Information Systems Design Of Surveillance of Non-Communicable Disease (NCD) Risk Factors through NCD Posbindu in Dinas Kesehatan Kota Surabaya

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Abstract
The implementation of Non-Communicable Disease (NCD) risk factors surveillance through Posbindu uses a health information system that is web-based NCD surveillance application. In practice, NCD risk factors surveillance information systems through Posbindu in Dinas Kesehatan Kota Surabaya still requires a development especially in processing and analyzing NCD risk factors data. This research aimed to design the development of NCD risk factors surveillance information systems through Posbindu in Dinas Kesehatan Kota Surabaya. This research used descriptive method to describe the design of NCD risk factors Posbindu that conducted by in-depth interview using interview guidance with informants as many as 2 people. Data analysis were depicted in the form of Data Flow Diagram (DFD) and analyzed descriptively. The result of this research indicate that the type of information required on the output component is the proportion of positive NCD risk factors examination based on the age group and sex. The design of process components in the development of surveillance information systems NCD risk factors through Posbindu is processing and data analysis in accordance with the design of DFD. The data requirement on input component is age data that can be obtained from available data source.

Keywords*: NCD risk factors, system, information, Posbindu*

I. INTRODUCTION

Universally, Non-Communicable Disease (NCD) has become the major cause of death. It is also known as the main problem of public health in Indonesia. Some risk factors that currently happened are tobacco use, unhealthy diet, lack of physical activity and excessive alcohol consumption. These factors may lead to psychological changes in human body and based on that reasoning it can cause some risk factors which consist of hypertension, diabetes, cholesterol and obesity. In a long period of time, it will become NCD.

NCD restraint programs and the risk factors are started from prevention, early diagnosis, medicinal treatment, and rehabilitation. Community empowerment in *Posbindu* can be the alternative way to undertake the prevention and early diagnosis and the rest is in health care facility which are *Fasilitas Kesehatan Tingkat Pertama (FKTP)* and *Fasilitas Kesehatan Rujukan Tingkat Lanjut (FKRTL)* (Kemenkes RI, 2015).

NCD risk factors surveillance is the particular thing of NCD restraint program in Indonesia that produce some valid data and information as the planning, monitoring, and program evaluating. The implementation of NCD risk factor surveillance is using a *Health Information Systems. Health Information Systems* may support the process of making some decisions for a). daily health service implemetation b.) the intervention in the response to health problems and c). to support the health management at the level of district/city, province and national in the preparation of the short-term plan, middle-term plan and long-term plan. *Health Information System* is an information system which capable of generating data or information that is accurate and punctual (Gavinov and Soemantri, 2016).

The implementation of NCD risk factors surveillance at the level of *Posbindu* and *FKTP* need some surveillance systems and informations that currently well occure, in order for the data and informations can be used for the development and for strengthening the NCD restraint program (Kemenkes RI, 2015).

The implementation of NCD risk factors surveillance in the level of *Posbindu* can be made through some activities that are collecting the data, processing and analyzing the data, interpreting the data and dissemination and it is disperable for producing information that is objective, measurable, and can be compared among times, regions, and different groups of people as the material for making decisions (Kemenkes RI, 2015).

The evaluation of surveillance systems and the information of risk factors have been implementing in the area of *Dinas Kesehatan Kota Surabaya* with the analysis of the problems based on the input, process, output, as well as

to determine the priority of the problems and to formulate the alternative solutions. The main problem is to process and to analyze data in NCD risk factors surveillance information systems through *Posbindu* that have not worked to its full potential. The common systems are often experiencing some errors on the server, it may not be described the actual condition of the data. The alternative way to solve problem is to develop the offline system of NCD surveillance information that can cover the purpose of NCD surveillance programs. It consists of processing and analyzing data, in case to produce informations that can be used in making some decisions.

Based on that reasoning, this study has some objectives research which are to arrange the pattern of developing surveillance information systems in risk factors of NCD through *Posbindu* in *Dinas Kesehatan Kota Surabaya* that cope with the common problems of surveillance information systems in NCD risk factors.

II. RESEARCH METHODOLOGY

This research used descriptive design that aim to design and to develop surveillance information systems of NCD risk factors through *NCD Posbindu* in *Dinas Kesehatan Kota Surabaya*. The design of development consists of identification the type of informations in information systems of NCD risk factors through *Posbindu* to design activities for generating informations and identifying the data, resources and methods in order to develop systems on the component input.

The data were conducted using indepth interview with the interview guidance to some employees who are in the field of health service *P2PTM Surabaya*. The Chief of *P2PTM* officer and coordinator of NCD risk factors surveillance programs in the area of NCD *Posbindu* in *Dinas Kesehatan Kota Surabaya.* The data and information were described by using Data Flow Diagram (DFD) then descriptively analyzed.

III. RESULTS AND DISCUSSIONS

A. Identification the type of informations and the utilization of Non-communicable Disease (NCD) risk factors data through *Posbindu* in *Dinas Kesehatan Kota Surabaya* as the output component.

Identification of needed-information was the first step of developing systems. The needed-information were retrieved from interview results with some employees and the chief of P2PTM officer. It was based on the principles of some references, they are the general guidance in the integrated NCD *Posbindu*, technical instructions of NCD risk factors surveillance web-based, guidance in the implementation of surveillance systems on health epidemiology, and guidance in the implementation of surveillance systems on communicable disease epidemiology and integrated non-communicable disease.

The requirements of needed-information as the output components are as follows:
Table 1. The guidelines of needed information on surveillance information systems of NCD risk factors through *NCD Posbindu* in *Dinas Kesehatan Kota Surabaya*.

No.	The Needed Informations	How To Obtain	The Form of Presentation	Period	*References*
1.	Proportion of NCD risk factors checkup	Numerator: Total of positive NCD Denominator: Total of participants on NCD risk factors checkup	Table and Graphs	Monthly	Petunjuk Teknis Surveilans PTM (2015)
2.	Scope of NCD risk factors	Numerator: Total of population ≥15 years old which doing NCD checkup in a region Denominator: Total of population ≥15 years old in the same region.	Table and Graphs	Yearly	Petunjuk Teknis Surveilans PTM (2015)
3.	Proportion of positive NCD risk factors checkup based on age	Numerator : Total of positive NCD risk factors based on age Denominator: total of some positive NCD risk factors	Table and Graphs	Monthly	Pedoman Penyelenggaraan Sistem Surveilans Epidemiologi PM dan PTM Terpadu (2003)
4.	Proportion of positive NCD risk factors	Numerator: Total of some NCD risk factors based on gender	Table and Graphs	Monthly	Pedoman Penyelenggaraan Sistem

	checkup based on gender	Denominator: total of some positive NCD risk factors			Surveilans Epidemiologi PM dan PTM Terpadu (2003)

Based on table 1 the needed-information number 1 and 2 are the output which is on the NCD risk factor systems and the rest are the needed-information on information systems of NCD risk factors through *Posbindu* in *Dinas Kesehatan Kota Surabaya.*

B. System Development Design on Process Components to Produce the Required Information related to the System Information of Non-Communicable Desease (NCD) Risk Factors *Posbindu* in Dinas Kesehatan Kota Surabaya.

1. Surveillance Implementation Process of Non-Communicable Desease (NCD) Risk Facrtors

The implementation of surveillance systems about the NCD risk factors in *Posbindu* based on the process of surveillance activities as follows; data collection, data processing and analysis, data interpretation and information dissemination.

a. *Data Collection:* The data of NCD risk factors based on *Posbindu* in *Dinas Kesehatan Kota Surabaya* were collected by using the *offline* and *online* ways. The *online* way was collected by the application program of surveillance information systems NCD risk factors through *Posbindu* web-based. Meanwhile *offline*, the data results of NCD risk factors *Posbindu* assessment have been collected by each *Puskesmas* to *Dinas Kesehatan Kota Surabaya*. The data were collected every month where the frequency of data collection is once a month. The data have been collected manually on the 10th of each month provided by the manager as the deadline.

b. *Data Processing and Analysis:* Data processing surveillance of NCD risk factors *Posbindu* in *Dinas Kesehatan Kota Surabaya* were in the form of recapitulation or the total of *Puskesmas* reported the data results of measurement NCD risk factors *Posbindu*. Data from *Rumah Rekap Bindu* form were directly processed (summed), it is because every month must include the activity report. The collected data have not been analyzed by in person (age and sex), whereas the place (*Puskesmas*) and time have been already collected. System development design on data processing and analysis was produced the necessary information. The information has become the basis for decision-making and planning control of NCD as well as program evaluation. The processing was done by dealing out the existing data into information in accordance with the draft report.

c. *Data Interpretation:* Data surveillance of *Posbindu*-based NCD risk factors in *Dinas Kesehatan Kota Surabaya* has made the interpretation against the data analysis which is based on the output table produced in the activity report.

d. *Information Dissemination:* Information dissemination was conducted in the form of reports to the city government by applying the e-monev application that collected on the 8th of each month. As for dissemination to *Dinas Kesehatan Provinsi* and *Kementerian Kesehatan*, it is also conducted through web port information surveillance system *Posbindu*-based of NCD risk factors.

2. Data Grouping on Information System Surveillance of NCD Risk Factors *Posbindu*

Data processing on information system surveillance of NCS risk factors one of which is by way of data grouping, the following data categories are based on NCD risk factors as follows:

Table 2. Data Grouping on System Information Surveillance of NCD risk factors *Posbindu*

No.	Risk Factors	Category
1.	Tobbaco use	- Yes - No
2.	Low Physical Activity	- Yes - No
3.	Low Vegetables and Fruits Intake	- Yes - No
4.	Alcohol Consumption	- Yes - No
5.	Blood Preasure	- Normal - Warning > 129 - Hypertension > 139

6.	BMI = weight in Kg divided by height in meter squared	- Normal - Warning > 22,9 - Obesity > 25
7.	Abnominal Circumference	- More > 90 - Normal
8.	Blood Glucose	- Hyperglycemia > 144 - Normal - Hypoglycemia < 80
9.	Cholesterol	- Hypercholesterol > 200 - Normal
10.	Uric Acid	- High > 7 - Normal
11.	Age = Check Date minus Birth Date	- 15 – 19 years - 20 – 44 years - 45 – 54 years - 55 – 59 years - 60 – 69 years - ≥70 years
12.	Gender	- Male - Female

3. Identifying data requirements that can produce the Required Information on Information System of Surveillance of NCD risk factors through *Posbindu* in *Dinas Kesehatan Kota Surabaya* as input components.

Data were needed on the development of the surveillance information systems of NCD risk factors through *Posbindu* in order to produce the required information.

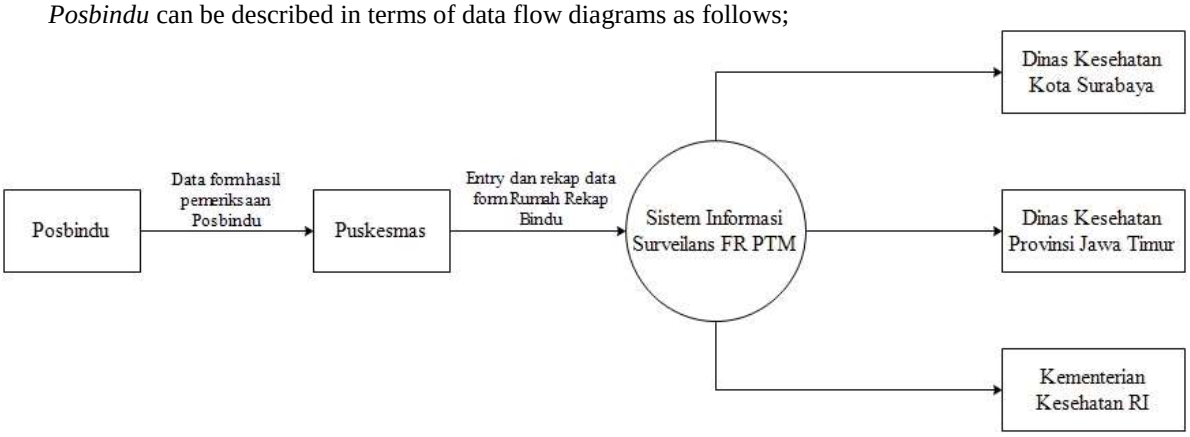
Table 3. Data Requirements of NCD risk factors through the *Posbindu* Information System of Surveillance.

No.	Information	The Required Data	Data Source
1.	*Posbindu* Participants' Identity	- Inspection date - Name - Nick name - NIK - BPJS number - Date of birth - Gender - Religion - Address - Blood group - Last education - Job - Status	Form *entry* data *Posbindu*
2.	Historical data of self-disease and family history of disease.	- Diabetes - High blood pressure - Heart - Asthma - Cancer - High cholesterol	Form *entry* data *Posbindu*
3.	Interview data	- Smoking - Low physical activity - Low vergetables and fruits intake - Alcohol compsumtion	Form *entry* data *Posbindu*
4.	Measurement data	- Blood pressure - Height - Weight - Abdominal circumference - GDA / GDP - Cholesterol	Form *entry* data *Posbindu*

		- Uric acid - IVA	
5.	Data on risk factors grouping	- Blood pressure: normal, warning, hypertension - BMI and BMI criteria: normal, warning, obesity - Abdominal circumference: more, normal - Blood sugar: hyperglycemia, normal, hypoglycemia - Cholesterol: hypercholesterol, normal - Uric acid: high, normal - Age and age group: 15-19 years, 20-44 years, 45-54 years, 55-59 years, 60-69 years, >70 years	Form Rumah Rekap Bindu

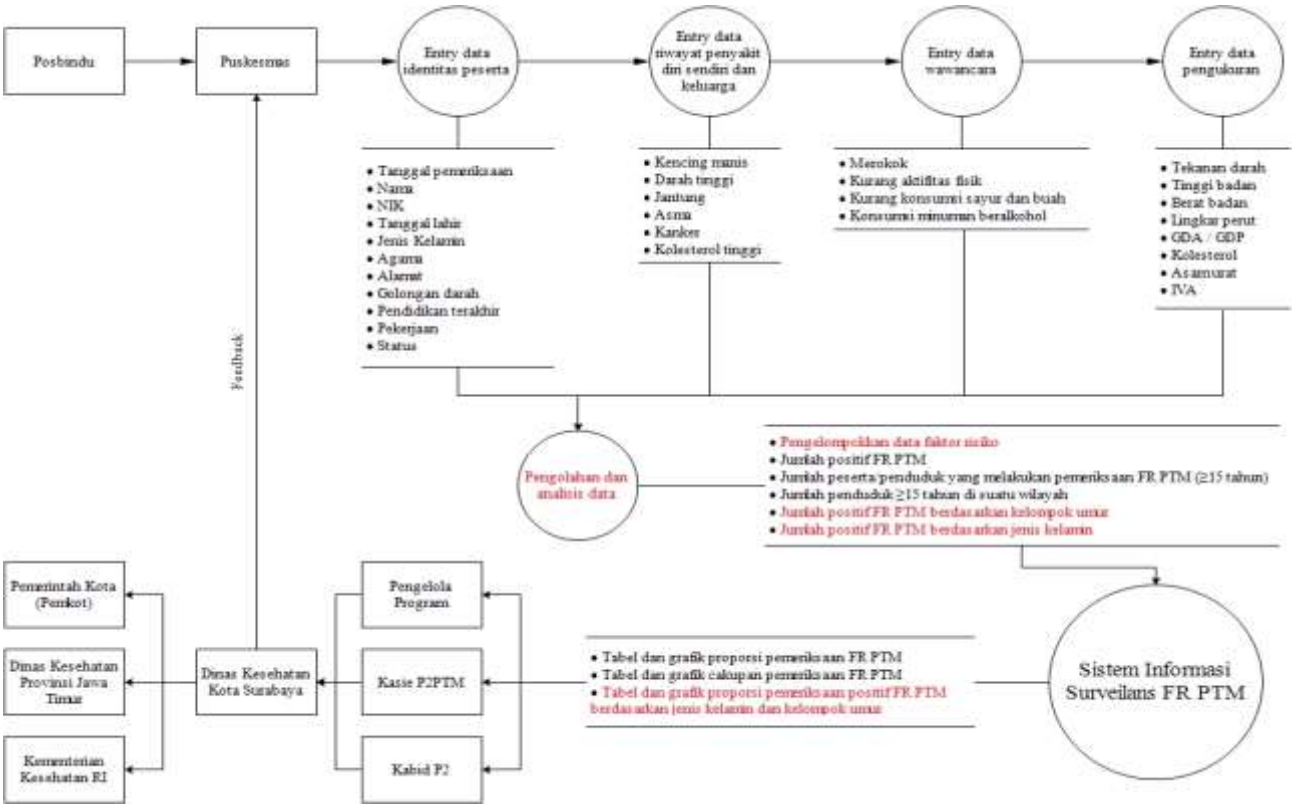
4. Data Flow Diagram (DFD)

a. ***Diagram Context:*** Diagram context of surveillance information systems of NCD risk factors through *Posbindu* can be described in terms of data flow diagrams as follows;



Picture 1. Diagram context of surveillance information system NCD risk factors through *Posbindu*

b. Data Flow Diagram Design of Information System Development for NCD risk factors through *Posbindu* in *Dinas Kesehatan Kota Surabaya*. The plan for developing surveillance information systems related to NCD risk factors through *Posbindu* in *Dinas Kesehatan Kota Surabaya* can be seen in picture number 2.



Picture 2. Design of Data Flow Diagram Surveillance Information Systems Development of NCD risk factors through *Posbindu* in *Dinas Kesehatan Kota Surabaya*

Based on picture number 2, data collection of NCD risk factors were done by *Posbindu* employees on monthly activity using *Posbindu* examination form. The results of *Posbindu*'s activities were consciously reported to the *Puskesmas*, and then the Puskesmas' employees entered all data that collected on the *entry* form and *Rumah Rekap Bindu*. The variable was added to the form that age data, where the data can be automatically obtained through the data that have been provided in the form of date of birth and date of examination.

The design of data processing and analysis was added to the process to produce the needed information, namely the grouping of risk factors. Grouping of added data were age group, the positive number of NCD risk factors by sex and the positive number of NCD risk factors by age group. The added variables and grouping of data in order to produce the output required by the program in surveillance information system NCD risk factors through *Posbindu* in *Dinas Kesehatan Kota Surabaya*.

Tables and graphs were added to surveillance information systems of NCD risk factors through *Posbindu* as the output component in terms of the proportion of positive measurements of NCD risk factors by age group and sex. The output generated from this system was needed by the program manager, the co-chief of P2PTM officer and the chief of P2 officer. Information dissemination can be carried out by *Dinas Kesehatan Kota Surabaya* and be reported to the City Government and *Dinas Kesehatan Provinsi Jawa Timur*. As a result of the output of *Dinas Kesehatan Kota Surabaya*, it can consciously provide feedback to the Puskesmas.

IV. CONCLUSION

The conclusions obtained from this research are as follows;

1. The type of information required on the output component in the development of surveillance information system of NCD risk factors through *Posbindu* in *Dinas Kesehatan Kota Surabaya* is the proportion of positive NCD risk factors based on age and sex group.
2. The design of process components in the development of surveillance information systems related to non-communicable disease risk factors is the process of data processing and analysis in accordance with the design of Data Flow Diagram (DFD).

3. The data requirement on the input component in the surveillance information system of non-communicable disease risk factors through *Posbindu* is the age data that can be obtained from the available data sources.

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