



# Lead (Pb) Content Test in Somay Street Food Using Atomic Absorption Specphotometry Selling on Haluoleo Airport Axle Road Kendari

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**Abstract.** The Kendari City main road has very heavy traffic because along the road there are public facilities, so the road has heavy vehicle activity. Crowded vehicles can increase air pollution and risk increasing the concentration of lead (Pb) in the air which has the potential to contaminate food around it which is dangerous for the body. The aim of this research is to identify the lead content in somay snacks sold around Jalan Poros Halu Oleo Airport, Kendari City. This type of research is descriptive research with total sampling technique. A total of 8 somay sellers on the main road of Halu Oleo Airport, Kendari City were the samples in this research. The samples that have been collected are then tested using an Atomic Absorption spectrophotometer in Biomolecular and Environmental Sciences, Faculty of Mathematics and Natural Sciences, Halu Oleo University. The examination results showed that all 8 (100%) of the somay samples examined contained lead (Pb) at levels of 0.0001 – 0.0008 mg/kg. The conclusion is all somay samples contain lead but have not exceeded the threshold in accordance with the provisions of SNI No. 7387: 2009.

**Keywords:** Lead, Somay, Spectrophotometer

## 1. Introduction

Lead is a heavy metal that is usually found in exhaust emissions produced by vehicles [1]. Plumbum or lead is a heavy metal that can enter the body of living things through the gastrointestinal tract (gastrointestinal), respiratory tract (inhalation), and penetration through the skin. Plumbum that enters the body will be toxic [2]. Food safety that is good for consumption is food that is free from contamination of contaminants such as biological, chemical and other objects that can interfere with, harm and endanger human health. One of the contaminants that can contaminate food is harmful chemicals [3].

Hazardous chemicals can enter food either intentionally or unintentionally. Hazardous chemicals that enter food can cause poisoning to the body if consumed and one of the foods that can be contaminated with hazardous chemicals is roadside food [4]. Roadside food is at risk of contamination with harmful chemicals, including lead (Pb). Some people, particularly those who are highly concerned about the nutritional value

of their food, consider roadside food that is left open to be dangerous for health due to the conditions around the food vendors. One of the reasons is the conditions around the food vendors that cause the food to be unhealthy for consumption. Roadside food that is left open can cause food to be contaminated with biological, physical, and chemical contaminants, one of which is heavy metal lead [5]. According to WHO, relatively low levels of lead exposure were previously considered 'safe', but have been shown to damage children's health and impair their cognitive development. Despite low levels of exposure, lead is a potent neurotoxin that causes a decrease in IQ scores. Children under the age of 5 are most at risk of suffering lifelong neurological, cognitive and physical damage and even death from lead poisoning. The older children and adults also suffer greatly from prolonged exposure to lead in the food, water and air they breathe, and are more at risk of death from cardiovascular damage and kidney disease later in life [6]. According to the Institute for Health Metrics and Evaluation (IHME) in 2019, there were 900,000 deaths caused by lead exposure, with the highest number occurring in low- and middle-income countries. A report by the United Nations International Children's Emergency Fund (UNICEF) and Pure Earth reveals that up to 800 million children, or 1 in 3 children worldwide, have blood lead levels exceeding 5 micrograms per deciliter ( $\mu\text{g}/\text{dL}$ ) [7].

In Indonesia, more than 8 million children have blood lead levels above 5 micrograms per deciliter ( $\mu\text{g}/\text{dL}$ ), a level that requires action. Based on data from IHME in 2020, in Indonesia the number of children aged 0-19 years with blood lead levels (BLL) above  $5 \mu\text{g}/\text{dL}$  was 8,271,863 and above  $10 \mu\text{g}/\text{dL}$  was 17,017 (Rees & Fuller, 2020). The estimated number of lead-related deaths is 143,000 annually, with 853,000 deaths occurring in middle- and low-income countries, including Indonesia. Due to its effects on humans through food poisoning or potentially toxic air pollution, lead metal is considered a crucial issue and has received special attention from a health perspective [8].

In Kendari City itself, the number of people exposed to lead after research was conducted found that out of 30 people there were 7 people whose blood contained lead but was still within normal limits and 23 other people whose blood contained lead and had abnormal lead levels [9]. Research related to food or roadside food exposed to lead was conducted by Sudarsana (2021) on fried foods on the road around Mandonga Mall in Kendari City, the results showed that of all fried food samples there was lead content in all samples, which ranged in the range of 0.0002-0.0022 ppm. In addition, research has also been conducted related to lead levels in Fuji apples in all traditional markets in Kendari City by finding that the Fuji apples studied all contained lead with the highest level of 0.0652 mg/kg [10].

In Kendari City, research found that out of 30 people, 7 had lead in their blood within normal limits, while 23 had abnormal lead levels. Sudarsana (2021) conducted research on roadside food in Kendari City, specifically fried foods around Mandonga Mall, to determine the lead content. The results showed that all fried food samples contained lead, with levels ranging from 0.0002-0.0022 ppm. In addition, research has also been conducted related to lead levels in Fuji apples in all traditional markets in Kendari City by finding that the Fuji apples studied all contained lead with the highest level of 0.0652 mg/kg [10].

One of the most popular foods among Indonesians is somay. Somay is a popular food among Indonesians due to affordability, taste, and accessibility of it. However, its

safety for consumption is not widely known. Air quality on highways with heavy traffic contains higher lead than air on highways with low traffic density [11]. Pb levels in the air are influenced by the distance to the highway [12]. Based on data from the Kendari City Transportation Office in 2023, the vehicle density on the Halu Oleo Airport Poros Road in 2023 has an average of 1197-1399 per hour [13].

Some food vendors selling along the streets of Baruga Sub-district do not cover the food they sell. This can make the food contaminated by various microorganisms as well as dust particles and chemicals produced by vehicles. Moreover, this will be more dangerous if the merchandise is traded for a long time. Lead (Pb) contained in vehicle fumes can potentially be one of the contaminants in food, one of which is somay sold on the roadside.

Based on preliminary observations on the sales that will be used as research locations, there are still many somay traders who sell their wares in an open state. The road is also a place of activity for various groups of people. Along the road there are schools, universities, hospitals, offices, supermarkets, Pertamina and many other places that are often traveled by the community so that the road has dense vehicle activity. In addition, the distance between the highway and the point of sale is about 5 meters. Environmental conditions close to the road body can allow this fried snack food to be contaminated due to lead contamination that originates in vehicle fumes that pass by on the road around the selling place.

The density of vehicles can increase air pollution and risk increasing the concentration of lead (Pb) in the air which has the potential to contaminate the food around it. Based on the explanation above, the researcher is interested in examining the "Test of Lead (Pb) Levels in Somai Snacks by Atomic Absorption Spectrophotometry Selling on Jalan Poros Halu Oleo Airport Kendari."

## **2. Methods**

The type of research used is descriptive to identify the presence or absence of the presence of lead (Pb) content in somay. The samples in this study were all somay snacks sold in the roadside area of Halu Oleo Airport Poros, Baruga District, namely 8 samples. Then a qualitative examination was carried out using the atomic absorption spectrophotometry method and the sample examination test is carried out at the Biomelecular and FMIPA laboratories of Halu Oleo University. The results of the examination of lead content in somai snacks were then compared with the maximum limit of metal content contamination according to the SNI 7387-2009 standard regarding the maximum content limit of heavy metal contamination in food.

### **2.1 Lead inspection work procedure**

The lead inspection work procedure is:

1. Preparation of Tools and Materials
  - a) Tools: Atomic Absorption Spectrophotometry (SSA), measuring cup, test tube, spatula, analytical balance, hotplate, autoclave, erlenmeyer, cutter and fume hood
  - b) Materials: somay samples, distilled water, concentrated nitric acid (HNO<sub>3</sub>), handscoon, filter paper.

## 2. Work procedure for lead testing

The working procedure for lead testing on somay samples are:

- a) Prepare the samples to be tested with each sample has been labeled,
- b) Take samples using a spatula and weigh the sample as much as 1 gram placed in an erlenmeyer container on an analytical balance,
- c) Adding 10 ml of concentrated HNO<sub>3</sub> solution.
- d) Deconstruct the sample somay at a temperature of 250 °C - 300 °C until the sample dissolves and obtained white smoke vapor,
- e) Cooling the filtrate, then adding liquid aquadest as much as 20 ml.
- f) Filtering the sample using filter paper into a measuring flask
- g) The clear filtrate obtained is analyzed to the sample metal reading tool using SSA (Atomic Absorption Spectrophotometry).

## 3. Results

### 3.1 Lead (Pb) Test Results on Samples

The results of the lead (Pb) test on somay samples at Jalan Poros Bandara Halu Oleo Kot Kendari are as follows.

**Table 1.** Test Results of Lead (Pb) in Somay Samples at Halu Oleo Airport Road, Baruga District

No.	Sample code	Average Pb Content (mg/kg)	Description
1.	Somay 1	0,00025	Eligible
2.	Somay 2	0,0001	Eligible
3.	Somay 3	0,0002	Eligible
4.	Somay 4	0,0005	Eligible
5.	Somay 5	0,0003	Eligible
6.	Somay 6	0,0004	Eligible
7.	Somay 7	0,0004	Eligible
8.	Somay 8	0,0008	Eligible

Based on the laboratory examination results in table 1, it shows that of the 8 somay samples, the highest lead (Pb) content is in somay sample 8, which is 0.0008 mg/kg and the lowest lead (Pb) content is in sample 2, which is 0.0001 mg/kg. The average of all samples had a lead content of 0.00036 mg/kg so that all somay samples examined at Jalan Poros Bandara Halu Oleo, Baruga Subdistrict still meet the requirements according to the predetermined standards, namely the SNI maximum limit of 0.3 mg/kg.

## 4. Discussion

In this study, laboratory tests were conducted to determine the presence of lead (Pb) in somay samples sold on Jalan Poros Halu Oleo Airport in Baruga District, totaling 8 samples. In this study, several stages were carried out starting from sampling, then preparation of materials and tools needed for analysis needs, the deconstruction process

to the sample analysis process using Atomic Absorption Spectrophotometry in accordance with applicable operational standards at the Biomolecular and Environmental Laboratory, Faculty of Mathematics and Natural Sciences, Halu Oleo University.

From the research on the content of Lead (Pb) in somay snacks sold around Jalan Poros Halu Oleo Airport Kendari City by Atomic Absorption Spectrophotometry conducted on 8 samples and tested in the laboratory using the Atomic Absorption Spectrophotometry (SSA) method, the results obtained: Sample 1 contains lead 0.00025mg/kg with a maximum SNI limit of 0.3 mg/kg. Sample 2 contains lead 0.0001mg/kg with a maximum SNI limit of 0.3 mg/kg. Sample 3 contains lead 0.0002mg/kg with a maximum SNI limit of 0.3 mg/kg. Sample 4 contains lead 0.0005mg/kg with a maximum limit of SNI of 0.3 mg/kg. Sample 5 contains lead 0.0003mg/kg with the maximum limit of SNI 0.3 mg/kg. 6. Sample 6 contains lead 0.0004mg/kg with the maximum limit of SNI 0.3 mg/kg. Sample 7 contains lead 0.0004mg/kg with the maximum limit of SNI 0.3 mg/kg. Sample 8 contains lead 0.0008mg/kg with the maximum limit of SNI 0.3 mg/kg.

The results of the inspection test carried out on somay samples identified that all samples had lead content in them but still met the requirements in accordance with SNI No. 7387: 2009 standard of 0.3 mg/kg so that it will not cause poisoning if consumed. Lead (Pb) content that is still below the threshold will still be harmful to the body because lead (Pb) is a metal that takes a long time to be broken down by the body, so if exposed continuously for a long period of time, it will have a negative impact on health in the future [14].

Based on the results of the study, it is known that of the 8 samples tested, the results show that there is lead (Pb) content in all samples but the levels are still below the maximum limit set by SNI 7387-2009. because the lead metal content does not exceed the maximum standard of SNI, it can be stated that the food is still safe for public consumption.

The tool used in the research is atomic absorption spectrophotometry (AAS). AAS is a method used to determine the elements in a sample in the form of a solution. The process of energy absorption by atoms that are at the level of basic energy (ground state) is based on the principle of analysis with AAS. So that the absorption of energy results in the excitation of electrons in the atomic shell to a higher power level (excited state). As a result of the radiation absorption process causes electrons from unstable excited free atoms will return to their original state by emitting radiation energy of a certain wavelength for each element [15].

The reason why 8 samples of somay snacks on the axis road of Halu Oleo Kendari Airport contain lead, although they are still eligible for consumption or do not exceed the prescribed limit is because lead easily binds to fat so that it is easily absorbed by somay snacks.

The presence of lead in somay sold by traders on the airport axis road can be caused by several factors, one of which is because somay sold on the side of the road is left for a long time in open conditions which causes somay to be contaminated with surrounding air pollution caused by exhaust emissions from motorized vehicles. Lead metal from motor vehicle exhaust emissions can be caused by vehicles that use engine fuel containing Pb [16].

The presence of Pb metal in the fuel aims to make it easier for the fuel to burn. The mechanism is to lower the combustion point by increasing the octane number with the

addition of lead in the form of tert-butyl lead (TEL) so that locations with dense vehicles can cause lead pollution in the air which has the potential to contaminate not only humans directly but also merchandise sold around it [17].

In this study, the parameters for the presence of heavy metal lead (Pb) content refer to the SNI No. 7387: 2009 regarding the maximum threshold of heavy metal contamination in somay snacks that has been set at 0.3 mg / kg, if exposed it can be harmful to health causing toxic to humans causing disorders of the kidneys and digestive system.

This study is in line with research conducted by Yulia et al., in 2022 which showed that meatballs tested using Atomic Absorption Spectrophotometry found that there was lead content in all samples of meatballs sold around the Aur Kuning terminal but still below the standard determined in accordance with SNI No. 7387: 2009 which is 0.3 mg/kg. In addition, this research is also in line with the research conducted by Umar et al. in 2021, in which it was found that of the 20 fried food samples tested, it was found that all samples contained lead but the lead metal content was still below the maximum limit.

In addition, one of the causes of the presence of lead in somay on the airport axis road is because the seller does not use cooking oil according to SNI standards and uses cooking oil repeatedly. Based on the results of research by Restiani et al, 2020, it is known that 63.3% of traders have poor use of cooking oil such as using bulk oil, adding new cooking oil by not disposing of used cooking oil [18].

## 5. Conclusion

Based on the results of the analysis that has been carried out, it can be concluded that of the 8 samples of fried food sold around the Halu Oleo Kendari airport axis road, all of them contain lead metal, but the lead metal content is still below the maximum standard of SNI 7387-2009.

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