

Report No. 23883-BY

**BELARUS:
Chernobyl Review**

Draft for Discussion with the Government

April 8, 2002

**Ukraine and Belarus Country Unit
Europe and Central Asia Region**



Document of the World Bank



Currency Equivalents
Currency Unit=Ruble (BYR)
January 2002: US\$1=BYR1,600

Government Fiscal Year
January 1 – December 31

Weights and Measures
Metric System

ACRONYMS AND ABBREVIATIONS

BIPM	Bureau International des Poids et Mesures
BYR	Belarusian Ruble
CAS	Country Assistance Strategy
CIS	Commonwealth of Independent States
FAO	Food and Agriculture Organization
FSU	Former Soviet Union
GDP	Gross Domestic Product
IAEA	International Atomic Energy Agency
IRMM	Institute for Reference Materials and Measurements
MCB	Minimum Consumption Budget
MSL	Minimum Subsistence Level
NGO	Non-Governmental Organization
NIST	National Institute of Standards and Technology
NPL	National Physical Laboratory
NPP	Nuclear Power Plant
OCHA	Office for the Coordination of Humanitarian Affairs
PSD	Private Sector Development
SANEPID	Sanitary-Epidemiological Services
SME	Small and Medium Size Enterprise
TA	Technical Assistance
TACIS	Technical Assistance for CIS (European Union)
UNDP	United Nations Development Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
UNIDO	United Nations Industrial Development Organization
USSR	Soviet Union
WHO	World Health Organization
VAT	Value Added Tax

Vice President:	Johannes F. Linn
Country Director:	Luca Barbone
Team Leader:	Lilia Burunciuc

ACKNOWLEDGEMENTS

This report was produced by Lilia Burunciuc, Luis Alvaro Sanchez, Arvo Kuddo, Joana Godinho, Vladimir Kreacic, Larisa Leshchenko, Miroslav Ruzica, Eugenia Marinova, and Elena Klochan. The report relies on work produced by Anil Markandia and several other colleagues from ECSSD under the Environment Sector Review. Galina Sotirova and Segiy Kulyk provided useful inputs. Konstantin Senuit compiled statistical information. Dorota Kowalska formatted the report.

The report is issued under the supervision of Luca Barbone, Country Director (ECC11). Helena Ribe (LCSHD) was the peer reviewer.

The report was discussed with the Government, academia, civil society organizations and donors at a seminar held in Minsk on May 28, 2002. In addition, two regional meetings were held in Mogilev and Gomel. We are grateful for the assistance of many Belarusian officials who have been most forthcoming with their time, information and comments, in particular Messrs./Mme. Vladimir Tsalko, Valery Shevchuk, Andrei Sokolov, Svetlana Butko, Valery Gurachevsky, Zoya Trofimchyk, and Gennady Antsyov (Chernobyl Committee); Valentin Stezhko (Ministry of Health); Anatoly Sverzh, Emma Ivanova, Vladimir Amarin, and Vladimir Belsky (Ministry of Finance); Antonina Morova (Minister of Labor and Social Protection); Anatoly Zagorsky (Mogilev Oblast Executive Committee); Anna Zhetlukhina, Tatiana Polevtsova, and Svetlana Novosyolova (Ministry of Statistics and Analysis).

TABLE OF CONTENTS

EXECUTIVE SUMMARY AND RECOMMENDATIONS.....	I
INTRODUCTION	1
CHAPTER 1: THE SITUATION TODAY.....	3
Contaminated Zones	4
Environment and Agriculture.....	5
Demographics and Health.....	7
Employment and Poverty.....	12
Economic Development in Affected Areas.....	14
CHAPTER 2: CHERNOBYL BUDGET.....	19
The History	19
Institutional Arrangements.....	21
Chernobyl Expenditures.....	22
CHAPTER 3: REVIEW OF CHERNOBYL PROGRAMS	26
Social Programs.....	26
Health Programs.....	31
Social Services	34
Resettlement.....	36
Protective Measures in Agricultural Production of "Clean" Food.....	38
Environmental and Food Monitoring	39
Measures to Support Economic Development	40
Information and Education.....	41
Main Government Achievements and Failures	45
CHAPTER 4: IMPROVED APPROACHES	46
Is the Current Approach to Chernobyl Consequences Sustainable?.....	46
Focusing Attention on Highly Contaminated Areas.....	47
Finding New Ways of Informing the Public	48
A New Approach to Economic Development of the Affected Regions	48
Streamlining and Refocusing Government Programs.....	49
Improving the Institutional Setting.....	52
An Agenda for the World Bank and Donors.....	52

LIST OF TABLES:

Table 1:	Zoning of the Territory of Belarus According to Radioactive Contamination and Dose Loads on Population
Table 2:	Natural Increase of Population (per 1000)
Table 3:	Poverty Rates by Region, %
Table 4:	Breakdown of Social Expenditures by Main Categories, 1999-2001, %
Table 5:	Categories of "Chernobyl Victims"
Table 6:	Child Care Allowances for Families with Children under 3 Years of Age, October 2001, BYR
Table 7:	Monthly Chernobyl Cash Allowance per Family Member in 2001, BYR
Table 8:	State Chernobyl Register
Table 9:	Number of Hospitals, Ambulatories, Polyclinics and Hospital Beds by Region, and Number of Physicians in 2000
Table 10:	Resettlement Program, 1986-2000

LIST OF CHARTS:

Chart 1:	Population Age Structure in Contaminated Districts of Gomel and Mogilev Oblasts as of January 1, 2001
Chart 2:	Average Annual Birth Rate, per '000
Chart 3:	Average Annual Death Rate, per '000
Chart 4:	Infant Mortality Rates, per '000 Births
Chart 5:	Chernobyl Expenditures as Share of GDP
Chart 6:	Breakdown of Chernobyl Expenditures by Three Main Categories

LIST OF BOXES:

Box 1:	Radiation and Radioactivity
Box 2:	ETHOS Project – Rehabilitation of Living Conditions in the Chernobyl-Affected Areas

ANNEX:

A.	Indicators of Social Development (23 Tables)
B.	Indicators of Economic Development (16 Tables)
C.	Indicators of Public Expenditure (12 Tables)

ATTACHMENTS:

1.	Business Climate in the Contaminated Oblasts
2.	Institutional Budgetary Arrangements
3.	Belarusian and International Health Studies

MAP

EXECUTIVE SUMMARY AND RECOMMENDATIONS

i. The world's worst nuclear accident occurred in Chernobyl on April 26, 1986, releasing at least 100 times as much radiation as the atomic bombs dropped on Hiroshima and Nagasaki. The most affected country was Belarus, for which the environmental, health and other consequences of the Chernobyl accident were disastrous. A significant part of the radioactive fall-out after the explosion at the Chernobyl nuclear power plant landed on the Belarus soil, affecting approximately 2.5 million people.

ii. The accident has had detrimental consequences for the people affected by the accident, and especially for those who still reside on contaminated lands. In addition to the economic hardships brought by the transition to the whole post-soviet region, these people have to deal with additional challenges posed by the radioactive contamination, including health consequences (the extent of which are still unclear), depressed economic development, an elevated level of poverty and uncertainty about their future -- especially the future of their children.

iii. Belarus has expended a considerable amount of its resources on mitigating the consequences of the accident. The present value of resources spent from the republican budget since 1991 amounts to about 20% of the 2001 GDP¹. Isolated donor efforts have occurred in areas such as health treatment, equipment, radiation monitoring, and children's health recuperation, but their contribution is small comparable to the magnitude of Belarus's effort.

The Situation Today

iv. The situation today in the affected areas is the result of a combination of several factors. These are (a) the overall socio-economic situation in the country, (b) the uncertainty of the effects of radiation on human beings, and (c) the effectiveness of public programs in mitigating the consequences of the accident. The combination of these factors makes it difficult to determine which factors are dominant. Therefore, it is difficult to single out the direct consequences of Chernobyl with great certainty.

v. Nevertheless, the present report reveals the following:

- Notable differences exist between the zones with relatively mild levels of contamination (Zone 1) and those with higher levels (Zones 2 and up) as far as health, economic and social consequences are concerned.
- Contaminated areas suffer from a distorted demographic structure. As a result of resettlement programs and voluntary migration, the percentage of elderly individuals in contaminated areas is higher than the national average. In addition, a large proportion of skilled and entrepreneurial people have left the region.
- The affected territories are mostly agricultural, and tend to be poorer than urban areas. Cash incomes are low; people complement their incomes with small-plot production on contaminated lands.

¹ This report does not attempt to calculate the full cost of the Chernobyl accident to Belarus. Rather, the report takes stock of the situation today, reviews current programs, and provides suggestions for how to reorient the Chernobyl strategy towards economic growth, contain the lingering effects of the disaster, and reduce the risks to the population in more efficient ways.

- The potential for economic activity is rather limited, as (a) the economic situation of large farms, which provide most of the income and employment in the region, is deteriorating and (b) the opportunities for private economic activity and self-employment, already at a very low level, are more limited than in the rest of the country. The age structure of the population, the scarcity of skilled people, the measures needed to control contamination, and the need to certify production as radiation-free make matters even worse.
- It has clearly been established that the incidence of thyroid cancer in children has increased as a result of exposure to radiation. Other health consequences for those exposed to different doses of radiation in the long run remain to be seen.
- It is certainly difficult to separate the direct impact of radiation from the indirect impact that may come from psychological perceptions of risk, the consequences of the economic downfall and the quality of health services. Thus, it is not surprising that the affected areas experience health problems similar to those in the rest of the country, while people, inside and outside the affected areas, firmly believe that radiation has had a significant negative health impact on them and especially on their children.
- People are ambivalent about the effectiveness of government programs on Chernobyl, as shown by the sociological survey.
- Although sufficient information on radiation is available, the sociological survey revealed that it is not reaching large groups of the population, and that what information is disseminated is not trusted.

Public Programs

vi. Since Belarus' independence in 1991, the objectives of the Belarus Government have been to limit the health risk of radiation for the population, implement social protection measures, and reduce the environmental and economic consequences of the catastrophe. In implementing its strategy, the Government has achieved some notable successes during the 16 years following the accident. It has minimized the collective radiation dose of the population, developed farming and processing technologies to reduce the level of radiation in food, provided good care for those who fell ill with thyroid cancer and other illnesses, and made a significant contribution to the scientific understanding of the possible causes, scenarios and consequences of nuclear power plant accidents.

vii. However, this strategy has also had unintended consequences. The heavy emphasis on social assistance has encouraged a "victim mentality" and dependency on state support. Also, some programs are not directly addressing health or other consequences; rather, they address exposure to risk by linking benefits to place of residence. Meanwhile, insufficient attention is given to economic development and to boosting the confidence of the people in taking a more proactive role in their lives. Moreover, while mean radionuclide intake has decreased, some groups of people, especially those in rural areas, are still exposed to high doses of radiation, mainly through food intake. Finally, the current strategy has failed to increase the trust and reduce the anxiety of the population.

viii. The effectiveness of previous government interventions must be reviewed in an historical context. Some measures that were relevant immediately following the accident have become less appropriate over time. The changing social and economic environment calls for new approaches 16 years after the accident.

Sustainability of the Current Strategy

ix. An important question is whether the Government can or should continue current programs. The Government is aware that some of its approaches no longer correspond to evolving circumstances and is willing to introduce necessary changes. In re-evaluating the current approach to Chernobyl consequences, this report suggests that the following facts are taken into account:

- *Limited budgetary resources.* The shortage of fiscal resources, which is likely to increase in the future, will significantly limit the Government's ability to continue current programs, which are already not being fully fulfilled.
- *Differentiated approaches.* There is a need to differentiate programs and strategies depending on the level of contamination, as problems and complications created by radiation are different in different zones. The zone with mild radiation levels (Zone 1), according to most experts, can be made fit for adequate and even prosperous living with limited, cost-effective measures to reduce radiation exposure. The zones with higher levels of contamination would require a different strategy focused on greater monitoring, provision of health and social services, and other assistance.
- *Need to learn from the effectiveness of past programs.* Some government programs have been more effective than others. The Government should conduct a careful review and eliminate those programs that are the least cost-effective. This should be a continuous activity that would provide the basis for further strategic decisions.
- *Take account of poverty considerations.* Poverty is an emerging problem in many rural areas, especially the remote ones; this fact should serve as the context in the development of mitigation programs.
- *Need to improve the reliability of the radiation monitoring and product certification system.* The entire system of food monitoring and certification needs to be improved in order to increase buyer confidence in the reliability of the system.
- *Need to learn from how people have adjusted to the consequences of the accident.* The Government should try to learn more from those who have adjusted to the conditions in the contaminated zones and introduce programs that promote healthy lifestyles and encourage personal initiative.
- *Need to improve the institutional set-up.* The Chernobyl Committee should strengthen its focus on coordination while transferring implementation issues to the ministries where they belong – social programs to the Ministry of Labor and Social Protection, health and recuperation programs to the Ministry of Health and agriculture countermeasures to the Ministry of Agriculture.
- *Need to align the Chernobyl program with country-wide reforms.* Many issues regarding Chernobyl-related problems, such as inefficiencies in the health care, education and social care systems and the economic development climate are generic in nature; these areas need major reforms countrywide.

Recommendations

x. Based on the evaluation of existing programs, the economic and social situation in the contaminated territories, the opinion of the population and the criteria set forth above, the key recommendations of this report are as follows:

xi. **Focusing Attention on Highly Contaminated Areas.** The Government should focus on the issues faced by the highly contaminated areas – Zone 3 and, to a certain extent, Zone 2. Many settlements in these zones are in economic disarray, have a high proportion of elderly population, suffer from elevated levels of poverty, and cannot offer adequate social, health and other services to their residents. People in these zones perceive themselves to be much sicker than others, according to the sociological survey. Most concerning, they seem to have given up on themselves and do not care about self-protection measures or their future. Special assistance programs should be specifically designed and targeted to serve these people.

xii. **Finding New Ways of Informing the Public.** The results of the survey suggest that the current information program is not reaching large numbers of people, and that the information is considered unreliable. This is not only a problem with the information strategy but also a deficiency of the overall Chernobyl strategy of the Government, which has failed to gain the interest and understanding of the population. A new, improved Chernobyl strategy should be designed, as described in this report, in tandem with a new information strategy. The latter should embrace a comprehensive approach to promoting healthy lifestyles, accompanied by concrete activities that would encourage people to improve their lives. In the health sector, for example, health education aiming at reducing internal and external radiation should be developed in the context of health promotion policies and interventions that aim at reducing the main causes of burden of disease, especially amongst the poorest populations.

xiii. **A New Approach to Economic Development of the Affected Regions.** Economic development should be a key priority of the Government. Programs should shift from those that create a victim and dependency mentality to those that support opportunity, promote local initiatives, involve the people and spur their confidence in shaping their destiny.

xiv. *Improve business climate and support private sector development.* The Government has developed a new vision of private sector development (PSD) in the country, which includes streamlining registration and licensing and reducing the golden share provisions in privatization. It should build on this vision in order to develop a new approach to PSD in the Chernobyl regions as well as countrywide. It could start with some experiments/pilots in contaminated oblasts that are likely to attract potential entrepreneurs and lead to faster growth.

xv. *Support rural development.* The Government can promote sustainable livelihoods and economic development in rural areas by improving the environment for agribusiness and other business development. For example, the Government could make rural development packages available to those individuals who would like to engage in private activities both agricultural and non-agricultural (such as rural services, education, micro-credits, marketing assistance, etc.).

xvi. *Provide economic incentives.* The use of economic incentives and the improvement in the business environment should proceed in tandem, as the use of tax and other incentives to attract entrepreneurial and skilled people to the region may not work in an unfriendly business environment or because badly designed instruments may lead to perverse incentives.

xvii. **Streamlining and Refocusing Government Programs.** If the main objectives of the Government are to reduce the exposure of the population to radiation and to provide support to those who have been directly affected by the accident, the current programs need to be refocused in order to meet these objectives in a cost-effective manner. The review of current activities confirms that many existing programs do not quite meet these objectives. When reconsidering the Chernobyl programs, emerging priorities should be considered and program adjustments should be guided by the following criteria: (a) aligning programs with new objectives; (b) preventing the creation of perverse incentives; and (c) matching the mandates

with available resources. A significant discrepancy between the commitments and the actual delivery of benefits will hamper the credibility of these programs.

xviii. Thus, the report recommends that (a) certain programs should be strengthened and expanded (e.g. and dissemination of information and education, monitoring and certification; provision of better primary health services, including psychological support; provision of social care in highly contaminated areas, support for clean food production;); (b) others should be streamlined or refocused to target the most vulnerable groups in the most contaminated areas (e.g. health recuperation, free meals for children, free medicine); and (c) programs with limited impact on reducing exposure should be reduced or even eliminated (e.g. cash benefits to people in low contamination zones, and capital expenditures in new social infrastructure).

An Agenda for the World Bank and Donors

xix. Belarus has so far carried the burden of the Chernobyl aftermath, while donor assistance, albeit very welcomed and helpful in resolving some problems, has not been sufficient and sometimes not targeted to the most critical needs. Belarus is the repository of substantive knowledge for mankind, but the country does not have the potential to develop and systematize this knowledge, as this would require significant investment in research (which the country cannot presently afford). The international community should contribute its share toward this research, since the international community is likely to benefit the most from this knowledge in the future.

xx. A change in Belarus's Chernobyl strategy towards forward-looking activities directed at economic development and improvement in quality of life, as proposed by this report, will provide solid ground for increased assistance from the international community.

xxi. The following are the areas of possible Bank and donor assistance:

- Improving the system of information and education
- Building community support for healthier lifestyles (e.g. expansion of the Ethos project)
- Improving the monitoring of radionuclides in environment and agricultural produce
- Supporting rural development in Gomel, Brest and Mogilev oblasts (e.g. improved business climate, micro-credits, rural services, education, marketing assistance, etc.)
- Providing SME support (e.g. improved business climate, business incubators, micro-credits, office space, training in entrepreneurship)
- Developing radiation countermeasures for food production (e.g. expansion of successful local and donor initiatives/pilots)
- Performing research and epidemiological studies to deepen the understanding of health and other consequences of radiation (preferably donor-funded)
- Improving the provision of primary health care services, including psychological assistance
- Providing technical assistance on streamlining expenditure and institutional arrangements (preferably donor-funded)
- Providing technical assistance on strengthening capacity in the assessment of the efficiency and effectiveness of government programs.

BELARUS CHERNOBYL REVIEW

INTRODUCTION

1. On April 26, 1986, Chernobyl, Ukraine, became the site of the world's worst nuclear accident, which released at least 100 times as much radiation as the atomic bombs dropped on Hiroshima and Nagasaki. The initial explosion was followed by a prolonged release into the atmosphere of large quantities of radioactive substances that spread across the entire Northern Hemisphere. Radioactivity from the Chernobyl accident was even detected in the United States, Japan and Canada. The most affected countries were Belarus, Russia and Ukraine.
2. The environmental, health and other consequences of the Chernobyl accident were disastrous for Belarus. Over 70% of the radioactive fall-out landed on Belarusian soil. The affected territory included 3,600 settlements with approximately 2.5 million inhabitants.
3. The Belarusian Government has undertaken significant measures to mitigate the consequences of the accident. Now that major undertakings, like resettlement, are approaching completion, it is time to take stock of the present situation and re-examine the Government's priorities and efforts in dealing with the consequences of Chernobyl. Moreover, given the decline in available financing, both internal and external, the most efficient ways of addressing these priorities must be determined so that the maximum possible benefit can be achieved. Hence, the main objective of this report is to evaluate the present situation, review current programs and identify the priority areas in need of action.
4. The Chernobyl theme occupies a central role in the Country Assistance Strategy (CAS) for Belarus for 2002-2005. The CAS pays particular attention to global public goods, which include subjects like environment and health, and which form an important part of the Chernobyl agenda. The present report provides the basis for future World Bank support, including lending.
5. The report draws upon previous work by the Bank, such as the Environment Sector Review, which examined in detail the environmental and agricultural consequences of Chernobyl. It also builds upon the findings of previous reviews conducted by the Government and the international community.
6. The recent UNDP report – "The Human Consequences of the Chernobyl Nuclear Accident," which covered Russia, Ukraine and Belarus, the three most affected countries – serves as an important background source for the present report. The UNDP report reviewed the economic, health and social consequences of Chernobyl in the three countries. It revealed that increased international support is needed to revitalize the affected territory and help the people become more proactive in improving their own lives. The report also stressed the importance of international assistance in carrying out systematic research on health and environmental consequences, as such research could provide extremely valuable information for the rest of the world.
7. The present report goes beyond the UNDP study in several areas in one country – Belarus. It deepens the fiscal review of Chernobyl expenditures, examines the value of social and other Chernobyl programs and develops recommendations for how to restructure these programs and their underlying expenditures. In addition, a sociological survey was implemented in Gomel, Mogilev, and Vitebsk oblasts to assess people's perceptions about the impact of the Chernobyl accident on their lives, their living conditions and the usefulness of the

current programs². The report also assesses the business environment and presents recommendations for the economic development of the distressed territories.

8. The report addresses four main blocks of issues in its four chapters. The *first* chapter describes the current situation in the contaminated districts. It reviews the environmental situation, the state of agriculture, and the economic development in contaminated areas. It also analyzes the demographics, health status, employment and poverty of the affected population. The *second* chapter discusses the fiscal implications of the Chernobyl accident for the Government as well as the institutional arrangements for managing the Chernobyl programs. The *third* chapter reviews the main government programs developed to mitigate the consequences of the Chernobyl accident, including social programs, health programs, social services, resettlement, protective measures in agriculture, environmental and food monitoring, measures to support economic development and information and education. The *fourth* and final chapter presents recommendations for developing improved approaches that would lower the fiscal burden, improve the use of resources, and ameliorate the health, social and economic consequences of the Chernobyl catastrophe.

² The survey was carried out by NOVAK, a Minsk-based research agency, in the period December 2001-January 2002. A total number of 1,564 individuals were interviewed in Gomel (713), Mogilev (452), and Vitebsk (399) oblasts. The Vitebsk sample served as a control group.

CHAPTER 1: THE SITUATION TODAY

9. Initially, almost the whole territory of Belarus was contaminated by radioactive isotopes of short-lived iodine and about 50,000 km², or 23% of Belarusian territory, which was occupied by some 20% of the national population, was contaminated by radioactive isotopes of long-lived cesium (Cs-137) in excess of 1 cu/km² (see Box 1 for basic radiation terminology). Strontium (Sr-90) contamination was more localized and more limited, affecting some 10% of the nation's territory closest to the Chernobyl plant, in parts of the Gomel and Mogilev regions. Plutonium contamination was even more limited, affecting some 2% of the nation's territory, primarily in the 30 km zone around the Chernobyl plant. The affected territory included 3,600 settlements with approximately 2.5 million inhabitants, of which one-half million were children. Some 2,650 km² of agricultural land has been removed from use in these contaminated areas and some 1,721 km² of forests have been contaminated (see Annex Tables 15-20 for detailed data on contaminated areas).

10. By 2001, after 15 years of radioactive decay, the radioactivity still present in the environment had fallen to about 0.9% of the total amount released, and was mainly composed of long-lived radionuclides. Nonetheless, in 2001 some 7-8% of Belarus territory was still contaminated above acceptable levels of Cs-137. Remaining radioactivity will decline more slowly, as long-lived radionuclides make up an increasingly higher proportion of the remaining deposition: in 100 years, the level of Cs-137 and Sr-90 radionuclides will be approximately 1/10th of what they are today.

Table 1: Zoning of the Territory of Belarus According to Radioactive Contamination and Dose Loads on Population

Zone description	Equivalent dose, mSv/year	Contamination density, kBq/m ² (Curie/km ²)			Residents, as of January 1, 2001
		Cs-137	Sr-90	Pu-238, -239, -240	
1. Zone of periodic radiation control	<1	37-185 (1-5)	5.55-18.5	0.37-0.74	1,244,441
2. Zone with the right to resettle	>1 but <5	185-555 (5-15)	18.5-74	0.74-1.85	293,136
3. Zone of subsequent evacuation	>5	555-1480 (15-40)	74-111	1.85-3.7	27,669*
4. Zone of primary evacuation	>5	>1480 (>40)	>111	>3.7	0*
5. Exclusion zone	Territories adjacent to the Chernobyl NPP (mainly 30-km zone) where the population was evacuated in 1986 (and 1987)				0*

Source: Chernobyl Committee, Ministry of Statistics

*Number does not include individuals who returned to their homes after being resettled, as they are not official residents of these zones.

Box 1: Radiation and Radioactivity

The Chernobyl accident has given rise to irradiation of the populations living in contaminated regions. This radiation is potentially health damaging. The radiation arises from the decay of radioactive nuclides, called fission products, released into the environment from the stricken nuclear power plant (NPP). Such radioactive nuclides are characterized by their **activity** and their **half-lives**. The activity is the number of nuclides decaying per unit of time. In the Chernobyl context this has been expressed with the unit "**Curie**." Now it is more usual to express activity in "**Bequerel**." (1 Bq = 1 decay per second. 1 Ci = 3.7×10^{10} Bq.) The decay of radionuclides takes place in such a way that the activity halves in a fixed time characteristic of the nuclide. This is termed its half-life. For I-131 this time is 8 days and for Cs-137 it is 30 years.

Upon decay, the nuclides emit **radiation**. Radiation may take several forms, but those of concern in the context of the Chernobyl accident are **beta rays** and **gamma rays**. These are termed "**low LET**" radiations. Similar types of radiation are responsible for about half the average natural background radiation. The other half is from the radioactive gas radon. Radon emits alpha particles, which are termed "**high LET**" radiation. Some of the nuclides in the fallout from the Chernobyl accident, such as plutonium, emit this type of radiation, but that material is confined to the exclusion zone. The half-lives of alpha-emitting nuclides can be very long.

A person living on contaminated ground is exposed to radiation emanating from the decaying nuclides. The extent to which that radiation is absorbed by his or her body tissues is the **absorbed dose** or **dose**. Dose is a quantity expressed in energy absorbed per unit mass of tissue. The modern day unit is the Gray. (1 Gy = 1 Joule per kilogram.) An earlier unit is the **rad**, which is one hundredth of a Gy. The exposure can be **external**, if the decaying nuclides are outside the body, or **internal**, if they decay from within the body. The quantity against which the health consequences of exposure are judged is the dose. For example, the lifetime risk of thyroid cancer is estimated to be up to 6% per Gy (absorbed by the thyroid) for an infant aged less than one year old at the time of exposure.

In order to assess overall risk, in terms of **detriment**, from exposure to different types (high and low LET) of radiation and different tissues in the body, the unit called the "**Seivert**", named after a Swedish scientist, has been derived. Detriment is a complex concept, which includes the main detrimental health consequences of radiation exposure. The Sievert is dose multiplied by two so-called "**weighting factors**". The radiation weighting factor is equal to unity for low LET radiation and to 20 for alpha particles. The "tissue weighting factor" is equal to unity for the whole body and values of less than unity for other tissues, e.g. 0.125 for the lung and 0.05 for the thyroid. Thus, where exposure is to the whole body from low LET radiation, as is assumed to be the case for exposure to Cs-137, 1 Sv = 1 Gy. But for 1 Gy of dose from radon in the lung, the absorbed dose is equivalent to $20 \times 0.125 = 2.5$ Sv -- and has the effect, in terms of detriment, of 2.5 Gy from a low LET source irradiating the whole body.

Reprinted from Baverstock (2001)

Contaminated Zones

11. In Belarus, contaminated areas are divided into five zones depending on radioactive contamination of soils with radionuclides and average annual effective dose (see Table 1), as stipulated by the law "On legal regulations of territories exposed to radioactive contamination as a result of the catastrophe at the Chernobyl nuclear power station." The most contaminated area immediately closest to the Chernobyl plant has been declared a 1700 km² *exclusion zone* (Zone 5) from which all inhabitants were evacuated in 1986; lands in this zone were taken out of economic activity. Only basic safety and maintenance, forest fire fighting and scientific research activities are currently carried out. Beyond this exclusion zone lie zones of *primary resettlement* (Zone 4), *subsequent resettlement* (Zone 3) and the *zone with the right to resettle* (Zone 2). Further away lies the *radiation control zone* (Zone 1), where levels of radiation are low and where only radiation control activities are contemplated.

12. The distribution of contaminated territories with Cs-137 and residing population by oblast is presented in Annex Table 16. The most contaminated oblast is Gomel (about 70% of the oblast territory), followed by Mogilev (about 30% of its territory). Contaminated territories are also found in Brest oblast, and to a lesser extent in Minsk and Grodno oblasts.

13. The total population in contaminated areas as of January 1, 2001 is 1.565 million. All people from Zones 4 and 5 have been resettled or have left on their own. In Zone 3 the population has diminished significantly due to resettlement, but also due to the shrinkage of this zone's size as a result of a natural decline in radiation. However, as of January 1, 2001, this zone still included 74 settlements with 27,700 people, including 5,888 children aged 0-14. There were 293,136 residents in Zone 2 and 1.244 million people in Zone 1 at the beginning of 2001. Thus, almost 80% of total residents in contaminated areas reside in the zone where the density of contamination is minimal, leading to an annual equivalent dose of less than 1mSv. The contaminated territories are mostly rural.

Environment and Agriculture

14. The Belarus Environment Sector Review, conducted by the Bank in 2001, studied in detail the impact of Chernobyl on environment and agriculture. Following is a brief account of the main findings of this review.

15. **Flora and Fauna.** An extensive survey of flora and fauna in the resettlement and exclusion zones indicates that direct radiation damage to plants and animals was reported only in localized areas within the 30 km exclusion zone and within the first one to three years following the accident. Most damaged were conifers and some small mammals. Some 500-600 ha of trees in the vicinity of the reactor received very high doses of radiation, resulting in the death of pine trees and partial damage to the crowns of other trees (especially birch and alder), the crowns receiving the bulk of the Chernobyl plume deposition. Conifers are extremely sensitive to radiation. Over an area of about 3,000 ha receiving high doses, some 25-40% of pine forests died, and some 90-95% of the trees showed some damage to reproductive functions. By 1988-89, however, most had recovered their reproductive functions. The total number of trees that died amounted to less than 0.5% of the forested area of the zone.

16. Nonetheless, concentration of radionuclides in the wood of affected trees varies, sometimes limited to the rings grown after 1986 and sometimes pervading the tree. Radionuclides also tend to concentrate in certain forest products, notably mushrooms, berries and venison, which traditionally form part of the local diet. Levels of contamination in these products can be very high, and people are no longer permitted to forage or hunt except in areas declared safe from the radiation point of view. There is an additional concern that burning contaminated wood may increase exposure to radiation. However, experts disagree as to the extent of this risk. Forest fires, on the other hand, pose a greater threat to Belarus and surrounding countries, as the wind can carry radioactive particles far away.

17. Some physical abnormalities were noted in plants subjected to initial exposure, but no visible changes in growth or reproductive function in most species of herbaceous plants have occurred. Within three years, herbaceous plant seeds for most species had regained relatively normal production and viability, although contamination levels remain high in some areas. Small mammals, such as mice, with high initial doses of radiation were observed to have reproductive and genetic disorders and population instability. In some cases, the populations returned to normal in a few years; as with humans, longer-term effects could not yet be determined. Some species of frogs initially showed a 30% increase in sterility. Aquatic organisms have shown high levels of tolerance for high levels of contamination without

reproductive damage. Benthic organisms showed high levels of contamination, reflecting concentration of radionuclides in bottom sediment. None of the 31 species of fish examined in the 10 years following the accident showed any damage or effects despite high levels of Cs-137 uptake.

18. **Water.** Direct deposition from the Chernobyl plume occurred on rivers, lakes and seas. Within one month or so of deposition, the concentration of radionuclides in surface waters had fallen dramatically with sedimentation, and within three years was negligible or undetectable even in the highly contaminated Pripyat River. Following storms and floods, which roil the rivers and disturb bottom sediments containing settled radionuclides, elevated amounts of radioactivity are detected, but at levels that, according to international standards, pose no hazard to human health even for persons using the Pripyat directly for drinking water. The government authorities took early and extensive steps to protect drinking water sources and underground aquifers from contamination. An intensive program was undertaken to seal first artesian wells and then shaft wells in the resettlement areas. At present, the possibility of radionuclide contamination of drinking water in the resettlement zones does not seem to be a major concern of the authorities, whereas contamination with iron salts and nitrates are.

19. Indeed, most individuals surveyed perceive the quality of water to be a serious issue (74.3% of respondents in Gomel, 79.8% in Mogilev, and 67.3% in Vitebsk). In addition, respondents noted their use of self-protective strategies, such as buying bottled beverages or boiling the water.

20. **Agriculture.** Agricultural practices and food production in radioactive environment continues to be of great concern in Belarus. As mentioned above, large areas of agricultural land are still excluded from use primarily in Zones 4 and 5 and are expected to be excluded for a long time. In Zones 1-3, where contamination levels are lower, it has not been necessary to completely suspend agricultural activities; however, changes are being implemented in agricultural practices, crop and fertilizer choices, and food processing in order to assure the production of "clean" food products from these areas for consumption and sale in Belarus markets.

21. Uptake of radionuclides into crops can vary by several hundred times, depending on the clay, humus, acid and moisture content of the soil, and especially on the type of crop. Chemical blocking of the radionuclides by using lime and fertilizers can reduce uptake significantly. Moreover, a comprehensive improvement of natural hayfields and pastures can be achieved through meadow cultivation and re-cultivation, adding fertilizers, and over-grassing. Changing crops and fertilizers, coupled with food processing strategies as discussed below, can result in food products that meet national standards in most contaminated areas.

22. Nonetheless, access to and application of such countermeasures is not universal, even among collective farms, due to lack of funds and shortage of materials. Inertia in the traditional farming sector may also account for part of the failure to apply countermeasures. In the 2% of farms in the affected regions that are individually owned (private farms), agricultural countermeasures are particularly scarce, due in part to more limited access to mineral fertilizers, lime, or agricultural extension services. This situation is even more worrisome given that the vast majority of households practice subsistence economy, producing food for personal consumption on individual plots (77.7% of respondents in Gomel, 82.3% in Mogilev, and 85.3% in Vitebsk), as revealed by the sociological survey. Even the urban population of Gomel oblast (69.7%) and those living in the heavily polluted areas (75-83%) produce food for personal consumption. Only a negligible portion of these households test the food for radiation level (3% of urban and 1.4% of rural respondents, and less than 4% of those living in the heavily contaminated parts of the Gomel region).

Demographics and Health

23. Even though some demographic trends in the areas affected by Chernobyl follow general countrywide trends, there are also some notable differences. The out-migration of population, especially from the most affected districts, has led to a distorted age structure and to a higher than average ratio of retirees to working-age population.

24. As far as health is concerned, although the full health impact of the Chernobyl nuclear accident has been hard to measure, it has undoubtedly had a profoundly negative effect on the health and well being of the affected population. The incidence of thyroid cancer has increased, and the accident has caused a deep psychological impact on the affected population. Adult and

Table 2: Natural Increase of Population (per 1000)

	1990	1995	1998	1999	2000
Belarus	3.2	-3.2	-4.4	-4.9	-4.1
Gomel oblast	2.7	-3.2	-4.6	-5.1	-4.4
Mogilev oblast	1.7	-4.0	-5.5	-6.0	-5.4

Source: Ministry of Statistics and Analysis

infant mortality rates also tend to be higher in some of the most contaminated areas, although the Chernobyl-related diseases are not among the leading causes of death. However, this increase in mortality rates suggests that the affected districts, especially those in Zone 3, may suffer from indirect consequences of the accident related to poor provision of social services and poverty. The sociological survey, undertaken under the present review, has revealed that people in the contaminated areas perceive themselves to be less healthy than the rest of the population.

25. **Population Decline in the Contaminated Regions.** Overall, in Belarus, total population declined at an annual negative growth rate of around 0.36% between 1994 and 2001. As in other countries in the region, life expectancy in Belarus decreased, especially for men, during the late 1980s and 1990s. This has been a consequence of decreased income per capita and of increased premature mortality due to cardiovascular diseases and injuries. However, the situation in the contaminated areas in many instances is even worse. The accident forced a significant part of the population to leave the contaminated regions. In 10 years (1989-99), the population of Belarus declined by 1%, while the population of Gomel declined by 7.4% and the Mogilev population declined by 5.2%, mainly due to out-migration. In the most contaminated districts the population declined even more sharply. For example, between 1984 and 2000, the population declined by 56.3% in Braginsky district, by 55.2% in Narovlya district and by 46.3% in Vetkovsky district of Gomel oblast. Similarly, the population declined by 42.3% in Krasnopol'sky district and by 32.0% in Slavgorod'sky district of Mogilev oblast during the same period. (See Annex Table 8). However, the natural population decline, which is higher in Gomel and especially in Mogilev than the country average, has also contributed to changes in the population structure (see Table 2).

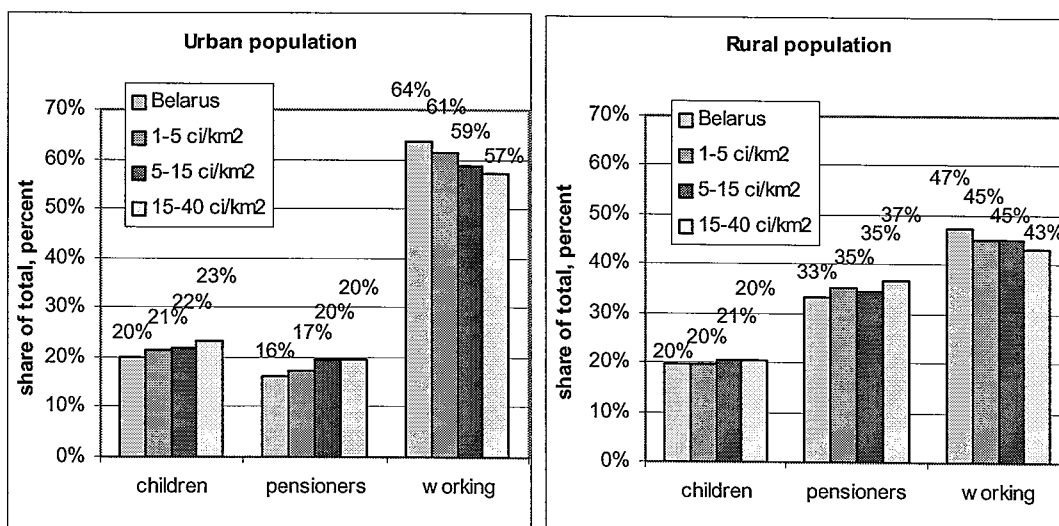
26. **Age Structure.** Out-migration, especially of younger people, has led to a distorted age structure in the contaminated areas. Overall in Belarus, the aging of the population has been quite rapid, and the share of population at retirement age (55/60+) increased by two percentage points during 1989-1999. The predominance of older people has become apparent in all rural areas of the most contaminated districts (see Chart 1 and Annex Table 14). This in turn has had a direct impact on crude birth and death rates, and natural population increase in general. In

several rural areas, such as in Narovlya, Vetka and Bragin districts of Gomel oblast and in Chaussy and Bykhov districts of Mogilev oblast, population at retirement age equals or already exceeds working age population. The aging of the population has accelerated in several urban areas as well, which makes the economic and social self-sustainability of these districts questionable. The general trend is that the more contaminated urban areas exhibit a lower ratio of working age population to retirees. This ratio is 2.8 for the urban areas with a level of contamination of 15-40 Ci/km², compared to the Belarus average of 4.0. Similarly, in rural areas, the ratio of working age population to retirees in contaminated regions is 1.16, compared with 1.42 countrywide (see Chart 1).

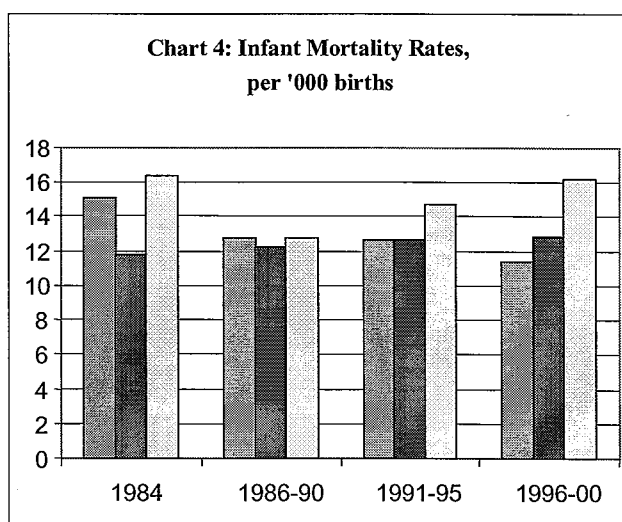
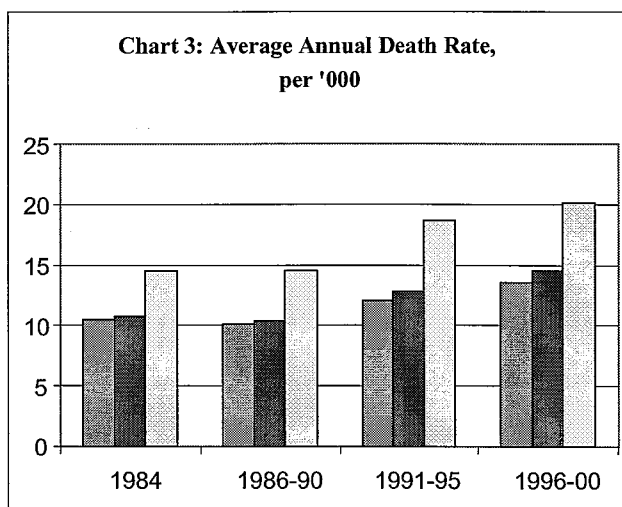
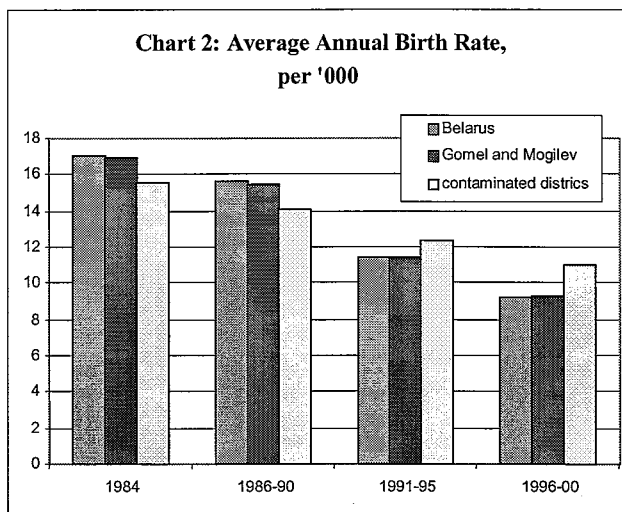
27. **Birth Rate.** Since 1986, the birth rate in the highly contaminated districts has declined, as in the rest of the country, but at a slower rate to the point that these areas have a higher birth rate than both the oblast average and the country average. Interestingly, prior to the accident, in 1984, the contaminated areas had significantly lower crude birth rates, which can be partly explained by the older population structure at that time. As discussed above, the population age structure in the contaminated districts has worsened further since the accident. Despite that fact, the crude birth rate in these districts in 1990 is significantly higher than in Gomel and Mogilev oblast in general and much higher than in Belarus as a whole (see Chart 2). This might be explained by the benefits and privileges enjoyed by the families with young children in these areas (see discussion in Chapter 3).

28. **Death Rate.** Crude death rates, in turn, have always been higher in these areas, and the gap has increased since late 1980s (see Chart 3). This can be explained by higher age-specific mortality rates due to a less favorable population age structure, but also may be due to Chernobyl accident consequences. An analysis of age-specific mortality rates confirms that the chief causes of mortality in the affected oblasts are cardiovascular diseases, injuries and poisonings, indicating that the most pressing health concerns lie in poor diet and lifestyle factors such as alcohol and tobacco use, as well as in problems with access to basic health care in some remote locations.

Chart 1: Population Age Structure in Contaminated Districts of Gomel and Mogilev Oblasts as of January 1, 2001 (%)



Source: Ministry of Statistics and Analysis



Source: Ministry of Statistics and Analysis

29. **Infant Mortality.** Prior to the Chernobyl catastrophe, in 1984, infant mortality in contaminated areas was 39% higher than in Gomel and Mogilev oblasts, but "only" 9% higher than in Belarus as a whole. At the end of the 1990s, the gap in infant mortality between the contaminated areas in Gomel and Mogilev oblasts and the oblasts in general narrowed, but was still high (27%). However, in the late 1990s, infant mortality in contaminated areas rose; it is, on average, significantly higher than in Belarus and is rapidly increasing, contrary to the general trend in the country (see Chart 4). Furthermore, in some of the most contaminated districts in Gomel and Mogilev oblasts, the average infant mortality rate has reached even higher levels in the period 1996-2000. For example, the Lelchitsk and Vetka districts experienced 23.9 and 20.6 infant deaths per 1,000 births, respectively, during this period.

30. In Belarus, the leading causes of death of children one year old and younger are congenital anomalies (in 2000, 32.2% of cases), conditions originating in the prenatal period (32.1%), diseases of the respiratory system (10%) and accidents and other external causes (8.5%). Higher mortality rates among infants in the most contaminated areas can be partially explained by the out-migration of more educated and younger people from the region, poorer social and economic conditions, and worsening access to health services in many remote areas. A linkage of higher infant mortality to Chernobyl 15 years after the accident, if any, can be

established only by a more detailed analysis.

31. **Thyroid Cancer.** The Ministry of Health reports 975 cases of thyroid cancer among children aged 0-18 years from 1986 to 2000, representing a 33.6-fold increase from 29 cases in 1972-1985. It also reports 7,504 cases of thyroid cancer among adults in the period 1986-2000 – greater than a four-fold increase from 1,472 cases in the period 1972-1985. Those cancers arose from the accumulation of radioactive iodine within the thyroid glands, exacerbated by an iodine deficiency that is prevalent in the population in the affected areas.

32. **Burden of Disease in the Affected Areas.** The main causes of mortality in Gomel and Mogilev are similar to the general trends in the country – cardiovascular diseases, injuries and poisonings. The main causes of mortality and morbidity among Belarusian children aged 0-14 years are injuries, diseases of the respiratory system, and infectious and parasitic diseases. However, official statistics show that morbidity in children affected by the accident is lower than or similar to the country average for most conditions, with the exception of hematological diseases (about 50% higher in 2000) and endocrine diseases (16% higher). This may be a consequence of the accident. (See Annex Table 9).

33. **Psychological Consequences.** Psychosocial consequences of the accident remain a serious concern. Many in Belarus believe that the Chernobyl nuclear accident has cast a long shadow over the current and future health status of the population and that ionizing radiation has significantly increased the incidence of cancer and other illnesses. This firm belief in radiation-induced diseases, exacerbated by the distrust of information provided by the Government and international community and the lack of consensus among local and international specialists on the ways to protect the population from elevated levels of ionizing radiation, has been a major factor in fostering a depressed health situation and an impaired state of well-being in the affected population. Many people have adopted an attitude of apathy and fatalism arising from the perceived lack of control over their lives. Moreover, the sense of victimization and dependency created by government social protection policies is widespread in the affected areas.

34. Re-settlers face particular stresses. Although in general they are younger (particularly those who relocated voluntarily), they are usually unemployed and believe they are without a place in society and have little control over their own lives. Experience shows that certain adults never adjust to resettlement. It should be possible through appropriate social policies to rescue the younger generation and rebuild the confidence of the middle-aged population, provided that sustainable economic and community life can be restored.

35. **Other Health Consequences.** So far, there is no evidence of a significant increase in leukemia and other blood-related diseases (as has been the case in Hiroshima). A retrospective review of relevant studies of Chernobyl's health impact undertaken by an international panel concluded that, except for the increase in thyroid cancer in children under age 15, other major public health impacts related to ionizing radiation have not yet been demonstrated by scientifically reliable evidence. This assessment is not fully accepted by some medical and government bodies in the most affected countries; their view is that this unduly limited and optimistic assessment of Chernobyl's full consequences understates some likely medical effects and fails to capture its full sociological and psychological impact.

36. **Belarusian Studies.** Belarusian studies confirm that Chernobyl's main impact on health has been an increase in thyroid cancer rates among children under age 15. In addition, the national studies claim that the health of the population from the affected areas, including those that were evacuated, is significantly worse than the health of the rest of the population. Contrary to what would be expected, death rates among liquidators (those who were involved in clean-up efforts) are lower than among the rest of the adult population, but the increase in

mortality is much higher, and liquidators are sick much more frequently, than the general population.

37. The studies also claim that fertility has been negatively affected in the younger population in the affected districts, that the risk of congenital malformations has increased, and that children that have lived in the affected areas for a long time are at increased risk of high blood pressure. Some studies advance the hypothesis that exposure to radioactive cesium speeds up the aging processes throughout the life cycle, leading both to earlier ages for puberty and to reductions in life expectancy in general. Others claim that Chernobyl has had significant mental health consequences. However, these claims need to be substantiated. A review of the Belarusian health studies and international studies is presented in Attachment 3.

38. **The Views of the Population.** The sociological survey suggests that people living in the contaminated zones perceive themselves to be less healthy than the rest of the country and report a higher incidence of illness. The number of respondents who assess their health as bad (21.6% in Zone 1; 32.8% in Zone 2; and 38% in Zone 3) is higher in areas with a higher level of contamination. This number is significantly lower in Vitebsk (19.3%)³. More than half of those who report poor health associate it with residing in the contaminated areas. This is not surprising, as 70.2% of those surveyed in contaminated areas believe that residing in these areas poses high risk for adults, and 84.5% of them think that it is risky for children⁴. The residents of contaminated areas who think that the risk of living there is high associate the risk mainly with (a) the products consumed (90.7%), (b) external radiation (56%), (c) water quality (76.7%), and (d) lack of information (42.5%).

39. Based on the survey, there are reasons to believe that those who reside in the most contaminated areas (Zone 3) have developed a fatalistic attitude towards their lives. The survey clearly shows that these people are fairly aware that their location is contaminated (84.6% in Zone 2 and 92.7% in Zone 3 knew that they live in a contaminated zone). However, 60.6% of the respondents in Zone 3 reported collecting mushrooms for personal consumption, compared with 47.5% in the lower contaminated Zone 2⁵. Moreover, people from Zone 3 are more likely not to test the content of radionuclides in food products (77.4%) compared with 57.1% in Zone 2, a difference that cannot be explained by the lack of opportunity to test the food. These results suggest that some of these people may have given up on their health or are too poor to care.

40. Only 24.4% of people from the contaminated areas claim that they have changed their diet habits, the majority of whom stopped or reduced mushroom consumption. Only a minority buys bottled beverages, buys only officially tested 'clean food,' or avoids buying agricultural products at the open market. The survey also revealed widespread perception of growing alcoholism. 77 percent of respondents in the contaminated zones, especially city dwellers, think that the consumption of alcohol has visibly increased. Interestingly, only 19.3% of them link alcohol consumption with contamination; the remainder cite causes such as economic problems, low living standards, personal problems, and work place issues.

41. **Conclusion.** In sum, the Chernobyl accident had a negative impact on the population structure and dynamics in Gomel and Mogilev oblasts, and especially in the contaminated districts. Although these regions exhibit general demographic trends that have occurred in the

³ The propensity of reporting bad health in the contaminated territories continues to be true even after account is taken of sex and age.

⁴ Those residing in non-contaminated areas do not perceive this risk as particularly high -- only about 30% of them think that residing in contaminated areas is risky.

⁵ Collection of mushrooms in non-contaminated places is much higher; for example, 87.5% of people in Vitebsk collect mushrooms.

country since the late 1980s and especially in the transition period of 1990s, the out-migration of population, especially from the most affected districts, has had a significant effect on their demographics. The ratio of working-age population to retirees tends to be lower in the highly contaminated areas.

42. Adult and infant mortality rates tend to be higher in some of the most contaminated areas, although diseases caused by the Chernobyl accident are not among the leading causes of death. This suggests that the affected districts, especially those in Zone 3, may have problems with poverty and provision of social services. So far, there is clear evidence of increased thyroid cancer incidence in individuals who were children at the time of the accident. In addition, the population in the contaminated areas is suffering deep psychological consequences, and it perceives itself to be less healthy than the rest of the population. However, the long-term consequences are still not fully known. Additional studies and research are needed in this area.

Employment and Poverty

43. **Employment.** The level of employment and its structure by sector in Gomel and Mogilev oblasts are quite similar to that across the country. The 1999 population census allows an assessment of hidden employment and unemployment. Except for the city of Minsk, all the regions had a similar ratio of economically active population (population aged 15 years and over), including the ratio of employed to unemployed. On average, 55% of the active population were employed and 3.7% were unemployed in Belarus, while in Gomel, the rates were 53.4% and 3.9%, and in Mogilev, 54.1% and 3.2% respectively. At oblast level, differences in employment patterns are not so significant. However, at district level, the economic situation in contaminated areas is much more distressed.

44. Compared to the average employment structure in the country by sector, Gomel and Mogilev oblasts have a very similar composition of employment by main branches of the economy: in 2000, 28.8% and 29.4% were employed in industry in Gomel and Mogilev oblasts, respectively. Mogilev has a slightly higher share of employment in agriculture and forestry (15.5% of total employment) than Belarus in general. Both oblasts have slightly higher percentage of population employed in the health care, physical culture and social protection sectors, and Mogilev has also a higher share of population employed in education, culture and arts than the country as a whole.

45. **Poverty in Belarus.** The poverty data, as measured by national authorities,⁶ shows that in 2000 the share of population with incomes below Minimum Subsistence Level was 35.7%. Single mothers, children and those temporarily unemployed are the most vulnerable groups. The poverty rate is the highest among those engaged in agriculture (54.9%). The lowest poverty rates are among civil servants (25.5%) and among those employed in industry (31.1%). These

⁶ In Belarus, the extent of poverty is measured using two main indicators – Minimum Consumption Budget (MCB), and Minimum Subsistence Level (MSL). MCB is a consumption-based poverty criterion – a minimum “basket” of essential goods and services necessary to secure the basic physical needs of food, clothing, and shelter. The MCB is calculated as an average per capita, and is also calculated for certain socio-demographic groups, such as able-bodied population, pensioners, students, children aged 3 to 16 years, and children under age 3. MSL equaled 60% of the MCB until 1998, 65.7% in 1999, and 64.4% in 2000.

Table 3: Poverty Rates by Region, %

	1995	1997	1998	1999	2000
BELARUS	31.2	26.4	27.8	40.4	35.7
<i>including by oblasts:</i>					
Brest	37.6	31.4	30.4	47.5	43.5
Vitebsk	33.5	24.9	34.1	45.4	42.3
Gomel	29.9	26.7	30.9	39.4	31.5
Grodno	37.6	28.9	27.8	41.3	42.2
Minsk-City	21.8	14.8	17.9	25.3	18.8
Minsk	27.8	28.5	25.1	44.8	34.7
Mogilev	31.8	30.5	29.9	41.4	41.0

Source: Sotsial'no-ekinomitcheskoye polozheniye domashnikh hoziastv 2001. Minsk, 2001.

general characteristics apply to Chernobyl-affected regions as well, although detailed data by districts, due to a relatively small survey sample, is not available.⁷

46. **Poverty in Contaminated Areas.** Poverty rates vary significantly by region and between urban and rural areas. In 2000, Gomel oblast (except Minsk city) had the lowest level of poverty incidence (31.5%). Mogilev oblast had the third lowest poverty rate among oblasts (41.0%) after Gomel and Minsk regions (Table 3).

47. However, the contaminated territories in the Gomel and Mogilev oblasts are mostly rural, where agriculture and the production of food on subsidiary household plots are the dominant economic activities. Moreover, the population in the predominantly rural regions of contaminated areas has much lower educational levels than the oblast population in general. This can be partially explained by the fact that the more educated people have left the region. Given the low education level and the unfavorable population age structure, the highly contaminated districts are at high risk of poverty.

48. Although the detailed data on household incomes and expenditures by region are scarce, some conclusions can be made about the Chernobyl-affected regions based on the structure of monetary and in-kind incomes of households and their consumption expenditures (see Annex Tables 28-29). The structure of household income in both oblasts also appears to be similar to national data. In 2000 in Gomel, wages represented 48.9% of total household income from all sources, while in Mogilev the share was 50.8%. The ratio of households with earned income was close to 70% in both oblasts. Similarly, pensions are the second most important source of income. About half of households include a retiree in their family unit.

49. The data on average wages by oblast demonstrate that in 2000, only Minsk city and Minsk oblast had higher wages than Gomel and Mogilev oblasts. Partial wage supplements received by employees in Chernobyl-affected areas have an impact on wage levels. However, a more detailed analysis of wages at district level demonstrates that remuneration may differ significantly depending on the area and its dominant economic activities. Average wage levels in contaminated districts are much below the level in the oblast (see Annex Tables 30-32). While the average monthly wage in the Mogilev oblast in August 2001 equaled BYR132,800 or US\$93, in Krasnopol'je, the average wage equaled BYR97,000 or US\$63; in Byhov district, BYR106,600 or US\$74; and in Chaussy district, BYR109,700 or US\$76. The main reason is that

⁷ In 2000, 5,005 out of 6,006 selected households agreed to participate in the survey, including 3,332 households in urban areas and 1,673 households in rural areas.

in these districts, the collective agricultural sector dominates the local economy, and agricultural workers are the lowest paid employees in the country. This again suggests that contaminated areas may suffer from elevated levels of poverty.

50. A significant share of households has access to social privileges (73.7% in Gomel oblast and 60.0% in Mogilev oblast), but privileges have a meaningful impact on household income only in Gomel, where privileges comprise 6.3% of total income. This may be explained by the fact that Gomel is a more contaminated area and more families may have access to a large number of various benefits and privileges.

51. Thus, the rough analysis of consumption expenditures at the oblast level does not reveal a significant difference in living standards when compared with the rest of the country, although the Mogilev oblast has the lowest per capita monthly consumption, which is around 12% less than average in Belarus (BYR68,100 and BYR77,900 respectively). Still, the situation in the contaminated districts, especially those with high levels of contamination, may be worse.

52. **Conclusion.** The limited information available suggests that there may be serious poverty issues in some of the contaminated locations, especially in the most remote ones. However, a more detailed analysis of the poverty situation in the affected districts is needed in order to determine the situation with a greater certainty.

Economic Development in Affected Areas

53. Unquestionably, the accident caused a major disruption in normal life and economic activity in the affected areas. In particular, agricultural and forestry production was severely disturbed in major territories. Radiation control measures limited industrial and commercial activities, which became more costly due to the need to incorporate radiation control. This is especially true in agriculture and food processing. However, even other industries are suffering because many of the highly qualified specialists, especially the younger ones, have left the region. Unfavorable business environments as well as the perception of an "unsafe" life in affected areas and of unavailability of "clean" products have held back private investment.

54. **Economic Situation.** The Chernobyl accident led to a reduction in land use and the loss of buildings, facilities and even factories⁸, which meant a significant initial loss for the regions and the country. Over time, however, the economic transition has had an equally, if not a more important, impact on the economic situation of the affected territories. Particularly difficult is the situation in agriculture, where the combination of price controls and rigid management practices have led to losses and put a heavy burden on the national budget. This situation is complicated by the fact that producing clean food requires additional costs, further affecting the economic profitability of agricultural production in the zones.⁹ An analysis of the economic

⁸ In some of the most contaminated districts, the areas under cultivation now can be as low as half of what they were prior to the accident.

⁹ The net effect of the additional measures on profitability cannot be ascertained without detailed empirical studies. Additional fertilizers will surely increase production; however, the point at which radiation content decreases to an acceptable level may be above or below optimal economic behavior. Currently, the state distributes fertilizers to farms, and allocations do not necessarily follow economic considerations. This issue will become important as the country moves to a market economy. Then, getting farms and people to produce clean food may require a change in the structure of incentives to compensate for the additional costs of producing clean food.

situation in the affected areas, with emphasis on industry and agriculture, permits a succinct view of the levels of economic activity and its recent evolution.¹⁰

55. *Gomel.* In Gomel, 33.4% of the population lives in contaminated territories, which produce 56.8% of the agricultural products and 11.1% of the industrial output of the oblast (see Annex Table 24). These regions are thus important for agricultural production. The values of the agricultural and industrial outputs in the contaminated zones are of a similar magnitude (BYR5264 million in agriculture and BYR5844.5 million in industry)¹¹. However, the value of per capita industrial output is much lower in the contaminated territories than in the rest of the oblast (BYR253.6 thousand versus BYR1015.8 thousand). This means that industries in the contaminated territories have low value added, as is typical of rural or semi-industrialized areas. Indeed, if large cities are excluded, the non-contaminated districts have an even lower ratio of value of per capita industrial production (BYR103.1 thousand). On the other hand, the value of agricultural output per capita exhibits a different pattern. The agricultural output per capita is much higher in the contaminated areas than in the rest of the oblast (BYR233.1 thousand compared to BYR91.4 thousand). This could result partly from a more adequate provision of fertilizers to farms in contaminated areas, but also may be due to population decline in these zones.¹²

56. Since 1997, although the values of both industrial and agricultural outputs have fallen, the industrial output fell at a higher rate. Thus, affected regions in Gomel are becoming more dependent on agriculture. At the same time, the overall economic situation in Gomel is improving, particularly for industry. This means that the economic situation in the contaminated areas is declining with respect to the rest of the oblast. In fact, the combined share of contaminated areas' industry and agriculture of the total oblast output has decreased from 25% in 1997 to around 20% in 2000.

57. *Mogilev.* In Mogilev, 15.5% of the population lives in contaminated territories, which produce 25.5% of the oblast's agricultural output and 5.9% of the industrial output (see Annex Table 24). The values of the total output in industry and agriculture are roughly similar (BYR2365.3 million in industry and BYR2210.6 million in agriculture). The industrial output per capita in the contaminated territories (BYR281,900) is roughly similar to the non-contaminated districts of the oblast when the two biggest cities -- Bobruisk and Mogilev -- are excluded. As in the case of Gomel, this means that light industry prevails in contaminated areas, including the processing of agricultural products.

58. The trends since 1997 show that in the contaminated areas in Mogilev, the values of both industrial and agricultural output have been falling, with agriculture declining at a higher rate when compared with the contaminated areas in Gomel (see Annex Tables 39-40). The value of oblast agriculture and industrial outputs has also been declining, with agricultural output falling at a higher rate. Contrary to Gomel, these indicators suggest that the economic performance of the affected territories in Mogilev is trending with the rest of the oblast.

59. *Comparison between Gomel and Mogilev and reference to Vitebsk.* Although industrial production in Gomel is higher than in Mogilev, industrial output per capita in Mogilev (BYR735,900) is roughly similar to Gomel (BYR 761,2000). Similarly, total agricultural

¹⁰ The information below, unless otherwise noted, refers to year 2000.

¹¹ Because these are measures of total production and industry most likely involves processing of agricultural products, the value added in agriculture is most likely higher than in industry.

¹² Reportedly, the quality of the land in Belarus does not compare with is lower than that in Ukraine. Its climate conditions are also worse. Thus, it is unclear how much of a competitive advantage Belarus has in producing agricultural goods.

production in Gomel is slightly higher than in Mogilev. However, agricultural production per capita is much lower in Gomel (BYR137,100) than in Mogilev (BYR163,500). In contaminated areas the agricultural output per capita is also higher in Mogilev (BYR268,000) than in Gomel (BYR233,100) (see Annex Table 24).

60. An examination of the most contaminated districts in both oblasts shows that they are overwhelmingly agricultural, with the value of agricultural production higher than the value of industrial production. Also, the number of SMEs as a percentage of the population is lower in the contaminated zones than in the rest of the oblasts (UNDP, 2002).

61. Agricultural and industrial outputs per capita in Vitebsk (BYR175,000 and BYR824,800, respectively) are higher than in Mogilev and Gomel oblasts. However, production per capita is higher in the contaminated territories in Gomel and Mogilev oblasts when compared with Vitebsk. This could be explained by the use of additional fertilizers, by the better quality of land in Gomel and Mogilev, and by the fact that the population has migrated out of rural areas in Gomel and Mogilev (thus leading to a higher output per capita).

62. *Small Plot Production.* Surprisingly, despite a vast area of contaminated territories in both oblasts, income from subsidiary household plots constitutes a high portion of household incomes: 13.5% in Gomel oblast and 15.7% in Mogilev oblast (see Annex Table 29). Moreover, 94-95% of households reported incomes from household plots that are the same as the country average. This confirms that despite contamination, households in both oblasts still produce a substantial amount of food on their plots of land. They consume it themselves, share it with their relatives in cities, and/or sell it on the market. At the same time, there is evidence that the number of private enterprises has been declining over the last four years, although the agricultural land at the disposal of farmers is growing in Gomel and Vitebsk and decreasing slightly in Mogilev oblast (see Annex Tables 34-36). Some anecdotal evidence indicates that household agricultural production has even increased. In Khoyniky district, the number of cattle possessed by families almost doubled in the last seven years. In the most affected, predominantly rural communities in Gomel oblast, more than three out of four households have at least one cow (UNDP 2001).

63. **Business Climate.** Due to the unfavorable business environment, the development of private businesses in Belarus considerably lags behind that in all neighboring countries, both in their numbers as well as in their sustainability. Belarus, with approximately 2.6 private small and medium enterprises (SMEs) per 1,000 inhabitants, has the smallest number of SMEs in comparison with its FSU neighbors¹³. A business survey¹⁴ was conducted to review the impediments to business development in the contaminated oblasts. The results of the survey are presented in Attachment 1 and a brief summary is presented below.

64. It does not appear that the business climate in Gomel oblast is different from that in the rest of the country. Respondents did not indicate that operating in contaminated areas was different due to specific regulations or more vigorous enforcement of national regulations. The only Chernobyl-related problem for the private sector reported during qualitative interviews in the Gomel area was the shortage of skilled employees (many of whom have found better jobs

¹³ Ukraine has 4 SMEs per 1,000 inhabitants, Russia has 6, and Poland has 35.

¹⁴ The International Finance Corporation's Belarus Small and Medium Business Development project conducted a regulatory cost assessment survey of 625 businesses in Belarus in December 2001. Of all surveyed businesses, 11.4% (71 businesses) were located in Gomel and 8.3% (52 businesses) were located in Mogilev. In addition to the quantitative survey, a number of qualitative interviews were conducted with the entrepreneurs from the most contaminated areas as well as from the Minsk city and Minsk oblast.

elsewhere). However, this was indicated only by a few respondents who operated in the most contaminated areas far from the city of Gomel itself. Analysis of quantitative data corroborated this finding. Moreover, the sociological survey confirmed that people in contaminated areas did not see contamination with radio nuclides as a problem for their professional activity or the ability to open SMEs.

65. In addition, it appears that the "Chernobyl label" may create some problems for exporting goods produced in the area. For example, the entrepreneurs exporting to Poland noted strict controls by Polish authorities of all goods coming from Gomel and stated that the origin reduced the product price. The problem seems to be less acute as far as export to Russia is concerned. While during the qualitative interviews a few respondents indicated that they had to lower their prices on exports to Russia because of the "Chernobyl" origin of their products, the overall quantitative data does not suggest that such problems are widespread or systemic.

66. Gomel and Mogilev oblasts need to embark on a broad developmental program, including accelerated SME development, in order to provide new opportunities and new jobs for their people. A better business environment coupled with adequate support in terms of training, office space, and start-up financing is likely to increase interest in starting up new businesses, as evidenced by the experience of transition countries. This would be key in letting people take the initiative to resolve their problems and help eliminate the widespread "victim" and "state-dependency" mentality. In addition, deregulatory efforts that can be implemented at the regional level, such as elimination of contract control or a major reduction of interventions in business activities, would need to be seriously considered. The oblast that is prepared to "experiment" with bolder de-regulation measures in order to improve its business environment could attract potential entrepreneurs, who are currently waiting for better times, and enjoy the benefits of faster growth.

67. **Perception of Opportunities by the Population.** People in the contaminated zones are mainly employed by state-owned enterprises. Very few rely on self-employment or other private activities, which are less developed than in non-contaminated zones, as discussed above. The survey shows that 44.3% of respondents in the clean parts of the Gomel and Mogilev oblasts predict good economic prospects for themselves, compared with only 33.2% in the contaminated zones. Overall, people in contaminated zones see better opportunities for themselves than those in Vitebsk. Respondents are relatively optimistic regarding educational opportunities for their children, although more so in the contaminated areas of Gomel and Mogilev. Therefore, regarding employment and education, people in the contaminated areas do not feel more disadvantaged than those in non-contaminated areas of the same oblast. Still, people in the contaminated areas feel that their situation is worse than in the rest of the country (40.5% in Zone 3 and 34.5% in Zone 2), while only 29% think so in the non-contaminated areas.

68. **Conclusion.** The following conclusions can be drawn based on the above analysis:

- Production in the affected districts of Gomel and Mogilev oblasts consists mostly of agricultural and light industrial products, which explains the lower levels of wages in the contaminated districts compared with the oblast average and accentuates the need to pay greater attention to poverty problems in contaminated districts.
- In both Gomel and Mogilev oblasts, industrial and agricultural output has been declining over the last five years. In the contaminated areas in Gomel, however, this decline compares negatively with an overall increase of economic activity in the oblast as a whole. There is a danger that the contaminated areas will become more dependent on transfers and that the taxable base will decrease. Already, some of the most contaminated districts

depend on transfers from the republican budget for up to 70% of their expenditures. This means that the tax base has already decreased considerably.

- Agricultural production is, in the short and medium term, the most important factor in providing employment to people residing in the contaminated territories. Therefore, the priority is to improve production conditions by removing price controls, giving farms greater flexibility in purchasing inputs and selling goods. Also, it will be necessary to address issues such as certification of radiation-free production and additional costs of cultivation, if any.
- There are very few SMEs in the contaminated regions. This means that inhabitants have very limited employment options outside state farms or industries. Given currently low farm profitability, introducing alternatives will decrease reliance on welfare assistance.

CHAPTER 2: CHERNOBYL BUDGET

The History

69. After the Chernobyl accident in 1986, the Soviet Union Government focused on basic priorities like evacuation, containment of radioactive elements and clean-up. Delays in implementing a comprehensive strategy exposed the population close to the Chernobyl nuclear power plant to high levels of radiation for extended periods of time. The Supreme Soviet of the USSR adopted the first comprehensive strategy for dealing with the catastrophe's consequences in 1989. After the dissolution of the Soviet Union, the affected republics had to face the whole set of Chernobyl problems on their own. The comprehensive program adopted by the USSR in 1989 served as the basis for the National Program of the Republic of Belarus on Mitigating the Consequences of the Chernobyl Catastrophe for 1990-1995 (National Program). Since then, two additional programs have been approved for 1996-2000 and for 2001-2005.

70. **Government Program Objectives.** The main government objectives are to mitigate the aftermath of the Chernobyl accident by limiting the health risk of radiation, to implement social protection measures and to reduce the environmental, economic and social consequences of the catastrophe. This implies a system of initiatives related to health protection, monitoring radiation levels in the environment and in food, protective measures in agriculture and forestry, social protection programs for the affected population, and decontamination activities. However, over time, the order of priorities has altered, affecting the allocation of resources among different programs. The new government strategy on Chernobyl for 2001-2005 and up to 2010 is very much in line with previous approaches¹⁵. It identifies the following priority areas:

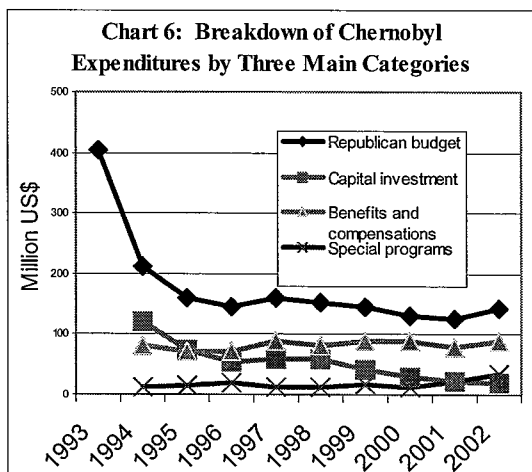
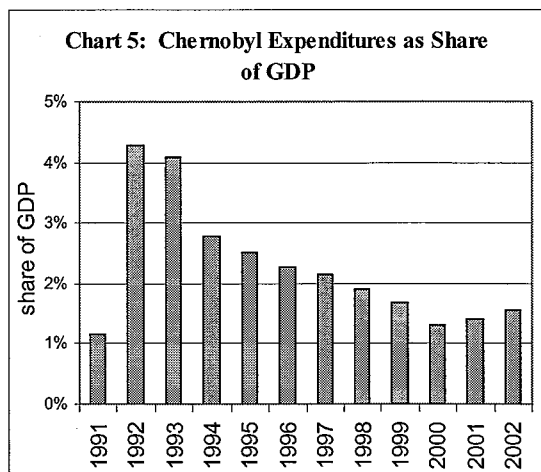
- Social protection of those living in the contaminated territories, including health rehabilitation (with a special emphasis on children's health);
- Rehabilitation of contaminated lands and production of clean products;
- Substantiation of all such measures with research.

71. **Resources Absorbed.** Before Belarus' independence (during 1986-1991), all expenditures related to the consequences of Chernobyl disaster were financed from the USSR budget. Since independence in 1991, the country has carried the brunt of financing the Chernobyl programs. Chart 5 shows the direct budget resources spent on Chernobyl programs since independence. Although these resources have been declining with time, the opportunity cost to the country has been substantial. It is estimated that the present value of the republican budget resources spent on the mitigation of Chernobyl consequences since 1991 amounts to 20% of the 2001 GDP¹⁶.

72. **Priorities and Budgetary Allocations.** Chernobyl priorities have been organized around three main sets of programs. The first set – capital investments – has covered activities such as resettlement, housing construction, construction of gas pipelines to the affected areas, road paving, school construction, health facility construction and other projects. As seen in Chart 6,

¹⁵ Annex Table 55 presents details of the proposed Chernobyl budget for 2001-2005.

¹⁶ This does not represent the total resources spent on Chernobyl issues. Neither is it a true reflection of the cost of the accident for Belarus. Such an estimate would have to take account of, for instance, economic losses from taking land out of circulation and the present value of the future works needed to replace lost assets.



Source: Ministry of Finance, Chernobyl Committee

capital investment allocations have decreased in real and relative terms (see also Annex Table 41). The second set – benefits and compensations – covers activities mandated by the law (health recuperation, free meals for children, free medicines, etc.) and has increased in relative terms to become the largest program. The third set – special targeted programs – covers activities such as the production of clean food, the removal of radioactively contaminated materials, research and information, etc. These programs are analyzed in detail below.

73. Financing of Chernobyl Expenditures. In 1992, the Government introduced an earmarked emergency payroll tax to finance the Chernobyl expenditures, but it has not relied exclusively on this tax. Initially, its level was fixed at 18%, but it was reduced several times in order to ease the burden on enterprises and ultimately reached 4% in 1998. Now, the emergency tax revenues cover only 65-70% of Chernobyl budget expenditures. The remaining share is financed from the republican and local budgets. Chernobyl programs and benefits represent a heavy burden on the national budget, and many current programs are under-financed due to resource constraints.

74. Donor Assistance. Although donors have been active in providing assistance to the Belarus Government, their resources have been modest compared to the funds spent by the Government. According to the Chernobyl Committee, more than 30 international projects amounting to US\$4 million¹⁷ were implemented in 2000, including procurement of equipment, training, seminars, consultations and research (this excludes humanitarian assistance and recuperation of children abroad). At present, there are about 15 ongoing projects supported by OCHA, UNESCO, UNDP, IAEA and TACIS, and some bilateral donors. The Chernobyl Committee, while appreciating the donors' support, is concerned that after the closure of the Chernobyl nuclear power plant the international community interest in this area has diminished.

75. Changing the Government's Chernobyl strategy to forward looking programs is likely to attract more donor resources in the future.

¹⁷

This represents 0.03% of the budgetary resources spent by the Belarus Government in 2000.

Institutional Arrangements

76. Coordination of all Chernobyl-related activities was assigned to a special state agency – the Committee for Dealing with the Consequences of the Catastrophe at Chernobyl Nuclear Power Plant (Chernobyl Committee)¹⁸. This committee is the main agency charged with direct responsibility for the implementation of the National Program on Mitigating the Consequences of the Chernobyl Catastrophe. The Chernobyl Committee's main tasks are (a) the development of government policies to protect the population from the effects of the Chernobyl catastrophe, (b) coordination of and control over the implementation of these policies, and (c) supervision of the contaminated territories (Exclusion Zone, etc.).

77. Several other ministries and agencies are involved in various aspects of the Chernobyl program, including the Ministry of Finance; the Ministry of Agriculture; the Ministry of Health; the Ministry of Environment; the Land Reform Committee; the Forestry Department; local governments and other agencies. A National Scientific Center for Thyroid Cancer, a Research Institute of Radiological Medicine and Endocrinology, the Institute of Ecological and Professional Pathology and a Department of Radioactive Iodine Therapy in the Gomel Cancer Center operate under the Ministry of Health. Several agencies are involved in monitoring radioactive contamination – the Chernobyl Committee, the Ministry of Environment (Department of Hydrometeorology), the Academy of Sciences (Institute of Radiobiology), the Ministry of Health, and other ministries and agencies. The two most affected oblasts, Mogilev and Gomel, each have a Deputy Oblast Governor in charge of Chernobyl issues with a department under him/her. At the level of affected districts, a deputy district head is in charge of Chernobyl issues with several people under him/her. In addition, a variety of research institutions are involved in research, program development and implementation.

78. Although the current institutional system seems to be functioning without major flaws, the efficiency of the government management of the Chernobyl programs can be improved. The division of responsibilities among all above-mentioned agencies is not always clear, and their functions sometimes overlap.

79. The Chernobyl Committee is responsible for preparing the proposal for the Chernobyl budget based on the National Program on Mitigating the Consequences of the Chernobyl Accident. In this process, it interacts closely with the local authorities, ministries and agencies involved in program implementation. The Chernobyl Committee is also directly in charge of implementation of some programs and thus manages the budget for those programs, while other programs are managed by the relevant agencies.

80. The Committee has accumulated significant knowledge and information on Chernobyl issues and can continue to play a paramount role in the future. However, its tasks extend beyond planning and oversight and currently include direct program implementation, which creates fragmentation and leads to inefficiencies. For example, the administration of cash benefits to the population residing in contaminated areas is handled independently of the social assistance programs under the Ministry of Labor and Social Protection. This distorts the overall social assistance picture in the country, especially that the Ministry of Labor and Social Protection is developing a targeted means-tested system of interventions. The Chernobyl Committee is also in charge of administering the health recuperation programs as well as construction of some health facilities, which is handled independently of the Ministry of

¹⁸ The Chernobyl Committee was created in 1991. In 1994 the Chernobyl Committee formed the basis for the creation of the Ministry of Emergency Situations. In 1998, a separate Chernobyl Committee was created under the Ministry of Emergency Situations, and in 2001, the Chernobyl Committee received independent status and now reports directly to the Cabinet of Ministers.

Health. It makes sense to transfer these functions to the Ministry of Health, which should have sole responsibility for all health-related policies in the country. Similarly, the protective measures in agriculture should be transferred to the Ministry of Agriculture. Finally, greater responsibility should be given to local governments to ensure better use of Chernobyl resources.

81. Hence, the role of the Chernobyl Committee, the Ministries and the local governments should be better aligned with their institutional responsibilities. Programs that fall within one functional area should be handled by the agency responsible for that function, as the current fragmentation among different government agencies compromises the effectiveness of these programs and increases administrative costs. The Chernobyl Committee should remain the main agency responsible for government policy in the area of Chernobyl. However, it should mainly focus on program coordination rather than direct program implementation, while other functions should be transferred to line ministries.

82. It is important to mention that NGOs, charitable organizations, local communities and other civil society formations are active in various Chernobyl-related areas (environment, health, distribution of humanitarian aid). NGOs and charitable organizations play an important role in channeling international assistance. However, with the decline of international aid the NGOs activities have also been declining. Thus, the large city of Gomel has only 148 NGOs, and the population is hardly aware of them and their services. Their role in the provision of services, community building activities, and information campaigns is obviously restricted and is also significantly under-researched. Government's support to NGO activities in these areas hardly exists, while the overall legal and institutional environment for the third sector is very constraining.

83. Institutional budgetary arrangements are described in detail in Attachment 2.

Chernobyl Expenditures

84. The share of Chernobyl program expenditures (hereafter referred to as the Chernobyl Budget) has varied from 16% of total budget expenditures in 1993 down to 10-11% in 2000-2001. The State budget for the year 2002 allocates BYR266 billion for Chernobyl programs, which is 6.1% of total budget expenditures. The Chernobyl component has traditionally been the major part (over 95%) of the budgetary line item entitled "Prevention and Liquidation of Emergency Situations and Natural Calamities." Some Chernobyl expenditures are financed from other lines of republican and local budgets, namely, the administrative budget of the Chernobyl Committee, the budgets of the Ministry of Health (contract-based employment of medical staff, free medicine, etc.) and the Ministry of Education (contract-based employment of pedagogical staff), and other line items. Local budgets have also allocated funds to finance Chernobyl programs. Other sources of finance include the Union budget of Russia and Belarus and donor assistance.

85. **Main Programs.** As mentioned previously, the Chernobyl Program expenditures fall under three major categories: (a) capital investments, (b) social programs mandated by the Law on Social Protection of Population Affected by the Chernobyl Accident, and (c) special targeted activities and programs. Certain long-term trends have been maintained through 2002. Mainly, the share of the Chernobyl Budget allocated to capital expenditures has continued to decline, from 56.4% in 1994 to 12.2% in the 2002 Budget. Social expenditures are growing as a percent of total expenditures, reaching 68.2% in 2002. The share of special targeted activities has fluctuated and stands at 19% in 2002. Chart 6 reflects a breakdown of budget expenditures by three broad categories for the period 1991 – 2002.

Table 4: Breakdown of Social Expenditures by Main Categories, 1999-2001, %

	1999	2000	2001
Free school and kindergarten meals	16.97	27.29	28.54
Recuperation of children	36.54	23.87	22.24
Free medicines and dental services	3.97	11.15	16.74
Salaries/pensions for those who live/work in the contaminated area/Chernobyl zone and for Chernobyl disaster liquidators	19.66	11.75	13.30
Resort treatment / payments for treatment	5.28	2.25	3.54
Social transfers/compensation related to families with kids/pregnant women	5.54	6.03	3.20
Compensation/additional payments for privileged vacations/day-offs/business trips	5.36	4.30	2.80
Compensation for working disabilities/losses of qualification	0.17	2.52	2.43
Social transfers to disabled because of Chernobyl	1.38	1.14	1.34
Other expenses	3.45	2.07	2.08
Financing terminated	1.68	7.63	3.79

Source: Chernobyl Committee; Ministry of Finance

86. **Capital Expenditures.** The allocation for capital expenditures has been decreasing as the resettlement program and investments in housing and various social facilities (schools, medical centers, etc.) in the new settlement areas are nearing completion. Annex Table 43 provides a detailed breakdown of capital expenditures for the last two years and shows that the expenditure shares for housing construction, utilities and gasification are diminishing, while health expenditures, executed both through the oblast administrations and through the Ministry of Health, are increasing. The tight fiscal situation has implied the emergence of capital arrears in capital construction at the oblast level, to reach 14% of the Chernobyl Budget. Lastly, the share of the capital budget managed directly by the Chernobyl Committee has increased.

87. **Social Programs.** The major social programs in the Chernobyl Budget are: (a) rehabilitation of the population (mostly children) in the contaminated zones, and (b) free school meals for children (see Table 4). These two programs comprise more than 50% of expenditures related to social benefits and compensations. Notably, the provision of free school meals for children has become a growing burden on the Chernobyl Budget, while health recuperation expenses have even grossly under-financed (less than 60% of those eligible for health recuperation are being covered). The share of free medicine and dental services is growing as a share of total expenditures, while salaries and pensions for affected population and liquidators is declining.

88. The benefits, social privileges and social services listed in the law "On social protection of people who suffered from the catastrophe at the Chernobyl nuclear power plant" exceed the Government's fiscal ability to meet all commitments. Implementation of the current version of the law required 342.6 billion rubles in 2001 (prices as of January 2001, including direct costs only). Due to lack of funds, a number of entitlements, such as interest-free loans to purchase or build individual houses and summer cottages, free or discounted public transport for some categories of beneficiaries, reduced housing tariffs, and several others were suspended in 1995. However, the new draft law "On social protection of people who suffered from the catastrophe at the Chernobyl nuclear power plant and other nuclear accidents," currently under preparation, proposes to keep many of such entitlements, which questions the consistency of the draft law with fiscal realities.

89. **Special Programs.** This set of programs covers a wide variety of initiatives. Decontamination of the environment, waste disposal, and research comprised about 60% of this expenditure category in the year 2000, while in 2001 protective measures in agriculture (to produce clean food) represented the major share (82.6%) (see Annex Table 44).

90. **Emerging Fiscal Difficulties.** Belarus began to face severe fiscal problems in 2000-2001. The situation has been exacerbated by the decision to increase wages in the budgetary sphere to at least BYR165 thousand (equivalent of US\$100) per month by the end of 2001. As a result, additional resources in the amount of BYR450 billion were required for the 2001 budget. At the same time, revenues fell below the original estimate; as a result, the 2001 republican budget could only be executed at 90% and the consolidated budget at 94%. As a result, the Government had to either shift resources to cover wages or to accrue arrears. It did both.

91. Capital investments, including purchasing medical equipment in Chernobyl-affected areas, were significantly reduced (see Annex Table 41). These cuts were not sufficient and the budget accrued BYR312 billion in arrears, including BYR32 billion in benefits and compensations to the population living in Chernobyl-affected areas^{19,20}.

92. In preparing the 2002 budget, the Ministry of Finance faced even greater difficulties, trying to maintain a US\$100 wage policy while the ruble is expected to depreciate by 25% this year. This has led to a drastic reduction in all expenditures other than wages. Capital investments have been drastically constrained and the purchase of medical and other types of equipment is not planned at all for 2002. To help reach the fiscal deficit objectives, the Government plans to increase housing and utility tariffs to reach 40% of the cost recovery level, up from 20% in 2001. Similar increases are expected for transport and other services. Moreover, the Government is reexamining the system of privileges in order to streamline them.

93. The Ministry of Finance has sought to apply new principles for budget formulation and fiscal decentralization. For the first time, Mogilev and Gomel oblast budgets will not receive transfers from the republican budget; instead, their VAT share has been increased to 91% to make them self-sufficient. The calculations were made based on the assessment of tax capacity and expenditure norms on a per capita basis.

94. **Chernobyl Allocations and the New Budget Realities in 2002.** Chernobyl program expenditures have been given priority, and they remain roughly at the same level when measured as a proportion of GDP (1.5% in 2002, compared to 1.6% in 2001; see Annex Table 41) and as a share of consolidated budget (4.3% in 2002, compared to 4.2% in 2001). But these expenditures have grown if measured as a share of the republican budget (8% in 2002, compared to 7.3% in 2001). Curiously, the coverage of the special Chernobyl tax on wages has grown from 51.6% in 2001 to 62.5% in 2002, as a result of a 60% increase in real wages.

95. In 2002, the financing of free school meals was reinstated in the republican Chernobyl budget, and will be allocated in the form of a targeted subvention to local budgets. In 2001, this item was delegated to the local authorities but this mechanism did not work well. Local authorities accrued more than BYR 2.6 billion (out of BYR42 billion planned for this item) in arrears to food suppliers²¹. While a decision has been made to move this item back to the

¹⁹ In fact, these social benefits and compensations were paid to the population by the enterprises where they work, but the Treasury has not reimbursed the enterprises for this expenditure.

²⁰ The survey showed that 28.3% of those in the contaminated zone reported arrears in the cash benefit delivery, which suggests that arrears are becoming a serious issue.

²¹ Food is supplied to all the schools at the expense of public resources by Belpotrebcooperatsia, a Belarus food purchasing/supplying cooperative that is the only company providing free school meals.

republican budget, local financial departments will have to pay arrears from their own resources.

96. The 2002 budget suspends cash compensations (supplementary salaries, wages, pensions etc.) to those living and working in the urban areas of Zone 1 (1-5 Ci/km²). According to an initial plan, cash compensations in both rural and urban areas in Zone 1 were supposed to be terminated irrespective of rural or urban place of residence, at estimated savings of BYR24 billion. However, the decision by Parliament to suspend compensations only for those living in the urban areas of Zone 1 (1-5 Ci/km²) would only yield an estimated BYR17 billion. These estimated savings were left within the Chernobyl budget, but were redistributed to other programs.

97. **Conclusions.** The following conclusions can be drawn from the above analysis:

- Belarus has carried the burden of Chernobyl expenditures, while international assistance has played a relatively minor role.
- Over time, allocations to Chernobyl programs have been decreasing as a share of GDP.
- Due to present fiscal difficulties, the Government has started to run arrears, including on Chernobyl programs, and has been unable to fully fund its mandates as established by the law.
- Allocations to social expenditures have increased, consuming most of the budget and squeezing out other expenditures.
- Chernobyl budget resources do not represent all net additional resources spent on Chernobyl issues in affected areas.
- In addition to program coordination, the Chernobyl Committee is involved in program implementation, which creates overlap and inefficiencies in program implementation.