

CHAPTER 3

MEDICAL AND SOCIO-PSYCHOLOGICAL CONSEQUENCES OF THE CHERNOBYL CATASTROPHE

Medical consequences of the Chernobyl NPP catastrophe are the subject of close attention of the medical world.

It is explained by the fact that the radiational effect connected with the Chernobyl catastrophe upon republic is unique in its character and scale. First, this is the multicomponent and prolonged effect of ionizing radiation, intensification of radiation effects by social and psychological factors, and also by various factors of anthropogenic origin.

And though immediately after the catastrophe the determined effects were vague, the analysis of distant consequences is of special interest.

3.1. Dose commitments on the population

The most important in the formation of the external exposure dose for the first year were isotopes of caesium -137,-134; ruthenium-103,-106, tellurium - 132; zirconium - 95; niobium - 95, barium - 140; lanthanum - 140. During the first months after the Chernobyl catastrophe the radiation burden on the thyroid gland was formed by radionuclides of iodine-131,-132,-133,-135, and by other short-living radionuclides.

For the estimation of exposure doses in the early period on the territory of the republic 300 thousand measurements were made and it made it possible to estimate the radiation burdens on the thyroid gland of almost 125 thousand affected people (Fig. 3.1.). The average thyroid exposure dose for the adult population of the republic made up 1,6 Gy, for children - 3,2 Gy. At the same time very high exposure levels were registered as well, especially of children inhabiting the south districts of Gomel region (5-10 Gy and higher).

The formation of large thyroid exposure burdens was aggravated by the goiter endemia of the Belarus territory, late iodine prophylactics, late introduction of veto on the sale of milk, the presence of other anthropogenic polluters in the environment, etc. Nevertheless, more than half of the children and adolescents with the confirmed diagnosis of thyroid gland tumour received relatively small exposure doses not exceeding 0,6 Gy (Fig.3.2.) There arises the necessity to reexamine the reasons of this heavy oncological disease not only of children but adults as well and more thorough study of its etiopathogenesis.

The collective exposure thyroid gland dose of the inhabitants of Belarus made up 500-700 thousand people-Gy. For comparison - the similar dose in Ukraine reaches 400-600 thousand people-Gy, in Russia - 200-300 thousand people-Gy.

The collective summary dose received by the population in 1986 on the territories with Cs-137 contamination over 185 kBq/m² made up 4330 people-Sv, individual doses from 6,5 to 32,4 mSv, though in some cases they exceeded 50 mSv. The largest contribution to the collective internal exposure dose was made by zones with small contamination density that can be considered the zones of raised disease risk. It is true, first of all, for the zone with Cs-137 contamination level equal to 37-185 kBq/m².

The highest exposure doses of the whole body were registered within the participants of the liquidation of the accident consequences (LAC). Incidentally, doses equal to 50-100 mSv were absorbed by 30 % of the liquidators, 100-250 mSv - 47 %, 250-500 mSv - 7,3 %.

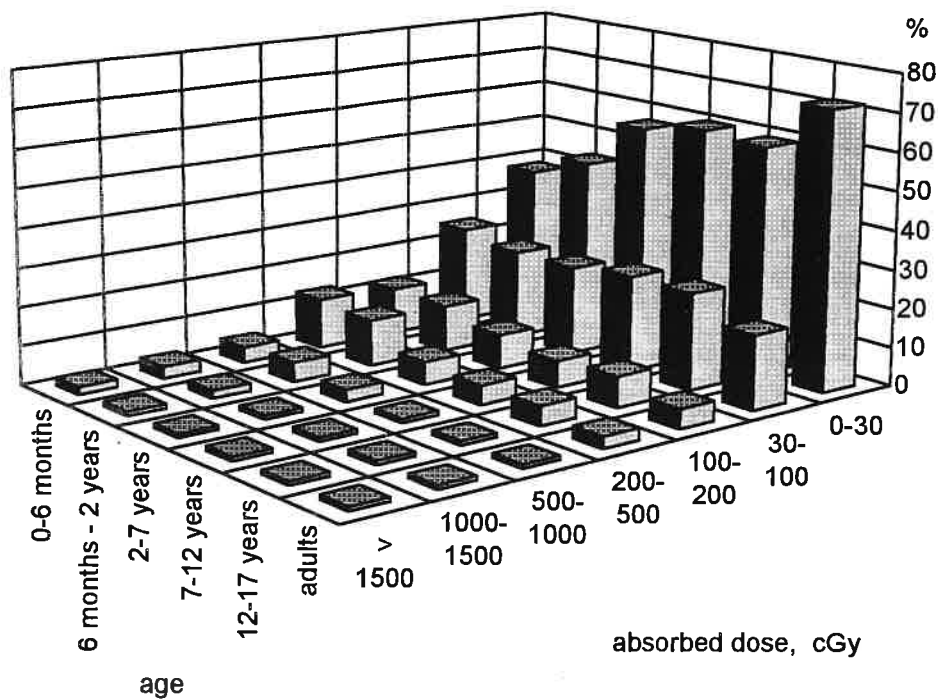


Fig.3.1. Individual doses distribution on thyroid gland of children of different age groups of the population of the republic, %

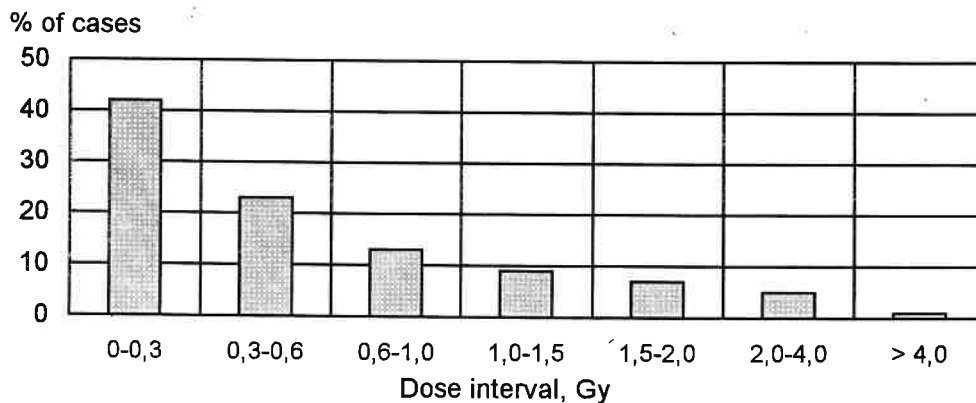


Fig. 3.2. Individual exposure dose distribution of children and adolescents with the tumour thyroid gland diagnosis

Comparable doses were absorbed by the population evacuated from the 30-km zone in 1986. Significant doses were absorbed by the inhabitants of the Khojniki district, a bit smaller ones - by the inhabitants of Bragin and Narovlya districts (Fig. 3.3.). At the same time children absorbed doses equal to those of adults.

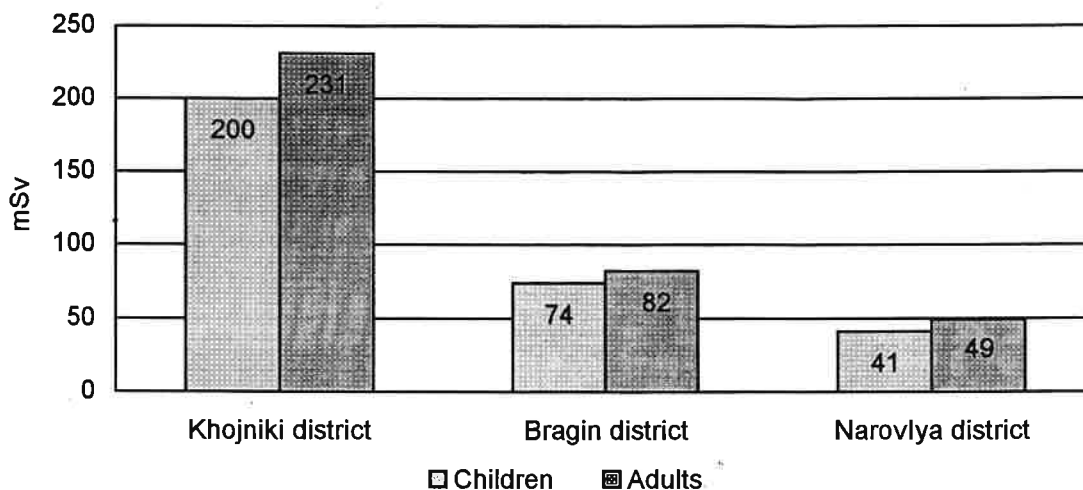


Fig. 3.3. Effective equivalent exposure doses of the evacuated from 30-km zone

3.2. Medico-demographic consequences

Before 1993 the demographic situation in the republic was characterized by the growth of the total number of population. In 1994 the population of the republic decreased and at the beginning of 1995 made up 10 300 000 people.

On 1.01.95 on the Cs-137 radionuclides contaminated territories over 37 kBq/m² there lived 1840852 people including: 75,5 % in Gomel region, 9,9 % in Mogilev, 9,6 % - Brest and 5 % in the rest of the regions of the republic.

In Gomel region 87 % of the whole population live on the radionuclides contaminated territories, among them - 68,1 % of agrarian and 95,5 % of town. In Mogilev region 14,6 %, 28,2 % and 4,0 % correspondingly.

As a whole, in the republic 2,3 % live on the territories of compulsory and subsequent resettlement, 17,2 % - with the right for settling out and 80,5 % of the affected population - with periodic radiation control.

On the territory with Cs-137 contamination of 1480 kBq/m² there live 14 children and 4 adolescents; on the territory with contamination density of 555-1480 kBq/m² - 2346 children and 1577 adolescents.

The decrease of the rural population share is a characteristic feature. In comparison with 1985 the population of Gomel region reduced by 4,2 % while the town population grew by 10,1 % and the reduction of rural population made up 24,8 %. In Mogilev region the total number of population being unchanged, the town population grew by 9,9 %, and the rural - reduced by 16,6 %.

As a whole, the structure of the town population of the republic and also of Gomel and Mogilev regions can be characterized as progressive, and the rural population - as regressive as the number of elderly people exceeds that of children. In the agrarian districts of Gomel region most affected by the Chernobyl catastrophe the population aged above 60 makes up 35-68 % of the total number, whereas children - 10-15 %. In Mogilev region the natural growth of population reduced from +4,9 to -3,0 for 1000 people, in Gomel region - from +7,0 to -1,8.

Infantile mortality in the republic has the tendency to reduction, however, since 1992 it began to grow in the republic as a whole and in the contaminated regions as well (Fig.3.4.).

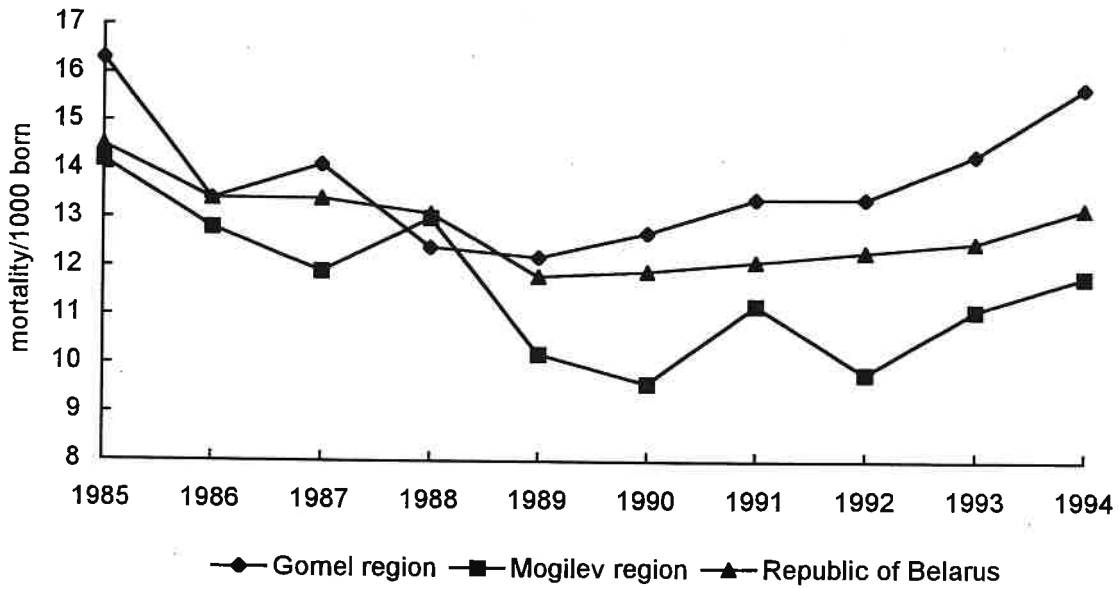


Fig. 3.4. Dynamics of infantile mortality on the contaminated territories and in the republic as a whole (per 1000 born)

The growth of sterile marriages and incomplete pregnancies is registered. From 1986 to 1994 in the republic the birth rate reduced (by 37,4 %) and the population mortality increased (by 29,9 %). This tendency is especially sharp on the contaminated territories of Gomel and Mogilev regions (Fig. 3.5., 3.6.).

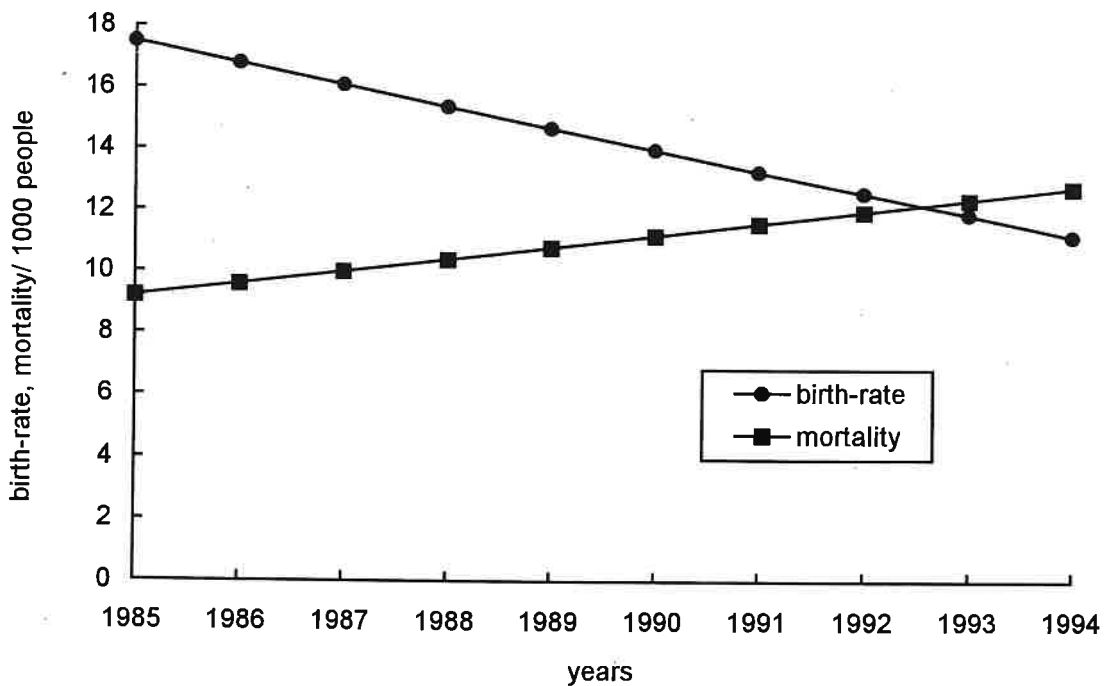


Fig. 3.5. Dynamics of birth rate and mortality indices in Gomel region (per 1000 people)

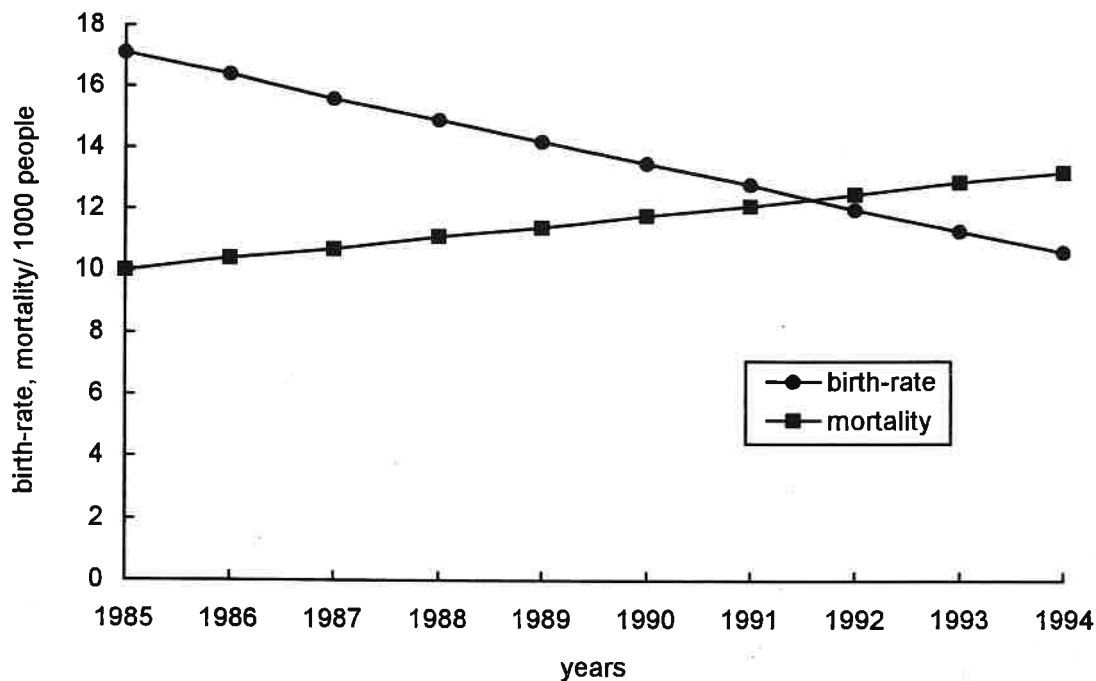


Fig. 3.6. Dynamics of birth rate and mortality indices in Mogilev region (for 1000 people)

3.3. The health state of the participants of the liquidation of the Chernobyl NPP catastrophe consequences and of people evacuated from 30-km zone

Morbidity of the participants of the accident consequences liquidation as a whole and by the main classes of diseases is higher than on average in the republic and has the tendency to increase. (Fig.3.7.). The tendencies revealed for the last years within liquidators 1986-1987 allow to consider them to be a group of high risk for many diseases.

The increase of morbidity of oncological diseases, the endocrine system, the blood circulation system diseases, and the organs of digestion have become characteristic. The liquidators' mortality in 1994 was higher than in 1993. Incidentally, the mortality risk of liquidators of 1986-1987 is 1,4-1,6 times higher than of liquidators of 1988-1989 and 1,3 times higher than of the able-bodied population of the republic as a whole.

The analysis of somatic morbidity confirms to a certain extent the correlation of this index with the Chernobyl NPP accident consequences.

The doses comparable with total body exposure doses of liquidators were absorbed by the population evacuated from the Chernobyl NPP 30-km zone. They also have the tendency to the morbidity increase among adults as well as among children. (Fig. 3.8.)

The initial morbidity of evacuated adults and adolescents in 1994 increased by 3,5 times in comparison with 1993. Mainly men and women at the age from 40 to 60 and older were subjected to the blood circulation system diseases, organs of respiration, digestion and nervous system diseases, from 40 to 49 - tumours; from 20 to 49 - psychic diseases. In 1994 in comparison with 1993 the morbidity of the evacuated population increased on the majority of classes of diseases, including endocrine system - by 5,7 times, blood circulation - by 5,3, nervous system - 4,6, and also organs of respiration, digestion, psychic disturbances, etc. Cataracts,

chronical bronchitis are more often registered (7,2 times), hypertension disease , heart disease, cerebro vascular disease, infectious kidney pathology.

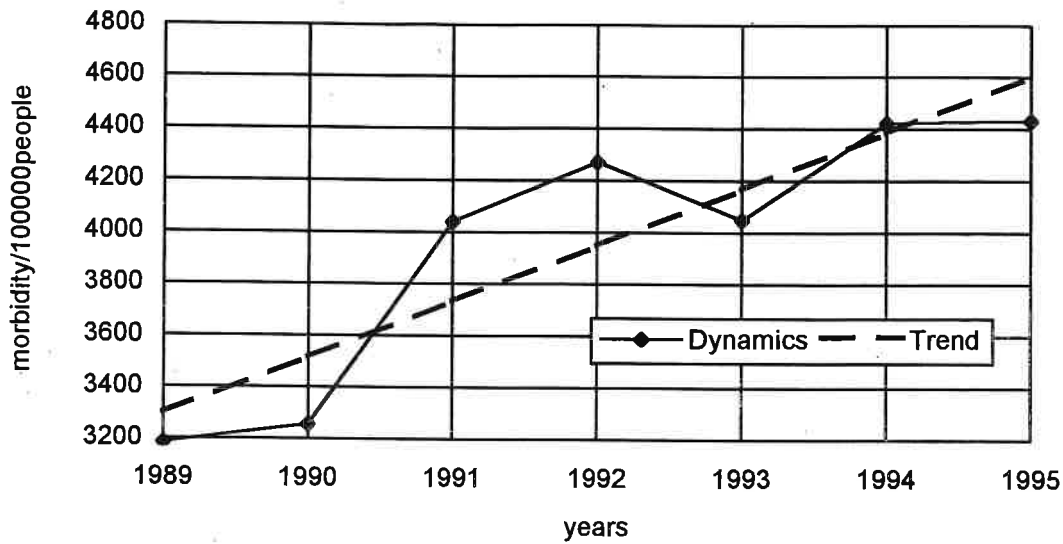


Fig.3.7. Dynamics and trend of morbidity of participants of the liquidation of the Chernobyl NPP accident consequences (per 100000 people)

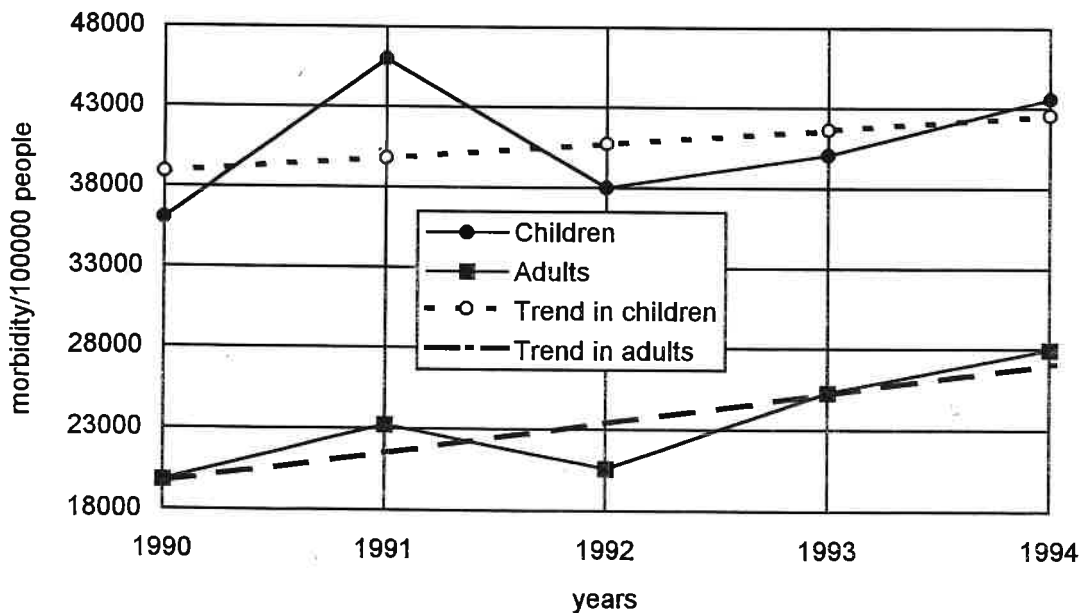


Fig. 3.8. Dynamics of the evacuated population morbidity (per 100000 people)

The mortality of the evacuated population for the period 1990-1994 has got the tendency to increase. Fatal outcomes of diseases in 82,6 % of cases were registered within the group of 60 years and older. The most frequent death reasons were the diseases of the blood circulation system and neoplasms.

3.4. The health state of children subjected to radiation exposure due to the Chernobyl NPP catastrophe

Along with the increase of the pregnancy pathology and confinement there increases the new born children mortality. So, from 1981 to 1986 in Minsk and Gomel regions the noticeable reduction of the growth rates of new-born children morbidity was registered and after 1986 on the whole territory of Belarus there was registered the growth of the average annual rates of this index increase. For the period 1987-1994 the increase of the primary and total morbidity of children on the majority of classes of diseases and constant increase of the number of children with chronic pathologies was registered.

The further increase of neoplasms morbidity and malignant, in the first place, worries. In these groups of the primary account the high rate of morbidity of thyroid gland tumour has been registered. The second place in the morbidity structure of these children belongs to the diseases of the organs of digestion, the morbidity risk of which exceeds the republican level by 2,15 and 3,74 correspondingly. For the classes of otolaryngological diseases and endocrine system diseases as well the morbidity level in 1994 was 1,97-6,25 times higher as compared to the republican one.

The diseases of blood and hemopoietic organs also exceed the average indices of all the children under survey in the republic. The highest level is registered among those born from people subjected to radioactive exposure. These children have also increased 1,8 times the primary morbidity of congenital defects.

The comparison of morbidity indices of evacuated children with analogous data of the children's population of Minsk region has shown that the latter have much less morbidity of blood and hemopoietic organs, of endocrine system and organs of digestion than the children evacuated from the alienation zone. (Fig.3.9.).

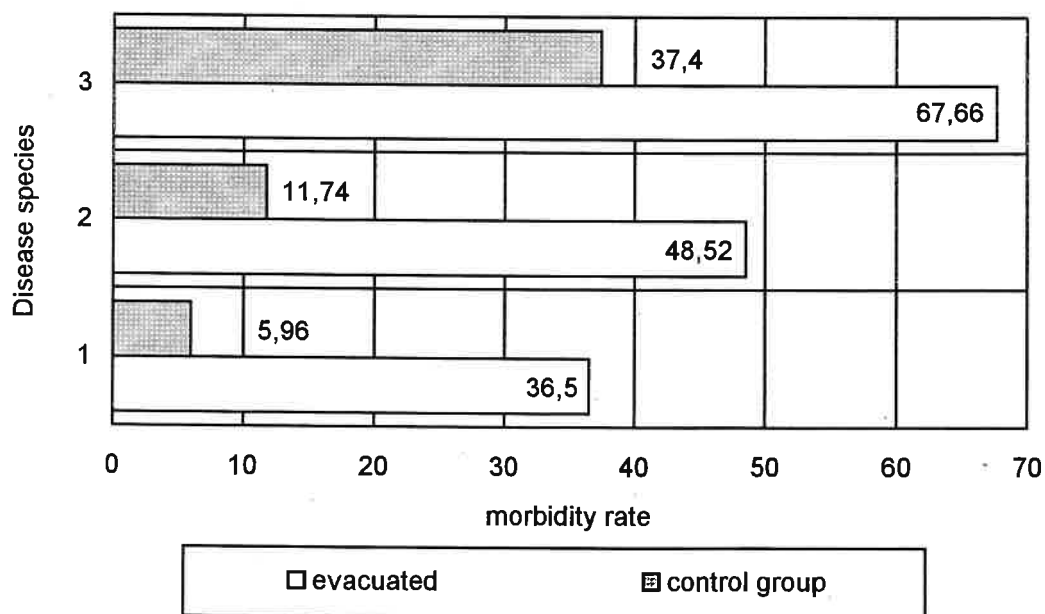


Fig. 3.9. Morbidity of evacuated children and children inhabiting Minsk region in 1994 (for 1000 children): 1 - diseases of blood and hemopoietic organs; 2 - diseases of endocrine system; 3 - diseases of organs of digestion

3.5. Morbidity of the population - inhabit and former inhabitants of the Cs-137 radionuclides contaminated territories over 555 kBq/m².

The group of population inhabiting and resettled from the territories with Cs-137 radioactive contamination level over 555 kBq/m² has the increase of indices of sickness and morbidity on the main classes of diseases.

The most frequent are the diseases of bronchi and lungs system, blood circulation system, digestion, nervous and endocrine systems, organs of perception. Their morbidity index exceeds in 2,1-9,8 times the average in the republic (Fig. 3.10.).

In the post - accidental period the tumour morbidity and other thyroid gland diseases have increased. The same frequency of pathology is observed of the population inhabiting the territories with Cs-137 contamination level of 37-555 kBq/m².

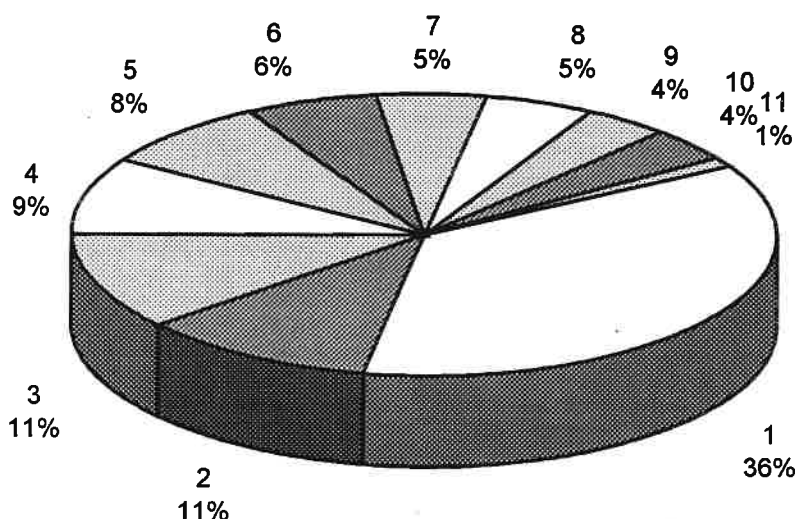


Fig. 3.10. The structure of morbidity of the population inhabiting the Cs-137 contaminated territories over 555 kBq/m² :

- | | |
|---------------------------------------|--|
| 1 - Organs of respiration; | 7 - Infectious and parasitic diseases; |
| 2 - Blood circulation system; | 8 - Urogenital system; |
| 3 - Nervous system and sense organs ; | 9 - Skin and subcutaneous cellular tissue; |
| 4 - Organs of digestion; | 10 - Psychic ; |
| 5 - Bone and muscles system; | 11 - Malignant neoplasms |
| 6 - Endocrine system; | |

3.6. Oncological morbidity

There are certain changes in the structure of oncological morbidity: the specific number of belly tumours has reduced, thyroid gland, respiration organs tumours (mainly at the expense of lungs neoplasms) morbidity has noticeably increased, tumours of urogenital organs, etc. The accumulated data allow to presuppose that it is connected with radiation factor effect.

It is indisputable that the Chernobyl catastrophe influences the increase of thyroid gland tumour morbidity.

For the 10-year period the indices of morbidity of malignant tumours of men increased by 24,1 % (Fig.3.11.) and of women - 22,6 % (Fig. 3.12).

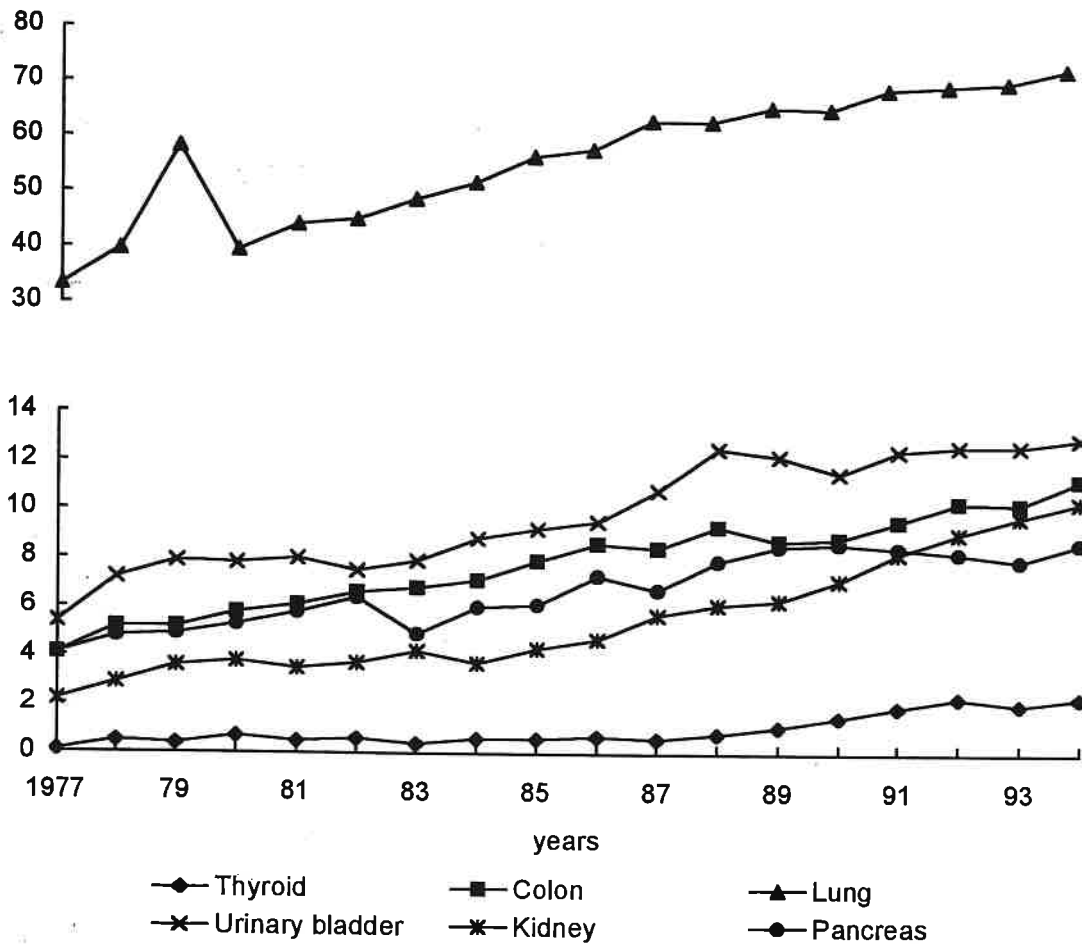


Fig. 3.11. Dynamics of morbidity of men by malignant tumours of various localization (standardized indices per 10000 people)

The dynamics of oncological diseases morbidity has changed in different regions as well. For many years in the pre-accidental period in Belarus there were high morbidity indices in the north-east and the east of the republic (Vitebsk and Mogilev regions) and low - in the west and south-east (Gomel and Grodno regions) and for the last years this regularity has changed. So, in 1988-1989 the morbidity in Grodno region and in 1992 in Gomel region have already reached the level of Vitebsk region.

In the post-accidental period the oncomorbidity of the inhabitants of the compulsory resettlement zones made up 304,1 (indices increment is equal to 56,3 %), in the districts with the right for resettlement this index has increased up to 248,4 (increment - 40,4 %). The index increased in comparatively clean zones up to 238,0 (increment - 31,5 %). The fast increase of morbidity in the districts of strict control has resulted in the increase of the morbidity level in comparison with the rest part of Gomel region (Fig. 3.13., 3.14).

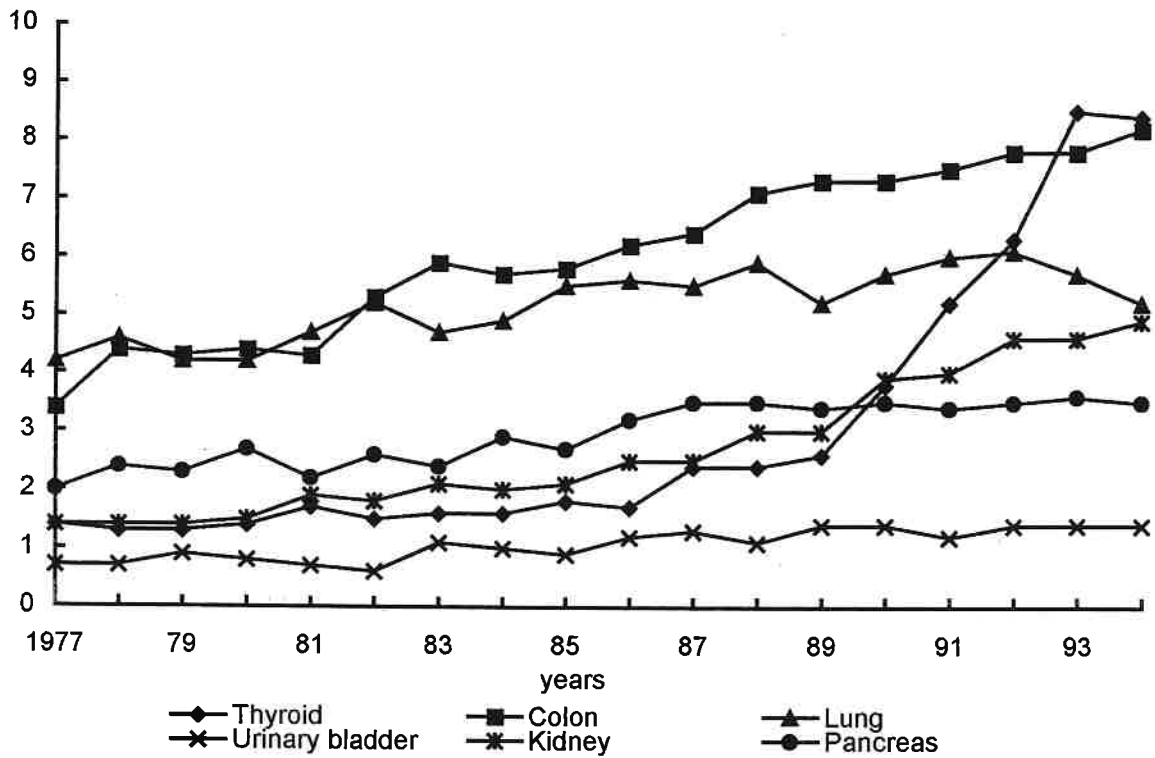


Fig. 3.12. Dynamics of morbidity of women by malignant tumours of various localization (standardized indices per 100000 people)

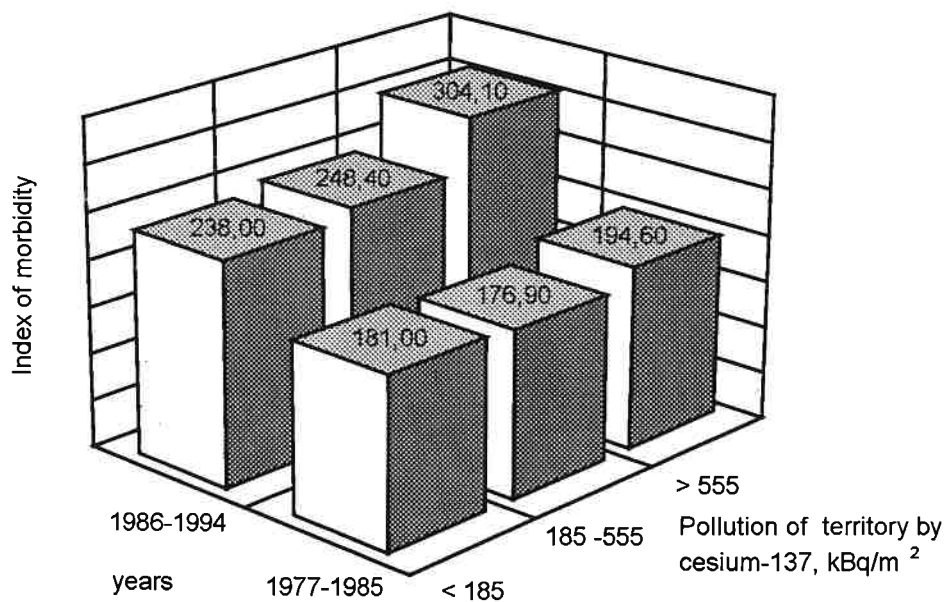


Fig. 3.13. Average intensive indices of malignant neoplasms morbidity of the population of Gomel region depending on the radionuclides contamination degree (per 100000 people)

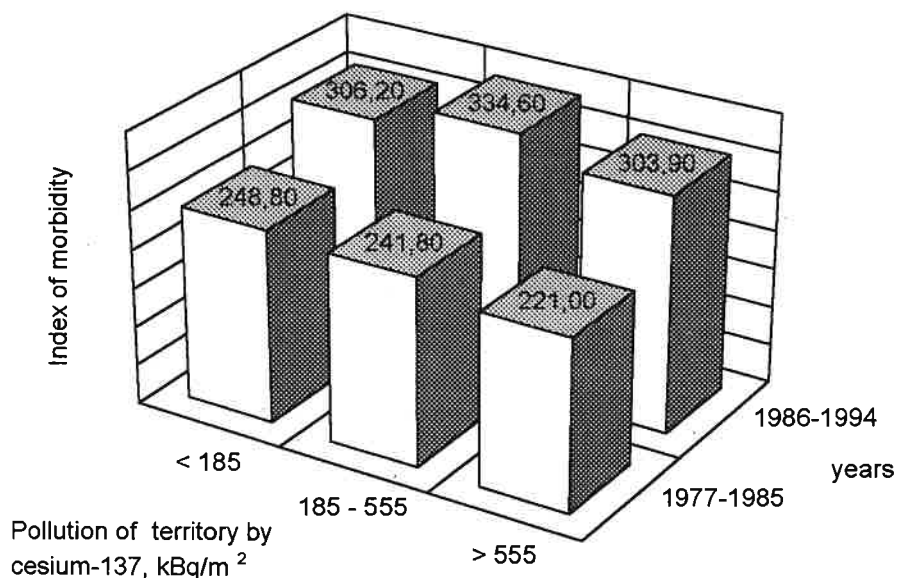


Fig. 3.14. Average intensive indices of malignant neoplasms morbidity of the population of Mogilev region depending on the radionuclides territory contamination degree (per 100000 people)

3.6.1. Malignant thyroid tumours

It is established that the growth of malignant thyroid tumours is connected with the Chernobyl catastrophe consequences. Before the accident thyroid cancer was a rare case (1 case per 100000 people) and was characteristic mainly for the elderly people. For the 15-years period (1971-1985) prior to the catastrophe this tumour was revealed only in 14 children, that is to say, annually 1 child per 1 million children got ill.

The growth of thyroid cancer morbidity began after 4 years after the catastrophe first in Gomel, and then in Brest and other regions and is continuing up to now. (Fig.3.15). For 9,5 years 390 children and 73 adolescents (463 patients total) were operated. Among them the children of Gomel and Brest regions made up 74,5 %. In 1994 the morbidity index per 100000 children's population in Gomel region made up 11,7, in Brest - 5,9. In Belarus this index appeared to be the highest among the European states where thyroid cancer is a rare disease (0,1 case per 100000 children). The average annual thyroid cancer morbidity of children increased approximately 50-times.

The morbidity growth rate of men's population of the republic for the post-accident period has increased 1,5 times, of women's - 18 times as compared with the pre-accidental period. In Gomel region the malignant tumour morbidity growth rate of men increased 6 times, of women - 73 times. In Mogilev region these indices are lower: of men - 5,3 times, of women - 11,3 times.

The prevailing cancer forms are papillary (98,3 %). Less frequent are follicular (1,3 %) and medullary (0,3 %) thyroid cancer forms.

The risk of thyroid cancer has sharply increased within children subjected to irradiation at the age under 3 years old for the moment of the accident.

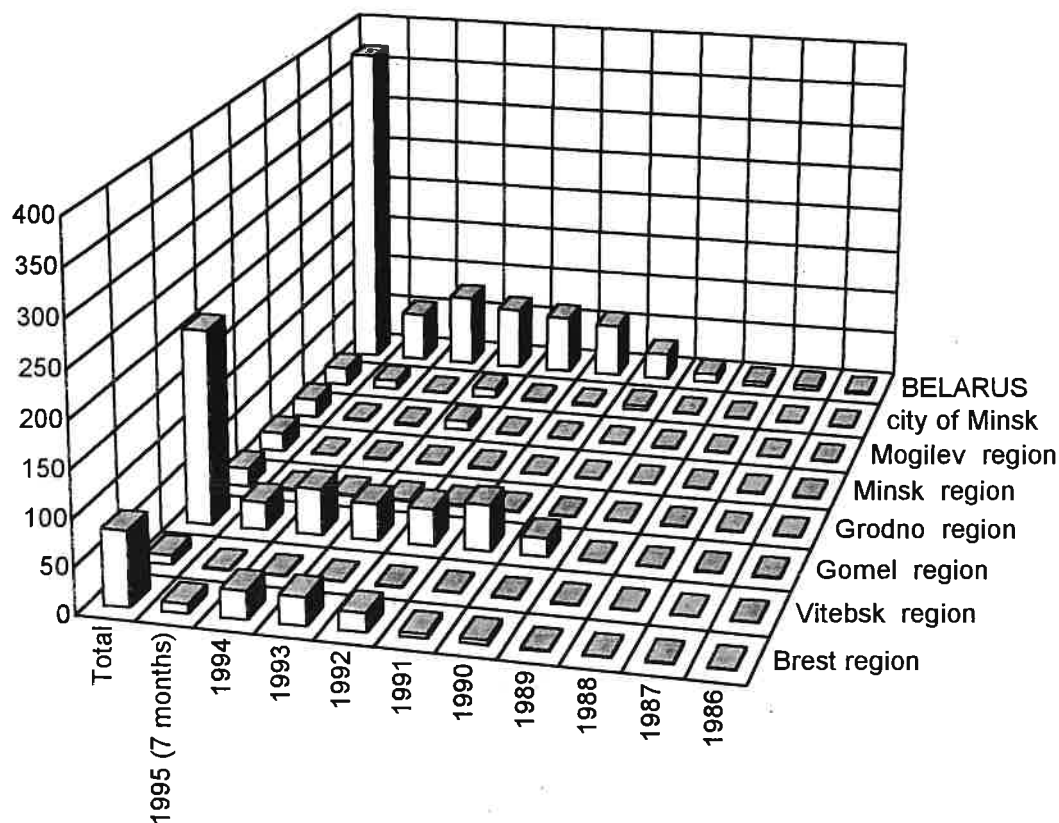


Fig. 3.15. Dynamics of the number of thyroid cancer cases within children for the period 1986-1995

A characteristic feature is a high aggressiveness of thyroid cancer of children. In 48 % of cases the tumour went outside of the thyroid gland and grew into surrounding organs and tissue. 78 % of patients had lymphgland metastasis and thyroid cancer relapses were registered in 2,7 % of the sick.

3.6.2. Lungs tumour

In Belarus lungs malignant tumour morbidity growth is observed in the majority of the contaminated regions. Incidentally, in Gomel region the authentic growth of this pathology is registered among men, as well of women, and in Mogilev region - only of men. The specified changes have happened in these regions for last two years. At the same time it is established that the morbidity growth rate of men in Gomel region is higher.

Lungs tumour incidence in the regions with radioactive contamination $> 555 \text{ kBq/m}^2$ has increased faster than in the zones with the Cs-137 contamination $< 185 \text{ kBq/m}^2$.

3.6.3. Mammary gland tumours

For many years there have been registered the mammary gland cancer incidence, moreover, in Gomel region its growth is registered within women over 40 years old. In other regions

of the republic the similar changes have been observed in older age groups. The average morbidity level in the pre-accidental period (1977-1985) made up 20,5, in the post-accident period (1986-1994) - 28,7. In Mogilev region there is registered statistically significant growth of mammary gland malignant tumours, however, there are no growth rate changes.

3.6.4. Bone tissue tumours

Among radionuclides fallen out of the damaged Chernobyl NPP reactor there was strontium-90 that has the capacity to accumulate in the bone tissue. There are no yet direct proofs of the radioactive strontium or other radionuclides influence on the bone tissue tumours growth rate, however, the fact of such growth within children's population residing Gomel region testifies to its possible interrelation with the radiation factor (in 1981-1985 - 0,3; in 1986-1990 - 0,5; and 1991-1994 - 0,8).

3.6.5. Urinary bladder tumour

In Gomel and Mogilev regions of Belarus already 8 years later after the Chernobyl catastrophe there is registered the growth of bladder tumours incidence. The distinguished growth of this cancer morbidity is registered among the population of Gomel region. In the post-accident period the level of urinary bladder tumour morbidity of men as well as of women increased 2 times and made up: for men - 10,7 (in the pre-accident period - 5,5) and for women - 1,1 (0,6 correspondingly). For men of Mogilev region the morbidity index increased from 7,2 to 12,1, that is to say, 1,7 times. The more intensive increase of the bladder morbidity took place in rural areas. Taking into account that the exposure dose including at the expense of radionuclides incorporation, is higher among rural residents, it can be supposed, to a certain extent, that this increase is stipulated by the radiation component. The considerable increase of the urinary bladder morbidity is registered in Gomel region among people over 35 years old whereas before the Chernobyl NPP accident the sick with this tumour at the age under 50 were a rare case. In Mogilev region the increase of tumours of the given localization took place among residents over 55 years old. The comparable analysis on districts of Gomel and Mogilev regions has shown marked tendency to the bladder tumour morbidity growth in the areas with Cs-137 contamination level over 555 kBq/m². Especially marked is this tendency in Gomel region where in 5 out of 11 such districts there happened the growth rate of this disease.

3.6.6. Kidney tumours

A characteristic feature is the increase of the kidney cancer morbidity level of men in Gomel and Mogilev regions - 2 times, in comparison with the pre-accident period. The growth of this pathology is also registered among women. There is observed the increase of growth rate of kidney tumour morbidity.

The most frequent kidney cancer is registered within adults over 45 years old and children from 1 to 4 years old (Willms' tumour). In particular, the Willms' tumour morbidity of children has increased 2,5 times.

The risk of kidney malignant tumours has considerably increased within the population of the republic aged over 35 years old.

3.6.7. Leukemias and other hemopoietic tissue diseases

For the period of 1979-1985 in Belarus 677 children under 14 years old got ill with acute and chronic leukosis that made up 4,34 cases per 100000 children's population. This level of

leukemia morbidity of the children of Belarus before the Chernobyl accident corresponds to the children morbidity level in other countries. On average in the republic it has made up 4,45 per 100000 children, e.i. has not changed.

The significant difference in the leukemia morbidity of children on the Cs-137 contaminated territories over 555 kBq/m² has been registered as well.

In Fig.3.16. there is represented the dynamics of the hemopoietic system morbidity of the whole population. It is obvious that after the Chernobyl catastrophe in Belarus the considerable growth of leukemias and lymphomas has been registered. The total leukemia morbidity with account of undefined forms for 7 years after the accident made up 11,62 per 100000 people (for the same period before the accident it made up 9,34).

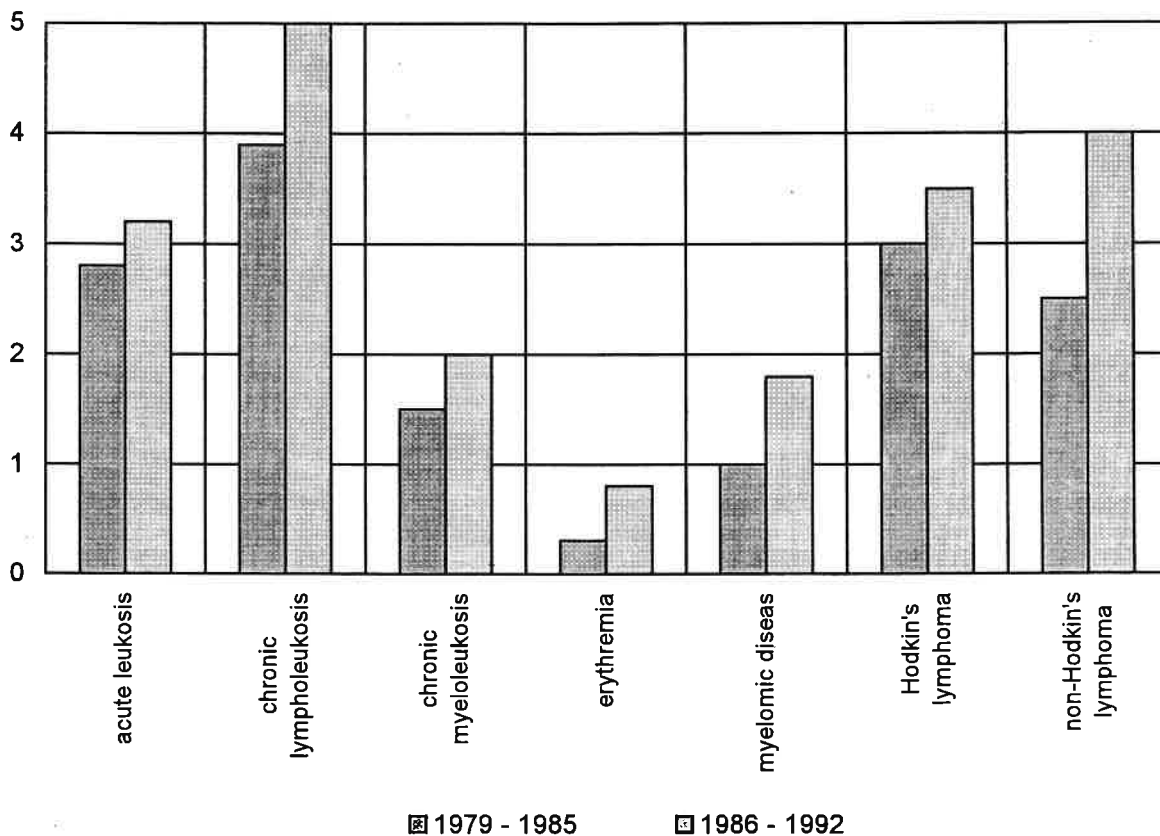


Fig. 3.16. Dynamics of hemopoietic system morbidity in adults (per 100 000 people)

Among the men's population of Belarus there is registered the growth of number of tumours of immunocompetent system: lymphomas, chronic lympholeukosis and myelomic disease. The women have had the acute leukosis morbidity growth. In the age group of 15-40 the lymphogranulomatosis and lymphomas morbidity has grown and at the age of 40-60 leukemias have become more frequent. The age of 60 is the risk factor for hemopathy morbidity.

The analysis of the data of the Belarussian State Register of the Irradiated Individuals and Belarussian cancer-register for 1993-1994 has shown that the liquidators who worked in the 30-km zone for more than 30 days have got the exceeding of leukosis morbidity in comparison with the population of the republic of the similar age groups. Standardized index of the leu-

koses morbidity in the republic among residents at the age of 20-69 made up 10,7 and among liquidators who worked in the 30-km zone, -25,8 cases (per 100000 people).

3.7. Genetic disorders

The most important index of genetic disorders is the birth rate of children with congenital defects. So, the congenital defect frequency index for 1986-1994 made up 4,62 (on the contaminated territory) and 2,55 (in the control zone) per 1000 analyses. The frequency of birth of children with congenital defects of strict account (subjected to compulsory registration) has increased in all the republic. However, the index of such increase on the "clean" territories makes up 39 %, now on the Cs-137 contaminated territories from 37 to 555 kBq/m² - 44 %, and on the Cs-137 contaminated territories over 555 kBq/m² - 79 % (Table 3.1.).

Table 3.1. Dependence of the congenital defects of strict account frequency on the Cs-137 contamination density in Belarus

Density of Cs-137 and the number of districts observed	Years of observation				Ratio of increase
	1982-1985		1987-1993		
	Absolute figure	Per 1000 births	Absolute figure	Per 1000 births	
37-555 kBq/m ² (54)	899	4,56 ± 0,15	1882	6,56 ± 0,15	0,44
>555 kBq/m ² (17)	151	3,87 ± 0,31	338	6,94 ± 0,38	0,79
Control zone (30)	255	3,90 ± 0,24	565	5,43 ± 0,23	0,39

The increase in birth of children with congenital defects in Belarus after the Chernobyl catastrophe is explained to some extent by the growth of mutations induced by radiation.

This is confirmed by the cytogenetic investigation. The evacuated pregnant women, born children, and also population inhabiting the contaminated territories during the long period of time absorbed biologically significant exposure doses that manifests itself in the considerable dicentric and circular chromosomes number increase. As an example, Fig. 3.17. represents the data on the frequency of chromosome aberration of the participants of the Chernobyl NPP accident consequences liquidation and the children with thyroid cancer. The represented data show the intensified frequency of cellular aberrations, the appearance of the single DNA fragments that testifies to undoubted radiation effect on the genetic apparatus and heavy consequences connected with them.

3.8. Somatic morbidity

For the years passed after the accident the structure of morbidity of the population inhabiting the contaminated territories has changed. In particular, the significant growth has been registered in the organs of digestion, blood circulation system, nervous system, organs of respiration and endocrine system morbidity.

3.8.1. Digestive system diseases

The analysis of the dynamics of digestive organs diseases of children and adolescents has shown the frequency increase of this pathology amongst adults as well as children and adolescents residing on the radioactively contaminated territories (Fig.3.18). Among them the leading

role play diseases of stomach , duodenum and biliary ducts. The combined forms of digestive system pathology (chronic gastroduodenites) prevail. Within children evacuated from 30-km zone the digestive organs diseases take second place.

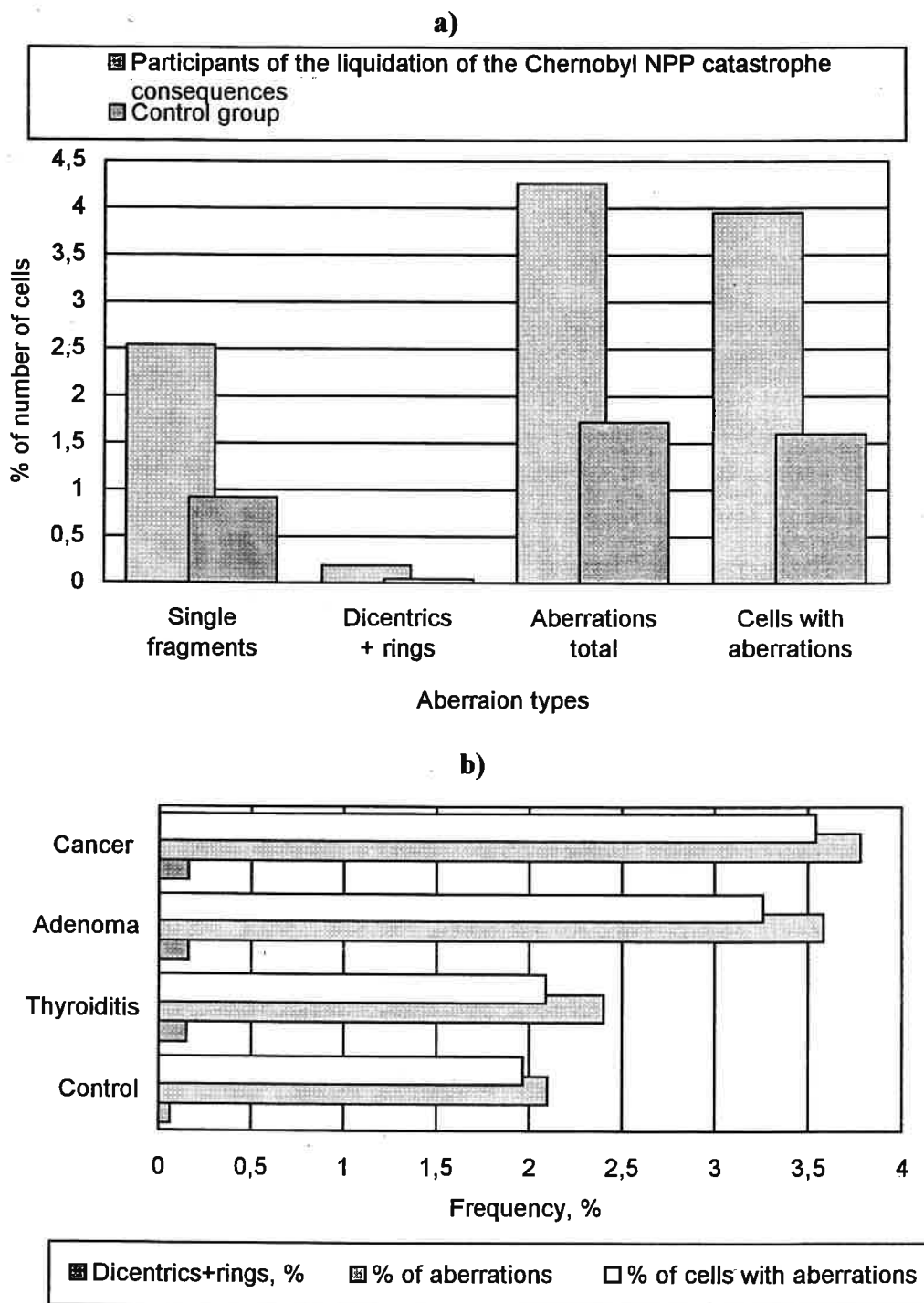


Fig. 3.17. The frequency of chromosome aberrations of the participants of the liquidation of the Chernobyl NPP accident consequences (a) and children with thyroid gland pathology (b)

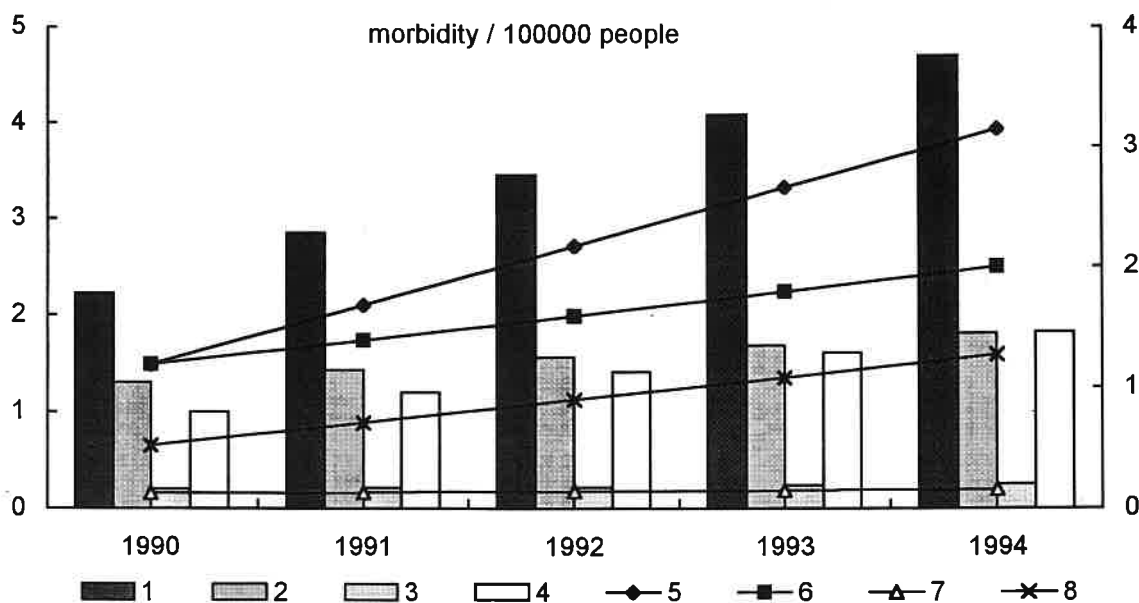


Fig. 3.18. Tendencies for primary morbidity of the adult population of Gomel and Mogilev regions (columns - Gomel region, lines - Mogilev region):
1,5 - chronic gastritis; 3,7 - kidneys diseases;
2,6 - ulcerative disease of the stomach; 4,8 - cholelithiasis

The data available on dynamics of population morbidity inhabiting the contaminated territories of Gomel and Mogilev regions allow to forecast the further growth of a number of diseases: of children - stomach, liver and biliary ducts diseases, of adults - chronic gastritis, ulcerative disease of the stomach, etc.

3.8.2. Cardiovascular system diseases

A characteristic feature is a comparatively higher specific weight of the wide distribution of cardiovascular diseases among population affected by radiation. (Fig.3.19.).

This tendency is especially marked among the evacuated adult population. Blood circulation system morbidity has increased 1,5 times for the past five years and exceeded the average morbidity index on these classes of diseases 3,7 times.

3.8.3. State of psycho-emotional sphere

Changes of neurological, psycho-emotional status and immune system disorders within the affected population testify to tension and dysfunction of the adaptation systems of organism to exhaustion of protective neuro-psychic mechanisms.

Persons affected by radiation are characterized by the lowering of the psychic adaptation level, caused by lack of self-confidence, unstable self-estimation and pessimistic estimation of their future. There is also a tendency for raised exhaustion of nervous system, decreasing of capacity for work, weakening of concentration and stability of attention.

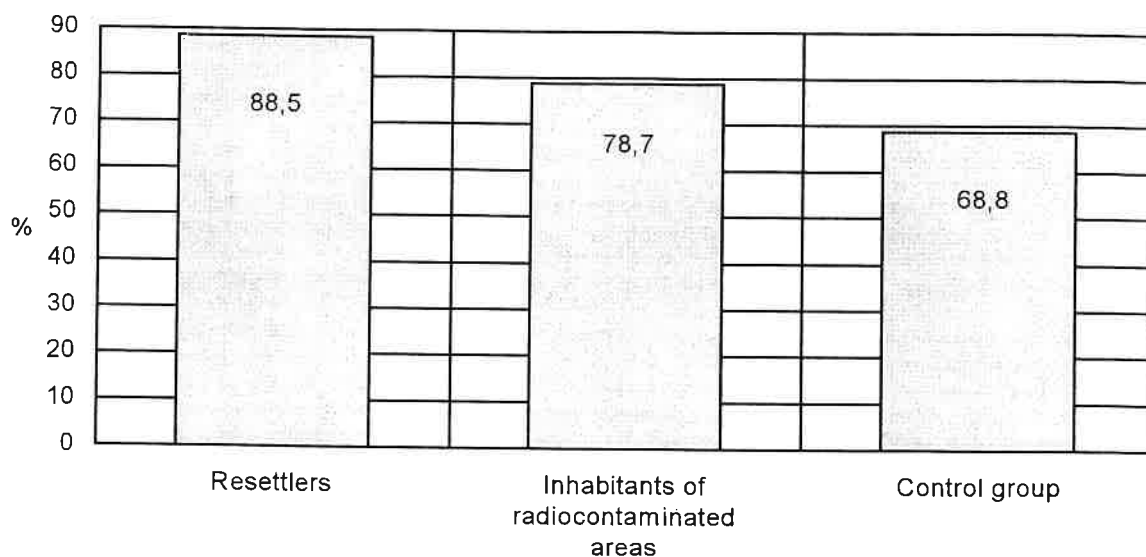


Fig. 3.19. Specific weight of cardiovascular system diseases in all the diseases of different groups of population

The specific peculiarities of psychogenic disorders caused by the catastrophe are determined by the following reasons:

- complex character of the effect of different factors;
- insufficient knowledge of radiation effects;
- constant apprehension for the health and well-being of themselves and their families, especially children;
- unexpected change of the life stereotype (forced resettlement, the break of the former life, changing the place and the character of work, etc.);
- the necessity of constant keeping precaution measures and prophylactic medical examinations;
- restricting possibilities of social and professional self-determining, especially for young people;
- acknowledgment dissonance connected with information about the radiation situation and the possible negative consequences as well.

This action has accumulative character and the range of this syndrome distribution increases constantly. So, in 1987 48 % of the examined were subjected to it, in 1991 - 54, in 1995 - 74 %.

The mass socio-radioecological stress engenders some types of adaptation syndromes:

- Increased somatization of alarming expectations (“escape into illness”);
- The depreciation of needs (socio-psychological apathy);
- The fixation on unpleasant traumatizing feelings (the case - hopeless syndrome).

Increased somatization of alarming expectations that is characteristic for 74 % of the affected population.

Widely spread is also such kind of post-traumatic stress syndrome as fixation of socio-psychological states if individuals on unpleasant, traumatizing feelings. 62,6 % of the examined

in these districts have the feeling of lost private safety and unbelieve in future that by itself testifies to the deepest socio-psychological trauma. Such situation creates pessimistic perception of reality within the third part of the residing population.

The above mentioned testifies to the fact that 10 years later after the accident the deadaptation forms of behaviour are still wide- spread.

The examination of children with supposed foetus cerebral damage shows that this category is often characterized by psychic development delay, asthenic states and vegetovascular pathology. This testifies to the fact that nuclear catastrophe consequences may influence negatively on a mam before his birth.

3.8.4. Respiration organs diseases

The highest specific weight in the structure of the children's population morbidity inhabiting the contaminated territories belongs to respiration organs diseases. Incidentally, the average annual growth rate exceeds the one for other classes of diseases. For the post-accident period the frequency of these diseases increased more than 2 times.

There is a direct correlation between the degree of Cs-137 contamination and respiration organs morbidity indices (Fig. 3.20).

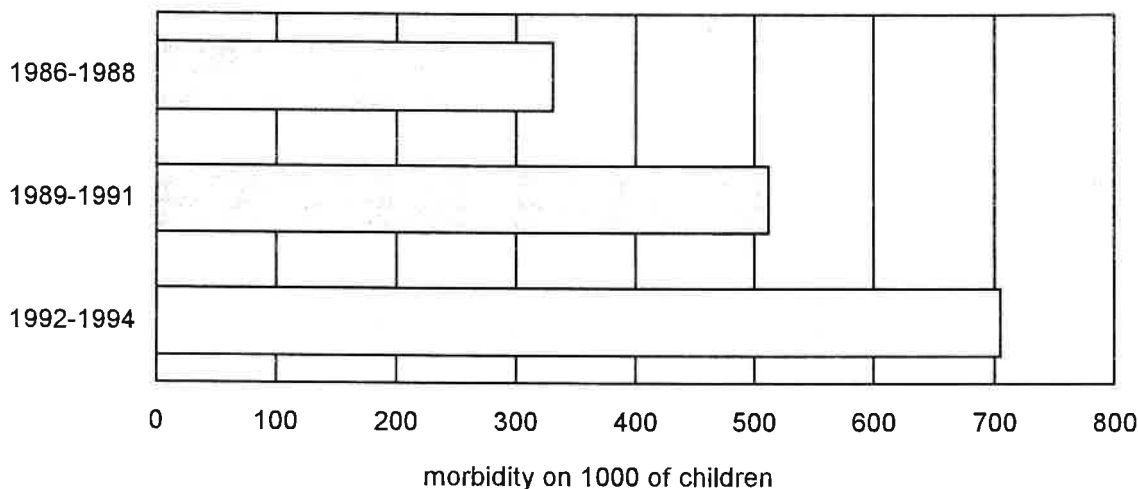


Fig. 3.20. Dynamics of the respiration organs morbidity of the children's population of Luninets district, Brest region

3.8.5. Thyroid gland diseases

In the structure of the primary endocrine system morbidity thyroid gland pathology prevails, incidentally, the annual morbidity of thyroid gland diseases is higher within liquidators and also population evacuated from 30-km zone and residing on the territories with high contamination density (Fig.3.21.).

The children inhabiting in radionuclides contaminated areas have higher frequency of thyroid gland knot pathology and autoimmune thyroiditis than those evacuated from 30-km zone (Fig.3.22.).

The analysis of the thyroid gland functional state has shown that the pathological states of the children and adolescents who have their thyroid gland exposed (1-2 Gy), are more frequent.

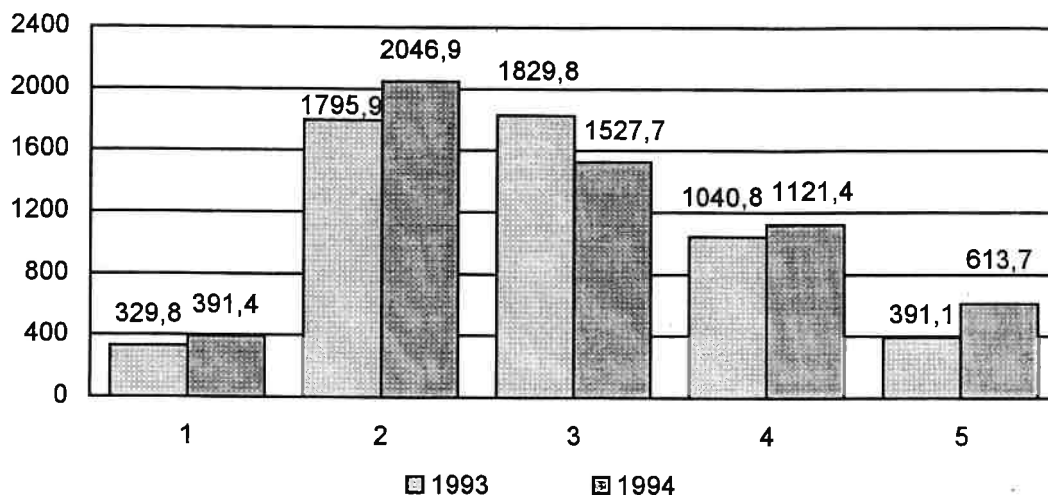


Fig. 3.21. Morbidity of thyroid gland diseases of adults and adolescents affected by the Chernobyl catastrophe consequences (per 100000 people):

- 1 - adults and adolescents in total;
- 2 - liquidators;
- 3 - evacuated from 30-km zone;
- 4 - population residing the contaminated territories (555 kBq/m² on caesium-137);
- 5 - population residing the contaminated territories (37-555 kBq/m² on caesium-137)

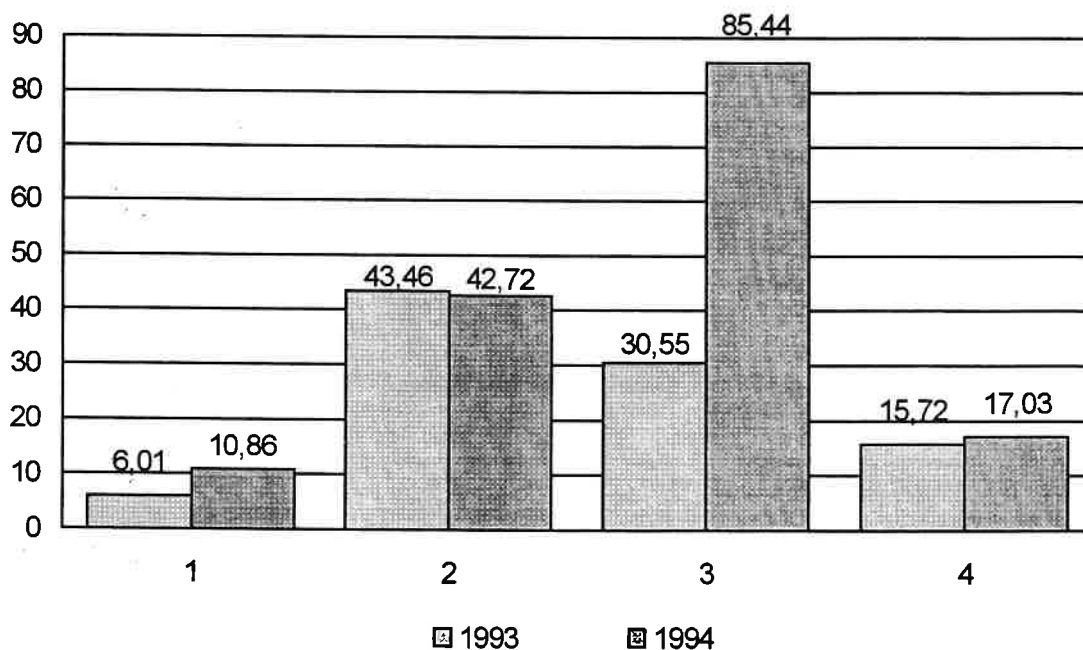


Fig. 3.22. Morbidity of the thyroid gland diseases of children affected by the Chernobyl catastrophe consequences (per 1000 children):

- 1 - data for the republic as a whole;
- 2 - morbidity of children evacuated from the 30-km zone;
- 3 - morbidity of children residing and settled out of the radionuclides contaminated territories (over 555 kBq/m²);
- 4 - morbidity of children born from parents affected by the Chernobyl NPP catastrophe.

* * *

Thus, in the post-accident period the affected population has more significant, in comparison with the republican indices, morbidity growth practically on all classes of diseases and in the first place, digestive, cardiovascular, nervous, endocrine, urinogenital, otolaryngological, among adult as well as children's population. There continues worsening of the health state of children and adolescents permanently residing radioactively contaminated territories especially accompanied by long-lasting and considerable accumulation of long-living radionuclides by the organism - Cs-137 and Sr-90. The health state of the participants of the liquidation of the Chernobyl NPP catastrophe consequences and evacuated from alienation zone, absorbed considerable radiation doses for the whole organism (the growth of endocrine, cardiovascular, nervous systems diseases, etc.).

In the republic a considerable increase of thyroid cancer morbidity of children and adolescents especially in Gomel and Brest regions has been registered. This is stipulated by dose burdens on thyroid gland at the expense of iodine-radionuclides in the first period after the accident, goiter endemia, incorrect iodine prophylactics, etc.

Alongside with it in Gomel region mainly there is observed the marked increase of oncological diseases morbidity, especially in areas with high radionuclides contamination level and subsequently with larger radiation doses. This in the first place concerns the increase of morbidity of lungs, mammary gland, urine bladder, kidney cancer, etc.