Does knowledge of non-communicable diseases risk factors influence screening service utilization? The finding from North Shewa Zone, Central Ethiopia

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ABSTRACT

Enhanced Non-communicable Diseases (NCDs) screening efforts are emphasized as opportunities to reduce premature mortalities due to the diseases. Nevertheless, the utilization of NCDs screening is affected by the knowledge of the risk factors. This study aimed to assess the relationship between knowledge of non-communicable diseases risk factors and screening service utilization. This community-based cross-sectional study was conducted among randomly selected adult residents of North Shewa Zone, Oromia Region, Central Ethiopia. Descriptive statistics were used to describe the background variables and multivariable logistic regression analysis was conducted to identify the factors associated with screening utilization. A total of 823 respondents completed the survey. The proportion of screening utilization was found to be 34.5 %; 95 % CI: 31.3, 37.9. Age < 25 [Adjusted Odds Ratio (AOR) = 0.10; 95 % CI: 0.04, 0.25] compared with age above 34, attaining secondary school [AOR = 5.28; 95 % CI: 2.28, 12.21], college/above [AOR = 3.41; 95 % CI: 1.53, 7.61] compared with those who had no formal education, presence of family member/s with NCDs [AOR = 1.85; 95 % CI: 1.14, 3.00] and knowledge of NCDs risk factors [AOR = 11.71; 95 % CI: 7.08, 19.35] were significantly associated with screening utilization. This study found that the use of NCD screening was very low. Knowledge of NCD risk factors was strongly associated with screening utilization. This highlights the importance of improving adult knowledge of noncommunicable disease risk factors in Ethiopia.

1. Introduction

Non-communicable diseases (NCDs) represent the principal cause of death worldwide killing 41 million people each year which accounts for 71 % of mortality globally. Among NCDs, the four top killers that together account for ~80 % of all premature NCD deaths are cardiovascular diseases, cancers, respiratory diseases, and diabetes (Forouzanfar et al., 2015). In sub-Saharan Africa, because of the demographic transition, the prevalence of NCDs is highly increasing. The disability-adjusted life-years (DALYs) due to NCDs in the region increased by 67 % between the years 1990–2017. The age-standardized DALY rate (per 100 000 population) due to NCDs in 2017 was 21,757.7 DALYs which was almost equivalent to that of communicable, maternal, neonatal, and nutritional diseases (Gouda et al., 2017).

Even though there is an overlap between them, the main risk factors for NCDs can be classified into behavioral (lifestyle), metabolic, genetic, environmental, medical conditions, and sociodemographic factors (Forouzanfar et al., 2016; Budreviciute et al., 2020). The World Health Organization created a list of ‘Best Buys’ to describe health interventions that are globally recommended for controlling NCDs. The interventions include screening services, brief interventions targeting the risk factors of NCDs and access to affordable drugs for the prevention and control of

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NCDs (World Health Organization, 2017). Screening has also been cited as the best buy in some countries (Teerawattananon et al., 2016).

Knowledge of the risk factors of NCDs plays a pivotal role in the prevention and control of diseases. However, the level of knowledge of these risk factors is limited. A community-based study conducted in Negeri, Malaysia, measured the overall knowledge of NCDs using a questionnaire that included risk factors, disease management, and preventive practice. Accordingly, the study indicated that 78.7% and 69.9% of adults living in urban and rural had good knowledge, respectively (Ithnin, et al., 2021). Particular to African countries, the knowledge of the risk factors of NCDs remains poor (Thippeswamy, 2016). The finding from a hospital-based study conducted in Kigali revealed that the magnitude of poor knowledge about NCD risk factors was 65.0% (Biraguna et al., 1970). On the other hand, a study conducted among public servants in Ethiopia revealed that 72.7% of participants had poor knowledge (Fida and Shuma, 2019).

Early detection of NCDs has been recommended for a one-third reduction in premature mortality from the major NCDs in the 2015–2030 sustainable development goals (Cao et al., 2020). In Africa, studies have revealed that enhanced NCD screening efforts should be emphasized as opportunities to improve NCD services (Lupafya et al., 2015). Similarly, it has been recommended that there is a need to reinforce efforts and initiatives on cervical cancer screening, hypertension screening, and diabetes screening in the implementation of NCDs prevention and control in Ethiopia (Federal democratic republic of Ethiopia Ministry of Health. Health sector transformation plan, 2015). Nevertheless, the utilization of NCD screening is affected by the knowledge levels of the risk factors. Despite this, the relationship between knowledge of non-communicable diseases and screening utilization has not been studied in Ethiopia. Thus, the purpose of this study was to examine the relationship between knowledge of noncommunicable disease risk factors and screening utilization.

2. Methods

2.1. Study area and period

This community-based cross-sectional study was conducted in the North Shewa zone, Oromia region, Central Ethiopia. The zone has 13 rural districts and two town administrations. Based on the 2007 national population and housing census, the Zone has a total population of about 1,639,586 of which 717,552 (43.8%) were male. The Zone has a total of 521,506 households with an average household size of 4.57 persons per household. There are sixty-four health centers and five public hospitals in the zone that provide health care services to the community. The study was conducted from April 1, 2021, to May 30, 2021.

2.2. Populations and eligibility

The potential study population was randomly selected, adult (18 or more years old) residents of the North Shewa Zone, Central Ethiopia. Adult individuals who lived for at least six months in the district before the study period were included in the study. Adults who were unable to hear, and severely ill during data collection were excluded.

2.3. Sample size and sampling technique

The sample size was determined using a single population proportion approach based on the assumptions of a 95% confidence level, a 5% margin of error, and a 50% proportion of screening for NCDs. A proportion of 50% was considered as there was no similar study done in Ethiopia previously. After adding 10% contingency for non-response and a design effect of 2, the final sample size for the study was 846. A multistage sampling technique was used in this study. First, five towns (Thirty percent of the towns in the zone) were randomly selected i.e., Fiche, Garba Guracha, Debre Tsege, Muka Turi, and Gundo Meskel. The sample size was proportionally allocated to each town. Accordingly, 338, 169,169, 85, and 85 of the sample size were assigned to Fiche, Garba Guracha, Gundo Meskel, Debre Tsege, Muka Turi towns respectively. Subsequently, 30% of their kebeles (the lowest administrative units in Ethiopia) were selected. Finally, simple random sampling using computer-generated random numbers was used to select households from the kebeles using house numbers as a sampling frame. The lottery method was used to select individuals in households with more than one adult.

2.4. Data collection tools procedures

Interviewer-administered structured questionnaires were used to collect data. The questionnaire was adapted from previous studies. It has four parts including socio-demographic, exposure to NCDs information, knowledge of risk factors and practices of screening which was developed by reviewing different literatures (Samuel, 2017; Elnaem and Elkalmi, 2019; Sharma, 2015; Knowledge, 2016; Gamage and Jayawardana, 2019). The tool was translated to the local language, Afan Oromo then back to English, to ensure its consistency. Then, it was pre-tested on 5% of the total sample size in the district which was not selected for actual study data collection to evaluate the readability, understandability, completeness, and reliability of the questionnaire and modified accordingly.

Standard precautions for COVID-19 prevention and risk management were followed throughout the data collection. Accordingly, both the data collectors and participants were protected by wearing face masks, maintaining physical distance, and cleaning the physical environment including hands with disinfectants.

Data were collected by trained data collectors. Ten BSc nurses were recruited for data collection. Five supervisors who have BSc in public health were recruited to facilitate the data collection procedures. The data collectors and supervisors were recruited based on their previous experience in data collection. A two-day training was given for data collectors and supervisors.

2.5. Operational definition and measurements

Screening for NCDs: the participants were said to be screened if they had undergone at least one test for the four most common NCDs (cardiovascular diseases, cancers, diabetes, and chronic lung diseases).

Knowledge of risk factors of NCDs: was assessed using 9 questions about respondents’ knowledge of NCDs and their risk factors. The questions covered the most common risk factors for NCDs. Correct answers received a score of 1 if the individual identified the risk factor, while incorrect answers received a score of 0. The possible total score ranged from 0 to 9. As an indicator of “good” knowledge, a cut-off level of 60% of the individual percentage scores was used (Gamage and Jayawardana, 2018). The tool was found to be reliable (Cronbach’s alpha = 0.73).

2.6. Study variables

The dependent variable of the study was the screening for NCDs. The independent variables were socio-demographic information (age, sex, religion, marital status, educational status, occupational status, income, and ethnicity), exposure to information about NCDs (getting information from media, getting information from health professionals, getting information from family members, having family members with NCDs and having friends with NCDs) and behavioral factors (physical activity, alcohol, and tobacco use).

2.7. Data processing and analysis

The collected data were checked for completeness manually and
entered, cleaned, and checked by Epi data manager version 4.0.2.101 and then exported to SPSS version 23 statistical package for analysis. Descriptive statistics were used to describe the background variables and presented with frequencies, percentages, graphs and text. Multicollinearity was checked using the variance inflation factor and no multicollinearity was detected. Bivariable binary logistic regression analyses were done for each independent variable and variables with a p-value < 0.25 were considered as candidates for the multivariable model. Finally, a multivariable binary logistic regression analysis was conducted to identify factors associated with screening utilization. Adjusted odds ratios (AORs) with their corresponding confidence intervals (CI) were used to assess the strengths of association between screening service utilization and its determinants at p values ≤ 0.05. The model fitness was checked by Hosmer and Lemeshow’s goodness-of-fit model and the model was well fitted (p-value = ).

2.8. Ethical consideration

The ethical approval to conduct this study was obtained from Salale University College of Health Science’s ethical review committee. A Permission letter was also obtained from the respective districts and kebele administrations before data collection. Written informed consent was also obtained from each participant before beginning the study. Moreover, the confidentiality of the study participants was maintained throughout the study.

3. Result

3.1. Socio-demographic characteristics

A total of 823 respondents completed the survey giving a response rate of 97.3 %. The mean age (±Standard deviation) of respondents was 31.83(±11.04) years. Of the total study participants, 443 (53.8 %) were female. Regarding marital status, 497 (60.4 %) of them were married. About one-third of them, 255 (31 %) attended above secondary education. The majority 628 (76.3 %) were from the Oromo ethnic group. About 189(23 %) of them were a merchant in occupation (Table 1).

3.2. Exposure to information about NCDs

All of the study participants reported that they heard about NCDs. The majority of the study participants 619 (75.2 %) heard about NCDs from TV (Fig. 1). Of the total study participants, 218 (26.5 %) had family members with NCDs. The most prevalent NCD was hypertension accounting for 187(22.7 %).

3.3. Knowledge of risk factors of NCDs and magnitude of screening

Of the total study participants, 329(40.0 %) of them had adequate knowledge of risk factors NCDs. The most frequently listed risk factor was smoking cigarettes 541 (65.7 %) followed by alcohol consumption 503(61.1 %) and excess salt intake 409(49.7 %) (Table 2). The proportion of screening utilization was found to be 34.5 %; 95 % CI: 31.3, 37.9.

3.4. Factors associated with screening of NCDs

During the binary logistic regression analysis, variables like sex, age group, educational status, marital status, getting health information from TV, getting information from health professionals, knowledge of NCD risk factors, and the presence of family members with NCD had a p-value<0.25. To control possible confounding multivariable logistic regression was conducted. Hosmer and Lemeshow test was checked to test model fitness and declared to be fit (P = 0.12). After controlling for possible confounders, those aged <25 were less likely [AOR = 0.10; 95 % CI: 0.04, 0.25] to be screened compared with those aged above 34.

Table 1
Socio-demographic characteristics of adult residents of selected towns of North Shoa zone, Oromia region, central Ethiopia, June 2021 (n = 823).

| Variables          | Categories | Frequency | Percent |
|--------------------|------------|-----------|---------|
| Age group          |            |           |         |
| <25                |            | 230       | 27.9    |
| 25–29              |            | 205       | 24.9    |
| 30–34              |            | 113       | 13.7    |
| >34                |            | 275       | 33.4    |
| Sex                |            |           |         |
| Female             |            | 443       | 53.8    |
| Male               |            | 380       | 46.2    |
| Marital status     |            |           |         |
| Single             |            | 270       | 32.8    |
| Married            |            | 497       | 60.4    |
| Divorced           |            | 24        | 2.9     |
| Widowed            |            | 32        | 3.9     |
| Educational status |            |           |         |
| No education       |            | 153       | 18.6    |
| Primary            |            | 212       | 25.8    |
| Secondary          |            | 203       | 24.7    |
| Above secondary    |            | 255       | 31.0    |
| Occupation         |            |           |         |
| Unemployed         |            | 91        | 11.0    |
| Housewife          |            | 162       | 19.7    |
| Gov’t employee     |            | 187       | 22.7    |
| Merchant           |            | 189       | 23.0    |
| Students           |            | 154       | 18.7    |
| Daily laborers     |            | 49        | 4.9     |
| Ethnic background  |            |           |         |
| Oromo              |            | 628       | 76.3    |
| Amhara             |            | 160       | 19.4    |
| Others             |            | 35        | 4.3     |

Others: Garage, Silte and Tigre.

![Source of information about NCDs](image)

Fig. 1. Sources of information about NCDs among adult residents of selected towns of north Shoa zones Oromia region central Ethiopia June 2021.

Table 2
Risk factors identified by adult residents of selected towns of north Shoa zone, Oromia region, central Ethiopia, June 2021 (n = 823).

| Risk factors identified by study participants | Frequency (Percent) |
|----------------------------------------------|---------------------|
| Smoking                                      | 541 (65.7)          |
| Alcohol drinking                             | 503 (61.1)          |
| Passive smoker                               | 94 (11.4)           |
| Obesity                                      | 310 (37.7)          |
| Consuming junk food                          | 281 (34.1)          |
| Stress                                       | 364 (44.2)          |
| Anxiety                                      | 151 (18.3)          |
| Consuming excess salt                        | 409 (49.7)          |
| Lack of physical exercise                    | 185 (22.5)          |
Participants who attained secondary school [AOR = 5.28; 95% CI: 2.28, 12.21] and college or above [AOR = 3.41; 95% CI: 1.53, 7.61] were more likely to be screened for NCDs compared with those who had no formal education.

Again, study participants who had family member/s with NCDs were almost two times [AOR = 1.85; 95% CI: 1.14, 3.00] more likely to be screened for NCDs compared with those who didn’t have. Moreover, the odds of NCDs screening was eleven times [AOR = 11.71; 95% CI: 7.08, 19.35] higher among participants who had adequate knowledge of the risk factors of NCDs compared with their counterparts (Table 3).

### Table 3

| Variables                       | Categories | Screening status | OR     | AOR    |
|---------------------------------|------------|------------------|--------|--------|
|                                 |            | No               | Yes    |        |
| **Age group**                   |            |                  |        |        |
| >34                             | 118        | 157              | 1.00   | 1.05   |
| ≤ 25                            | 38         | 192              | 0.01   | 0.04   |
| 25-29                           | 69         | 136              | 0.58   | 0.29   |
| 30-34                           | 59         | 54               | 1.45   | 1.42   |
| **Sex**                         |            |                  |        |        |
| Male                            | 152        | 247              | 1.04   | 2.26   |
| Female                          | 133        | 126              | 0.78   | 0.97   |
| **Educational status**          |            |                  |        |        |
| No education                    | 33         | 120              | 1.00   | 1.00   |
| Primary education               | 62         | 150              | 1.50   | 1.59   |
| Secondary education             | 77         | 126              | 2.22   | 5.28   |
| College or above                | 112        | 143              | 2.85   | 3.41   |
| **Marital status**              |            |                  |        |        |
| Single                          | 70         | 200              | 1.00   | 1.00   |
| Married                         | 198        | 299              | 1.89   | 0.63   |
| Divorced & widowed              | 16         | 40               | 0.14   | 0.44   |
| **Got information from TV**     |            |                  |        |        |
| No                              | 34         | 157              | 1.00   | 1.00   |
| Yes                             | 250        | 382              | 2.02   | 3.23   |
| **Advice from Health Professionals** |        |                  |        |        |
| No                              | 115        | 263              | 1.00   | 1.00   |
| Yes                             | 169        | 276              | 1.40   | 0.71   |
| **Presence of family member with NCD** |      |                  |        |        |
| No                              | 168        | 437              | 1.00   | 1.00   |
| Yes                             | 116        | 102              | 1.85   | 1.85   |
| **Knowledge of risk factors of NCD** |        |                  |        |        |
| Inadequate                      | 80         | 414              | 1.00   | 1.00   |
| Adequate                        | 204        | 125              | 1.00   | 1.00   |

*Significantly associated at P-value < 0.05.

Variables included in multivariable model: sex, age group, educational status, marital status, getting health information from TV, getting information from health professionals, knowledge of NCD risk factors, and presence of family member with NCDs.

4. **Discussion**

This study aimed to assess the relationship between knowledge of NCDs risk factors and screening service utilization. Accordingly, the proportion of screening utilization was found to be 34.5%; 95% CI: 31.3, 37.9. Age of the participants, educational status, presence of family member/s with NCDs and knowledge of NCD risk factors were identified to be associated with screening service utilization.

Ethiopia has developed a national NCD comprehensive guideline for the prevention, screening, diagnosis and treatment of major NCDs. The country also placed an effort to integrate the screening service into existing health care systems, especially at the primary level (Major Non Communicable Diseases, 2016). Yet, in this study, the proportion of participants who were screened for at least one non-communicable disease was 34.5%. Despite differences in population characteristics, this finding is similar to a study conducted in rural settings of Sri Lanka which reported that 37.8% of individuals have ever attended an NCD screening clinic (Dehiwattage Eroma Gayani Fernando, Sumal Nandasena, 2019) However, the finding is lower than the study conducted in Indonesia (46.4%) (Rachman et al., 2018). In addition, the finding is also lower than a study conducted in Kasaragod, India (62%) (Bhagyalakshmi and Kodali, 2019). This finding, therefore, warrants the need to improve screening service utilization in the study setting. The difference in the observed proportion of screening service utilization might be due to socioeconomic differences. It might also be because of low non-communicable diseases health service coverage in Ethiopia. The national response to NCDs in the country remains fragmented with insignificant total health spending per capita for NCDs (Shiferaw et al., 2018).

The novel respiratory syndrome coronavirus-2, also known as Covid-19, continued to be a catastrophic public health emergency throughout the world. The disease has a synergistic effect with non-communicable diseases. People with NCDs are more likely to be affected by the disease. More importantly, Covid-19 is associated with worse clinical outcomes in individuals with NCDs (Nikoloski et al., 2021). Yet, this study demonstrated that the screening service utilization was very low. Therefore, screening and prompt management of these NCDs should be considered to decrease the fatalities from the disease.

This study revealed that the age of participants was significantly associated with screening utilization. A study conducted in Sri Lanka, even though different age groups were used, also reported that the age of the respondents influences attendance to the screening services (Dehiwattage Eroma Gayani Fernando, Sumal Nandasena, 2019) This might be because of an increment in the morbidity in non-communicable diseases as age increases (Fattahi et al., 2021) which leads to higher health-seeking behavior among old ages.

The educational status of the study participants was also found to be associated with screening utilization. This is consistent with the studies conducted in Malaysia which reported that more educated individuals were more likely to utilize diagnostic and screening test services for non-communicable diseases (Cheah, 2018; Cheah and Goh, 2017) This can be explained by the effect of education on health literacy; higher education is associated with adequate health literacy which in turn improves service utilization.

Knowledge is a predominant factor influencing health service utilization (Li et al., 2016) This study also found that knowledge of risk factors of NCDs was the most important determinant of screening service utilization. Our finding showing the association between knowledge of risk factors of NCDs with screening utilization is in line with the study conducted in India (Bhagyalakshmi and Kodali, 2019) which reported that comprehensive knowledge of NCDs had significantly higher odds of NCD screening service utilization. This might be explained by the fact that individuals with good knowledge of the risk factors might have a positive attitude and practice toward the prevention and control of NCDs.

In the present study, the presence of family member/s with NCD was...
also associated with the utilization of screening services. This finding is in line with a nationwide study conducted in Brunei Darussalam (Pg Suhaimi et al., 2021). The possible explanation for this finding is the fact that NCDs have genetic predispositions that make individuals with a family history of NCDs be screened. It might also be due to the reason that individuals with a family history of NCDs have better knowledge of the diseases, and thus, are more likely to be screened for them.

4.1. Limitation of the study

The study employed a cross-sectional study design which could not establish a cause-and-effect relationship. The study was conducted among urban population, and thus, the results might not represent the rural population. Also, the frequency of different types of screenings or examinations undergone were not assessed.

5. Conclusion

In conclusion, this study found that the utilization of NCDs screening services was very low. Knowledge of NCDs risk factors along with other variables like age, educational status and presence of family members with NCDs were significantly associated with the screening utilization. This underscores the importance of improving the knowledge of adults on non-communicable disease risk factors in Ethiopia. Furthermore, to address the reduction of risk factors for NCDs, a coordinated comprehensive access to knowledge and diagnostic follow-up to the NCD risk factors should be implemented.

6. Fundings

This project was funded by Salale University. The funding source has no role in the study design; collection, analysis and interpretation of data; in the writing of this report; and in the decision to submit the article for publication.

7. Availability of data and materials

The data used for this research is available from the corresponding author upon reasonable request.

8. Ethics approval and consent

Ethical approval was obtained from the ethical review committee of Salale University. Permission letters were obtained from the respective district and kebele administration before data collection. Written informed consent was obtained from each participant before beginning the study. Confidentiality of the study participants was also maintained throughout the study.

CRediT authorship contribution statement

Elsbeth Legesse: Conceptualization, Methodology, Funding acquisition, Writing – original draft, Writing – review & editing. Tadesse Nigussie: Conceptualization, Formal analysis, Funding acquisition, Project administration, Writing – original draft. Derara Girma: Supervision, Validation, Visualization, Writing – original draft. Leta Adugna Geleta: Supervision, Validation, Visualization, Writing – original draft. Hirwo Dejene: Data curation, Formal analysis, Methodology, Writing – review & editing. Hiwot Dejene: Data curation, Formal analysis, Methodology, Writing – review & editing. Budreviciste, A., Danišli, S., Sabir, D., Onder, K., Schuller-Goetzburg, P., Plakyga, G., et al., 2020. Management and Prevention Strategies for Non-communicable Diseases (NCDs) and Their Risk Factors. Front Public Heal. 8.

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