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Environmental Health Risk Assessment in Flood Prone Area; Case Study in Wajo District

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ABSTRACT

Background: Environmental Health Risk Assessment (EHRA) is one of the appropriate methods used in the study of the impact or risk of flooding on public health in flood-prone areas. This article aims to analyze environmental health risks in flood-prone areas with a case study in Wajo District, South Sulawesi which is prone to flooding that occurs every year.

Method: This type of research is observational with a descriptive approach that analyzes the environmental health risks in flood-prone areas in Wajo District, namely Tempe District and Sabbangparu District. The sample in this study were all people aged> 15 years in areas affected by flooding that occurred in Wajo District in the Tempe and Sabbangparu Districts as many as 398 people. Data were analyzed descriptively in the table with reference to EHRA standards.

Discussion: Environmental health risk assessment in Wajo District showed that Wiringpalannae and Mattirotappareng villages is in a very high risk category, Salomenraleng and Salotengnga villages are in the high risk category, Laelo, Pallimae, Mallusesalo, Worongnge, Liu, Ugi, and Walannae are in the risk category moderate, and the Tadangpalie and Watalippue villages are in the less risky category.

Recommendation: This research will become a literature and in the framework of determining the direction of health care policies and efforts to overcome environmental based diseases such in people living in areas affected by flooding in Wajo District.

Keywords: EHRA, Flood-prone areas, Floods, Wajo District.

INTRODUCTION

Flooding is the most destructive natural hazard. This disaster struck the sunken to flat areas located in the lowlands. Excess water that inundates an area that usually often occurs as a result of the river's capacity is unable to accommodate the water that flows over it or the excess of local rainwater. The excess of local rainwater that causes flooding can be caused by two things, namely saturated soil in the place and still high-water level in the river channel. [1] Along with the development of time and increasing human activity, causing environmental damage tends to get worse and even trigger an increase the number of occurrences and intensity of disasters that occur alternately in many regions in Indonesia. In 2006 there were flash floods in Jember, Banjarnegara, Manado, Trenggalek and several other areas. [2]

The National Disaster Management Agency (BNPB) notes that of the total hydrometeorological disasters that occur most frequently in Indonesia are flood disasters. [3] One of the islands in Indonesia is the island of Sulawesi, it is known that various regions in Sulawesi are areas that are very vulnerable to disaster aspects, due to geographical and geological conditions of the region. [4] Tempe and Sabangparu districts are sub-districts in Wajo District, South Sulawesi Province. [5] Based on data from the Health Crisis Center in 2014 the Wajo District floods occurred inaffected sub-districts, Bellawa, Bola, Pammana, Sabangparu, Tanasitolo, and Tempe with

victims' data including data of 2 dead victims and 103 refugee data. [6]

Environmental Health Risk Analysis (ARKL) or Environmental Health Risk Assessment (EHRA) is one method used in the study of environmental impacts on health. In several European Union, American and Australian countries, ARKL has become a central idea for legislation and regulation of environmental impact control. [7] The aspect assessed is sanitation which is an intentional effort or behavior to cultivate clean life to prevent humans from directly touching dirt and other hazardous waste materials, in the hope of maintaining and improving human health. The objective of this study was to assess environmental health risks in flood-prone locations in Wajo District.

MATERIALS AND METHODS

The type of research used is observation with a descriptive approach through interviews using questionnaires and direct observation through observation sheets. The study was conducted in 2 sub-districts in Wajo Regency, namely Tempe District and Sabangparu District. The sample in this study amounted to 398 households in flood prone areas. Determination of samples was done with the Lemeshow formula. The collected data was processed using the SPSS application and the results of data analysis are then presented in narrative form and tables.

RESULTS

Most of the respondents in this study were female in the amount of 58.5% with a total of 233 respondents, while respondents who were male were 41.5% with a total of 165 respondents. The age of most respondents is age 36-45 years by 30.9% with a total of 120 respondents, then followed by the age of 46-55 years by 21.9% with the number of 85 respondents, aged 26-35 years at 20.4% with the number 79 Respondents, aged 56-65 years amounted to 11.3% with a total of 44 respondents, aged 17-25 years at 7.7% with a total of 30 respondents, age >65 years at 7.2% with a total of 28 respondents and the age of respondents at least is at the age of 12-16 years that is equal to 0.5% with the number of 2 respondents. For the number of people who stay in the house, most have small family members, namely families with 4 or <4 members per house, which is 61.6% or 239 houses and as many as 38.4% or 149 houses are large families with a number of family members >4.

Household water sources used in Tempe District, Wajo Regency, especially for clean water are tap water / PDAM, drilled wells / dug wells, springs / rivers / lakes. Of the three sources of clean water, most respondents use well drilling / digging as many as 232 houses or 58.3%, then springs / rivers / lakes as much as 140 or 35.2% and the least is using tap water / PDAM as many as 26 home or 6.5%. For drinking water, most respondents use drill well water which is 140 houses or 35.2%, refill / refill / gallon as many as 116 houses or 29.1%, springs / rivers / lakes as many as 63 houses or 15.8%, wells dug cemented as many as 52 houses or 13.1%, tap water / PDAM as many as 22 houses or 5.5%, dug wells not cemented as much as 4 houses or 1% and the least one was as much as 1 or 0.3%.

Judging from the drinking water treatment, most of the respondents have managed their drinking water by boiling, namely 308 houses or 97.5%, not processing as much as 82 houses or 20.6% and giving chlorine as much as 4 houses or 1.3%. For the distance of water sources from polluters there are still many who do not meet the requirements (≤10) as many as 359 houses or 90.2% and those who meet the requirements (> 10) as many as 39 houses or 9.8%.

Table 1: Distribution of Characteristics of Respondents by Age and Gender in Wajo District Flood Prone Areas

Characters	Villages in Tempe Subdistrict										Villages in Sabbangparu Subdistrict														Total	
	Laelo		Salomenraleng		Wiringpalannae		Mattirotappareng		Salotengnga		Pallimae		Tadang Palie		Mallusesalo		Worongnge		Liu		Ugi		Walannae		Watallippue			
	n	%	n	%	n	%	n	%	N	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Age (Year)																												
12-16	1	4,5	0	0,0	1	1,9	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	2	0,5
17-25	1	4,5	4	16,0	6	11,3	4	8,3	0	0,0	4	12,9	1	3,8	2	9,1	2	9,5	1	3,7	4	8,9	1	5,0	0	0,0	30	7,7
26-35	5	22,7	5	20,0	16	30,2	10	20,8	1	11,1	2	6,5	5	19,2	4	18,2	4	19,0	3	11,1	15	33,3	2	10,0	7	17,9	79	20,4
36-45	5	22,7	8	32,0	12	22,6	12	25,0	4	44,4	9	29,0	9	34,6	7	31,8	4	19,0	9	33,3	11	24,4	10	50,0	20	51,3	120	30,9
46-55	3	13,6	4	16,0	9	17,0	15	31,3	2	22,2	11	35,5	7	26,9	14	18,2	5	23,8	7	25,9	10	22,2	1	5,0	7	17,9	85	21,9
56-65	6	27,3	3	12,0	8	15,1	3	6,3	0	0,0	3	9,7	2	7,7	5	22,7	4	19,0	3	11,1	3	6,7	3	15,0	1	2,6	44	11,3
>65	1	4,5	1	4,0	1	1,9	4	8,3	2	22,2	2	6,5	2	7,7	0	0,0	2	9,5	4	14,8	2	4,4	3	15,0	4	10,3	28	7,2
Sex																												
Male	12	54,5	12	48,0	27	50,9	19	39,6	3	33,3	12	38,7	12	46,2	9	40,9	4	19,0	11	44,4	13	28,9	7	35,0	24	59,0	165	42,5
Female	14	45,5	15	52,0	29	49,1	29	60,4	7	66,7	19	61,3	14	53,8	13	59,1	17	81,0	15	55,6	32	71,1	13	65,0	16	41,0	233	57,5
Family member																												
<4	11	50,0	12	48,0	23	43,4	17	35,4	3	33,3	10	32,3	16	61,5	10	45,5	13	61,9	17	63,0	20	44,4	10	50,0	9	23,1	171	44,1
4	4	18,2	3	12,0	9	17,0	8	16,7	2	22,2	7	22,6	5	19,2	7	31,8	2	9,5	2	7,4	8	17,8	3	15,0	8	20,5	68	17,5
>4	7	31,8	10	40,0	21	39,6	23	47,9	4	44,4	14	45,2	5	19,2	5	22,7	6	28,6	8	29,6	17	37,8	7	35,0	22	56,4	149	38,4
Total	22	100,0	25	100,0	53	100,0	48	100,0	9	100,0	31	100,0	26	100,0	22	100,0	21	100,0	27	100,0	45	100,0	20	100,0	39	100,0	388	100,0

Table 2: Distribution of Clean Water and Drinking Water Treatment in Flood Prone Areas in Tempe District, Wajo District

Source of water	Villages in Tempe Subdistrict										Villages in Sabbangparu Subdistrict																Total	
	Laelo		Salomenraleng		Wiringpalannae		Mattirotappareng		Salotengnga		Pallimae		Tadang Palie		Mallusesalo		Worongnge		Liu		Ugi		Walannae		Watallippue			
	n	%	N	%	n	%	N	%	N	%	n	%	n	%	N	%	n	%	n	%	n	%	n	%	n	%	n	%
Clean water																												
Tap water	0	0,0	0	0,0	0	0,0	1	2,1	0	0,0	0	0,0	3	11,5	0	0,0	0	0,0	0	0,0	0	0,0	1	5,0	21	52,5	26	6,5
artesian well	4	15,4	5	18,5	28	50,0	3	6,3	9	90,0	30	96,8	22	84,6	21	95,5	21	100,0	25	96,2	45	100,0	19	95,0	0	0,0	232	58,3
Water springs /lake/ river	22	84,6	22	81,5	28	50,0	44	91,7	1	10,0	1	3,2	1	3,8	1	4,5	0	0,0	1	3,8	0	0,0	0	0,0	19	47,5	140	35,2
Distance of water sources from pollutants																												
≤10	22	84,6	27	100,0	48	85,7	47	97,9	9	90,0	28	90,3	21	80,8	18	81,8	20	95,2	23	88,5	40	88,9	18	90,0	38	95,0	359	90,2
>10	4	15,4	0	0,0	8	14,3	1	2,1	1	10,0	3	9,7	5	19,2	4	18,2	1	4,8	3	11,5	5	11,1	2	10,0	2	5,0	39	9,8
Drink water																												
Tap water	1	3,8	0	0,0	0	0,0	2	4,2	0	0,0	0	0,0	2	7,7	0	0,0	0	0,0	0	0,0	0	0,0	1	5,0	16	40,0	22	5,5
Artesian well	0	0,0	5	18,5	14	25,0	0	0,0	7	70,0	21	67,7	21	80,8	14	63,6	19	90,5	25	96,2	6	13,3	8	40,0	0	0,0	140	35,2
Cemented well	0	0,0	0	0,0	5	8,9	0	0,0	1	10,0	1	3,2	1	3,8	6	27,3	0	0,0	0	0,0	28	62,2	9	45,0	1	2,5	52	13,1
Un-cemented well	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	3	6,7	1	5,0	0	0,0	4	1,0
Water springs /lake/ river	12	46,2	12	44,4	18	32,1	12	25,0	1	10,0	0	0,0	1	3,8	0	0,0	0	0,0	1	3,8	1	2,2	0	0,0	5	12,5	63	15,8
Gallon	13	50,0	10	37,0	19	33,9	34	70,8	1	10,0	9	29,0	1	3,8	1	4,5	2	9,5	0	0,0	7	15,6	1	5,0	18	45,0	116	29,1
Others	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	1	4,5	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	1	0,3
Drinking water treatment																												
Boiled	15	88,2	24	100,0	51	98,1	23	92,0	8	100,0	18	100,0	25	100,0	20	100,0	16	88,9	25	100,0	39	100,0	19	100,0	25	96,2	308	97,5
Chlorine	1	5,9	0	0,0	1	1,9	2	8,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	4	1,3
Do not do processing	9	34,6	3	11,1	4	7,1	23	47,9	2	20,0	13	41,9	1	3,8	2	9,1	3	14,3	1	3,8	6	13,3	1	5,0	14	35,0	82	20,6
Total	26	100,0	27	100,0	56	100,0	48	100,0	10	100,0	31	100,0	26	100,0	22	100,0	21	100,0	26	100,0	45	100,0	20	100,0	40	100,0	398	100,0

Table 3. Distribution of Family Latrine Ownership in Wajo District Flood Prone Areas

Latrine Ownership Distribution	Villages in Tempe Subdistrict										Villages in Sabbangparu Subdistrict																Total	
	Laelo		Salomenraleng		Wiringpalannae		Mattirotappareng		Salotengnga		Pallimae		Tadang Palie		Mallusesalo		Worongnge		Liu		Ugi		Walannae		Watallippue			
	n	%	n	%	n	%	N	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Yes	20	76,9	23	85,2	43	76,8	38	79,2	10	100,0	28	90,3	25	96,2	18	81,8	18	85,7	25	96,2	42	93,3	19	95,0	39	97,5	348	87,4
No	6	23,1	4	14,8	13	23,2	10	20,8	0	0,0	3	9,7	1	3,8	4	18,2	3	14,3	1	3,8	3	6,7	1	5,0	1	2,5	50	12,6
Total	26	100,0	27	100,0	56	100,0	48	100,0	10	100,0	31	100,0	26	100,0	22	100,0	21	100,0	26	100,0	45	100,0	20	100,0	40	100,0	398	100,0
Defecation place																												
Public toilet	3	50,0	2	50,0	8	61,5	2	20,0	0	0,0	0	0,0	0	0,0	3	75,0	2	66,7	1	100,0	0	0,0	1	100,0	1	100,0	23	46,0
Hole in the ground	0	0,0	0	0,0	1	7,7	6	60,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	7	14,0
River / sewage / lake / sea / pond	3	50,0	2	50,0	4	30,8	2	20,0	0	0,0	1	33,3	0	0,0	0	0,0	1	33,3	0	0,0	0	0,0	0	0,0	0	0,0	13	26,0
Shrubs / yards / gardens / terraces	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	2	66,7	1	100,0	1	25,0	0	0,0	0	0,0	3	100,0	0	0,0	0	0,0	7	14,0
Total	6	100,0	4	100,0	13	100,0	10	100,0	0	0,0	3	100,0	1	100,0	4	100,0	3	100,0	1	100,0	3	100,0	1	100,0	1	100,0	50	100,0

Table4. Distribution of Family Toilets in Wajo District Flood Prone Areas

Distribution of Family Toilets	Villages in Tempe Subdistrict										Villages in Sabbangparu Subdistrict																Total	
	Laelo		Salomenraleng		Wiringpalannae		Mattirotappareng		Salotengnga		Pallimae		Tadang Palie		Mallusesalo		Worongnge		Liu		Ugi		Walannae		Watallippue			
	n	%	n	%	n	%	N	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Latrine Type																												
Goose neck	19	95,0	23	100,0	42	97,7	38	100,0	10	100,0	26	92,9	25	100,0	17	94,4	18	100,0	25	100,0	41	97,6	19	100,0	36	92,3	339	97,4
Cemplung	1	5,0	0	0,0	1	2,3	0	0,0	0	0,0	2	7,1	0	0,0	1	5,6	0	0,0	0	0,0	1	2,4	0	0,0	3	7,7	9	2,6
End Stool Channels																												
Septic tank	19	95,0	23	100,0	42	97,7	36	94,7	10	100,0	25	89,3	25	100,0	17	94,4	18	100,0	25	100,0	40	95,2	18	94,7	36	92,3	334	96,0
SPAL	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	1	5,6	0	0,0	0	0,0	0	0,0	1	5,3	0	0,	2	0,6
River / sewage / lake / sea / pond	0	0,0	0	0,0	0	0,0	1	2,6	0	0,0	1	3,6	0	0,0	0	0,0	0	0,0	0	0,0	1	2,4	0	0,0	0	0,0	3	0,9
Hole in the ground	1	5,0	0	0,0	1	2,3	1	2,6	0	0,0	2	7,1	0	0,0	0	0,0	0	0,0	0	0,0	1	2,4	0	0,0	2	5,1	8	2,3
Others	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	1	2,6	1	0,3
Total	20	100,0	23	100,0	43	100,0	38	100,0	10	100,0	28	100,0	25	100,0	18	100,0	18	100,0	25	100,0	42	100,0	19	100,0	39	100,0	348	100,0

Table5. Distribution of Ownership of Trash and Processing in Flood Prone Areas in Wajo Regency

Distribution of Ownership of Trash and Processing	Villages in Tempe Subdistrict										Villages in Sabbangparu Subdistrict																Total	
	Laelo		Salomenraleng		Wiringpalannae		Mattirotappareng		Salotengnga		Pallimae		Tadang Palie		Mallusesalo		Worongnge		Liu		Ugi		Walannae		Watallippue			
	n	%	n	%	n	%	N	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Ownership of trash bins																												
Yes	21	80,8	22	81,5	16	28,6	27	56,3	4	40,0	12	38,7	13	50,0	8	36,4	11	52,4	9	34,6	15	33,3	8	40,0	36	90,0	202	50,8
No	5	19,2	5	18,5	40	71,4	21	43,8	6	60,0	19	61,3	13	50,0	14	63,6	10	47,6	17	65,4	30	66,7	12	60,0	4	10,0	196	49,2
Total	26	100,0	27	100,0	56	100,0	48	100,0	10	100,0	31	100,0	26	100,0	22	100,0	21	100,0	26	100,0	45	100,0	20	100,0	40	100,0	398	100,0

Table 5 to be continued…																												
Type of Trash																												
Permanently Closed	0	0,0	0	0,0	0	0,0	1	3,7	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	1	0,5
Permanent Open	0	0,0	0	0,0	1	6,3	1	3,7	0	0,0	0	0,0	1	7,7	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	3	1,5
Semi Permanent Closed	1	4,8	3	13,6	1	6,3	0	0,0	0	0,0	0	0,0	1	7,7	1	12,5	0	0,0	0	0,0	1	6,7	0	0,0	4	11,1	12	5,9
Semi Permanent Open	17	81,0	15	68,2	9	56,3	17	63,0	3	75,0	9	75,0	5	38,5	6	75,0	7	63,6	6	66,7	13	86,7	6	75,0	19	52,8	132	65,3
Plastic bags	3	14,3	3	13,6	3	18,8	5	18,5	0	0,0	1	8,3	2	15,4	0	0,0	1	9,1	1	11,1	1	6,7	1	12,5	9	25,0	30	14,9
Open hole in the yard	0	0,0	0	0,0	2	12,5	1	3,7	1	25,0	2	16,7	3	23,1	1	12,5	1	9,1	2	22,2	0	0,0	1	12,5	0	0,0	14	6,9
Others	0	0,0	1	4,5	0	0,0	2	7,4	0	0,0	0	0,0	1	7,7	0	0,0	2	18,2	0	0,0	0	0,0	0	0,0	4	11,1	10	5,0
Total	21	100,0	22	100,0	16	100,0	27	100,0	4	100,0	12	100,0	13	100,0	8	100,0	11	100,0	9	100,0	15	100,0	8	100,0	36	100,0	202	100,0
Tempat Membuang Sampah																												
Pekarangan/lapangan/sawah /kebun	1	20,0	1	20,0	4	7,1	8	38,1	5	83,3	10	52,6	5	38,5	10	71,4	2	18,2	3	17,6	17	56,7	5	27,8	2	50,0	73	33,0
Sungai/empang/laut	3	60,0	1	20,0	11	19,6	2	9,5	0	0,0	1	5,3	4	30,8	1	7,1	7	63,6	8	47,1	1	3,3	3	16,7	2	50,0	44	20,1
Dibakar	1	20,0	3	60,0	25	44,6	11	52,4	1	16,7	8	42,1	4	30,8	3	21,4	2	18,2	6	35,3	10	33,3	4	22,2	0	0,0	78	35,6
Dikubur	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	1	3,3	0	0,0	0	0,0	1	0,5
Lainnya	0	0,0	0	0,0	16	28,6	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	1	3,3	6	33,3	0	0,0	23	10,5
Total	5	100,0	5	100,0	56	100,0	21	100,0	6	100,0	19	100,0	13	100,0	14	100,0	11	100,0	17	100,0	30	100,0	18	100,0	4	100,0	219	100,0
Frekuensi Buang Sampah																												
Setiap hari	11	42,3	16	59,3	18	33,3	28	58,3	4	40,0	10	32,3	9	34,6	10	45,5	7	33,3	12	46,2	12	26,7	9	45,0	12	30,0	158	39,9
2-3 kali seminggu	8	30,8	8	29,6	25	46,3	11	22,9	3	30,0	10	32,3	8	30,8	11	50,0	9	42,9	10	38,5	27	60,0	10	50,0	23	57,5	163	41,2
4-6 kali seminggu	2	7,7	3	11,1	9	16,7	7	14,6	1	10,0	9	29,0	2	7,7	1	4,5	2	9,5	4	15,4	5	11,1	1	5,0	1	2,5	47	11,9
1 kali seminggu	5	19,2	0	0,0	2	3,7	2	4,2	2	20,0	2	6,5	7	26,9	0	0,0	3	14,3	0	0,0	1	2,2	0	0,0	4	10,0	28	7,1
Total	26	100,0	27	100,0	56	100,0	48	100,0	10	100,0	31	100,0	26	100,0	22	100,0	21	100,0	26	100,0	45	100,0	20	100,0	40	100,0	398	100,0

The percentage of family toilet facilities showed that 348 respondents or 87.4% had latrines and 50 households or 12.6% who did not have latrines, 23 (46.0%) of them used public toilets as a means of defecating, 7 (14%) use holes in the ground, 7 (14%) use shrubs / gardens / fields, and 13 (26.0%) use rivers / gutters / lakes / sea / ponds. The amount of septic tank use for the final stool channel is 334 or 96.0%, the hole in the soil is 8 or 2.3%, the river / sewage / lake / sea / pond is 3 or 0.9%, SPAL is 2 or 0.6% and others 1 or 0.3%.

Based on the wastewater disposal area of the kitchen / toilet most houses did not have shelter as many as 289 houses or 72.6%, then the open shelters in the yard were 54 houses or 13.6%, directly to the gutter / river as many as 39 houses or 9.8 %, closed shelters in the yard as many as 11 houses or 2.8% and the least is 5 houses or 1.5% outside the yard. As many as 389 households or 97.7% have done hand washing habits with soap, while those who have not done hand washing habits with soap are 9 or 2.3%.

The number of households that have a trash bin is 202 or 50.8%, more than the community that does not have a trash facility that is 196 houses or 49.2%. Based on waste management, 78 households or 35.6% tended to burn their waste, while others were dumped in the fields / fields / gardens by 73 households or 33.0%, discharged into rivers / ponds / seas by 44 households or 20 , 1%, others amounted to 23 households or 10.5% and buried as many as 1 household or 0.5%.

Environmental Health Risk is the value of the hazard source and the chance of exposure to hazards found in Wajo District. To determine the magnitude of the risk, the first step taken is to create an environmental health risk index table per hamlet based on the hazard sources and the components contained therein. Furthermore, the environmental health risk index is weighted based on the severity of the hazard source component and the probability of occurrence of danger, then calculating the risk index through the cumulative risk index table.

DISCUSSION

In this study there are three main sources of clean water used by households for daily activities. The most water source used by households is the drill well which is 58.3%. The use of other clean water sources, namely springs / rivers / lakes. The number of households using springs / rivers / lakes is 35.2%. The use of tap water / PDAM is 6.5%. Water is very important for human life. Humans need water for drinking, cooking, bathing, washing and so on. [8,9] Judging from public health science, the provision of clean water sources must be able to meet the needs of the community because of limited supply of clean water to facilitate the emergence of diseases in the community. Water intended for humans must come from clean and safe sources

Family latrine facilities are one of the important environmental sanitation supports for attention. The results of the above research show that the majority of people have understood the importance of latrine ownership to improve sanitation. Sanitation is one of the main aspects in the realization of a strong and healthy building. The importance of awareness of making sanitation in accordance with hygiene quality standards is an awareness that must be applied to every family. [10]

From the data, it was found that most of the people did not have the potential and awareness in waste management. People who do not have a household trash can choose to burn their garbage (35.6%). The behavior of burning trash can endanger the environment and cause air pollution which damages the ozone layer causing global warming. [11]

Waste water is the residual water that comes from households, which generally contain harmful substances or substances. Unprocessed waste can cause health problems in the community. From the results of research in Wajo District, the number of houses that had SPAL was 88.5%

and those who did not have 11.5%. It is feared that without the presence of domestic wastewater treatment facilities, public health will decline and affect the productivity of local communities. The availability of a centralized domestic wastewater treatment system is expected to reduce the level of river water pollution and improve the quality of the environment which has implications for the improvement of community health status. [12] Hand washing with soap is 389 out of 398 households or 97.7%, while 9 households (12.3%) did not practice hand washing with soap at 5 important times, namely before eating, before preparing food, before feeding the child, after feeding the baby, and after defecating.

Environmental health risk categories are divided into four, such as less risky with IRKL 118-140, moderate risk with IRKL 141-163, high risk IRKL 164-186 and very high risk with IRKL 187-204. Areas with very high environmental health risks, namely in Wiringpalannae and Mattirotappareng villages as the most vulnerable areas for various environmental diseases or other health problems. From the data obtained, it is known that the area uses river water for daily activities, namely for Wiringpalannae Village by 50.0% and Mattirotappareng Village by 91.7%. While regions with less risky environmental health risks are in the Watalippue and Tadangpalie villages. Households that use PDAM water in the area are the most compared to other urban villages, and the majority have used latrines as a means of defecating.

CONCLUSIONS

Environmental health hazards include the use of surface water sources, namely rivers, the distance of water sources, and the physical quality of water that do not meet health requirements, the absence of SPAL, and the absence of household trash. Opportunity for exposure to environmental health hazards is the habit of not washing hands with soap (CTPS). Assessment of environmental health risks in Wajo District for Wiringpalannae and Mattirotappareng Villages is in the very high-risk category, Salomenraleng and Salotengnga villages are in the high-risk category, Laelo, Pallimae, Mallusesalo, Worongnge, Liu, Ugi, and Walannae are in the moderate risk category, and the Tadangpalie and Watalippue villages are in the less risky category.

The government and the local community to pay attention to the quality of river water used by managing it properly and properly, if necessary, use the latest technology to produce water that meets health requirements. In addition, it is necessary to maintain a clean environment, the behavior of washing hands with soap, having a trash bin accompanied by a cover, and preventing the behavior of trash in the river as a source of clean water used for household activities.

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