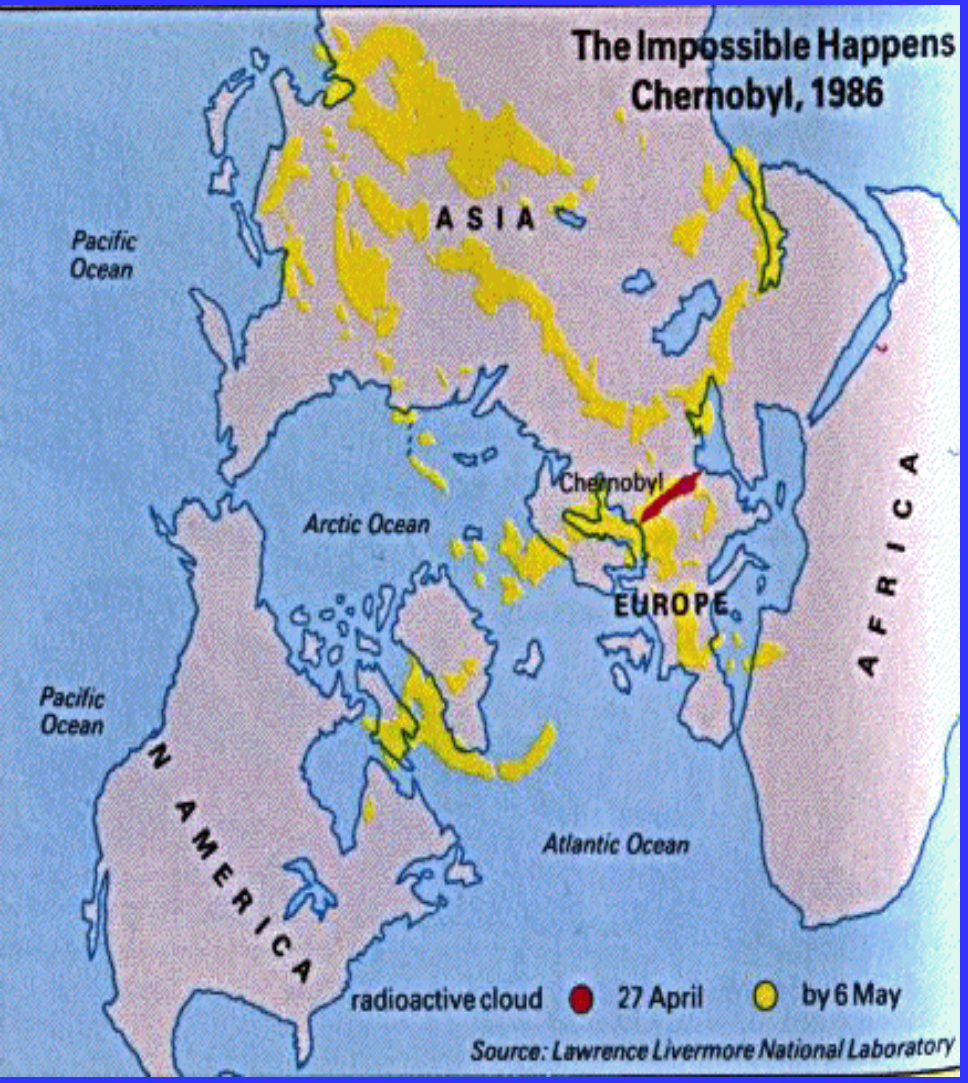
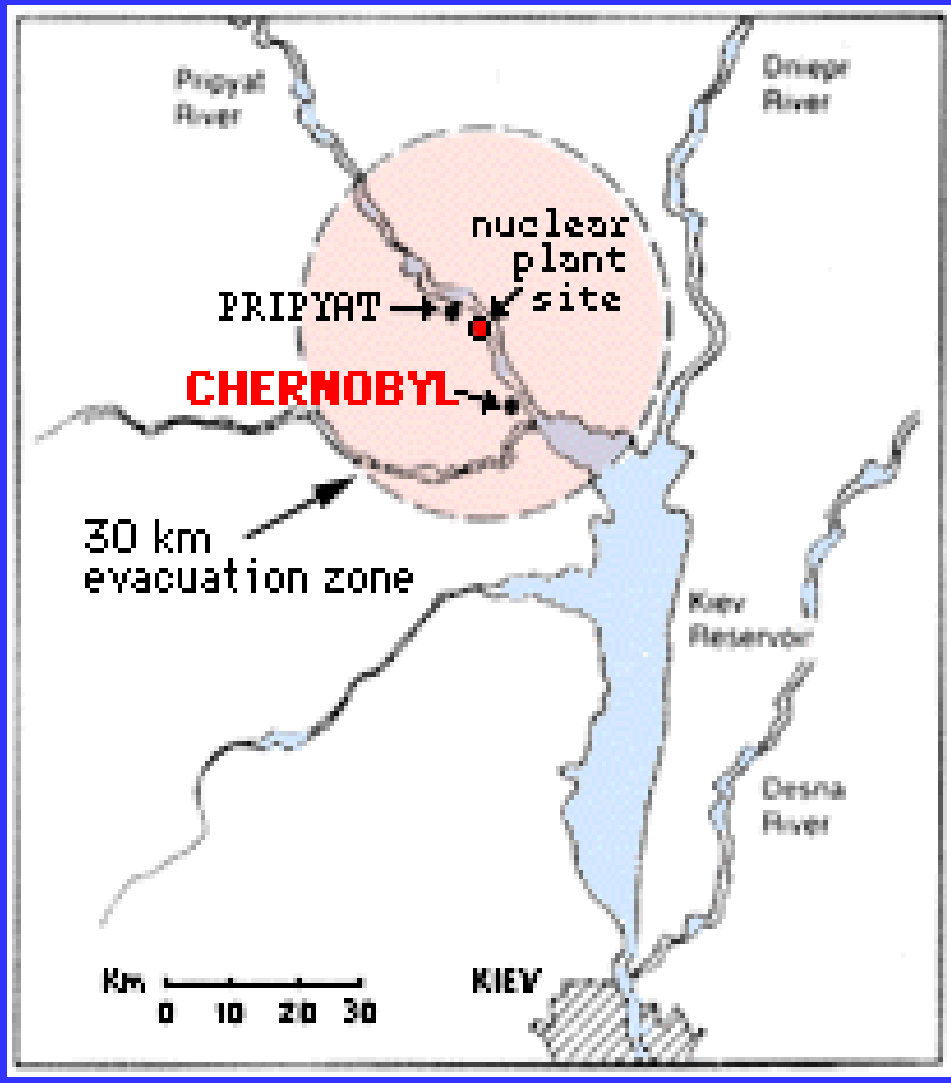
Post-Chernobyl psychological effects on individuals in Belarus

Toma-Drane, M.; Frongillo, A. E.; Moysich, K.; Vena, J.; Karmaus, W.; Friedman, D.; Michalek, A.; Karen, F.; Baker, J., Beehler, G.; Zevon, M.

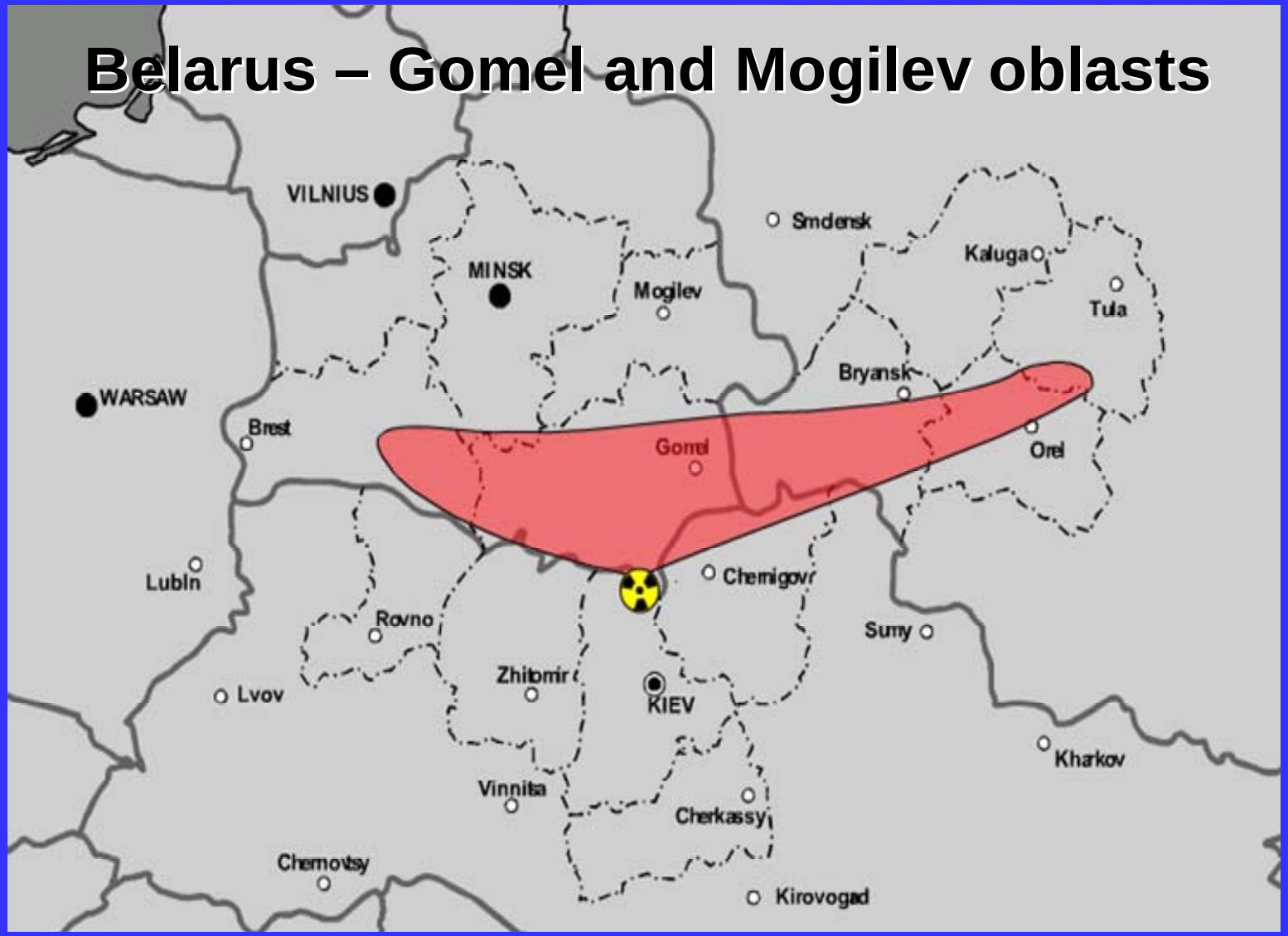
40th Symposium on the Interface: Computing Science and Statistics
Risk: Reality, 22-24 May 2008

Geography of the Accident





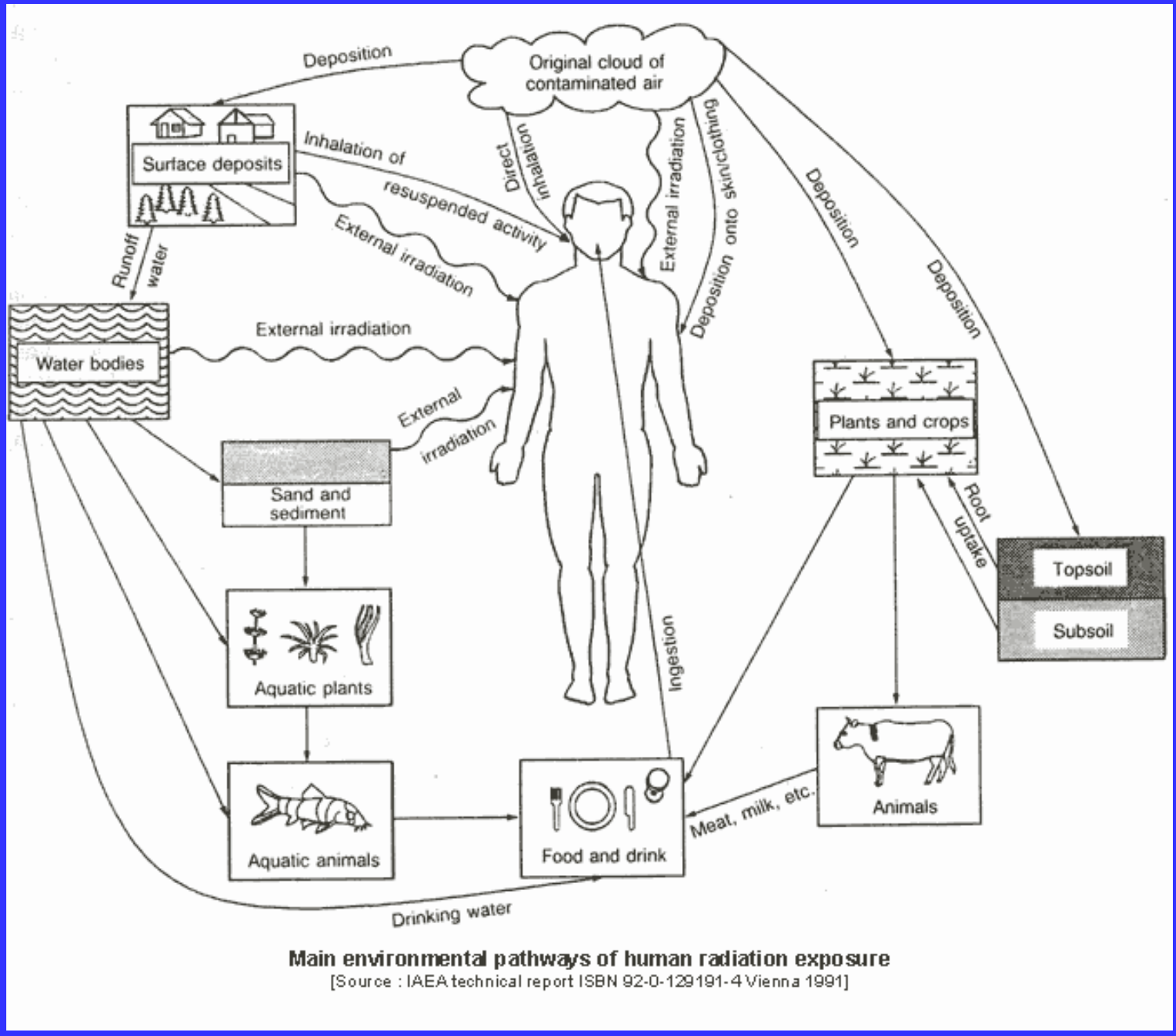
Geographical map of Belarus – Gomel and Mogilev Oblasts



Source: UNESCEAR Report, New York 2000; Annex J.

Main environm. pathways of human radiation exposure

*Retrieved from internet at http://www.world-nuclear.org/info/cherno byl/inf07.html



Main environmental pathways of human radiation exposure
[Source : IAEA technical report ISBN 92-0-129191-4 Vienna 1991]

Objective

- **To examine:**

(1) if a large-scale nuclear disaster such as the Chernobyl nuclear accident induced
- **long term psychological effects**
- **food-related behaviors on the Belarusian exposed individuals**

(2) if these effects differ based on family roles at the time of the accident:
- **mother**
- **father**
- **or child**

Methods

- **Data:**

  - collected in 2002-2003 on psychological effects and food-related behaviors

  - using questionnaires

  - translated in the Belarusian language
  - administered by trained Belarusians interviewers

Methods (cont.)

- The study sample:

  - children (n=145) and
  - their parents (n=153)
  - from 82 families living in 72 households
  - residents of two Belarusian counties (oblasts)
  - recruited as controls in a case-control pilot study of childhood leukemia

Methods (cont.)

Characteristics			N	%
Participants		Total	298	100
	Parents	Total	153	51.3
	Children	Total	145	48.6
Parents by region	Mogilev		106	69.2
	Gomel		47	30.7
Child by region	Mogilev		101	69.6
	Gomel		44	30.3

Methods (cont.)

Characteristics			N	%
Gender	Total participants	Male	141	47.3
		Female	157	52.6
	Parent	Male mean age = 44.7	72	47.0
		Female mean age = 46.4	81	52.9
	Child	Male	69	47.5
		Female Mean age = 20.7	76	52.4
Region of residence	Mogilev (low perceived exposure)=0		207	69.4
	Gomel (high perceived exposure)=1		91	30.5

Methods (cont.)

- Children's age:
  - 0 to 6 years of age at the time of the Chernobyl accident (1986)
  - 16 to 22 years of age at the time of the interview (2002- 2003)

residents of two geographic radionuclear contaminated areas of low (Mogilev) and high (Gomel) in Belarus

Statistical analyses

- Variables used for analysis:
  - selected from several instruments
- Instruments reliability:
  - Cronbach's alpha cut-off of 0.70
- Outcome variables:
  - perception of risk
  - perception of health
  - food perception
  - food-related behavior

Statistical analyses (cont.)

- Theoretical confounders controlled:
  - region of residence, education, parents' age
  - served also as sociodemographic variables

- Independent variable: an individual's role in the family

- The significance level for all reported results was at the p-level of less or equal to 0.05

Statistical analyses (cont.)

- SAS Windows (version 9.1.3., 2000)
- Mixed linear regression models (PROC MIXED) were:
  - estimated for each dependent variable
  - used because of repeated and non-independent measurements, between families and within families, reported by mothers, fathers, and children

Results

Outcome variable	Mother (mean)	Father (mean)	Child (mean)	p-value for overall	p-value for t-test mother vs. father	p-value for t-test mother vs. child	p-value for t-test father vs. child
Perception of risk (self)	1.6	1.3	1.3	0.0004	0.0044	0.0001	0.5056
Parents perception of risk about their children	1.8	1.5		0.0003	0.0003		
(large means values indicate higher perceptions of risk)							
Perception of health (self)	3.1	3.3	3.8	<0.0001	0.0746	<0.0001	<0.0001
(large values of adjusted means indicate that individuals' perceive their health as less likely to be affected by the Chernobyl accident)							

Results (cont.)

Outcome variable	Mother (mean)	Father (mean)	Child (mean)	p-value for overall	p-value for t-test mother vs. father	p-value for t-test mother vs. child	p-value for t-test father vs. child
Parents perception of health about their children	3.8	3.7		0.6842	0.6842		
(large values of adjusted means indicate that individuals' perceive their health as less likely to be affected by the Chernobyl accident)							
Food perception	1.6	1.6	1.4	0.0020	0.9437	0.0024	0.0041
(large values of adjusted means indicate that individuals perceive their food more likely to be radioactively contaminated)							
Food-related behaviors	1.4	1.2	1.3	0.0137	0.0075	0.0149	0.5778
(large values of adjusted means indicate positive changes on food-related behavior)							

Results (cont.)

- Fathers were less likely to perceive themselves as being at risk than mothers, but children were more likely to perceive themselves as being at risk.
- Children were less likely to perceive themselves as having health problems than their mothers and fathers.
- Children were less likely to perceive their food as being radioactively contaminated than their mothers and fathers.

Results (cont.)

- **Fathers were less likely to report improvements on food-related behaviors.**

- **Assessing parents' perceptions of risk for their children indicated the parents were more likely to perceive their children as being at risk than themselves.**

Conclusions

An individual's role in the family, helped explain:

(1) long-term psychological effects

(2) food related behaviors among family members

(3) these results are consistent with the caregiver role of a mother within the Belarusian family