3	11	3	3	1
1988	M	13	1	33	8	8	0	5	0
	F	20	3	17	8	6	0	3	1
1989	M	16	3	17	4	13	0	3	0
	F	15	1	13	2	12	0	5	1
1990-1992	M	7	4	8	2	10	1	2	0
	F	9	3	13	4	3	0	4	0

Table 33. Data for Oleśnica county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	11	2	10	2	5	1	1	0
	F	4	2	4	0	1	0	2	0
1946	M	4	1	4	0	2	1	0	0
	F	3	1	0	0	0	0	0	1
1947	M	6	0	2	0	2	0	0	0
	F	3	0	1	1	1	1	0	0
1948	M	13	0	7	3	4	1	1	0
	F	2	1	0	2	1	0	1	0
1949	M	3	3	6	1	5	2	1	0
	F	3	0	3	0	1	2	1	0
1950	M	8	0	4	1	7	1	2	0
	F	0	0	5	1	2	0	0	0
1951	M	10	3	6	1	5	1	4	2
	F	4	0	4	0	1	1	2	0
1952	M	18	4	15	1	5	2	1	0
	F	2	2	6	4	1	1	0	0
1953	M	8	4	16	3	4	3	0	0
	F	2	2	5	1	1	0	0	0
1954	M	13	3	14	4	7	3	1	1
	F	7	0	2	0	3	2	1	0
1955	M	10	5	13	5	9	4	2	1
	F	2	1	3	0	6	1	1	0
1956	M	17	5	19	3	4	3	2	0
	F	6	2	5	1	2	0	1	2
1957	M	12	7	9	4	9	1	4	0
	F	3	1	3	1	2	0	1	0
1958	M	12	3	16	6	4	3	1	1
	F	9	3	9	2	3	0	0	0
1959	M	17	6	11	4	6	4	3	0
	F	3	2	2	2	3	3	0	0
1960	M	10	3	20	5	12	3	4	0
	F	5	1	7	2	3	0	0	0
1961	M	13	2	18	4	8	3	6	1
	F	4	1	2	3	1	1	1	1
1962	M	16	9	13	2	10	1	7	1
	F	3	1	4	3	2	1	2	0
1963	M	11	5	13	5	7	4	0	1
	F	0	3	2	0	4	1	0	0
1964	M	14	0	8	5	12	2	1	1
	F	4	1	5	3	2	2	2	0
1965	M	21	6	11	3	8	3	3	3
	F	2	0	2	0	2	0	1	1
1966	M	11	1	19	3	9	0	3	2
	F	2	2	3	2	4	1	2	0
1967	M	24	2	16	4	6	4	0	0
	F	5	1	5	0	0	0	1	0

1968	M	17	2	14	1	8	2	3	0
	F	4	1	6	0	4	0	2	1
1969	M	19	3	22	4	9	1	4	0
	F	5	2	6	2	0	2	3	0
1970	M	15	2	17	7	8	4	5	2
	F	6	0	9	1	4	1	2	0
1971	M	25	4	14	5	10	1	3	2
	F	3	1	7	3	2	3	1	0
1972	M	24	4	26	8	8	6	5	3
	F	7	3	4	1	5	4	1	0
1973	M	30	12	30	7	17	4	3	2
	F	11	0	5	0	6	0	2	2
1974	M	28	8	27	10	11	2	7	0
	F	8	3	14	2	5	0	1	1
1975	M	40	3	25	7	26	5	8	0
	F	7	3	15	3	4	6	2	0
1976	M	29	10	31	3	17	1	7	0
	F	11	2	18	2	5	0	4	1
1977	M	40	5	27	8	17	3	8	2
	F	12	1	16	6	5	1	4	0
1978	M	36	8	27	5	20	3	4	0
	F	15	1	16	2	7	1	5	1
1979	M	29	4	34	5	17	6	11	1
	F	15	6	16	4	9	3	6	2
1980	M	29	5	24	6	15	8	5	2
	F	7	2	13	3	5	1	4	0
1981	M	34	6	32	7	16	3	7	1
	F	11	2	17	4	7	5	2	0
1982	M	40	17	47	12	20	0	7	4
	F	18	6	31	4	7	2	7	1
1983	M	44	14	54	15	21	5	11	4
	F	24	5	22	10	14	0	7	2
1984	M	40	7	62	4	29	6	10	1
	F	32	12	38	6	15	7	9	0
1985	M	42	10	57	2	25	6	19	1
	F	27	15	60	9	29	6	15	2
1986	M	49	16	78	12	29	7	7	2
	F	30	4	42	8	19	3	8	1
1987	M	56	12	70	6	33	7	18	5
	F	47	7	52	15	28	5	11	1
1988	M	57	8	68	15	36	10	15	1
	F	34	6	48	6	29	3	14	2
1989	M	45	11	60	25	21	9	10	1
	F	32	6	55	13	25	5	6	3
1990-1992	M	33	3	44	7	19	1	11	1
	F	22	6	23	6	13	7	4	3

Table 34. Data for Oława county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	1	2	4	3	1	2	1	0
	F	2	2	0	1	0	0	0	0
1946	M	3	1	1	1	1	0	0	0
	F	1	0	1	0	0	0	0	0
1947	M	4	1	0	2	0	0	2	0
	F	0	0	2	0	0	0	0	0
1948	M	1	0	2	1	2	0	1	0
	F	2	0	0	0	0	0	1	0
1949	M	5	1	1	2	4	0	0	0
	F	0	0	0	0	3	0	0	0
1950	M	2	1	2	0	2	2	1	0
	F	0	2	1	1	1	0	0	0
1951	M	4	1	7	1	5	0	0	0
	F	1	1	0	2	0	0	0	0
1952	M	2	2	13	3	4	1	2	3
	F	2	1	1	2	0	0	0	0
1953	M	6	1	10	0	4	0	4	1
	F	2	0	0	1	0	0	0	0
1954	M	8	1	8	3	7	2	5	2
	F	0	0	0	1	1	0	0	0
1955	M	5	2	8	3	3	1	2	0
	F	2	0	2	0	2	0	0	1
1956	M	5	3	9	3	4	1	1	2
	F	3	0	1	0	0	0	0	0
1957	M	10	0	8	3	5	0	1	1
	F	3	0	2	2	2	0	0	0
1958	M	8	2	5	4	2	0	4	1
	F	2	0	2	0	0	1	1	0
1959	M	5	3	12	3	3	1	4	1
	F	5	1	1	0	0	0	0	0
1960	M	7	2	4	2	2	0	0	0
	F	4	1	3	1	1	0	0	0
1961	M	7	1	9	1	2	0	3	0
	F	3	1	0	0	0	0	0	1
1962	M	10	1	5	1	2	2	1	1
	F	2	1	1	0	1	1	1	0
1963	M	15	2	4	1	3	1	2	0
	F	4	0	1	0	2	0	0	0
1964	M	10	2	5	1	4	1	1	1
	F	1	0	1	0	0	1	1	0
1965	M	6	4	6	0	5	1	2	0
	F	0	1	2	0	0	1	0	0
1966	M	6	1	10	0	1	1	0	0
	F	4	1	1	2	1	0	0	0
1967	M	4	3	13	4	4	2	2	0
	F	0	1	0	0	3	3	0	2

1968	M	8	0	9	2	8	1	2	1
	F	2	2	4	0	1	0	1	0
1969	M	1	1	10	2	0	1	0	0
	F	6	0	3	0	1	3	1	0
1970	M	5	3	6	4	6	1	0	3
	F	3	1	1	2	6	0	2	0
1971	M	9	0	6	3	4	2	3	0
	F	3	0	5	0	1	0	0	0
1972	M	9	3	11	1	3	1	2	0
	F	3	0	3	0	2	1	2	0
1973	M	8	2	8	1	6	1	5	0
	F	5	3	3	0	2	1	1	1
1974	M	8	4	16	4	3	2	7	1
	F	3	3	10	2	0	2	1	0
1975	M	9	6	6	3	9	2	3	0
	F	5	4	5	2	2	0	0	1
1976	M	21	4	19	1	7	1	5	3
	F	7	0	8	1	3	1	1	1
1977	M	18	4	19	4	13	1	5	0
	F	7	1	4	2	6	1	1	0
1978	M	20	6	20	9	13	1	5	0
	F	10	1	7	1	7	1	2	0
1979	M	12	3	20	7	8	2	4	1
	F	9	4	7	1	1	0	3	0
1980	M	12	6	10	6	5	3	1	0
	F	8	1	9	1	4	1	1	0
1981	M	19	2	18	2	7	0	6	1
	F	9	3	8	0	7	1	3	0
1982	M	19	5	20	5	10	4	3	2
	F	11	3	7	1	2	2	2	0
1983	M	20	4	27	9	12	4	4	2
	F	11	2	8	1	7	2	3	1
1984	M	23	9	22	9	19	3	4	2
	F	19	2	21	5	11	4	5	1
1985	M	20	5	27	13	11	5	5	0
	F	14	4	16	6	12	2	4	0
1986	M	21	2	18	6	14	3	4	1
	F	15	6	14	3	11	2	3	0
1987	M	28	4	26	5	12	5	10	3
	F	13	1	14	2	8	1	5	1
1988	M	12	6	12	4	9	4	5	1
	F	14	4	17	3	10	1	3	1
1989	M	18	4	18	1	10	5	3	1
	F	11	4	24	5	7	0	5	2
1990-1992	M	4	1	1	0	0	0	0	0
	F	0	0	1	0	1	0	0	0

Table 35. Data for Polkowice county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	3	1	1	4	0	1	1	1
	F	2	0	2	0	0	0	0	0
1946	M	3	1	3	1	0	0	0	0
	F	0	0	0	0	0	0	0	0
1947	M	1	1	1	1	1	1	1	0
	F	1	0	0	0	0	0	0	0
1948	M	1	0	3	0	0	0	0	1
	F	0	0	0	0	0	0	1	0
1949	M	0	0	2	1	2	0	0	0
	F	0	0	0	0	0	0	0	0
1950	M	1	0	3	2	1	1	1	1
	F	0	0	1	0	0	0	0	0
1951	M	3	2	2	1	2	0	1	1
	F	2	0	0	0	0	0	0	0
1952	M	5	1	4	2	2	1	1	0
	F	2	0	0	0	0	0	1	0
1953	M	1	0	7	1	6	2	1	0
	F	2	1	0	0	0	0	0	0
1954	M	3	1	3	0	4	0	0	0
	F	1	0	0	1	1	0	0	0
1955	M	4	2	5	1	4	1	1	0
	F	1	0	1	0	0	0	0	0
1956	M	9	3	10	0	2	0	0	1
	F	5	0	0	2	2	1	0	1
1957	M	7	3	8	0	4	0	3	0
	F	1	1	1	2	1	0	1	0
1958	M	8	1	9	3	9	1	2	1
	F	3	0	1	0	1	1	0	0
1959	M	3	2	7	2	3	1	2	1
	F	1	1	6	0	0	0	1	0
1960	M	8	3	7	2	2	1	0	1
	F	1	4	5	0	2	1	0	0
1961	M	12	1	11	5	2	5	3	1
	F	0	2	3	0	0	0	0	0
1962	M	6	1	12	1	4	3	3	0
	F	2	0	3	2	1	0	0	0
1963	M	10	3	10	2	3	2	5	1
	F	3	1	3	0	1	1	0	0
1964	M	7	2	11	4	6	0	1	0
	F	0	0	6	0	2	0	0	0
1965	M	10	2	10	1	9	1	0	1
	F	1	1	1	1	0	0	1	0
1966	M	6	2	8	4	7	2	4	0
	F	2	2	3	0	1	0	1	0
1967	M	12	3	7	5	4	0	0	0
	F	1	0	5	1	1	1	1	1

1968	M	7	0	12	4	8	1	4	2
	F	5	0	3	0	3	0	0	0
1969	M	6	2	9	2	8	1	3	0
	F	5	5	3	0	3	0	1	0
1970	M	11	1	17	2	3	2	6	0
	F	4	1	3	0	1	0	0	0
1971	M	11	2	18	2	9	1	5	2
	F	5	2	4	1	2	2	0	0
1972	M	12	3	16	7	11	0	2	0
	F	5	1	5	1	3	1	1	0
1973	M	20	5	19	2	5	0	5	0
	F	7	3	7	1	3	0	3	0
1974	M	15	6	21	3	5	1	2	1
	F	1	3	11	4	0	1	0	0
1975	M	22	6	21	4	6	4	3	2
	F	4	2	8	3	2	2	3	1
1976	M	20	9	15	4	9	0	6	1
	F	5	0	7	1	5	2	2	0
1977	M	18	6	13	8	7	4	4	1
	F	4	2	6	2	3	1	1	0
1978	M	17	2	29	2	4	2	3	3
	F	7	0	8	1	1	0	1	1
1979	M	23	7	27	8	17	1	7	2
	F	4	2	2	2	4	1	2	0
1980	M	27	2	22	4	16	0	6	0
	F	4	1	12	3	3	0	1	0
1981	M	20	3	25	14	14	4	6	1
	F	5	3	13	2	2	1	0	0
1982	M	25	5	29	6	10	7	7	2
	F	12	3	12	1	4	0	2	0
1983	M	19	7	40	7	15	6	11	4
	F	6	2	12	3	7	1	3	2
1984	M	33	6	28	8	20	1	10	1
	F	10	1	9	3	8	0	1	0
1985	M	36	10	38	13	16	3	5	1
	F	14	1	13	5	11	2	5	1
1986	M	46	9	44	8	25	5	8	1
	F	13	6	22	4	7	3	0	1
1987	M	39	13	35	10	29	2	5	3
	F	18	2	10	3	8	2	3	1
1988	M	21	6	43	8	18	3	3	0
	F	18	6	16	3	9	5	1	4
1989	M	29	4	29	4	12	6	3	1
	F	19	2	14	2	11	6	4	3
1990-1992	M	14	2	18	4	16	2	5	0
	F	9	3	14	2	11	1	3	0

Table 36. Data for Strzelin county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	0	0	2	0	2	0	0	0
	F	0	0	0	0	0	0	0	0
1946	M	0	0	3	1	0	0	0	0
	F	0	0	0	0	0	0	0	0
1947	M	0	0	0	0	1	0	0	0
	F	0	0	0	0	0	0	0	0
1948	M	4	0	1	1	1	0	0	0
	F	0	0	0	0	0	0	0	0
1949	M	2	1	3	0	0	0	0	0
	F	0	1	0	0	0	0	0	0
1950	M	2	0	3	0	2	0	1	0
	F	2	0	0	1	2	0	0	0
1951	M	3	1	3	2	0	1	2	0
	F	0	0	0	1	1	0	1	0
1952	M	5	2	5	2	1	1	0	1
	F	0	0	1	0	1	0	0	0
1953	M	2	1	2	2	3	0	2	0
	F	2	0	0	0	0	0	0	0
1954	M	1	3	5	1	1	1	0	0
	F	2	0	4	0	0	0	1	0
1955	M	7	1	7	1	3	0	0	1
	F	2	0	0	1	0	1	0	0
1956	M	0	1	3	1	6	0	2	0
	F	2	0	2	1	0	0	0	0
1957	M	7	0	6	1	5	1	1	0
	F	0	0	1	0	1	0	1	0
1958	M	1	5	8	2	3	4	3	0
	F	0	1	3	0	0	0	0	0
1959	M	8	3	6	3	3	1	1	0
	F	0	0	1	0	1	0	0	0
1960	M	9	1	6	2	1	0	4	2
	F	1	1	1	1	0	1	0	0
1961	M	10	1	6	4	4	0	2	0
	F	1	0	2	1	2	0	0	0
1962	M	2	3	6	1	2	3	1	0
	F	1	1	1	0	1	0	1	0
1963	M	5	1	7	1	4	0	1	0
	F	1	0	0	1	1	0	0	1
1964	M	8	1	3	1	4	0	0	0
	F	1	0	1	0	1	0	0	0
1965	M	2	0	13	0	2	0	2	2
	F	1	0	0	1	0	0	0	0
1966	M	7	4	9	2	3	0	3	0
	F	1	2	1	0	3	0	0	0
1967	M	3	0	7	0	1	0	1	0
	F	2	0	1	0	1	0	0	0

1968	M	7	3	2	3	4	1	1	1
	F	1	1	1	0	0	0	0	0
1969	M	4	3	10	2	4	1	1	0
	F	1	1	2	1	1	0	0	0
1970	M	7	1	3	3	3	0	3	0
	F	0	1	3	1	0	0	0	0
1971	M	8	1	7	2	1	0	2	1
	F	1	0	0	0	1	0	0	0
1972	M	8	1	10	2	3	2	2	0
	F	1	2	5	0	3	2	0	0
1973	M	8	4	11	1	3	0	3	1
	F	1	1	3	0	0	0	0	0
1974	M	10	6	15	1	4	1	1	0
	F	7	0	4	0	1	0	1	0
1975	M	16	0	14	4	5	1	3	2
	F	4	0	5	0	4	0	0	0
1976	M	7	2	9	5	5	2	1	0
	F	10	2	7	0	2	0	2	0
1977	M	11	5	13	3	5	1	3	1
	F	5	0	5	1	1	0	0	0
1978	M	11	2	9	1	8	3	2	1
	F	7	0	2	0	1	1	1	1
1979	M	12	2	15	1	7	3	7	0
	F	4	3	1	1	3	0	0	0
1980	M	6	5	12	4	9	1	4	1
	F	10	3	6	0	3	0	1	0
1981	M	13	3	15	5	8	0	2	0
	F	5	0	1	2	0	0	1	0
1982	M	17	9	26	3	9	3	5	0
	F	6	2	9	3	3	2	1	2
1983	M	14	1	16	3	15	1	4	2
	F	8	2	11	2	5	0	3	0
1984	M	17	6	20	3	12	5	4	0
	F	6	1	9	4	3	0	0	1
1985	M	14	5	18	5	7	2	3	1
	F	7	2	7	2	4	2	5	1
1986	M	12	3	14	5	5	2	1	0
	F	12	1	8	4	3	1	1	0
1987	M	19	1	13	4	8	1	5	0
	F	11	2	11	3	4	3	3	0
1988	M	15	1	12	3	6	1	3	1
	F	14	1	10	2	2	0	1	0
1989	M	11	5	12	7	7	1	3	1
	F	15	1	8	5	10	2	4	0
1990-1992	M	4	2	3	1	4	1	0	0
	F	4	4	4	2	2	0	2	1

Table 37. Data for Środa Śląska county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	1	1	2	0	0	0	0	0
	F	1	0	0	0	0	0	0	0
1946	M	0	1	1	0	2	0	0	1
	F	0	0	0	0	0	0	0	0
1947	M	5	0	2	0	0	0	1	0
	F	0	0	0	0	0	0	0	0
1948	M	3	1	2	1	0	1	0	0
	F	0	0	0	0	1	0	0	0
1949	M	1	3	1	0	1	0	0	0
	F	1	0	1	0	0	0	0	0
1950	M	1	0	2	2	1	0	0	0
	F	0	1	0	0	0	0	0	0
1951	M	4	0	2	1	4	0	0	1
	F	1	1	0	1	1	0	1	1
1952	M	4	1	4	0	1	0	0	0
	F	0	3	1	0	0	0	0	0
1953	M	2	0	2	0	4	1	0	0
	F	2	0	0	2	0	0	0	0
1954	M	5	2	3	3	3	0	1	0
	F	1	1	0	0	1	0	0	0
1955	M	8	2	4	4	1	0	2	0
	F	0	0	0	0	2	0	1	0
1956	M	6	1	4	0	4	0	0	0
	F	0	1	1	0	1	0	0	0
1957	M	4	4	1	1	11	1	0	0
	F	0	0	1	1	0	0	0	0
1958	M	5	1	7	1	1	3	3	0
	F	1	1	0	0	0	0	0	0
1959	M	6	1	8	0	4	0	0	0
	F	0	0	0	1	1	0	1	0
1960	M	7	1	6	1	3	1	1	0
	F	2	1	1	2	1	0	0	0
1961	M	9	2	5	2	2	1	3	2
	F	1	0	1	1	1	0	0	0
1962	M	6	1	6	1	3	1	5	0
	F	0	1	3	0	1	0	1	0
1963	M	4	2	2	1	2	1	0	1
	F	2	0	0	0	1	1	1	0
1964	M	6	2	7	4	3	1	2	1
	F	0	2	0	0	2	0	1	0
1965	M	7	3	5	3	4	1	1	0
	F	1	0	0	0	0	0	0	0
1966	M	4	1	7	2	6	0	1	0
	F	4	0	1	0	1	0	0	0
1967	M	3	1	5	1	4	3	1	0
	F	0	0	3	2	3	0	0	0

1968	M	10	1	7	0	2	0	0	0
	F	3	1	1	0	2	0	1	0
1969	M	5	3	7	2	2	0	3	0
	F	2	0	4	0	0	0	1	0
1970	M	9	2	10	2	2	1	1	0
	F	1	1	1	2	0	0	2	0
1971	M	6	3	7	3	5	0	2	0
	F	0	0	1	1	2	1	1	0
1972	M	13	2	8	1	2	0	1	0
	F	3	0	3	1	1	0	0	0
1973	M	8	3	10	2	5	1	2	0
	F	3	1	2	0	3	0	0	0
1974	M	7	4	19	1	8	2	1	0
	F	4	0	3	1	2	2	0	0
1975	M	8	1	15	2	9	1	3	0
	F	3	2	0	1	1	1	0	1
1976	M	6	2	12	2	9	0	3	0
	F	4	2	5	0	4	3	1	0
1977	M	10	5	10	1	10	2	2	1
	F	4	1	4	1	5	1	0	0
1978	M	11	5	7	2	6	0	1	1
	F	3	4	5	1	2	0	0	2
1979	M	9	3	11	5	6	1	4	0
	F	4	0	7	0	2	0	3	1
1980	M	12	1	9	6	7	3	2	0
	F	9	3	8	2	0	1	3	0
1981	M	11	4	14	2	12	0	3	1
	F	4	1	2	2	4	3	1	0
1982	M	16	2	18	2	11	1	4	0
	F	7	0	3	5	5	0	0	1
1983	M	20	5	16	3	12	2	6	1
	F	6	1	10	3	7	0	3	2
1984	M	15	3	21	0	6	1	5	1
	F	3	2	6	3	4	1	1	0
1985	M	15	2	8	3	9	1	1	2
	F	9	1	10	3	7	1	2	0
1986	M	16	1	18	2	8	1	0	2
	F	7	2	10	2	7	1	1	1
1987	M	10	4	19	4	13	3	6	2
	F	6	6	7	2	5	3	3	0
1988	M	6	0	17	1	8	0	2	1
	F	6	1	8	0	9	3	3	0
1989	M	9	5	18	0	9	0	1	0
	F	8	4	18	3	8	1	2	3
1990-1992	M	1	1	2	0	0	1	0	0
	F	0	0	1	0	1	0	0	1

Table 38. Data for Świdnica county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	21	4	19	4	10	1	4	1
	F	0	2	4	0	0	2	0	1
1946	M	2	1	9	3	4	0	3	2
	F	0	2	0	0	3	0	0	0
1947	M	7	4	11	5	3	2	1	3
	F	4	1	0	0	0	2	0	0
1948	M	6	2	13	2	5	3	2	2
	F	1	0	1	1	2	1	0	0
1949	M	17	1	15	1	7	3	4	1
	F	1	2	2	2	2	0	0	0
1950	M	13	9	11	4	12	0	2	0
	F	2	0	2	2	3	1	0	1
1951	M	22	4	24	5	9	2	0	1
	F	8	2	2	0	1	0	0	0
1952	M	22	3	22	5	10	3	6	1
	F	3	0	4	2	2	0	1	0
1953	M	38	2	45	7	12	3	0	2
	F	8	1	2	2	0	0	1	0
1954	M	32	5	30	9	7	2	5	3
	F	5	1	4	1	3	0	1	1
1955	M	43	4	33	8	21	3	8	4
	F	4	1	3	1	5	2	2	1
1956	M	41	8	34	7	19	2	14	1
	F	1	1	3	1	8	0	1	0
1957	M	37	8	39	5	20	4	8	3
	F	4	0	6	1	3	2	1	0
1958	M	32	7	62	7	24	3	10	2
	F	4	5	6	4	2	1	0	1
1959	M	41	8	44	14	21	6	9	1
	F	7	2	9	0	4	1	2	1
1960	M	31	8	29	13	22	7	11	1
	F	5	2	6	1	4	3	3	0
1961	M	39	8	34	7	21	5	15	1
	F	8	0	9	3	2	0	1	0
1962	M	46	9	38	14	26	6	9	1
	F	4	6	8	1	3	0	1	0
1963	M	30	7	25	11	25	3	6	3
	F	7	1	7	2	6	2	2	0
1964	M	31	8	35	3	27	4	10	1
	F	8	2	9	2	1	1	3	0
1965	M	33	10	38	5	15	4	6	3
	F	5	4	8	4	5	0	1	2
1966	M	40	5	43	14	19	4	10	2
	F	3	1	3	1	4	1	0	0
1967	M	33	8	41	8	13	4	9	5
	F	6	3	4	2	7	3	4	0

1968	M	38	5	35	14	20	6	12	1
	F	4	2	8	2	3	0	3	1
1969	M	22	10	32	10	20	6	13	2
	F	5	3	3	3	5	0	1	0
1970	M	34	7	45	8	28	7	7	1
	F	7	2	11	2	9	2	1	0
1971	M	34	11	35	7	14	8	7	1
	F	8	3	11	2	5	0	3	0
1972	M	21	8	32	10	23	2	10	1
	F	9	3	5	4	3	0	1	4
1973	M	34	4	42	9	18	4	5	2
	F	5	0	15	5	6	1	0	1
1974	M	38	10	30	12	11	5	4	1
	F	12	2	12	3	7	2	5	0
1975	M	38	15	32	8	19	3	6	3
	F	14	2	11	6	7	1	0	0
1976	M	54	11	45	13	25	5	16	1
	F	15	2	14	0	11	1	5	0
1977	M	39	10	55	9	27	6	11	4
	F	16	6	7	8	10	1	4	0
1978	M	40	10	34	12	23	8	11	2
	F	17	4	17	4	12	1	2	0
1979	M	47	6	73	12	28	6	7	0
	F	27	6	18	4	11	1	6	1
1980	M	51	15	58	12	27	11	11	2
	F	19	1	18	5	14	2	10	0
1981	M	40	6	85	16	35	9	13	3
	F	21	6	31	15	18	3	12	2
1982	M	48	18	60	13	32	10	10	5
	F	32	9	28	10	20	3	5	2
1983	M	60	12	60	9	35	7	12	7
	F	29	14	37	14	20	7	10	1
1984	M	63	14	83	17	45	9	21	8
	F	33	15	34	8	13	4	8	5
1985	M	51	17	71	12	37	14	16	4
	F	34	11	43	9	18	3	11	1
1986	M	50	18	71	15	29	8	17	0
	F	27	7	27	8	23	6	8	2
1987	M	47	19	67	18	30	6	17	1
	F	28	9	40	12	22	4	11	2
1988	M	67	12	49	18	26	5	9	5
	F	20	7	27	5	12	3	3	3
1989	M	41	8	48	16	35	6	15	8
	F	29	3	39	11	14	8	8	0
1990-1992	M	31	5	25	6	22	7	7	2
	F	20	6	28	12	15	2	3	0

Table 39. Data for Trzebnica county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	4	1	4	0	1	1	2	0
	F	0	0	0	0	0	0	0	0
1946	M	1	0	1	0	0	0	0	0
	F	0	0	0	0	0	0	0	0
1947	M	6	0	5	0	1	0	0	0
	F	0	0	1	0	0	1	0	0
1948	M	2	0	1	1	1	0	1	0
	F	0	1	1	0	0	0	0	0
1949	M	2	3	4	0	1	0	0	0
	F	0	0	0	0	0	0	2	0
1950	M	1	0	3	0	2	0	0	0
	F	0	0	3	0	2	0	0	0
1951	M	4	1	6	1	1	1	0	0
	F	0	0	0	0	1	1	0	0
1952	M	5	1	7	1	4	2	0	0
	F	0	2	1	1	1	1	0	0
1953	M	8	2	1	2	4	0	1	0
	F	2	1	4	1	0	1	0	0
1954	M	6	0	5	3	2	1	2	0
	F	1	1	1	0	1	0	0	0
1955	M	8	3	3	0	4	1	1	0
	F	7	1	1	0	0	0	1	0
1956	M	6	2	10	0	1	0	2	2
	F	1	0	2	0	1	0	0	0
1957	M	10	2	11	2	3	0	0	1
	F	4	1	2	1	1	0	1	0
1958	M	9	3	7	2	1	1	2	1
	F	5	0	0	0	0	0	0	0
1959	M	8	0	10	0	2	1	2	0
	F	0	1	2	1	0	1	0	0
1960	M	9	3	11	4	6	3	0	1
	F	1	0	3	0	1	0	0	0
1961	M	9	1	2	2	7	0	2	0
	F	3	1	3	0	0	0	0	0
1962	M	5	0	9	1	5	0	1	0
	F	1	1	2	1	2	0	2	0
1963	M	4	2	11	5	6	0	1	0
	F	0	1	2	0	1	1	2	0
1964	M	9	3	10	3	7	1	0	0
	F	1	0	3	0	0	0	0	0
1965	M	5	2	5	1	2	0	2	1
	F	3	1	0	0	0	0	0	0
1966	M	8	3	12	0	6	0	5	1
	F	5	1	1	0	0	0	1	0
1967	M	10	4	5	1	2	0	3	0
	F	0	2	2	0	1	0	1	0

1968	M	5	2	9	1	5	3	2	0
	F	2	0	2	1	1	0	3	0
1969	M	9	1	17	1	4	4	1	1
	F	3	0	3	0	3	0	0	0
1970	M	9	2	9	1	7	1	2	0
	F	2	1	5	0	0	1	0	0
1971	M	14	3	15	3	8	1	1	0
	F	2	2	4	2	4	1	0	0
1972	M	13	2	12	2	6	3	0	0
	F	3	1	6	0	3	0	0	1
1973	M	10	5	8	2	6	2	2	1
	F	2	0	3	1	2	2	0	0
1974	M	18	2	15	6	9	1	4	0
	F	2	2	2	1	1	0	0	0
1975	M	23	3	16	3	9	4	2	1
	F	3	0	3	0	4	1	1	0
1976	M	19	6	15	8	11	2	1	1
	F	17	2	7	0	4	1	1	0
1977	M	17	7	18	7	5	2	3	1
	F	5	1	6	4	3	1	2	0
1978	M	29	6	17	3	13	0	2	0
	F	5	4	7	0	7	0	2	0
1979	M	21	5	20	5	9	2	4	0
	F	13	1	6	0	6	2	0	0
1980	M	18	2	15	5	10	3	8	0
	F	10	4	12	3	8	0	3	0
1981	M	16	7	16	4	16	3	6	0
	F	9	3	7	2	5	0	2	1
1982	M	19	5	20	6	11	6	7	3
	F	7	3	15	1	3	1	4	0
1983	M	22	1	19	10	17	4	7	1
	F	17	5	19	4	6	2	7	1
1984	M	35	5	34	3	16	4	8	1
	F	14	1	17	7	15	1	6	1
1985	M	23	2	36	5	2	2	5	0
	F	18	1	14	4	8	1	3	0
1986	M	26	2	28	4	13	5	5	3
	F	12	5	14	4	5	1	3	1
1987	M	26	7	29	4	14	1	4	0
	F	16	5	29	7	10	2	7	1
1988	M	13	5	17	0	5	2	4	1
	F	11	1	16	4	4	0	1	1
1989	M	7	5	13	5	4	2	1	1
	F	11	4	19	2	2	1	1	0
1990-1992	M	3	1	3	1	2	1	1	0
	F	3	0	3	0	2	0	3	0

Table 40. Data for Wałbrzch county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	185	53	257	62	112	26	50	17
	F	22	10	21	5	12	6	5	2
1946	M	55	8	52	16	26	4	12	4
	F	10	3	4	4	1	0	1	0
1947	M	54	14	70	14	33	9	14	2
	F	5	2	7	4	3	2	4	1
1948	M	69	19	93	17	45	12	15	5
	F	9	5	13	5	4	0	1	2
1949	M	75	20	104	23	58	10	15	6
	F	15	0	10	1	9	0	3	0
1950	M	97	22	115	25	74	12	22	5
	F	13	6	10	3	6	2	2	2
1951	M	110	32	132	35	61	23	42	5
	F	11	4	17	5	13	1	4	0
1952	M	113	31	166	35	87	12	41	4
	F	17	8	17	6	8	2	8	0
1953	M	159	39	180	54	89	24	34	9
	F	20	6	23	3	8	2	4	0
1954	M	166	37	203	34	108	17	36	9
	F	22	10	26	5	8	1	6	2
1955	M	200	47	230	46	102	19	39	16
	F	19	5	25	8	17	6	6	2
1956	M	178	50	199	63	132	21	45	10
	F	26	8	37	10	19	5	6	1
1957	M	185	59	249	57	132	33	53	11
	F	31	4	27	8	17	4	8	2
1958	M	215	48	245	57	135	26	54	22
	F	18	6	42	10	12	3	10	1
1959	M	202	50	244	54	126	22	50	11
	F	26	8	23	10	9	4	2	0
1960	M	191	51	245	46	116	23	54	10
	F	37	7	37	7	25	4	11	1
1961	M	169	53	228	46	128	18	55	13
	F	18	3	36	3	11	6	4	1
1962	M	154	33	199	55	96	25	38	11
	F	19	5	28	5	8	3	3	1
1963	M	156	25	229	46	104	23	46	11
	F	30	2	30	2	8	4	5	0
1964	M	154	26	194	35	88	20	39	12
	F	25	7	26	3	15	6	5	1
1965	M	131	31	187	40	82	13	37	10
	F	22	5	31	5	13	4	8	4
1966	M	143	23	183	28	81	12	52	8
	F	23	3	34	2	8	2	5	3
1967	M	142	33	155	29	77	18	32	5
	F	13	2	17	4	10	4	7	1

1968	M	125	36	148	29	76	15	29	13
	F	13	6	23	4	7	1	6	0
1969	M	138	30	126	29	67	17	31	6
	F	19	5	20	4	7	5	4	4
1970	M	121	36	135	20	91	13	23	4
	F	20	9	25	5	6	4	7	1
1971	M	84	23	112	25	65	18	36	10
	F	26	2	22	4	10	3	7	3
1972	M	86	23	101	31	46	21	24	6
	F	22	4	14	6	17	4	5	1
1973	M	78	19	102	33	60	12	27	3
	F	21	7	22	6	14	3	4	2
1974	M	87	23	86	19	56	4	16	6
	F	25	11	25	4	15	5	1	2
1975	M	85	17	98	12	52	8	21	4
	F	31	8	36	9	17	5	9	1
1976	M	82	26	93	27	57	7	22	2
	F	33	9	30	4	9	8	7	2
1977	M	65	15	89	20	63	6	17	8
	F	32	7	32	7	20	2	5	4
1978	M	101	22	109	25	48	14	23	7
	F	20	9	37	8	25	8	10	1
1979	M	86	14	102	15	47	16	16	5
	F	36	8	39	8	17	5	10	3
1980	M	100	17	122	37	48	9	34	5
	F	39	6	42	13	23	5	12	2
1981	M	86	22	113	16	46	13	18	5
	F	30	10	38	7	16	7	10	2
1982	M	92	26	96	23	46	20	24	10
	F	36	9	48	6	24	9	14	1
1983	M	76	25	92	21	54	11	32	7
	F	40	5	45	11	30	5	9	5
1984	M	70	15	101	20	48	19	20	0
	F	35	12	36	8	27	3	5	1
1985	M	78	16	80	22	33	10	22	3
	F	32	12	34	5	17	10	14	3
1986	M	55	16	64	15	44	7	23	3
	F	40	10	36	5	21	3	7	1
1987	M	66	16	65	15	37	9	10	7
	F	37	6	44	15	14	4	7	1
1988	M	43	10	60	18	34	7	21	3
	F	28	0	36	6	21	3	5	2
1989	M	50	10	64	13	41	11	13	4
	F	22	13	24	6	10	0	5	1
1990-1992	M	30	6	15	4	16	3	3	6
	F	12	3	7	4	5	0	2	0

Table 41. Data for Wołów county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	2	1	4	2	1	1	0	0
	F	1	0	1	1	0	0	0	1
1946	M	1	0	2	0	2	0	0	0
	F	0	0	1	0	0	0	0	0
1947	M	4	0	2	0	0	0	0	0
	F	0	0	1	0	0	0	0	0
1948	M	2	0	7	0	2	0	0	0
	F	2	0	0	1	0	0	0	0
1949	M	2	1	0	1	6	1	0	0
	F	0	0	1	0	0	0	0	0
1950	M	3	0	4	3	3	1	0	0
	F	2	0	1	0	0	0	0	1
1951	M	2	1	4	3	3	1	2	0
	F	0	0	1	1	0	0	0	0
1952	M	2	1	4	1	2	0	2	0
	F	2	0	0	0	1	1	0	0
1953	M	1	1	4	1	3	0	0	0
	F	0	1	3	0	1	0	0	0
1954	M	6	1	5	0	2	1	0	0
	F	1	0	0	1	0	1	0	0
1955	M	5	4	6	2	3	1	2	0
	F	3	1	3	0	1	0	0	0
1956	M	7	6	5	4	4	1	3	0
	F	1	3	0	0	0	0	1	0
1957	M	5	9	2	0	5	0	1	1
	F	1	0	2	0	1	0	0	1
1958	M	8	0	4	0	6	0	4	0
	F	0	1	1	0	3	0	0	0
1959	M	5	1	5	2	3	3	0	1
	F	3	0	0	0	0	1	0	0
1960	M	3	4	7	3	2	0	1	0
	F	2	2	1	0	2	1	1	0
1961	M	3	0	3	1	3	0	1	0
	F	4	1	0	1	0	1	0	0
1962	M	6	2	3	2	5	3	0	1
	F	0	1	1	0	1	0	0	0
1963	M	9	0	7	4	1	1	2	1
	F	1	2	5	0	1	0	0	0
1964	M	3	3	5	2	3	0	1	1
	F	4	0	2	0	1	1	0	0
1965	M	4	1	5	1	4	0	2	0
	F	4	0	5	1	0	0	0	0
1966	M	3	1	9	1	1	0	3	0
	F	3	0	3	1	2	0	1	0
1967	M	11	3	6	3	7	3	3	0
	F	2	1	2	0	3	1	0	1

1968	M	5	1	10	4	2	3	1	1
	F	4	0	0	2	1	0	1	0
1969	M	9	2	7	2	5	1	2	0
	F	1	4	2	2	1	0	2	1
1970	M	6	6	8	4	2	0	0	0
	F	1	1	6	1	2	1	1	0
1971	M	9	5	9	2	6	1	1	0
	F	3	1	1	1	2	1	0	1
1972	M	13	1	10	3	2	2	5	0
	F	4	0	6	2	2	1	0	1
1973	M	8	4	12	3	5	1	1	0
	F	0	2	7	0	1	1	0	0
1974	M	13	1	13	2	8	2	4	1
	F	7	5	2	3	5	0	0	1
1975	M	11	5	12	3	5	1	6	1
	F	6	1	6	1	4	0	0	0
1976	M	14	2	11	2	9	2	1	1
	F	3	3	0	0	4	0	0	0
1977	M	19	1	24	4	11	4	3	2
	F	9	5	4	3	5	0	1	0
1978	M	22	4	14	2	9	1	8	1
	F	5	4	5	1	5	0	2	0
1979	M	23	6	14	3	11	2	6	0
	F	10	2	9	1	4	1	0	1
1980	M	21	4	30	4	14	2	5	0
	F	14	1	6	3	5	2	4	0
1981	M	25	4	19	6	9	3	4	1
	F	12	0	14	2	3	3	2	0
1982	M	25	7	23	9	12	3	5	1
	F	10	5	19	4	7	1	2	0
1983	M	15	5	28	9	9	3	2	0
	F	19	1	22	7	14	1	5	3
1984	M	40	5	35	5	20	3	8	0
	F	14	9	22	2	14	4	3	0
1985	M	25	7	32	7	11	5	1	0
	F	13	0	18	7	10	3	3	1
1986	M	26	8	24	6	13	5	5	1
	F	18	5	11	3	15	0	5	1
1987	M	30	7	31	5	20	3	9	0
	F	23	7	23	5	16	2	4	2
1988	M	26	5	22	7	12	1	8	2
	F	15	3	11	2	7	2	1	0
1989	M	22	6	22	2	17	3	5	2
	F	20	9	23	4	16	2	4	2
1990-1992	M	13	2	26	8	12	1	5	1
	F	17	2	27	5	14	0	6	2

Table 42. Data for Wrocław county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	4	0	8	1	3	2	2	1
	F	2	0	2	0	0	0	0	0
1946	M	4	0	1	0	0	0	3	0
	F	0	0	0	0	0	1	0	0
1947	M	5	1	4	2	1	0	0	1
	F	0	0	1	0	0	0	0	0
1948	M	1	1	0	0	1	1	0	0
	F	1	0	2	0	1	0	0	0
1949	M	9	0	1	2	6	0	0	0
	F	0	0	2	0	1	0	0	1
1950	M	5	4	5	3	4	1	1	1
	F	6	1	1	0	0	1	1	0
1951	M	5	2	2	0	4	0	0	1
	F	4	2	3	2	1	0	0	0
1952	M	6	3	4	4	4	3	2	0
	F	3	0	2	0	1	0	0	1
1953	M	4	4	8	0	1	1	2	0
	F	5	1	3	1	2	0	1	0
1954	M	10	2	12	4	5	0	3	0
	F	5	0	4	0	1	0	1	0
1955	M	5	7	16	1	5	1	4	0
	F	5	1	2	1	0	1	2	0
1956	M	10	4	9	0	5	1	0	0
	F	2	1	4	2	2	0	0	0
1957	M	10	6	11	2	3	2	5	2
	F	0	2	4	2	2	0	0	0
1958	M	9	5	11	3	6	0	1	0
	F	6	0	2	3	1	1	2	0
1959	M	13	4	12	4	2	2	5	2
	F	4	1	1	0	2	1	0	0
1960	M	14	2	9	3	5	4	2	0
	F	6	2	3	3	3	0	1	0
1961	M	10	3	12	5	6	2	2	0
	F	4	2	5	0	1	0	1	0
1962	M	11	1	16	2	7	1	1	0
	F	4	1	3	1	0	2	0	0
1963	M	9	4	9	3	4	5	4	0
	F	2	0	1	0	5	1	1	0
1964	M	6	6	12	2	6	0	3	0
	F	3	2	7	0	1	0	2	0
1965	M	9	1	14	4	8	1	4	1
	F	5	2	3	2	1	1	1	0
1966	M	9	3	10	3	6	0	2	1
	F	5	3	5	0	1	0	0	0
1967	M	9	2	12	2	7	2	1	1
	F	7	2	6	0	1	0	0	0

1968	M	6	2	12	3	6	2	1	0
	F	6	0	6	1	4	0	0	0
1969	M	14	0	15	2	5	0	4	2
	F	6	0	5	2	0	1	0	0
1970	M	13	2	15	4	11	0	5	0
	F	2	3	6	2	4	1	3	0
1971	M	14	4	22	5	14	1	3	1
	F	6	3	4	5	0	0	3	1
1972	M	10	4	14	4	6	1	5	1
	F	1	2	4	0	5	1	2	0
1973	M	25	3	18	4	16	1	4	0
	F	4	0	6	3	4	1	2	0
1974	M	14	8	21	5	13	3	5	2
	F	7	1	11	1	4	1	2	0
1975	M	19	4	22	5	12	1	5	1
	F	6	3	10	3	3	0	3	0
1976	M	16	0	16	5	15	3	4	0
	F	7	4	11	3	4	1	0	0
1977	M	22	4	26	6	8	7	7	1
	F	6	1	8	1	4	1	2	0
1978	M	18	4	21	4	14	2	3	0
	F	8	2	12	1	11	1	1	1
1979	M	19	9	16	11	14	4	10	2
	F	14	3	7	7	4	2	6	2
1980	M	24	7	18	3	12	4	6	1
	F	11	2	16	5	12	1	3	0
1981	M	21	4	17	5	8	2	3	0
	F	15	2	17	1	7	1	5	3
1982	M	23	5	20	11	13	3	6	2
	F	9	7	21	5	8	2	5	0
1983	M	22	2	27	1	16	2	8	1
	F	11	6	16	9	9	2	9	0
1984	M	24	8	32	6	22	4	4	1
	F	15	3	26	9	17	0	3	2
1985	M	29	1	38	6	16	3	3	2
	F	12	7	24	7	13	0	1	2
1986	M	33	3	36	15	18	5	8	1
	F	19	8	27	3	9	3	4	1
1987	M	28	5	29	5	10	3	10	1
	F	19	2	26	6	18	3	1	1
1988	M	19	6	17	4	15	1	3	2
	F	13	2	13	3	13	3	2	2
1989	M	18	4	23	8	9	3	6	1
	F	7	5	17	6	8	2	5	1
1990-1992	M	5	5	3	2	1	0	2	1
	F	2	0	3	0	4	1	1	1

Table 43. Data for Ząbkowice county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	3	0	3	2	4	0	0	1
	F	0	0	0	0	0	0	1	0
1946	M	1	1	0	0	1	0	1	0
	F	2	0	2	0	0	0	0	0
1947	M	2	0	4	0	2	0	1	0
	F	0	0	1	0	0	0	0	0
1948	M	2	1	1	0	2	0	0	0
	F	0	1	1	0	0	0	0	0
1949	M	5	2	1	0	4	0	3	0
	F	1	1	0	0	1	0	0	0
1950	M	8	1	7	0	3	2	2	0
	F	0	1	1	0	0	1	0	0
1951	M	4	0	2	0	5	2	1	0
	F	0	0	1	0	1	0	0	0
1952	M	14	1	7	1	4	1	1	1
	F	1	0	1	0	1	0	1	0
1953	M	5	1	8	1	7	0	1	0
	F	0	0	3	0	0	0	0	0
1954	M	6	3	8	0	2	0	5	0
	F	2	0	1	1	0	0	0	0
1955	M	10	2	9	2	5	3	4	0
	F	3	0	2	0	2	0	0	0
1956	M	10	3	7	3	7	1	2	0
	F	4	0	6	0	4	0	1	0
1957	M	11	0	15	3	1	1	1	0
	F	1	0	5	2	2	0	0	0
1958	M	7	3	10	4	7	0	2	1
	F	2	1	3	3	0	0	0	0
1959	M	8	1	11	9	3	0	4	0
	F	1	1	1	2	2	1	1	0
1960	M	6	0	11	1	6	0	3	1
	F	0	0	3	0	1	1	1	0
1961	M	10	7	10	1	2	1	1	0
	F	1	0	2	0	1	0	3	0
1962	M	11	2	6	2	8	2	1	0
	F	1	1	2	1	1	0	1	0
1963	M	10	1	12	3	3	2	0	0
	F	2	0	2	0	0	0	0	0
1964	M	3	1	11	0	4	0	1	1
	F	2	2	2	1	2	0	0	0
1965	M	7	1	8	5	5	1	2	0
	F	4	2	4	0	1	0	0	0
1966	M	7	2	8	4	1	3	3	0
	F	3	0	2	0	1	0	1	0
1967	M	10	3	10	4	5	4	1	0
	F	3	1	5	4	2	0	1	0

1968	M	6	3	5	1	7	0	6	0
	F	1	1	4	1	0	0	0	0
1969	M	8	0	14	2	5	3	1	2
	F	1	0	6	1	4	1	1	0
1970	M	11	1	18	5	6	0	2	0
	F	3	1	3	0	2	0	1	0
1971	M	10	3	10	0	9	2	3	0
	F	2	0	5	0	2	0	0	0
1972	M	7	0	11	5	8	3	3	1
	F	1	2	3	0	3	2	1	0
1973	M	9	3	18	2	7	0	3	1
	F	7	1	6	1	4	0	1	1
1974	M	13	4	18	2	4	2	7	0
	F	0	2	4	1	2	1	0	0
1975	M	24	4	20	3	7	2	2	0
	F	1	1	5	2	2	1	0	0
1976	M	12	3	18	2	9	1	8	0
	F	2	2	6	1	8	0	1	0
1977	M	16	11	21	1	8	0	1	0
	F	6	2	9	1	4	0	1	2
1978	M	17	8	19	6	12	0	6	1
	F	9	2	8	3	4	1	4	0
1979	M	22	3	15	6	10	1	10	5
	F	5	3	10	0	5	1	4	0
1980	M	16	5	28	7	11	1	2	0
	F	10	2	4	4	3	2	1	1
1981	M	24	4	22	5	11	1	0	2
	F	15	0	8	0	6	2	4	0
1982	M	18	7	28	9	18	2	3	0
	F	16	1	21	3	11	0	3	1
1983	M	19	5	35	7	18	1	7	3
	F	6	0	12	2	10	1	3	1
1984	M	23	8	15	8	12	5	3	1
	F	8	1	11	2	7	1	3	0
1985	M	16	7	31	3	8	2	7	0
	F	10	1	10	5	7	2	4	0
1986	M	20	8	22	7	15	3	5	1
	F	6	3	5	6	5	1	2	0
1987	M	18	3	26	5	17	1	7	0
	F	11	2	20	5	10	3	5	0
1988	M	24	2	15	6	12	4	5	0
	F	9	2	19	2	7	1	2	3
1989	M	16	2	29	3	10	3	2	1
	F	10	1	20	1	1	1	3	0
1990-1992	M	27	5	19	7	9	2	6	3
	F	11	3	11	3	9	1	3	1

Table 44. Data for Zgorzelec county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	5	8	8	1	5	4	2	1
	F	0	0	0	0	0	0	0	0
1946	M	9	0	6	2	1	0	3	0
	F	0	0	0	0	0	0	0	0
1947	M	4	2	4	1	3	0	1	0
	F	0	0	0	0	1	0	0	0
1948	M	5	1	7	0	5	1	2	0
	F	1	0	0	0	0	0	0	0
1949	M	6	3	8	1	6	1	3	2
	F	0	2	1	0	0	1	0	0
1950	M	8	3	7	3	4	0	3	0
	F	1	1	0	0	3	0	0	0
1951	M	5	2	9	2	7	0	1	2
	F	2	0	1	0	1	0	1	0
1952	M	7	2	17	2	14	1	4	1
	F	2	0	0	0	1	1	0	0
1953	M	15	3	19	3	9	0	2	0
	F	5	0	0	1	3	0	0	0
1954	M	10	3	11	3	9	2	4	2
	F	0	0	2	1	3	0	0	0
1955	M	20	8	13	1	9	7	0	0
	F	2	0	1	1	1	0	0	0
1956	M	15	11	22	6	10	3	3	1
	F	1	0	1	0	1	0	1	0
1957	M	15	9	15	5	6	4	4	1
	F	2	1	0	0	1	0	0	0
1958	M	27	5	23	3	11	6	3	2
	F	5	0	1	1	1	0	0	0
1959	M	24	4	21	2	10	2	6	1
	F	7	0	1	0	1	0	0	0
1960	M	11	4	12	4	6	2	4	0
	F	6	0	1	1	1	0	0	1
1961	M	14	3	19	5	10	2	1	2
	F	2	0	2	1	2	1	0	0
1962	M	13	3	22	8	11	2	3	0
	F	3	3	2	3	0	1	0	0
1963	M	18	1	13	9	5	1	6	2
	F	0	1	2	2	0	0	1	1
1964	M	14	2	16	5	8	1	2	0
	F	1	0	1	0	1	1	1	0
1965	M	18	2	20	3	7	4	5	1
	F	3	1	5	0	2	0	1	1
1966	M	15	3	13	5	7	4	4	1
	F	5	2	2	0	0	0	1	0
1967	M	20	5	21	2	4	3	2	0
	F	1	2	2	0	2	0	1	0

1968	M	8	5	21	6	11	5	2	0
	F	1	2	3	0	2	0	0	0
1969	M	17	5	19	1	10	2	3	1
	F	4	2	3	0	0	0	1	1
1970	M	12	2	21	3	7	4	0	1
	F	3	2	3	0	1	1	0	2
1971	M	14	5	30	9	14	2	2	2
	F	0	1	2	0	2	2	1	0
1972	M	20	6	26	2	9	5	3	0
	F	3	0	0	2	0	2	1	0
1973	M	22	2	27	7	7	1	6	1
	F	3	1	0	0	3	0	0	1
1974	M	18	7	18	3	10	5	7	2
	F	4	0	6	2	0	1	0	0
1975	M	23	1	29	9	18	2	6	0
	F	8	3	4	1	2	0	0	0
1976	M	31	10	22	9	13	4	2	2
	F	6	2	5	0	1	1	1	3
1977	M	26	3	34	6	13	4	8	0
	F	2	1	2	2	4	2	1	0
1978	M	29	2	27	10	9	4	7	1
	F	15	1	16	4	6	3	1	1
1979	M	24	3	37	5	20	3	11	2
	F	6	3	15	1	3	0	2	0
1980	M	33	7	33	9	19	1	8	1
	F	6	2	10	4	6	3	2	0
1981	M	36	12	41	7	23	4	12	0
	F	6	6	6	4	6	1	2	0
1982	M	38	9	44	11	24	8	12	2
	F	18	5	20	2	10	1	4	0
1983	M	30	8	39	13	20	5	4	1
	F	16	4	14	4	12	3	3	1
1984	M	59	5	49	12	22	5	2	0
	F	25	3	24	7	9	7	5	0
1985	M	40	9	35	9	15	3	12	3
	F	22	4	21	7	13	4	3	0
1986	M	45	6	54	10	8	7	8	0
	F	17	8	17	0	7	2	1	1
1987	M	29	13	36	8	21	2	7	1
	F	19	5	24	2	8	2	6	2
1988	M	18	5	35	6	12	6	10	2
	F	18	4	13	4	5	2	2	0
1989	M	24	8	25	2	10	2	6	2
	F	13	5	16	5	9	2	6	0
1990-1992	M	9	1	12	1	7	3	2	1
	F	16	5	18	1	10	1	3	1

Table 45. Data for Złotoryja county

Year of birth	Sex	O (+)	O (–)	A (+)	A (–)	B (+)	B (–)	AB (+)	AB (–)
1945 and before	M	0	0	0	0	0	0	0	0
	F	0	0	0	0	0	0	0	0
1946	M	0	0	0	0	0	0	0	0
	F	0	0	0	0	0	0	0	0
1947	M	2	0	1	0	0	0	0	0
	F	0	0	0	0	0	0	0	0
1948	M	2	0	2	0	0	0	0	0
	F	0	0	0	0	0	0	0	0
1949	M	1	0	1	2	0	0	0	0
	F	0	0	0	0	1	0	0	0
1950	M	3	1	4	0	0	0	0	0
	F	1	0	0	1	0	0	0	0
1951	M	0	1	2	1	5	0	2	1
	F	0	0	0	0	0	1	0	0
1952	M	4	0	3	0	0	1	1	0
	F	0	0	0	0	1	0	0	0
1953	M	3	1	3	0	1	0	1	0
	F	0	0	1	0	0	0	0	0
1954	M	4	0	3	0	1	0	1	0
	F	1	0	0	0	0	0	0	0
1955	M	5	3	4	1	1	0	2	1
	F	1	0	1	0	0	0	0	0
1956	M	2	1	6	1	1	0	0	0
	F	0	1	1	0	1	0	1	0
1957	M	1	0	3	0	2	0	1	1
	F	0	0	1	0	0	0	0	0
1958	M	3	0	6	1	3	0	0	2
	F	2	0	0	0	1	0	0	0
1959	M	5	1	4	2	1	0	1	0
	F	3	1	1	0	0	0	0	0
1960	M	3	0	7	2	1	0	1	1
	F	0	1	0	0	1	0	0	0
1961	M	3	1	5	2	5	1	0	1
	F	0	0	0	0	0	0	0	0
1962	M	7	2	10	2	1	0	1	0
	F	1	0	1	0	0	0	0	0
1963	M	4	0	7	2	2	1	0	1
	F	1	0	2	0	1	0	0	0
1964	M	2	1	3	2	2	1	0	1
	F	0	0	0	0	0	0	0	0
1965	M	5	1	5	0	3	0	0	0
	F	0	0	0	0	0	0	0	0
1966	M	7	3	5	1	3	1	0	2
	F	0	1	0	0	1	0	0	0
1967	M	1	0	4	0	2	2	2	0
	F	0	0	0	1	0	0	0	1

1968	M	2	1	6	1	5	0	0	0
	F	0	0	0	1	0	0	0	0
1969	M	5	0	2	1	1	0	1	0
	F	2	0	4	0	0	0	0	0
1970	M	6	2	2	3	6	1	1	0
	F	0	0	1	2	1	0	0	0
1971	M	6	2	4	1	1	1	1	1
	F	1	0	0	1	0	0	0	0
1972	M	4	0	5	0	3	0	0	0
	F	4	0	1	0	0	0	1	0
1973	M	4	1	7	4	3	0	2	1
	F	1	0	2	0	1	0	1	0
1974	M	2	0	14	5	3	0	1	1
	F	0	1	1	1	0	0	0	0
1975	M	5	4	9	0	2	1	3	0
	F	1	1	7	1	0	0	0	0
1976	M	14	1	7	0	8	2	3	0
	F	4	1	3	0	1	1	1	0
1977	M	15	0	4	3	6	3	0	2
	F	1	2	1	1	0	1	0	0
1978	M	6	2	12	2	1	1	4	1
	F	1	0	2	0	0	0	0	0
1979	M	11	2	12	2	4	0	2	0
	F	1	1	5	0	2	1	1	0
1980	M	11	1	17	1	6	4	4	1
	F	0	0	4	1	2	0	1	0
1981	M	6	2	16	3	13	3	7	0
	F	0	1	6	7	2	0	0	0
1982	M	12	5	8	2	6	2	8	2
	F	6	1	3	1	3	0	2	0
1983	M	11	2	21	7	13	1	8	4
	F	3	0	3	3	4	2	1	0
1984	M	20	2	25	4	12	0	4	0
	F	4	0	13	1	6	2	0	1
1985	M	24	4	28	7	18	2	6	1
	F	7	2	8	3	6	0	2	0
1986	M	20	2	20	3	13	2	3	1
	F	6	3	11	1	1	0	5	2
1987	M	15	3	10	5	11	2	4	0
	F	10	1	7	1	3	0	1	2
1988	M	21	4	25	5	10	3	5	1
	F	14	1	7	2	6	5	0	0
1989	M	14	4	12	3	8	2	5	0
	F	9	1	9	4	8	1	3	0
1990-1992	M	11	2	8	3	9	1	1	0
	F	4	3	5	0	6	0	0	1

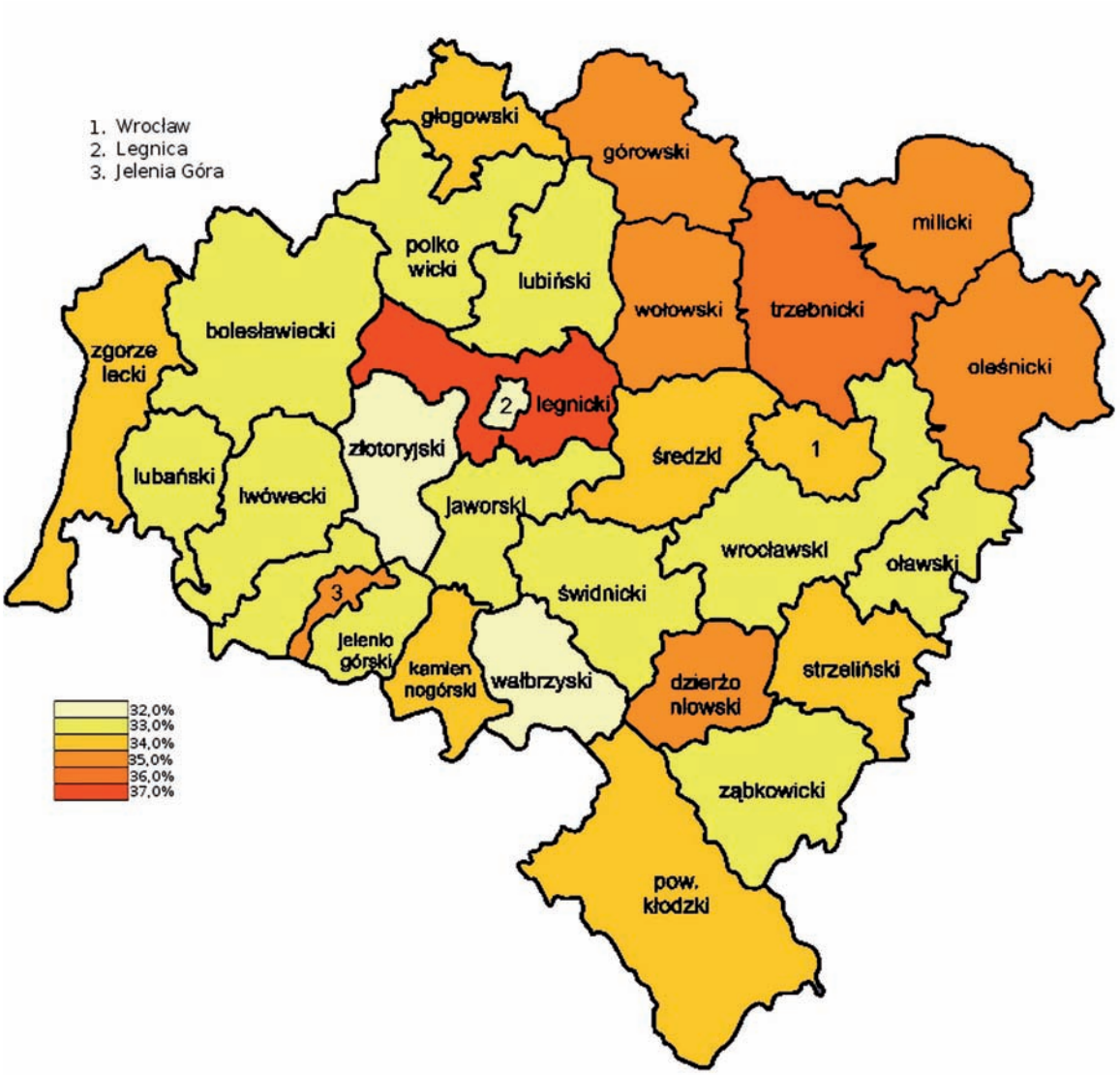

Figure 2. Frequencies of O blood group in men in Lower Silesian counties.

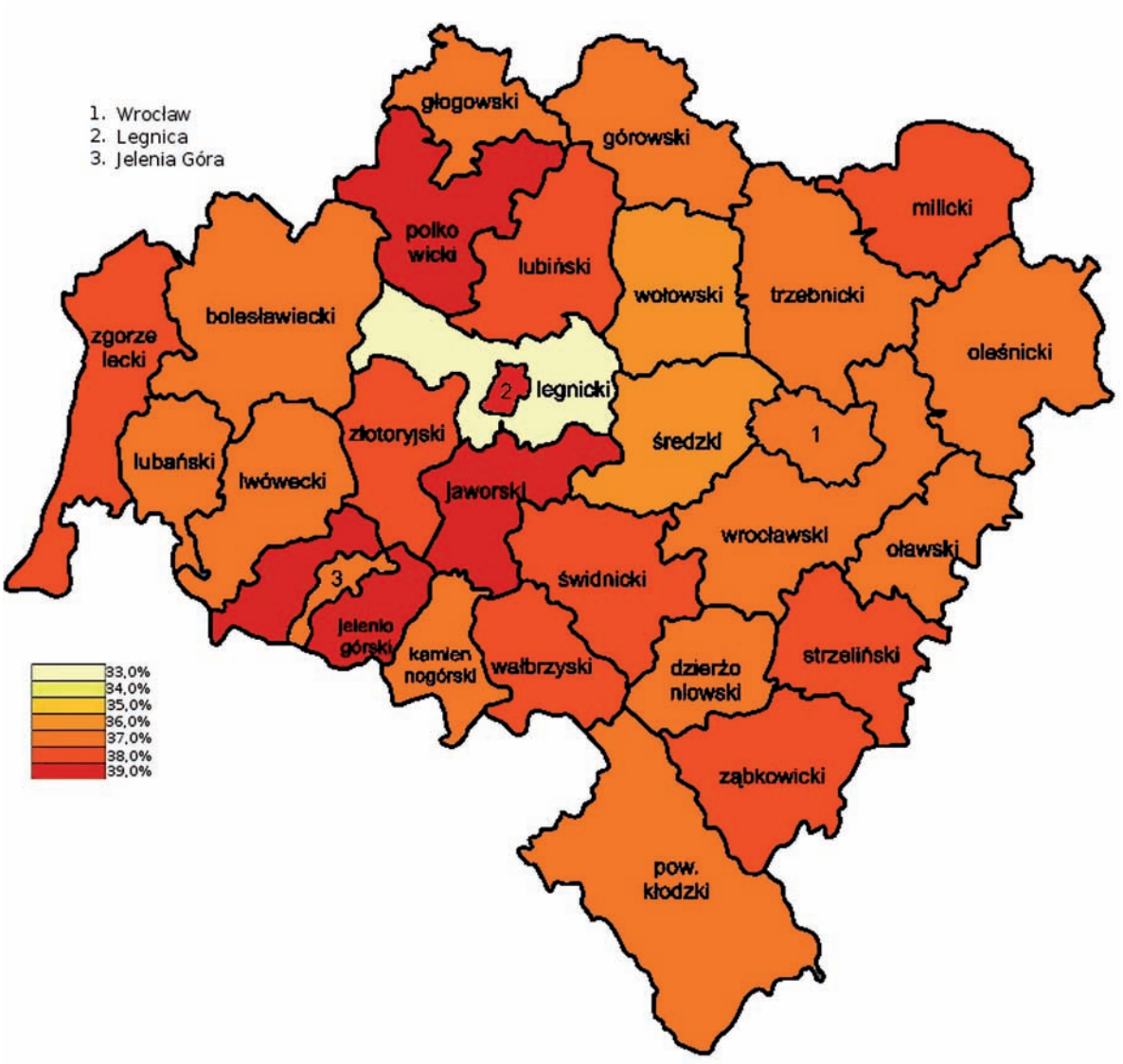

Figure 3. Frequencies of A blood group in men in Lower Silesian counties.

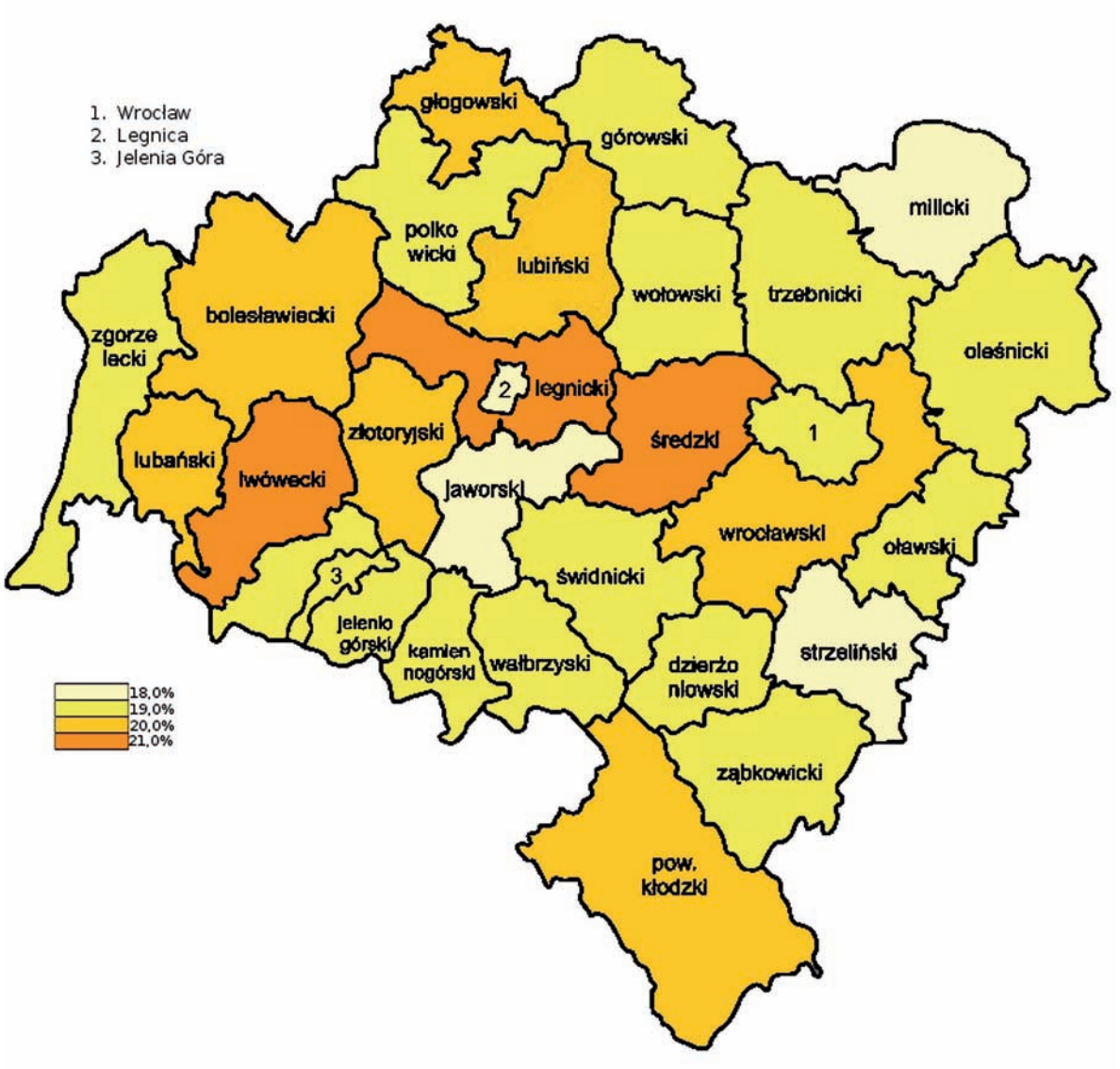

Figure 4. Frequencies of B blood group in men in Lower Silesian counties.

Figure 5. Frequencies of AB blood group in men in Lower Silesian counties.

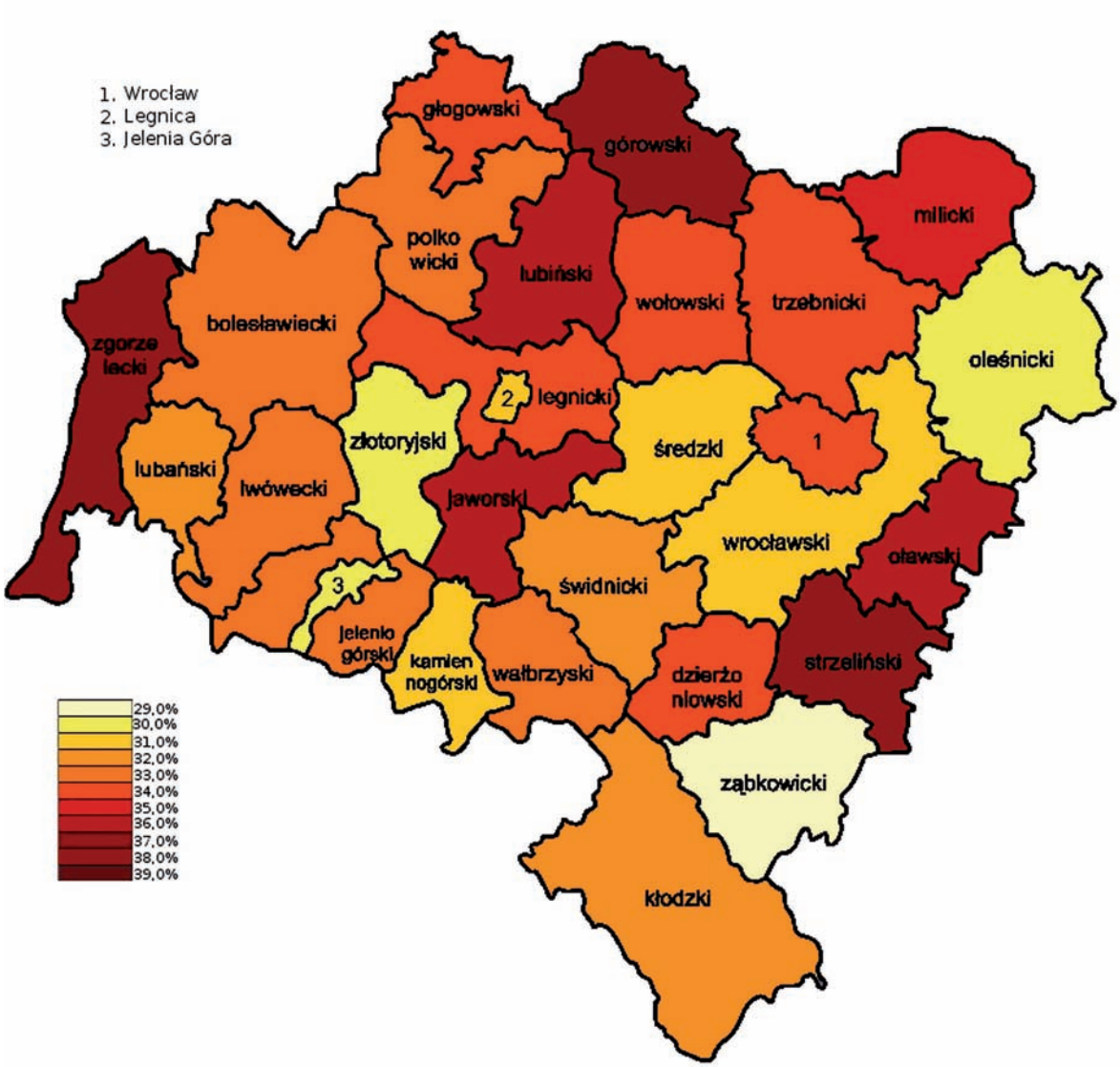

Figure 6. Frequencies of O blood group in women in Lower Silesian counties.

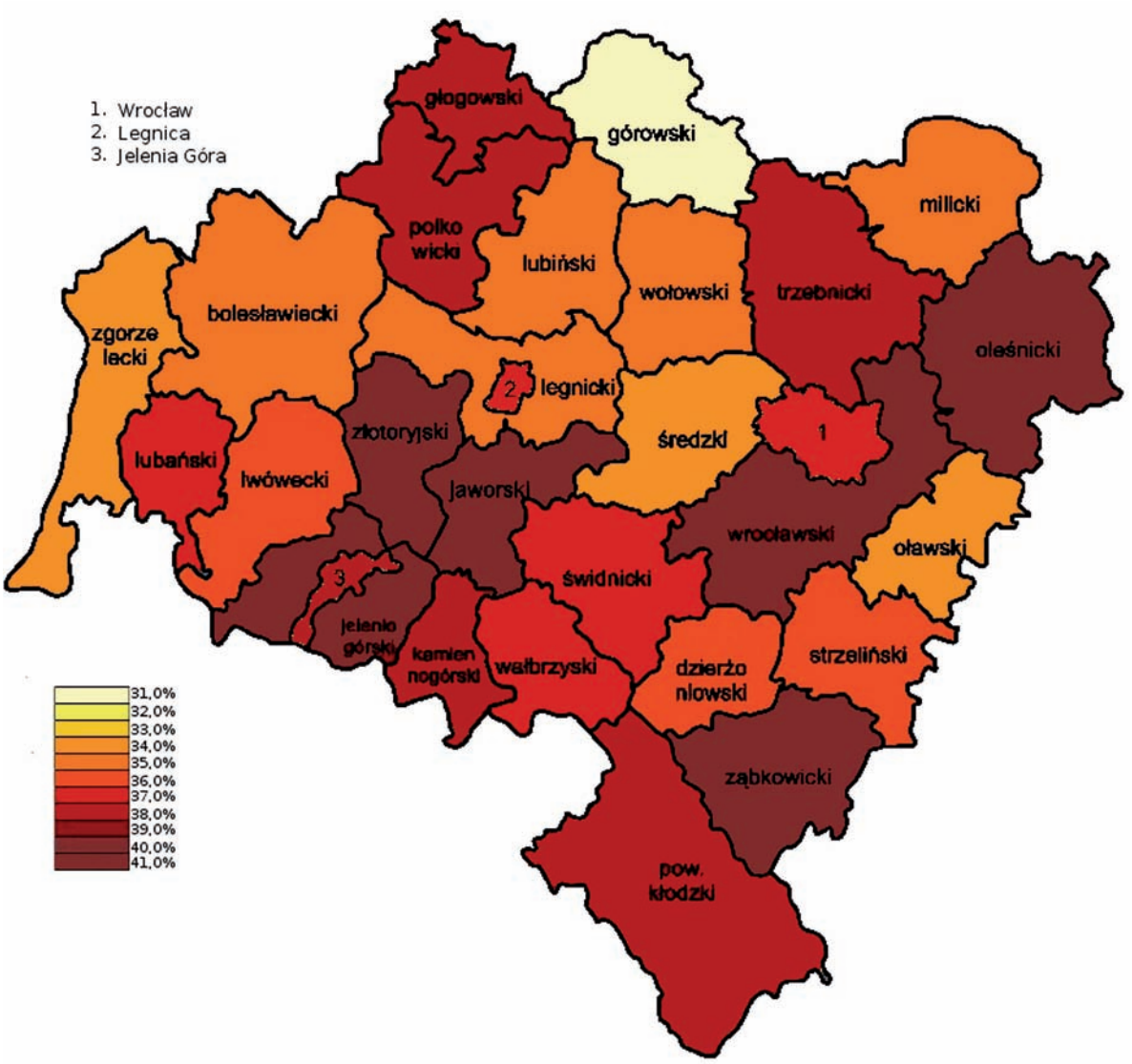

Figure 7. Frequencies of A blood group in women in Lower Silesian counties.

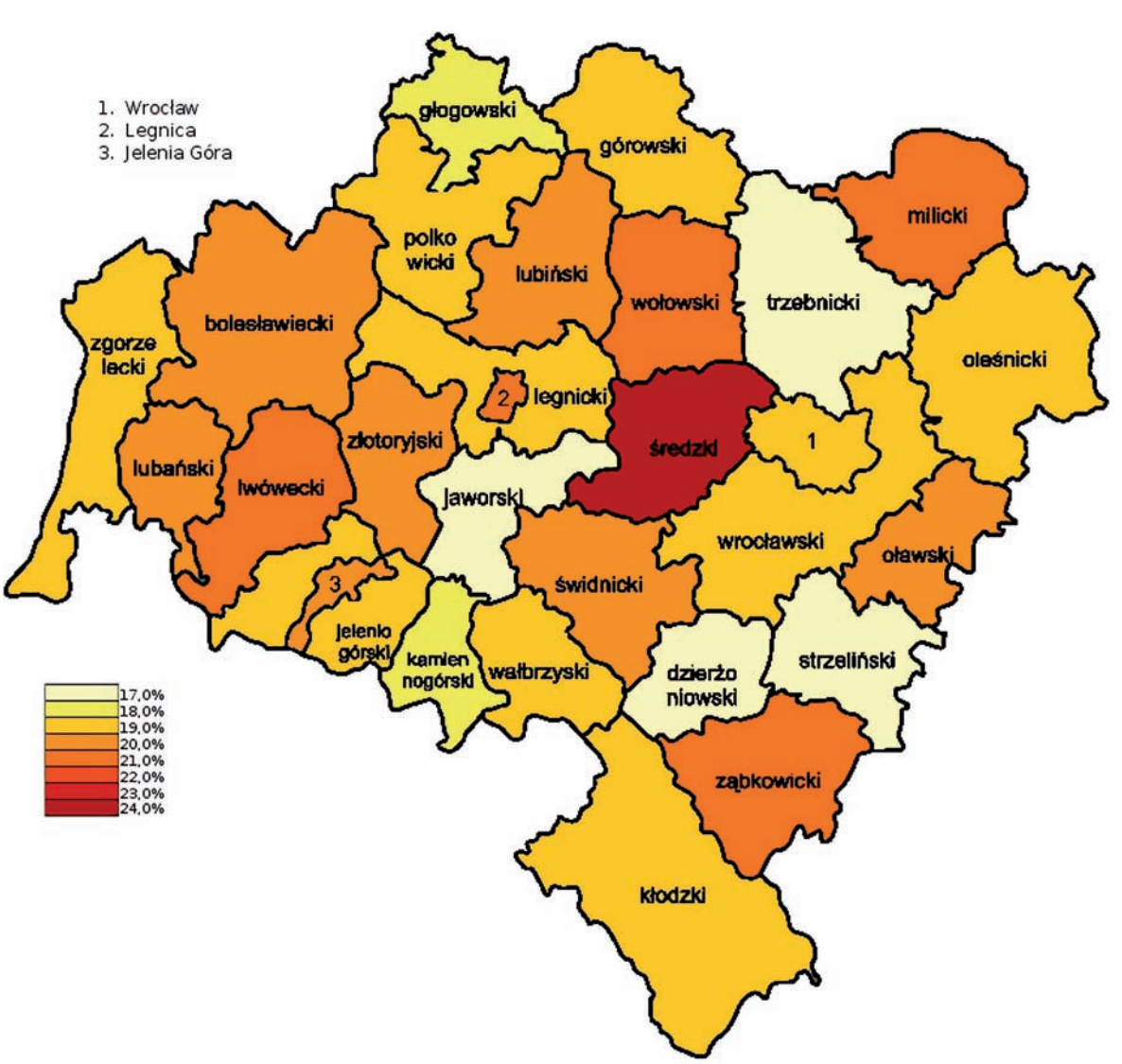

Figure 8. Frequencies of B blood group in women in Lower Silesian counties.

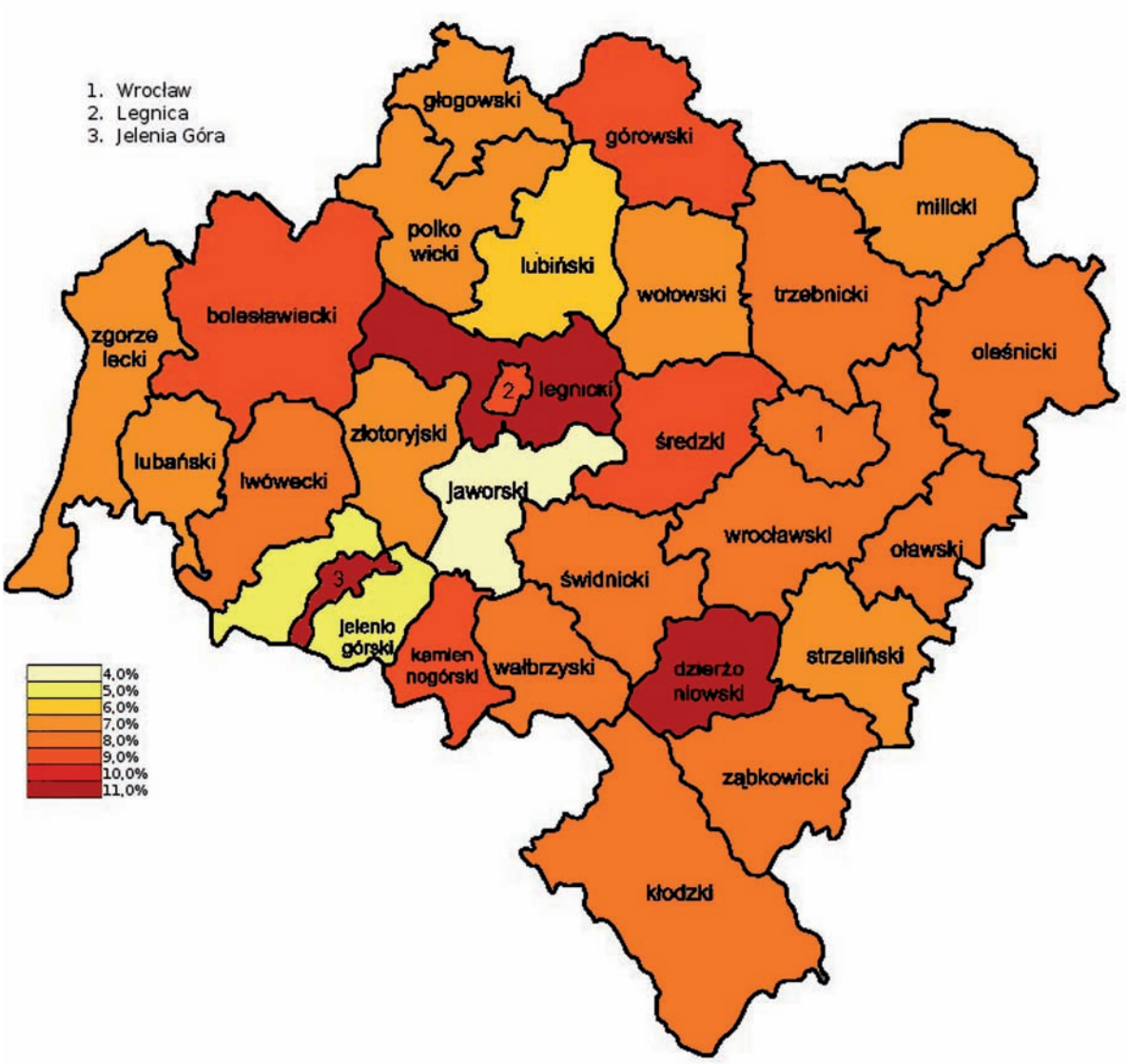

Figure 9. Frequencies of AB blood group in women in Lower Silesian counties.

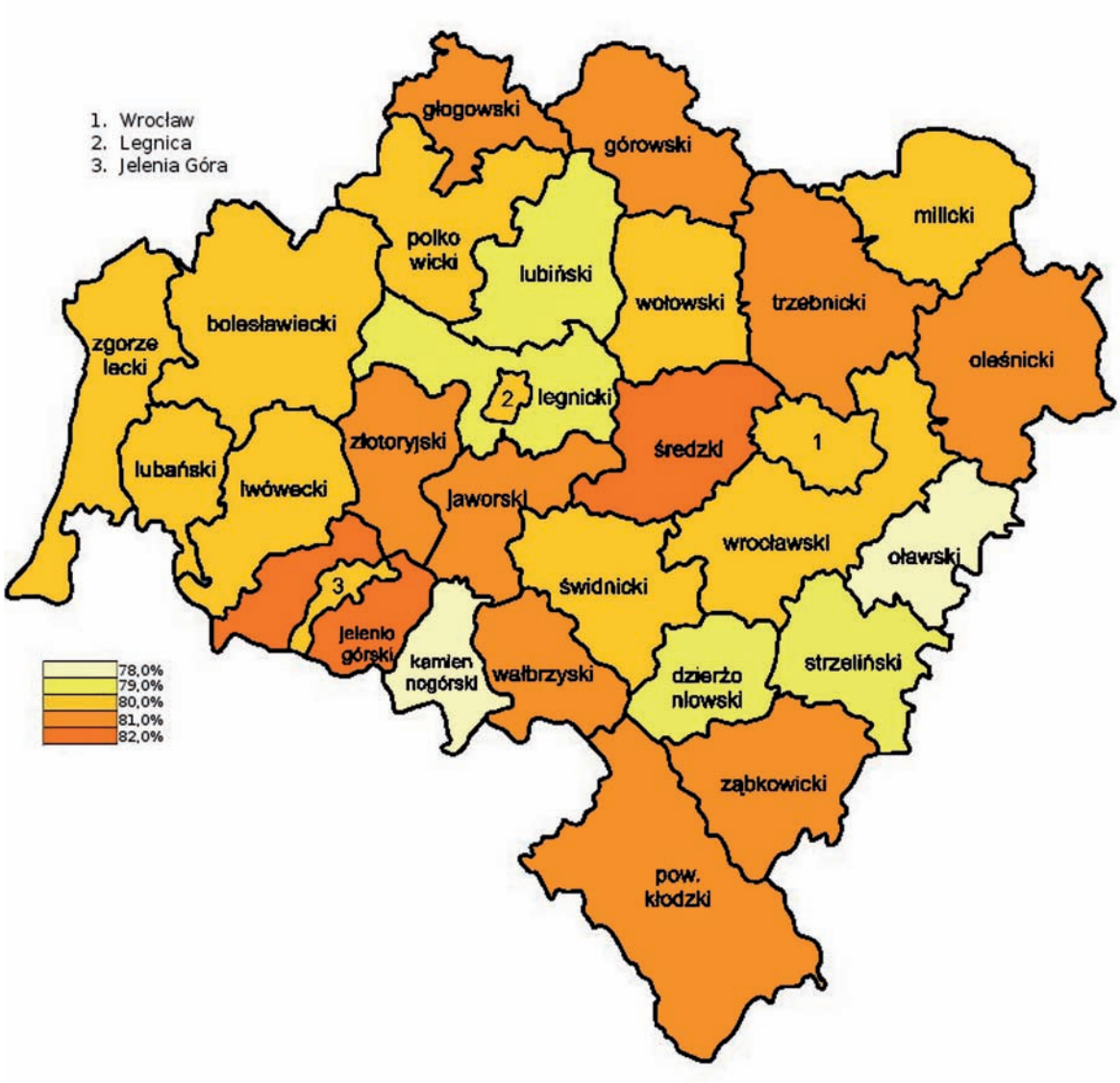

Figure 10. Frequencies of Rh(+) blood groups in men in Lower Silesian counties.

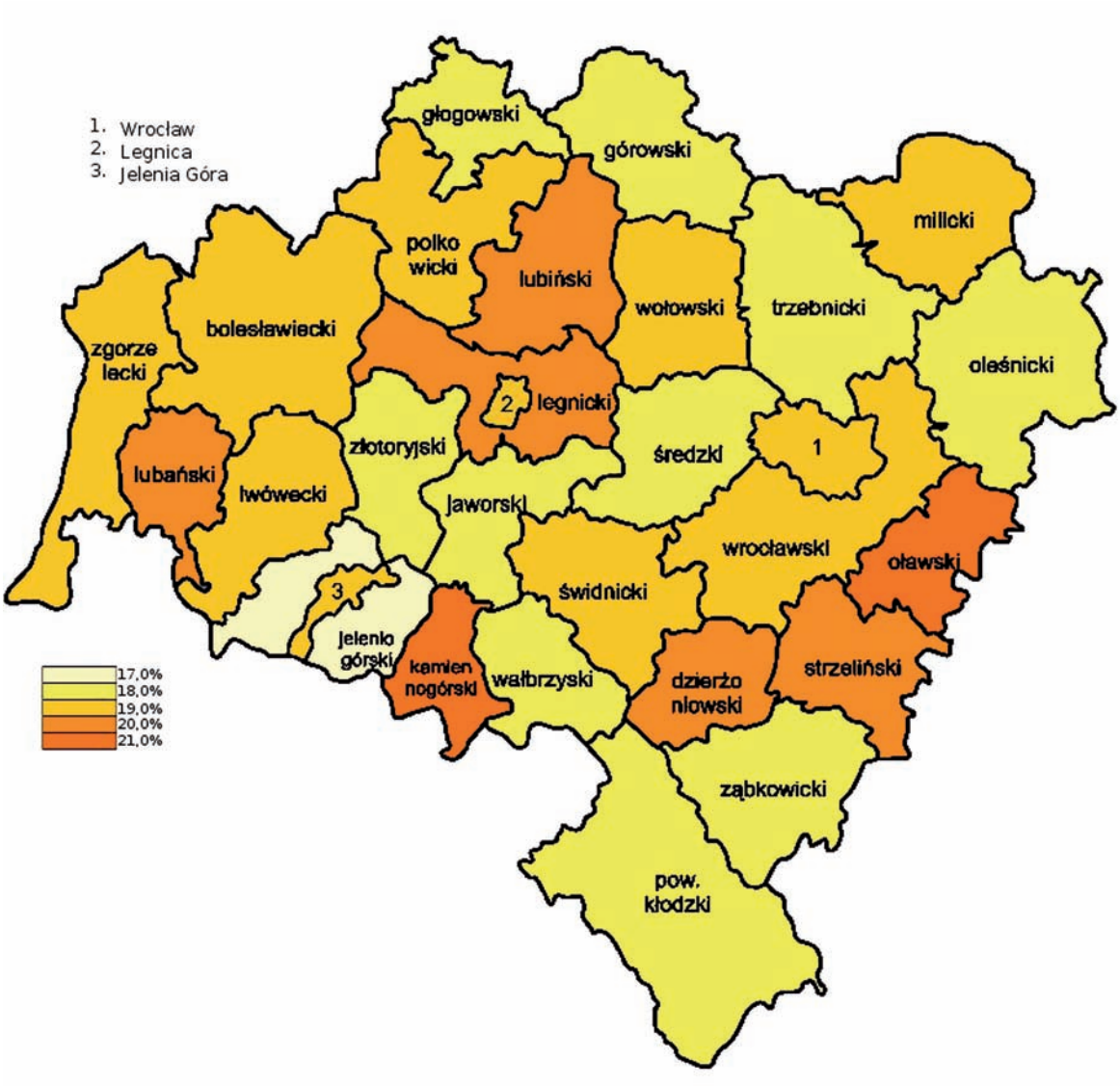

Figure 11. Frequencies of Rh(–) blood groups in men in Lower Silesian counties.

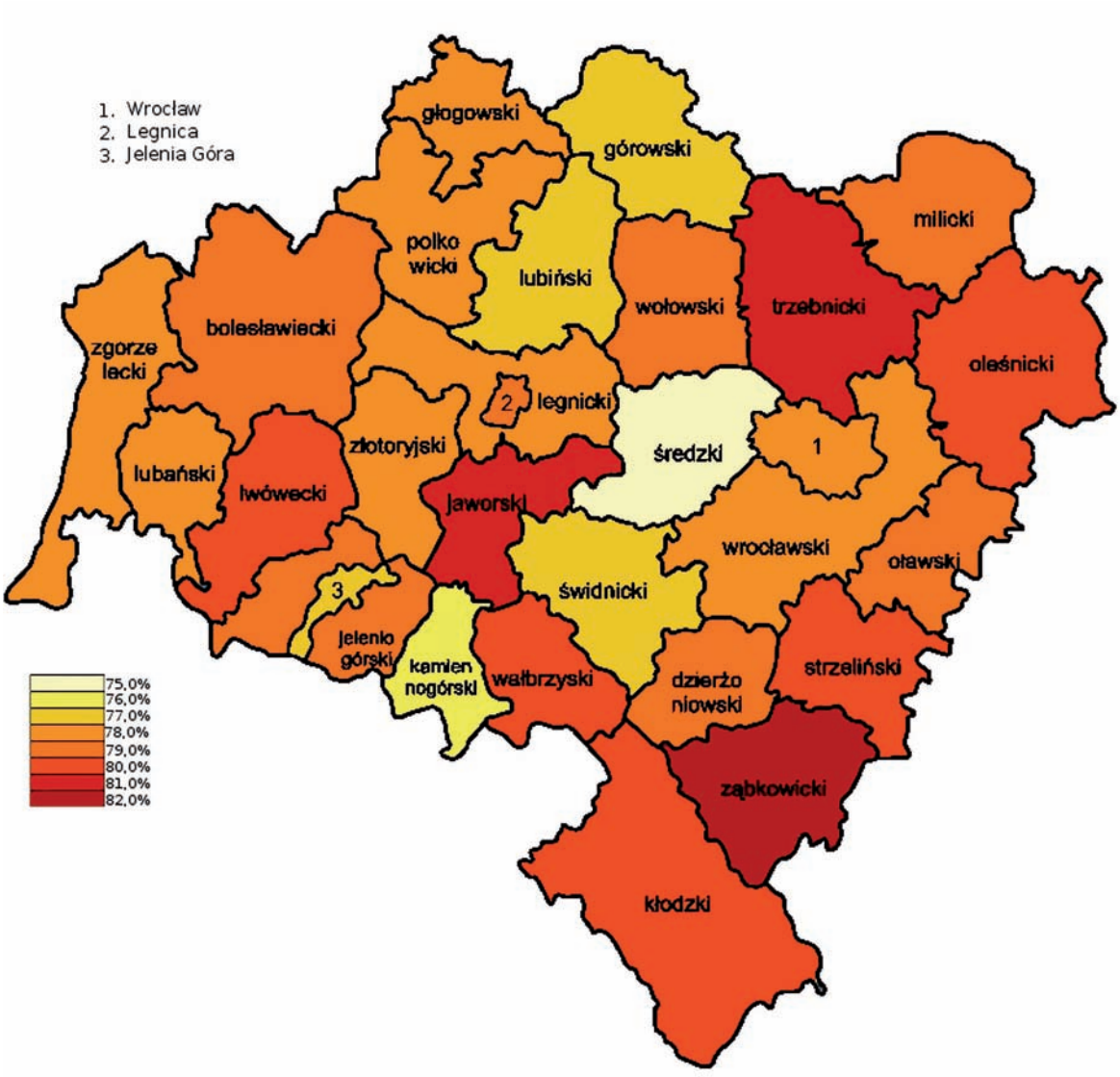

Figure 12. Frequencies of Rh(+) blood groups in women in Lower Silesian counties.

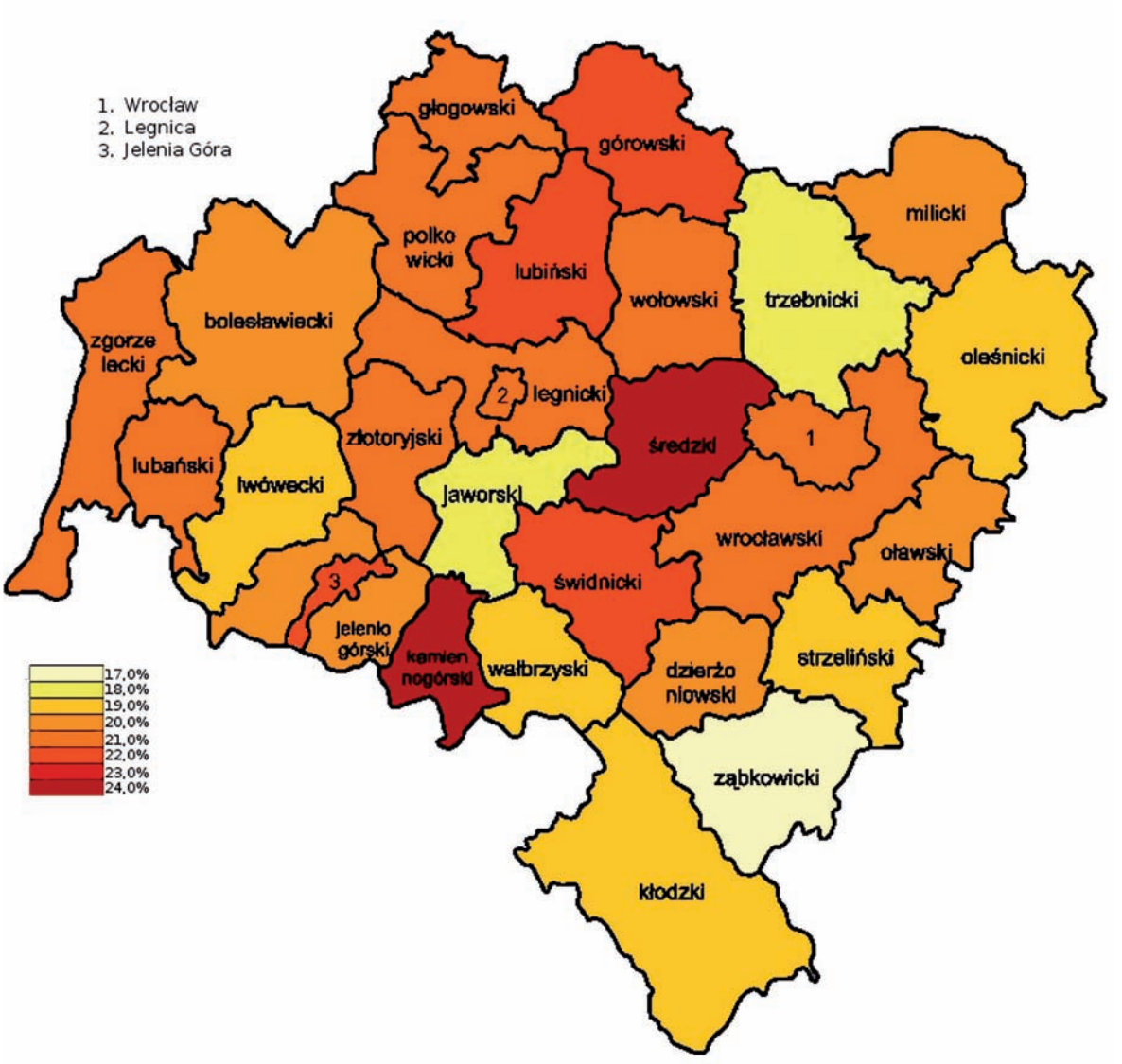

Figure 13. Frequencies of Rh(–) blood groups in women in Lower Silesian counties.

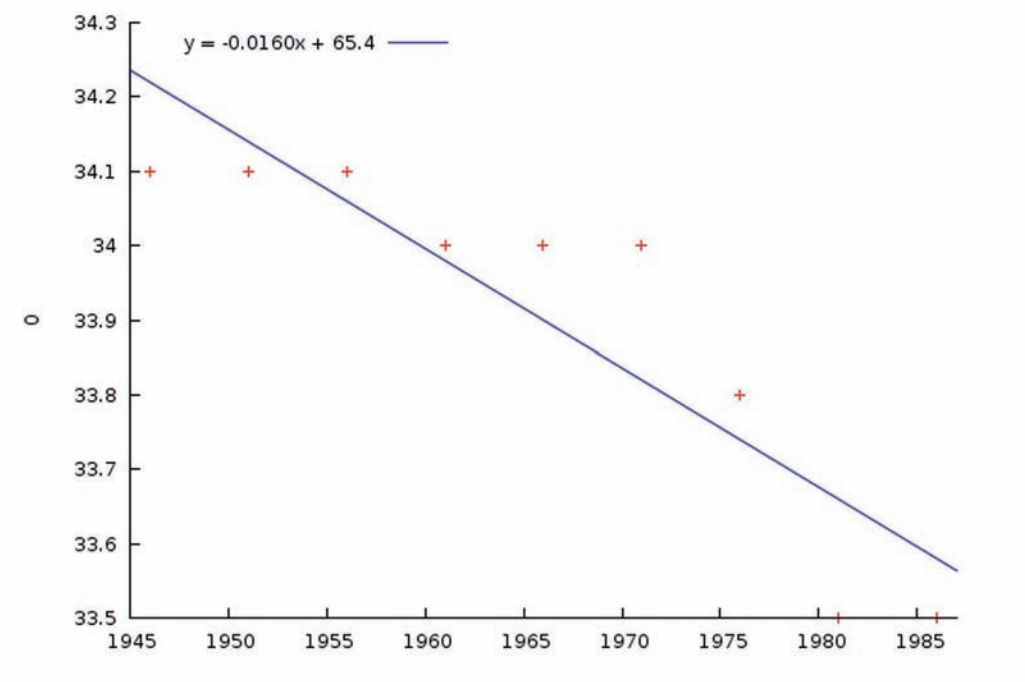

Figure 14. Temporal changes in the frequency of O blood group in men born in the years 1946-1990.

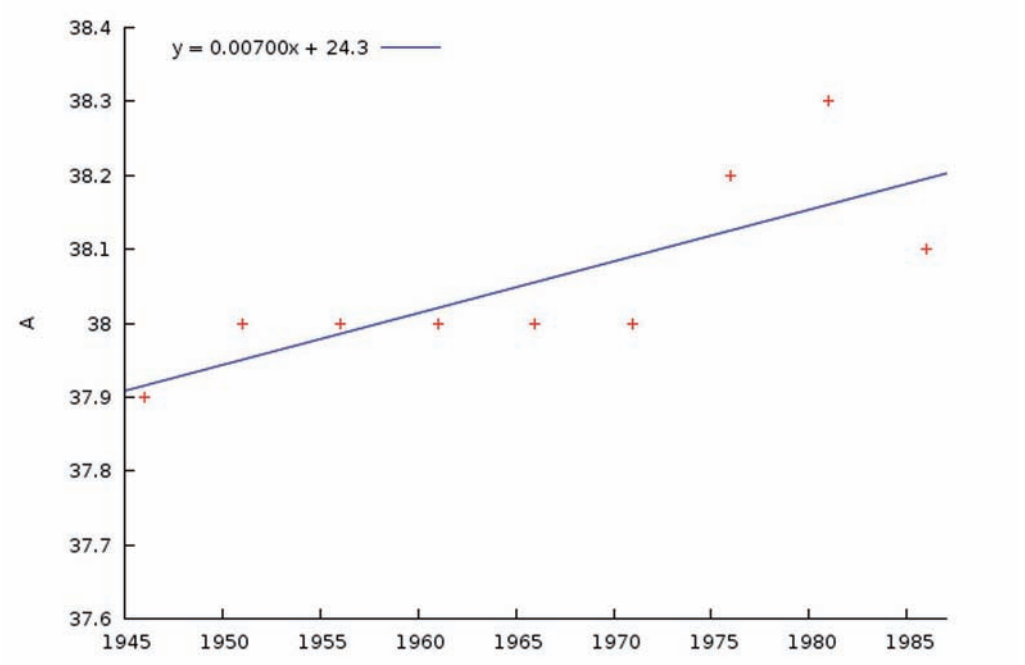

Figure 15. Temporal changes in the frequency of A blood group in men born in the years 1946-1990.

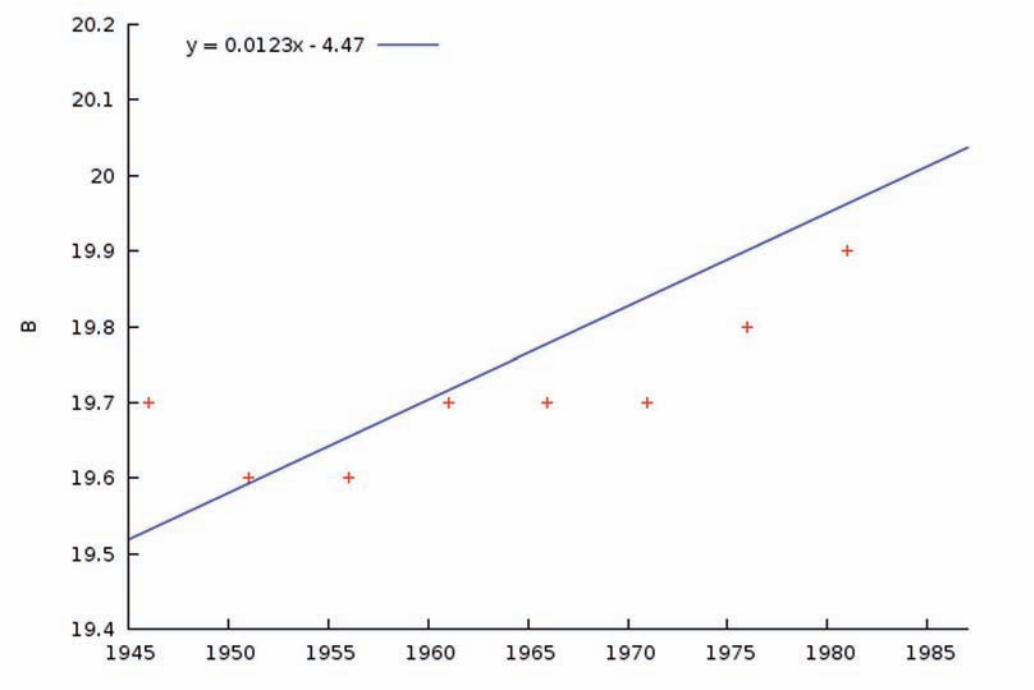

Figure 16. Temporal changes in the frequency of B blood group in men born in the years 1946-1990.

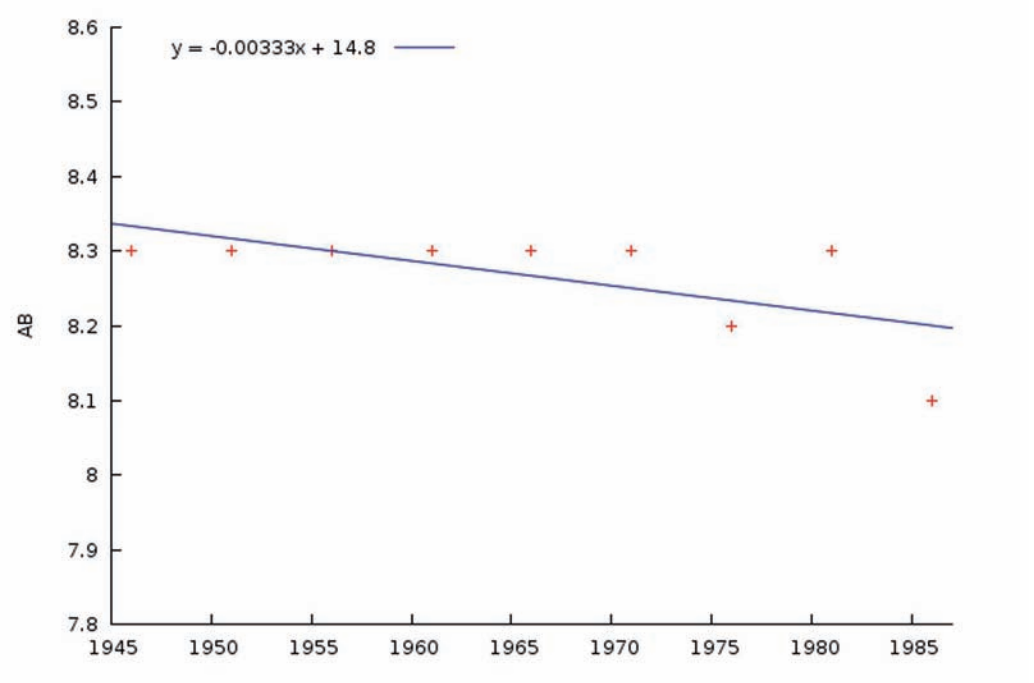

Figure 17. Temporal changes in the frequency of AB blood group in men born in the years 1946-1990.

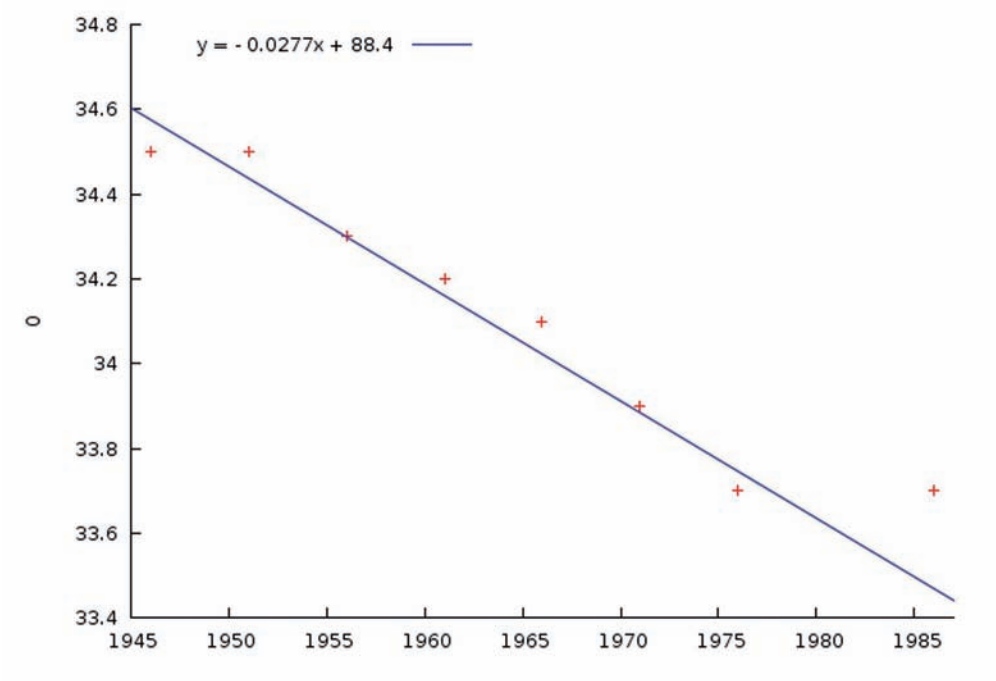

Figure 18. Temporal changes in the frequency of O blood group in women born in the years 1946-1990.

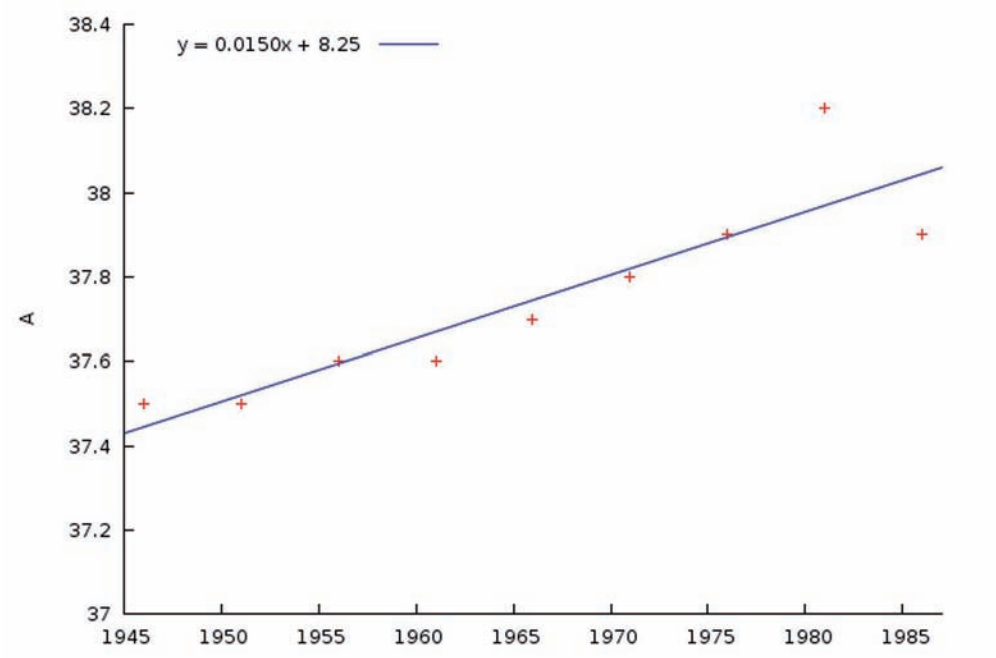

Figure 19. Temporal changes in the frequency of A blood group in women born in the years 1946-1990.

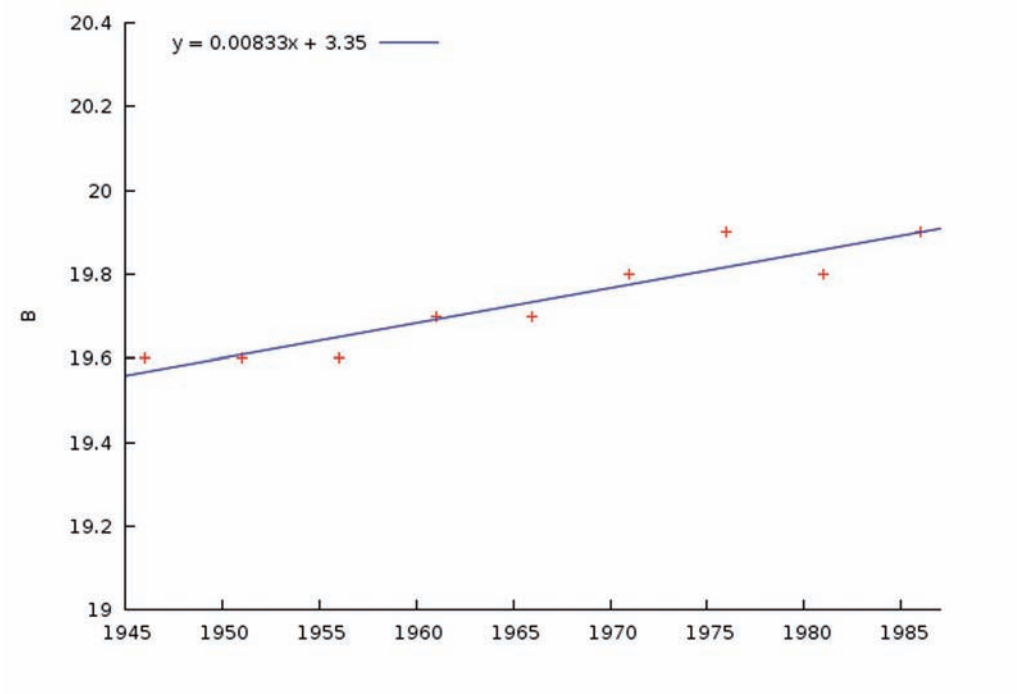

Figure 20. Temporal changes in the frequency of B blood group in women born in the years 1946-1990.

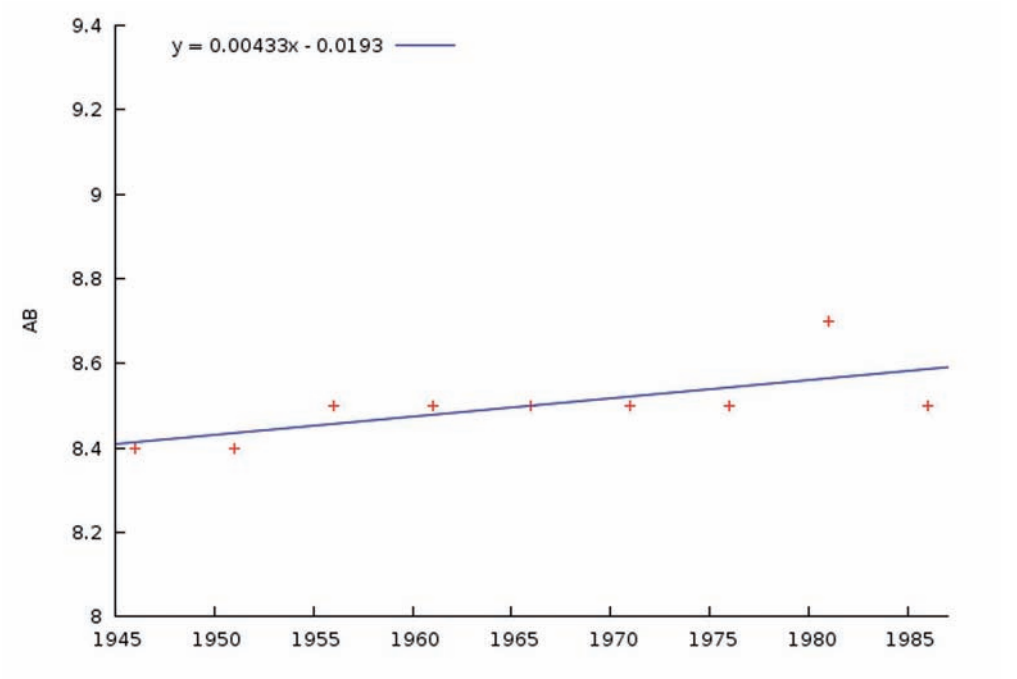

Figure 21. Temporal changes in the frequency of AB blood group in women born in the years 1946-1990.

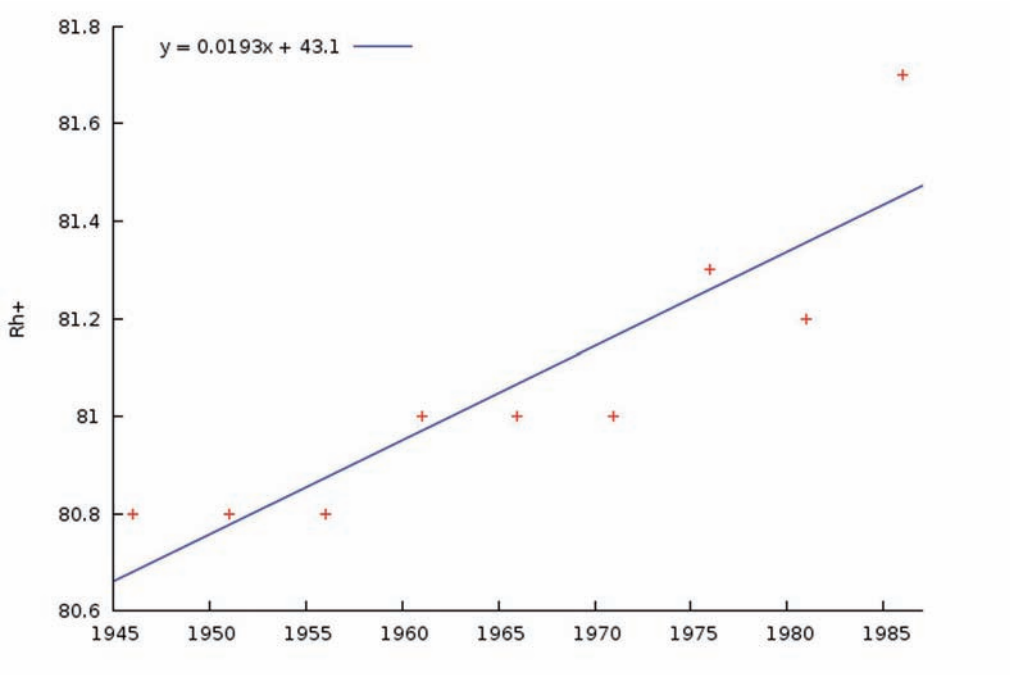

Figure 22. Temporal changes in the frequency of Rh(+) factor in men born in the years 1946-1990.

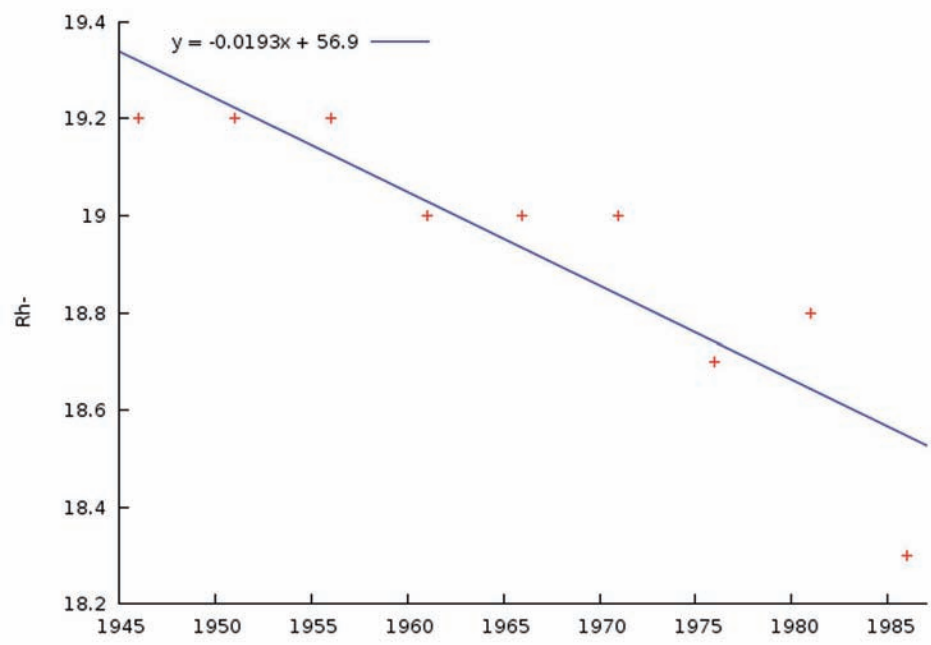

Figure 23. Temporal changes in the frequency of Rh(–) factor in men born in the years 1946-1990.

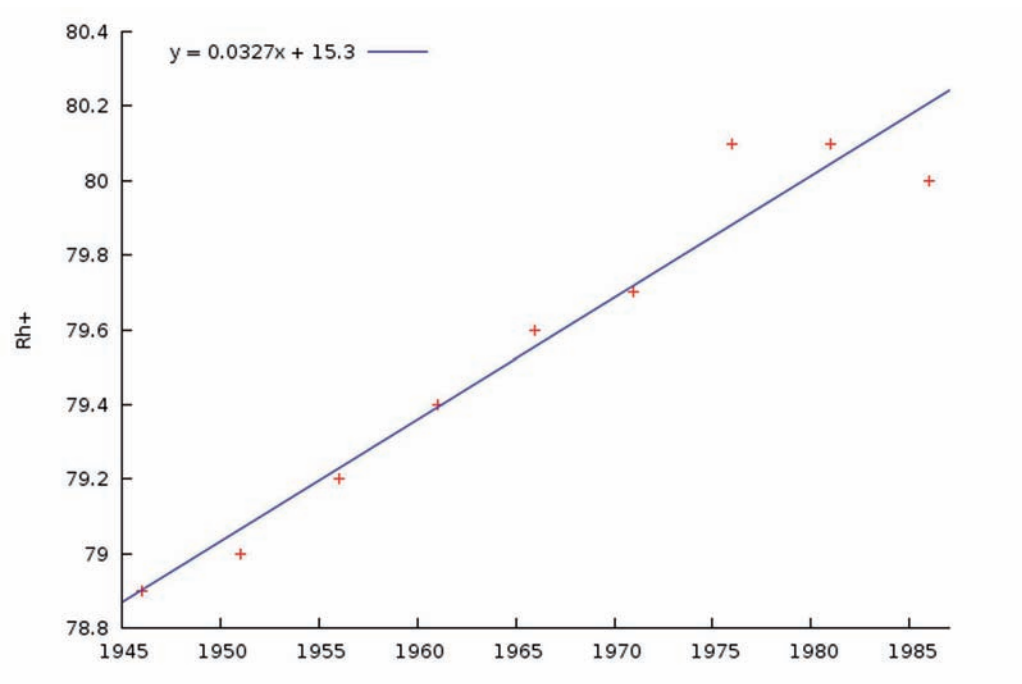

Figure 24. Temporal changes in the frequency of Rh(+) factor in women born in the years 1946-1990.

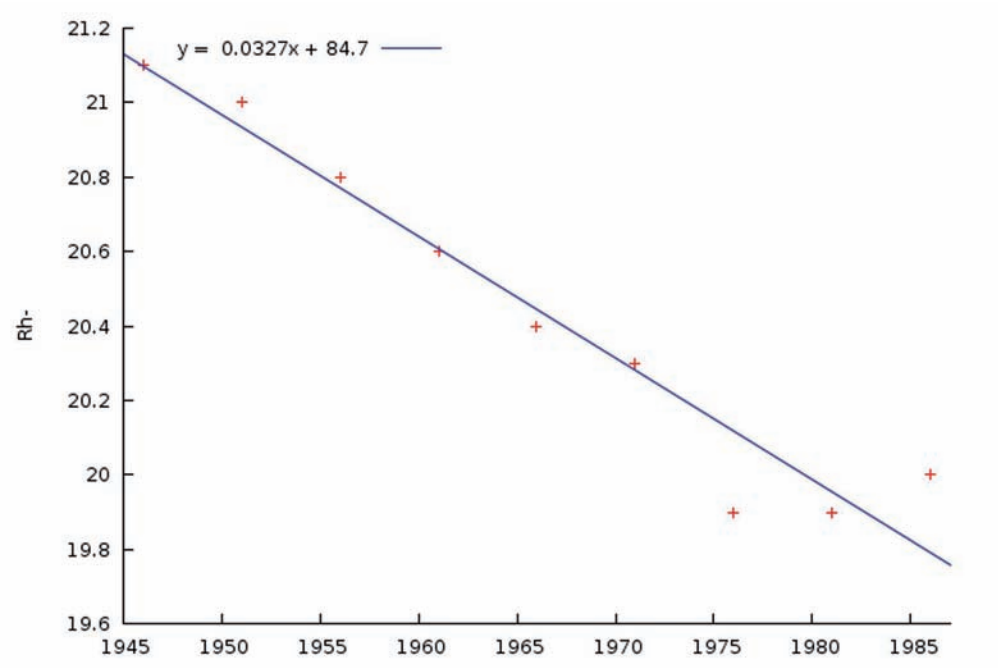

Figure 25. Temporal changes in the frequency of Rh(–) factor in women born the years 1946-1990.

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