ISBN 978-602-60569-3-1

SHELLS THAT HAVE BEEN POLLUTED BY LEAD AROUND YOUTEFA BAY IN JAYAPURA CITY THAT HAVE POTENTIAL RISK OF NON CARCINOGENIK

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INTRODUCTION

According to several researchs, there are several coastal areas in Indonesia has contaminated with heavy metals, example lead. Lead contamination in water can be found in the waters, bays, coastal, marine and rivers. Several reports found variety of areas that had been contaminated with lead or plumbum (Pb) which exceeded the threshold value was allowed, even the impact of pollution. For example, lead pollutions in the Jakarta Bay (Fitriany, 2004; Sarjono, 2009; Rochyatun, 2003), the coastal of Riau (Nasution, 2011), Badung River (Bogoriani, 2006), coastal Borneo (Hartono, et all 2011), Bali beaches (Nelyazar, 2007), and the coastal of Makassar (Habrianti, 2013). In Papua, Youtefa bay in Jayapura is recorded as costal areas that already contaminated Lead, and gulf youtefa can not be separated from the problem of heavy metal pollution because a part of ragtag Jayapura, the estuary into the gulf Yotefa. In 2004 (Arobaya & Pattiselano, 2010) a survey Bapedalda Jayapura on water quality parameter Youtefa polluted sea in gulf of Pb has reached 0.03 mg/l. Based on the researchresults Manalu in 2012, found that an index ofpollution in the waters of the gulf of storet Youtefa based index (a value of raw data about the quality of the water which is then transformed into an index) are in moderate and severe polluted (Manalu, 2012).

This study aims to analyze how much health risks that caused by lead exposure in shells which may effect human health or community that stay around this site. In addition, this researches is observational research with risk analysisi or Hazard Quotient. Samples have been collected through purposive sampling method.

METHOD

Researches is observational research with risk analysis or Hazard Quotient. Samples have been collected through purposive sampling method. This type of research is an observational with risk analysis or *Hazard Qouetient* approach of calculation or estimates the risk to a target organism, system or (sub) populations by measuring concentrations in humans.

Human sample: 75 respondent

The sample is a portion of the population, sampling technique was purposive sampling, so that the determination of the sample, the researcher establishes the following criteria: 1. Willing to be a respondent 2. Live in Youtefa Gulf > 2 years Exclusion criteria: Not willing to be respondent, Stay in Youtefa gulf < 2 years. shellfish sample criteria: is the most frequent type of shellfish for consumption in the Gulf Youtefa and found there are six species most commonly consumed species namely; Anadara granosa, Bathyarca Petucunloidus, Anadara ovalis, Barbatia obliquata, Strombus Canarium, Canarium granosa Anadara.

Examination of lead in shellfish (Nasution, 2009) was conducted by taking 12 samples of shellfish meat from stations around the coast Yotefa Gulf. The sample consists of 6 species of musselshells The content of lead in shellfish meat examined by ICP (DKI Labkesda, 2014). The determination of the threshold values with standard ISO7387 in 2009, contaminated if more than 0.3mg /kg (Hartono, et all. 2011). Shellfish sample inspection conducted in Laboratorium of health Jakarta by using the (Inductively coupled plasma) ICP-Thermo IRIS Interepid II

RESULTS AND DISCUSSION

Lead Levels in Shellfish

Examination of lead at 12 shellfish found an average concentration of 0.57mg/kg, with arrange from 0.0016 to 3.480 (SD 1.35). There were four shellfish have lead level sexceeding the threshold value ISO 7387/2009 of 0.30mg/kg(range0.46 to 3.48) (Table 2). Contaminated shellfish obtained from station 9,10,11 and 12.

 ISBN 978-602-60569-3-1

Table 1. Lead **Levels in Shellfish from 12 Stations in**
the Youtefa Gulf

Stations	Sample Location	Sellfish size (cm)	Species	Lead level (mg/kg)	Result
1	02° 58'81,6" LS 140° 70 75,3"BT	L=5,5 W=7	Bathyarca petucunloidus	<0,00 116	Normal
2	02° 59'00,4" LS 140°70'89,1"BT	L=6 W=6	Anadara Granosa	0,08	Normal
3	02° 59'31,6" LS 140° 70' 1,5"BT	L=5 W=6	Bathyarca petucunloidus	<0,00 116	Normal
4	02° 59'93,8" LS 140°71'17,0"BT	L=4,5 W=5,5	Anadara Ovalis	<0,00 116	Normal
5	02° 62'42,9" LS 140°'70'14,3"BT	L=6,5 W=7	Bathyarca petucunloidus	0,18	Normal
6	02° 60'35,8" LS 140°'70'35,2"BT	L=4 W=5	Bathyarca petucunloidus	<0,00 116	Normal
7	02° 61"16,7LS 140°69'34,5"BT	L=5 W=3	Barbatia Obliquata	<0,00 116	Normal
8	02° 60'81,9" LS 140°71'20,8"BT	L=5,5 W=5	Anadara Granosa	0,07	Normal
9	02° 62'81,2" LS 140°72'22,3"BT	L=5,5 W=4	Strombus Canariium	0,46	Contaminated
10	02° 61'83,7" LS 140°72'0,17"BT	L=5,5 W=6,5	Bathyarca petucunloidus	2,18	Contaminated
11	02° 61'97,5" LS 140°2'21,7"BT	L=6 W=7,5	Bathyarca petucunloidus	3,48	Contaminated
12	02° 62'54,4" LS 140°02'51,7"BT	L=5 W=5	Anadara Granosa	0,43	Contaminated

Risk Analysis

The risk analysis is done with the first step is to identify exposure risk exposure due to consumption of shellfish contaminated plumbum plumbum by an interview expressed as intake. Intake used in this study is the intake through the consumption of shellfish. Afterwards anthropometric characteristics such as weight, height and frequency of consumption patterns and contact time activity patterns are also collected.

Next is calculating the concentration of the source of exposure by analyzing the content of plumbum in shellfish from the bay Youtefa, where the risk of exposure to any risk of health by an agent to differentiate on Noncarcinogenic effect. Risk analysis measures the consumption of shellfish and fish are not much different, ranging from interviews to anthropometric measurements. The following analytical data are the mean, median, minimum and maximum and standard deviation of the concentration of plumbum, the rate of intake, frequency of exposure and duration of exposure, and the respondents' weight greater the risk (RQ) due to the consumption of shellfish:

Tabel 2. Statistical data of the concentration plumbum

Variable	Mean Median	Minn Max	SD
Konsentration Plumbum in shellfish	0.57 2,18	0,01 3.48	1.35
Frekuensi Exposure	47.93 50	15 50	78
Duration exposure	40.22	2 80	19
Weight	66 64	24 105	16.8
Intake rate	0.011 0.0001	0.00 0.60	0.071
RQ	2.42 0.68	0.00 27.81	4.56

Furthermore, after it was done following the risk analysis and risk analysis and the results of the calculation:

Tabel. 3.

No	Nama	BB	Waktu terpapar	Lama tinggal	Frek. paparan	Kons. Plumbum kerang	laju asupan kerang	Laju asupan kerang	RQ
			jam/hari	(Dt (thn)	Hari/thn	mg/kg	Kg	m/kg/hari	
1	LS	86	4	61	350	3.48	0.05	0.0158	3.945
2	FR	57	1	45	350	2.18	0.05	0.0028	0.688
3	MA	52	2	16	350	0.08	0.1	0.0002	0.039
4	DB	74	1	49	350	0.08	0.1	0.0002	0.042
5	YB	24	2	69	350	2.18	0.05	0.0200	5.008
6	YU	78	12	51	350	3.48	0.05	0.0436	10.909
7	KA	64	4	52	350	3.48	0.05	0.0181	4.519
8	SA	52	5	33	350	0.08	0.1	0.0008	0.203
9	JRi	67	1	50	350	0.08	0.1	0.0002	0.048
10	MC	52	2	43	350	0.011	0.05	0.0000	0.012
11	MR	100	2	25	350	0.08	0.05	0.0002	0.038
12	EP	56	6	72	350	0.08	0.15	0.0036	0.901
13	MK	55	6	33	350	0.08	0.15	0.0011	0.267
14	RI	95	6	59	350	2.18	0.15	0.0673	16.818
15	SE	97	1	40	350	0.08	0.15	0.0002	0.045

The derivation of the intake rate for Noncarcinogenic respondents LS

$$I = \frac{Cx\ Te\ x\ R\ Fe\ x\ Dt}{Wb\ x\ t\ avg}$$

I = intake (intake), mg / kg / day
C = Concentration risk agent: 3:48 mg / kg for mussels
R = rate of intake or consumption of 0.05 kg / day or for food
TE = 4 hours / day
FE = Frequency of exposure, 350 days / year
Dt = duration of exposure, the (real time 6 or projection, 30 years for residential default value)
Wb = Weight, kg
Vg = Period average time (30 × 365 days / year for substance nonkarsinogen)

$$I = \frac{3{:}48\ X\ 0.05\ X\ 4\ x\ 350\ x\ 61}{86\ x\ (30\ x\ 365)}$$

$$I = \frac{14859.6}{941\ 700} = 0.0158$$

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Interpretation: The rate of Plumbum intake at the population weighing 86 kg which consumption shells which have high levels of plumbum 3:48 mg / kg / day for 350 days / year with duration of exposure for 61 years is 0.0158 mg / kg / day.

Once the rate of intake of her in the know, the next is to know the characteristics of the health risk is expressed as a Risk Quotient (RQ, Risk Level) to effects Noncarcinogenic (ATSDR 2005; EPA 1986; IPCS, 2004; Kolluru 1996; Louvar and Louvar 1998) and Excess Cancer Risk (ECR) for carcinogenic effects (EPA 2005) in 2013. Mallongi RQ is calculated by dividing the intake Noncarcinogenic (Ink) risk agent with RFD or her RFC according to equation:

$$RQ = \frac{I_{nk}}{RfD\ atau\ RfC}$$

Where :
I_{nk} = 0.0158
RfD = 0.004

$$RQ = \frac{0.0158}{0.004} = 3.94$$

Interpretation: The ratio of the population with a weight of 86 Kg of consumption mussels contaminated Lead 3:48 mg / kg / day for the duration of exposure of 61 years in the Gulf Youtefa is 3.94 or risky because RQ> 1.

Lead levels were higher in shellfish consumed excessive lead. shellfish are the main consumption of the people living around the Yotefa Gulf. The shellfish were consumed by settlers that cause lead excess and may cause pathological disorders such as sideroblastic anemia(Athena, 2009).

The water of Yotefa Gulf content waters that classified aspolluted due exceeding the threshold 0.0080 mg/l, Minister of Environment Standards No.51 in 2004. Yotefa Gulf water pollution has also been reported by some other research hers previously(Manalu, 2012). Pollution was mainly located in the mouth of the river which entered the Yotefa Gulf so brown and muddy water containing suspended solids.

High levels of lead in the shellfish in the Youtefa Gulf due to low a wareness of the people who make the waters of the bay as a place to dispose of trash. Large a proportion of the people living in the coast areaYoutefa dispose of their garbage directly into the waters. Effect of heavy metals on marine ecosystems is a heavy metal that is transferred to the water, eitherriv eror seawill experience processes such as precipitation, adsorption and absorbed by aquatic organisms.

CONCLUSION

The mean of RQ that more than one indicate that people who live near by youtefa bay have risk to develop effect of lead exposure from polluted shells. Based on formula calculation, RQ value is very high because RQ high above 1 ; therefore, this number (RQ) must controlled.

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