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REVIEW ARTICLE

## Citizens' Image of Asthma and Their Actions During and After the Yokkaichi Lawsuit

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### ABSTRACT

Yokkaichi asthma is one of Japan's four "big pollution diseases." It occurred in the early 1960s and was caused by emissions from the petrochemical industry. The disease led to the first litigation concerning air pollution in Japan. From 1967 to 1972, citizens fought against corporations as part of the Yokkaichi lawsuit. This article explores how Yokkaichi asthma occurred, how citizens saw the disease before and during the lawsuit, and what actions they took to react to the problem. By appealing, studying, recording, and measuring, citizens in Yokkaichi made their voices heard and helped scientists testify during the legal proceedings, ultimately promoting Japan's environmental legislation.

**Key words:** Yokkaichi asthma; Yokkaichi lawsuit; citizen movement; non-specific disease; epidemiology

## Introduction

Asthma has a long history. However, it has not been considered to be a public health problem until modern times. In the early 1950s and 1960s, heavy industry developed in Japan. At the same time, diseases of unknown origin started appearing in the population. The symptoms of these diseases got worse under certain environmental conditions. These so-called big pollution diseases include Minamata disease, Niigata Minamata disease, Itaiitai disease, and Yokkaichi asthma. The asthma in Yokkaichi was different from the other illnesses because it was non-specific, that is, it also occurred in areas where there was no pollution. Medical scientists spent years discovering the relationship between atmospheric pollutants and the disease. This process involved committee investigations, clinical surveys, and epidemiological studies. A certification system was eventually established based on three conditions to assess whether someone was suffering from this pollution-related illness. A lawsuit filed by residents against several petrochemical corporations began a new era of scientific testimony for liability and compensation. During the legal proceedings, epidemiology was the most effective method to provide convincing evidence. In addition to the scientists, the attorneys, the media, and the citizens gradually understood its important role.

It has been 50 years since the plaintiffs won in the Yokkaichi lawsuit, and Yokkaichi asthma is perhaps a fading episode for most young people. However, there are parallels with the present. COVID-19 also causes acute respiratory distress and pulmonary inflammation, and although its incidence rate is many times higher than that of pollution-related asthma, they are both diseases causing public health emergencies. The epidemiological method, which was crucial to the Yokkaichi asthma case, is also vital in understanding the coronavirus pandemic. This article discusses the

history of Yokkaichi asthma from the citizens' point of view, thus highlighting the significant role residents played in the lawsuit. Citizens were crucial in fighting for the rights of patients. Their image of the disease was shaped by the scientists' findings and the court testimonies. Their protests influenced the final legal judgment and the national environmental legislation.

## The occurrence of Yokkaichi asthma

Soon after the first petrochemical complex started operating in the Shiohama district, residents began to complain about the noise and the irritating gas from the plant, along with several health symptoms. As things got worse, in April 1960, the Association of Shiohama Community petitioned the health and medical division of the city's government to improve their living conditions. Residents complained that they could hardly sleep at night because of the noise and the gas from the industrial complex. Initially, the gas was not linked to sulfur because people knew little about sulfur dioxide; the soot and the noise were the greatest annoyances.<sup>1</sup> In July 1960, Mihama Primary School was enveloped in a foul odor, which caused lessons to be temporarily halted.

In the summer of 1961, the residents of Shiohama started suffering from a new type of asthma that had no apparent cause. In the small town of Isozu, located south of the industrial complex across the Suzuka River, a large number of people were diagnosed with a severe respiratory disease. Local physicians could not determine its cause, but they noticed that it was different from normal asthma. Most of the patients were local fishermen and their families. The attacks occurred almost simultaneously on specific summer days. Because the disease occurred in the Shiohama district, it was called "Shiohama asthma".

In August 1961, the Association of Shiohama Community conducted a survey asking residents

about their symptoms and the possible source of the pollution among the industrial corporations. The toxic gas was thought to be released by the industrial plants, but identifying the chief polluter was problematic. In Isozu, more than 70% of respondents thought that the Showa Yokkaichi Oil Corporation and the Chubu Electric Power Plant were the polluters.<sup>2</sup> The survey reached three conclusions regarding the pollution situation. First, it was not necessary for the city to develop industrial plants. Second, control measures had to be quickly established. Third, the effects of pollution were especially serious in patients and children. The Yokkaichi community thus pleaded to the city's government to improve the environment and the equipment of the industrial plants.

The municipal government promised to organize a special consultative committee to look into the matter. Provisional data from the Committee for Pollution Control in Yokkaichi showed that the concentration of sulfur dioxide in Isozu was six times higher than in other areas.<sup>3</sup> Although the amount of dust fall was lower than in Kawasaki and Amagasaki, it was higher than in Nagoya and Kobe. In the meantime, sulfur oxides became a severe problem in Yokkaichi, where the Shiohama and Kaizō districts were pollution sources in the winter. The number of serious cases of respiratory disease and other diseases caused by air pollution in Yokkaichi increased. A survey at Mihama Elementary School indicated that many children complained about headaches and sore eyes and throats, as well as anorexia and insomnia.<sup>4</sup> The survey also suggested that there was a relationship between the symptoms and sulfur dioxide, which required looking into.

The air pollution in Yokkaichi started with the operation of the Shiohama petrochemical complex; it then got worse when the Umaokoshi complex was opened in 1963. At that time, the sulfur content of the fuel oil used in Yokkaichi was about 3%, and

the amount of sulfur oxides discharged was estimated to be between 130 and 140 thousand tons per year (SO<sub>2</sub> conversion).<sup>5</sup> As the irritating gases were continually discharged into the air, the complaints of the residents increased. Other districts besides Shiohama faced serious contamination, which led the disease to eventually become known as "Yokkaichi asthma".<sup>6</sup>

In Yokkaichi, short-term, high-concentration pollution happened more often than long-term, low-concentration pollution.<sup>7</sup> On 23 January 1964, a high concentration of sulfur dioxide (2.5 ppm) was observed in Isozu.<sup>8</sup> On 31 March, heavy smog occurred in the Shiohama area, which aggravated the symptoms of those suffering from the respiratory disease. Three days later, a former factory worker who had been suffering from emphysema died. The postmortem examination of his body revealed distinct pulmonary signs similar to those found during the Great Smog of London in 1952.<sup>9</sup> This man is considered the first victim of air pollution in Yokkaichi. The type of contamination in Yokkaichi was different from London's calm smog. In the Japanese district, pollution was accompanied by high winds—the so-called gale pollution (Shippu Osen).<sup>10</sup> Because the height of the smokestacks was nearly the same as that of people's houses, a phenomenon called "down draught" occurred, which brought the pollutants to the ground. Especially during the summer, Isozu faced severe pollution.

Katsumi Yoshida, who was commissioned as a committee member to investigate the effects of pollution on the human body, found a preliminary correlation between sulfur dioxide and the asthma symptoms. He conducted a survey using the medical bills of the National Health Insurance (Kokuho) Program. Furthermore, the clinical examination of patients in Isozu showed that when sulfur dioxide in the air was above 0.2 ppm, asthma attacks would occur that were quickly followed by severe heart or lung problems.<sup>11</sup> Yoshida's study confirmed the link

between asthma and contaminated air and supported citizens' fight against the petrochemical industry. The study also contributed to frontline research at the time that identified chronic obstructive lung disease.<sup>12</sup>

In the summer of 1962, prefect Tanaka arranged for free examinations to be carried out to check whether visitors to the area were affected by a disease linked to air pollution. Later, a mass examination of residents was conducted by the Medical Department of Mie Prefectural University. In 1963, the Association of Shiohama Community approached the University's Institute of Industrial Medicine and persuaded it to diagnose residents at Shiohama Hospital. If the diagnosis showed that the illness was caused by air pollution, the association would cover the patient's expenses. This communitarian payment system was well beyond the association's financial resources and only continued for three months.

At the time, the national insurance program covered only 50% of patients' medical expenses. This meant that many people could not afford the medical bills for the disease. Following demands from local doctors, Hirata, the mayor of Yokkaichi city, decided to seek help from the national and the prefectural government. Having failed in both attempts, Hirata decided to develop his own coverage system and consulted Yoshida for advice. In the meantime, after the first pollution victim, the citizens increased their protests, and although a certification system was established in Yokkaichi city, the corporations did not admit any responsibility. Therefore, the possibility of filing a lawsuit against them started to be discussed.

### **The Yokkaichi lawsuit**

Yokkaichi city created its certification and compensation system for air pollution victims in 1965. The system was based on three conditions: the designation of specific pathological symptoms,

the patient's geographical area of residence, and the temporal duration of the symptoms.<sup>13</sup> It soon became clear that "Yokkaichi asthma" was not a single but several kinds of respiratory diseases, such as bronchial asthma, chronic bronchitis, and pulmonary emphysema.<sup>14</sup> The first 18 patients were certified in May 1965. However, although the government's actions, the corporations did not admit that there was a link between their behaviors and air pollution. They thus refused to pay for the patients' medical bills. Faced with this denial, the attorneys of the Tokai Labor Counsel decided to prepare for litigation.

Four preliminary meetings were held in the Yokkaichi City Office between August 1966 and the end of that year.<sup>15</sup> During this preparation, it became clear that proving that the non-specific asthma was caused by the heavy oil combustion in the petrochemical plants was going to be difficult. There was still not enough evidence to prove the relationship between the plants' discharges and air pollution, and between the pollution and the asthma. Although the Kurokawa investigative team, a special investigative team dispatched to the Yokkaichi area by the Ministry of Health and Welfare (MHW) and the Ministry of International Trade and Industry, gave a plausible explanation based on the local weather conditions and the epidemiological research results, the corporations denied compensation. Under the slogan "fighting with studies, studying while fighting," the lawyers began to analyze the epidemiology involved in the case and found that it provided the most valid method for determining legal causation.<sup>16</sup> The fourth meeting determined the plaintiffs and the amount of compensation that should be demanded. The attorneys chose as plaintiffs patients with heavy respiratory diseases from Isozu, the worst-affected area.

On 1 September 1967, nine plaintiffs filed a lawsuit against the six corporations involved in the

oldest petrochemical complex in Yokkaichi. The bill of complaint was filed to the Yokkaichi branch of the Tsu district court, demanding compensation that amounted to 18,000,000 yen.<sup>17</sup> Since two plaintiffs died during the proceedings, twelve people, including their families, became beneficiaries.

During the lawsuit, both the plaintiffs and the defendants made their case, and the responsibility of corporations was discussed. Witnesses were crucial to this process, and the plaintiffs also tried to provide evidence in court. As a witness, Yoshida referred to the theoretical content of epidemiology and explained a framework consisting of four epidemiological principles.<sup>18</sup> Hideo Kashiwagi, Yoshida's assistant, showed the medical records of the plaintiffs and explained that although they suffered from different types of asthma, the exacerbating factor was the same—air pollution.<sup>19</sup> During cross-examination, Yoshida explained the crucial point regarding the relationship between the individual plaintiff and the group, saying that as the individual belonging to the group is exposed to sulfur oxides, the epidemiological characteristics of him/her and the group will be in accordance. The non-specific diseases were explained in detail in the plaintiffs' preparatory pleadings.<sup>20</sup> Epidemiology thus played an important role in these proceedings, laying the foundation for the plaintiffs' victory.

The lawsuit lasted five years. During this period, several associations were created, such as the Association for Certified Victims of Yokkaichi Pollution (ACVYP) (1968), the Citizens Association Fighting Against Yokkaichi Pollution (CAFYP) (1969), the Association for Recording Environmental Pollution (AREP) (1969), and the Shiohama Mothers Association to Protect Children from Pollution (1970). In 1969, the AREP started the Citizen School for Environmental Pollution in Yokkaichi to teach residents basic scientific knowledge concerning contamination. The association also launched a bulletin called *Kiroku Kōgai* (*Record the Pollution*). In

1971, the AREP published the first issue of *Kōgai Tomare* (*Stop the Pollution*), a journal edited by the CAFYP. In charge of this initiative was Yoshiro Sawai, who had been recording environmental pollution in Yokkaichi with a black-and-white camera since the early 1960s. Sawai took a large number of valuable photographs. As the leader of the AREP, he collected a great deal of data for the lawsuit and used them in the abovementioned publications.

During the lawsuit, witnesses from different fields testified in court. Isao Yoshimura, a statistician at Nagoya University, pointed out that the real purpose of a lawsuit is not to obtain compensation but to control the pollution source.<sup>21</sup> One of the plaintiffs, Yukikazu Noda, made the same point on behalf of all the patients:<sup>22</sup>

We're not suing for the money; we're suing to make the pollution go away. If the pollution disappears, the lawsuit can end immediately. I've been hoping for the government's intervention, but I don't think that's going to happen. I was strong and wanted to be a world-class fisherman, but now I can't.

### Supporting environmental standards setting

Citizens and the media played a crucial role in fighting for the rights of pollution victims, building the certification system, and establishing national environmental standards. When Yoshida prepared to testify on how the environmental standards for sulfur oxides were determined by the expert panel in Tokyo, Yokkaichi citizens complained about the mitigation of the final standard values. Two of the protest activities they organized were the collection of signatures and visiting Tokyo. Afterward, citizens started spontaneously measuring sulfur dioxide levels. Students from Nagoya University developed starch iodine paper that could detect high concentrations of the substance. This action

supported the court testimonies and promoted the revision of the environmental standards for sulfur oxides.

The environmental standards for sulfur oxides were first established in 1969, but both the one-hour value and the one-day value were lowered compared to the original scientific criteria. This led more than 42,000 people in Yokkaichi to sign a petition calling for "correct environmental standards" in the autumn of 1968. Some of them even went by bus to Tokyo to discuss the matter with the new minister of MHW, Noboru Saito.<sup>1</sup> The leader of the ACVYP claimed that the standard should be met within three years. Other associations in Yokkaichi agreed with this position and said the minister must compromise.

Citizens in Yokkaichi also made efforts to find a proper method of measuring sulfur dioxide. During the lawsuit, they used a detector paper to check for the presence of the contaminant. As the patients were concerned about the lawsuit's outcome, they began to prepare for further litigation. To provide more convincing evidence, they conducted a survey. These actions started in 1971 and were recorded in citizen publications.<sup>23</sup> The plan was proposed during the second phase of the Citizen Pollution School in Yokkaichi. The members of the CAFYP and the students of Nagoya University used the detector paper. After measuring the polluted areas in Yokkaichi and the clean ones in Mie Prefecture, this method was approved and applied to the homes of patients living in the east part of National Road Number One. At least two testing sites were set up in each town.<sup>24</sup>

At that time, the conductometric method and the lead peroxide method were both used in Yokkaichi city. However, the former was only used in nine sites; the latter was used in 30 sites but could only measure data monthly. Moreover, the academic reports based on these two methods were difficult for common people to understand. The citizens

focused on the following three shortcomings in the existing methods:<sup>23</sup>

a. The units (ppm and mg/100cm<sup>2</sup>) were not easily interpretable;

b. The monthly average data could only show the entire situation, but could not show the difference between two plants. Daily changes had to be recorded to document the pollution coming from different plants. To obtain daily data, hundreds of monitoring stations had to be set up.

c. The methods used at the Environmental Pollution Center were too costly.

As an alternative, the citizens could choose between two types of detector papers: one with lead acetate for hydrosulfuric acid and the other with iodine and starch for sulfur dioxide. As the former could not detect daily changes in concentration, the latter was chosen and widely used.

The members of the CAFYP and the ACVYP conducted four surveys to measure the pollution: August 1971, October 1971, December 1971–January 1972, and July 1972. Each survey lasted two weeks. On 10 January, there was little wind, and the whole city was enveloped in pollution. Other days with similar weather conditions produced the same result. On 6 January, there was a strong northwesterly wind, and only the leeward side of the city was polluted. On 28 August, there was a strong southeasterly wind, and areas more than 10 kilometers from the complex, such as Sakura, were polluted. Isozu was the most polluted area. There, the detector paper turned completely white.

When the standards for sulfur oxides concentration were set, new scientific knowledge provided new evidence. During and after the Yokkaichi lawsuit, citizens protested against the corporations for contaminating the environment and against the government for its ineffectual response. Their actions forced the authorities to reconsider their position and revise the standards.

During the lawsuit, the plaintiffs had priority in most of the judicial debate; the defendants could not even invite experts. The judgment on 24 July 1972, adopted the compensation standards proposed by the expert on the plaintiffs' side. Because joint tort was found to apply, all the corporations had to pay compensation. The total for the twelve plaintiffs was 88,211,823 yen.<sup>20</sup> As other victims began to demand compensation, the corporations set up the Financial Group for Pollution Policies in Yokkaichi in 1973.<sup>25</sup> This body influenced the verdict of the Central Environmental Pollution Council according to which all laborers (regardless of gender and age) had to be compensated with 80% of their average wages.<sup>26</sup>

#### After the lawsuit

While the Yokkaichi lawsuit was taking place, several other lawsuits were filed. The most important ones were the Minamata disease and the Itaitai disease lawsuits. In these cases, the pollution-related diseases were specific. During these lawsuits, after the Basic Law was established, the "Law Concerning the Relief of Pollution-Related Health Damage" (the Relief Law) was approved in 1969. As a result, the payment of medical fees and the provision of allowances to patients in designated areas began. In 1973, the judgments of four major pollution lawsuits promoted the establishment of the "Law Concerning Pollution-Related Health Damage Compensation and Other Measures" (the Compensation Law). This law regulated two kinds of designated areas: the air pollution area and the pollution area with specific diseases. The illnesses involved in the first area were chronic bronchitis, bronchial asthma, etc.; those in the second area were Minamata disease, Itaitai disease, and chronic arsenic poisoning. Regarding the latter, the causation between the pollutant and the disease was clear—if there had been no contaminants, the illness would not have occurred.

The standard in the Yokkaichi certification system was now seen as the best one to determine who would be paid compensation beyond medical bills (e.g., mental health damages, funeral expenses). By certifying patients and providing compensation, the national government showed strength and a willingness to act.

In 1973, after the lawsuit, the Association for the Elimination of Yokkaichi Pollution (AEYP) was established. The AEYP began to monitor the operations of the corporations and conduct several investigations into the industrial plants. When 40 residents visited the facilities of the Mitsubishi Oil corporation, they raised concerns about the measures for disaster prevention as accidents had already occurred at other plants. The company replied that they were upgrading their equipment.<sup>27</sup> Later, 70 AEYP members visited the Ishihara Industry complex to check whether the construction of the sewage treatment facilities had been completed.<sup>28</sup>

Right after the Yokkaichi lawsuit ended, another lawsuit was filed by Inabe residents to the Yokkaichi branch of the Tsu district court. Six plaintiffs filed against a cement corporation for the longstanding discharge of dust and sulfur oxides. As the company had been operating for 40 years, they each demanded 3,000,000 yen of compensation.<sup>29</sup> The plaintiffs won in 1982.

In 1976, the ACVYP, the attorneys of the Tokai Labor Counsel, and the local film club made a documentary called *For Real Blue Sky*. After the Yokkaichi lawsuit, newspapers such as *Asahi Shimbun*, *Mainichi Shimbun*, and *Chunichi Shimbun* started paying more attention to industrial accidents and the reconstruction of plants. The *Kiroku Kōgai* and *Kōgai Tomare* lasted for years. They were eventually taken over by the *Kawaraban* broadsheets, which is still published today.

Although the certification system attracted worldwide attention, the industry soon started



calling for its abolition, arguing that pollution in the country had improved. In 1987, the Environment Agency announced that air pollution areas would be scrapped and that no new cases of public disease would be recognized. However, compensation to already identified victims would continue to be paid. In March 1988, the designation of the country into 41 regions was canceled and no new patients with air pollution-related illnesses were identified.

### Conclusion

The actions against air pollution by scientists and the government have received considerable attention. This article has shown that citizens also played an important role. In the beginning, citizens in Isozu considered asthma a disease of unknown origin, thus living in fear. They asked for help from the Association of Shiohama Community and the Yokkaichi municipal government. When the investigation committee and Yoshida's research team showed the prevalence of asthmatic patients

was increasing and had a close relationship with the pollutants, the citizens began to realize that their illnesses were due to the petrochemical complexes and began fighting against the corporations. During the lawsuit, they set up several community associations to support their cause. The scientists' testimonies and the epidemiological studies showed the link between air contaminants and the non-specific respiratory diseases. Anti-pollution activities were spontaneously organized. Different groups focused on different tasks: appealing for an end to environmental contamination, protecting children, supporting the litigation, and recording the occurrence of pollution and the legal proceedings through printed media. After winning the lawsuit, the citizens continued monitoring the operations of the petrochemical plants. They also cooperated with the media and the attorneys to create an audiovisual record of the fight. The citizen movement in Yokkaichi set an exemplary precedent for other regions and had a profound impact on Japan's environmental legislation.



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