

PENGARUH KUALITAS UDARA AMBIEN TERHADAP FUNGSI PARU IBU RUMAH TANGGA DI SEKITAR SEMBURAN LUMPUR SIDOARJO

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RESPIRATORY COMPLAINTS

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ABSTRACT

The Influence of Ambient Air Quality to Housewives Lung Function Surrounding Sidoarjo Mudflow

One of recent process in the nature that can influenced the ambient air quality was Sidoarjo mudflow. The contamination itself came in the shapes of NO₂, SO₂ and other dust particles that has negative impact to environment and people health, especially on human respiratory tract. The objective of this research was to analyzed the influences of ambient air quality to housewives lung function surrounding Sidoarjo mudflow and their complaints about respiratory activities. This was an analityc observasional result with crossectional approach. The research location was Besuki village, Dukusari village, Jemirahan village and Semampir village. All of those village were part of Sidoarjo regency which approximately distances 2 km, 3 km, 4 km and 19 km from the center of Sidoarjo mudflow. The population of this research were housewives that met several criteria. By using simple random sampling method twenty peoples from each village has been selected as research samples. The research used Spearman correlation test and multiple logistic regression test with $p < 0.05$ considered as a significant result. The average level of NO₂, SO₂ and dust particles in Besuki village were 0,0021667 ppm, 0,0131 ppm and 0,297 mg/m³. In Dukusari village were 0,0005333 ppm, 0,0094333 ppm and 0,187 mg/m³. In Jemirahan village were 0,0006333 ppm, 0,0074333 ppm and 0,106 mg/m³. While in Semampir village were 0,0001 ppm, 0,0042333 ppm and 0,0623 mg/m³. The average level of NO₂ and SO₂ in all research village had meet ambient air quality standard according East Java Governor Regulation No.10 in 2009 (0,05 ppm and 0,1 ppm). While dust particles measurement result showed only Besuki village that exceed ambient air quality standard (0,26 mg/m³). According to Spearman correlation test, the analyzed data showed a very strong correlation between the village distance from the center of Sidoarjo mudflow with NO₂ level ($r = -0.800$), SO₂ ($r = -1.000$) and dust particles ($r = -1.000$). The simple logistic regression test result showed distance variable has a strong influence on the occurence of impaired lung function with $p.value = 0.000$ and respiratory complaints with $p.value = 0.001$. Conclusion : Ambient air quality affected lung function and respiratory complaints. The higher NO₂, SO₂ and dust particles level, then the greater the risk of lung function decline and respiratory complaints.

Keywords : Sidoarjo mudflow, ambient air quality, lung function, respiratory complaints

SUMMARY

The Influence of Ambient Air Quality to Housewives Lung Function Surrounding Sidoarjo Mudflow

One of recent process in the nature that can influenced the ambient air quality was Sidoarjo mudflow. The contamination itself came in the shapes of NO_2 , SO_2 and other dust particles that has negative impact to environment and people health, especially on human respiratory tract. As one of village that studied by Sidoarjo Mudflow Disaster Risk Reduction and Residential Feasibility team, Besuki village in 2010 stated as uninhabitable area. Based on the team review result it has been found that the probability of air pollution threats on Besuki village was nearly positive and caused a high impact as well as high risk damage potential to community health and psychology condition. The objective of this research was to analyze the influences of ambient air quality to housewives lung function surrounding Sidoarjo mudflow and their complaints about respiratory activities. The aim of this research was to provide some useful input for the community about the danger of dust particles in the air along with NO_2 and SO_2 , so the community awareness about the dangers will rise and consciously take some preventive and countermeasures action in order to protect and reduce public health burdens and also to provide input and information for related agencies to take necessary actions to deal with this such kind conditions. This was an analytic observational result with cross-sectional approach. The research location was Besuki village, Dukuhsari village, Jemirahan village and Semampir village. All of those village were part of Sidoarjo regency which approximately distances 2 km, 3 km, 4 km and 19 km from the center of Sidoarjo mudflow. This research was begin in February until August 2011. The population of this research were housewives that met several criteria, such as age 20-40 y.o, have lived in the research location at least since 2005, had daily living approximately 24 hours in research location, nonsmoker (both active or passive) and willingly to participated in research activities. By using simple random sampling method twenty peoples from each village has been selected as research samples. The research used Spearman correlation test and multiple logistic regression test with $p < 0.05$ considered as a significant result. The average level of NO_2 , SO_2 and dust particles in Besuki village were 0,0021667 ppm, 0,0131 ppm and 0,297 mg/m^3 . In Dukuhsari village were 0,0005333 ppm, 0,0094333 ppm and 0,187 mg/m^3 . In Jemirahan village were 0,0006333 ppm, 0,0074333 ppm and 0,106 mg/m^3 . While in Semampir Village were 0,0001 ppm, 0,0042333 ppm and 0,0623 mg/m^3 . The average level of NO_2 and SO_2 in all research village had meet ambient air quality standard according East Java Governor Regulation No.10 in 2009 (0,05 ppm and 0,1 ppm). While dust particles measurement result showed only Besuki village that exceed ambient air quality standard (0,26 mg/m^3), due the village's proximity with Sidoarjo mud pond. According to Spearman correlation test, the analyzed data showed a very strong correlation between the village distance from the center of Sidoarjo mudflow with NO_2 level ($r = -0.800$), SO_2 ($r = -1.000$) and dust particles ($r = -1.000$). Based on these Spearman correlation coefficient values it can be interpreted that the closer the village distance from center of Sidoarjo mudflow then the higher NO_2 , SO_2 and dust particles it became.

The housewives lung function examination result at all village indicate the presence of abnormal lung function in a row from the largest to the smallest indicated by Besuki village (90%), Dukuhsari village (60%), Jemirahan village (45%) and Semampir village (25%). Respondent respiratory complaint at Besuki village was classified mild (30%), moderate (30%) and severe (40%), while at Dukuhsari showed mild (60%), moderat (25%) and severe (155) respiratory complaint. At Jemirahan village indicate mild (755), moderat (20%) and severe (5%) respiratory complaint while Semampir village showed mild (80%) and moderate (20%) respiratory complaint. The simple logistic regression test result showed distance variable has a strong influence on the occurrence of impaired lung function with $p.value=0.000$ and Odds ratio 0.374 (OR = 0,374, CI 95% = 0,229 – 0,613, $p = 0,000$), respiratory complaint with $p.value=0.001$ and odds ratio 0.465 (OR = 0,465, CI 95% = 0,292 – 0,741, $p = 0,001$). It mean that the closer residential distance from the center of Sidoarjo mudflow (the higher NO_2 , SO_2 and dust particles exposure values) then the impairment lung function risk was 2.67 much higher compared those who live with longer distances as the respiratory complaints risk was 2.15 times much higher. Conclusion : Ambient air quality affected lung function and respiratory complaints. The higher NO_2 , SO_2 and dust particles level, then the greater the risk of lung function decline and respiratory complaints. The use of mask on extreme condition, a balance food nutrition consumption and early health examination were a preventive alternative step for community. The local authority should draw up and implement adaptation and mitigation plan, providing a reachable health services and not to make air quality much worse by build alternative pathways far from residential area and to ensure the termination efforts of Sidoarjo mudflow.