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# Social Demographic Factor on Early Detection Ability of Acute Coronary Syndrome in Blitar Regency Indonesia

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## ABSTRACT

**Background:** The prevalence of ACS in Indonesia is high, at least 2 million people in Indonesia are diagnosed with ACS. It is one of the main causes of death among adults in many countries around the world, including Indonesia with prevalence of heart disease in Indonesia is estimated at 2 million ACS cases. One of the causes of the high ACS mortality rate is a prehospital delay. Decision time delay refers to the length of time the patient takes for early detection or to make a decision to seek help. This study will focus on the influence of social demographic factors on the ability of early detection of ACS.

**Purpose:** This study aims to explain the relationship between treatment-seeking behavior, transportation, and socio-demographic factors (age, gender, socio-economic, educational status, health insurance).

**Methods:** A prospective cross-sectional study was conducted in this study. The samples will be obtained in Blitar regency with 22 public health center sub-districts with sample 126 respondents. The correlation among variables was analyzed using chi-squared ($\chi 2$), and for determining the dominant factors, multiple logistic regression with the enter method was used. A p value <0.05 was considered significant.

**Results:** The study found that the age, health insurance status, education level, and employment status of the patients were significant factors for early detection. Delay to early detection increased with the increase in age of the patients, although it was not significant by logistic regression.

**Conclusions:** This study reveals that several sociodemographic factors that can affect early detection abilities are education, employment status, and health insurance.

**Keywords:** ACS, early detection, socio demographic

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## BACKGROUND

Acute Coronary Syndrome (ACS) is one of the most common cardiovascular problems. ACS is also known as unstable angina, ST-segment elevation myocardial infarction (STEMI), and non-STEMI(Demisse et al., 2022; Schiavone et al., 2020). The morbidity rate of ACS is quite high and leads to defects in the quality of life after an attack. ACS is the biggest cause of death and loss of disability-adjusted life years (DALYs) in the world. More than 7 million deaths and 129 DALYs annually (Hayajneh et al., 2021; Knoery et al., 2020). The prevalence of ACS in Indonesia is high, at least 2 million people in Indonesia are diagnosed with ACS (Arrebola-Moreno et al., 2020; Arrebola-Moreno, Petrova, Garcia-Retamero, Rivera-López, Jordan-Martinez, et al., 2020; Stolic et al., 2019). It is one of the main causes of death among adults in many countries around the world, including Indonesia. According to data from the Ministry of Health Indonesia (2019) and a study in 2020, the prevalence of heart disease in Indonesia is estimated at 2 million ACS cases (Kemenkes, 2021).

One of the causes of the high ACS mortality rate is a prehospital delay. Prehospital delay is influenced by two factors, decision-making, and mobilization to the hospital (Hadid et al., 2020; Mirzaei et al., 2020b). The total prehospital delay period includes the time taken by patients to recognize the seriousness of their symptoms and to contact medical help (decision time) and the time taken from requesting help to admission to a center where emergency coronary care service is available (home-to-hospital delay) (Khaled et al., 2022). Decision time delay is the initial factor that causes delays in handling ACS (Hoschar et al., 2020; Mirzaei et al., 2020a).

Decision time delay refers to the length of time the patient takes for early detection or to make a decision to seek help. The longer it takes for early detection of ACS, the longer it takes to make a decision to seek help, which means it will cause prehospital delay (Arrebola-Moreno, Petrova, Garcia-Retamero, Rivera-López, Jordan-Martínez, et al., 2020; Garrido et al., 2020). Knowledge related to ACS symptoms is very important to speed up the ACS early detection process. Knowledge of ACS is influenced by many factors, ranging from education level, exposure to information, and experience with symptoms, to knowledge related to risk factors (Chau et al., 2018; Demisse et al., 2022). All of the above components will affect a person's assessment of the perceived ACS symptoms so it will affect the time needed for early detection (Demisse et al., 2022; Khaled et al., 2022). The above explains that social demographic factors are closely related to the ability to recognize ACS symptoms which will have an impact on accelerating early detection of ACS. This study will focus on the influence of social demographic factors on the ability of early detection of ACS.

## METHODS

A prospective cross-sectional study was conducted in this study. The population of this study is the community with a high risk of ACS in Blitar with 4282 cases of cardiovascular disease. The samples will be obtained in Blitar regency with 22 public health center sub-districts, they are Bakung, Binangun, Doko, Gandusari, Garum, Kademangan, Kanigoro, Kesamben, Nglegok, Panggungrejo, Ponggok, Sanankulon, Selorejo, and Selopuro. Of 22 sub-districts, 4 sub-districts will be taken with the highest ACS incidence rate, there are Srengat, Wonodadi, Kademangan, and Selorejo. The sampling technique in this study is a probability sampling technique. The samples of this study will be calculated using G*power. The researcher decide to use a large effect size suggested by cohen d (0,8) with $\alpha$= 0,05, $\beta$=0,95. The estimation for the minimum sample of 105 and assuming an attrition rate of 20% (126 respondents) so that the total minimum sample will be 126 respondents.

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Inclusion criteria from this study are age >45 yo; obesity; smoker; history of hypertension, diabetes mellitus, hyperlipidemia, hyper cholesterol, CVD; family history of cardiovascular disease, hypertension, diabetes mellitus, hyperlipidemia; patients who are willing to be respondents. Exclusion criteria from this study are a community with no high risk for ACS, and patients who are not willing to be respondents.

The instrument of this study is a checklist sheet which is divided into 3 sections, there are sociodemography data and early detection skills. This questionnaire is modified from several works of literature.

The data collection process is carried out from March to June 2022. The data used in quantitative research are primary data and secondary data. Primary data is obtained from interviews directly with respondents, then the researcher fills out observation sheets according to the data submitted by respondents. Secondary data is data obtained from reports or health documents from the Blitar Public Health Center and other data that support research, such as supporting documents and an overview of the research site.

The univariate analysis will be carried out descriptively to describe the sociodemographic data (Age, BMI, Gender, Education, Marital status, Health Insurance, Employment Status). The correlation among variables was analyzed using chi-squared ($\chi 2$), and for determining the dominant factors, multiple logistic regression with the enter method was used. A p value <0.05 was considered significant.

## RESULTS

**Table 1.** Characteristics of Respondents

| Characteristic | | F | % |
|---|---|---|---|
| Hypertension | Yes | 91 | 72.2 |
| | No | 35 | 27.8 |
| | **Total** | **126** | **100** |
| Diabetes mellitus | Yes | 38 | 30.2 |
| | No | 88 | 69.8 |
| | **Total** | **126** | **100** |
| Hyperlipidemia | Yes | 88 | 69.8 |
| | No | 38 | 30.2 |
| | **Total** | **126** | **100** |
| Current smoker | Yes | 33 | 26.2 |
| | No | 93 | 73.8 |
| | **Total** | **126** | **100** |
| Obesity/BMI | <18.5 : underweight | 20 | 15.9 |
| | 18.5-24.9 : normal weight | 32 | 25.4 |
| | 25.0-29.9 : overweight | 48 | 38.1 |
| | 30.0-34.9 : obesity class I | 26 | 20.6 |
| | **Total** | **126** | **100** |
| History ACS | Yes | 82 | 65.1 |
| | No | 44 | 34,9 |
| | **Total** | **126** | **100** |
| Age | <45 years old | 23 | 18.3 |
| | 45-59 years old | 68 | 54.0 |
| | 60-75 years old | 35 | 27.8 |

| | | | |
|---|---|---|---|
| | **Total** | **126** | **100** |
| Gender | Male | 53 | 42.1 |
| | Female | 73 | 57.9 |
| Education | Elementary school | 30 | 23.8 |
| | Junior high school | 35 | 27.8 |
| | Senior high school | 42 | 33.3 |
| | Bachelor's | 19 | 15.1 |
| | **Total** | **126** | **100** |
| Marital status | Single | 10 | 7.9 |
| | Married | 116 | 92.1 |
| | **Total** | **126** | **100** |
| Health insurance | Non BPJS | 10 | 7.9 |
| | BPJS | 116 | 92.1 |
| | **Total** | **126** | **100** |
| Employment status | Employed | 60 | 47.6 |
| | Unemployed | 50 | 39.7 |
| | Retired/Sickness disability | 16 | 12.7 |
| | **Total** | **126** | **100** |

The data above show that the respondents experience hypertension (72.2%). Most of them had no history of diabetes mellitus (69.8%). However, the clinical factors of hyperlipidemia indicated most of them had hyperlipidemia (69.8%). Meanwhile, when viewed from the aspect of smoking history as most of them had a smoking history (73.8%). Other clinical factors suggested that most of the respondents had an overweight BMI was 38.1%. Most of the respondents participating in the study had ACS history with 65.1%.

The results of the research in the table above indicated that the ages of most respondents are in the range of 45-59 years old (54%). Most of them are female with 57.9%. Respondents in this research have a good education and most of them finished their high school education (SMA). When viewed from other aspects such as marital status (92.1%) were married. Most of the respondents participating in this research had BPJS Health insurance (92.1%). Most of them also worked 47.6%).

**Table 2.** Association between Sociodemographic Characteristics and Early Detection

| **Characteristic** | | **F** | **%** | **Early Detection** | | **p-value** | |
|---|---|---|---|---|---|---|---|
| | | | | **≤ 60 min** | **> 60 min** | **Univariate** | **Multivariate** |
| Age | <45 years old | 23 | 18.3 | 16(69,6%) | 7(30,4%) | 0,001 | 0,125 |
| | 45-59 years old | 68 | 54.0 | 35(51,5%) | 33(48,5%) | | |
| | 60-75 years old | 35 | 27.8 | 17(48,6%) | 18(51,4%) | | |
| Gender | Male | 53 | 42.1 | 33(62,3%) | 20(37,7%) | 0,125 | 0,224 |
| | Female | 73 | 57.9 | 51(69,9%) | 22(30,1%) | | |
| Education | Elementary school | 30 | 23.8 | 17(56,7%) | 13(43,3%) | 0,001 | 0,001 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Junior high school | 35 | 27.8 | 23(65,7%) | 12(34,3%) | | |
| | Senior high school | 42 | 33.3 | 25(59,5%) | 17(40,5%) | | |
| | Bachelor's | 19 | 15.1 | 16(84,2%) | 3(15,8%) | | |
| Marital status | Single | 10 | 7.9 | 6(60%) | 4(40%) | | |
| | Married | 116 | 92.1 | 75(64,6%) | 41(35,4%) | 0,408 | 0,228 |
| Health insurance | Non BPJS | 10 | 7.9 | 6(60%) | 4(40%) | | |
| | BPJS | 116 | 92.1 | 102(87,9%) | 14(12,1%) | 0,001 | 0,001 |
| Employment status | Employed | 60 | 47.6 | 48(80%) | 12(20%) | | |
| | Unemployed | 50 | 39.7 | 16(32%) | 34(68%) | 0,001 | 0,001 |
| | Retired/Sickness disability | 16 | 12.7 | 6(37,5%) | 10(62,5%) | | |

A total of six variables were analyzed to identify the sociodemographic causes of prehospital delay in ACS patients (Table 2). The study found that the age, health insurance status, education level, and employment status of the patients were significant factors for early detection. Delay to early detection increased with the increase in age of the patients, although it was not significant by logistic regression. Approximately 30.4% of the patients below 40 years of age concluded that they experienced ACS after 60 minutes of the first onset of symptoms, whereas for the aged patients (> 60 years), this value was 51.4%. The percentage of early detection of ACS after 60 minutes of ACS onset was 40% and 12.1% in Non-BPJS vs. BPJS. The study revealed that the patient's education level was directly proportional to the rate of early detection. The percentage of early detection within 60 minutes of the onset of symptoms in elementary school, junior high school, senior high school, or higher-level educated patients were 56.7%, 66.7%, 59.5%, and 84.2%, respectively. Unemployment was associated with a delay in early detection, with 68% of detection after 60 minutes of ACS onset. On the other hand, 80% of the job holders were early detection with ACS within 60 minutes.

## DISCUSSION

Knowledge of the symptoms of ACS is very important in reducing prehospital delay. Good knowledge of ACS symptoms will increase public awareness and make it easier for them to recognize perceived ACS symptoms (Darsin Singh et al., 2018; Demisse et al., 2022). With increased knowledge, patients do not need to wait for symptoms to worsen, they can already recognize that the symptoms they feel require immediate action to receive treatment at the hospital(Chau et al., 2018). One of the factors that cause high knowledge of ACS symptoms is the level of education. The results of the study show that higher education is linear with an increase in early detection abilities. Education will improve the ability to comprehend, literature search, and decision making (Allana et al., 2018; Garrido et al., 2020). This condition will speed up the process of understanding the symptoms of ACS that are felt so that it will be faster in the decision-making process to seek help at the hospital (Chau et al., 2018; Garrido et al., 2020).

Apart from education, occupational factors and having health insurance also affect the speed of early detection. Employment and insurance ownership are driving factors that accelerate the decision to seek help(Al Barmawi et al., 2021; Arrebola-Moreno, Petrova, Garrido, et al., 2020). This is because, with a job and health insurance, a person will feel safer and more secure when they have to seek treatment because they do not need to be burdened with costs. Reduced financial distress makes someone more quickly detect ACS due to decreased anxiety so they can focus more on analyzing the symptoms they feel (Al Barmawi et al., 2021; Mujtaba et al., 2021). The existence of financial guarantees can prevent prehospital delay in ACS sufferers which will increase the output of care performed(Arrebola-Moreno et al., 2020; Khaled et al., 2022).

Age is one of the factors that affect the speed of early detection but in multivariate analysis, the effect is not too significant. Old age is one of the inhibiting factors for early detection. The elderly's reduced physical activity and a lower ability to perceive pain. In addition, the elderly will also have an increased likelihood of atypical symptom presentation and an increased prevalence of comorbidities in older patients, which may result in a delay in seeking medical care (Khaled et al., 2022). Older people will also have a decreased ability to recognize warning symptoms and an inadequate perception of the risks associated with them and their increased wish to avoid burdening family members seen in the elderly population(Khaled et al., 2022). Gender and marital status have no effect on the ability to early detection of ACS. This proves that gender does not affect the speed of decision-making in seeking help (Allana et al., 2018). Marital status also does not correlate with early detection ability. It's not always that unmarried people don't have a support system that will motivate them to seek help immediately (Arrebola-Moreno, Petrova, Garcia-Retamero, Rivera-López, Jordan-Martinez, et al., 2020). So that these two things do not have a significant effect on increasing the ability of early detection of ACS in this study.

## CONCLUSION

This study reveals that several sociodemographic factors that can affect early detection abilities are education, employment status, and health insurance. Increasing knowledge related to the early detection of ACS can be a solution to increase knowledge which will have an impact on increasing the ability of early detection of ACS.

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