

Summary

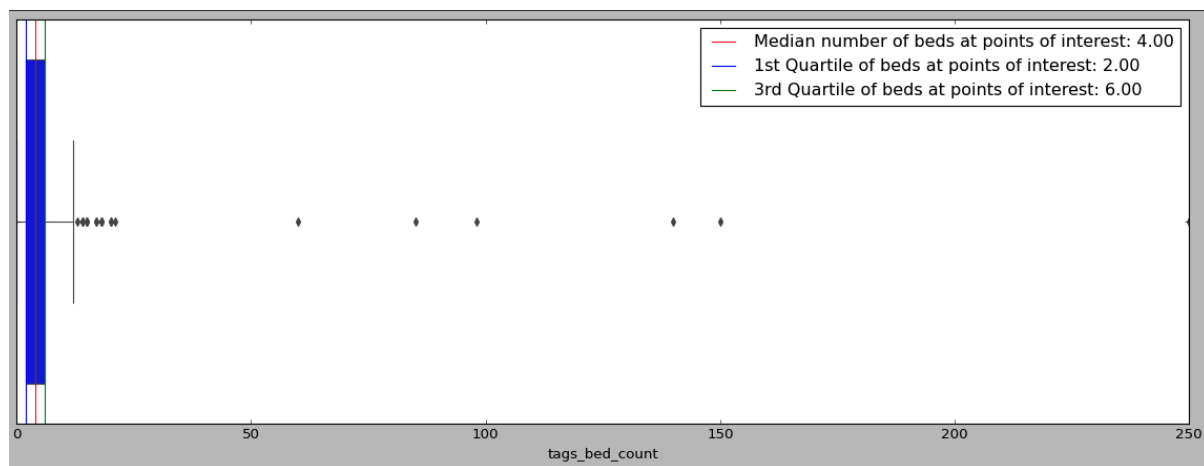
The goal of this project was to analyse the open and comprehensive datasets from the Ebola epidemic, which included data pertaining to water sources, sanitation, health and community resources in Sierra Leone, Guinea and Liberia. The next objective was to present the conclusions and recommendations, based on the above analysis, to better handle future outbreaks in these countries.

Conclusions

The three datasets issued for analysis were the data for the:

1. Red Cross Health Facility Centres – facilities opened up by the Red Cross
2. The Red Cross Points of Interest (i.e., additional centres that could help in the required task)
3. The Red Cross rapid assessment centres – where surveys were taking place in the local area.

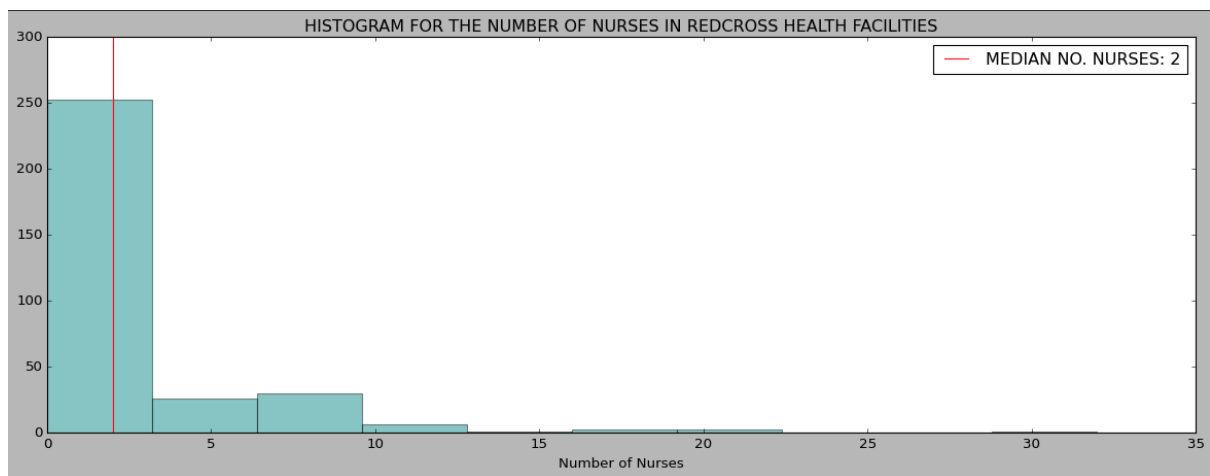
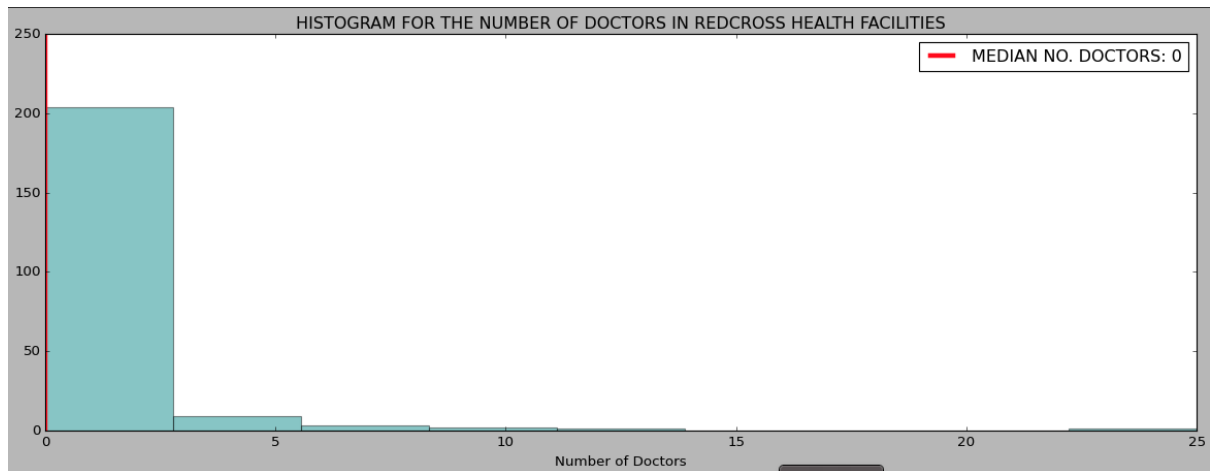
The analysis found there were 7 beds, on average, found per health facility and point of interest. The median number of beds was 4 (for both health facilities and points of interest). This calculation ruled out centres which had null values for the number of beds. The number of healthcare facilities was 335 and the number of points of interest was 330. There were 2223 beds in the health facilities dataset and 2216 beds in the point of interest dataset. Hence the difference between the total number of beds was 7, which was insignificant.



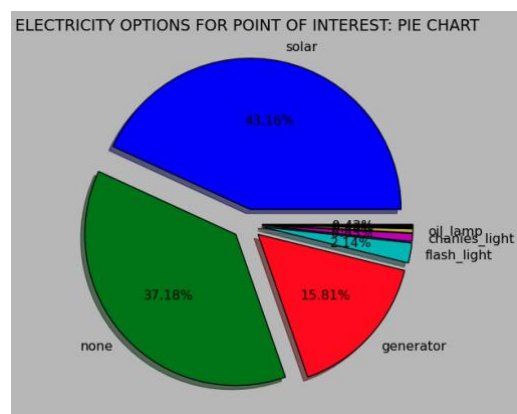
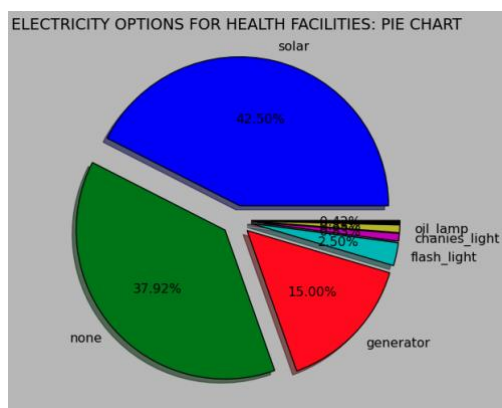
Similarly, it was found that there was, on average, 1 doctor and 3 nurses per health facility and point of interest. The median number of doctors was 0 and the median number of nurses was 2. Again, information with no data has not been included.

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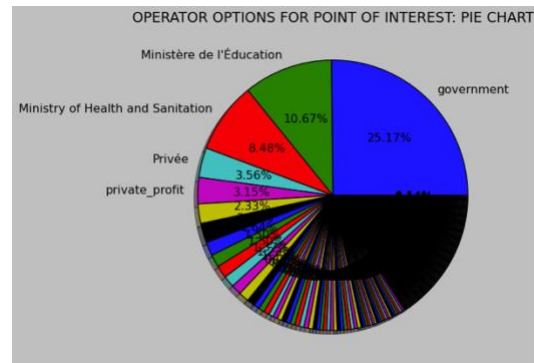
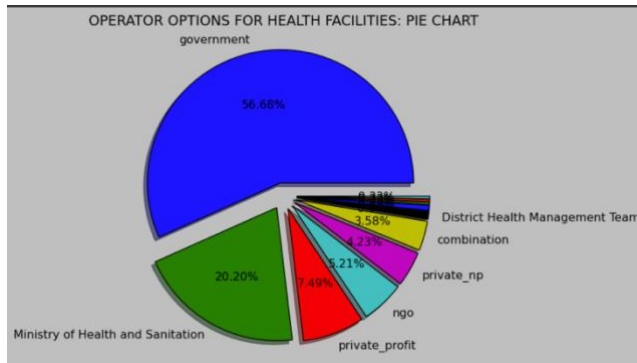
The graphs for power source for health facilities and points of interest revealed that the major source of electrical power was solar (about 43%), followed by generator (15%). Approximately 38% of facilities had no electrical power supply.



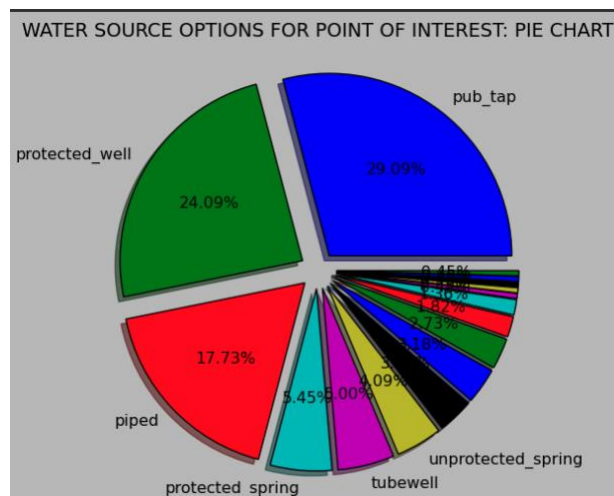
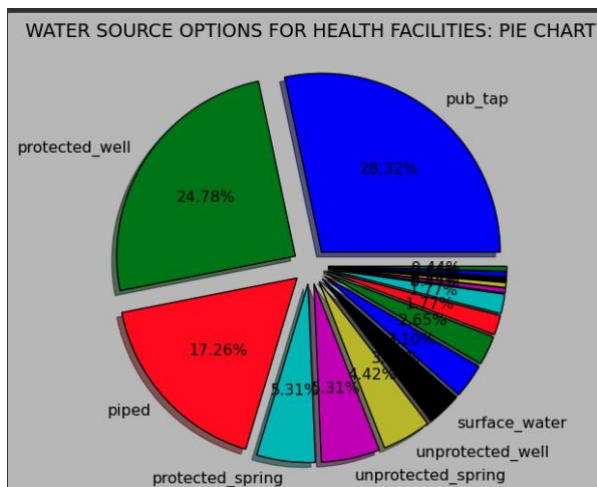
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This was an area where there was a significant difference between the point of interest facilities and the healthcare facilities. For health facilities, a whopping 56.68% of healthcare facilities were operated by the government. The ministry of education and the ministry of health and sanitation played an important role in the operations too. On the other hand, assuming that all of the small operators were private, the majority of operators for points of interest appeared to be private, as the top 3 government operators accounted for only 44.32% of the healthcare facilities, but the remaining 55.68% were assumed to be private operators.



This was the result for the water source options for point of interest and health facilities. The plots present very similar data. The three major sources of water were public tap water (29%), followed by protected well (25%) and piped water (17%).



The analysis also found that there were 91 health facilities and 134 points of interest open 24/7. Therefore, the point of interest facilities were more likely to be open 24/7 than the healthcare facilities. In addition, the average of the drinking water scores was 9.85/100, the average of the water timing scores was 24.78/100 and the average of the toilet scores was 8.15/100, in centres where the survey was done. Hence, the water timing parameter scored the maximum.

Recommendations:

Based on the conclusions deduced from the data analysis, I propose the following recommendations.

1. The average number of beds seemed to be promising for both healthcare facilities and points of interest. For a total number of 330 point of interest facilities, and 335 healthcare facilities, there was an average of 7 beds. There were several large outliers which increased the value of the mean: when plotting the boxplot for the distribution of number of beds, the median was found to be 4. I recommend increasing the median value by increasing the number of beds by 50% of the median ($n = 2$).
2. The current average number of doctors and nurses per facility seemed quite reasonable. However, the median number of doctors and nurses was less, which explained the skewed distribution of doctors and nurses across health facilities. I recommend paying immediate attention to the areas where there are no doctors and/or nurses.
3. It's commendable that solar power provided energy to power about 43% of the facilities. However, 38% facilities didn't have access to any electrical power. I recommend that more WHO funding / Government funding should be allocated to the creation of more solar farms to generate sufficient electricity to power those healthcare facilities.
4. On the one hand, the government had been able to operate more facilities than the private organisations for the health facilities. On the other hand, there were several private operators for the points of interest that decentralised the operation modes, which was not scalable or reliable. Therefore, the government would need to take control of the operations that are in the hands of the private sector.
5. About 70% of the facilities had access to the three main sources of potable water. However, there was still a reasonable percentage of facilities with no access to potable water. To contain future outbreaks there should be a sustainable water infrastructure in place.
6. It is recommended that point of interest and healthcare facilities are maintained to give 24/7 access to the patients.
7. The average of the drinking water, water timing and toilet scores in the healthcare facilities should be maintained **at least** at 9.85, 24.78 and 8.15/100 respectively, and further measures should be taken as recommended above to improve the values.

The data analysis found a great work had been underway by Red Cross and the government to provide the necessary healthcare facilities which contained the Ebola epidemic. So, I strongly believe the above recommendations would further help the decision-makers,

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humanitarian workers, and community stakeholders, as well as the governments and Red Cross in containing any more deadly or contagious outbreaks.