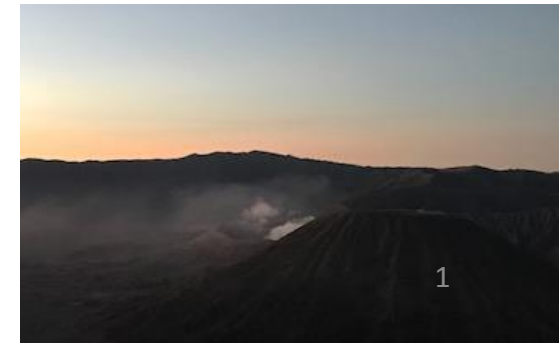




NAT IMPLEMENTATION IN INDONESIA

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Ministry of Health



OUTLINE

- BACKGROUND
- BLOOD SAFETY REGULATIONS IN INDONESIA
- STUDIES AND DATA ON BLOOD SAFETY IN INDONESIA
- IMPLEMENTATION OF NAT IN INDONESIA
- OBSTACLES & PROBLEMS IN NAT IMPLEMENTATION
- CONCLUSION

BACKGROUND

- Transfusion Transmitted Infections (TTIs) are delayed transfusion reactions that can be prevented
- Appropriate donor selection and TTIs blood screening are key strategies to increase safety of blood from TTIs
- Effort in detecting an infection during window period can improve blood safety
- The additional molecular blood screening plays important role in blood safety in Indonesia with high-endemic of hepatitis B

COUNTRY PROFILE

Indonesia is the **largest archipelago** in the world between two oceans, the Pacific and the Indian ocean, and bridges two continents, **Asia** and Australia.



- 17,000 islands
- Population 255 Million
- 34 Provinces
- 2,633 Hospitals
- 9,754 Primary Health Centers

ENSURING THE AVAILABILITY OF SAFE BLOOD



Blood Centers (BCs)
(221 RC BCs & 193 Hosp BCs)*

- Donor recruitment
- Blood collection
- Blood testing
- Blood processing
- Blood storage
- Blood distribution
- Hemovigilance system



Hospital Blood Banks (HBBs)
(432/2,633)*

- Blood Storage
- Pre-Transfusion Testing
- Blood transportation to hospital wards
- Haemovigilance System



Hospitals
(2,633)**

- Pre-Transfusion Preparation
- Rational and Clinical Use of Blood
- Haemovigilance System

**“Eligible”
Blood Donor**



**Primary Health Centre
(PHCs) (9,754)****

**Patient’s referral
system**

**Collaboration between PHC, BC & Hospital on Blood
Services through Donor Recruitment & Selection**

2016: 3,252,071 Unit of Whole Blood; 90.9 % (VNRD), 9% (Repl.Donors), 0.1% (Paid Donors)

* MoH Data of Blood Services, 2017

** MoH on Line Data of Hospitals and PHCs, 2017

CAUSES OF NOT DETECTED

ASSAY FAILURE

- Miss detection of virus variant
- Bad performance of assay

DONOR IN A DIAGNOSTIC WINDOW PERIOD (DWP)

- The length of DWP is depend on (analytical) sensitivity of an assay
- Depend on assay category (Ab, Ag, Ag-Ab, NAT)

IMPORTANCE OF VIRAL EPIDEMIOLOGY ON BLOOD DONORS POPULATION

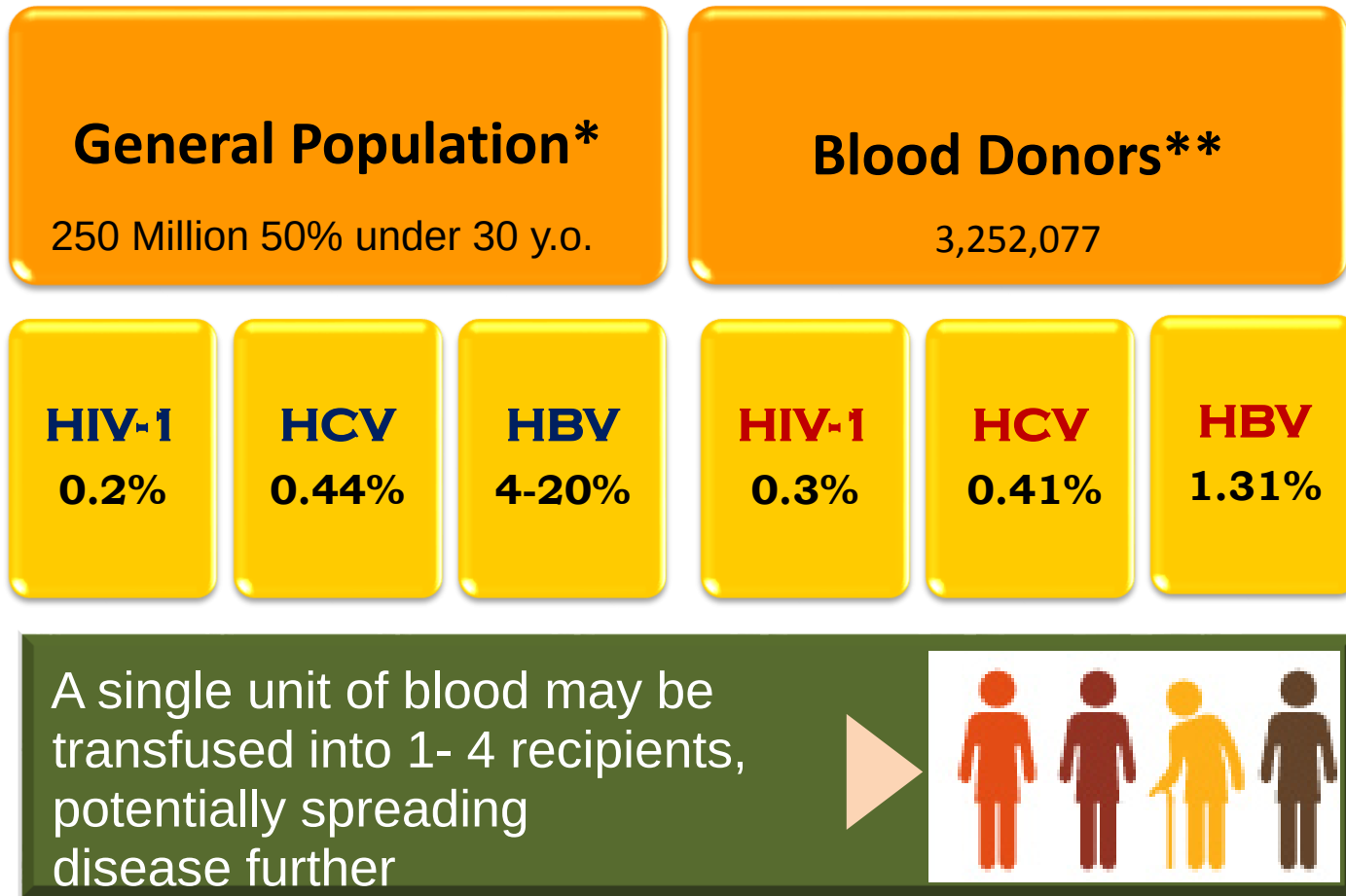
POSITIVE TTIS ON NEW DONORS

- *Prevalent (old) infections* → strong antibody avidity, usually easy to be detected by high quality assay
- *Incident (recent) infections* → weak antibody avidity, highly contributes to residual risk WP
- *Recent infection degree on new donors is considered to be 3 times higher than repeat donors*

POSITIVE TTIS ON REPEAT DONORS

- *Incident (recent) infections during interval of inter-donation*
- Previous donation might be in DWP → the shorter the interval inter-donation the higher of non detected possibility of viremia DWP donation by serology assay

Sero-prevalence of HIV-1, HCV and HBV in Indonesia



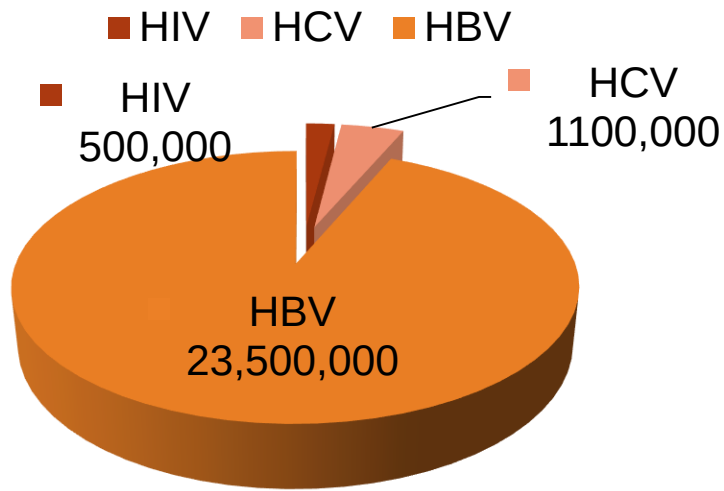
*Soedarmono and Lucinanto, Abstract and Poster, ISBT, Cancun 2012

** Blood Services Report of 2016, MoH Indonesia

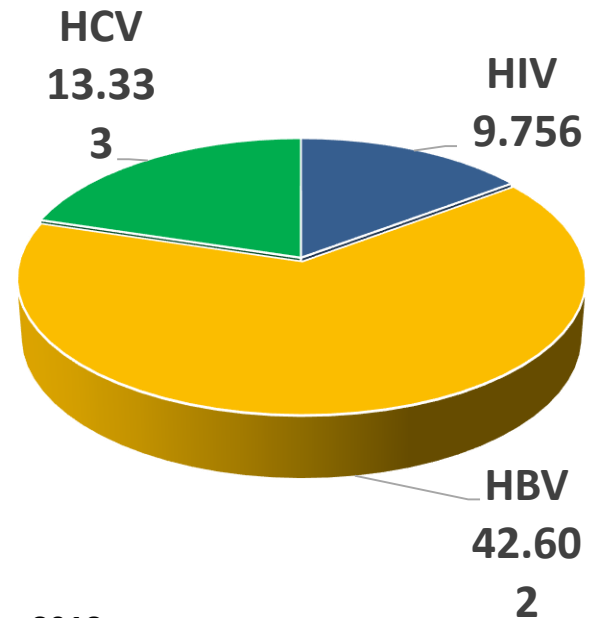
IPFA Athens May 2018

Based on 255 million population and 3.2 million donations

Indonesia Sero-prevalence in General Population*



Indonesia Sero-prevalence in Blood Donors**



*Soedarmono and Lucinanto, Abstract and Poster, ISBT, Cancun 2012

** Blood Services Report of 2016, MoH Indonesia

BLOOD SAFETY REGULATIONS IN INDONESIA

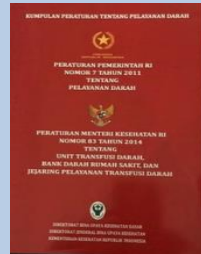


BLOOD SAFETY RELATED REGULATIONS



**Health Law
No. 36/2009**

**Government
Regulation
No. 7/2011 on
Blood Services**



**MoH Decree
No. 83/2014 on
Blood Centres,
Hospital Blood
Bank & Blood
Services
Network**



**MoH Decree
No. 91/2015
on National
Standard for
Blood Services**

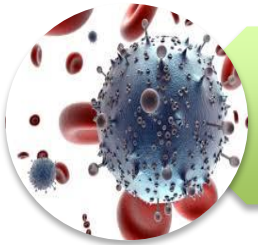
**NADFC: GMP
Guideline for Blood
Establishment, 2017**



CONTAIN OF REGULATIONS



Each blood bag should be tested for TTIs before transfusion



Blood screening is mandatory for HIV, hepatitis B, hepatitis C and syphilis and other proved endemic TTIs



IVDs used should has sensitivity of $\geq 99.5\%$ and specificity $\geq 98\%$. RDT could only be used in difficult geography and poor infrastructures places



TTIs blood screening should be done in accordance to national standard

MoH Decree No. 91/2015 on National Standard for Blood Services

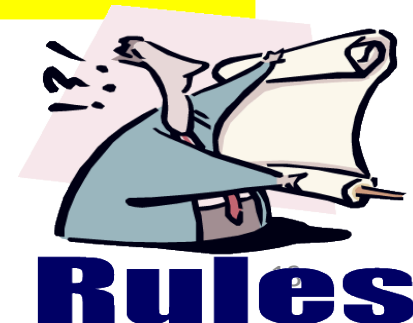
**Only non reactive
blood can be used for
transfusion**

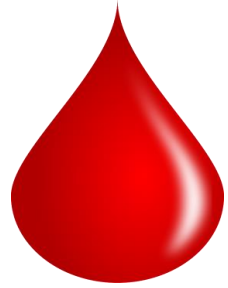
Blood screening
should be **approved
and registered** for
*HBsAg,
anti-HIV1/HIV2,
anti-HCV, Syphilis*

Additional blood
screening **CAN BE** applied
toward *HBV, HIV and
HCV* using **individual NAT**

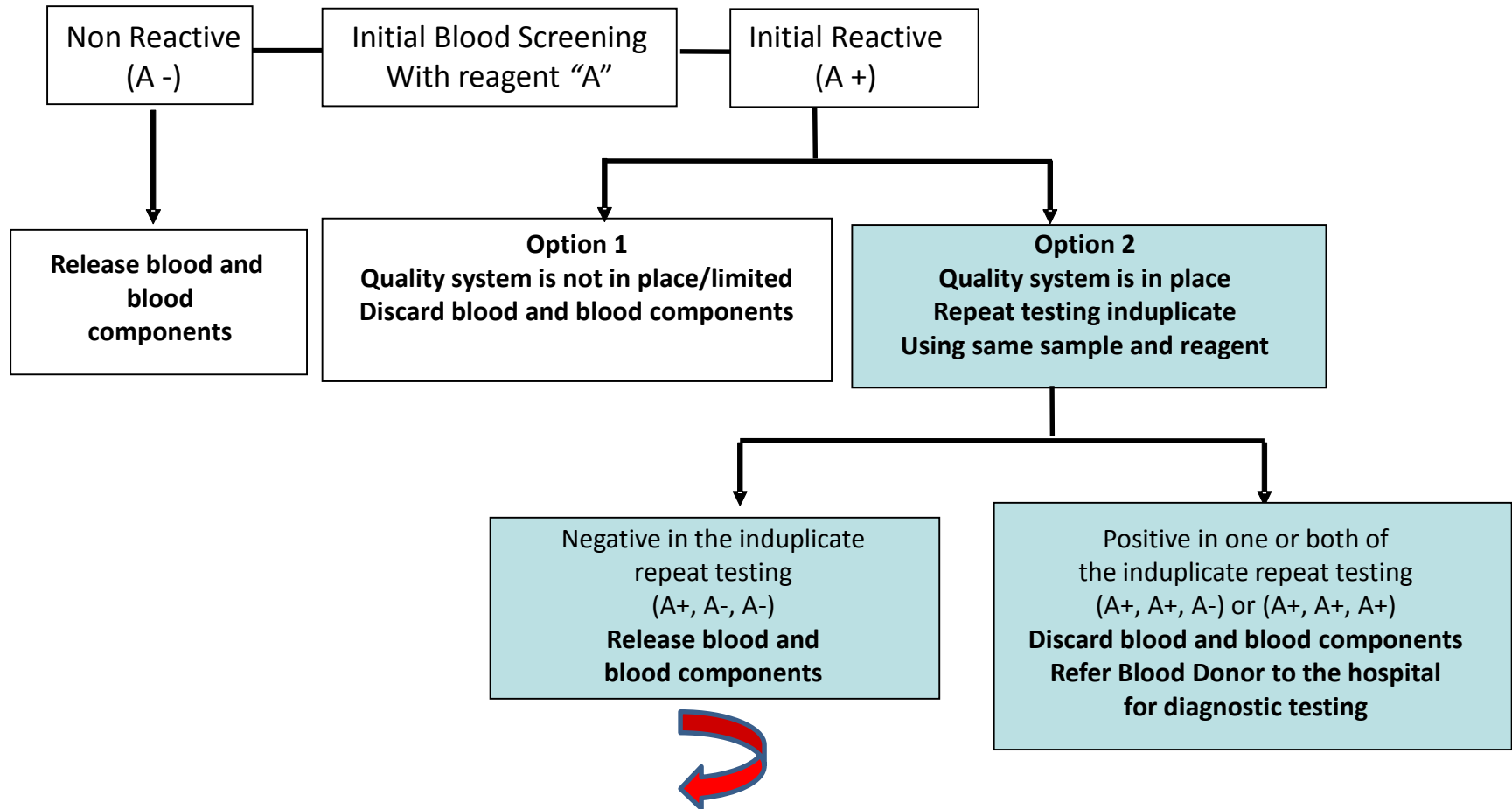
All sample should not be
diluted for example due to
anticoagulant or pooling.

Every initial reactive sample
should be retested
induplicate by similar assay





TTIs BLOOD SCREENING ALGORITHM



Repeated reactive blood should be discarded

REASON OF ADDITIONAL NAT FOR BLOOD SCREENING IN INDONESIA

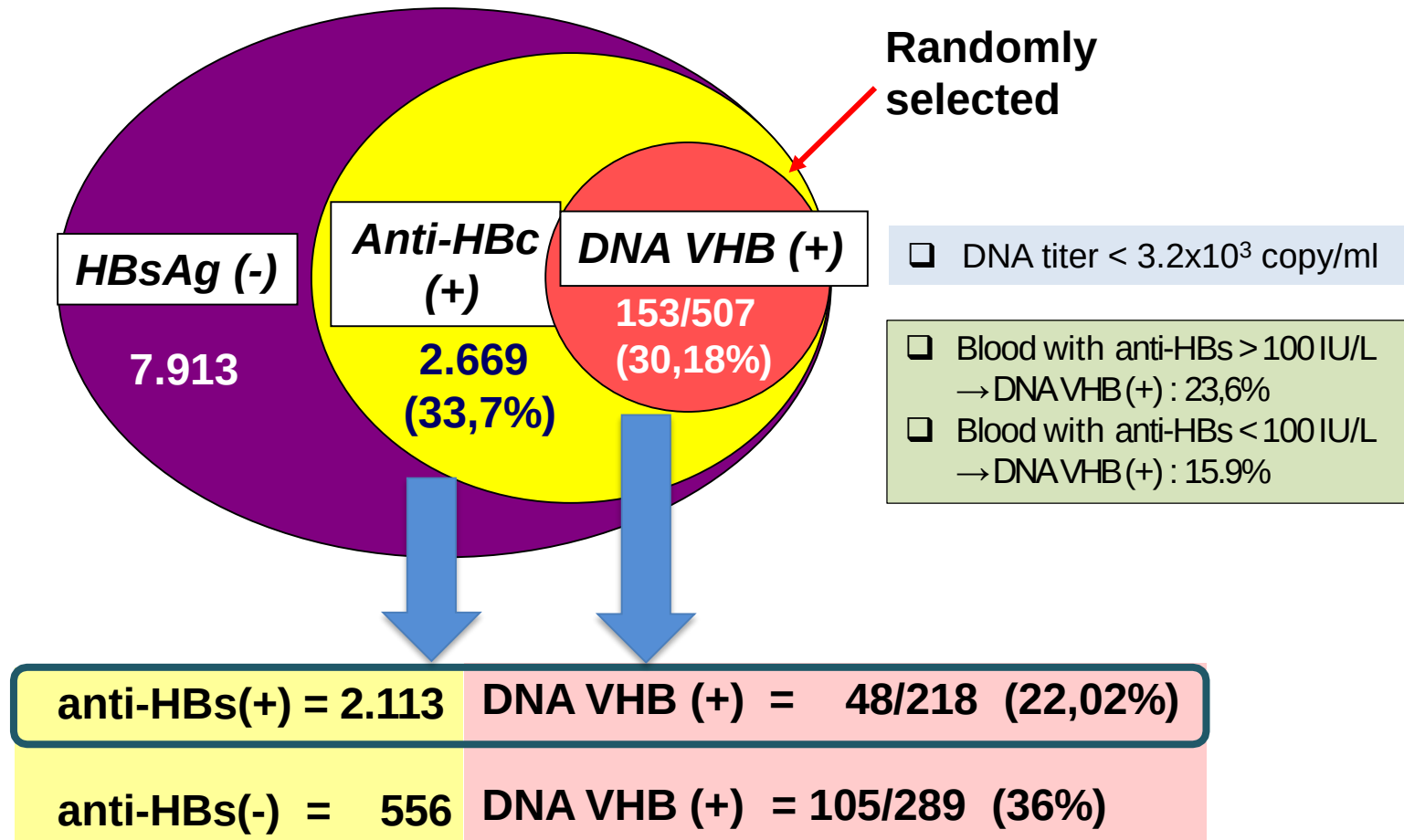
- Risk of having blood donor with HBsAg window periode is high, due to:
 - High to medium prevalence of hepatitis B among general population (7.1%)*
 - Hepatitis B vaccination started in 1987 (30 years ago) while Blood donors in Indonesia mostly in the age group of 31-50 year (56%) and 51-60 year (17%) **
- Increasing number of multi transfused patients
 - Increase number of Cancer and chronic diseases patients
 - High number of Thalassemia patients
- Health services direction toward patient safety

* National Basic Health Research, 2013

** National Data of Blood Services, 2015

STUDIES AND DATA ON BLOOD SAFETY IN INDONESIA

HBV MOLECULAR DIAGNOSTIC STUDY ON BLOOD DONORS, 2010*



DNA Detection is more effective than anti-HBc detection to increase blood safety in Indonesia
anti-HBs does not guarantee that blood free of HBV

NAT STUDY ON 3.038 BLOOD DONOR SAMPLES, 2012

Sample origin	Sampel with NAT yield and NAT discr positive	Sampel with NAT yield and NAT discr negative
Kota Depok	0	1
Kab. Bekasi	1	1
Kota Jakarta	0	1
Kota Tangerang	4	4
Total	5	7
%	0.16%	0.22%

dNAT: all 5 samples with NAT IR yields was HBV DNA (+)

dNAT: 7 samples with NAT IR was Discriminatory Negative even though NAT Repeated reactive

1 sample was occult anti-HBc positive

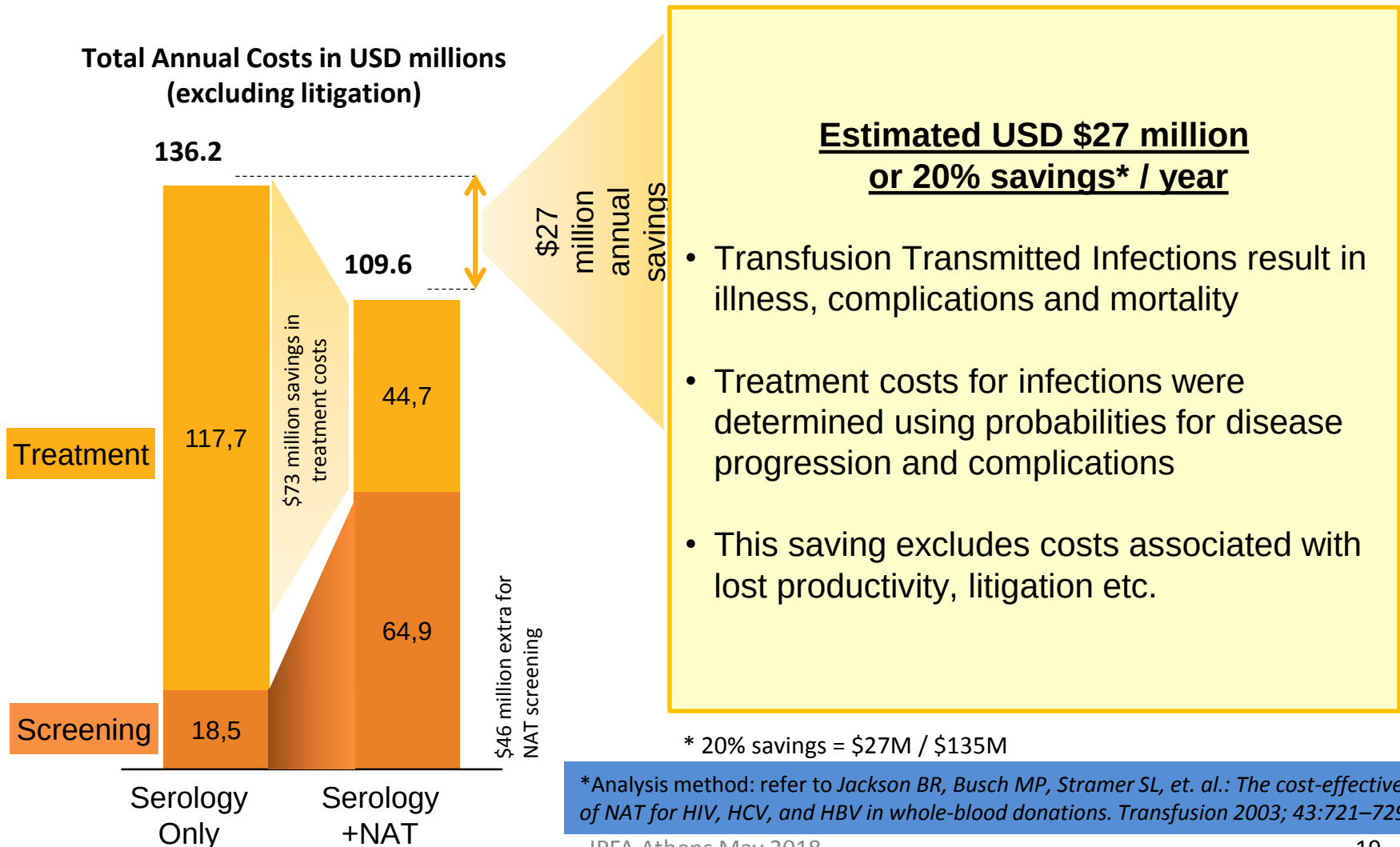
1 sample was anti-HBc & anti-HBs positive

5/3.038 DNA HBV positive → prevalence of HBV: 1/607

These samples may have very low of viral that can not be detected by dNAT

Soedarmono, ISBT KL, 2013

Health Economics Analysis in Indonesia*: NAT potential savings estimated at IDR 244 billion per year by preventing infections



Health Economics Analysis: NAT can save IDR 244 billion per year by preventing infections

Cost Category	Incremental Costs Serology + NAT	Incremental Costs Serology only
Screening costs NAT USD 22.10/donation, Serology USD 8.83/donation	USD 46,410,000	Baseline
HIV-1 Calculated treatments costs	Baseline	USD 1,739,285
Hepatitis B Calculated treatments costs	Baseline	USD 67,419,069
Hepatitis C Calculated treatments costs	Baseline	USD 3,855,310
Litigation costs	<i>Not included</i>	<i>Not included</i>
Total	USD 46,410,000	USD 73,013,665
Cost-savings with ID- NAT adoption	- USD 26,603,665 - 244 billion IDR (1 USD= 9,200 IDR)	

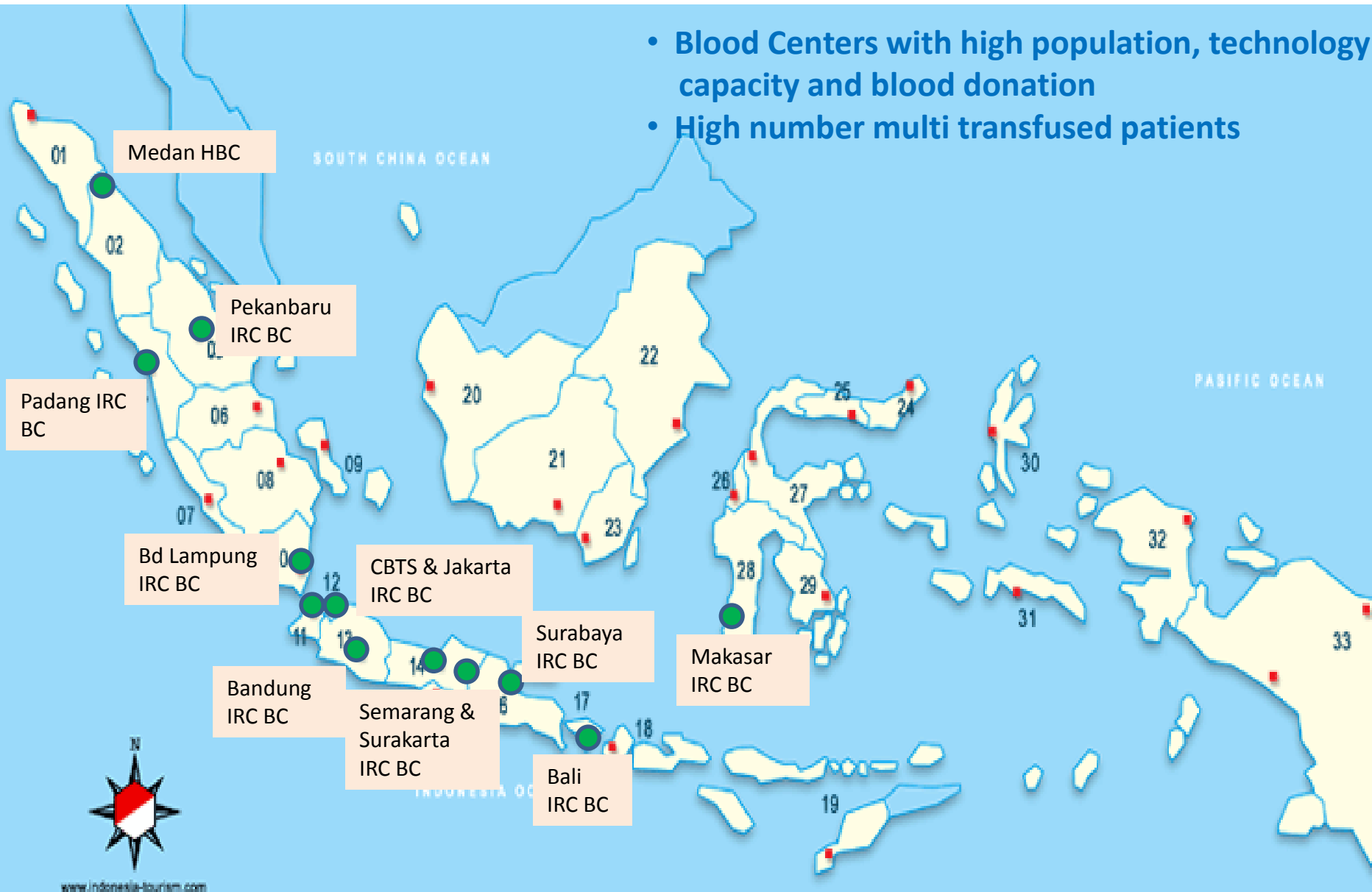
USD 74m
Cost to treat patients
infected by TTIs
preventable
by ID-NAT*

* Note: Even after screening blood with ID-NAT, a residual risk of TTIs still remains

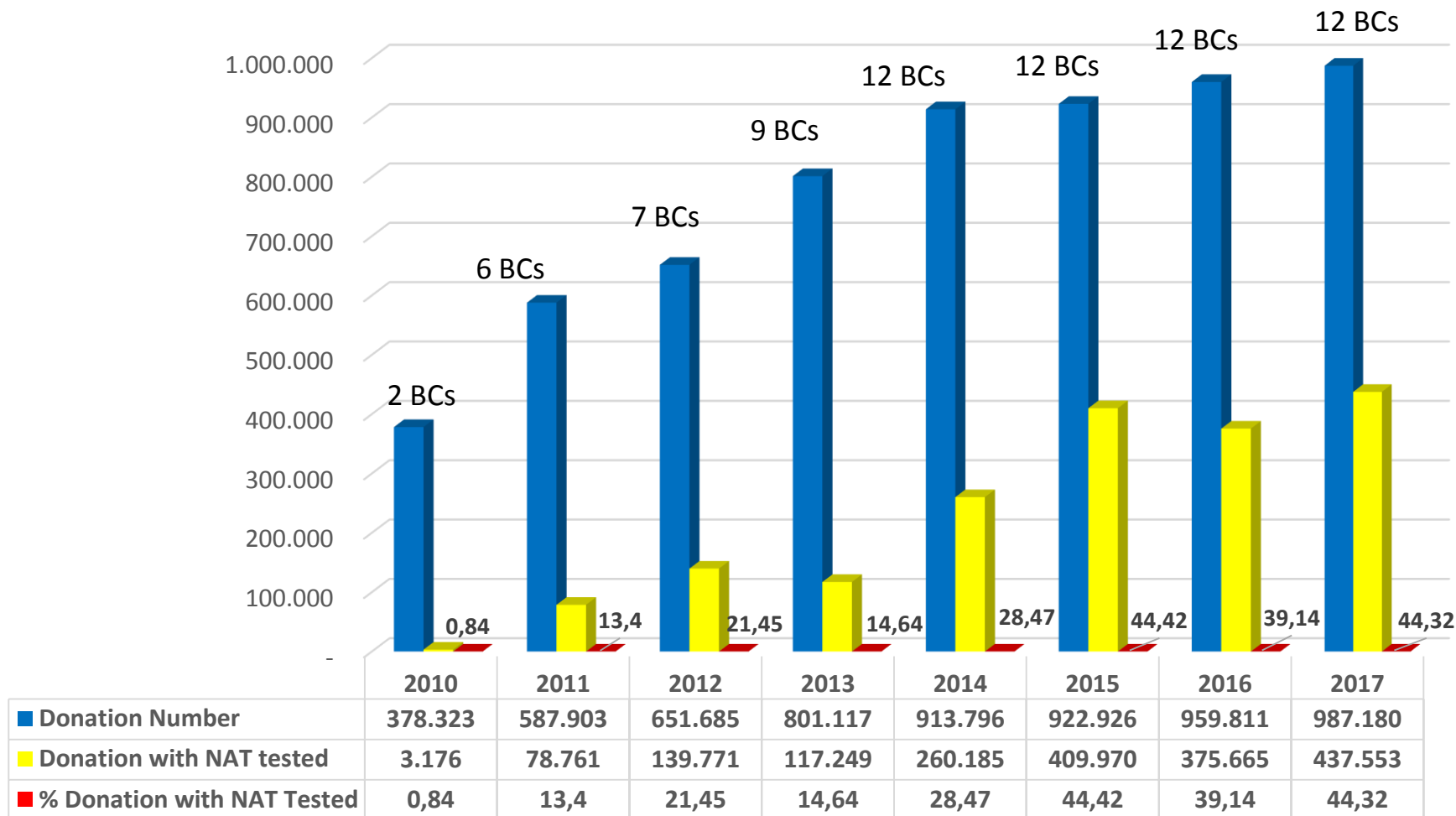
IMPLEMENTATION OF ID NAT IN INDONESIA

NAT WAS RUN IN 12 BLOOD CENTERS

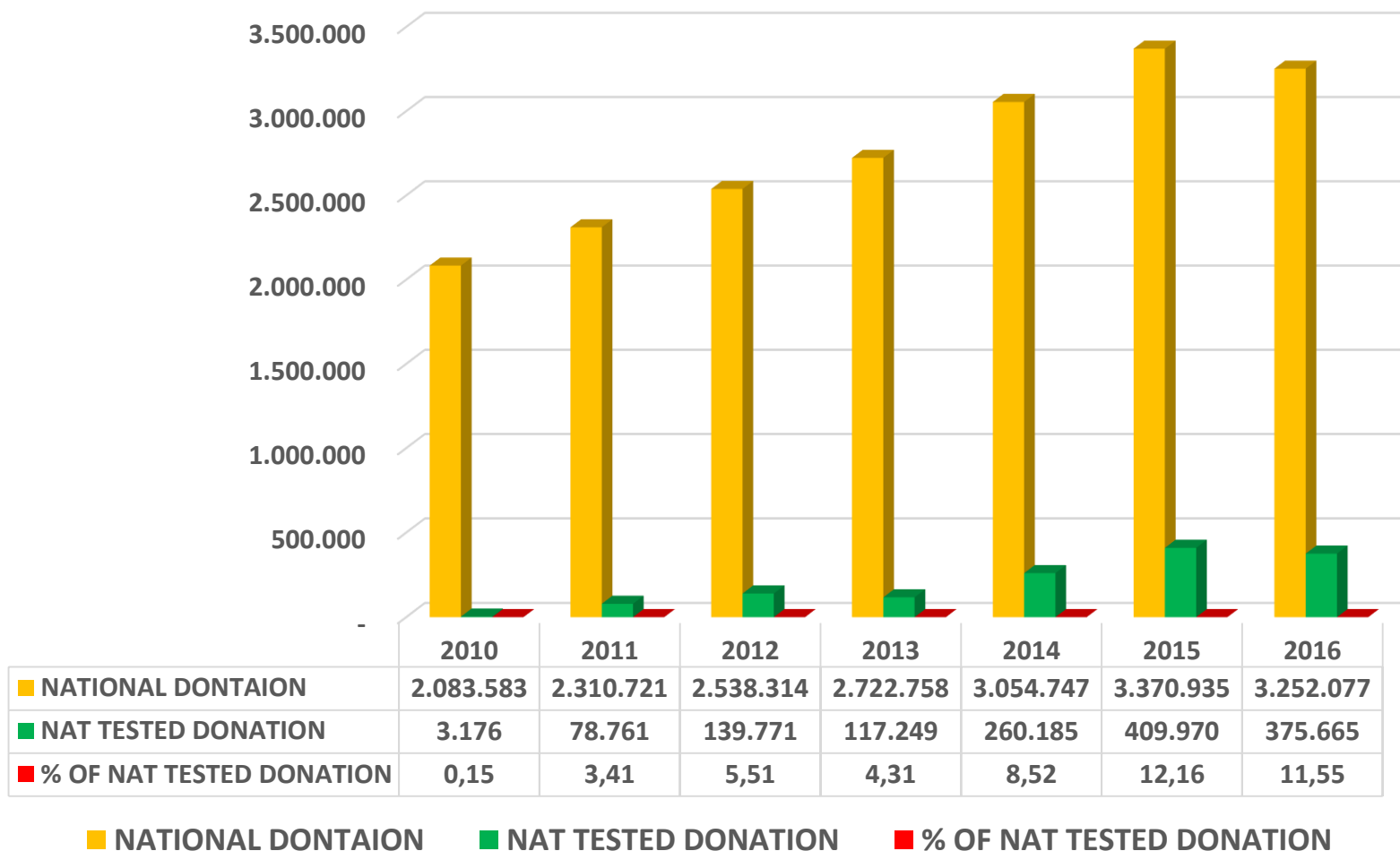
- Blood Centers with high population, technology capacity and blood donation
- High number multi transfused patients



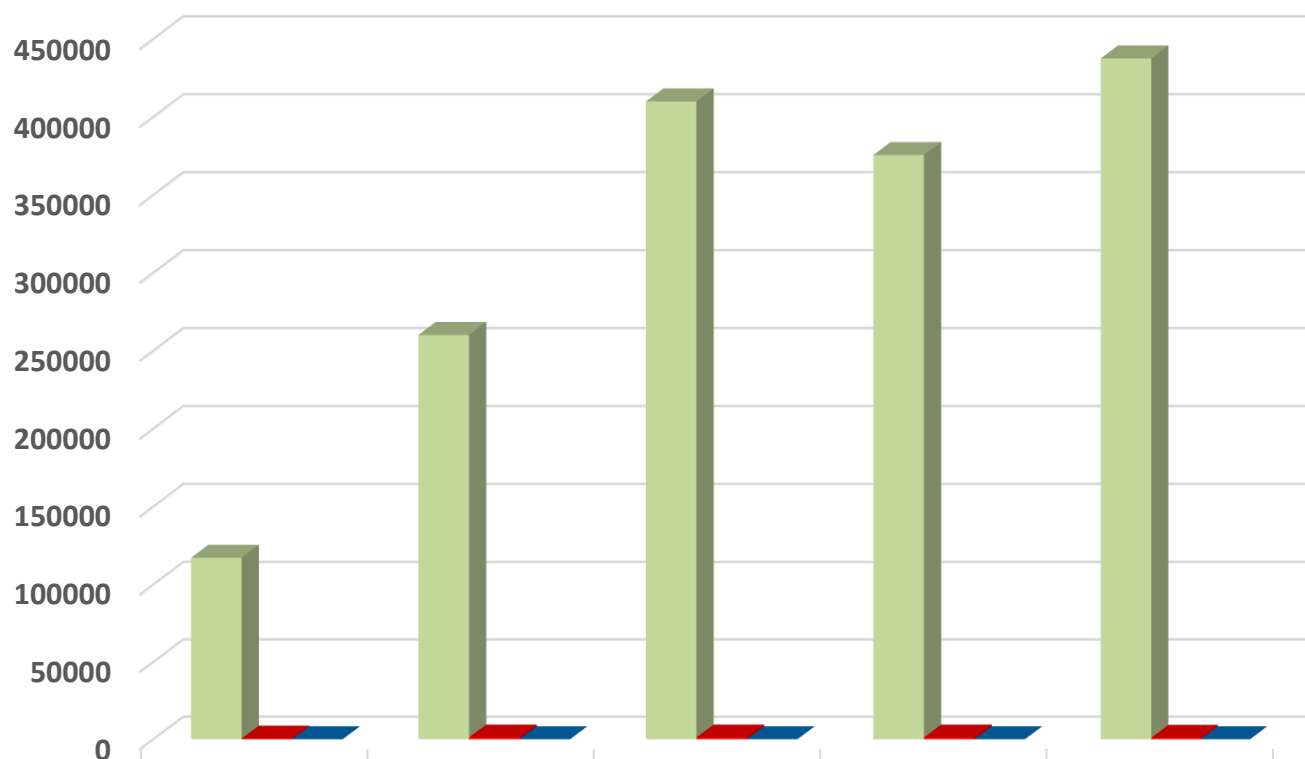
NAT in 12 BCs (2010-2017)



NAT TESTED BLOOD NATIONALLY



PERCENTAGE OF NAT YIELD (2013-2017)

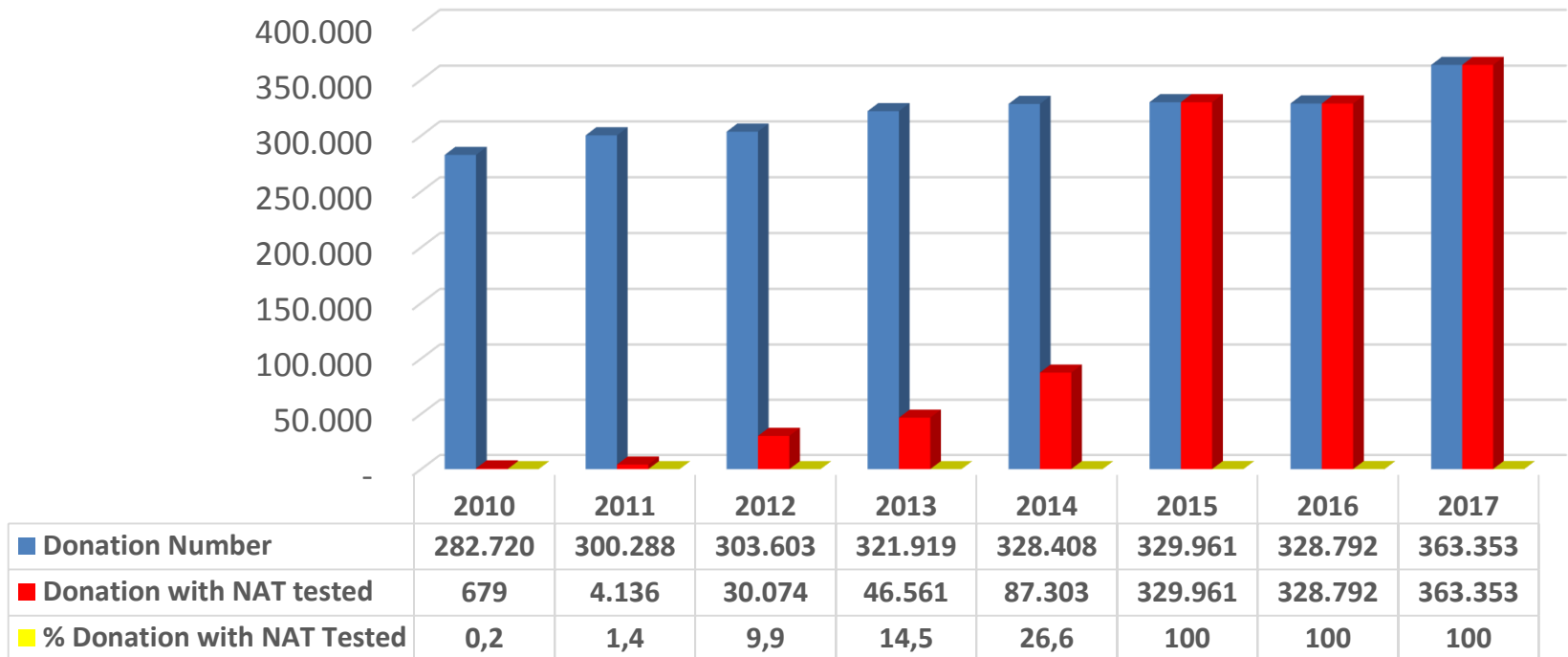


NAT TESTED SAMPLE	2013	2014	2015	2016	2017
	117249	260185	409970	375584	437553
SEROLOGY NEGATIVE NAT REACTIVE	382	1092	1108	1071	902
%	0,32	0,42	0,27	0,28	0,21

■ NAT TESTED SAMPLE
 ■ SEROLOGY NEGATIVE NAT REACTIVE
 ■ %

EXPERIENCE OF JAKARTA BC IN IMPLEMENTING 100% NAT

Strategy: Rise up the issue of HIV transmission risk through transfusion
→ get the local government subsidy of NAT reagent



NAT Reactive: 29.4% HBV; 4.6% HCV; 3.6% HIV and 56.3% dNAT negative

OBSTACLES & PROBLEMS IN NAT IMPLEMENTATION

- High percentage of negative discriminatory results
 - Degradation of DNA/RNA on samples during storage
 - Low sensitivity of dNAT
 - High mutation of HBsAg (?)
 - No budget to repeat dNAT or having anti-HBc and anti-HBs test or other tests for HIV and HCV
 - All multiplex NAT reactive blood was discarded : based on study that among the dNAT Negative was anti-HBc or and anti-HBs positive → we assume that the dNAT negative was mostly have low titer of HBV

OBSTACLES & PROBLEMS IN NAT IMPLEMENTATION

- Limited EQC of NAT been run:
 - Only CBTS and Jakarta BC have joined the NAT International EQAS
- Low coverage of NAT nationally (11.5% of donations):
 - “High cost perception”, although study proved that NAT can save IDR 244 billion per year by preventing TTIs
 - NAT cost has not been covered by national insurance system
 - Unawareness of NAT benefit among clinicians
 - Geography difficulties and infrastructure limitation to centralize the NAT

EXPECTATION

- Improve donor selection and donor retention program
- Running EQC of NAT regularly:
 - Developing the local NAT EQC samples (?)
- Having a more analytical sensitive dNAT
- NAT consolidation in the area that has no geographic & infrastructures burden
- Budget support for NAT through national insurance system
 - NAT is now prioritized to be run on new blood donation
 - NAT tested blood is prioritized for multi transfused patients

CONCLUSION

- Appropriate blood screening will improve blood safety
- Blood screening category, method and algorithm influence the safety level of blood
- Due to early detection of infected blood units, NAT helps to
 - Improve public health through early intervention of infected donors
 - Protect transfusion recipients through avoidance of future care in treatment related to TTI
 - Update the blood screening level in Indonesia to international standards
- There is a need to run NAT EQC regularly in Indonesia



THANK YOU