

Rehabilitation of Living Conditions After a Nuclear Accident : Lessons From Chernobyl

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- Some lessons from the Chernobyl accident
 - Transition from the emergency to the existing exposure situation
 - Living in contaminated territories : a complex situation
 - A successful experimentation : the ETHOS project and the CORE programme in Belarus
- Two illustrations of stakeholder engagement for improving living conditions
 - The process implemented in ETHOS and CORE
 - The Bragin experience to develop radiation protection culture
- Proposals on the way forward for Fukushima

Transition from the emergency to the existing exposure situation (1)

- **Chernobyl accident : 26 April 1986**
- Individual dose criteria adopted by authorities:
 - 1986: 100 mSv
 - 1987: 30 mSv
 - 1988 and 1989: 25 mSv/year
- **Proposal in October 1988** by Supreme Soviet of a 350 mSv lifetime projected dose (5 mSv x 70 years) as criterion for allowing permanent residence in the contaminated territories:
 - the 350 mSv should include the dose received between April 1986 and December 1989
 - the 350 mSv life time projected dose was also proposed for permanent relocation of the population if exceeded
 - the proposal should have been applied from January 1990 i.e. **3 years and 8 months** after the accident

Transition from the emergency to the existing exposure situation (2)

- The Republics proposed 70 mSv lifetime projected dose as criterion for permanent relocation (1 mSv x 70 years). Long and controversial debate involving risk and economic considerations
- Finally laws were adopted in the early 90s by the new independent republics :
 - If the average annual individual dose may exceed 5 mSv/year the population must be relocated
 - If the average annual dose is ranging from 1 to 5 mSv/year voluntary relocation is possible with compensation = **decision of relocation transferred to the individuals**
 - If the average individual dose is lower than 1 mSv/year periodic radiological control is implemented

From April 86 to Dec. 89 the average individual dose over the period has been estimated to be around **35 mSv**

Living in contaminated territories: a complex situation (1)

- **The radioactive contamination: a worrying presence**
 - Invisible, impalpable, imperceptible,
 - Everywhere in the environment, the places of living and intrusion in the private sphere
 - Durable : several generations
- **No words in the common language : no past experience, no memory**
- All dimensions of daily life are affected: health, environment, social life, production and distribution of foodstuffs and commodities... but also psychological, aesthetic and ethic aspects
- **Strong concern about the future and particularly the health of children**

Living in contaminated territories: a complex situation (2)

- **For each individual, the presence of radioactivity modifies her/his relationship to risk, to other people, to the territory :**
 - Stigmatisation of the resident of the affected areas : the “chernobylians”
 - The environment becomes hostile and is disqualified
 - Foodstuffs are perceived as dangerous
 - Goods and products have less or no value anymore

- **General feelings among the population:**
 - Loss of control on daily life and disqualification of life
 - Loss of confidence in authorities and experts
 - Uncertainties on the long-term effects of radioactivity
 - **Feeling of helplessness, abandonment or even exclusion**

Living in contaminated territories: a complex situation (3)

- **The actions driven by authorities and experts reinforce the feeling of exclusion:**
 - Contamination measurements reduce the intrinsic quality of everything to figures
 - Standards and norms divide the world in “good” and “bad”
 - The countermeasures are intrusive and generate interdictions, they isolate from the rest of the world
- **“Classical” public actions are facing difficulties to manage the complexity of the situation**
- **Temptation of politicians and experts to put the blame on the population : [theory of radiophobia](#)**

Living in contaminated territories: a complex situation (4)

- **Each individual is permanently confronted to the question : “should I stay or should I leave the territory?”. To answer:**
 - Need to understand the risk,
 - To evaluate the potential to work and/or to produce in the future
 - To consider the new conditions in comparison to the situation prevailing before the accident

The majority of the population affected by the Chernobyl accident decided to stay in the affected territories

- Attachment to the home land
- Difficulties of envisaging to live elsewhere, to abandon ones job...
- The progressive return of those who left the contaminated territories immediately after the accident played a key role in the decision to stay of many inhabitants

The ETHOS project and the CORE program in Belarus (1996-2008)

- A pilot experiment supported by the Belarus authorities and implemented by a team of European experts in 4 districts of Southern Belarus affected by the Chernobyl accident
- Aiming at developing a sustainable improvement of the living conditions of the local population
- Based on the direct involvement of the local populations in their own protection
- Developed with groups of teenagers, young mothers, farmers, teachers, health care professionals, foresters... in villages
- Addressing their key concerns :
 - The protection of children
 - The radiological quality of foodstuffs particularly milk and meat
 - The management of the domestic radioactive waste
 - The wish to improve incomes and the quality of life

The ETHOS project and the CORE program in Belarus (1996-2008)

**A strategic shift in the management of the situation
mainly relying on:**

- The direct involvement of the inhabitants in their own protection with the help of the local and national authorities and experts
- The development of the radiation protection culture among the population based on 4 pillars:
 - A radiation monitoring of proximity
 - A practical education at school
 - An inclusive health surveillance
 - A cultural approach of the memory of the accident
- The setting up of social and economic measures to favour the local development

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1. **Listening and learning** from the villagers about their concerns, difficulties and wishes
 2. Developing a **common evaluation** of the local radiological situation
 3. **Implementing protective actions** for improving the local situation
 4. **Establishing (or re-establishing) links** between villagers and the local authorities and professionals

1. *Listening and learning from the villagers*

- Finding out stakeholders issues and concerns
- Elaboration of a contractual and ethical framework to overcome distrust
 - *Precautionary approach, open and honest information, problem solving attitude, commitment to improve the situation, voluntary involvement...*
- Setting up working groups for the effective involvement of stakeholders in the improvement of their own situation
- Empowerment, training and providing technical assistance to local stakeholders
 - *Access to relevant information, practical training on measurements, placing equipment at the disposal of interested stakeholders, access to independent technical expertise,...*



Listening about concerns - Public Meetings



Access to local expertise

2. *Developing a common evaluation between the villagers and the European experts*

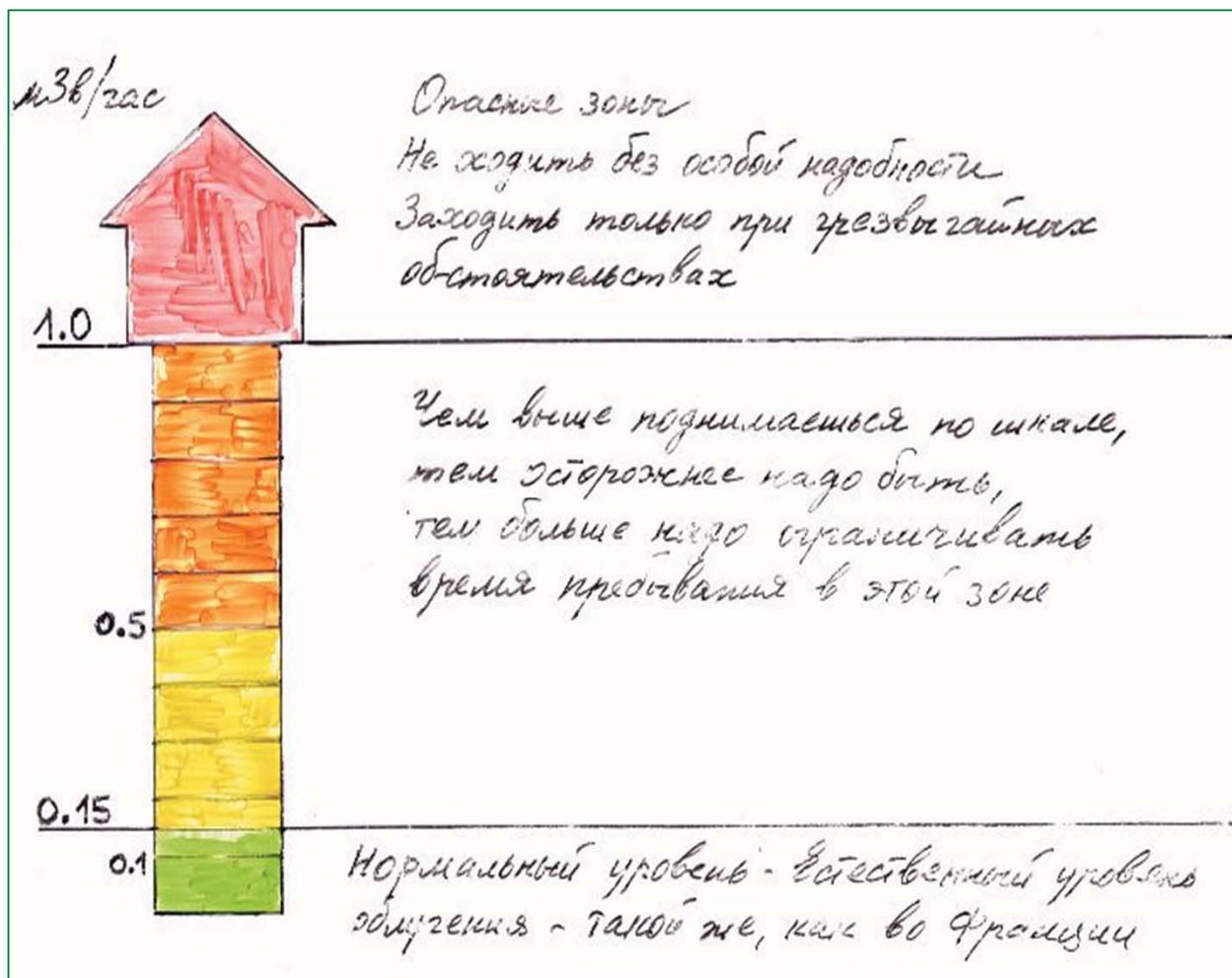
- Collection and interpretation of available information on the radiological situation
- Identification of issues and problems according to the specific context
 - *Influence of local traditions, habits and diet, organization of local production...*
- Giving each individual a means to get a grip on its own day-to-day environment
 - *Reference values, comparison with other villages...*
- Revealing the heterogeneity of the local contamination and the distribution of exposures in relation to the individual behavior. Identifying room for maneuver



Empowerment of villagers



Local farmers meeting



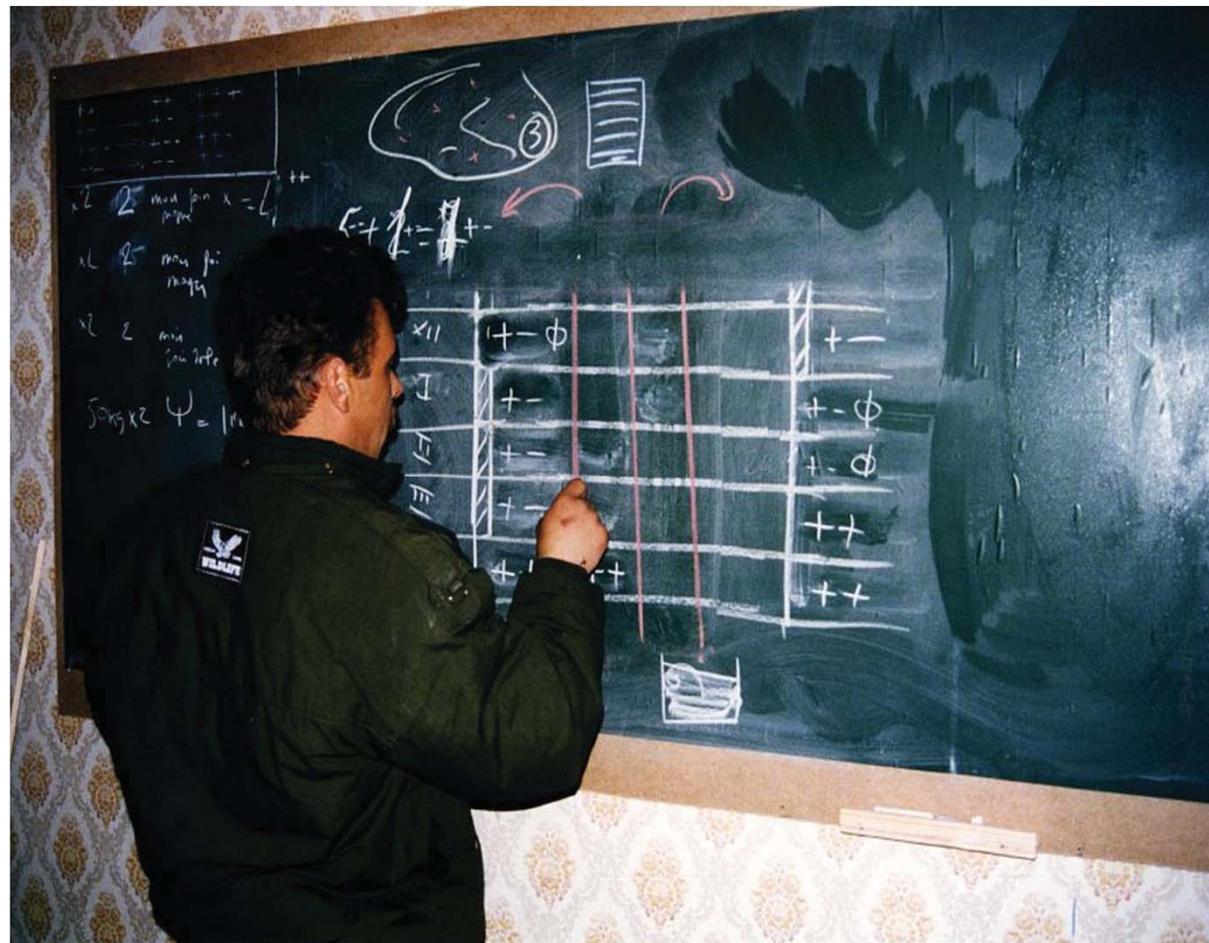
Radiological scale for external exposure adopted by a village

3. Implementing protective actions

- Identification of possible protective actions including the individual and collective values and constraints:
 - *To reduce the contamination of milk according seasons and local contamination maps*
 - *To improve the food production according available resources*
 - *To reduce the contribution of fire-ashes to the contamination of gardens*
 - ...
- Evaluation of the alternative actions including **self-help protective actions** complementary to the collective actions implemented through the national rehabilitation program
- Adoption of actions on a broad-based consensus between the villagers and the local authorities



'Milk mapping' for summer production



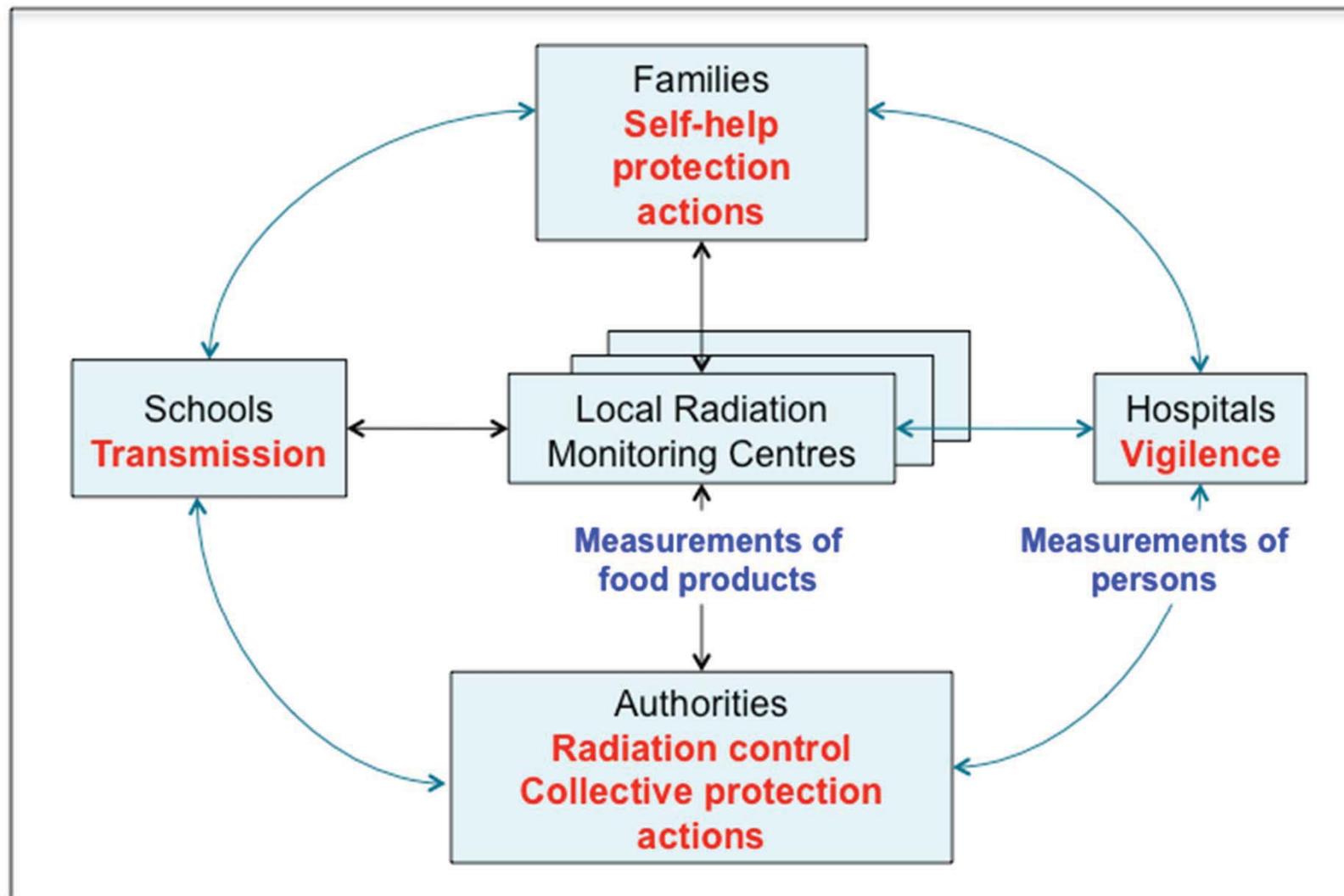
**Optimization of winter milk production of a “private” farmer
(Selection of hay and use of Prussian blue)**

4. *Establishing (or re-establishing) links between villagers and the authorities*

- Empowerment of local professionals (teachers, medical doctors,..) to directly implement the step-by-step approach with the villagers
- Involvement of scientific institutes and the different levels of authorities to accompany the process in order to:
 - *Ensure availability of information and equipments*
 - *Allow the adaptation of the protective strategies to the specificity and the evolution of the local situation*
 - *Maintain the cooperation between the different stakeholders in the rehabilitation process*
- Involvement of the education and the health care professionals to develop a **practical radiation protection culture** among the villagers necessary to ensure the sustainability of the rehabilitation program

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- Establishment of an operational radiation monitoring system including measurement of foodstuffs and whole-body contamination
 - Aiming at providing the access to the measurements for all the inhabitants
 - Allow the population to be able to participate to its own protection and to regain self-control on its direct environment
 - Importance of the pluralism of sources of measurement for ensuring confidence and providing useful information to cope with the local situation

The radiation monitoring system implemented in the Bragin District





A radiation monitoring centre implemented in a school

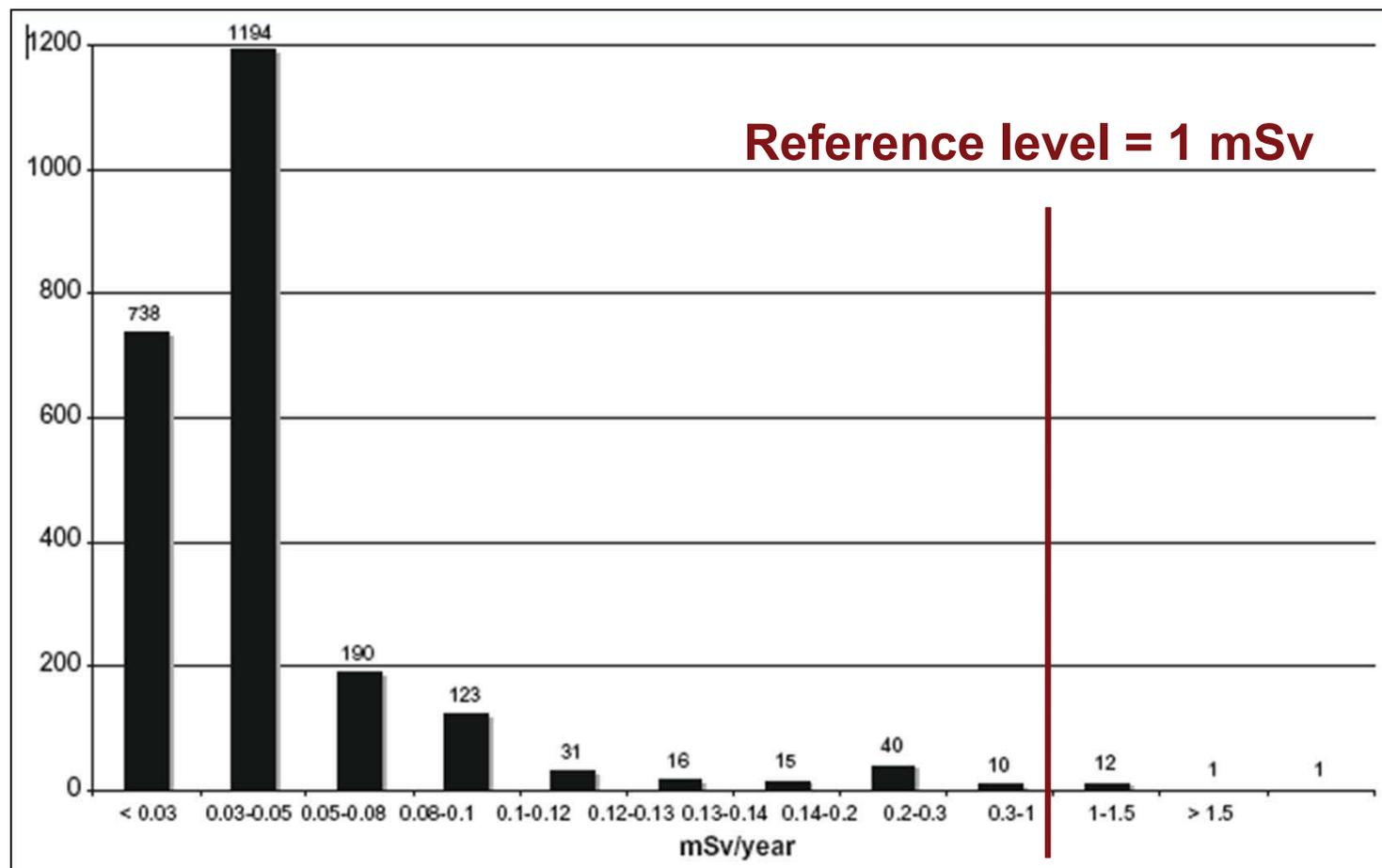


Measurements of local foodstuffs in radiation monitoring centre implemented in a village dispensary



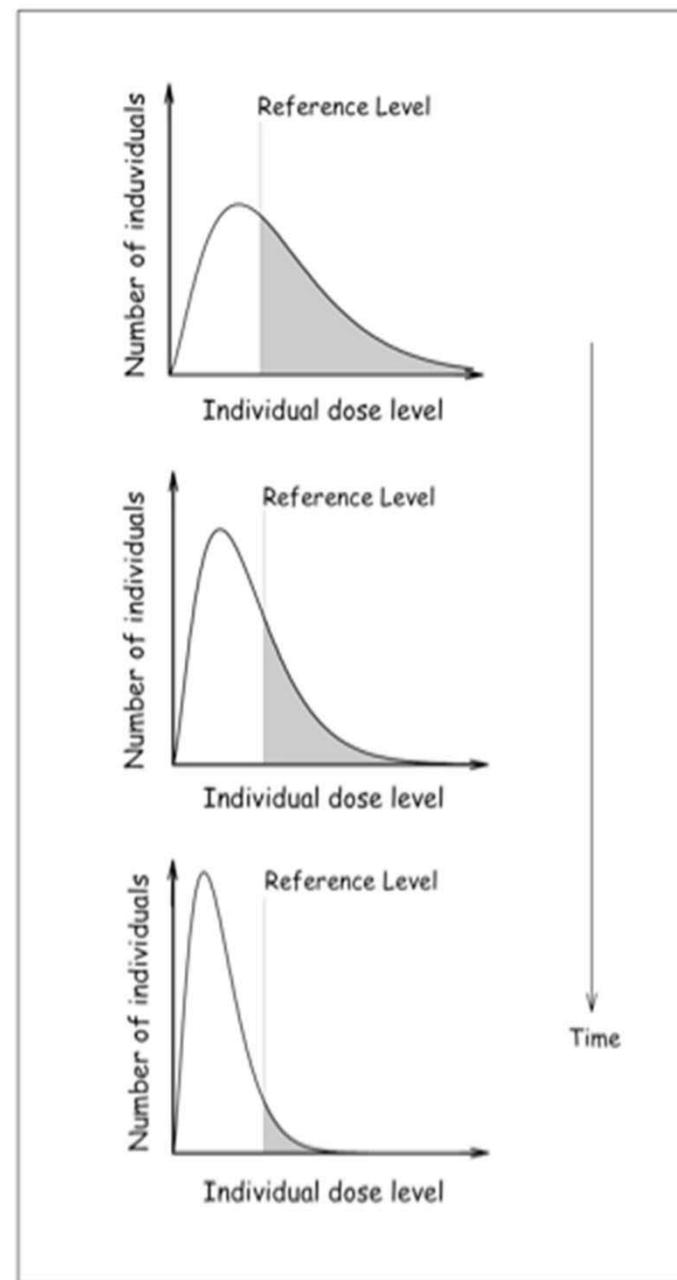
Whole body measurements in the hospitals of the district

Dose distribution from caesium intake of children in the Bragin district 20 years after the accident



Evolution of the distribution of individual doses with time as a result of the process of optimisation of protection in an existing exposure situation

ICRP Publication 111



Proposals on the way forward for Fukushima (1)

- A personal view based on my understanding of the situation -

1. To prepare the transition to the existing exposure situation

- To complete the characterisation of the radiological situation
- To continue the decontamination works to reduce as low as reasonably achievable the exposures in all places of living
- To re-enforce the system of control of foodstuffs
- To put in place the conditions and means to give easy access to the local population to all relevant information concerning the radiological situation (pluralism of sources of information and coordination of monitoring programs are crucial)
- To adopt the radiation protection criteria to drive the process of long term rehabilitation taking into account the prevailing constraints and future potentialities

To achieve these tasks involve as necessary all concerned parties : local, regional and national authorities, experts, professionals and the population

Proposals on the way forward for Fukushima (2)

- A personal view based on my understanding of the situation -

2. In the perspective of the future

- Beyond the R&D programs on:
 - agricultural and environmental countermeasures to improve the radiological quality of the foodstuff production and of the environment
 - health surveillance of the population residing in the affected areas
- **Work together (local, regional and national levels) to develop the radiation protection culture IN and OUTSIDE the affected areas**
 - This can be done building on the Belarus experience keeping in mind that daily life in Fukushima Prefecture is rather different than daily life in Bragin District
 - There is a need to find the appropriate ways to the Fukushima situation (pilot projects with volunteers?)

A final comment

The complexity of a nuclear post-accident situation leads to reconsider the traditional modes of governance

This is a real challenge which implies to shifting from a normative approach (“black and white”) to a quality driven approach (“a lot of nuances”)

Such evolution can only be achieved by mobilizing local, regional, national intelligences at the service of common goals

Long term rehabilitation is not only a matter of numbers but also of living together

Radiation protection must not drive the process but support it

A non resolved issue to be seriously addressed: the relationship between the affected and the non affected areas and populations