Debate over health effects of Chernobyl re-ignited

Controversy surrounding the true toll and disease burden caused by fallout from the Chernobyl nuclear disaster in 1986 has resurfaced following the release of a new study. Ed Holt reports.

Calls have been made for comprehensive studies into the continuing health effects of the Chernobyl nuclear disaster after a rise in birth defects was identified in one of the regions most affected by the catastrophe.

A study by Wladimir Wertelecki of the University of Southern Alabama, AL, USA, found above average rates of a number of birth defects in one province in Ukraine—where the devastated nuclear power plant, which exploded 24 years ago, remains encased in concrete. Wertelecki says that the rise could be linked to continuing exposure to low-level radiation doses.

For the **birth defects study** see *Pediatrics* 2010; **125:** 836–43

The findings, published in *Pediatrics*, are in stark contrast with a major, but highly criticised, 2005 study by WHO and other groups, which suggested that there was no evidence of an increased risk of birth defects in areas contaminated by the accident. Wertelecki says that the results of his study show claims that birth defects are not linked to the disaster need to be re-evaluated. He told *The Lancet*: "The official position is that Chernobyl and birth defects are not connected. That position needs to be reconsidered at the very least."

Stefan Boness/Panos Pictures

Russian infants are treated for disabilities thought to be caused by Chernobyl fallout

When unit number four of the Chernobyl nuclear power plant exploded in April, 1986, it caused the world's worst nuclear disaster. WHO has estimated that the total radioactivity from Chernobyl was 200 times that of the combined releases from the atomic bombs dropped on Hiroshima and Nagasaki. The blast and following fires sent a huge radioactive cloud spreading across Europe and 350 000 people in areas near the plant had to be evacuated.

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The UN, WHO, International Atomic Energy Agency, and other bodies joined with the Russian, Belarus, and Ukraine Governments to set up the Chernobyl Forum to undertake a major study into the effects of the disaster and in 2005 released their findings.

According to their study, there had only been 56 direct deaths (47 accident workers and nine children with thyroid cancer) and an estimated 4000 deaths in future because of the accident. Also, there was no evidence of an increased risk of birth defects or other reproductive effects in areas contaminated by radiation from the accident.

The report included data from WHO showing that although an increase in birth defects had been found between 1986 and 1999 in Belarus—whose southern border is 30 km from Chernobyl and which was badly affected by radioactive fallout from the disaster—those rates were rising in both contaminated and uncontaminated areas.

But the study was heavily criticised by other groups who said it grossly underestimated the deaths and the potential future health effects of the disaster and had used selective reporting of data.

Alternative studies contradicted some of the Chernobyl Forum findings and suggested that the health effects of the disaster were much greater. One, the TORCH report published in 2006 by British scientists Ian Fairlie and David Sumner and commissioned by a German Green Party MEP, indicated the uncertainty surrounding the health effects of low doses of radiation and of internal radiation doses through ingestion and inhalation of nuclides.

Wertelecki's study concentrated on the Rivne province of Ukraine, about 200 km from the Chernobyl plant. Its northern half, Polissia, was classified as being "significantly affected" by the disaster and the ground, as well as food, in the area still contains low doses of radioactive caesium 137.

The study, which covered births in the years from 2000 to 2006 in Rivne, showed that of 96 438 babies born in the province in that time, the rate of some birth defects was far above the European average. It showed that 22 of 10 000 babies were born with a neural tube defect compared with the European average of nine per 10 000 babies.

The rate was even higher in the Polissia region with 27 of 10 000 babies born with a neural tube defect. Polissia also had high rates of microcephaly and microphthalmia than in other parts of Rivne. The study recorded 3·7 cases of microcephaly per 10 000 children in Polissia, while the rate in the rest of Rivne was 1·3 per 10 000. Meanwhile, the rate of microphthalmia was 1·8 per 10 000 while it was just 0·4 per 10 000 in other areas of the province.

But Wertelecki is keen to point out that the study does not claim that

radiation exposure is definitively the cause of the defects. The study lacked data about prenatal drinking and the diet of mothers in the region, he stresses. Both are key to understanding the causes of the defects as fetal exposure to alcohol and a lack of folates during pregnancy can lead to both types of birth defects.

Alcoholism is rife in the Ukraine and generally low standards of living for much of the population also mean diet can be poor. "Alcohol and folates are among the factors involved in certain birth defects. A lack of folates combined with ionizing radiation could multiply the risks of birth defects or at least greatly enhance them. Alcohol is a factor in microcephaly, as ionizing radiation can also be, and combined their effects could be enhanced", says Weretlecki.

"That data [on prenatal fetal exposure and folates in mothers' diets] was not available to us and to prove that one factor is behind the birth defects rather than others or that the factors are all combined is a matter of resources. But what is key is that these birth defects can be prevented."

He adds that so far studies on the possible effects of radiation had been focused on external exposure to radiation near Chernobyl rather than other forms. "Models used so far have mainly concentrated on external exposure levels—eg, permissible levels of radiation in the air and how much these have been exceeded etc. But what needs to be studied is the internal exposure—eg, in what is eaten, drunk, consumed, or breathed in through the air", says Wertelecki.

When contacted by *The Lancet* regarding Wertelecki's study and its apparent contradictions to the Chernobyl Forum's findings, WHO said it supported efforts to undertake new studies, but stuck by its own findings in the 2005 report. Igor Pokanevych, head of the WHO office in the Ukraine, tells *The Lancet*: "The conclusions of the Chernobyl Forum study were based on the data collected in the Forum's studies. We found that there would likely be no major effects on birth defects. But our conclusions do not match those of Dr Wertelecki. We are not saying that he is wrong, or that he is right, just that our data was different to his and our conclusions were different. He perhaps had access to data that we did not."

Pokanevych says that Wertelecki's method was different to the WHO study and that he made conclusions based on studies of one particular part of the wider Rivne province rather than at nationwide level. "We would definitely welcome more studies on this and any efforts that will help prevent birth defects. But any studies need to have the same methodology to be comparable", he says.

Both local and international studies into the long-term effects of the disaster have been hindered by difficulties in the health sectors in affected countries, including lack of funding, infrastructure, and lack of local experience in chronic disease epidemiology.

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Wertelecki is also critical of the claims made by the Chernobyl Forum that one of the greatest dangers to health in the wake of the nuclear plant disaster was the fear of becoming ill because of it, rather than actual illnesses as a result of the disaster. The Forum's report said: "The mental health impact of Chernobyl is the largest public health problem unleashed by the accident to date." It suggested that the psychological effects of the disaster had led some to ignore warnings of collecting food from contaminated areas and turn to overuse of alcohol and tobacco, and unprotected promiscuous sexual activity in the belief that such behaviour was no less risky than their exposure to the effects of Chernobyl.

Getty Images

A monument to the victims of the Chernobyl disaster in front of unit number four

But Wertelecki thinks that such statements hindered further studies. "At grassroots level in the Ukraine people are offended when they hear that the biggest health threat is radiophobia [anxiety about radiation safety] and the fear of illness from Chernobyl. Statements like that can also put a deep freeze on funding sources for other studies", he says.

The Ukrainian health ministry and health authorities in Rivne declined to comment when contacted by *The Lancet*. But Wertelecki says that the authorities in Rivne are keen to create international partnerships with other bodies to do research in the area. Ukraine still spends between 5–7% of its gross domestic product every year on Chernobyl-related matters, including health. Benefits programmes have been set up for people classed as Chernobyl victims and Ukrainian authorities have designated 2·4 million Ukrainians, including more than 400 000 children, as having health problems related to the disaster.

Wertelecki says that the most important thing now was to begin wide-scale studies to try to identify the cause of birth defects in the region and prevent them. "Chernobyl is a complete tragedy and work needs to be done now to prevent birth defects", he says.

Ed Holt