Uncover your risk! Using Facebook to increase the awareness of diabetes type 2 in Indonesia

– Pre-analysis Plan –

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Abstract

Using social media to distribute health related information has become increasingly common, especially in light of the recent Covid-19 pandemic. In this study, we assess whether social media – in particular Facebook – can serve as an efficient and cost-effective tool to increase the awareness about diabetes type 2 in Indonesia, where the prevalence of the diesease – and with it the rates of undiagnosed cases – has dramatically increased in the last decade. We use Facebook's advertisement function to randomly distribute informative ads related to the risk and consequences of diabetes to Indonesian Facebook users above the age of 21. The ads differ in their content and graphical design, but equally invite viewers of the ads to visit an information website on which they can participate in a diabetes self-screening activity (*Findrisk* test), which determines the risk of having or developing diabetes. Depending on their determined risk score, participants will receive a recommendation to contact their GP and ask for an in-depth screening. We investigate which type of advertisement content and graphic is able to generate the highest number of clicks, website visits and completed screenings per view to derive policy recommendations about (cost-)effective designs for health-related awareness campaigns in the context of surging rates of non-communicable diseases in low-and middle-income countries.

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1 Introduction

Diabetes currently presents the third leading cause of death in Indonesia (Centers for Disease Control and Prevention, 2020) and the country ranks seventh in the list of absolute numbers of diabetes cases worldwide (IDF, 2019). By the end of 2019, more than 10 million individuals were estimated to live with the disease in Indonesia (IDF, 2019). While this number is alarming *per se*, a major concern stems from the fact that about 70% of the cases remain undiagnosed (IDF, 2019). Specifically, the latest Indonesian Basic Health Research (RISKESDAS) has shown that while the diagnosed diabetes prevalence rate was equal to 2% (for individuals older than 15 years), the rate of individuals with diabetes according to blood sugar testing was 8.5%, with higher prevalence rates in urban areas (Kementerian Kesehatan Republik Indonesia, 2018). In comparison to 2013, the diabetes prevalence has increased by almost 25%. Additionally, the RISKESDAS results revealed that 1 in 3 adults (30.6%) suffers from impaired glucose tolerance, i.e. pre-diabetes, and therefore has an increased risk of developing diabetes type 2 in the future.

When diabetes is sufficiently early detected, it can be effectively treated by medicinal, lifestyle and dietary changes. If undetected and untreated, however, it can have detrimental health consequences, such as eye and kidney damage, neuropathy and, in the most severe cases, stroke and death. The unawareness of the disease and its related risk factors and symptoms and the belated or not at all occurring diagnosis are therefore major obstacles in the fight against diabetes in Indonesia that needs to be overcome.

The lack of diabetes awareness in Indonesia prevails both in the general public and among health care workers and policy makers. With respect to the general population, several studies report that low levels of knowledge about diabetes symptoms, risk factors and treatment possibilities prevail. For example, Kristina et al. (2020) in their study in rural Yogyakarta find that 45% of respondents have poor knowledge of diabetes risk factors. Bakti et al. (2021) conducted a study on public knowledge of diabetes and hypertension in metropolitan cities in Indonesia and found that on average 35% of the knowledge questions regarding diabetes symptoms and risk factors were answered incorrectly.

On the health care provider side, especially the awareness of diabetes screening guidelines seems to remain low. Widyahening et al. (2014) conducted a study with 400 general practitioners and found that even though health care professionals do know the risk factors and symptoms of the disease, a high share of them is unaware of the recommendation that patients at risk should regularly be screened for high blood sugar levels. This implies that individuals need to be aware of their risk status to demand the test individually. Raising awareness of diabetes is, hence, an important first

step in the process of diseases prevention and treatment. In a second step, the new awareness of being potentially at risk should be followed by a professional screening activity to learn about the actual disease status.

A potential low-cost intervention to effectively increase awareness is the distribution of diabetes related information via social media. In Indonesia's urban areas, which also have higher diabetes prevalence rates than rural areas, internet penetration rates and usage of social media platforms is high, making it a suitable target area for an online awareness campaign about diabetes. By January 2021, the internet penetration rate in Indonesia stood at 74%, with 95% of all users accessing the internet via smartphones. Especially the social medial platform Facebook is widely used in the country and therefore offers the great potential to serve as platform for information sharing and spreading. Facebook and its related applications (messenger, WhatsApp, Instagram) by now have 172 million Indonesian users – corresponding to 63% of the entire population. The country even provides the fourth largest Facebook audience worldwide, only after the US, India and Brazil.

Previous research has already shown that Facebook is a promising tool for spreading health-related information. A recent study with a representative sample of 1220 Indonesian Facebook users found that 60% of them already use Facebook to receive and search for medical and health related information (PwC Indonesia Advisory & Institute for Development of Economics and Finance, 2019). Also, Veale et al. (2015) show that Facebook is already successfully used for sexual health promotion. Using Facebook as social media platform for such an awareness campaign, hence, offers the opportunity to reach a sufficiently large target group to be (cost-)effective.

For the proposed study, we will therefore design an online awareness campaign implemented via Facebook and analyze whether it can serve as cost-effective solution to increase the awareness of diabetes in Indonesia and to encourage individuals to perform a self-screening activity based on the scientifically validated *Findrisk* test (Lindström & Tuomilehto, 2003). Specifically, we will randomly distribute information advertisements – that differ in their content and graphical design – via Facebook which encourage viewers to click on the advertisements ("ads" in short) and thereby being directed towards a website. On this website, we will provide informational material about diabetes and individuals can complete the self-screening questionnaire. Moreover, after the completion of the self-screening questionnaire, we offer all participants the opportunity to provide their e-mail address for the purpose of further participation in research activities. To these e-mail addresses, we will send an additional brief questionnaire.

The overall campaign name is "**Ada gula, ada diabetes**", which is related to a traditional

Indonesian saying.[1] All ads as well the information website will carry the name and logo of the campaign.

2 Research questions

With our study, we aim to answer the following research questions:

Q1: Can informational advertisements ("ads") distributed via Facebook encourage viewers to visit an information website about diabetes and to conduct a self-screening diabetes risk test?

Q2: Which type of ads (with respect to the graphical design and text content) is most effective in encouraging viewers to visit an information website about diabetes and to conduct a self-screening diabetes risk test?

Q3: What is the cost per view, per generated website visit and per completed *Findrisk* screening questionnaire?

Q4: What are the characteristics of those who participate in the screening questionnaire and what is their diabetes risk score? Do participants differ in their probability of participating in an additional survey and if yes, which characteristics determine the participation?

3 Research strategy

3.1 Intervention

We will distribute different information ads via the Facebook Advertisement function, which shall make the targeted individuals aware about the risk of diabetes in Indonesia. These ads will address different aspects of the disease and how it can affect individuals and families. Specifically, the different channels/aspects that will be addressed are:

1 Information – ads related to this topic will show an informative statement about the risk factors and potential health consequences of the diseases.

2 Social and family aspects – ads related to this topic will show a picture related to a family aspect and contain a statement that refers to social aspects of the disease.

[1] The traditional Indonesian saying is "Ada gula, ada semut", which literally means "When there is sugar, there must be ants". Figurativelly, the saying means that for every action there is an equal and opposite reaction. Our adapted campaign name hence figuratively interprets diabetes as the reaction to too much sugar; also in relation to the fact that diabetes is known as "Sakit Gula" ("sugar disease" or "sugar sickness") in Indonesia.

3 Religion – ads related to this topic will show a religious picture and contain a health-related statement from the Quran.

4 Healthy lifestyle – ads related to this topic will show a picture related to a healthy lifestyle (work outs, healthy diet) and contain a statement that links a healthy lifestyle to a reduced risk of diabetes.

5 Location specifics – ads related to this topic will contain information about diabetes that are relevant for certain cities or regions. For example, we show an ad with the city-specific prevalence rates of diabetes.

6 Shocking channel – ads related to this topic will contain a slightly shocking picture/ message.

All ads carry a statement about diabetes and encourage the viewer to visit the campaign website (adagulaadadiabetes.com). Randomizing these different ads allows to identify the most effective channel, i.e. to test which kind of approach would be well suited in the context of Indonesia to raise awareness about a health concern and which approach can effectively encourage individuals to seek for more information.

After clicking on one of the ads in Facebook, individuals will be redirected to the landing page, i.e. the campaign website. This website will contain factual information on diabetes in Indonesia, including the distribution of prevalence rates across the country and individual risk factors. It will also contain information about how diabetes is correctly diagnosed and how it is treated. Moreover, the website offers the opportunity to conduct a 1-minute self-screening test, based on the diabetes *Findrisk* questionnaire, which has scientifically been validated to diagnose the risk of diabetes. The Findrisk questionnaire has been adapted for Asian populations and consists of eleven questions that can be answered within one minute. It provides a test result in form of a score between zero and 20 points that indicates the degree of being at risk for diabetes. After the test, the participant will receive a summary of the score and a personal message on the risk that was calculated. Additionally, this message contains recommendations to visit a health center or a general practitioner, based on the calculated risk score.

3.2 Targeting and experimental design

The target group of the study includes all Indonesian male and female Facebook users above the age of 21, which live in either Jakarta or Yogyakarta – the two cities with the highest diabetes prevalence rates in the country.

The experiment will be designed in the form of an online health awareness campaign implemented via the social media platform Facebook. We will randomize the ads that differ in their design and content. Specifically, we will randomize different groups of ads, with each group representing one of the channels outlined above. Each ad groups consists of 2-3 different ads.

We will use Facebook's A/B-Test to implement the randomization procedure. This A/B-Test design allows us to specify that the exact same budget amount is allocated to each ad group and to thereby circumvent that Facebook's algorithms determine the budget allocation towards the ad groups. Each ad group receives a budget of €10 per day, summing to a total budget of €60 per day for a total of 6 different ad groups. The awareness campaign will for the maximum period possible for the A/B test, which is currently restricted to one month. The planned period for the final campaign – after running a short pilot – is April 2022.

The randomization is taking place at the individual level, no clustering is applied. There is no pre-defined number of individuals/observations for this study, but we aim to reach at least 200 users per ad-group that click on the ads to be redirected to the website and to participate in the self-screening. If after the period of one month the minimum number of participants has not been reached, we plan to extent the campaign for another month.

3.3 Data collection

The data of interest for this study are the number of views per ad, clicks per ad, views of information page per ad, number of tests started per ad, number of tests completed per ad. To be able to make a conclusion about the cost-effectiveness, we will also collect information about the costs per view, costs per click, costs per started screening questionnaire and cost per completed screening questionnaire. All of these metrics will be automatically collected via the Facebook campaign. Additionally, we will collect the information that individuals provide in the screening questionnaire. All participants need to give their consent with the privacy policy of the website in which the explicit use of the data for academic purposes is explained in detail.

To further collect demographic data and information, we will offer the opportunity to participate in a more comprehensive survey by entering their e-mail address on the campaign website. Through this survey, we will collect additional information on how individuals got aware of the website and the test, i.e. whether they were redirected from Facebook or whether they heard about the test from a family member or friend. Thereby, we can collect information on possible positive externalities which would further increase the cost-effectiveness of such a program.

Further questions concern the general knowledge about and awareness of diabetes (and potentially other NCDs), self-reported compliance with screening activities, and questions concerning risky behavior such as smoking, sedentary lifestyles and consumption patterns.

Here it is to mention that voluntary survey participation comes with a large risk of self-selection bias. To evaluate the severity of this bias we will use the data entered in the self-screening test, which will allow us to test for significant differences in survey participants and non-participants with respect to age, gender and diabetes risk. The number of survey questionnaires completed per ad will also be an indication on the interest and engagement with diabetes of the respondents.

4 Analysis

We will analyze the data with descriptive statistics and in an econometric regression framework. The following functions are of interest for the regression analysis:

- Webpage visit as a function of ads
- *Findrisk* test participation as a function of different ads (we will distinguish between starting and finishing the *Findrisk* test)
- Survey participation as a function of different ads (channels/aspects)
- Survey participation as a function of *Findrisk* score
- *Findrisk* score as a function of ads
- *Findrisk* score as a function of characteristics observed in survey characteristics

5 Ethical review

The proposed study is currently under review for ethical approval at the Ethical Review Committee of the University of Passau.

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