

## The day the bomb fell

Memories of the nuclear attack on Hiroshima remain sharp in the minds of survivors—many of whom live in constant fear for their health. Justin McCurry meets one of these survivors who along with numerous other “hibakusha” is this week returning to Hiroshima to pay her respects.

It is almost 60 years to the day since Sakae Tsuda was caught up in the world's first nuclear attack. Yet her memories of that day remain undimmed, either by the passage of time or the temptation to banish all thoughts of an event that most adults, let alone a teenage girl, would have found impossible to comprehend.

Mrs Tsuda, then 14, was on a train heading for work at a munitions factory when 600 m above an atomic bomb exploded over Hiroshima at 8:16 on August 6th, 1945.

This week she and her husband, Kazuhiko, a fellow survivor, will be reminded of their singularly tragic youth when the people of Hiroshima mark the day that the bomb layed waste to their city in a matter of seconds.

“I remember trying to walk to work instead”, Mrs Tsuda said in an interview with *The Lancet*. “I came across a baby, no more than a few days old, crying, as its mother, who looked half dead, tried in vain to feed it. There were people who were so weak that they couldn't even eat the rice balls they had been given as emergency rations.

“The heat burned everything in its path, so people were walking around without clothes on”, she said. “Their bodies were black and they had to wrap themselves up in newspaper.”

Mrs Tsuda did not know at the time, but her elder brother had been killed instantly in the blast. His would be the first of several bomb-related deaths in her family. One of her sisters died later the same month from radiation sickness, and almost 3 years later, her father met the same fate. Her mother and another brother both died in 1982, from cancer.

As one of an estimated 86 000 hibakusha—survivors of the atomic

bombing—Mrs Tsuda is the beneficiary of a perverse kind of fortune: studies show that survival on that day depended on being in exactly the right place when the Enola Gay released its deadly payload.

Those within a 2 km radius of the hypocentre didn't stand a chance. Within seconds of the explosion, an estimated 45 000 of the 310 000 people thought to have been in the city were dead, felled by walls of heat that reached 7000 fahrenheit and nuclear winds of up to 400 mph.

By the end of the year the death toll was thought to have reached 140 000, and in the decades that followed the top estimates put the total at 230 000, with the names of new victims added every year to the cenotaph in Hiroshima Peace Park.

That they, too, might to succumb to a radiation-related illness is a constant source of anxiety to the remaining survivors. “Radiation equals cancer”, Mrs Tsuda says. “That's what we always hear. I don't like having to go for regular check-ups (paid for by the government) but I do it because I have to.”

More than 55 years of studies by the Radiation Effects Research Foundation (RERF) in Hiroshima indicate exactly how concerned today's hibakusha should be. “The bomb was almost like being exposed to a giant X-ray machine,” says Charles Waldren, vice chairman and director of research at the foundation. “There's a bit of debate about this, but my feeling is that there were no substantial long-term effects.

“If you were less than 1 km from the hypocentre, you had a very good chance of being killed, but if you were 3 km away you'd have received a very low radiation dose.”

In 1955, RERF recruited about 100 000 hibakusha and estimated their radiation dose based on where they were at the time of the bombing. “The only really established fact is that cancer is more likely after radiation exposure”, Waldren says.

The long-term psychological effects are harder to gauge, but if a refusal to be bitter is a sign of robust mental health, then Mrs Tsuda has little to worry about. “I think that America felt that there was no alternative to the bomb at a time of war”, she says. “But we shouldn't forget that the peace we enjoy now is built on the deaths of my relatives and so many other people.”

Justin McCurry

See Editorial page 427



In August 1945, the first nuclear bombs destroyed Hiroshima and Nagasaki