SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 3 | March 2024 - Peer Reviewed Journal

POST ANALYSIS IDENTIFICATION OF TRANSFUSION TRANSMISSIBLE INFECTIONS (TTI'S) AMONG SCREENED BLOOD DONOR SAMPLES FROM 2016 – 2020 IN SELECTED TERTIARY HOSPITAL IN NUEVA ECIJA

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ABSTRACT

This study examined transfusion transmissible infection risk and cases in Nueva Ecija tertiary hospitals over five years. It aimed to help medical technologists, blood banks, and blood supply institutions test TTIs carefully. This enhances testing, donor recruitment, and selection. It also reduces the chance of spreading bacteria that kill and infect transfusion patients. The study utilized descriptive and ex post facto types of research. A descriptive and qualitative content analysis was used in the study, in which data were analyzed and theories applied to the research findings as a guide for conclusions. Results revealed that males are more frequent blood donors compared to females, the age group 25–44 was said to be the dominant blood donor group, and the blood donation type that was being implemented among the respondent hospitals was the replacement policy. Furthermore, it conveyed that the greatest number of cases of transfusion-transmissible infections (TTIs) among screened blood donor samples in selected tertiary hospitals in the province of Nueva Ecija from 2016–2020 were Hepatitis B infections (HBsAg). The study further recommended that communities be educated about blood transfusion, blood donation, and the benefits of blood donor recruitment so that people will become interested and motivated in the blood donation program. The volunteer policy regarding blood donation and donor eligibility should be strictly implemented for the careful selection of blood donors, which would lower the risk of transfusing and transmitting blood products during the window period.

KEYWORDS: *Transfusion, Transmissible, Infection, Blood*

INTRODUCTION

"A life nourishing, life supporting fluid that circulates the human body" a rare term that pronounces the physiognomies of blood. Blood is essential to the human body because it plays a vital role in the normal physiology of the human system. Humans cannot live without blood because it carries oxygen and nutrients to the different organs of the body to perform their tasks and roles in order to function well and survive. The human body could not keep warm or cool off without it. Blood also serves as a transport medium of the body because it carries minerals, vitamins and enzymes that the body needs. Such components of blood are able to develop antibodies to fight the different antigens that enter the human body causing infection that will surely harms, harbors and weakens the immune system. Also, it functions to get rid and eliminate waste products. Without enough supply of blood, the human body surely weakens and dies.

Transfusion medicine affects medicine. Blood transfusions likely rescue thousands of people in need. Medical professionals execute this one-step lifesaving operation. Healthcare practices need it for patient management. Blood transfusion involves transferring blood and its products from a qualified donor to a prospective receiver. In addition, blood-borne microorganisms that cause transfusion-transmissible illnesses harm medical professionals, notably blood bank technicians.

TTIs is usually defeated by the different pathogens like viruses, fungi and bacteria. This is very alarming because these TTIs cause life threatening conditions when they are not detected early. Reference laboratories and clinical laboratories are rigorous and vigilant when it comes to testing blood donors. They use highly-equipped machines and gold standard procedures and reagents for early detection and determination of TTIs because they have a so-called window period wherein the sign and symptoms cannot be seen in the donor and the antibodies are still undetectable. Because of this period there is a possible risk of transmitting blood borne pathogens (AABB standards, 2011).

The data was gathered by the Research Institute for Tropical medicine which is the confirmatory laboratory for transfusion services and they have a five years' data from 2015-2020 and receives a referral from the different regions with a total of 5,143 blood donor samples to be subjected for confirmatory testing with a total of 943, 891, 916, 1,171 and 1,222 as per year and there are 217, 242, 303, 438 and

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456 respectively yielded positive for the serological test done. Therefore, in the five-year study there are 1,656 blood donor samples positive and there was an increasing trend when it comes to HIV.

The referrals with a total of 22,220 collected by the different blood service facilities nationwide with 9,811, 5,186, 1,822, 3,160 and 2,241 as total referrals per year there was a total of 17,264 blood units confirmed positive for Hepatitis B virus and as per year 8,790, 4,174, 1,148, 1,938 and 1,214 respectively the result of confirmed units. The results revealed that in the year 2015 has the highest confirmed blood donor units in the research laboratory (Department of Health [DOH]/ Research Institute for Tropical Medicine [RITM]/ National Voluntary Blood Services Program [NVBSP] Transfusion Transmissible Infection -National Reference Laboratory [TTI-NRL]).

A total of 8,326 samples were sent to the national reference Laboratory for the confirmatory for Hepatitis C virus and the statistics of 1,993, 1,619, 1,542, 1,663 and 1,509 as per year and 1,863 found to be positive for the specific TTIs with a total of 379, 384, 361, 348 and 391, respectively as the total of confirmed blood units for HCV. As their result 2015 concluded that this will be the year that hepatitis C was more prevalent case among blood donor samples as for their referrals (Department of Health [DOH]/ Research Institute for Tropical Medicine [RITM]/ National Voluntary Blood Services Program [NVBSP] Transfusion Transmissible Infection – National Reference Laboratory [TTI-NRL]).

Syphilis was considered as one of the TTIs and NRLs that receive a total referral of 3,083 units to be tested for confirmatory and there were 1,225 confirmed positive by NRL with a total of 1,492, 1,160, 431, 0, 0 and positive 497, 512, 216, 0, 0 as per year respectively. As the result 2011 proved that the highest number of confirmed positive for the referral (Department of Health [DOH]/ Research Institute for Tropical Medicine [RITM]/ National Voluntary Blood Services Program [NVBSP] Transfusion Transmissible Infection – National Reference Laboratory [TTI-NRL]).

This study examined transfusion transmissible infection risk and cases in Nueva Ecija tertiary hospitals over five years. This study showed transfusion TTI trends. It helps medical technologists, blood banks, and blood supply institutions test TTIs carefully. This enhances testing, donor recruitment, and selection. It also reduces the chance of spreading bacteria that kill and infect transfusion patients.

Statement of the Problem

The study aimed to analyze and identify the cases of transfusion transmissible infections among screened blood donor samples from 2015-2020 in selected tertiary hospitals in the province of Nueva Ecija.

Specifically, it seeks to answer the following questions:

1. What is the profile of the screened blood samples in terms of:
   1.1. Gender of the donor;
   1.2. Age group of the donors; and
   1.3. Blood donation types
2. Is there a significant difference in the number of blood samples with cases of TTIs screened based on the profile of the blood donors?
3. What are the most cases of TTIs found in the different years based on the results of the blood samples tested?

Hypotheses of the Study

For the purpose of the study, the following hypotheses were pursued.

Ho_1: There is no significant difference in the number of blood samples screened from 2015 – 2020 based on their profile of the blood donors.

Scope and Limitations of the Study

The study focused on identifying and determining the cases of possible transfusion transmissible infections among screened blood donor samples in four selected tertiary hospitals in the province of Nueva Ecija. It covered the year 2015 to 2020 during which period blood donors were properly documented in selected blood bank sections of known tertiary clinical laboratories with more than a thousand of screened blood donor samples per year. The study included five screening tests, namely: The Human Immunodeficiency Virus (HIV); Hepatitis B Surface Antigen (HBsAg); Hepatitis C Virus (HCV); Malaria and Rapid Plasma Reagin (RPR) for the determination of Syphilis.

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The above-mentioned serological tests were used as their presumptive and screening test in order to test the enhanced electrochemiluminescence, enzyme linked immunosorbent assay, immunochromatography and Treponema pallidum hemagglutination as their guiding principle in performing the procedures among selected tertiary hospitals in Nueva Ecija.

Research Design
This study utilized the descriptive and ex-post facto type of research where identification of TTIs is determined from 2011-2015 in selected tertiary hospitals in Nueva Ecija. A descriptive and qualitative content analysis research method was used in the study in which data were analyzed and theories applied in the research findings as a guide for conclusions.

The content analysis research is now widely used by health care researches especially in health studies. (Hsieh and Shannon, 2005).

Another method used in the study was the ex-post facto type of research method to test the hypotheses about the cause and effect in situations where it was unethical to manipulate or control the dependent variables (Cohen, Mannion & Morrison, 2007). This research design was used in the study to identify the retrieved data of the donors who were previously screened for the five serological infectious diseases. Furthermore, the study investigated and determined the cases of infection retrospectively for the past five years.

Research Instrument
The researcher utilized a blood donor screening form and declaration form given and validated by the Department of Health or set by the hospital facility. The flow of the questionnaire was drawn out based on the mandated donor form of the Department of Health Region III. The questionnaire included items on the profile of respondents such as: a) gender; b) the age group of the donors; and c) blood donation type. It also included the other demographic profile like the weight, address, phone number and other information of a prospected blood donor as medical history, informed consent, medical examination and laboratory examination done by the medical technologist. The donor screening forms used were validated by the Department of Health, Region III in collaboration with the National Voluntary Blood Services Program and the different blood service facilities and hospital blood blanks in the Central Luzon.

Data Gathering Procedure
For the researcher to carried out the task of data retrieval, a set of guidelines was formulated in order to consider the veracity of the policies and standard of the different blood bank facilities.

Ethical Consideration
Guided by the principle of Institutional Research Ethics Board, the researcher sought the approval and endorsement of the University Research Ethics Board as recognized by the Commission on Higher Education (CHED) involving humans as respondents and the gathering of the secondary data by the different and selected tertiary hospitals in Nueva Ecija. The researcher also conducted the good laboratory practice wherein they abide by the rules in conducting research as set by the Food and Drug Administration.

The researcher greatly observed the high quality and ethical consideration of medical confidentiality as the guiding principle since the beginning up to the end of the study. The researcher gathered only the secondary data provided by the hospital's medical confidentiality that dictated the protection of the data. The aim of the researcher was to identify the highest cases of transfusion transmissible infection among screened blood donor samples from 2011-2015 from selected tertiary hospitals in Nueva Ecija that could be used as a reference index for the strict compliance of the standard operating procedures set by the lead agencies such as the Department of Health (DOH), National Voluntary Blood Services Program (NVBSP) and the National Reference Laboratories (NRL).

Anonymity was one thing the researcher valued due to any particular matter. Any given data that point to the identity of the subjects of the study was strongly observed and all the data gathered did not indicate the name of the hospitals.

Statistical Treatment
The researcher used the following statistical treatments in analyzing, tabulating and organizing data for the presentation of outcomes. Specifically, the study used frequency, weighted mean, and Chi – square.

Frequency. It was used in the study to tabulate the number of donors per hospital.

Weighted mean. It serves to represent the gathered data as a percentage of total relevancy and measure general response to the acquired data.

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Chi-Square. It was used to test the significant difference and relationship of variables in the study.

RESULTS AND DISCUSSIONS

This chapter presents the results of the study as well as analysis and interpretation of data.

1. What are the screened blood samples in terms of?

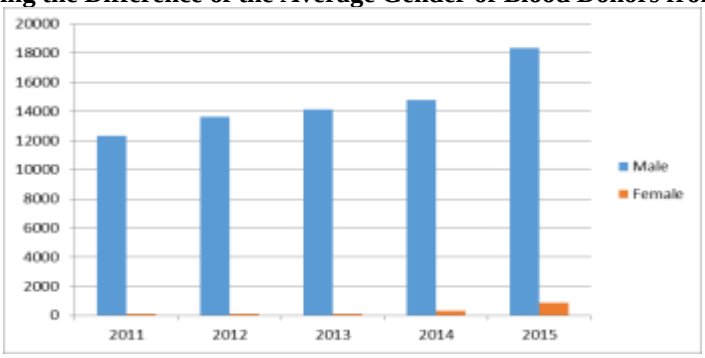
1.1. Gender

Table 1 presents that the total number of blood donors for the past five years was 74,813. The male blood donors were 73,263 (97.93%) while the female blood donors were 1,550 (2.07%). As per year 2011, there were 12,340 (99.02%) male and 121 (0.97%) female blood donors. In 2012, 13,616 (99.22%) male and 107 (0.98%); in 2013, 14,147 (99.11%) male and 126 (0.89%); in 2014, 14,802(97.85%) male and 326 (2.15%) female; and in 2015, 18,358 (95.48%) male and 870 (4.52%) female blood donors, respectively. It only denotes that males are more prevalent cases when it comes to blood donation due to the fact that they have more prominent veins, their hemoglobin and hematocrit are much higher than females who have their regular monthly menstruation. And theoretically, males have more blood that accounts 7-8 % of the body weight unlike females who only have 5-6 % of the body weight. Based on the Association of American Blood Banks (AABB), there was a lot of things to consider if the donors are females including their physical appearance and health status.

Table 1
Summary of the Gender of Blood Donors from 2011-2015

Year	Male	Female
2011	12340	121
2012	13616	107
2013	14147	126
2014	14802	326
2015	18358	870
Total	73263	1550

Figure 1
Graph Showing the Difference of the Average Gender of Blood Donors from 2011-2015.



1.2. Age

Table 2 shows that in the year 2011, the most common blood donors were 18-24 years old but in the succeeding years from 2013-2015, ages 25-44 years old were the most prevalent cases and the most frequent ages that were qualified and healthy blood donors. The reason why 25-44 was due to the advocacy of the Department of Health and other agencies in conducting seminars focusing on better understanding of the benefits of blood donation. Individuals who were in this age were said to be more physically fit and healthy. The researcher believed that at the age of forty individual's health conditions were more consistent and well monitored.

Table 2
Summary of the Ages of Blood Donors from 2011-2015

Year	18 below	18 – 24	25 - 44	45 - 64	65 up
2011	1998	4232	3739	335	0
2012	0	0	0	0	0
2013	5	2610	6659	2676	0
2014	11	4106	9658	1349	4
2015	9	5542	11708	1969	0

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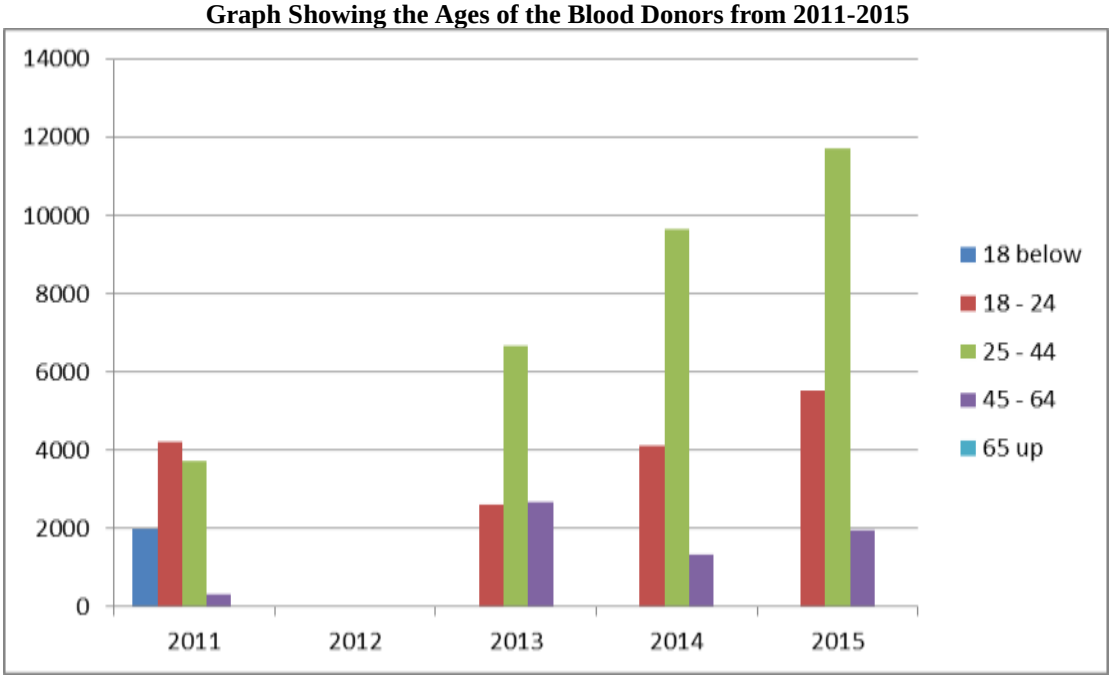
Figure 2
Graph Showing the Ages of the Blood Donors from 2011-2015



1.3 Blood Donation Type

Table 3 shows that the blood donation types were according to voluntary and replacement with an average of 74,813. The blood donors for volunteer were 24,423 (32.65%) and 50,390 (67.35%) for replacement, respectively. In the years 2012 and 2013 total of 8,128 (59.23%) and 7,714 (54.05%), respectively. These were the years that the volunteer blood donors predominated while in the years 2011, 2014 and 2015, there were of 7,552 (60.36%), 13,638 (90.15) and 17,076 (88.81%), respectively for the replacement donors and this also was predominating. Based on the policy on donor recruitment of the Department of Health (DOH) in collaboration with the National Voluntary Blood Services Program (NVBSP), it is mandated that every hospital and blood service facility should adopt the Blood Voluntarism Policy, and it is also a major concern of the Philippine National Blood Services Program to adopt the definition of voluntary non remunerated donation, which states that "donation" should be voluntarily and non- remunerated once the person gives blood and other components of blood of his/her free will and act, and therefore does not receive any payment, cash or any kind. As of today's status, the DOH mandates that all hospitals and blood service facilities should strictly abide by the policies on volunteerism as per donation type of healthy and qualified blood donors.

Table 3
Summary of the Total Number of Blood Donation Types

Year	Volunteer	Replacement
2011	4939	7552
2012	8128	5595
2013	7714	6559
2014	1490	13638
2015	2152	17076
Total	24423	50390

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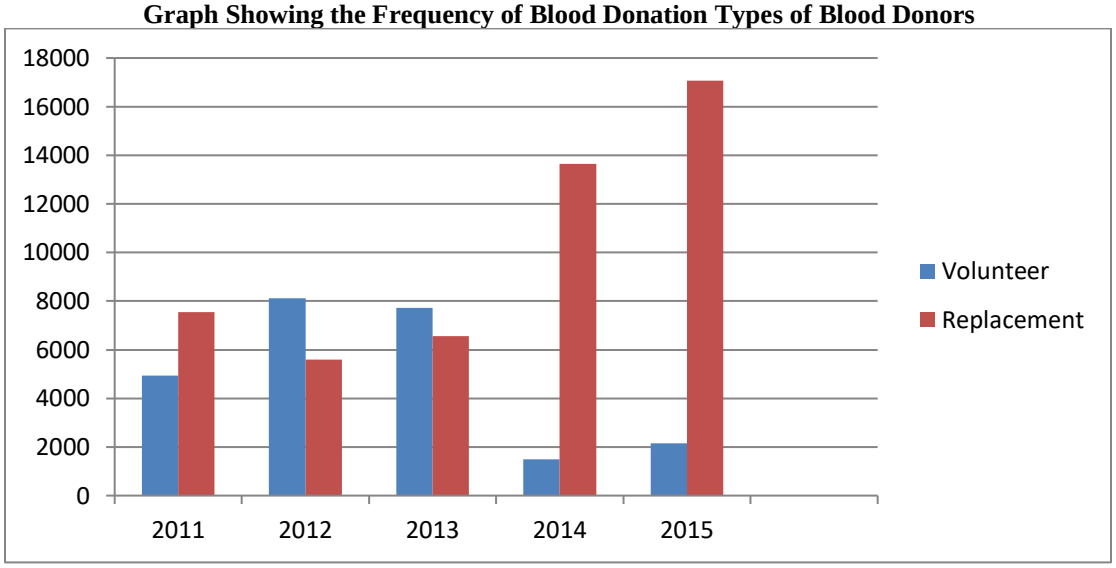
Figure 3
Graph Showing the Frequency of Blood Donation Types of Blood Donors



2. Is there a significant difference in the number of blood samples with a case of TTIs screened when the profile of blood donors is considered?

2.1. Gender

Table 4 presents the difference in the number of blood samples with cases of TTIs screened when the profile of blood donors is considered. As shown in the table, the donors on HIV, Hepatitis B (HBsAg), Hepatitis C (HCV), Syphilis (RPR) and Malaria cases were 4.6%, 82.6%, 5.2%, 7.3% and 0.3% while female donors were 3.3%, 17.7%, 11.8%, 2.1% and 0.0%, respectively. The results show that there was a significant difference since the computed p – value of 0.000 ($p < 0.000$) is less than the critical value at 0.05 level of significance. Thus, there was strong proof that the null hypothesis was rejected. With the results on the profile of the blood donors, it is shown that Hepatitis B infection with 84.5% had the most cases of Transfusion Transmissible Infections (TTIs) and male was more prevalent when it pertains to gender. Journals and researches proved that male donors (92.71%) were more predominant cases as revealed in the study from India on the prevalence and patterns of transfusion transmissible infections among blood donors in Sri Ganganagar, India.

Table 4
Result of the Chi – Square Based on the Gender of Transfusion Transmissible Infections (TTIs) of the Selected Tertiary Hospitals

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	51.193[a]	4	.000
Likelihood Ratio	71.185	4	.000
Linear-by-Linear Association	15.519	1	.000
N of Valid Cases	3043		

a. 1 cells (10.0%) have expected count less than 5. The minimum expected count is 1.10.

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.130	.000
	Cramer's V	.130	.000
N of Valid Cases		3043	

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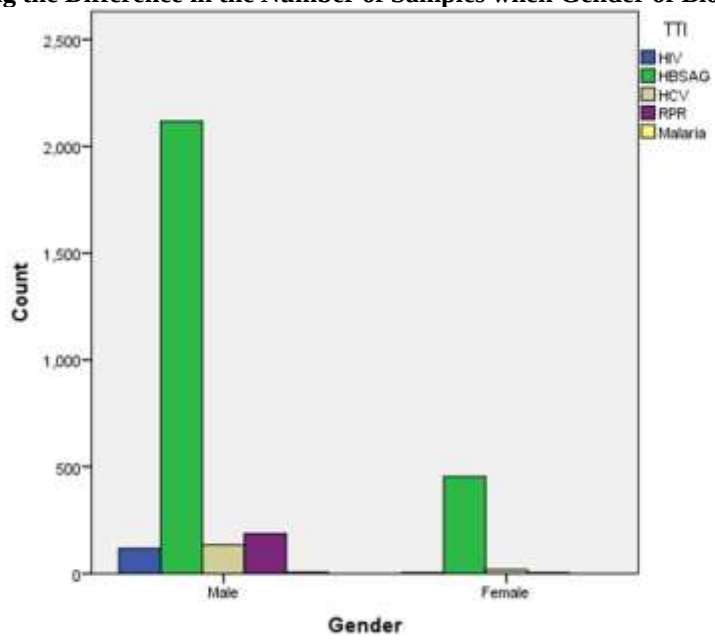
Figure 4
Graph Showing the Difference in the Number of Samples when Gender of Blood Donors is Considered



2.2. Age

Table 5 presents the difference in the number of blood samples when blood donors are grouped according to age. Based on the the table, the percentages of the age groups of reactive donors were 18-24 on HIV, and for Hepatitis B (HBsAg), Hepatitis C (HCV), Syphilis (RPR) and Malaria were 3.4%, 87.5%, 6.3%, 2.7% and 0.0%. Between the ages 25-44 were 4.7%, 82.2%, 4.6%, 8.1% and 0.3% while ages 45-64 were 0.0%, 92.2%, 2.4%, 4.9% and 0.5%, respectively. With regard to the ages 18 and below, 65 years old and up there were 0.0% to the ages group of blood donors. Since the computed p – value of 0.000 ($p < 0.000$) is less than the critical value at 0.05 level of significance, the null hypothesis was rejected. Thus, there was a strong proof that the number of blood samples differ among the age's groups. With the results on the profile based on the age group of the blood donors, it shows that Hepatitis B infection with (84.5%) was the most cases of Transfusion Transmissible Infections (TTIs) and ages 25-44 were more prone to the infection.

Table 5
Significant Difference in the Number of Blood Samples when Age of Blood Donors is Considered

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	54.348a	8	.000
Likelihood Ratio	68.885	8	.000
Linear-by-Linear Association	8.203	1	.004
N of Valid Cases	3043		

a. 3 cells (20.0%) have expected count less than 5. The minimum expected count is .47.

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.134	.000
	Cramer's V	.094	.000
N of Valid Cases		3043	

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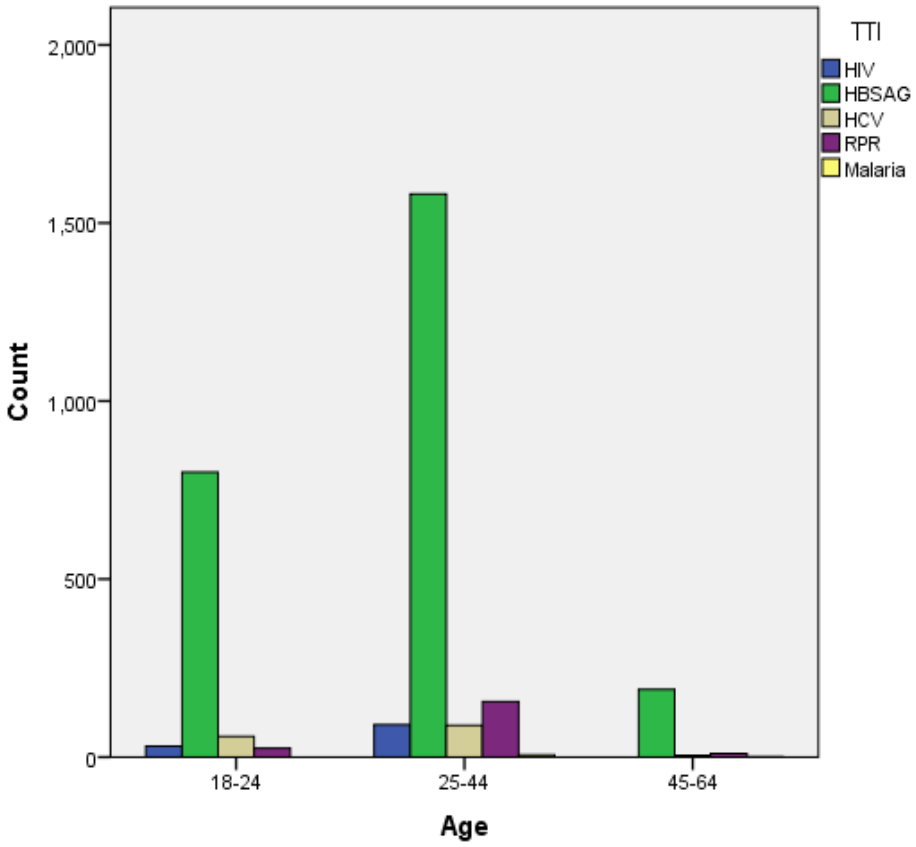

2.3. Blood Donation Type

The result of the blood donation types based on the Transfusion Transmissible Infections (TTIs). As stated in the table, the percentage of the blood donation type based on reactive donors' replacement system and was said to be constant with HIV, Hepatitis B (HBsAg), Hepatitis C (HCV), Syphilis (RPR) and Malaria with percentages of 4.0%, 84.5%, 5.0%, 6.3% and 0.2%, respectively.

3. What are the most prevalent cases of Transfusion Transmissible Infections (TTIs) found in different years based on the results of the blood samples tested?

Table 6 shows the summary of the most prevalent cases of Transfusion Related Infections classified as HIV, Hepatitis B (HBsAg), Hepatitis C (HCV), Syphilis (RPR) and Malaria. In the year 2011, as per Transfusion Transmissible Infection, Hepatitis B infection (HBsAg) with a total of 645 (18.09%) had the highest transfusion followed by Syphilis (RPR) 28 (14.66%), Hepatitis C (HCV) 16 (10.53%), HIV 6 (4.92%) and Malaria = 1 (14.29%) respectively. In the following year 2012, 2013, 2014 and 2015 were Hepatitis B (HBsAg) 107 (4.17%), 624 (24.27%), 661 (25.71) and 714 (27.77%) Hepatitis C (HCV) 16 (10.53%), 5 (3.29), 33 (21.71%) 43 (28.29%) and 55 (36.18%) for Syphilis (RPR) 28 (14.66%), 14 (7.33%), 42 (21.99%), and 80 (41.88%) and Malaria 1 (14.29%), 0 (0.00%), 6 (85.71%), 0 (0.00%) and 0 (0.00%), respectively. As presented in the table, the study was conducted for the past five years among selected tertiary hospitals in the province of Nueva Ecija and shows that Hepatitis B infections (HBsAg) with a total of 2,571 (84.49%) had the most number of cases of transfusion transmissible infection followed by Syphilis (RPR) 191 (6.28%), Hepatitis C (HCV) 152 (5.00%), HIV 122 (4.00%) and Malaria 7 (0.23%) having the least number of cases among transfusion related diseases. To further support the claim of the study, the study on the prevalence of transfusion transmitted infections in voluntary and replacement donors conducted by fernandes, D'souza and P. souza, (2010), yields that Hepatitis B infection (HBsAg) had the highest number of cases followed by Syphilis (RPR), HIV, Hepatitis C (HCV) and malaria and mostly male replacement donors were prevalent. The same study was conducted by Okocha, Aneke, Ezeh, Ibeh, Nwosu, Okorie and Onah (2015) in Nigeria.

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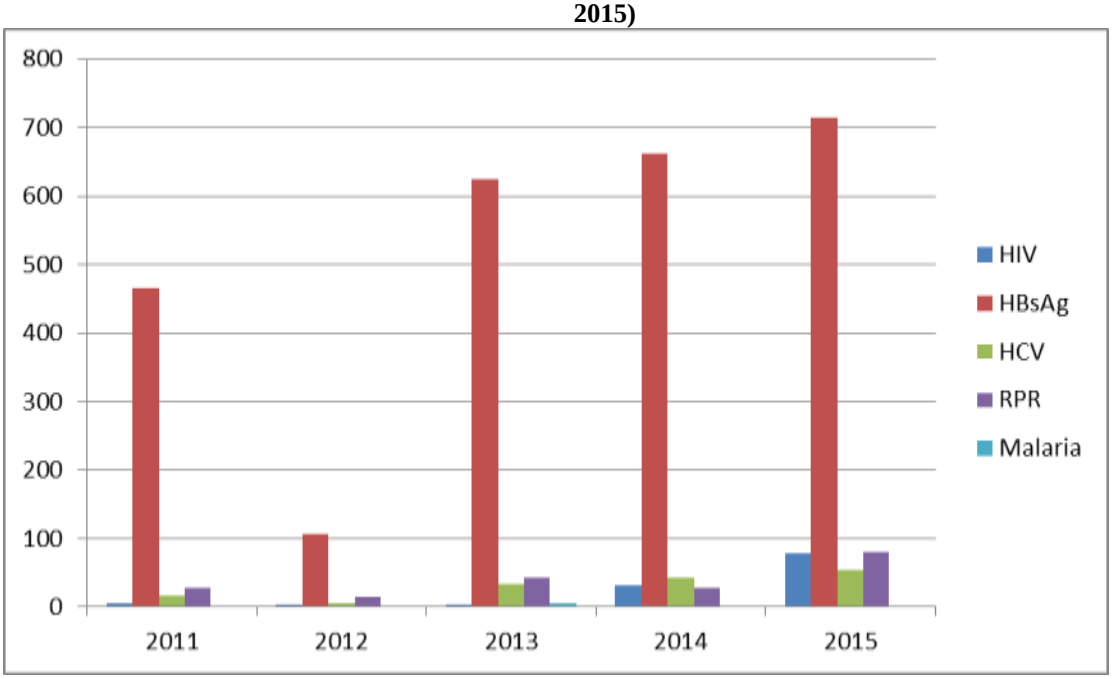
The Research Institute for Tropical Medicine as reference laboratory for infectious diseases received blood samples to be confirmed and Hepatitis B infection was the highest cases of Transfusion related infections.

Table 6
Summary of Reactive Blood Donors Causing Transfusion Transmissible Infections for the Past Five Years (2011-2015)

Year	HIV	HBsAg (Hepatitis B)	HCV (Hepatits C)	RPR (Syphilis)	Malaria
2011	6 (4.92%)	465 (18.09%)	16 (10.53%)	28 (14.66%)	1 (14.29%)
2012	3 (2.46%)	107 (4.17%)	5 (3.29%)	14 (7.33%)	0 (0.00%)
2013	3 (2.46%)	624 (24.27%)	33 (21.71%)	42 (21.99%)	6 (85.71%)
2014	32 (26.33%)	661 (25.71%)	43 (28.29%)	27 (14.14%)	0 (0.00%)
2015	78 (63.93%)	714 (27.77%)	55 (36.18%)	80 (41.88%)	0 (0.00%)
Total	**122**	**2,571**	**152**	**191**	**7**

Figure 6
Graph Showing Reactive Blood Donors Causing Transfusion Transmissible Infection for the Past Five Years (2011-2015)



CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based on the results of the study, the researcher concluded that males are more frequent blood donors compared to females, the age group 25-44 is said to be the dominant blood donor group, and the blood donation type that is being implemented among the respondent hospitals is the replacement policy

There is a significant difference in the number of blood samples when donors are grouped according to gender. The greatest number of cases of TTIs among the respondents are hepatitis B infections (HBsAg). Also, Hepatitis B infection is a disease common among males. There is also a significant difference in the number of blood types when donors are grouped according to age.

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Based on the result of the study the greatest number of cases of Transfusion Transmissible Infections (TTIs) among screened blood donor samples in selected tertiary hospitals in the province of Nueva Ecija form 2011-2015 is Hepatitis B infections (HBsAg).

Recommendations

Based on the findings of the study, the researcher would like to recommend the following:

1. Communities should be educated about blood transfusion, blood donation and benefit of blood donor recruitment so that people would become interested and motivated in blood donation program.
2. The Volunteerism policy regarding blood donation and donor eligibility should be strictly implemented for careful selection of blood donors that would lower the risk of transfusing and transmitting blood products during window period.
3. Gold standard in screening test like Nucleic Acid Testing (NAT) should be used to decrease the risk of transmitting infection.
4. Quality control should strictly implement specially the standard operating procedures, so that all untoward events during transfusion could be investigated and recorded.
5. Blood networking system should be started for the centralization of blood and other blood products in the province.

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SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 3 | March 2024 - Peer Reviewed Journal

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