

# The Prevalence of Blood Borne Diseases in the Community (A Cross Sectional Study in the District of Semarang)

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## ABSTRACT

Blood borne disease is a disease that spreads through blood contamination. Pathogenic blood-borne pathogens are pathogenic microorganisms found in human blood (such as viruses, bacteria or parasites) and are capable of causing disease in humans. Blood-borne pathogens in general are hepatitis B virus, hepatitis C virus and Human Immunodeficiency Virus (HIV). However, it is rarely known data about them in community. This study aims to determine the prevalence of some diseases that are transmitted through the blood in the community that lived at the district of Semarang. This research was descriptive observational using a cross sectional approach. HIV are tested by using the CLIA (Chemi Lumination Immuno Assay) and ELISA methods using Diasorin Murex reagents where HIV with anti HIV. HCV and HBV are tested by using the CLIA (Chemi Lumination Immuno Assay) and ELISA methods using Diasorin Murex reagents where Hepatitis B with antigen (HBsAg) and Hepatitis C with anti HCV. The research subject is the population who live in the district of Semarang for at least one year. Samples were taken by using simple random sampling method. The number of blood samples obtained from 1421 people who have filled informed consent and stated willing to be the subject of research. The results showed that the prevalence of HIV was 0.9 per 100 population, prevalence of hepatitis B was 1.9 per 100 population, and prevalence of Hepatitis C 0,6 per 100 population. There was moderate prevalence of blood borne diseases in community. There are some factors related to the transmission of blood borne diseases in the community that need to determine further.

**Keywords:** HIV, HCV, HBV, Blood borne, Prevalence

## INTRODUCTION

Blood-borne are transmitted by direct blood contact from injured skin or a mucous membrane <sup>[1]</sup>. The blood-borne pathogen is generally hepatitis B virus, hepatitis C virus and human immunodeficiency virus (HIV) <sup>[2-9]</sup>. Hepatitis B virus (HBV), hepatitis C virus (HCV), human immunodeficiency virus (HIV) still cause high burdens of disease in developing countries. For example, 184 million and 248 million individuals worldwide are chronic carriers of HCV and HBV, respectively <sup>[10-12]</sup>.

Around 37 million individuals are living with HIV/ acquired immunodeficiency syndrome (AIDS) globally <sup>[13-14]</sup>.

HIV is a major public health problem of the global community. According to WHO, people living with HIV are in low and middle income countries <sup>[15]</sup>. More than 240 million people worldwide are chronically infected with HBV and more than 350,000 people die each year due to HCV <sup>[16]</sup>. The prevalence of hepatitis in Indonesia infected with hepatitis virus was 1.2%<sup>[16]</sup>. The prevalence of liver cirrhosis was 0.6%. and HBV was 21.8% <sup>[16]</sup>.

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Blood-borne diseases can spread through organ transplants, sharing needles with others in activities such as tattoos and body piercings, blood or blood products donated as in blood transfusion activities <sup>[17-21]</sup>. Based on research conducted in eastern India, there are 44,173

blood sample was collected, and tested HIV I and II, hepatitis B, and hepatitis C. From the test results found that 283 tested positive for HIV (0.64%), 1001 HbsAg-positive (2.27%), And 717 positive for HCV (1.62%) [22]. While research conducted by Baha W et al. on volunteers and the community in Morocco, found seropositive HCV and HBV from 41,269 volunteers and 23,578 community [23]. In this study, found that the prevalence of anti-HCV increases and the various risk factors identified such as age, dental care, needle syringe and history of jaundice. In addition, male sex was associated with HBV infection and a history of risky sexual behavior were found to be associated with higher prevalence of hepatitis B [23].

According to Central Java Provincial Health Profile, in 2012 it was found out from 432,341 people who performed blood sampling as much as 432,148 (99.96%), 580 samples (0.13%) positive HIV.[15] Health profile data of Central Java 2012 showed the number of new cases of HIV / AIDS was 81/110 cases and hepatitis B disease in Central Java there are 98 cases[15]

Until 2013 the prevalence rates for hepatitis B, hepatitis C and HIV continue to be found, respectively 0.012%, 0.003% and 0.002%. The purpose of this study was to estimate the prevalence of blood-borne diseases (hepatitis B, hepatitis C and HIV) in the district of Semarang.

**METHODS**

**Study Design and Sampling Procedure**

This research was descriptive observational using cross sectional approach conducted between January-July 2017. Population of this study were someone who live in the district of Semarang at least one year. Sample was selected by using simple random sampling.

Sample calculated by the formula of minimum sample size for cross-sectional study as follow:

$$n = \frac{(z_{1-\alpha/2} \sqrt{2\bar{P}(1-\bar{P})} + z_{1-\beta} \sqrt{P_1(1-P_1) + P_2(1-P_2)})^2}{(P_1 - P_2)^2}$$

With level of significance 95%, power of study 80%, obtained minimum sample size 500 respondents.

Samples were taken by using simple random sampling method using sampling framework of house hold residence of District of Semarang. The number of blood samples obtained from 1421 people who have

filled informed consent and stated willing to be the subject of research.

**Instrument Development and Data Collection Procedure**

Data collection was carried out in January-July 2017. In the process of collecting research data assisted by officers from the Indonesian Red Cross area of Ungaran for blood collection. Primary data obtained from interviews with respondents, helped by research assistance.

HIV are tested by using the CLIA (Chemi Lumination Immuno Assay) and ELISA methods using Diasorin Murex reagents where HIV with anti HIV. HCV and HBV are tested by using the CLIA (Chemi Lumination Immuno Assay) and ELISA methods using Diasorin Murex reagents where Hepatitis B with antigen (HBsAg) and Hepatitis C with anti HCV.

**Data Processing and Analysis**

Data is presented as a percentage for categorical data and mean ± standard deviation for continuous data.

**RESULTS AND DISCUSSIONS**

**Socio-demographic characteristics**

Most of respondents who participated in this study were male (56.2%) with age <35 years (65.2%) with education level is graduated from high school (45.3%) and 53.5% were married. Most respondents work as non-government employees (53.2%). The hypertension status of the respondent mostly are pre-hypertension (59.0%). All as seen in Table 1.

**Table.1 Socio Demographic Characteristic of Subject (n=1421)**

Charac-teristic		Freq- uency	%
Sex	Male	799	56.2
	Female	622	43.8
Marriage status	Married	760	53.5
	Single	638	44.9
	Widowed	23	1.6

**Cont... Table.1 Socio Demographic Characteristic of Subject (n=1421)**

Age	≥ 35 years	494	34.8
	< 35 years	927	65.2
Education	No formal schooling	5	0.4
	Primary school completed	28	2.0
	Less than secondary school	15	1.1
	Secondary school completed	346	24.3
	Less than high school	24	1.7
	High school completed	644	45.3
	Academy	123	8.7
Occupation	College/ university completed	236	16.6
	Government employee	90	6.3
	Non-government employee	756	53.2
	Student	377	26.5
	Soldier/police	37	2.6
	Farmer	6	0.4
	Fisherman	2	0.1
	Merchant	26	1.8
	Self employed	9	0.6
	Others	118	8.3
Hypertension status	No hypertension	395	27.8
	Pre-hypertension	839	59.0
	Hypertension grade 1	166	11.7
	Hypertension grade 2	21	1.5

Result of our study showed that the respondents who donated blood is 67.9%, who had drugs abuse 0.5%, who had history of sexual intercourse with multiple partners is 54.5%, and 0.7% was male who have sex with male. While respondents who have sex with drug users is 0.4%.

There are 1.6% respondents that use permanent tattoo, and 6.1% use piercing. In addition, respondents also performed dental treatment, it is 16.1%. Respondents who had a history of surgery is 7.4%, and who get organ transplants is 0.5%. While respondents who received blood donor is 1.3%. (Table 2)

**Table.2 High Risk Behavior Related with Blood Borne Disease Transmission (n=1421)**

High Risk Behavior		Frequency	%
History of Blood Donor	Yes	965	67.9
	No	456	32.1
History of Received Blood Transfusion	None	6	0.4
	Yes	18	1.3
History of drug abuse	No	1397	98.3
	Yes	7	0.5
History of Organ Transplantation	No	1414	99.5
	Yes	7	0.5
History of Surgery	No	1316	92.6
	Yes	105	7.4
History of Dental Treatment	None	1	0.1
	No	1191	83.8
Had a permanent tattoo	Yes	229	16.1
	No	2	0.1
Had an ear/nose/body piercing	Yes	23	1.6
	No	1396	98.2
History of multiple sex partners	Yes	87	6.1
	No	1334	93.9
Had homosexual partners	Yes	775	54.5
	No	646	45.5
Had a drug users as a sex partners	Yes	4	0.7
	No	567	99.3
Had a drug users as a sex partners	Yes	2	0.4
	No	426	99.6

This study revealed that mostly respondents were male with age no more than 35, completed high school and married. They work as non-government employees with status of hypertension are pre-hypertension. If compare with the research conducted in Ghana to the blood volunteers, the results stated that most of the respondents were male 762 (94.3%) [24]. This is also in line with research from Janahi EM conducted in Bahrain

in 2000-2010 about the prevalence and risk factors of hepatitis B stated that several sociodemographic variables were significantly associated with the prevalence of hepatitis B virus infection [25]. Age was one of socio-demographic factor that related to the prevalence of hepatitis B infection. It significantly increased among the age groups 25–34 and 35–44 ( $p < 0.0001$ ) [25]. While research conducted by ministry of justice and human rights stated that 52% was graduated from senior high school and married [26]. While study conducted by Apidechkul et al in Northern Thailand reported that respondents mostly males (15,0%), nearly half (40,3%) were 30-39 years old and nearly three quarters (62,9%) were married, and most of them were employed (89,5%) [27]. Another research conducted by Peck et al reported that among HIV infected patients there are 49,0% who had prehypertension status [28]. According to Arboli et al the hypertension status among hiv infected patients related to age (adjusted hazard ratio [aHR] per 10 years: 1.34, 95% CI 1.07–1.68,  $p = 0.010$ ), BMI (aHR per 5 kg/m<sup>2</sup>: 1.45, 95% CI 1.07–1.99,  $p = 0.018$ ) [29]. From our study we know that respondents mostly have history of blood donors (67.9%), but most of them never receive blood transfusion (98,8%). Just a few of them had history of drug abuse (0.5%), had history transplantation (0.5%), and had history of surgery (7.5%). We found that 16.1% had history of dental treatment, 1.6% of them had permanent tattoo, and nearly 6.1% had ear/nose/body piercing. And we also found that nearly half of them (54.5%) had multiple sex partner, 0.7% had homosexual partners. Beside that they also had sexual intercourse with drug users but just a few (0.4%). If compare to research conducted by Awadalla et al in Egypt reported that respondent who had surgical treatment was 22.5%, who received blood transfusion was 7.5%, while who performed dental treatment was 74.6% [30,31]. This research also reported that respondent who have sexual relations was 8,5%, while who use tattoo was 31,3%, and who had drug abuse was 5.9% [31]. While study conducted by Apidechkul in Northern Thailand reported that 23.5% respondents had history of a blood transfusion, 0.8% were intravenous drug user, 29.8% tattooed, 64.5% had body piercing, and 6,5% were homosexual [27]. If compare to research conducted by Sriganayatri et al among hiv and hepatitis c co-infection reported that respondents who had blood transfusion was 20.6%, who had history of dialysis was 2.7%, who had tattoo 52.9%. The study also reported about the sexual risk factors [32]. The result showed that respondents mostly (68.5%) was

homosexual and 71.6% having sex with unprotected anal intercourse. While more than half of them (64.2%) having sex with intravenous drug user [32].

## CONCLUSIONS

There was moderate prevalence of blood borne diseases in community. There are some factors related to the transmission of blood borne diseases in the community that need to determine further.

**Conflict of Interest:** The author reports no conflicts of interest in this work.

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**Ethical Clearance:** Ethical clearance was obtained from Ethic Commission of Health Research, Faculty of Public Health UNDIP (112/EC/FKM/2017). All subjects signed informed consent to join the study.

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