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Assessing the Current Standing of Hamad Medical Corporation Blood Donor Center in Qatar and Developing a Forecast Model For the Blood Stock Needs During the 2022 World Cup Event

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Abstract

In 2022, Qatar will witness a historical event by hosting the World Cup. Qatar is expecting around 1.3 million football fans to visit Doha during this event, which requires high level of preparedness and readiness in different sectors including health care [1].

Among different sub-sections of health, the blood bank and the Blood Donor Center will have a major role in this event especially in case of unforeseen incidences that might happen during this event [2].

The blood bank should have adequate blood stocks and should stay alerted to any risk that could occur in case of any emergency [3].

A proper assessment of the current blood resource availability and a prediction of future blood needs helps in overcoming any obstacle that could be faced during the event.

Objectives

Highlight the Blood donation status and demands in the HMC-Blood Donor Center (BDC) over the six years.

Develop a forecast model that predicts the number of blood donors in the next four years as a method to evaluate the readiness of the Blood Donor facility to host the world cup event.

Assess the current standing of the BDC and explore the potential challenges that could be faced when meeting the benchmark of donation.

Methodology

The study has been conducted in the BDC-Department of Transfusion Medicine at Hamad General hospital.
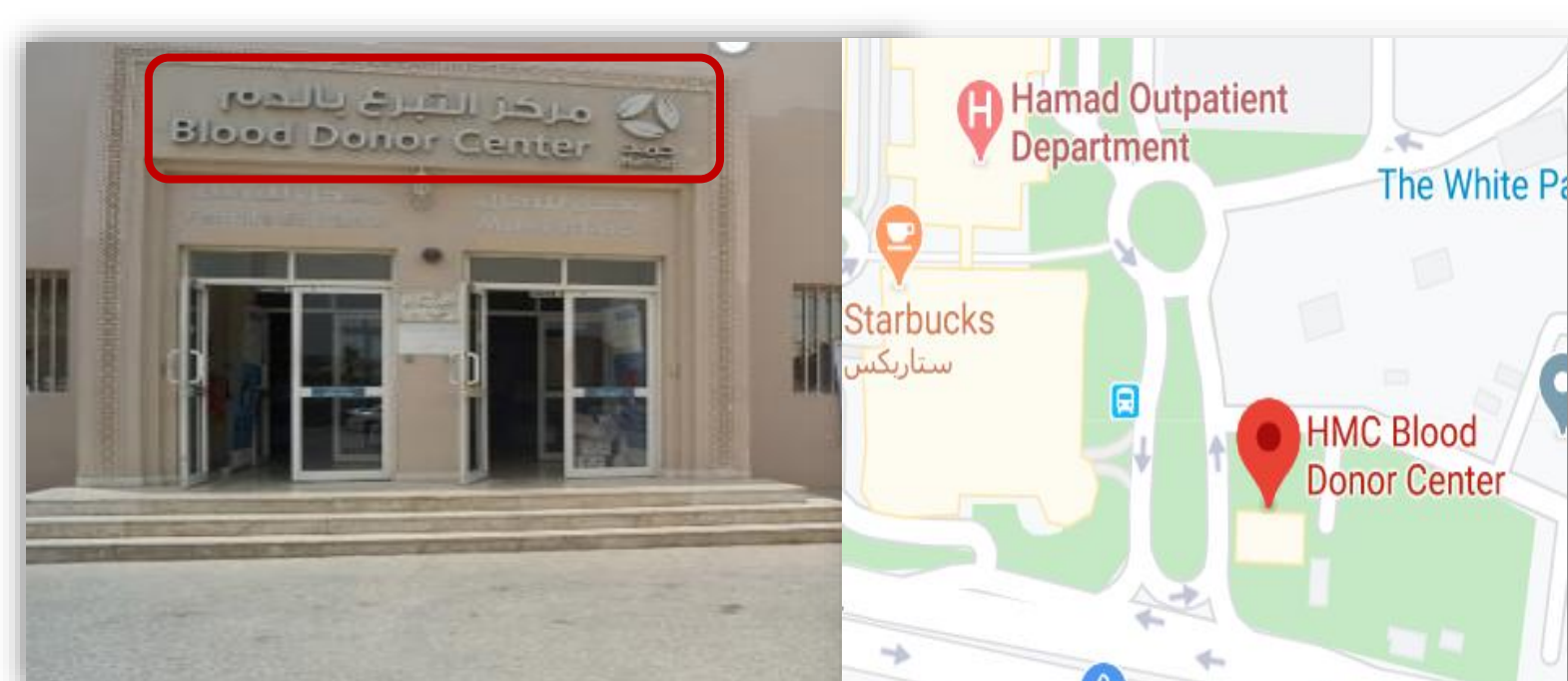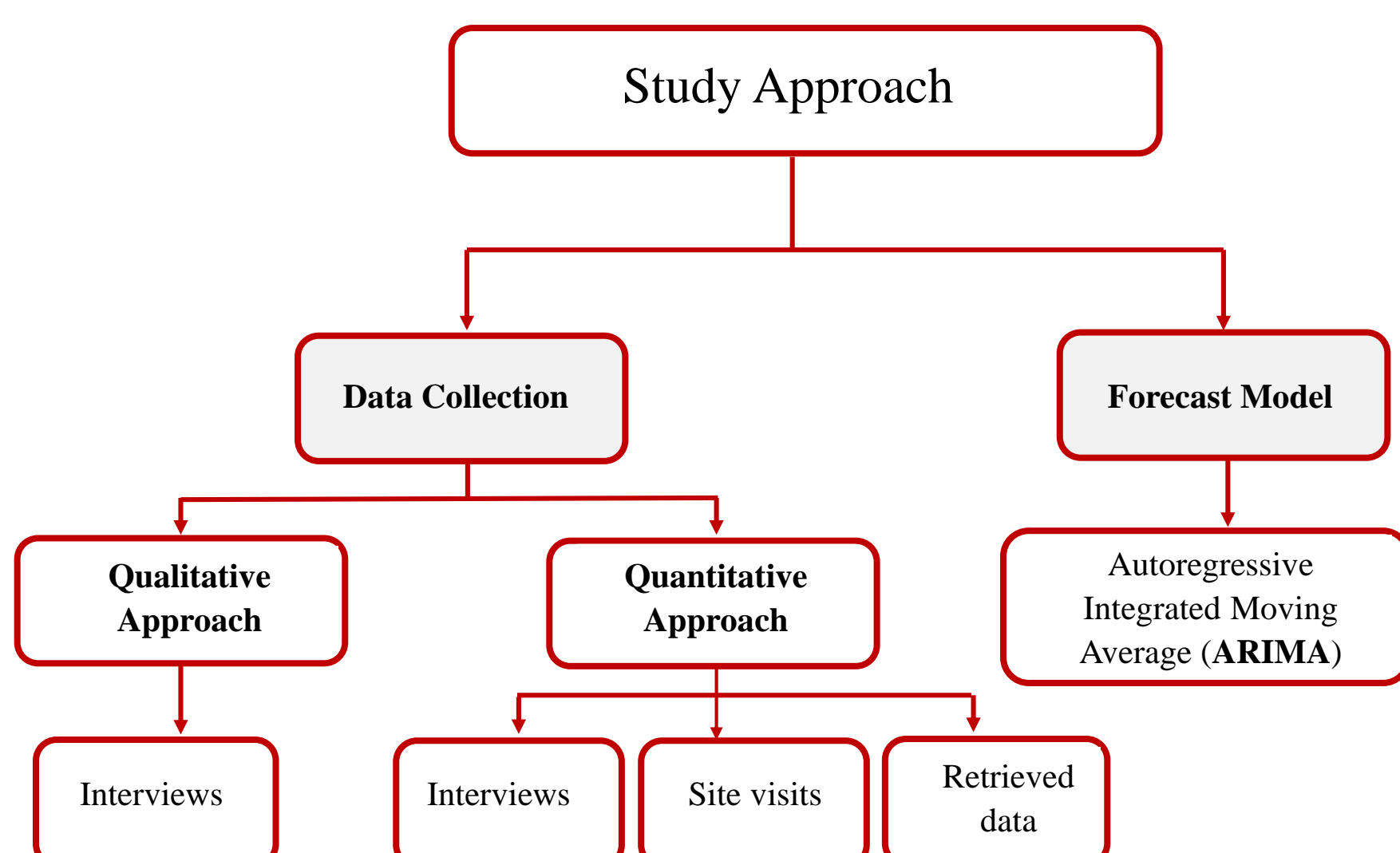
Results

1. Blood donation status and demands at HMC-BDC
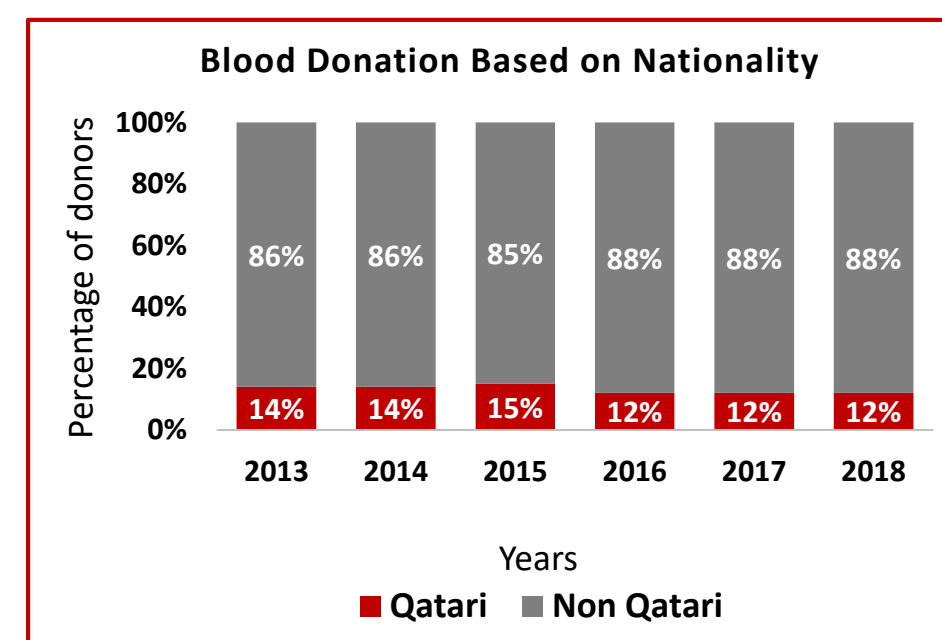
1 Eligible donors

Figure 1: Percentage of registered Qatari versus Non-Qatari donors. The figure shows the distribution of blood donation based on nationality in the HMC-BDC over a six years period ranging from 2013-2018. ■ Represents Qatari donors and represents non Qatari donors.
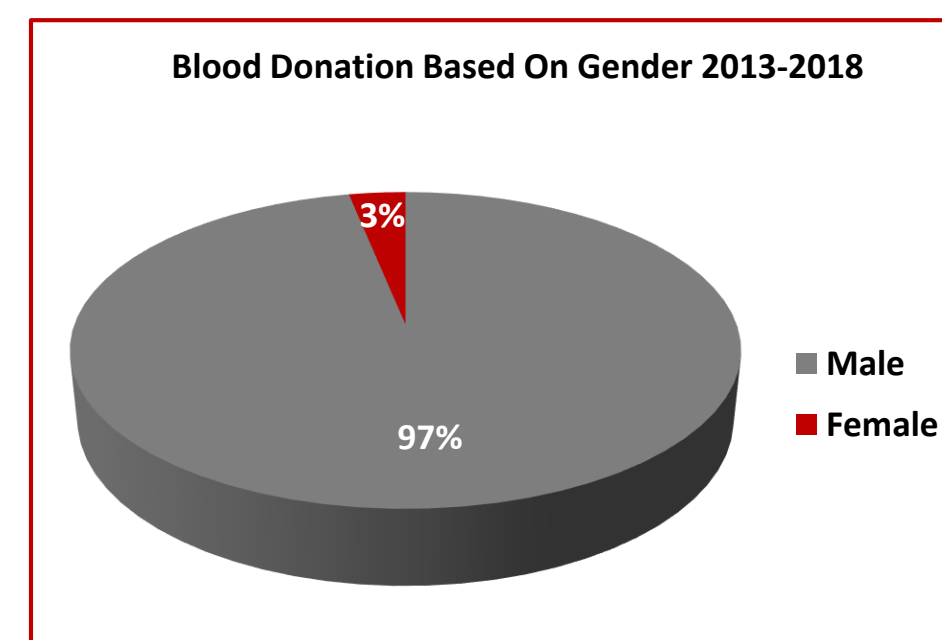
Figure 2: Percentage of male donors versus female donors registered in HMC-BDC over a six years period ranging from 2013-2018. ■ Represents the average percentage of male donors and ■ represents the average percentage of female donors.
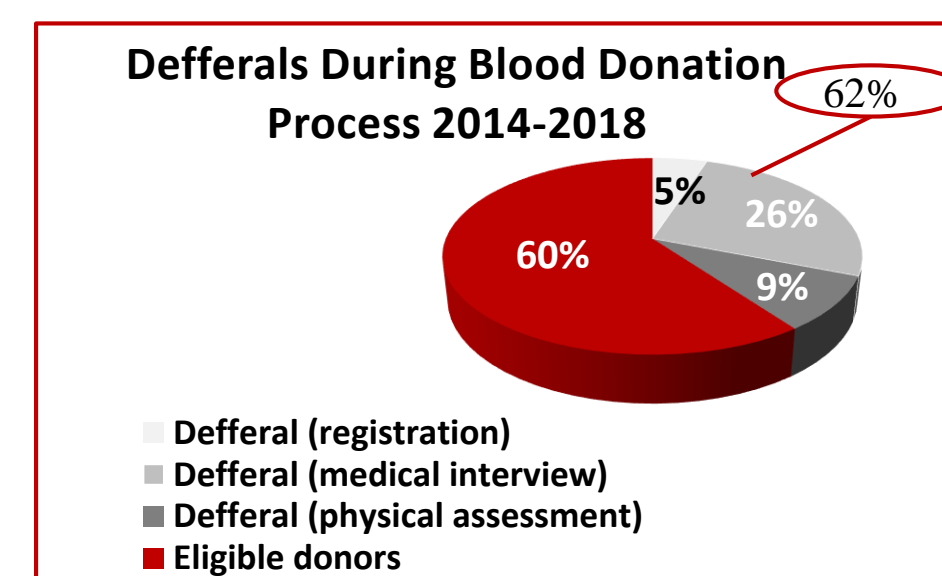
2 Rejected donors

Figure 3: Percentage of deferred donors versus eligible donors in blood donation process. ■ Indicates the eligible donors (60%), ■ indicates deferral due to physical assessments, ■ indicates deferral due to medical interview (26%) and indicates deferral due to registration step (5%). □ Indicates deferral due to malaria criteria.
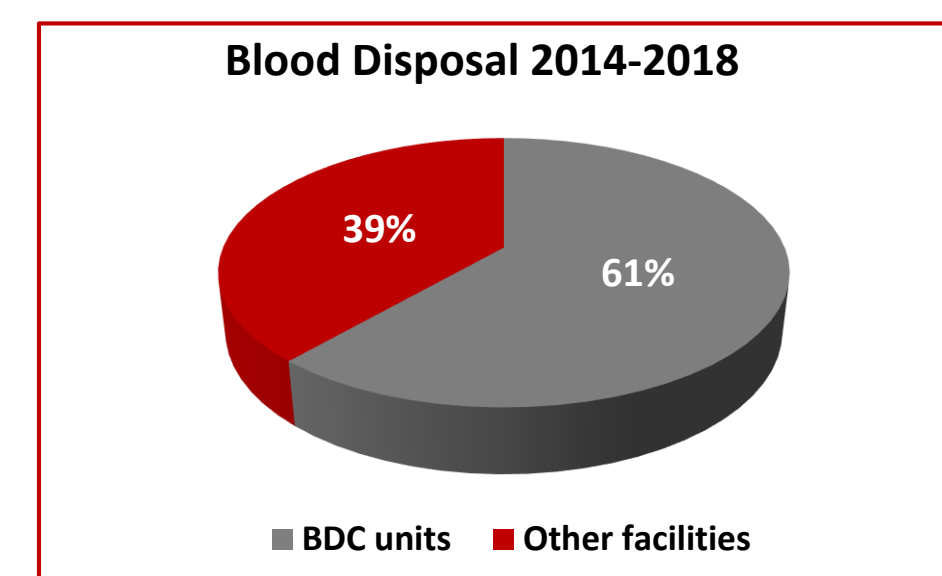
Figure 4: Average percentage of blood disposal in HMC-BDC and other facilities over a five years period ranging from 2014-2018. ■ Indicated the blood wastage in the BDC and ■ indicates the blood wastage in other facilities.

3 Donation sites
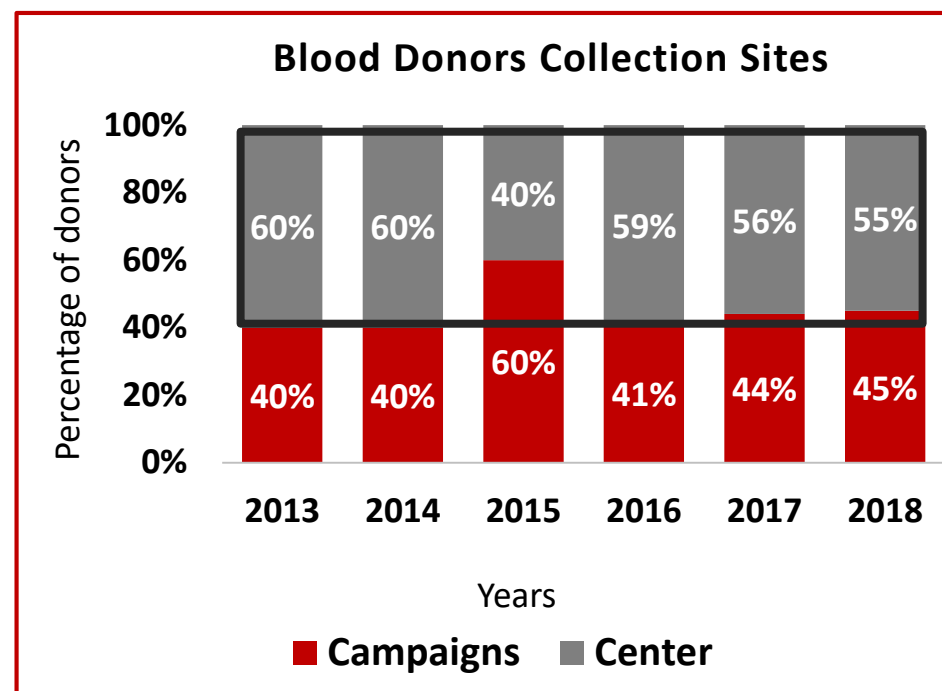

Figure 5: Percentage of participating donors donating either at HMC-BDC or through off-sight campaigns over six years period ranging from 2013-2018. ■ Denotes the percentage of donors participating through off-sight campaigns and ■ denotes the percentage of donors donating at BDC.
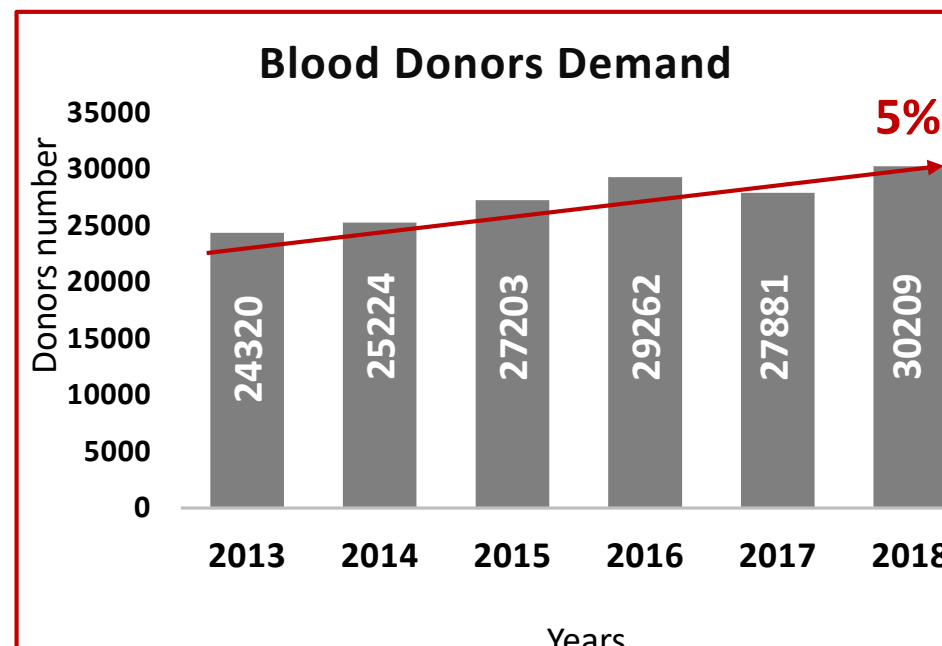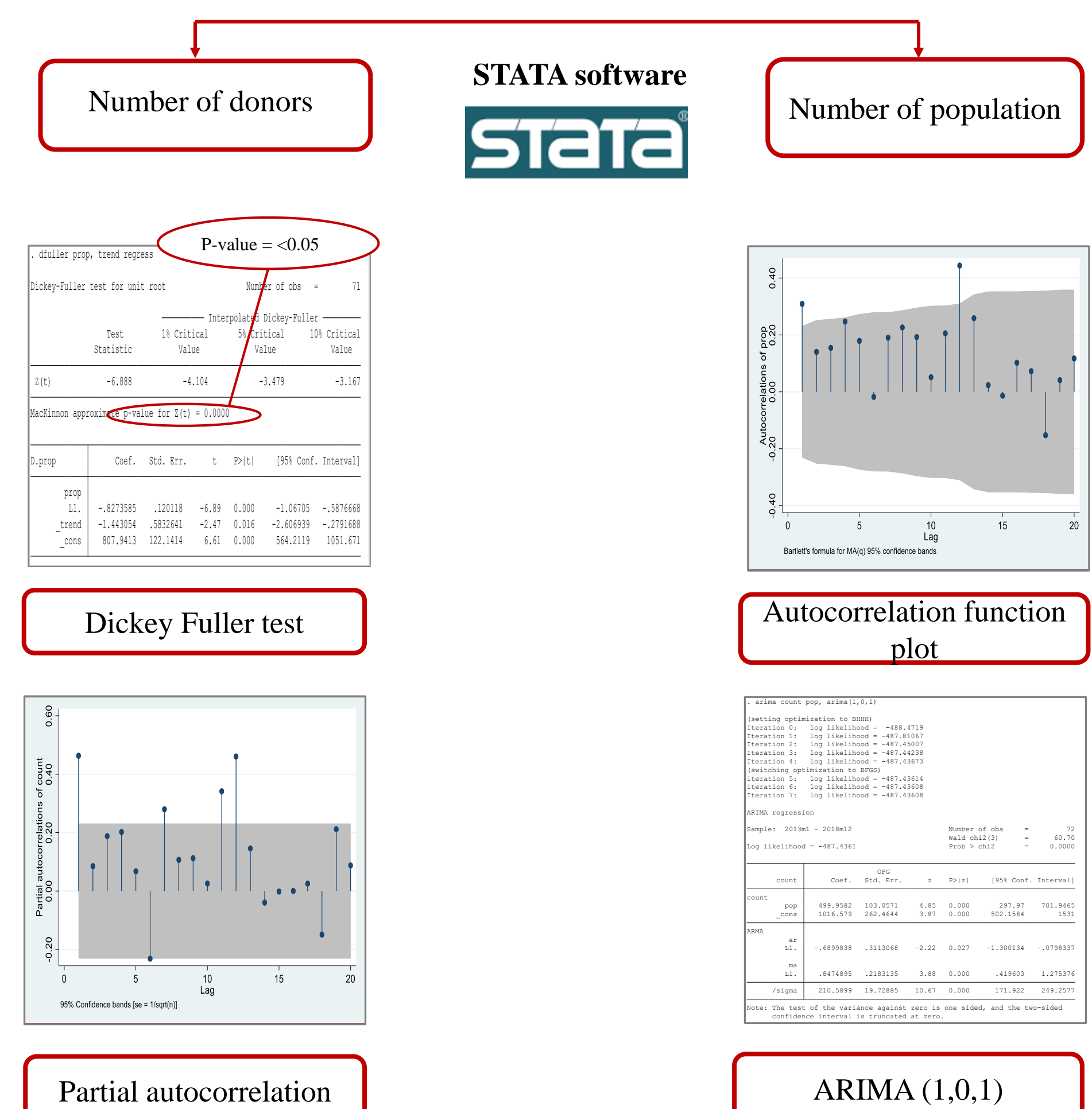
4 Provided services

Figure 6: Donors demand pattern over a six years period ranging from 2013-2018. — Represents an increase in the whole blood donation demand except in 2017. ■ Represents total numbers of donors.

2. Forecasting model

STATA software

Dickey Fuller test

Autocorrelation function plot

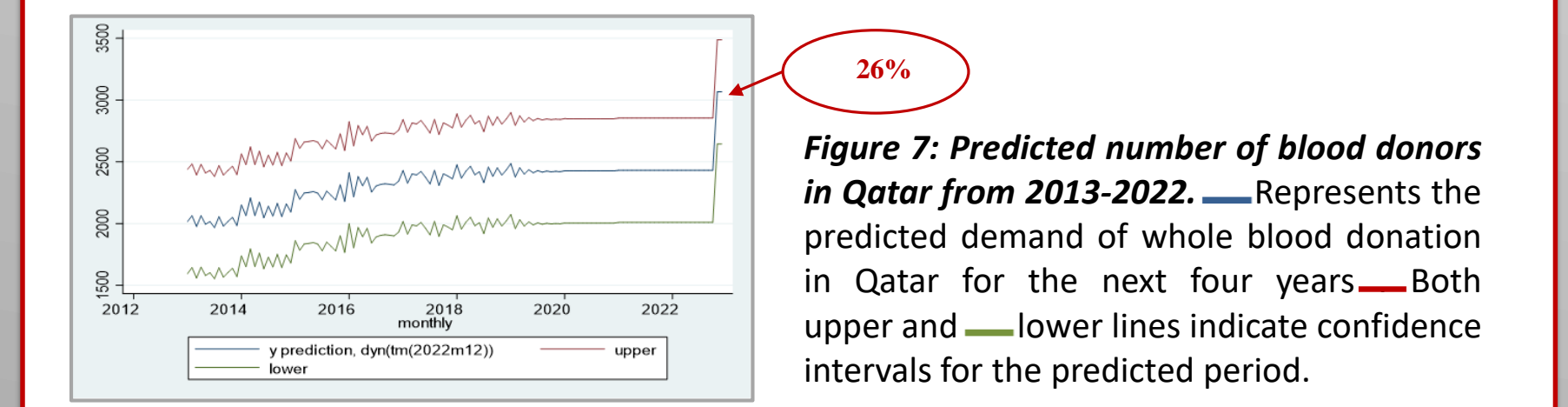Partial autocorrelation

ARIMA (1,0,1)

Results

Figure 7: Predicted number of blood donors in Qatar from 2013-2022. — Represents the predicted demand of whole blood donation in Qatar for the next four years — Both upper and — lower lines indicate confidence intervals for the predicted period.

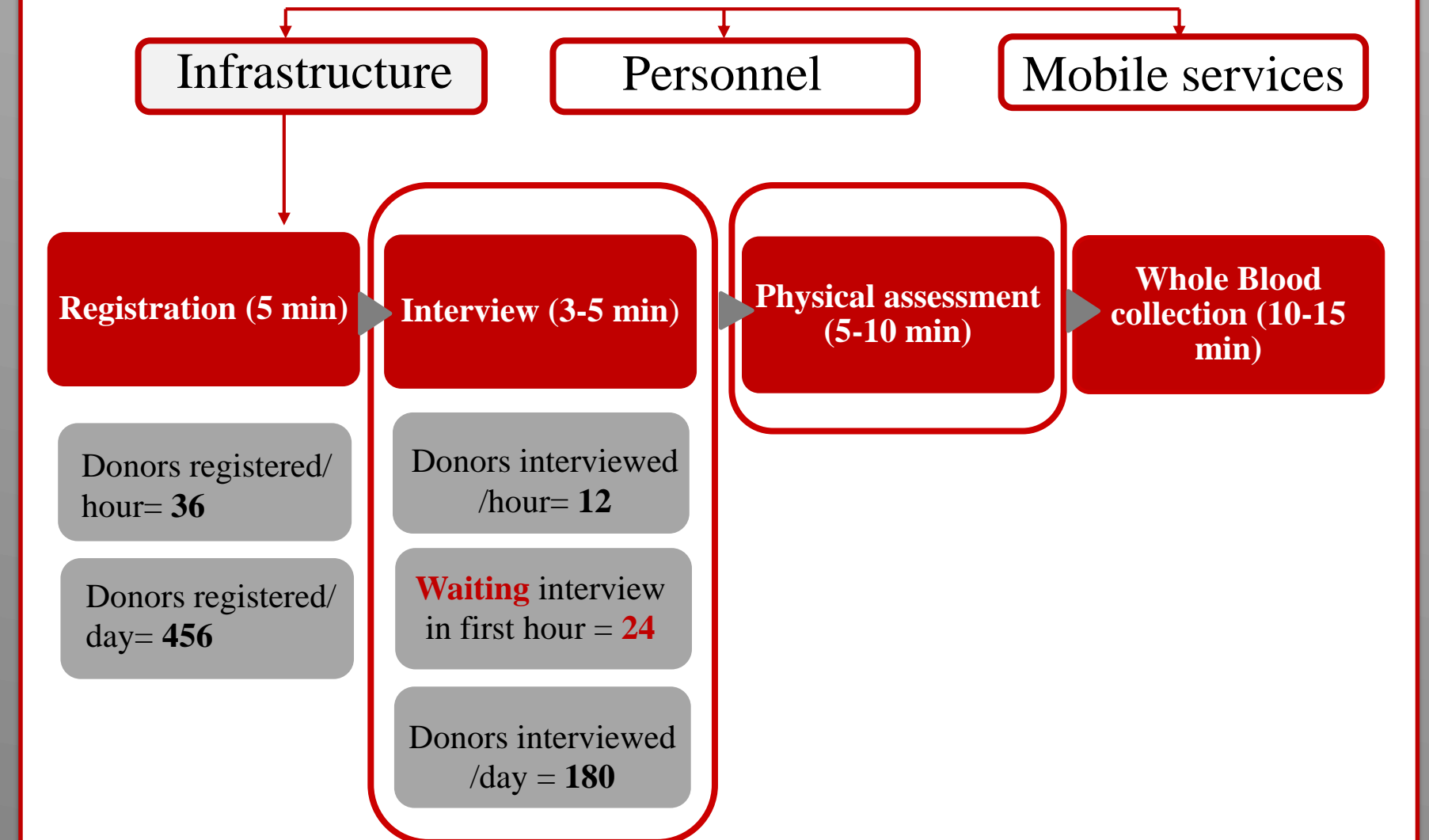### 3. Current standing of HMC-BDC and the potential challenges and obstacles

Figure 8: Process of blood collection and donor capacity on daily basis. ■ Indicates the main stages prior to the blood collection process with allocated time for each stage. ■ Demonstrates the number of donors that can be registered, medically interviewed, physically examined and processed for blood collection during the first hour and per working day. □ Indicates the bottle neck step which need to be resolved to avoid loosing donors.

Conclusion

The HMC-BDC will not be unable to accommodate this increase in the number of donors with the current available facilities and infrastructure.

Infrastructure improvements and logistics support for HMC-BDC are required.

Action plan and future directions are needed including:
- Increase the number off-sight campaigns
- Adapt the idea of multiple donor sites
- Collaborate with the MOI
- Examine donors blood samples before collection

Acknowledgment

References

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2. 2022 FIFA World Cup Bid Evaluation Report: Qatar. 2010, Fédération Internationale de Football Association: Zurich, Switzerland
3. Filho, O.S.S., et al., Demand Forecasting for Blood Components Distribution of a Blood Supply Chain. IFAC Proceedings Volumes, 2013. 46(24): p. 565-571.