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The differences historical abortion and hemoglobin between hazard volcano eruption

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ABSTRACT

The disaster area volcano is priority for intervention through maternal health is vulnerable group. Previous study estimate severe bleeding /haemorrhage was up to 71.9%, anaemia 51%. The study aimed to know incident of history abortion and haemoglobin in zone hazard risk volcanic eruption after 10th. Study addressed with cross-sectional design. The data history abortion and haemoglobin were collected with medical record in Puskesmas Cangkringan. The hazard level adoption in National Disaster Management Agency/*Badan Nasional Penanggulangan Bencana* (BNPB) divide 3 zone hazard risks. Data analysis by Health Mapper version 4.3 software and analysis with analysis of variance (ANOVA). The incidence of history abortion higher in zone 2 compare zones 1 and 3 volcanic disaster. The average of haemoglobin higher in zone 1 as 12.54±1.67 compare zones 2 and 3 volcanic disaster. No significant differences history abortion and haemoglobin between zones 1 to 3 volcanic disaster. The study concluded that history of abortion higher in zone 3 compared zones 1 and 2 volcanic disaster. The average of haemoglobin higher in zone 1 compared zones 2 and 3 volcanic disaster. No differences significant of history abortion and average haemoglobin between zones 1 to 3.

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1. INTRODUCTION

Maternal health still problem in the world, World Health Organization (WHO) estimate 287,000 maternal death in 2020 [1]. The areas highest at Africa region up to 198,000 maternal death and region lowest in European region 1,300 maternal death. WHO report 2020 that maternal death Indonesia higher was estimate 7,800 maternal death compare in Philippines estimated 1,900 maternal death. The maternal death related abortion and low preventive during pregnant. Pasquier *et al.* [2] in sub Shahara Africa was shown that the severity of abortion complications was high 103 (19.8%) and severe maternal outcome 34 (6.2%) deaths. Rice *et al.* [3] that case of surgical abortion up to 65%.

Previous study [3] conducted in the United States that the majority of abortions occurred at 0-10 weeks of gestation, were estimate of 5,948 cases (64%). Sahile and Beyene [4] in Ethiopia that average age of abortion common at 21-23 years old estimate at 238 abortion compared to 106 no abortion. Rice *et al.* [3] which conducted research in America, found that abortions occurred more frequently in mothers aged 25-29 years as 3,299 (35%). Coleman-Minahan [5] related surveillance abortion concluded that poor maternal health affected birth outcomes for women related disaster areas.

The disaster area is priority for intervention through maternal health is vulnerable group. The area disaster especially volcano eruption areas through zone risk. Constantinescu *et al.* [6] related volcano eruption show that information of geological data and community vital statistic is very important to prevent hazard risk. Aspinall *et al.* [7] concluded that magnitude of volcanic is very important to assessment for predicting material impacted for community. The assessment of zonetion hazard risk is very importance to prevent impacted volcano eruption. Study in sub Shahara Africa that severe bleeding/haemorrhage was the main complication up to 71.9% [2]. Gaston *et al.* [8] that the prevalence of anaemia up to 51%.

The early detection and monitoring maternal health very important to be continue in disaster areas. The zonetion hazard risks very important to draw and intervention scenario. The zonetion part of distance from source of source of eruption. Based on BASARNAS 2022 divided into three part such as zone ring 1, zone ring 2 and zone ring 3 in order several of grade danger eruption. Ramírez *et al.* [9] in Ecuador shown higher risk areas are priority for preparedness intervention and map of magmatic line areas draw for prevent hazard risk in community. Kyozuka *et al.* [10] concluded that preparedness required for emergency response in order disaster area for prevent mortality and morbidity. Maternal death related any factors such as bleeding, sepsis, cardiovascular, and disease infection. Gigantesco and Giuliani [11] shown that factors related maternal death such as sepsis 27%, 37.9% maternal bleeding, hypertension disorder pregnancy 15.5%. In Nigeria that after vaginal birth addressed blood transfusions 2.8% [12]. In Japan related earthquake shown that 11% women have been destroyed [13].

The problem post volcano eruption especially for maternal such as condition of anemia and outcome of vaginal birth. Gaston *et al.* [8] concluded that main factor related anemia and stunting childbirth weight significantly impacted stunting. Pasquier *et al.* [2] that Among the 146 women addressed anemia before admitted in hospital report and haemorrhagge up to 66.7%. Study in Canada during pandemic addressed that women importance of having access to this essential service [14]. The importance of continuing to provide access to safe timely abortion care emergencies.

In Ethyopia of 20 hospitals was shown that 70% medical management is ready compared manual procedure across three levels of the health system [15]. The Hospitals were prepared to manage retained placentas estimated 30.0% ready and hypertensive emergencies 85.0% of facilities ready for treatment. Study concluded that common emergencies such as sepsis, retained placentas and blending. Constantinescu *et al.* [6] that the coordinating all stakeholder is very important to decreased of hazard risk. The study aims to know incident of history abortion and haemoglobin level in zone hazard risk volcanic eruption after 10^{th} in Sleman District.

2. METHOD

The zone hazard risks seen from 3 zonetion level dangerous. Zone 1 distance 0-5 km from source of lava. Zone 2 distance 5-10 km from source of lava. Zone 3 distance 10-15 km from source of lava. Level hazards through distance peak lava. The hazard risk based on National Disaster Management Agency/*Badan Nasional Penanggulangan Bencana* (BNPB) standards classification. Regulation hazard risk adoption of the BNPB No. 02 of 2023 [16] based on the danger indicator of volcanic eruption.

Study addressed with cross-sectional design was carried out at sub district Cangkringan included 5 village which is divided around areas affected of Merapi disaster at Sleman District. Area affected of Merapi disaster divided 3 zonetion are zone 1 (distance 0-5 km), zone 2 (distance 5-10 km) and zone 3 (distance 10-15 km) of Merapi eruption. Population was addressed pregnant who carries out treatment at Puskesmas Cangkringan through medical record July 2023 until September 2023. Based the medical record have been estimated as 954 pregnant. Sampling was collected with total sampling that passed the inclusion and exclusion criteria. The inclusion criteria such as data medical record was completed, pregnant women who were recorded as multiple were taken ones, pregnant women who could be found during the research period. The exclusion criteria such as pregnant women who do not live in the research location area, pregnant women who are not willing to take part in the research. Based in inclusion and exclusion criteria were estimate sample required 772 sample.

Variable of distance were collected from ordinate point based were addressed https://www.google.com/maps/, zone of affected of volcano eruption were collected with kilo meter. Data were calibrated with verified coordinate points with another global positioning system (GPS). Data haemoglobin level and previous abortion were collected with medical record at Puskesmas Cangkringan. Data incidence rate of abortion was collected with divided number of event abortion per 1,000 pregnant each zone. The data of history abortion location displayed with health mapper software. The data were analysed with SPSS software and data analysis with ANOVA one way for known differences each zone. Study permission has been obtained the committee of human research Publication and Ethics No. 0190.3/FIKES/PL/VIII/2023 of the Faculty of Public Health, Respati University Yogyakarta.

3. RESULTS AND DISCUSSION

Study addressed 763 subjects in order study implemented based zonetion such as zones 1 to 3 volcanic disaster in Sleman District. The classification of zonetion divided 3 area impacted volcanic disaster. Zone 1 if distance of source of lava 0-5 km, zone 2 if distance 5-10 km of source lava, zone 3 if distance 10-15 km from source of lava. Based on study was shown in Figure 1. Based Figure 1 shown that distance of village near volcanic zone dangerous that village very near is Kepuharjo estimate 7.61 km and the village very long is argomulyo village as 13.27 km. Based on characteristic of subject each zone risk hazard show Table 1.

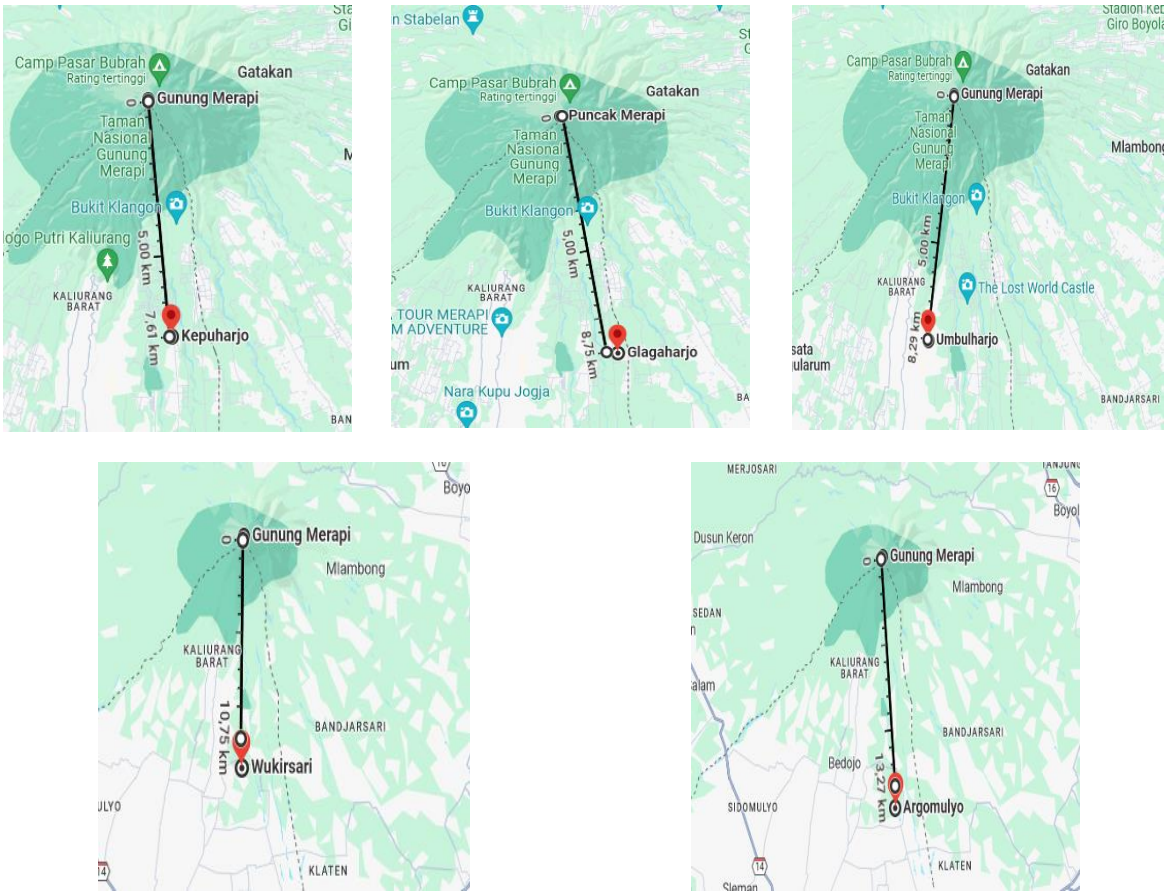

Figure 1. Drawing of village impacted of volcanic danger zonetion based zone 1, zone 2 and zone 3

Table 1. Distribution incidence history abortion and average of haemoglobin based zone volcanic disaster in Sleman District

Zonetion	N	Distance	Incidence	History abortion						
				0	1	2	3	4	5	6
Zone 1	48	4.13±1.77	62.5	45	3	0	0	0	0	0
Zone 2	214	7.56±1.39	163.5	179	32	3	0	0	0	0
Zone 3	501	13.58±2.38	153.69	424	58	12	3	1	1	2

*Incidence rate per 1,000 pregnant.

Table 1 shown that average of distance from source volcanic danger in zone 1 average 4.13±1.77 km, zone 2 average 7.56±1.39 km dan zone 3 average 13.58±2.38 km. The incidence of history abortion higher in zone 2 compare zones 1 and 3 volcanic disaster. Based in history abortion in Figure 2. Based on Figure 2 shown that higher of history abortion in zone 3 (10-15 km) from larval apex and lower in zone 1 (0-5 km) from larval apex volcanic disaster. Based statistic test was shown in Table 2.

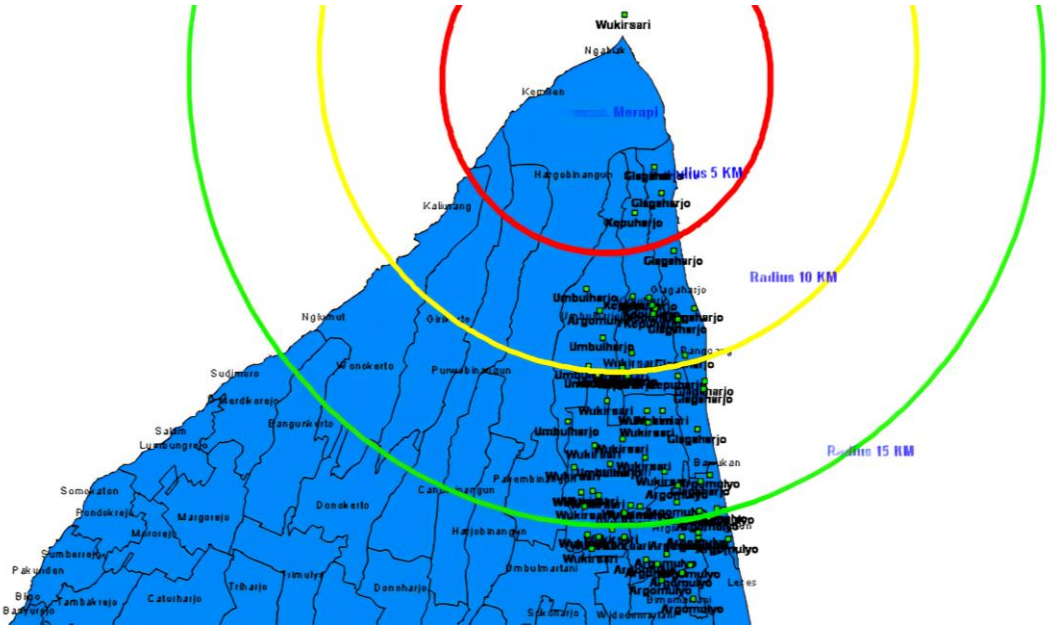

Figure 2. Distribution of history abortion in hazard risk zone areas volcanic disaster Sleman District

Table 2. Distribution of variable study such as history abortion and haemoglobin in volcanic disaster Sleman District

No	Variable	N	Incident abortion Mean±SD	F	P
1	History abortion				
	Zone 1	48	0.06±0.24	1.882	0.153
	Zone 2	214	0.18±0.41		
	Zone 3	501	0.22±0.66		
2	Haemoglobin				
	Zone 1	48	12.54±1.67	1.129	0.275
	Zone 2	214	12.32±1.30		
	Zone 3	501	12.19±1.69		

Table 2 shown that history abortion higher in zone 3 compare zones 1 and 2 through statistic test shown that no significant differences history abortion between zones 1 to 3 volcanic disaster. The average of haemoglobin higher in zone 1 as 12.54±1.67 compare zones 2 and 3 volcanic disaster. The statistic test shown no differences significant average of haemoglobin between zones 1 to 3 volcanic disaster p=0.275.

Study shown that history of abortion higher Merapi eruption zone 3 (distance 10-15 km) lava peak. This situation caused relocation residential relocation through disaster which safe condition radius distance upper 10 km. The relocation affected increasing of abortion in zone 3 volcano eruption. In case zone divided in three areas zonetion are zone 1 (0-5 km), zone 2 (5-10 km) and zone 3 (10-15 km).

The information related hazard risk is important factor for decreasing and preventing health problem especially for maternal. Constantinescu *et al.* [6] related volcano eruption show that information of geological data and community vital statistic is very important to prevent hazard risk. Ogburn *et al.* [17] shown that operational volcanic hazard map information accepted in community continue for prevent hazards. Study related hazard mapping practice shown that assessment of statistic vital community important to predicting impacted volcanic hazard [18]. Assessment of community priority for intervention related health vulnerable.

The incidence of abortion higher in zone 3 compare zones 2 and 1. This situation caused factors relocation residential affected volcano eruption in 2010. the relocation condition impacted almost population travel to zone 3. The volcano eruption was affected problem in community especially for maternal. Previous study [2] study in sub Shahara Africa was shown that the severity of abortion complications was high 103 (19.8%) and several maternal outcome 34 (6.2%) deaths. Rice *et al.* [3] conducted that abortions occurred more frequently in mothers aged 25-29 years estimate 3,299 (35%). In America conclusions that factor sociodemographic and service use is main focus contributed in abortion [3].

The factors of abortion caused such as anemia through decreasing haemoglobin, geography such as elevation. The decreasing haemoglobin affected for outcome vaginal birth through bleeding, in order caused maternal death. Pasquier *et al.* [2] that Among the 146 women addressed anemia before admitted in hospital report and bleeding up to 66.7%. The study in Canada during pandemic addressed that women importance of having access to this essential service [14]. The importance of continuing to provide access to safe timely abortion care emergencies.

The average of haemoglobin higher in zone 1 compare zones 2 and 3 of disaster areas. This situation caused population under zone 3 majority impacted of relocation after volcano eruption in 2010 in role any problem in activities daily. The problem potential impacted of relocation such as un working, physiology under pressure in relocation. Previous study [8] that the prevalence of anaemia up to 51% and stunting up to 43% in children under five years respectively. Rice *et al.* [3] that case of surgical abortion up to 65%.

Based on compared zonetion of volcano eruption shown that no differences significant incidence of history of abortion between zones 1 to 3. This study caused factors best local government for preparedness of disaster. The intervention of local government for relocation through population under zone eruption of volcano in Sleman District. In other hand factor health surveillance in good practice that early warning system for health was applied. Previous study [7] concluded that magnitude of volcanic is very important to assessment for predicting material impacted for community. Larijani *et al.* [19] concluded that preparedness very important to respond through integrated into disaster preparedness. Study policymakers is important to preparedness program. Ramírez *et al.* [9] study in Ecuador shown higher risk areas are priority for preparedness intervention and map of magmatic line areas draw for prevent hazard risk in community.

The incidence of abortion caused factors medical access of health facility, easy population for easy access to health service. The maternal accessing health facility rate was 21.6%, estimated maternal deaths 0.11% after vaginal birth [12]. Study recommended that support access to abortion continues pre, during dan post disaster. Lafortune *et al.* [20] review of paper was shown that natural disaster significantly related birth outcomes and cognitive. Constantinescu *et al.* [6] that the coordinating all stakeholder is very important to decreased of hazard risk). Study in Texas related disaster shown that emergency management addressed protocols for supporting lactation and infant feeding in disaster evacuations [21]. The studi in Mexico that maternal health and social determinants as factors to improve responses to obstetric emergencies and reduce maternal mortality [22]. The pregnancy planed through difficult to plan in disaster condition estimated 58.6% [23].

The volcanic disaster was impacted all sector in society such as social problem, economic and psychology. The volcanic disaster caused families separated, problem of economic through loss of job and traumatic. Andreastuti *et al.* [24] related volcano disaster in Indonesia shown that impacted of volcanic disaster such social problem, economic and politic. The strategy for prevent of hazard risk through all stakeholder for implemented crisis response. The information and communication all component have impacted outcome of hazard risk. Ishii *et al.* [25] that mothers in earthquake experience more depression compare no earthquake areas. post-earthquake estimated 38.8% posttraumatic stress disorder [26]. The disaster areas specific estimated the hippocampal volume in girls through increasing prenatal maternal stress [27]. The disaster was affected prenatal maternal stress related function of amygdala, the hippocampus and prefrontal cortex. The volcanic disaster affected for children and elderly [28].

The estimating of hazards risks very importance to decreasing volcanic disaster. The coordinating all sectors, best communication, and applied cooperation all component through government, non-governmental organization (NGO), and other. Andreastuti *et al.* [24] that the success outcome hazard preventing related effective communication and coordinator stakeholder. The access of information, social protection, training, educating and skill for disaster management related outcome of volcanic risk. Gattuso *et al.* [29] related volcano disaster that risk associated with lahar very varieties. The study related topographic models is priority for preparedness intervention. The complicate deterministic factors required when occurring to estimated lahar impacts. The volcano disaster very complect affected hazard such as material, physical and mental health. Kyozuka *et al.* [10] concluded that preparedness required for emergency response in order disaster area for prevent mortality and morbidity.

The early warning system for monitoring and evaluating importance for applied. The approach of volcanic disaster in role strategy minimal two component such government and community. Vinnell *et al.* [30] related volcano disaster in America that warning system is required to prevent impacted of hazard risk. Warwick *et al.* [31] volcanic in Colombia that assessment of hazard is key for monitoring such as regular gas and automated detection system. The early warning system related used technology such analysis of interferometric synthetic aperture radar (InSAR) images. Yamada [32] the hazards risk of volcanic required active commitment of government and experts. The communication strategy of volcanic hazards is key for prevents risk around public impacted.

The preparedness of community factors important for success of program disaster management such as education, training, and simulation of disaster. Vinnell *et al.* [30] related public education play importance in preparedness for evacuation awareness. The intervention was focused for demographics, social effects,

evacuation, and cognitive risk perception. The volcanic hazard zone is main focused for preparedness and key of role community education and participated. Warwick *et al.* [31] the assessment of hazards risk reduction for potential hazardous volcanic impacted. Safe abortion related in opportunities of health information availability [33]. The digital health innovations for abortion access are human rights violations abortion seekers. The digital tools for abortion self-care in communities and networks of care can take ownership of these digital innovations [34].

The success of surveillance system volcanic disaster in order the government as factors success handling of volcanic impacted. The good practice surveillance system capable to problem predicting related impact volcanic disaster. Coleman-Minahan [5] related surveillance abortion concluded that poor maternal health affected birth outcomes for women related disaster areas. Warwick *et al.* [31] the early warning system related used technology. Yamada [32] related volcanic hazard risk concluded that key approach system informatic and decreased of stigmatizing about hazard. The informatic system helps to draw community situation affected. Gigantesco and Giuliani [11] shown that investigate maternal mortality related vital statistics analysis for incidence reporting and enquiries. Vital statistics is indicator for scoring weighting of disaster impact areas.

4. CONCLUSION

The study concluded that history of abortion higher in zone 3 compared zones 1 and 2 volcanic disaster. The average of haemoglobin higher in zone 1 compared zones 2 and 3 volcanic disaster. No differences significant of history abortion and average haemoglobin between zones 1 to 3. The future study addressed situation relocation through caused abortion such elevation or maternal activities related abortion. The study aims to know incident abortion and haemoglobin-based zone hazard risk volcanic disaster in Sleman District.

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