

The Database of Russian National Medical and Dosimetric Registry: current state as of 01.12.1997. Brief review

The actual tabulated material reflecting the state of medical and dosimetric database of the RNMDR as of 01.12.97 is briefly described in the review. Before proceeding to the analysis of the information, an explanation of the main terms used in the tables is given.

The system of the RNMDR is known to cover the whole territory of the Russian Federation through the net of regional centers (regional level of the RNMDR) which accumulate information from subordinated oblast (kraj, republic, etc.) divisions located in each of the constituted Units of the RF (oblast level of the RNMDR). Information from raions of oblast (raion level of the RNMDR) comes to the oblast level of the RNMDR. In addition the regional centers ministerial registries deliver the information to the national level of the RNMDR. The ministerial registries are as follows: registry of the Ministry of Internal Affairs (MVD RF), registry of the Ministry of Defense (MO RF), registry of the Federal Service for Security (FSB RF), registry of the Ministry of Railroads (MPS RF), registry of the Ministry of the Russian Federation for Atomic Energy (Minatom), which is located at the State Scientific Center of the Russian Federation - Institute of Biophysics. So, the term "Russia" used in the tables means the combined RNMDR data of Russia, as a whole; the term "Russia except for ministerial registries" means combined data of Russia, except for information of the 5 ministerial registries. Data coming from regional centers are tabulated under the name of the relevant region, for instance, "North region" means that data of that line were delivered by the North regional center of the RNMDR. "Central region except for "contaminated" oblasts" means that information delivered by the Central regional center of the RNMDR does not consist of data from the 4 most contaminated oblasts of Russia. In the most contaminated oblasts of Bryansk, Kaluga, Tula and Oriol Oblast regional centers were established. These centers deliver the information directly to the national level of the RNMDR, bypassing the Central regional center.

Let us review the information of the RNMDR that is given in the tables below.

Registration information

Figure 1 illustrates the composition of the RNMDR sample by groups of primary registration. More than half (59.74%) of the registered persons are residents or former residents of the contaminated territories (where the contamination level is over 5 Ci/km²). One third of the RNDMR sample are persons who participated in clean-up work following the Chernobyl accident (liquidators). Offspring of liquidators who arrived at the zone during the years 1986 to 1987 contribute 3.6%. The proportion of evacuees and relocated persons is less than 2% in each year (1.71% and 1.95% respectively). More comprehensive information on the distribution of the RNMDR sample by groups of primary registration is given in table T1.

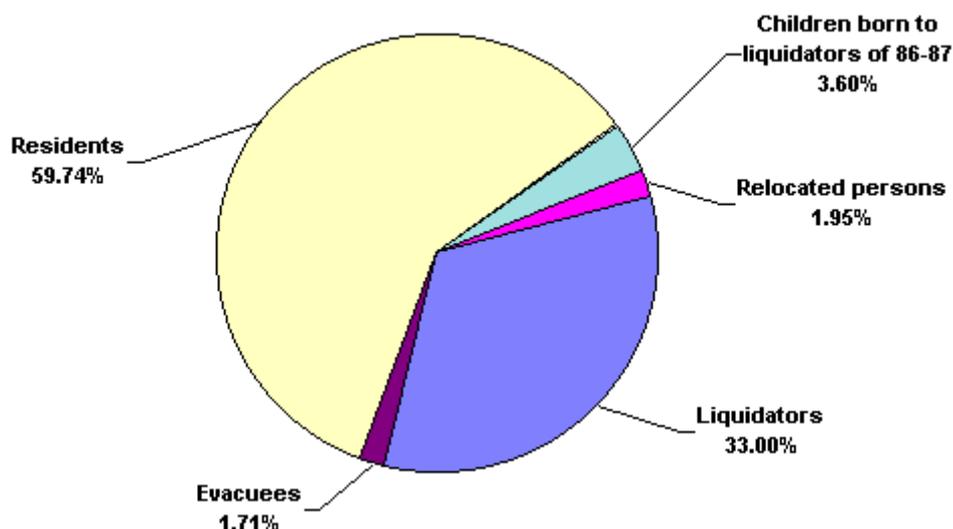


Fig. 1. Distribution of the RNMDR sample members by groups of primary registration, %.

Figure 2 illustrates the distribution in age of the RNMDR sample. The two peaks (at the age of 5-9 years and 40-49 years) in the figure can be explained as follows: a) the registry pays particular attention to the health status of children residing in contaminated territories and children of liquidators who were born after the departure of their parents from the area of radiation exposure; b) a high proportion of liquidators who entered the zone at 33 years old (on average), today are 45 years old. The age distribution of the liquidators is given in figure 3. The sex and age distribution of the RNMDR sample by individual territories is given in table T2, and the distribution of the RNMDR sample by age and group of primary registration with respect to individual regional centers and ministerial registries is given in tables T3.1-T3.22.

The distribution of the liquidators registered in the RNMDR by individual regions of Russia and ministerial registries is given in figure 4. The most representative groups of liquidators (more than 15 thousand each) are registered in 4 regional centers - North-Caucasian, Central, Ural and Povolzhsky, as well as in the registry of Minatom. The number of liquidators registered in each of the remaining regional centers and ministerial registries is less than 10 thousand persons.

Figure 5 illustrates the distribution of the population registered in the RNMDR who still reside or resided in those territories of Bryansk, Kaluga, Oriol and Tula oblasts, that are

contaminated with radionuclides (over 5 Ci/km²). Two thirds of them are residents of Bryansk oblast (190,674 individuals), more than 40 thousand persons registered in the RNMDR still reside in the contaminated territories of Kaluga and Tula oblasts. More than 15 thousand persons of the group of primary registration are from the Oriol oblast.

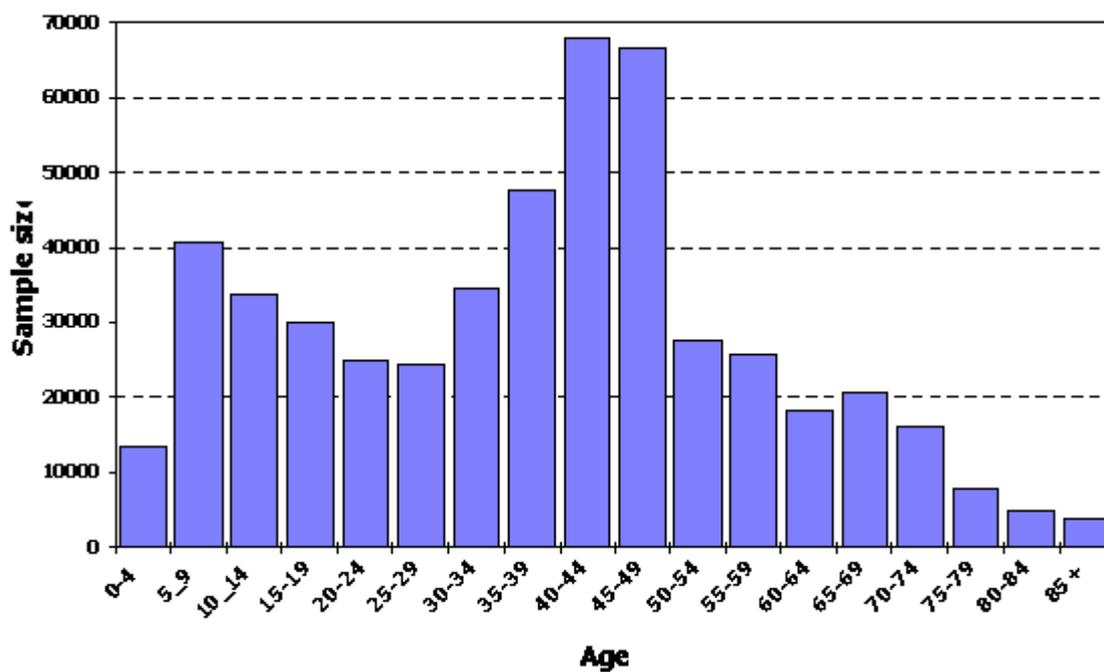


Fig. 2. Age distribution of the RNMDR sample.

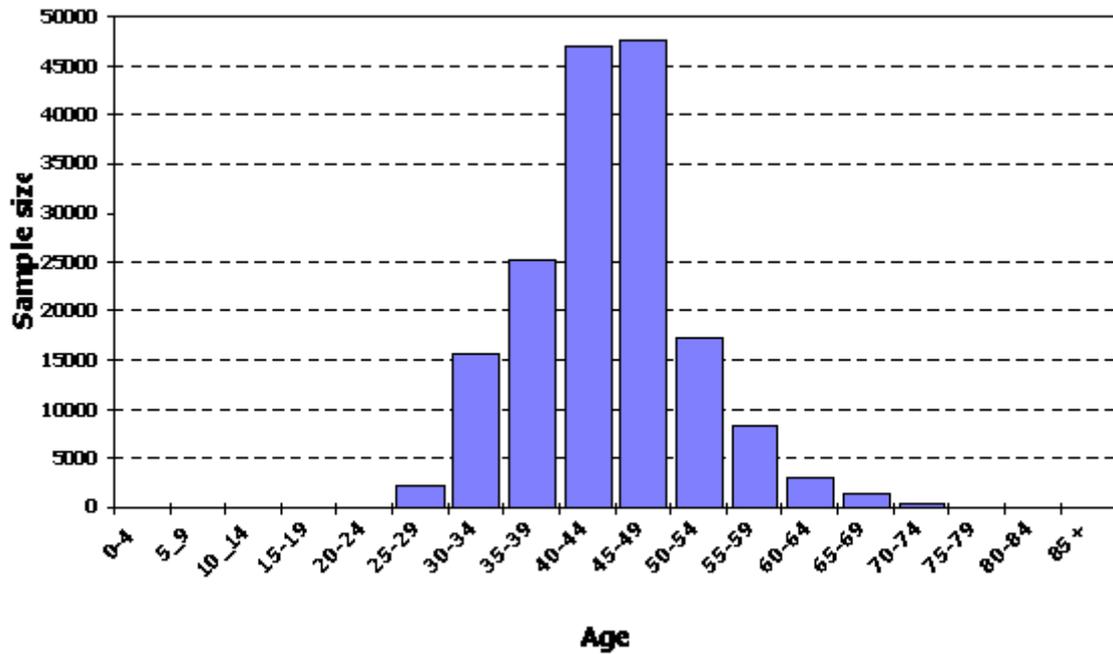


Fig. 3. Age distribution of liquidators.

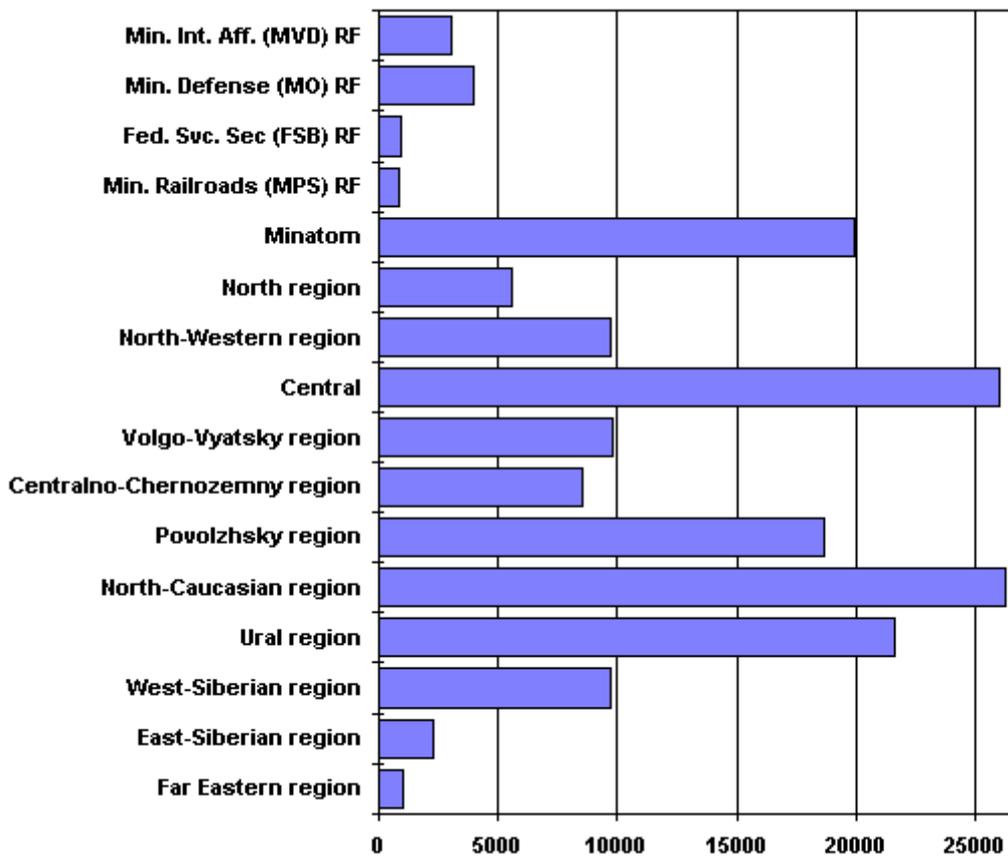


Fig. 4. Distribution of liquidators registered in the RNMDR by individual regions of Russia and ministerial registries.

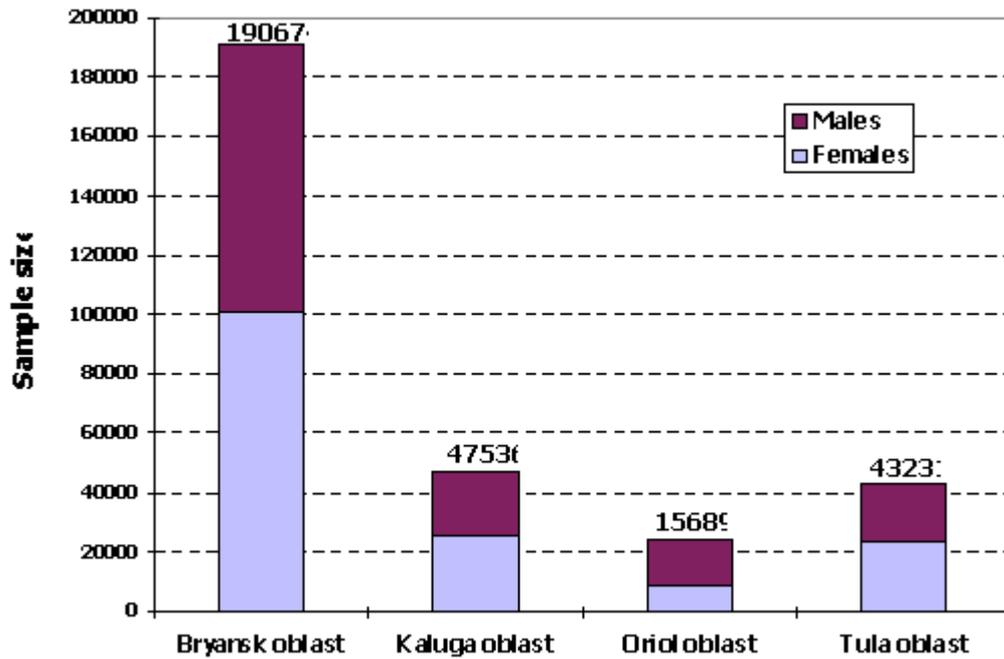


Fig. 5. Distribution of the population registered in the RNMDR residing in the oblasts of Russia most contaminated with radionuclides.

The distribution of offspring of liquidators registered in the RNMDR by specific regions and ministerial registries is given in figure 6. It shows that more than two thousand children born after their parents left the zone of radiation exposure were registered in the Central, Ural and North-Caucasian regions of Russia. The number of boys exceeds the number of girls (108 boys and 100 girls).

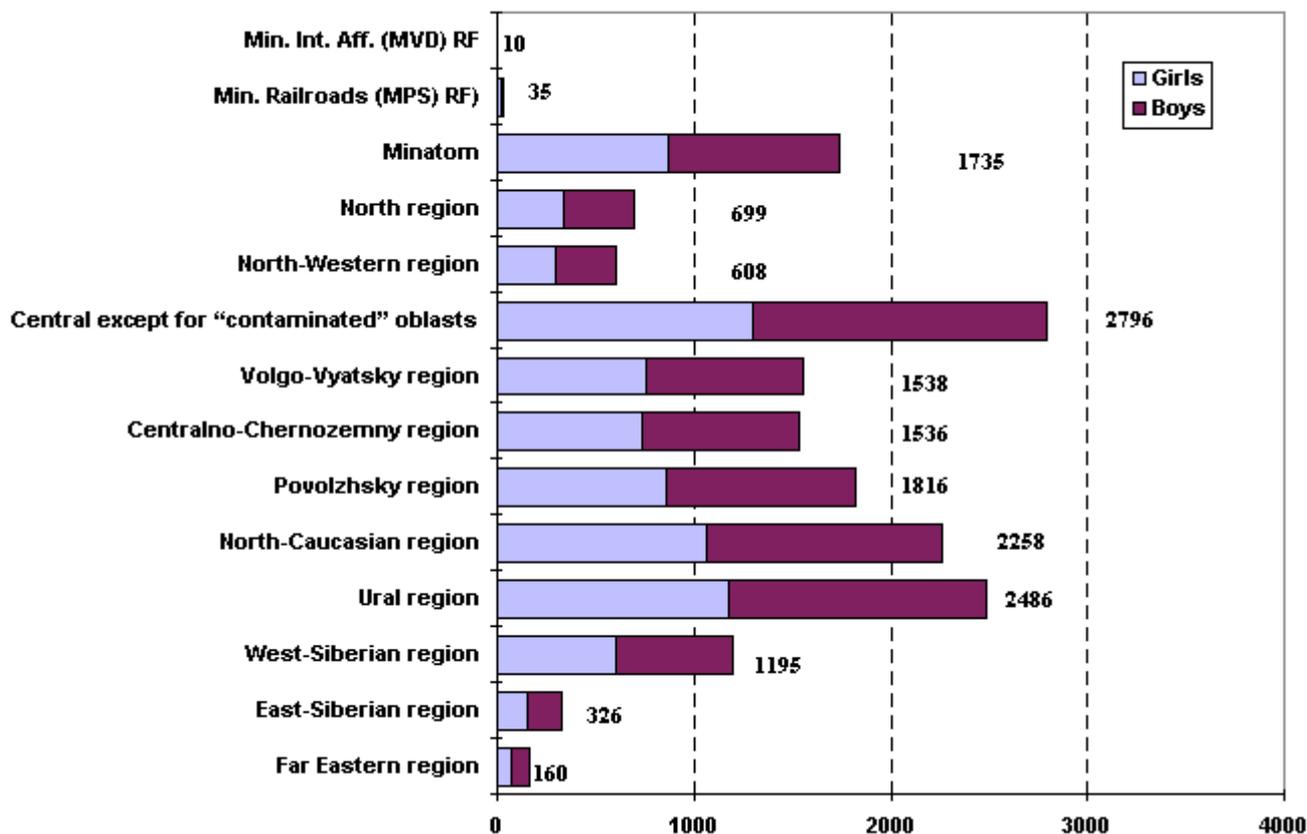


Fig. 6. Distribution of children born to liquidators by individual regions and ministerial registries.

Participation in medical examination over the years 1993 to 1996

The main source of the information on temporal changes in the health status of the observed RNMDR sample is the results of the annual medical examinations. In accordance with orders of the Ministry of Public Health of the Russian Federation regulating the delivery of medical and dosimetric information to the national level of the RNMDR, results of the examination are coded and typed in initial files (registration card, code medical coupon) which are put into personal computers and then analyzed. So, the portion of the population that participated in the examination is the key parameter for use of the medical population registries.

Figure 7 illustrates temporal changes in the proportion of RNMDR sample members who participated in medical examinations over the years 1993 to 1996. Data for 1996 could be increased by 3-5%, the proportion of the participants in 1996 can be increased as well. The figure shows (information in more detail is given in tables T8-T10) that there are two features typical for the observed RNMDR sample members (liquidators, children of liquidators, children, adolescents, and adults) from 4 of the most contaminated oblasts of Russia - Bryansk, Kaluga, Tula and Oriol) for the entire period of follow-up:

- the highest proportion of the registered participants (excluding adolescents) in the medical examination was in 1994, the highest participation of adolescents was in 1995, the lowest proportion of people examined was in 1996;
- the participation of the offspring of liquidators in the examination is high (on average, it is more than 80%), more than 70% of liquidators have participated annually, except for 1996, children of the contaminated territories are in the third position (on average, 67%), adolescents are in the fourth position - (on average, 53%), adults are on the fifth position (on average, 43%).

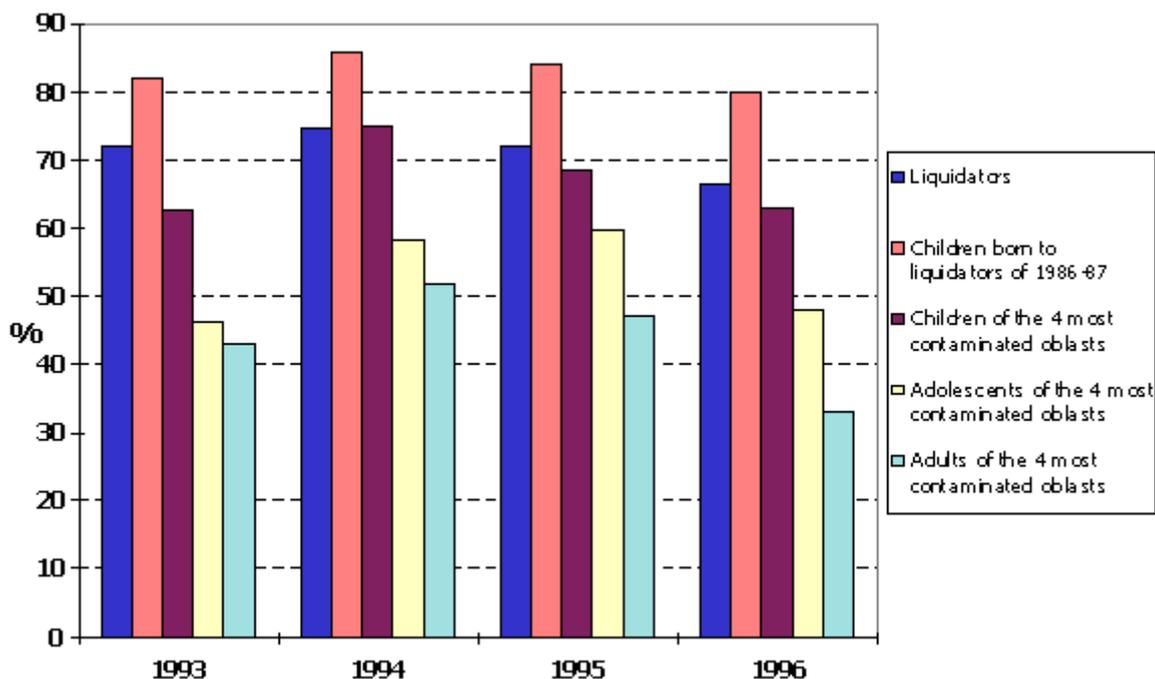


Fig. 7. Dynamics of the participation of the RNMDR sample in medical examinations over the years 1993 to 1996.

A relatively sharp decline in the number of persons who participated in the examinations in 1996 can be explained by a shortage of funds available for annual medical examinations of persons exposed to radiation. The participation of children and adolescents in the examinations in 1996 is of great concern. The number of the examined persons declined to 47.9% and 32.9% respectively. The lowest participation of adults in the medical examinations was in Bryansk oblast in 1996 (24.2%). There is expected to be a similar situation in 1997. This tendency is intolerable when considered against the background of increasing impact of unfavorable factors on health status of the RNMDR sample members.

The analysis of the results of the medical examinations of 1996 shows that distribution of the RNMDR sample members by individual health status groups (figure 8 and tables T11.1-T11.5) does not change if one recognizes that a decline in the portion of liquidators in health status group I (practically healthy) and an increase in the number of liquidators attributed to health status group III (sick) is a natural phenomenon. When comparing the distribution of liquidators examined in 1995 and in 1996 by health status groups the following is seen:

- group I - 8.6% (1996) and 12.2% (1995),
- group II - 24.0% (1996) and 24.1% (1995),
- group III - 67.4% (1996) and 63.7% (1995).

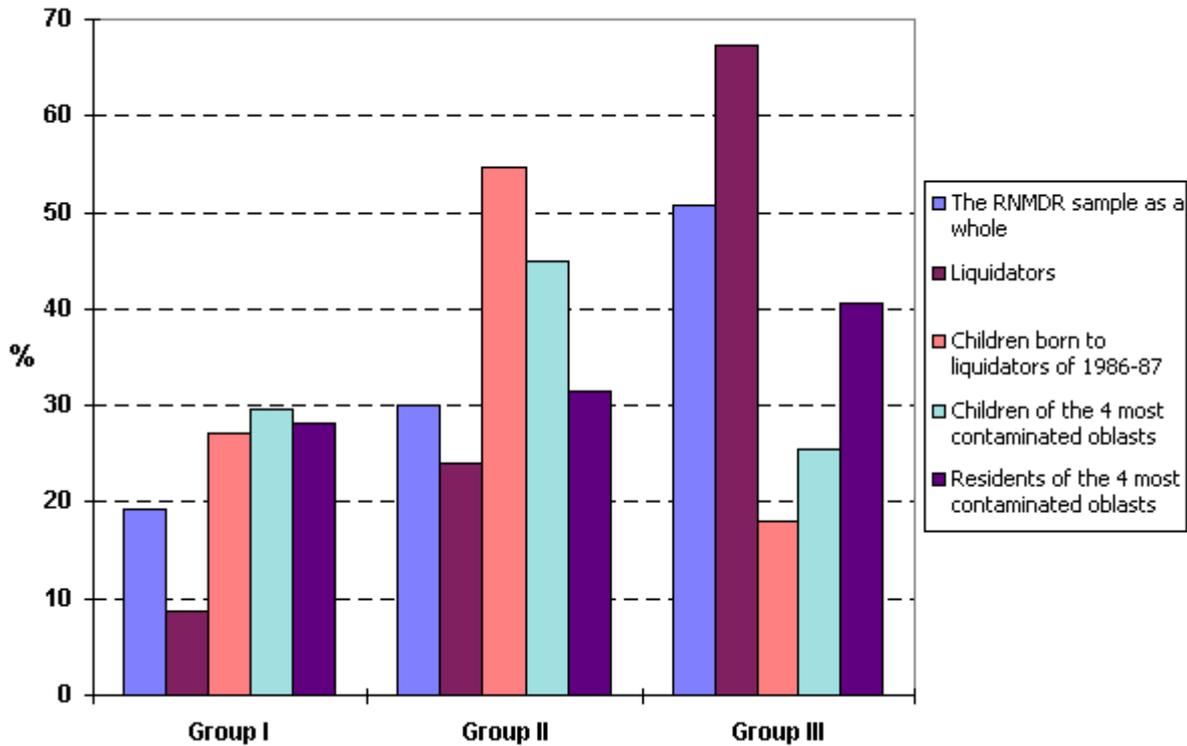


Fig. 8. Distribution of RNMDR sample members who participated in medical examinations in 1996 by health status groups (%).

In other subgroups of the RNMDR sample (children of liquidators, children residing in contaminated areas, residents of contaminated areas, examined in 1996) about an equal proportion of individuals are in group I (from 27% to 29%). The proportion of the children of liquidators in health group III (sick) is less (18.1%), their average age is 5.5 years, and is 2 years younger than the average age of children residing in contaminated areas, the proportion of them attributed to the health group III is 25.4%.

The continuing growth of the number of disabled persons among liquidators is the key social and medical problem that challenges health care institutions. Figure 9 illustrates the distribution of liquidators of the RNMDR sample by individual groups of disability, individual regions of Russia and ministerial registries in 1996. The proportion of liquidators who were in the disability groups II and III (the line "Russia" in table T12.2 illustrates the data relating to Russia as a whole) is about equal, 48.6% and 49.6% respectively. In 1995 the proportion of liquidators of groups II and III was 50.6% and 47.5% respectively. The proportion of those that belonged to group I was 1.7% and 1.6% in 1996 and 1995

respectively. In 1995 and 1996 a group of disability for 0.2% of disable liquidators was ascertained in the RNMDR.

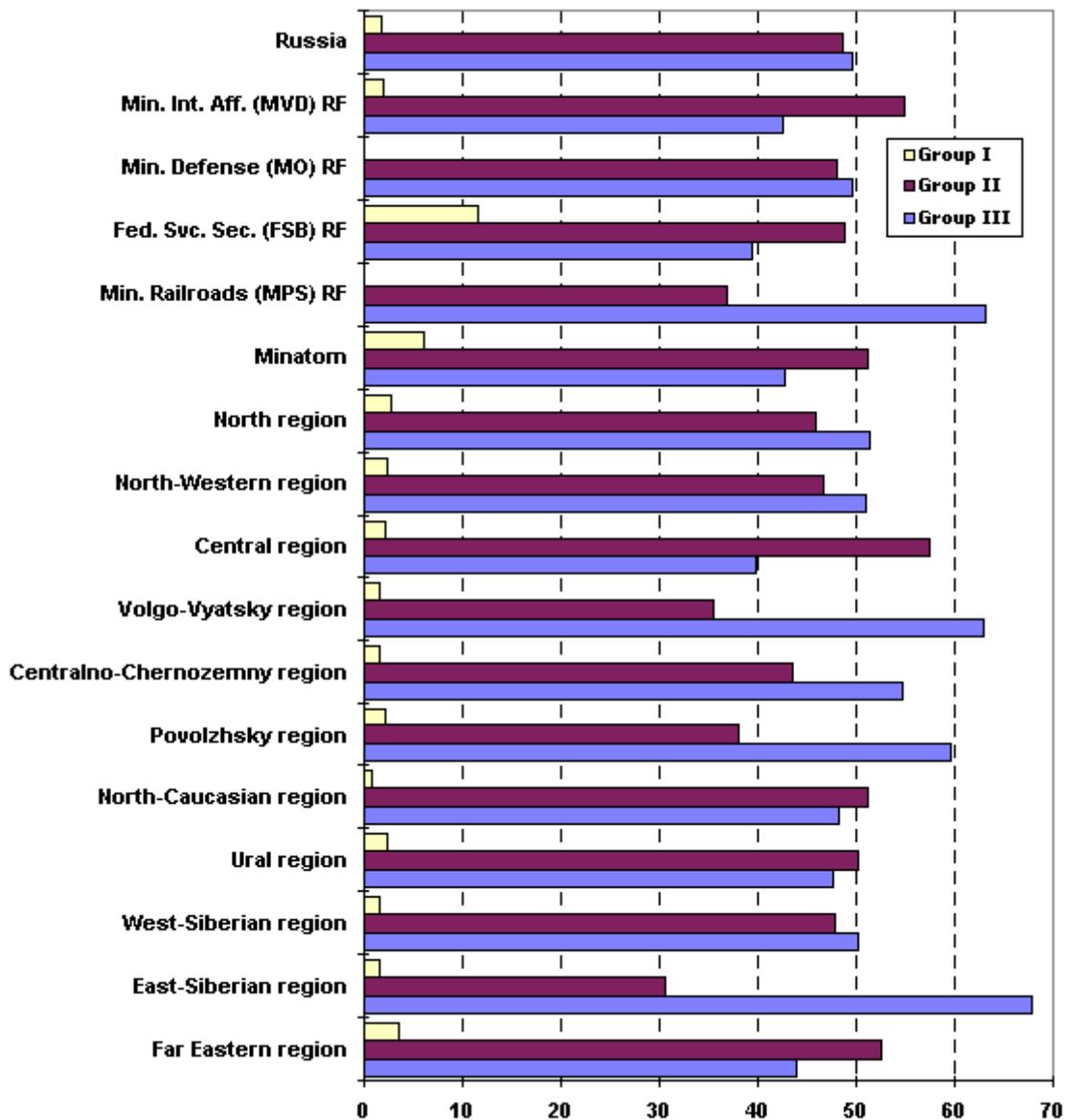


Fig. 9. Distribution of the liquidators of the RNMDR sample by groups of disability, individual regions of Russia and ministerial registry in 1996, %.

The highest percentage of liquidators that have been attributed to group I in 1996 was in the registry of Federal Service Security (FSB) RF and the registry of Minatom (11.6% and 6.1% respectively). In the registries of the Ministry of Railroads (MPS) RF and the Ministry of Defense (MO) RF no liquidators were attributed to group I in 1996. The highest percent of liquidators of the group of disability II was in Central region (57.4%), the lowest percent - in East-Siberian region (30.6%). The highest proportion of the liquidators that belonged to

the group of disability III was in East-Siberian and Volgo-Vyatsky regions, MPS RF registry (more than 60%), the lowest percent was in FSB RF registry and Central region (less than 40%).

HEALTH STATUS OF LIQUIDATORS

Territorial features of morbidity

The annual estimate for incidence and prevalence per 100,000 persons based on data of the national level of the RNMDR were used for analysis of the health status of liquidators with regard to the RNMDR, as a whole, and to individual regional centers. Information for analysis is collected by means of organizational actions undertaken by regional centers and the territorial medical care system within frames of annual compulsory medical examination for the purposes of atomized personal registration of individuals exposed to radiation due to the accident at the Chernobyl NPP. The main informative documents are given in tables (T.13-T.16), which summarizes the rates for incidence, prevalence, and their ratios for the period of 1993-96. For more comprehensive illustration the following relationships are given in the tables:

- between rates of 1996 and rates of 1995 with regard to a specific region;
- between rates regarding to a specific region and the RNMDR, as a whole;
- between rates regarding to a specific region and average rates for the period over 1993-96.

Before proceeding to review briefly the health status of the liquidators, it should be stressed that social and psychological factors, especially those associated with the Chernobyl accident, contribute to morbidity among liquidators. Rates for incidence among liquidators exceeds those characteristic of baseline rates in Russia, as a whole (figure 10). When comparing the rates for primary and overall morbidity derived from analysis of the RNMDR data, and relevant data of official national statistics, one should take into account that the technology for collection of medical information for the purposes of the RNMDR differs from that used by the official statistics. The technology of the RNMDR is based on results of annual medical examinations of persons exposed to radiation following the Chernobyl accident. Official statistics are based on reports which reflect the rate of overall morbidity among the population who independently visit medical doctors. When rates for morbidity among liquidators and the whole population of Russia are compared, one can say that disorders of the endocrine system occur 10 times more frequently among liquidators, diseases of the blood and blood-forming organs occur about 2 times more frequently, mental disorders about 5 times more frequently, diseases of the circulatory system and diseases of digestive organs occur 4 times more frequently.

The incidence ratio (the incidence of disease of the particular type as a percentage of the total disease incidence) of the main classes of diseases among the liquidators did not change remarkably for the period from 1993 to 1996. Diseases of respiratory organs are in the first place (21.7%), diseases of nervous system are in second place (16.9%), diseases of digestive organs in third place (13.2%) in 1996 (figure 11). A permanent decline in the proportion of mental disorders among liquidators can be considered as the main peculiarity of the temporal trend for incidence ratio: for the period from 1993 to 1996 the percentage of detected psychic diseases decreased from 6.8% (1993) to 4.4% (1996). A steady increase in incidence of genitourinary system diseases, on the other hand, is observed (from 2.6% to 3.6%). The prevalence ratio (the prevalence of disease of the particular type as a percentage of the total disease prevalence) is as follows (figure 12): diseases of the nervous system and sense organs, digestive organs, bone and muscle system were in the first place in 1996 (21%, 17% and 16% respectively). The prevalence ratio observed for the period from 1995 over 1996 is shown in figure 13.

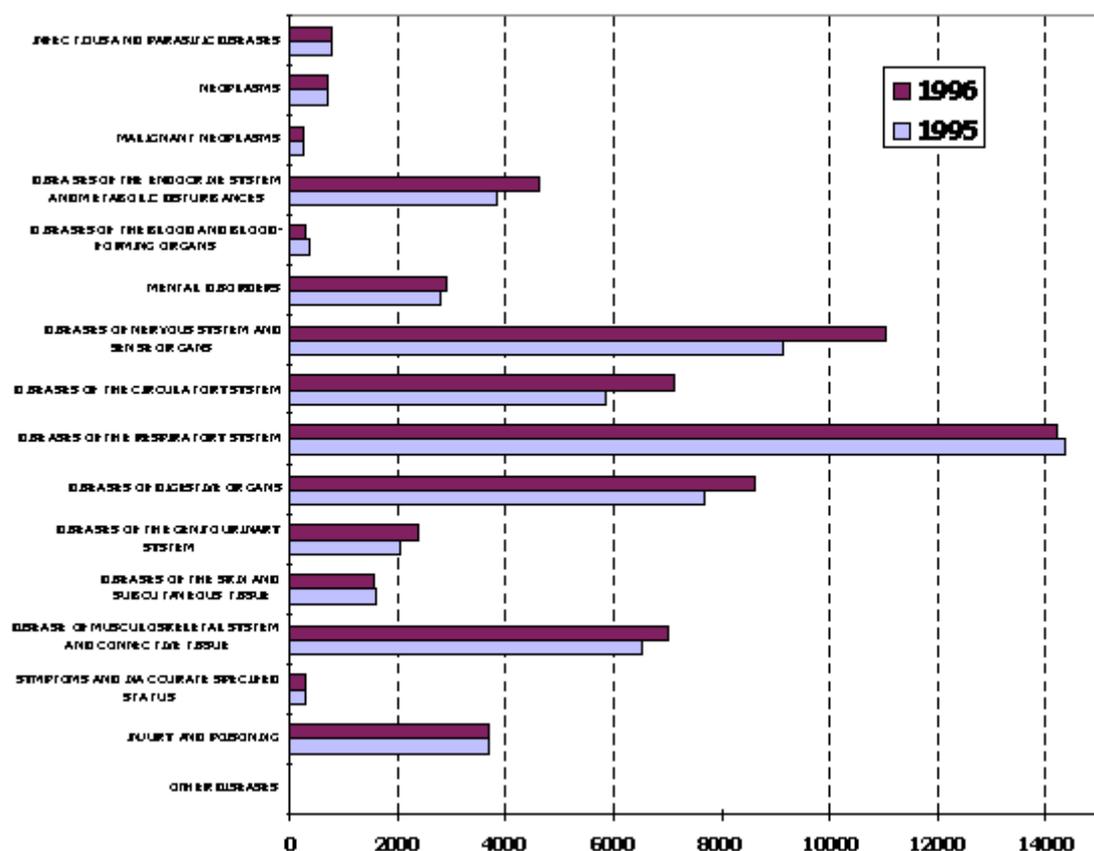


Fig. 10. Morbidity among male liquidators (per 100,000 persons) with regard to individual classes of diseases, 1995-1996.

Though morbidity levels in individual regions are different (figure 14), the common trend towards the stabilization of overall morbidity levels has been observed for the last three years. An increase in all classes of disease among the male liquidators of these regions is observed. When temporal trends for prevalence rates are analyzed, an increase in the rates with time is observed, the highest increase in prevalence among liquidators of the Ural region have been observed for the last two years (figure 15). Comparing incidence rates for malignant neoplasms among male liquidators in 1996 and 1995 one can say that there is a minor decline in rates with respect to Russia, as a whole, as well as in individual regions, except for Volgo-Vyatsky and North-Western regions. Previous unstable trends gave way to certain increases in recent years.

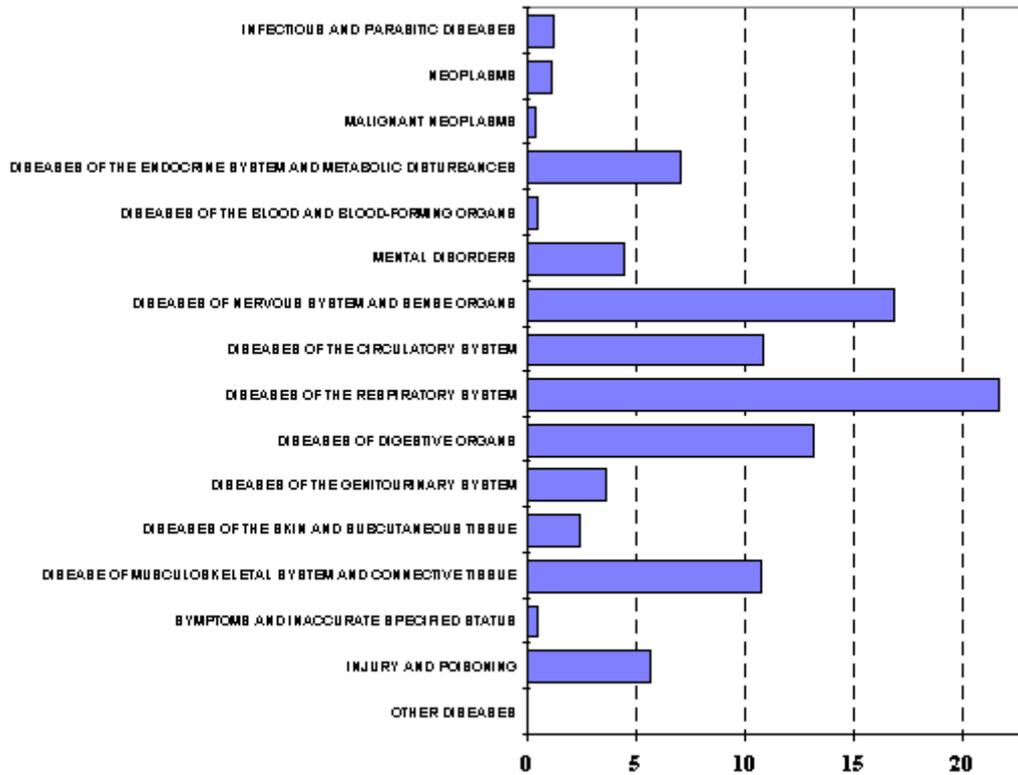


Fig. 11. Incidence ratio of various diseases in male liquidators of Russia in 1996 (%).

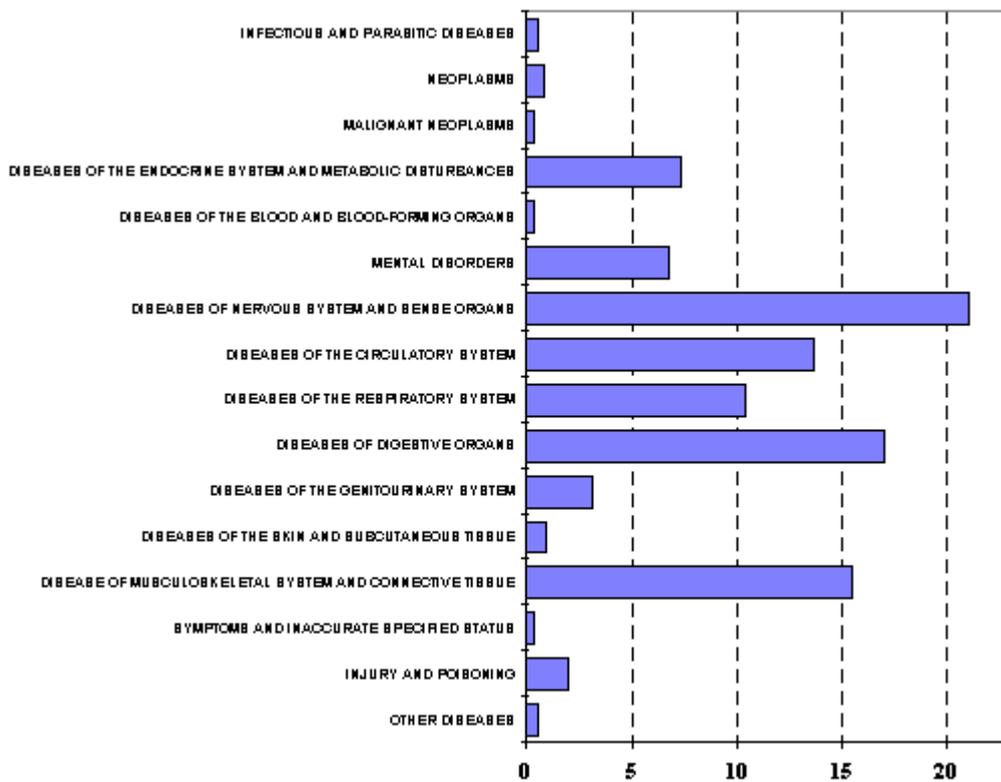


Fig. 12. Prevalence ratio of various diseases in the male liquidators of Russia in 1996 (%).

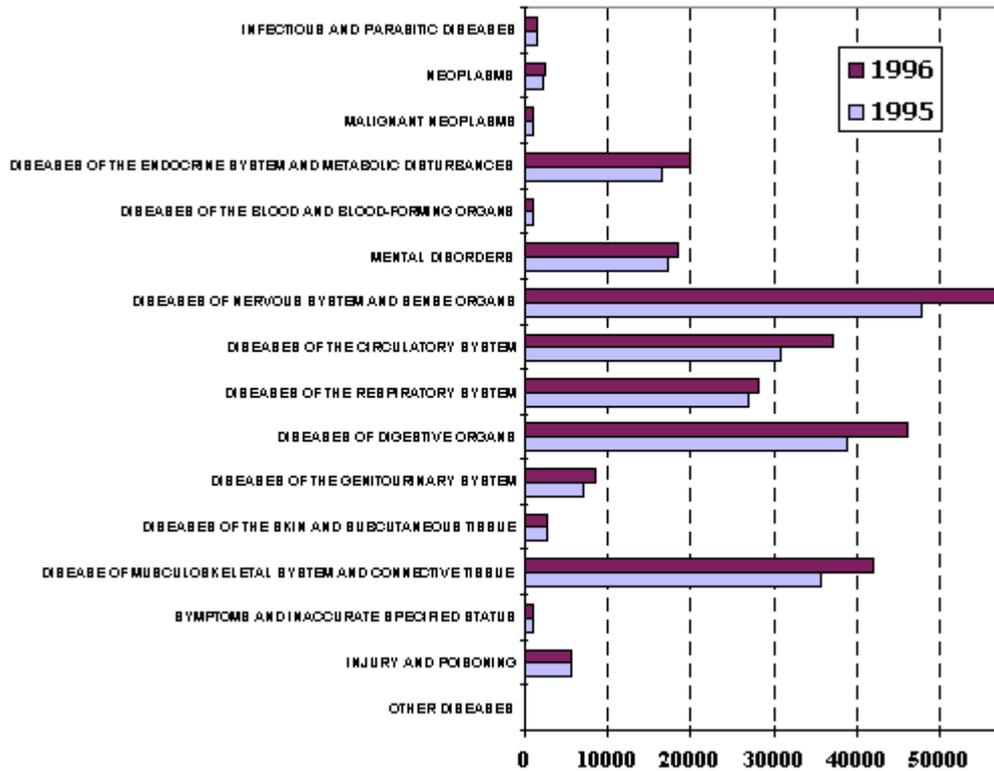


Fig. 13. Prevalence of individual classes of disease among male liquidators (per 100,000 persons), 1995-1996.

The incidence rates for endocrine diseases among male liquidators in individual regions of Russia fluctuate considerably, although some stability has been observed over the period 1995-1996. The incidence rates for endocrine diseases in the Central region declined by 1.3 times in 1996 compared to 1995. An increase in morbidity compared to 1995 was observed, being more pronounced in the Ural and Volgo-Vyatsky regions. When analyzing the prevalence rates for endocrine diseases and metabolic diseases among male liquidators with regard to individual regions of Russia, one can see the higher stability and the tendency for an increase in the rates with time. In 1996 the prevalence increased in Povolzhsky region by 1.3 times, and in the Volgo-Vyatsky region by 1.4 times compared to 1995.

Incidence rates for diseases of the blood and blood-forming organs among male liquidators by individual regions of Russia increased in the Central and Volgo-Vyatsky regions in 1996 compared to 1995. Prevalence rates declined in the North-Western, North-Caucasian, Ural and Povolzhsky regions, as well as in Russia without ministerial registries. Analysis of temporal trends for prevalence rates for diseases of the blood and blood-forming organs among male liquidators with regard to individual regions of Russia,

gave evidence for certain fluctuations of the rates towards increase in the prevalence with time. In 1996 the level of prevalence increased in the Central region and decreased in the Ural and Povolozhsky regions compared to 1995.

The incidence rates of mental disorders among liquidators steadily decline. This is derived from the ratio of incidence rates for the diseases of these classes to the mean rates for the period over 1993-1996. At the same time, prevalence rates for psychic diseases continue to increase.

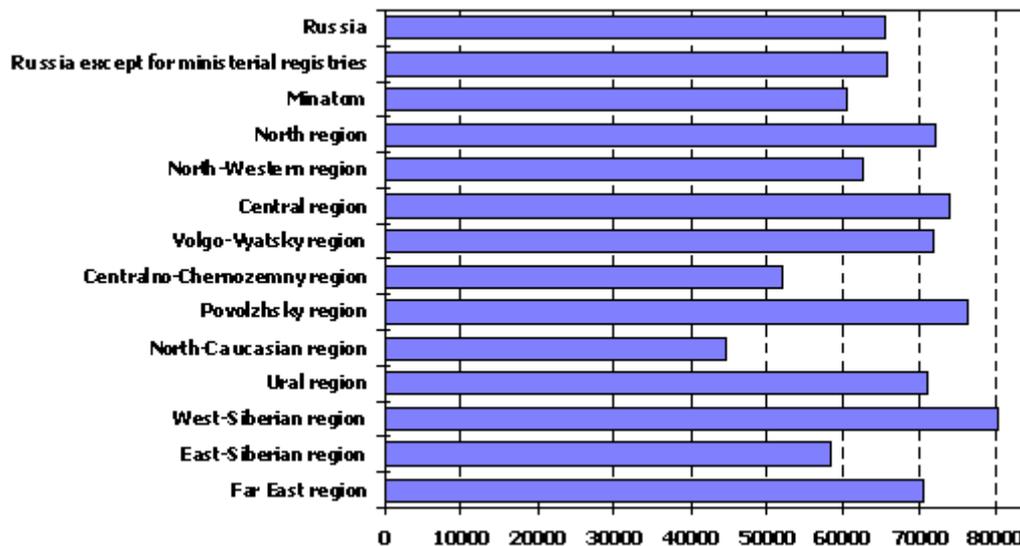


Fig. 14. Overall morbidity (total number of sick persons) in 1996 per 100,000 persons in male liquidators in the various regions.

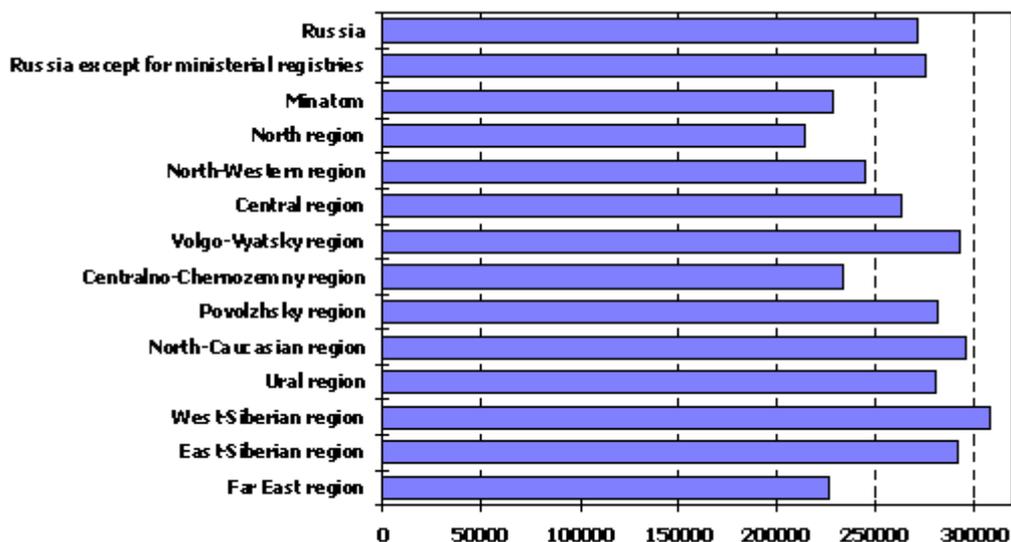


Fig. 15. Overall prevalence (total number of sick persons) in 1996 per 100,000 persons in male liquidators in the various regions.

Morbidity due to diseases of the nervous system is increasing. The rate for increase in morbidity in 1996 was higher compared to the period from 1993 to 1996. The increase in prevalence rates of the diseases in 1996, in contrast, was not large, and ranked below the increase for the period from 1993 to 1996.

The temporal trend for incidence and prevalence rates for circulation diseases among male liquidators with regard to individual regions of Russia reflects the trend common of all regions towards stabilization of the

rates. The North-Caucasian region is an exception, with a decrease in morbidity observed for the last four years, though there is increase in the prevalence.

Incidence rates for diseases of digestive organs among male liquidators with regard to individual regions of Russia declined in the North-Caucasian region solely in 1996 compared to 1995. In other regions an increase in incidence rates was observed. Temporal trends for the incidence rate shows a common trend towards a slight increase with time. Analysis of the prevalence rates for diseases of digestive organs among males liquidators by the regions of Russia shows a tendency for increase in the rates with time. The highest increase in prevalence was in the Ural region in 1996 compared to 1995 (by 1.3 times).

Incidence rates for the musculoskeletal system and connective tissue diseases among male liquidators increased in the Ural, North-Western, Volgo-Vyatsky regions and in Russia, as a whole, in 1996 compared to 1995. The morbidity of diseases of the musculoskeletal system in the North-Caucasian region has been observed since 1993, the largest rate of decline was observed in 1994. Similar decline was observed in the Ural region, however, the morbidity rate has increased since 1995. There was no well-marked tendency, however, one should notice that incidence rate in the Volgo-Vyatsky region is more pronounced compared to other regions. Analysis of the prevalence rate for diseases of the musculoskeletal system and connective tissue among male liquidators shows that they was more stable, with a well-marked tendency for an increase with time. In 1996 the increase in prevalence was more pronounced in the Ural region in 1996 compared to 1995 (by 1.3 times).

The basic results of the analysis show an increase in incidence rates in the cohort of liquidators as compared with baseline rates in Russia as a whole. This increase is in overall morbidity, diseases of the endocrine system, mental disorders, cardiovascular diseases, etc. Causes for this deterioration of the health status of liquidators have not been ascertained yet, because non-radiation risk factors, such as occupational, mental, environmental and other effects on health status of liquidators exist. We cannot exclude that the phenomenon called "rejuvenation of a disease" is realized at the population level. This phenomenon means that diseases typical for a specific age are developed at a younger age. A gap between the physiological and the biological age of liquidators can be responsible for a stable increase in morbidity during the last five years. At the same time, this situation is characteristic of an increase in the proportion of chronic disorders in the overall incidence ratio. The detectability of diseases has been stabilized. However, detected diseases as a result of screening are resistant to therapy. The latter in many respects can be due to the reduction of social programs addressed to the observed population, extending economical crisis, cutting off funds destined for medical care system, as well as the psycho-emotional peculiarities that are characteristic of the liquidators in their situation.