Editorial

Lesson Learnt from Cardiovascular Risk Factors Studies in Urban Population of Jakarta and House Hold Survey in Indonesia, 1988 - 2018.

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Introduction

The Framingham Heart Study was initiated in the United States in the year 1946 demonstrating correlations between several risk factors and coronary artery disease, left ventricular hypertrophy, and heart failure.[1]

Reports by the World Heart Federation showed that the cardiovascular mortality in developing countries was on the rise, contrasting to those of developed countries. Indonesia is in need of field cardiovascular laboratory (mobile cardiovascular laboratory?) to obtain data regarding cardiovascular risk factors on a community level in order to formulate an appropriate public health policy.[2-7]

On the year 1988, the director of National Cardiovascular Center Harapan Kita Hospital (NCCHK), Doctor Sukaman, initiated the Monica Jakarta Survey which was supported by Professor Georgi,

a representative from World Health Organization (WHO). A survey by Community Health Care and NCCHK was done on the three districts in the South Jakarta. These districts were selected due to the stable population (minimal immigration and emigration).[7,8] The Monica surveys were conducted in the year 1988, 1993, and 2000; unfortunately, it was discontinued due to changes in WHO policy worldwide. This lead to discontinuation of Monica Jakarta study. In short, we learn that organized intervention on a community level through Stop Smoking and Regular Exercise campaigns has a positive impact on the prevalence of cardiovascular risk factors.

On the year 2007, we proceed with the similar study design and rename the project into Jakarta Cardiovascular Survey which was funded and supported by the Government. Our results showed an increase in the prevalence of these cardiovascular risk factors compared to the year 1993-2007, probably due to discontinuation of organized intervention and campaigns from the year 2000 to 2007.[9,10]

From Monica Jakarta, Jakarta Cardiovascular Study, and other studies worldwide; we learn that continuing and revitalized organized intervention and campaigns on the community level are crucial to control the prevalence of cardiovascular risk factors in the community.

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Methods

The respondents of the study were recruited from three districts of South Jakarta namely Mampang Prapatan, Kebayoran Baru, and Cilandak. These districts were known as a laboratory community under the supervision of the National Cardiovascular Center Harapan Kita. Field surveys were conducted prior to study surveys to collect the data of respondents; the study surveys were done in the year 1988, 1993, 2000, and 2007.[7,8] 2013 and 2018 data were collected from Riskesdas report year 2013 and 2018.
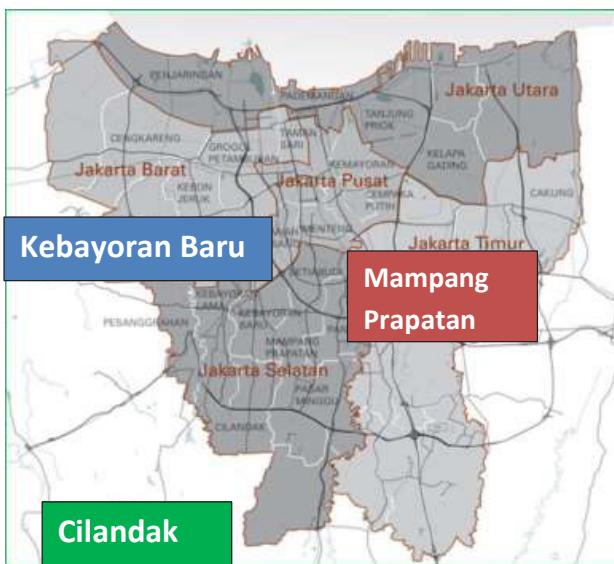

Fig. 1. The Location of Monica Jakarta Program

We used a multistage-stratified-cluster sampling method accumulating approximately 2000 respondents from a total of 523.000 population. The age ranges from 25-64 years. A complete questionnaire was used to assess the respondents, in addition to physical examination, 12 leads electrocardiogram and laboratory examination.

We used the same methods for the studies conducted in the year 1993, 2000, and 2007.

Our study showed a rise in cardiovascular risk factors in 1993 compared to 1998. In the year 2000, we introduced a lifestyle intervention spearheaded by trained health personnel in order to promote smoking cessation and regular exercise (callisthenics exercise/ Indonesian style "*Senam Jantung Sehat*", walking and jogging program). They used leaflets/pamphlets and visits home. Unfortunately, no organized intervention

was performed in the year 2000 to 200, leading to a concomitant rise in the prevalence of cardiovascular risk factors.

Hypertension was classified as recommended by WHO (Monica Manual) for 1988, 1993 and 2000, and JNC -7 for 2007 study. Body Mass Index defined as Obesity for > 30 kg/m2 and >27 kg/m2 respectively.[7,9,10] ECG was recorded and interpreted using the Minnesota code. Data were prospectively collected and analyzed using IBM SPSS software (for Window 10). Statistical significance was set at a p-value of < 0.05 (two-tailed).

Results

The ethnic groups did not change significantly for at least 20 years (Table 1), although few areas were excluded due to city development.

Table 1 . Characteristics of Respondents

Ethnics	1988	1993	2000	2007
Javanese	917(44.2 %)	985 (48.9%)	819(44,1 %)	474 (44.9%)
Batavian	708 (34.2 %)	600 (29.8 %)	602 (32,4 %)	374 (35.4%)
Sundanese	294 (14.2 %)	247 (12.3%)	244 (13,1%)	142 (13.4 %)
Minang	72 (3.5%)	88 (4.4 %)	69 (3,7%)	33 (3.1 %)
Batak	28 (1.4 %}	29 (1.5%)	45(2,4%)	24 (2,3 %)
Bugis	-	4(0.2%)	13(0.7%)	6(0.6%)
Ambon	-	3(0.1%)	9(0.5 %)	2(0.2%)
Balinese	-	6 (0.3%)	7(0.4 %)	6(0.6 %)
Chinese	-	3(0.1%)	3(0.2 %)	3 (0, 2 %)
Others	54 (2.6%)	47(2.7%)	45(2.4%)	31(2,9 %)
Total	2073 (100%)	2012 (100%)	1856 (100%)	1095 (100%)

Discussion.

The late Dr. Sukaman, first director of National Cardiovascular Center Harapan Kita Hospital initiated Monica Jakarta Surveys, and Jakarta Cardiovascular Survey is similar to Framingham Study with a modified population, were conducted in three districts of South Jakarta. Table 1 showed a similar baseline percentage of the Population in three districts over several years which fulfil the criteria for the stable study population. The

Table 2. Cardiovascular Risk Factors and Abnormal ECG

	Smoking		Hypertension		Obesity		ECG
	M (%)	F(%)	M(%)	F(%)	M(%)	F(%)	Both(%)
1988	59.5	5.9	13.6	16	2.3	7.3	2.3
1993	56.9	6.4	16.5	17	3.7	10	2.9
2000	38.5	1.8	12.1	12.2	6.1	15.8	1.2
2007	36.8	3.6	17.6	13.3	19.8	31.87	4.2
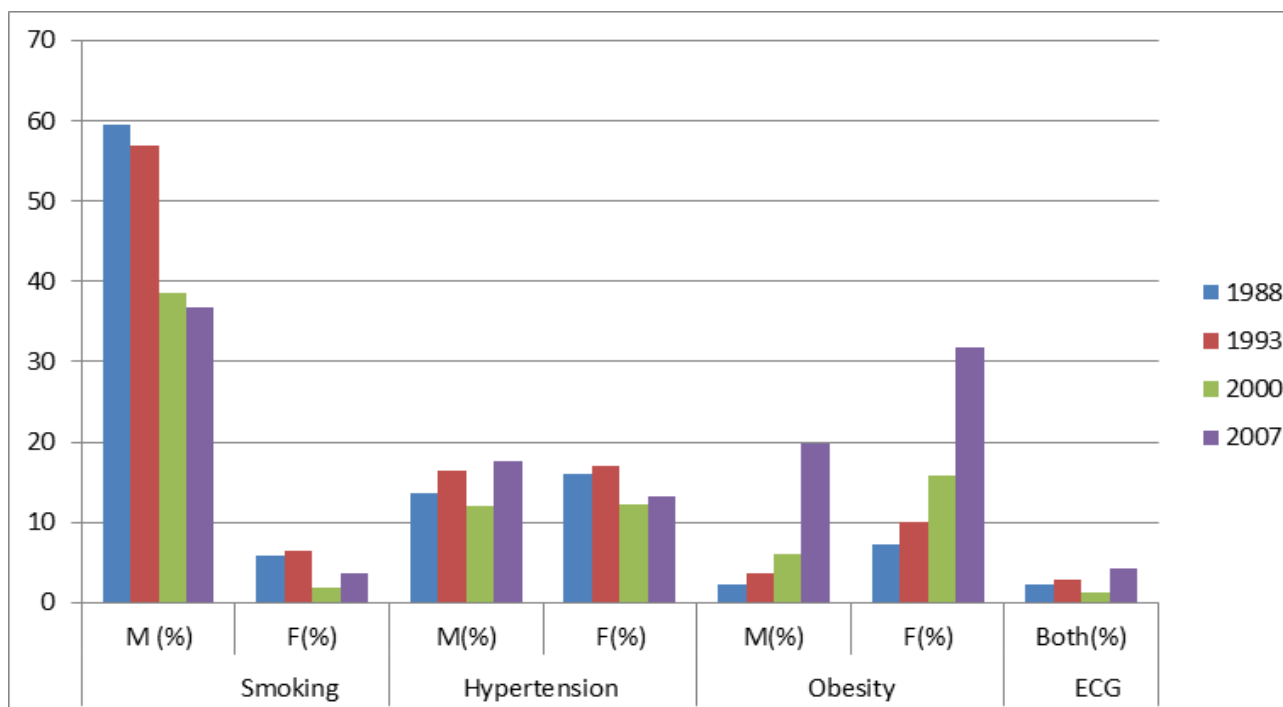
results revealed that Javanese, Batavian and Sundanese were the majority population in the three studies. Buginese, Ambonese, Balinese and Chinese emerges in the 1993 population.

The Monica Jakarta Team decided to conduct an intervention programme to lower the prevalence of smoking, hypertension, and Obesity since there was no intervention done before. The Healthy Lifestyle Programme was introduced with the support of the National Cardiovascular Center Harapan Kita and Department of Cardiology, Indonesian Heart Foundation and Community Health Center from the Government of Jakarta City.

The medical doctors, nurses and other health providers were regularly trained for this program. Indonesian Heart Foundation made pamphlets and brochures "*Panca Usaha Jantung Sehat*" or the five ways to have a healthy heart. The Indonesian Heart Club

Exercise trainers from Indonesia Heart Foundation encouraged people to join these exercise programmes. The exercise program was done for at least 2 to 3 times per week spanning from 30 to 60 minutes.

What do we learn from these surveys?

Smoking

Monica Jakarta and Jakarta Cardiovascular Study team collaborated with a non-governmental organization (Indonesian Heart Foundation, LM3, Indonesian Heart Association, and others) and Government for an anti-smoking campaign. These programmes showed satisfying results, with a decreased number of smokers by 18.4% in 7 years from 56.9% on the year 1993 to 38.5% on the year 2000 equal to 2.6% per year. If such intervention is done today, a further reduction of

13% can be achieved in 5 years and another 13% on the following 5 years, finally achieving a 30% decrease based on MDGs recommendation. Other factors should not be underestimated; government legislation may have an extensive influence. By forbidding smoking in public areas, the government has successfully reduced the number of smokers; a study showed that the level of education in the country is inversely associated with the number of smokers.[11] Literacy index, although not an exact measure of the level of education has been shown to steadily increasing in Indonesia and may contribute to the decreased smokers.[12] A higher level of education may also mean a more receptive audience on anti-smoking campaigns. A study in China showed that income was unrelated to the prevalence of smokers and may explain why the increase in Gross Domestic Product (GDP) did not lead to an increased number of smokers.

Hypertension

Definition of hypertension in the year 1988 was Systolic Blood Pressure > 159 mmHg and Diastolic > 94 mmHg on medication and or without medication according to Monica Manual, nearly equivalent to JNC 7 definition of stage 2 hypertension. Hence, only stage 2 hypertension from the year 2007 was included in the comparison. The prevalence of hypertension in males increased from 13.6% in 1988 to 16.5% in 1993. After the intervention, the prevalence was significantly reduced to 12.1% in the year 2000. Meanwhile, the prevalence of stage 2 hypertension in the year 2007 was 17.6%. In females, the prevalence increased from 16% in 1988 to 17% in 1993. After the intervention, it decreased to 12.2% in the year 2000 and rebounded to 13.33% in the year 2007. The combined stage 1 and stage 2 hypertension has a prevalence of 44.4% and 40.11%, this further decreased in the year 2018 to a combined male and female prevalence of 34.1%, that is one out of three people has hypertension.[13]

The valuable lesson learnt is that lifestyle intervention in the year 1993-2000 effectively reduced the prevalence of hypertension by 4.3% (16.5 %-12.2 %) 4.3 % or 0.6 % per year. If we carry out these lifestyle interventions in the year 2019, the prevalence of hypertension might be reduced by 3% or higher. Data in the year 2007 showed that only 61% was treated with medication and only 33.3% reached the target blood pressure might present as a challenge to combat hypertension, further campaigns and intensifications might be needed.

Obesity

The prevalence of obesity increased alarmingly in every consequent survey using both WHO (BMI > 30 Kg/M2) criteria as well as Asian (BMI > 27 Kg/M2). The
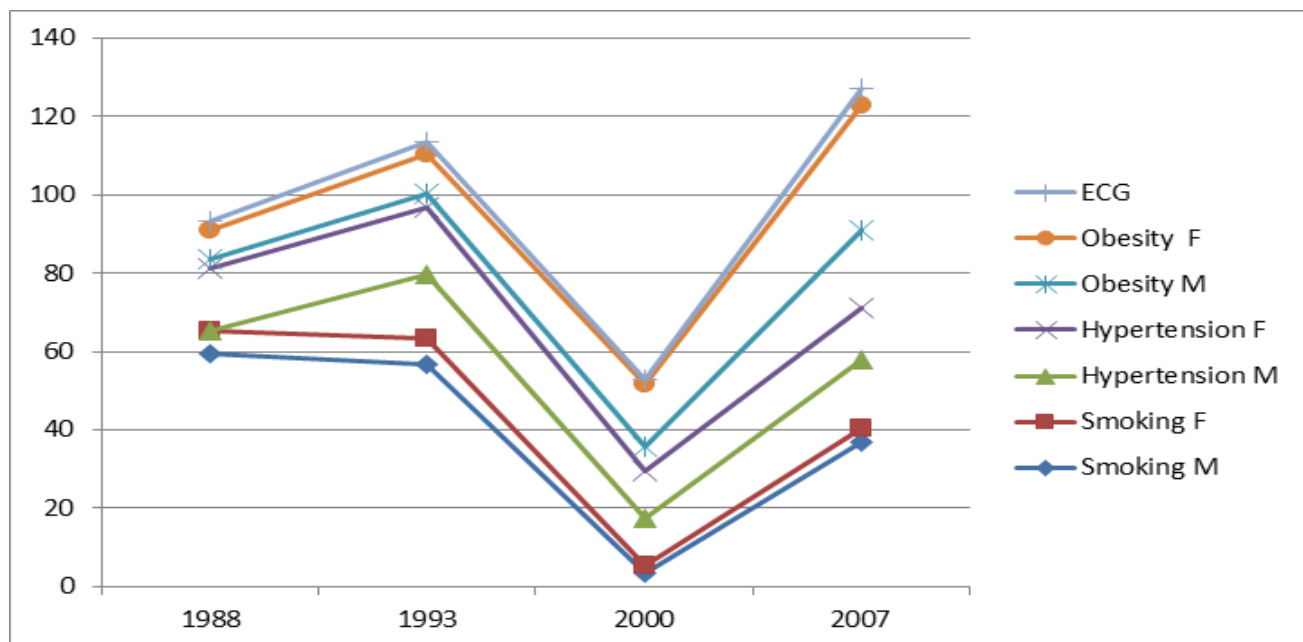
prevalence for obese male was 2,3 % (1988), 3.7 % (1993), 6.1 % (2000), and 19,8 % (BMI >27 kg/M2)in 2007. The prevalence for obese female was 7.3 %, 10 % and 15.9 %, and 31.8 % respectively. The burden of obesity was higher in women. The cost of obesity on the healthcare system is substantial; an estimated $147 billion in medical costs were attributed to obesity alone in the US in 2008. Furthermore, the prevalence of childhood and adolescent obesity, which now affects 17% of children and adolescents, raises concerns for its impact on adulthood obesity and long-term health outcomes. [14] The prevalence of obesity in Indonesia might be influenced by GDP which is steadily increasing in the early 90s before exponentially increasing few years after reformation in 1998.[15] This increase in obesity nearly mirrors the explosive rise of obesity prevalence to 3 times in the year 2007 compared to 2000. A study showed an association between GDP and obesity which then plateau after GDP reached a specific level.[16]

Overcoming obesity is challenging and multilevel and disciplinary approach is needed to formulate an effective intervention.

Diabetes

The data for blood sugar and diabetes in the year 1988, 1993, and 2000 was unavailable. The 2007 survey defined diabetes as fasting blood glucose > 126 mg/dL yielded a prevalence of 9.8% in male and 9.89% in female. Riskesdas 2018 showed a rising prevalence from 6.9% in the year 2013 to 8.5% in 2018. [13]

Third National Health and Nutrition Examination Surveys (NHANES III, 1988–1994) and subsequent 2-year NHANES cycles up to 2008 to define trends and forward projections to 2020 in CV health behaviours and factors. Time trends were estimated using weighted linear regression, adjusted for age, and projections were calculated assuming that trends would continue at a similar linear rate. Data from 35,059 NHANES CV disease-free participants aged ≥20 years (mean age: 44.4 years; 51% women) showed substantial increases in obesity (from 20% in 1988 to 32% in 2008) and poor or intermediate levels of glucose/diabetes control (from 21.1% to 42.9%).[14]

Obesity and Diabetes were intimately associated, and these issues should be addressed concurrently.

Physical Activity

Monica Jakarta Survey and Jakarta Cardiovascular Study also investigated physical activity, 51% of the respondents participated in regular sports activity on the year 1988 which decreased to 49.7% on 1993 before rebounding to 68% on the year 2007. Female participated in regular sport more frequently than male counterpart (64.9 vs 35.1%).

Although these data showed a contrasting relationship between physical activity and other cardiovascular risk factors, showing as if obesity and hypertension were not reduced with regular sports. Studies have shown that exercise and reduction of sedentary behaviours are an integral component to mitigate the genetic predisposition to increased BMI.[14] The counterintuitive data might be explained by other possibilities such as the questionnaire should also indicate the intensity, duration, and frequency of exercise activity on a weekly basis. There are other factors influencing the risk factors including the aforementioned GDP and other factors such as food intake.

Abnormal ECG

Old myocardial infarction was prevalent in 2.8% in the year 1988, 2.9% in 1993, decreased to 1.2% in 2000 and increased to 5.2% in the year 2007.

Conclusion

On a modern day, the prevalence of smoking dwindled compared to that of the past, forming a downtrend pattern. However, hypertension, obesity, and diabetes were more prevalent compared to the 1990s. Sports and physical activity was shown to be higher. A joint-effort by the medical society, government, legislation, social activists, and public figure should be made in order to modify the prevalence of these cardiovascular risk factors.
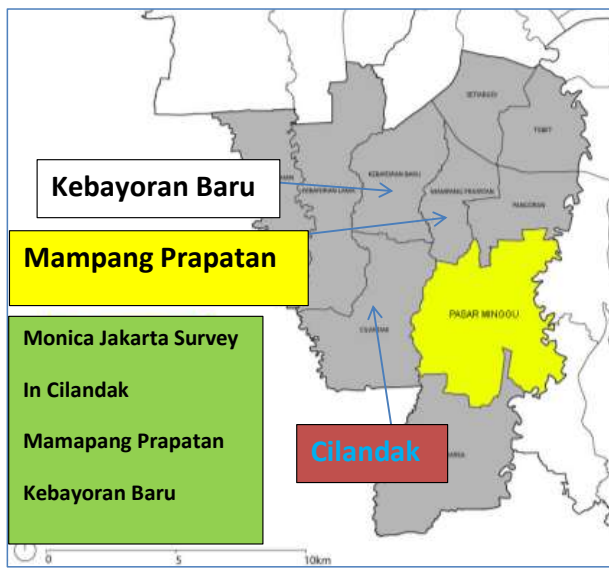
Harapan Kita National Cardiovascular Centre; the Director of Harapan Kita National Cardiovascular Centre; all community doctors from the district hospitals - Mampang Prapatan, Cilandak and Kebayoran Baru; the investigator team of the MONICA Jakarta project; Jakarta Cardiovascular Study . all colleagues, cardiology residents, nurses, paramedics, health-personnel for their valuable support and participation in these study.

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