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ORIGINAL ARTICLE

Epidemiological Analysis of Non-Communicable Diseases Post-Covid Era in Indonesia

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21 **STRACT**

Introduction: Non-communicable diseases (NCDs) are still a major health problem in the world and Indonesia. NCD prevention and control programs should be further improved to reduce NCD cases, especially in Indonesia. This study aims to analyze the risk factors for NCDs. **Methods:** This research is a mixed methods research (quantitative and qualitative) conducted in Surabaya, Sidoarjo and Gresik from July to September 2024. In quantitative research, the research sample was 400 people and analyzed using the Chi Square statistical test to see the risk factors for NCDs. In qualitative research, the research sample was 30 people from health workers, professional organizations and health office. **Results:** The results showed that the factors associated with post-Covid NCD risk factors were knowledge level ($p < 0.05$) and lifestyle factors ($p < 0.05$). One factor that causes the promotion, prevention, and early detection of NCD programs to be less than optimal is the lack of public awareness of the importance of preventing NCDs. **Conclusion:** Suggestions for this study are to increase health promotion through information technology, increase the implementation of early detection of NCDs independently and control risk factors, especially at the level of knowledge and lifestyle of the post-Covid community.

Keywords: education, epidemiological analysis, health promotion, non-communicable diseases, post-covid era

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22

INTRODUCTION

Non-communicable diseases (NCDs) have become a major health burden in Indonesia (Revansyach et al., 2024; Wahidin et al., 2023) with prevalence continuing to increase in line with changes in lifestyle and demographics (Sugiarti et al., 2024). Prior to the COVID-19 pandemic, NCDs had been the leading cause of death in Indonesia, with heart disease, diabetes, cancer, and chronic respiratory distress topping the list of causes of death. (Ministry of Health of the Republic of Indonesia, 2020; Khariri & Andriani, 2020).

NCDs caused 59.5% of deaths in Indonesia in 2007 and will increase to 71% by 2024. NCDs also lead to increased financing for health, requiring adequate prevention and control policies and programs. (Wahidin et al., 2023). Risk factors that influence the increase in NCD cases include smoking, lack of physical activity, unhealthy diet, and limited access to quality health services. (Susanti et al., 2023).

However, the COVID-19 pandemic has exacerbated this situation by causing disruptions in health services, increased psychosocial stress, and behavioral changes that may increase the risk of developing NCDs. (Tobing & Wulandari, 2021). Along with urgent pandemic response efforts, there are concerns that NCDs will become more serious and more widespread after the pandemic, both because of the direct impact of COVID-19 itself and because of the disruptions caused by the response to the pandemic (Thome, 2023). (Thome, 2023).

Recent data shows that the COVID-19 pandemic has had a significant impact on NCD cases in Indonesia (Hegelund et al., 2023; Musa et al., 2023). In addition to the increase in COVID-19 cases, there has also been an increase in cases of diseases such as diabetes, high blood pressure, and mental disorders due to the stress and anxiety caused by the pandemic situation (Isharyanti et al., 2023). (Isharyanti et al., 2023; Ministry of Health of the Republic of Indonesia, 2019).

NCD prevention and control programs have been developed in the Ministry of Health since 2005 until now. Some of the programs that have been implemented include the establishment of non-smoking areas, detection and monitoring of NCD

risk factors through the Integrated NCD Coaching Post, early detection of cervical cancer and visual inspection with acetic acid, clinical breast examination, and integrated services. Prevention and control of NCDs is also included in the minimum service standards in the health sector, namely on screening for NCD risk factors. The NCD program is also part of the Healthy Indonesia Program indicators with a family approach, especially related to hypertension and smoking control. (Wahidin et al., 2023).

While pandemic control measures have been the main focus, attention to NCDs and their long-term prevention efforts must still be considered. Therefore, research on innovations in public health strategies to address NCDs in post-COVID-19 Indonesia is crucial. By understanding the changing epidemiological trends and risk factors affecting NCDs, we can develop targeted and effective solutions to reduce the health burden they cause.

METHODS

This research is a mixed methods research, which is a combination of quantitative research and qualitative research. The design used is embedded mixed methods design. This design is used to compare and contrast quantitative statistical results with qualitative findings or validate and expand quantitative results with qualitative data with a concurrent triangulation approach. The research location was carried out in Surabaya City, Sidoarjo and Gresik. The sample selection was purposive based on age criteria and NCD treatment status. The research was conducted from July to September 2024. The study design used in quantitative research is descriptive cross-sectional. The variables studied included the level of knowledge, the role of health services and lifestyle. Data collection was done by distributing questionnaires. The study population was patients with NCDs in Surabaya City, Sidoarjo and Gresik. The research sample was taken using simple random sampling technique as many as 400 respondents. The instrument questionnaire consisted of 4 parts; respondent identity, knowledge variables, health services and lifestyle factors. Data analysis used Chi-Square test with 95% significance level.

Qualitative data collection aimed to explore the implementation of the control program. Data were collected using in-depth interviews and focus group discussions (FGDs). Interviews and FGDs were conducted in the cities of Surabaya,

Sidoarjo and Gresik involving health workers, professional organizations and health offices in Surabaya, Sidoarjo and Gresik. Qualitative analysis was conducted through content analysis. Data triangulation used in-depth interviews and FGDs. This research has received ethical approval from the Health Research Ethics Commission, Husada Jombang College of Health Sciences Number 0600-KEPKSHJ dated August 13, 2024.

RESULTS

Epidemiologic Overview of NCD Cases

Based on the research conducted, cases of NCDs, especially hypertension and diabetes in Surabaya City, Sidoarjo and Gresik can be seen from the following table:

NCD Case Data in Surabaya, Sidoarjo and Gresik from 2019 to 2023

Graph 1 shows data on NCD cases in Surabaya City, Sidoarjo and Gresik from 2019 to 2023. The graph above shows that the number of cases from year to year has increased, except in 2020. NCD cases decreased in 2020 in all cities.

Epidemiological Overview Based on Respondent Characteristics

Based on the research that has been conducted, the characteristics of the research subjects can be seen from the following table:

Table 1. Characteristics of Research Subjects

No.	Variables	N
1.	Age	
	21-30	10
	31-40	62
	41-50	193
	51-60	135
	Total	400
2.	Gender	
	Male	237
	Female	163
	Total	400

In table 1 it was found that respondents consisted of 237 people (59%) men and 163 people (41%) women. The most age in the research subjects was between the ages of 41-50 years.

Epidemiologic features based on non-communicable disease risk factors

Table 2. Results of Analysis of the Relationship between NCDs and NCD risk factors

No.	Variables	P-value
1.	Knowledge	0.004
2.	Health Services	0.080
3.	Lifestyle	0.001

Table 2 showed that the respondents had significantly different results on knowledge ($p=0.004$) and lifestyle ($p=0.001$) or $p<0.05$. Health services have no relationship with risk factors for non-communicable diseases ($p=0.08$).

Non-communicable Disease Prevention and Control Program

The main programs of NCD prevention and control in the Ministry of Health are promotion, prevention, early detection and treatment, where program priorities are more focused on promotion and prevention and early detection. Based on content analysis of the results of interviews and FGDs, there are several NCD prevention and control programs, namely:

- Integrated NCD screening activities

Screening activities include anthropometric examination, blood pressure, blood sugar, early detection of diseases of the senses of sight and hearing, VIA, Sadanis (Clinical Breast Examination), mental health examination in the population aged ≥ 15 years.

- Integrated screening in the community, OPD (Regional Apparatus Organization), Islamic boarding schools, private companies, universities, junior high schools, high schools, UKK (Occupational Health Efforts) posts, and other community organizations. Integrated screening activities are carried out once a year in each place according to the cooperation of each community group.

- Early detection of stroke

Health screening using lipid profile for DM (Diabetes Mellitus) and or HT (Hypertension) patients at Puskesmas

- Early detection of heart disease

Health checks using ECG (electrocardiography) for patients with DM and/or HT at Puskesmas

- Early Detection of Chronic Obstructive Pulmonary Disease (COPD)

Health check using the PUMA questionnaire for smokers

- Smoking cessation clinic services in all health centers

Early detection activities using the Alcohol

Smoking and Substance Involvement Screening Test (ASSIST) instrument, school UBM, and periodic screening in schools, the Healthy Indonesia Program with a Family Approach (PIS-PK), and smoking cessation screening in schools. • Bindu JIRONA activities integrated examination on mental health, smoking and drugs for school children

Some of the barriers found during the implementation of the PTM program

- Lack of public awareness of the importance of examination or early detection of non-communicable diseases

Some community groups do not understand the importance of early detection of NCDs. People tend to avoid health check-ups because they feel that they are not sick. In addition, there has been no intervention against excessive sugar consumption in the community, especially children. The increased production and promotion of sugary drinks can certainly increase their consumption in the community. Likewise, the number of fast food restaurants that serve foods that are high in fat, high in salt, high in sugar, can certainly increase the risk of NCDs in the community. On the other hand, fruit and vegetable consumption is still low.

- Wide range of early detection targets

Early detection targets in each primary health facility are different from one another. The large number of early detection targets in one area causes a high workload on health workers.

- The amount of data collection through various means such as googlesheet, applications and websites

Officers must immediately input early detection data on the system. A stable internet connection and a smooth system are needed in the implementation of the NCD program in health facilities so as not to hamper the reporting of NCD data.

Strategies to overcome obstacles in implementing the PTM Program

- Health education is conducted regularly
- Health education related to the importance of early detection of NCDs in the community should be carried out regularly to increase public awareness.

- Socialization on various social media

Socialization related to health checks, especially on NCDs, must be carried out through various social media such as WhatsApp, Instagram, TikTok, YouTube, etc. to reach various groups in society, especially productive age people with high levels of busyness.

- Implementation of home visits

The implementation of home visits is carried out on patients who are unable to conduct health checks at health facilities.

- Enhance cooperation with networks

Health facilities collaborate with networks such as independent clinics of doctors and midwives to expand the coverage of early detection in the community.

- Early detection of NCDs independently

It is hoped that in the future the community can carry out early detection independently with an integrated application at the nearest health facility.

DISCUSSION

Non-communicable diseases (NCDs) are a public health problem that can cause disability and death, putting a burden on health care financing. Almost all deaths in the world are caused by NCD cases (Putri et al., 2024). NCDs kill an estimated 41 million people each year, equivalent to 74% of all deaths globally, and are increasing every year. (World Health Organization, 2024). NCD cases in the cities of Surabaya, Sidoarjo and Gresik have also increased from year to year. Only once in 2020, NCD cases decreased due to a surge in emergency cases from Covid-19. After the pandemic ended, NCD cases increased again from year to year.

The risk of NCDs threatens all people of all age groups and regions in Indonesia. Indonesia is facing an epidemiological transition in health issues, where infectious diseases have not been resolved, while non-communicable diseases tend to increase. (Hamid & Putri Adekayanti, 2023).. Tobacco use, physical inactivity and unhealthy diet can increase the risk of death from NCDs. (Indonesian Ministry of Health, 2023). The increasing burden of NCDs is in line with the increasing risk factors which include increasing blood pressure, blood sugar, body mass index or obesity, unhealthy diet, physical inactivity, and smoking (Ministry of Health of the Republic of Indonesia, 2019). (Ministry of Health of the Republic of Indonesia, 2019).

The results of the study explained that lifestyle has a relationship with the risk of NCDs. A poor lifestyle can increase the risk of developing NCDs. The results of previous studies also explain that the lifestyle of today's society is at risk of non-communicable diseases (Yuningrum et al., 2021).. Lifestyle changes, especially during the post-COVID-19 pandemic conditions that occurred, finally affected the *lifestyle* of all people in all parts of the world. The factor of limited reach for food and the implementation of distance restrictions during the COVID-19 pandemic has an impact on limiting operating hours in every place to eat and making it difficult for people to reach food in the surrounding environment and affecting people's lifestyles to this day (Khariri & Andriani, 2020; Pua & Renyoet, 2022)

The results explain that the level of knowledge has a relationship with the risk of NCDs. The lower a person's knowledge, the more at risk of NCDs. Based on the results of previous research, it explains that the situation analysis of the problems found is that people's knowledge about preventing NCDs is still lacking. (Hamzah et al., 2021). The community must be provided with health education to improve their knowledge about preventing NCDs.

Health education is an effort to create health behavior in the community so that they realize how to maintain health and prevent things that are detrimental to health. (Purqoti et al., 2022).. Health behavior is all forms of community action related to health, especially in disease prevention actions. The behavior change strategy that must be carried out is to provide information on how to prevent disease and increase public knowledge. It is hoped that the knowledge gained can raise awareness in the community to behave in accordance with healthy behavior. (Purqoti et al., 2022)..

The COVID-19 pandemic has made several changes in healthcare services at all levels, especially in primary care. This has resulted in decreased monitoring of NCD cases in primary care due to increased demand and focus on emergency patients during the Covid pandemic. (Vieira & Caputo, 2023). The COVID-19 crisis has put a strain on the health system due to the increase in emergency cases. Health workers must adjust to the many emergency cases during the pandemic including the handling of NCDs (Peretz et al., 2023). (Peretz et al., 2023). These changes have led health workers to acquire new skills and experience in health care

delivery for people with NCDs (Astale et al., 2020). (Astale et al., 2023)..

The Covid pandemic also led to limited access to health services which contributed to an increase in NCD cases. Previous research results explain that during the Covid pandemic, Indonesia experienced disruptions in the provision of Posyandu and Posbindu services. (Center for Indonesia's Strategic Development Initiatives, 2022).. NCD management in patients requires consistent monitoring and regular check-ups. Patients with hypertension and diabetes mellitus require regular check-ups, but patients have difficulty conducting check-ups during the Covid pandemic. Access restrictions prevent patients from having their health checked (Olanrewaju et al., 2023).. This habit continued until the covid pandemic ended, people now rarely check their health because they feel that they are fine and not feel sick.

The role of health workers in the community is very important during the covid pandemic until now. People with NCDs cannot visit health facilities due to covid restrictions. The role of health workers in the community is as the main link between health service providers and people with NCDs. (Haregu et al., 2024).. Community health workers have the added responsibility of monitoring people with NCDs and providing treatment as well as raising awareness of the community to check their health regularly. However, factors such as high workloads, inadequate access to internet connectivity for remote health education, and the limited number of health workers in the community affect the implementation of this changing role. (Haregu et al., 2024).

Increasing public awareness and concern to carry out early detection of NCD risk factors independently and continuously is a very important stage in controlling NCD risk factors. The increase in NCD cases significantly adds to the burden on society and the government, because its handling requires short time, large costs and high technology. (Ministry of Health of the Republic of Indonesia, 2019). NCD cases are not transmitted but are deadly and cause individuals to become less productive. In an effort to prevent and control NCDs in Indonesia, it is necessary to conduct education and screening or early detection of NCDs. (Jepisa et al., 2023)..

Health problems cannot be solved by the government sector alone, to overcome them requires good cooperation between the

government and the community. (Aerts et al., 2021; Alfitra Perdana et al., 2021).. The NCD program has been implemented through promotive, preventive, early detection, treatment, and rehabilitation efforts. These efforts need to be strengthened through the support of various parties and cross-program cooperation, taking into account the burden of disease. Management support, from planning and evaluation of NCD programs, is an integral part of management. (Ravichandran, 2021).

The existence of obstacles in NCD prevention and control programs such as lack of public awareness and high workload on health workers in the field, requires serious attention from various parties. This is because prevention and control of risk factors are key in preventing NCDs. (Wahidin et al., 2023).. Strategies to overcome obstacles in the implementation of NCD prevention and control programs include increasing health promotion based on information technology such as social media, increasing early detection independently and controlling risk factors, especially lifestyle, should be considered a priority in the future.

Another problem that often occurs in NCD cases is the uneven distribution of the NCD burden in areas with limited resources. The community also does not routinely conduct health checks, as evidenced by the decline in the number of NCD cases during the pandemic and the surge in NCD cases after the pandemic. This needs attention so that public awareness increases and conducts health checks again. Health workers in the community have an important role in the prevention and control of NCDs, to ensure equity in the delivery of NCD services. (Haregu et al., 2024).. Community health workers play an important role in the prevention and management of NCDs because they are directly involved in the provision of health services at the community level. (Musoke et al., 2021). Previous studies have shown that community health workers play an important role in providing health education, early detection, disease management, adherence support, and lifestyle interventions that are important for managing NCDs at the community level. (Feroz et al., 2021)..

Data management in the disease reporting process in public health services also needs attention. The quality of the reports produced is very important because the reports are used for various kinds of strategic decision making. (Hendry et al., 2024).. Another strategy that can

be considered is the use of technology in screening, diagnosing or monitoring diseases (Geldsetzer et al., 2024). (Geldsetzer et al., 2023; Hassan et al., 2021).. WHO also supports organizations and countries to identify implementation gaps and prioritize the NCD research agenda to reduce the burden of NCDs. (Hyder et al., 2023).. NCDs are a global problem that must receive special attention (Isharyanti et al., 2023)..

Recommendations suggested from the interviews include increased education to the community about the importance of NCD prevention, synchronization/integration of programs, priority on risk factor control, and implementation of self-screening by the community. Increasing community awareness of the importance of self-screening can reduce the burden on health workers and the government in conducting NCD prevention screening. These recommendations should be implemented to improve the NCD program. The implementation of NCD prevention and control policies and programs in Indonesia needs to be strengthened. NCD detection, screening and treatment, as well as palliative care, are key components to NCD prevention and control.

CONCLUSIONS

The main risk factors for NCDs are the level of knowledge and lifestyle factors in the community. NCD prevention and control programs that have been implemented by the Directorate of NCD Prevention and Control and the Health Office are quite comprehensive, including research data, routine program data at the national and provincial levels, but the impact of the covid pandemic on NCDs has not been analyzed further. The COVID-19 pandemic has resulted in a shift in the role of health workers in providing much-needed NCD services in the community. This role is also needed during the post-pandemic period. The community needs readjustment when the pandemic restrictions are over. The community needs to be reminded of the importance of regular health checks to health facilities to prevent NCDs. In addition, it is important to increase public awareness in conducting self-screening. There needs to be a policy in requiring the community to do self-screening so that the incidence of NCDs can be prevented and does not increase. Increasing public awareness of the importance of self-screening can reduce the burden on health

workers and the government in conducting NCD prevention screening.

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