

# GLOBAL STAKEHOLDERS SCHEMES FOR PREVENTING BURDEN NON-COMMUNICABLE DISEASES, LESSON LEARNT FOR INDONESIA

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## Abstract

*In Indonesia, the burden non-communicable diseases (NCD) such as heart disease, diabetes, cancer, and stroke become a patient's burden because of costly, decrease quality of life and caused of premature death. The objective of this research was to collect various prevention schemes of NCD at the global level and take up lessons learnt schemes that can be developed in Indonesia. This research method used preferred reporting items for systematic review and meta analysis (PRISMA). It was conducted by tracing quantitative and qualitative research related to the prevention schemes for preventing NCD and screened by using prism flow diagram. After collected 3578 literatures from various online journal databases, it found that prevention schemes by stakeholders (government, researcher, health personnel, and patients) are done by provide early detection, develop sophisticated technological innovation and varied health education methods. The results of this study suggest to stakeholders in Indonesia to develop predictive models in preventing of NCD burden.*

**Keywords:** *Non-Communicable Diseases, PRISMA, Stakeholders, Prevention*

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## INTRODUCTION

**N**on-communicable diseases (NCD) are chronic conditions that occur over a long period of time and are less likely to be cured (Kroll, Phalkey, & Kraas, 2015). According to the World Health Organization (WHO) in collaboration with the Ministry of Health of Nepal, there are four costly NCD diseases and most of them are burden for patients, these are cardiovascular disease, cancer, chronic respiratory diseases and diabetes (WHO&Nepal, 2013). NCD that cause the death were estimated at 36 million people in which 48% were cardiovascular diseases, 21% cancer, 12% chronic respiratory diseases, and 10% diabetes (WHO, 2013).

Blasting the number of burden NCD sufferers begins in the early millennia era along with the better recording of disease sufferers list in world (Lopez et al., 2014). The prevalence of NCD sufferers is more common to the elderly population group (Feng et al., 2014). Old age according to WHO is the age range above of 60 years (WHO, 2002). Travels of time brings the changes of NCD sufferers to an increasingly into younger population (Lopez et al., 2014).

Most of NCD result is significant in costly losses. According to research results of Park and Jung mentioned that the burden of NCD is able to decrease the quality of life and eliminate the productivity of the sufferer (Park & Jung, 2017). Moreover, according to Lie et al said that NCD sufferers have potential experience of premature death and result in life expectancy lost (Li et al., 2017). Based on data PAN American Health Organization also said that the cost to treat cancer diseases is 31 billion, cardiovascular 395 million, and diabetes 65 billion per year (PAHO, 2011). This cost will lead to the inflation from the health sector if it is not controllable.

Costly NCD such as cardiovascular disease, cancer, hearth diseases and diabetes are found from unhealthy behavior risk factors. According to Begum et al smoking is a really risk factor for the occurrence of chronic respiratory diseases (Begum, Lewison, Wright, & Pallari, 2016). In addition, the habit of drinking alcohol that occurs mostly in 25-34 years of age in urban areas at risk of that kind of NCD (hearth diseases, diabetes, stroke, etc). Current behavioral changes such as lack of exercise and eating unhealthy fast food also become the potential cause of NCD (Lachat et al., 2013).

In the America continent, Peru, their government conduct a prevalence study to determine the right intervention effort to control the number of people with NCD (Miranda et al., 2012). Unlike in Peru, European union developed biomedical and clinical research to conduct appropriate treatment of NCD patients by taking samples in Sub Saharan Africa (Mccarthy, Maher, Ly, & Ndip, 2010). Based on these explanations, associated stakeholder have important role to control the rate of NCD sufferers.

In Indonesia cause of death due to NCD is occurs from **stroke** (17.7%), **heart diseases** (10%), **diabetes** (6.0%), and **cancer** (1.4%) (Riskesdas, 2013). Based on data BPJS of Health claims, expense claims for this NCD were IDR 15 trillion (\$ 75161.9) for health care in 2016 (BPJSkes, 2016). Stakeholders related to NCD control in Indonesia should be take action in order to control the growth of NCD burden.

Existing programs in Indonesia is still focus more on curative and rehabilitative aspect especially for medical therapy. Based on the data of Indonesia Family Life Survey in 2007, people who do a medical check up are those who are exposed of NCD due to lack of early prevention (IFLS, 2007). While PROLANIS program that is conducted in early 2015 is to provide health education to the patients with chronic diseases. But there should be various efforts that can be developed by stakeholders in this case the government, health workers or related stakeholders to provide early protection to the community. Therefore, this study conduct to review the articles that is contained various alternative of NCD control that can be learnt to Indonesia.

## METHOD

This research was preferred reporting items for systematic review and meta analysis (PRISMA). The research was conducted by browsing articles related to NCD prevention control that were implemented in various countries from various journal databases searching. The aim of this research was to get a lesson of effort that can be realized in Indonesia.

The study was conducted during August 2017 from 5 databases to identify articles relating to the experiences of different countries in preventing of burden NCD these were diabetes, cancer, chronic respiratory diseases, and cardiovascular diseases. Journal online database Identification is based on sourced from Pubmed, ACM digital library, IEEE Explore, science direct, other related sources including elsevier and google scholar. The keyword used to search the article was "prevention of non-communicable diseases. The search is limited to the last 5 years from 2012 to 2017 in order to obtain more results of the latest program implementation to control NCD burden.

Inclusion criterias of this research were a qualitative and quantitative research that explains the program or effort control of NCD during the year 2012-2017. The program outlined included preventive efforts. In addition, downloaded articles were limited only located in the Asian region for further screening. This limitation aimed to obtain similar characteristics with Indonesia which is the same in the Asian continent.

While the exclusion criteria of this research were the chosen of article is only one if there are multiple articles from the different source database search online journals. Research with medical attention, overly curative and rehabilitative was excluded and not eligible in this study.

Review was done by screening the title, abstract and full text of articles. The data then was identified by describing the Prisma flow diagram process. Selected articles were presented in the form of a meta-analysis table which was showed the author, country of origin, research design, disease or risk factors, data sources, and lessons learned from selected articles. Lessons to be taken are grouped by stakeholders who execute NCD prevention efforts. Stakeholders involved in NCD prevention efforts include governments, health personnel, relevant stakeholders such as NGOs, researchers, and consultants, as well as patients with NCD. Furthermore, further analysis of lessons can be learnt to Indonesia.

## RESULT

The search results showed as many as 1,571 as the relevant article pet. Based on figure 1, 817 articles are from pubmed, 163 articles from ACM Digital Library and IEEE, 413 articles from science direct,

and 178 articles from other sources. As many as 142 articles were issued due to duplicate articles. In addition, after the screening by reading the abstract and see the whole of article, stated only 21 articles declared eligible in making efforts to prevent NCD. The article consists of 9 qualitative and 11 quantitative studies.

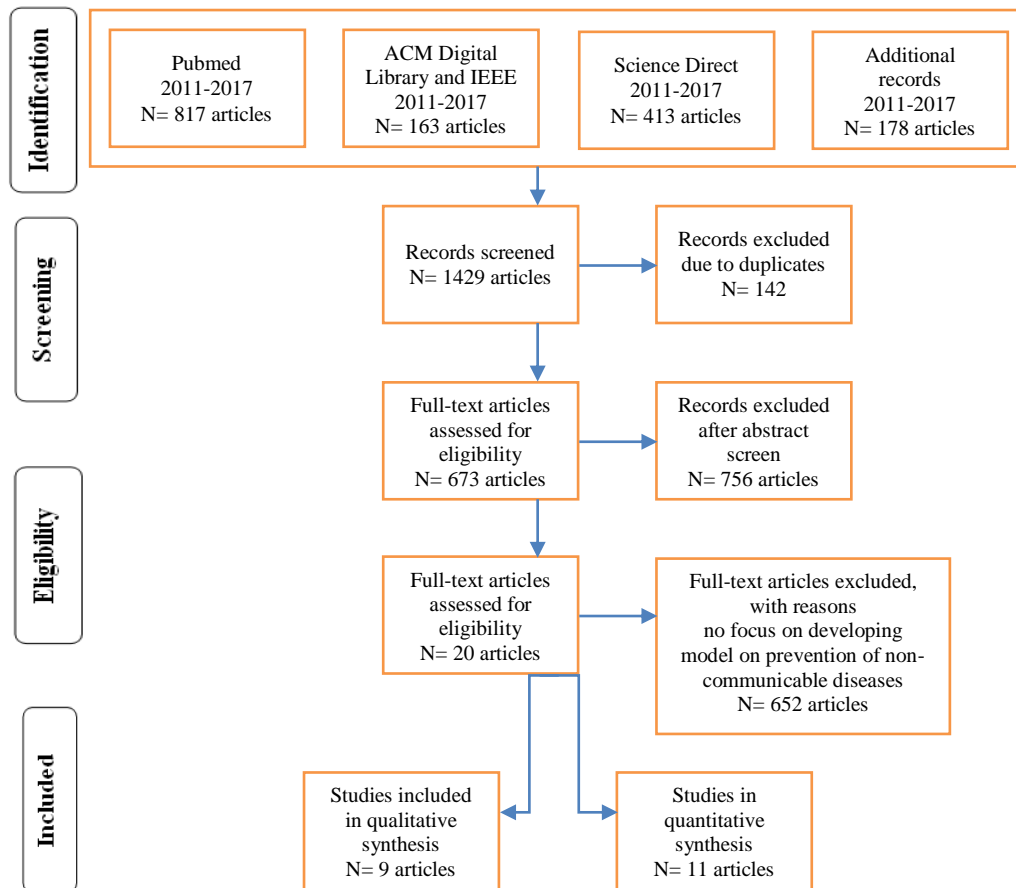


Figure 1. PRISMA Diagram Flow Prevention of Non-Comincable Diseases

Table 1 gives an overview of the 20 selected articles.

Table 1 Meta Analysis Prevention Model of Non-communicable diseases

No	Author and Year	Country	Diseases/risk factors	Population/ Data Source	Lesson Learnt
1	(Singh, 2012)	India	Cardio vascular diseases	Urban Indian with mean age 50 years, blood pressure 90/140, glucometer 105, smoker, alcohol consumption, BMI 25.78	<b>CVDMagic is a mobile phone android based for detecting CVD risk that can encode proposed non-laboratory based CVD risk diagnosis methods and give indication of CVD risk status system.</b>
2	(Moodie et al., 2013)	China and India	Harmful effect of tobacco, alcohol and ultra processed food and drink industries	Unhealthy commodities in low and middle-income countries	<b>Unhealthy commodity industries should be monitor by government to reduce death and disability from NCD.</b>
3	(Bhandari, Angdembe,	Nepal	cancer, cardiovascular	Cross sectional study to identify the	<b>It Needs to study prevalence of NCD to</b>

	<i>Dhimal, Neupane, &amp; Bhusal, 2014)</i>		<i>disease, diabetes mellitus, and chronic obstructive pulmonary disease</i>	<i>hospital based prevalence of 4 NCDs</i>	<i>take action, control, prevent, and reduction NCD burden</i>
4	<i>(Chisholm, Baltussen, Evans, Lauer, 2012)</i>	<i>Southeast Asia</i>	<i>Cancer, cardiovascular disease, respiratory disorders, sensory loss, injury</i>	<i>500 interventions people with NCD from global data</i>	<i>Screening to detect early, regulated food industry, enforcement of drink-driving laws, speed limits, seat belt use, and helmet use</i>
5	<i>(Lim, Chisholm, &amp; Mendis, 2011)</i>	<i>Southeast Asia</i>	<i>Cardiovascular disease, diabetes, and tobacco related disease</i>	<i>WHO databases of mortality and global burden of disease</i>	<i>WHO-CHOICE (Choosing Interventions that are Cost-Effective) such as Framework Convention for Tobacco Control</i>
6	<i>(Wah Yun Law, Yew Kong, 2014)</i>	<i>Asia Pasific</i>	<i>Diabetes, cancer, chronic respiratory diseases</i>	<i>Health Surveillance of WHO 2010</i>	<i>Control base on population-based ie dietary salt reduction, health education, psychological interventions</i>
7	<i>(Thakur, Garg, Narain, &amp; Menabde, 2011)</i>	<i>South east Asia</i>	<i>Tobacco use</i>	<i>Global status report on NCD, 2010</i>	<i>Reducing harmful use of alcohol, promotion of healthy diet and physical activity and tobacco control</i>
8	<i>(Bhagyalaxmi, Atul, &amp; Shikha, 2013)</i>	<i>India</i>	<i>Non-Communicable disease WHO stepwise risk factors approach</i>	<i>250 respondents 15-64 years in Gujarat State</i>	<i>Interventions of risk factors are needed for preventing NCD in rural and urban areas.</i>
9	<i>(Ikeda et al., 2012)</i>	<i>Japan</i>	<i>Tobacco smoking and high blood pressure, physical inactivity, high blood glucose, high dietary salt intake, and alcohol use</i>	<i>National Health and Nutrition Survey (NHNS) in 2007</i>	<i>Prevention of Tobacco smoking and high blood pressure are the two major risk factors</i>
10	<i>(Khan et al., 2013)</i>	<i>Pakistan</i>	<i>Permanent structures, sanitation facilities, clean drinking water), tobacco use, overweight, hypertension, diabetes, hepatitis.</i>	<i>Cohort patients The Indus Hospital and their households in Karachi, Pakistan between 2006-2009</i>	<i>Prevent rapid urbanization and changing lifestyles influence burden NCD</i>
11	<i>(Jafar et al., 2013)</i>	<i>Pakistan</i>	<i>cardiovascular diseases, cancers, respiratory diseases, diabetes, and mental disorders</i>	<i>Global Burden of Disease 2010 data</i>	<i>Modeling of risk factor reductions also achieve at least a 20% reduction in the number of these deaths by 2025 by targeting of the major risk factors.</i>
12	<i>(Anand, 2015)</i>	<i>India</i>	<i>Diabetes</i>	<i>Questionnaires for diabetic and non-diabetic persons in hospitals in India</i>	<i>Classification and Regression Tress (CART) is prediction model for identified</i>

					<i>significant factor causing diabetes</i>
<b>13</b>	<i>(Daniel, 2015)</i>	<i>India</i>	<i>Breast cancer, chronic hepatitis, Diabetes, Liver cancer, lung cancer</i>	<i>profiling of breath analyzer and collecting breathe samples from the volunteers</i>	<i>Breathalyzer is an artificial intelligent that is used to detect various physical abnormality of the human being. It is a machine learning approaches to diagnosis NCD</i>
<b>14</b>	<i>(Paiva &amp; Krishnarajah, 2012)</i>	<i>Srilanka</i>	<i>Non-communicable diseases</i>	<i>National House Hold survey in Srilanka</i>	<i>An innovative nutrition education (NE) model comprising of multiple nutrition education strategies was designed, to reduce risks of non-communicable diseases.</i>
<b>15</b>	<i>(Shin, Shin, &amp; Shin, 2016)</i>	<i>Korea</i>	<i>Chronic disease</i>	<i>Bio-signal patient's data in Hospitals</i>	<i>U-healthcare platform is proposed to reduce medical expense and provide high quality medical service for patients with chronic disease in Hospital.</i>
<b>16</b>	<i>(Biswas, Pervin, Tanim, Niessen, &amp; Islam, 2017)</i>	<i>Bangladesh</i>	<i>NCD in WHO 2013-2020 action Plan</i>	<i>List of Policy document from 1980- 2014</i>	<i>Research survey, policy and planning recommendation, legislation acts, guideline to monitor NCD.</i>
<b>17</b>	<i>(Li et al., 2017)</i>	<i>China</i>	<i>cardiovascular disease (CVD), diabetes, chronic respiratory disease, cancer</i>	<i>Global Burden of Disease Study (GBD) between 1990 and 2013 for all NCDs and subcategories were extracted</i>	<i>Based on projection result, it is possible to reduce premature mortality from NCD by if certain targets for risk factor intervention are reached</i>
<b>18</b>	<i>(Heshmat et al., 2017)</i>	<i>Iran</i>	<i>Smoking Behavior</i>	<i>sample of 14 880 school students were selected from urban and rural areas of 30 provinces of Iran</i>	<i>smoking prevention strategies should be considered as a health priority in school health</i>
<b>29</b>	<i>(Yarahmadi, Etemad, Hazaveh, &amp; Azhang, 2013)</i>	<i>Iran</i>	<i>hypertension and diabetes</i>	<i>Participants were from 6 provinces, 30 years and older who had been screened through the National Diabetes Prevention and Control Program.</i>	<i>Comprehensive NCD program with a strong collaboration from all stakeholders (governmental and non-governmental sector, academic, research centers and scientific associations).</i>
<b>20</b>	<i>(Hirakawa et al., 2017)</i>	<i>Japan</i>	<i>Cardiovascular diseases</i>	<i>Data from 38,854 individual participants without history of cardiovascular disease</i>	<i>The management of diabetes is important to reduce the risk of death from cardiovascular disease, not only in midlife but also in late life, in the Japanese population.</i>

Based on 20 studies that have been done by using meta-analysis, then selected only 13 studies that is true control program of NCD. Table 2 provides an explanation of 13 program controls accompanied by stakeholder analysis.

Table 2 Stakeholders terkait Program kontrol NCD

No	Prevention Models	Stake Holders (SH)			
		Government	Related SH	Health Personnel	Patients
1	Using mobile phone and artificial intelligent			√	√
2	Monitoring unhealthy commodity industries	√			
3	Studying prevalence of NCD	√	√		
4	Projecting burden estimation of NCD	√	√		
5	Screening check for early check			√	√
6	Choosing cost effective interventions	√			√
7	Giving health and psychological education			√	
8	Risk factors intervention	√	√		√
9	Innovative nutrition education			√	
10	Research survey, policy, and planning	√	√		
11	Smoking prevention and education in school			√	
12	NCD control in urban area	√	√		

## DISCUSSION

Effective health education or educational packages help to improve knowledge, consider the health literacy and activation of individuals to increase health condition (Adams, 2010). Effective health education in Indonesia based on Law Number 23 year 2014 about Regional Government stated that the health sector is assigned to the regional affairs both provincial as well as District or city (Republik Indonesia, 2014). As a result there are areas that comprehensively implement health promotion and there are also areas that focus only on the physical construction of health facilities in Indonesia.

Prevalence studies were performed with a diagnosis based on self-reported signs and symptoms (“Symptomatic Diagnosis,” or SD) that analyzed with computer-based algorithms may be a promising method for collecting timely and reliable information of NCD prevention (James et al., 2015). Data center and health ministry information of The Republic Indonesia already has a comprehensive record of the proportion of NCD patients. The data is collected from Public Health Center to the district health center until to the ministry of health by using an integrated system (Hui, 2011). However, there are nomany experts (stakeholders) who have captured and utilized the data to develop an application program (KemenkesRI, 2012). Besides, controlling the NCD program at school via Unit Kesehatan Sekolah (UKS) is not running well because there is no school curriculum that discusses the danger of unhealthy behavior such as smoking, drinking alcohol, and unhealthy life style (MendikbudRI, 2013).

The Weaknesses of application technologies such as mobile phones for the purposes of NCD program controls that is required expert stakeholders for developing application program (Kamis et al., 2015). Moreover, the development of randomized controlled trial technology to expand on the findings and address limitations of developed application (Haque et al., 2017). Thus, the technology can be maximally and useful as a factor control The risk of NCDs such as smoking, drinking, and eating unhealthy foods.

Indonesia also has screening programs to prevent NCD such as papsmear, blood tests, medical check ups and laboratory checks. Indonesia also has the potential schemes to develop sophisticated

technology screening methods. This potential can be seen from the amount of graduates of health school, medical, and informatics science from accredited A colleges scattered throughout the territory of Indonesia. The potential can be realized if any experts in the field of health, medical, and informatic technology collaborate each other to create a tool. Among of tools that can be made is by developing a model prediction of NCD.

## CONCLUSION

This study conclude that there are 12 prevention schmes that have been developed in countries around of Asia. One of model with the use of technology can be used as an alternative tools to control costly of NCDs besides doing health education program. Technology development in the form of advanced screening tool can be developed by academics, researchers, health ministry or health experts. The results of this research suggest to these stakeholders to be able to develop tools or instrument prediction base on advanced technology.

## ACKNOWLEDGEMENT

The author thanks to all provider of journal online data base that has been provide articles related to prevention of non-communicable diseases.

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