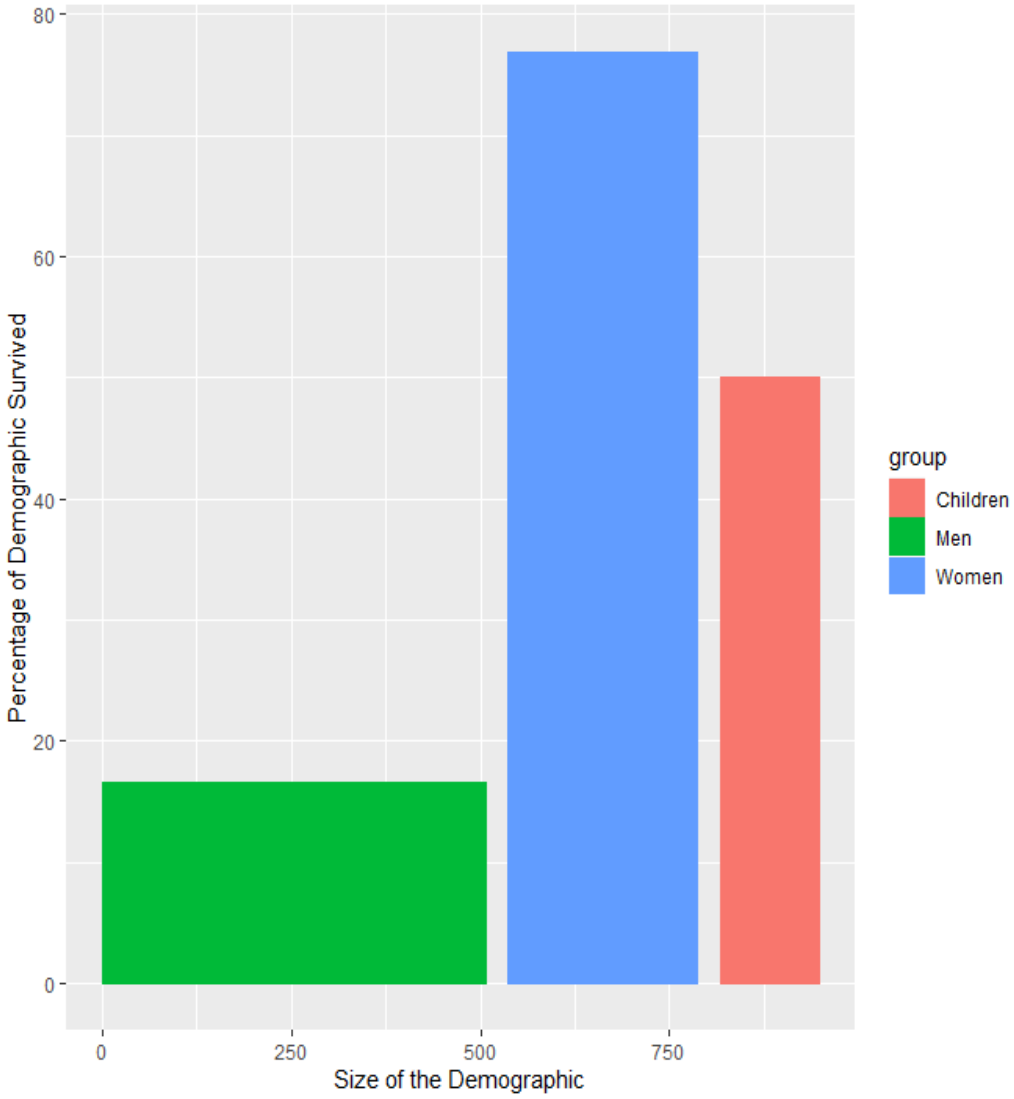
1) From the given data in titanic.csv, we have access to information about 887 of the passengers aboard the RMS Titanic. The total approximate number of passengers aboard is 1317. The information of these 887 passengers is used for the analysis below.

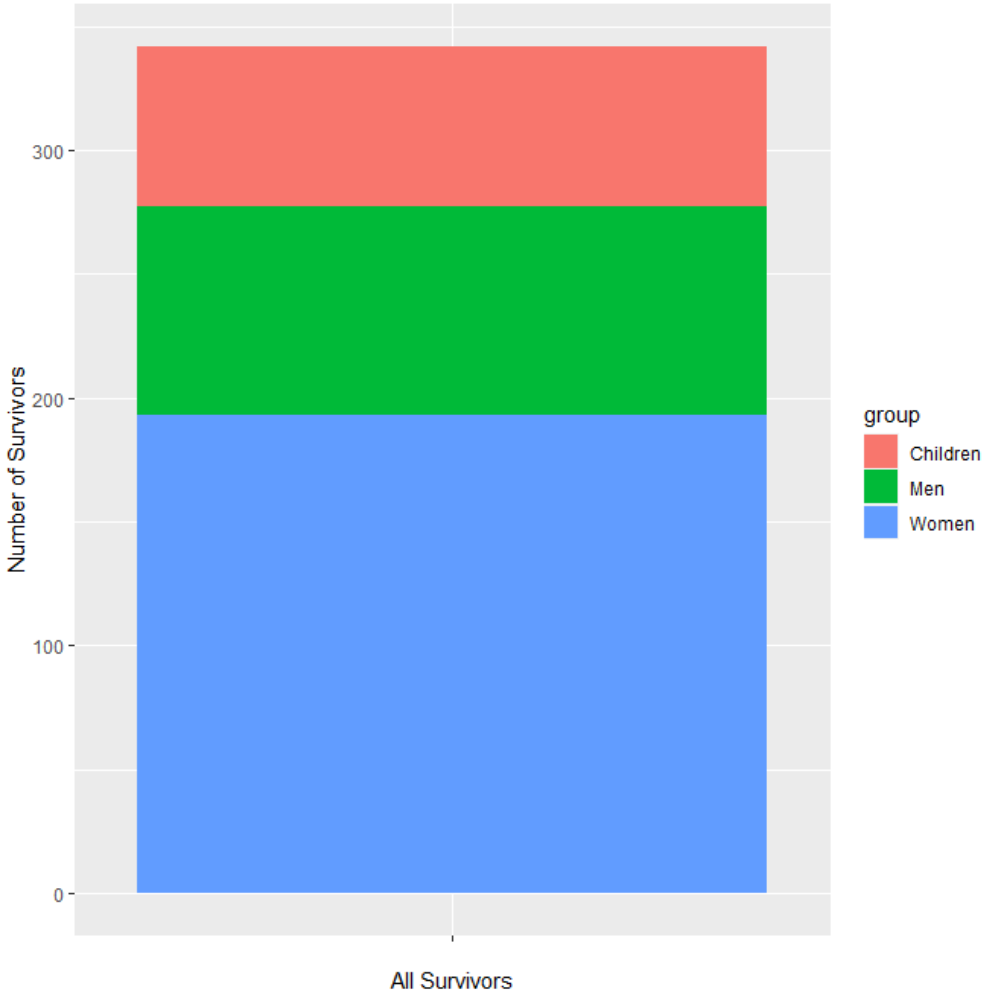
Total number of passengers – 887
Total number of survived passengers – 342

- Approximately 38.5% of all passengers survived.

Total number of female passengers – 314
Total number of women (age >= 18) - 251
Total number of male passengers – 573
Total number of men (age >= 18) - 506
Total number of children (age < 18) – 130
Total number of elders (age >= 65) - 13

Total number of survived men - 84
Total number of survived women - 193
Total number of survived children – 65
Total number of survived elders – 1



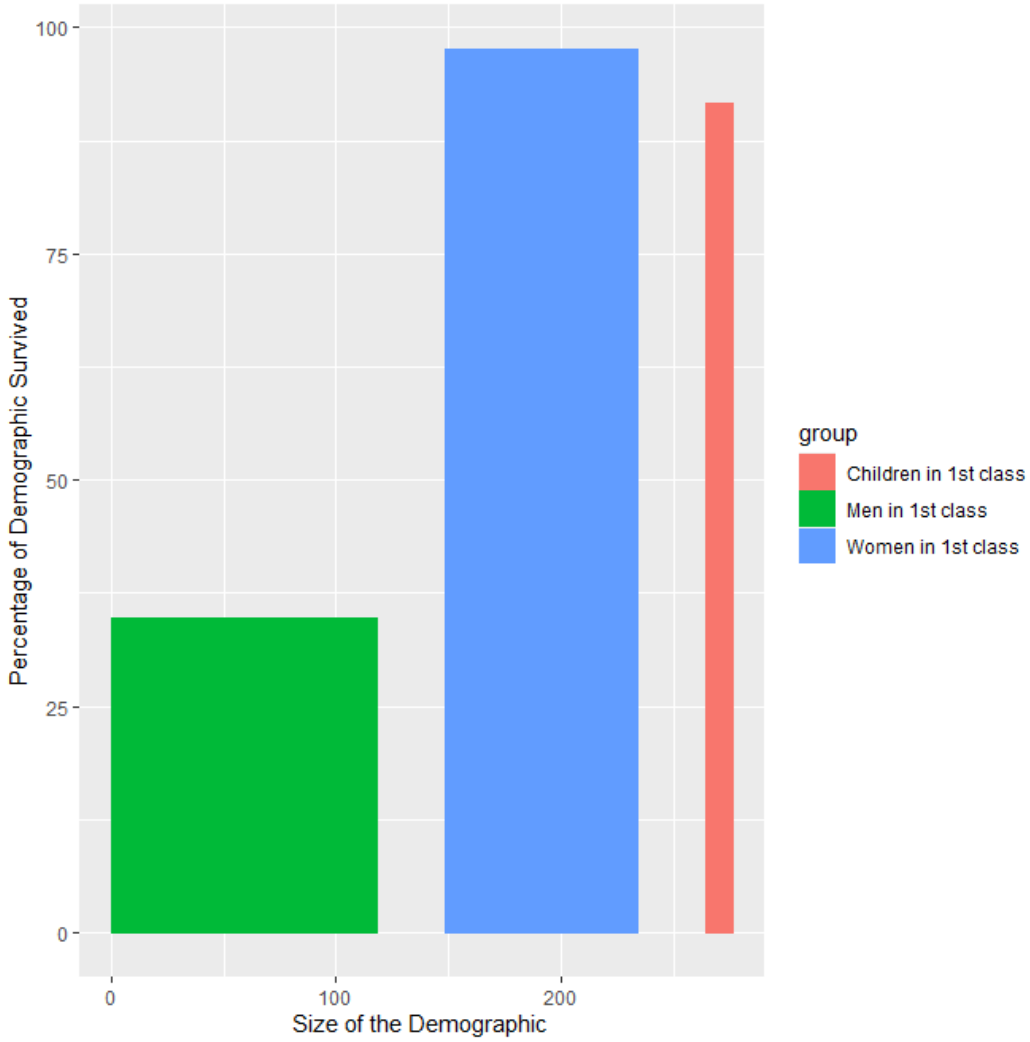


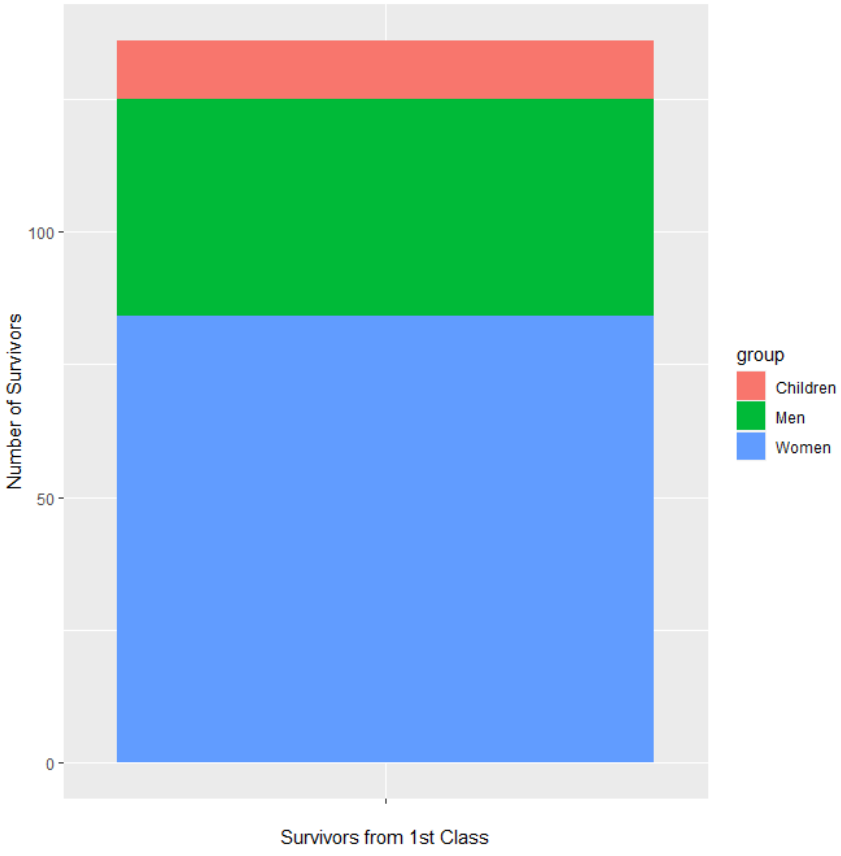
- The total number of women and children that survived constitute approximately 75% of all passengers.
- Furthermore, approximately 68% of all women and children survived whereas only 16.6% of all men survived.
- From the above data, there is definitely evidence that women and children were prioritized in being evacuated first.

Analyzing the passengers in 1st class –

Total number of passengers in 1st class – 216
Total number of men in 1st class – 118
Total number of women in 1st class – 86
Total number of children in 1st class – 12

Total number of survived passengers in 1st class – 136
Total number of survived men in 1st class – 41
Total number of survived women in 1st class – 84
Total number of survived children in 1st class – 11


100
75
50
25
0
Percentage of Demographic Survived
0
100
200
Size of the Demographic
group
Children in 1st class
Men in 1st class
Women in 1st class

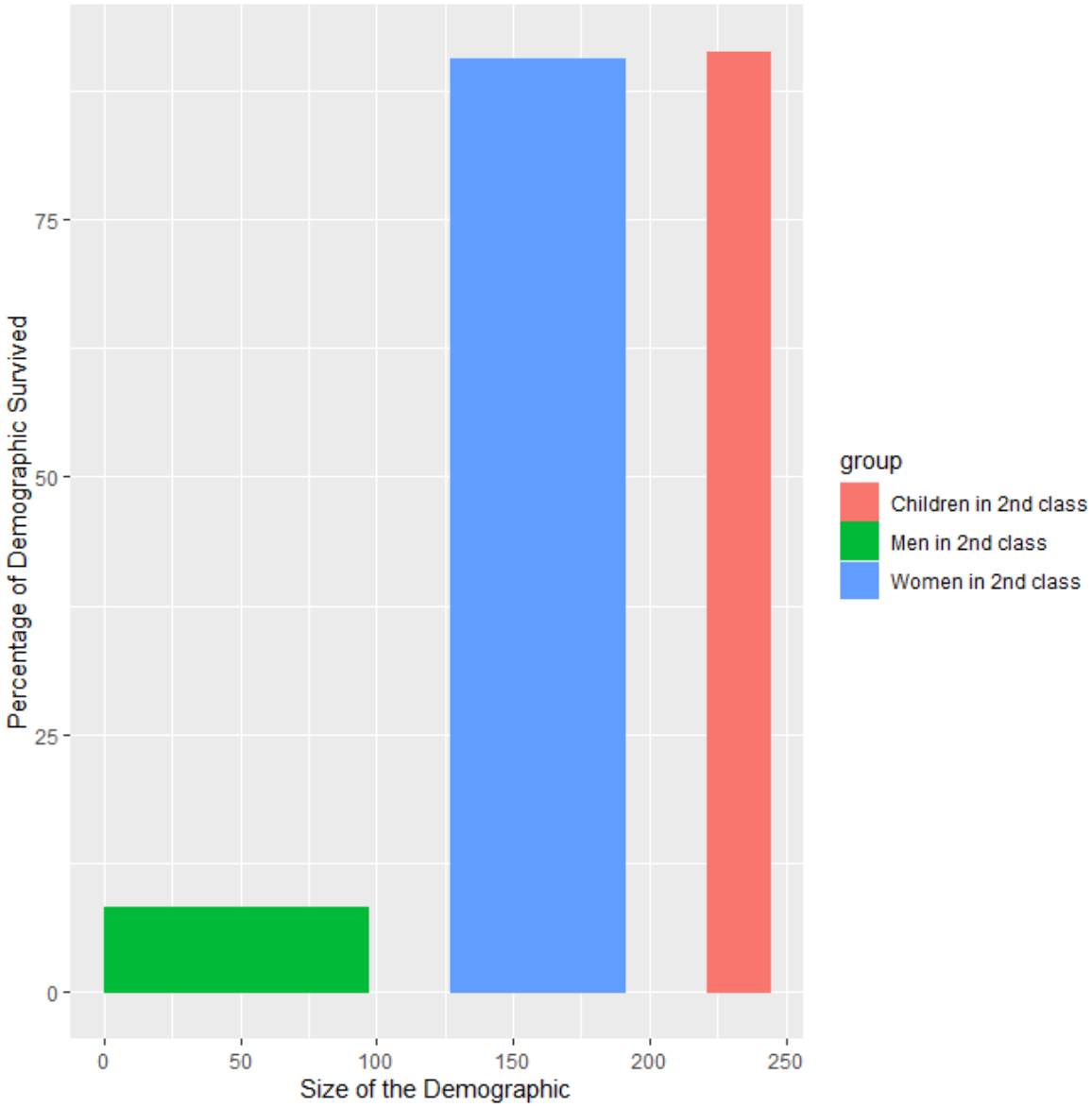

100
50
0
Number of Survivors
Survivors from 1st Class
group
Children
Men
Women

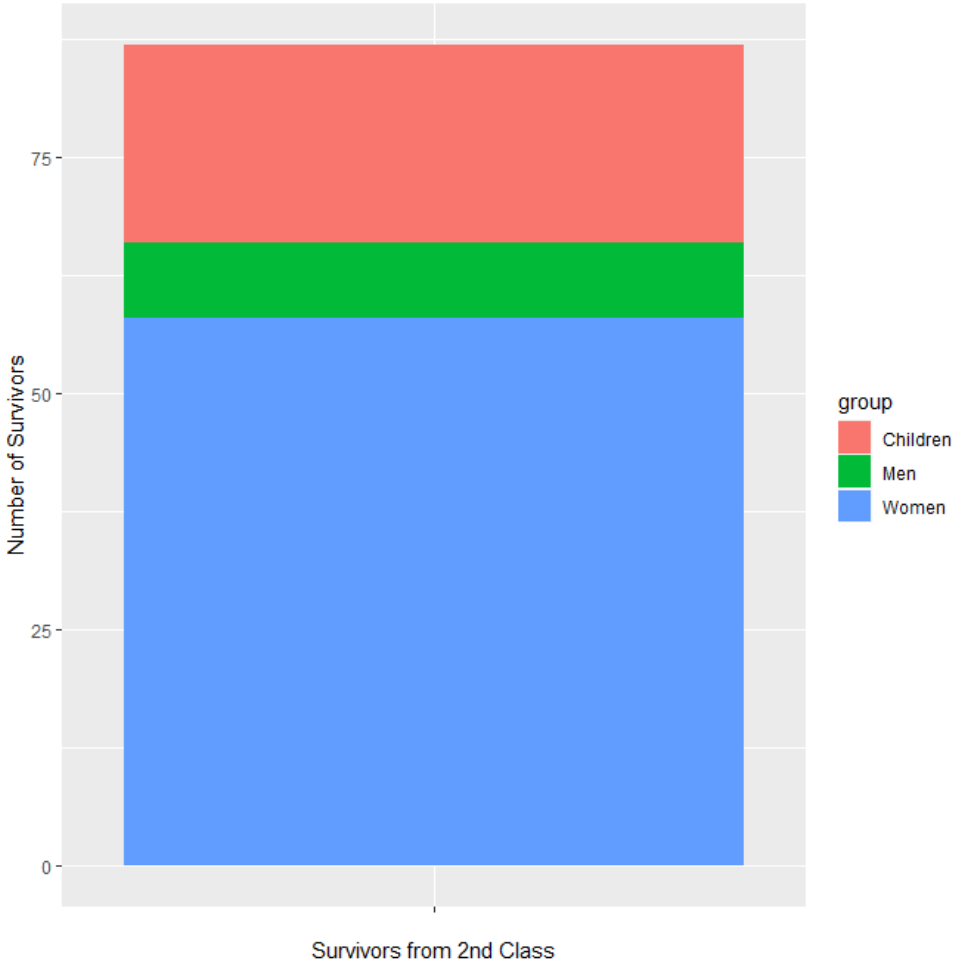
- Approximately 63% of all passengers in 1st class survived.
- Out of the survivors in 1st class, approximately 30% were men, 62% were women and 8% were children.
- 97% of all women and children in 1st class survived whereas 35% of all men in 1st class survived.

Analyzing the passengers in 2nd class –

Total number of passengers in 2nd class – 184
Total number of men in 2nd class – 97
Total number of women in 2nd class – 64
Total number of children in 2nd class – 23

Total number of survived passengers in 2nd class – 87
Total number of survived men in 2nd class – 8
Total number of survived women in 2nd class – 58
Total number of survived children in 2nd class – 21



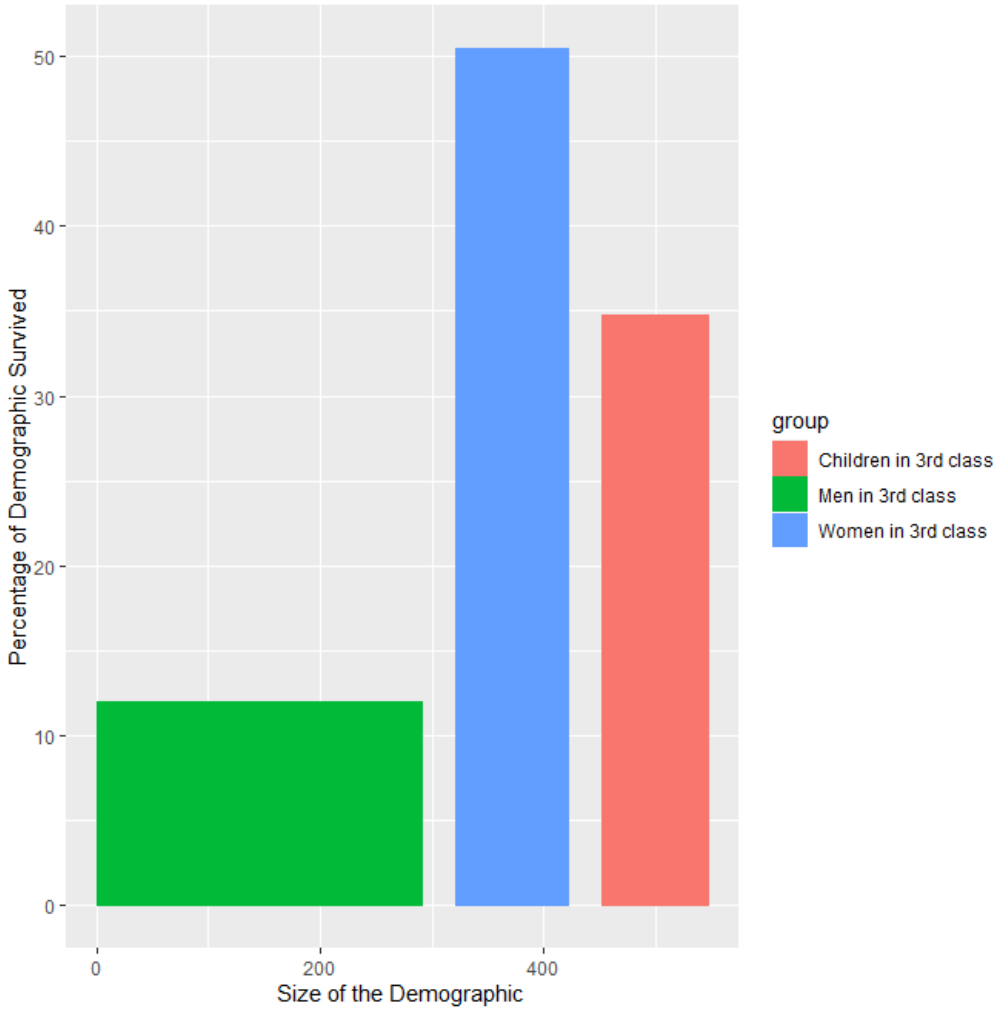


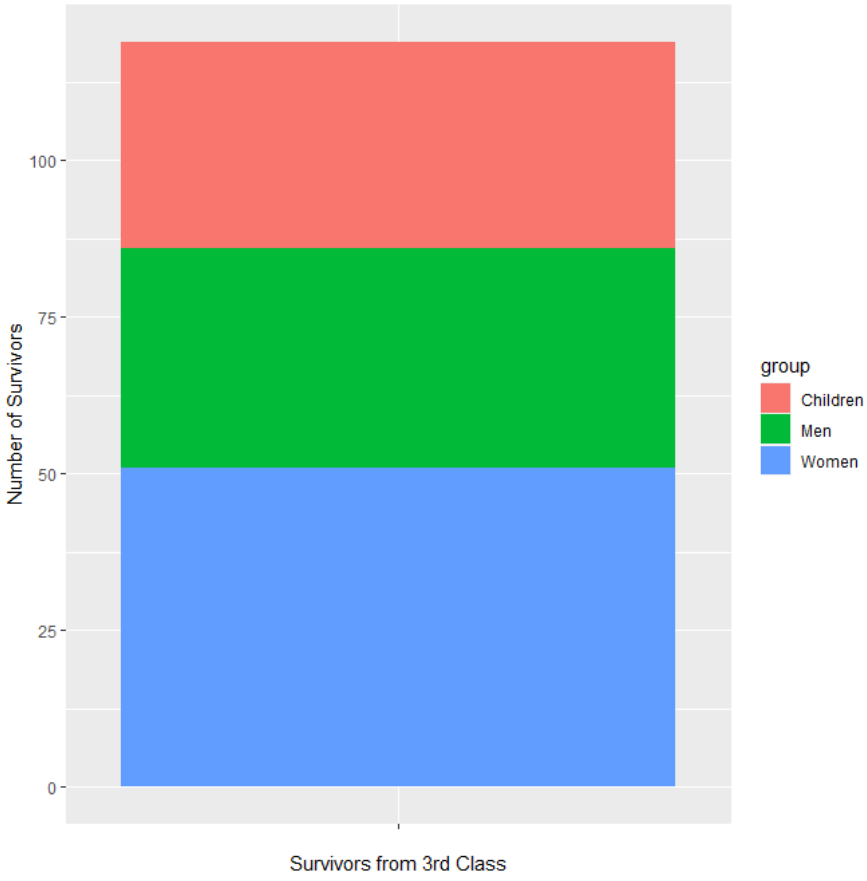
- Approximately 47% of all passengers in 2nd class survived.
- Out of the survivors in 2nd class, approximately 9% were men, 67% were women, 24% were children.
- 90% of all women and children in 3rd class survived whereas only 8% of all men in 2nd class survived.

Analyzing the passengers in 3rd class -

Total number of passengers in 3rd class – 487
Total number of men in 3rd class – 291
Total number of women in 3rd class – 101
Total number of children in 3rd class - 95

Total number survived passengers in 3rd class – 119
Total number of survived men in 3rd class - 35
Total number of survived women in 3rd class – 51
Total number of survived children in 3rd class – 33


Percentage of Demographic Survived
50
40
30
20
10
0
0
200
400
Size of the Demographic
group
Children in 3rd class
Men in 3rd class
Women in 3rd class


Number of Survivors
100
75
50
25
0
Survivors from 3rd Class
group
Children
Men
Women

- Approximately 24.4% of all passengers in 3rd class survived.
- Out of the survivors in 3rd class, approximately 29.4% were men, 42.8% were women, 27.8%
- However, approximately only 51% of all women and children in 3rd class survived whereas only 12% of all men in 3rd class survived.

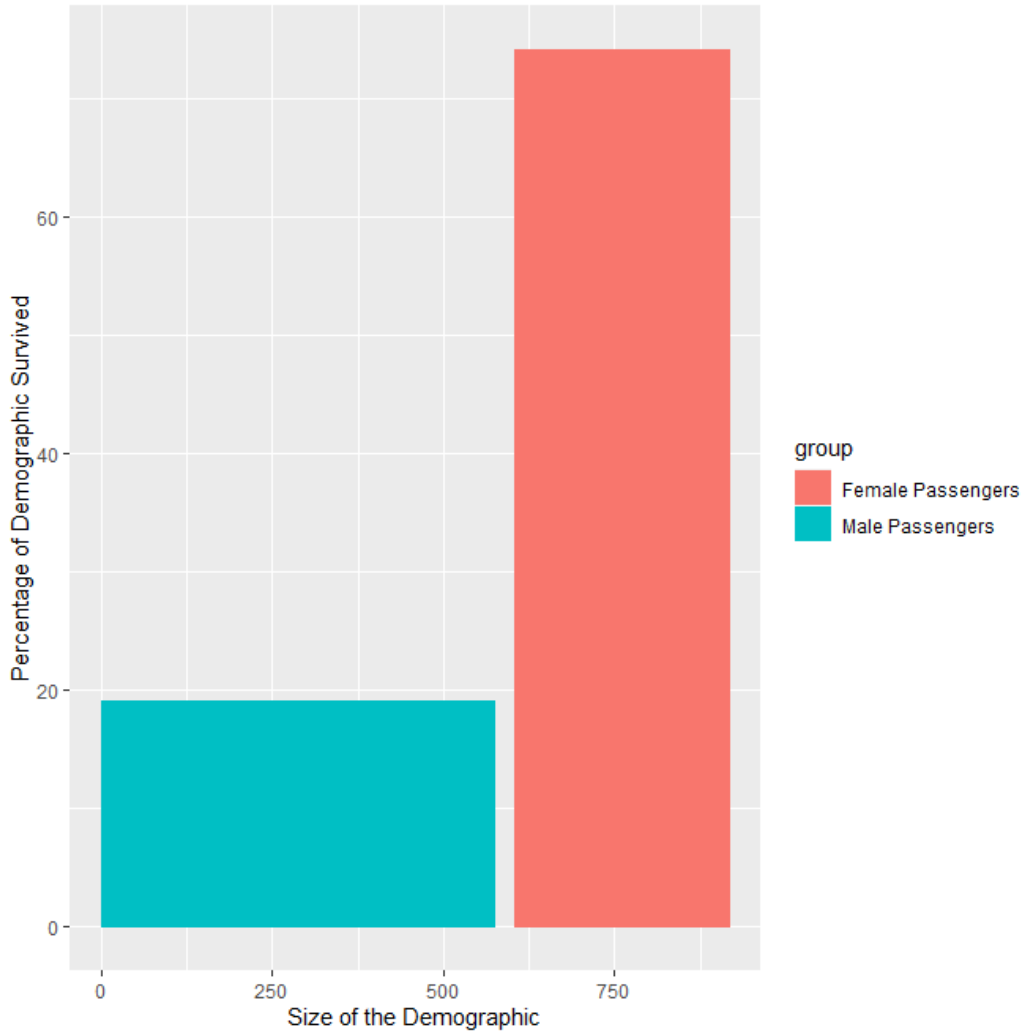
Survival based only on age group –

Children (age < 18) – 65 out of 130 survived.
Adults (age >= 18 & < 65) – 276 out of 744 survived.
Elders (age >= 65) – Only 1 out of 13 survived.

Graph seems redundant considering there are only 13 elders and children are already considered separately.

Survival based only on gender –

Female – 233 out of 314 survived.
Male – 109 out of 573 survived.



- Out of all the survivors, approximately 56% were women, 19% were children, 25% were men. Furthermore, approximately 40% belonged to the 1st class, 25% belonged to the 2nd class and 32% belonged to the 3rd class.
- Out of all the passengers that perished, approximately 11% were women, 12% were children and 77% were men. Furthermore, approximately 15% belonged to the 1st class, 18% belonged to the 2nd class and 67% belonged to the 3rd class.

- Surviving passengers were more likely to be women and belong to the 1st class.
- Passengers that perished were more likely to be men and belong to the 3rd class.
- According to these results, the probability that Rose (1st class adult and female) would survive is approximately 97.5% whereas the probability that Jack (3rd class adult and male) would survive is approximately 12%. Therefore, the results support the fate of the main characters in the movie "Titanic".

The difference in the makeup of passengers and survivors in the different classes is certainly interesting. Firstly, class 3 passengers have a considerably higher number of men relative to women as compared to other classes and similar number of women as children unlike the other classes. Furthermore, the percentage of passengers that travelled alone in class 1 is roughly 50% in class 1, 56% in class 2, 65% in class 3. Roughly 53% of lone passengers in class 1 survived compared to 35% in class 2 and 22% in class 3. Along with data from before, It can be concluded that passengers with a relative aboard were given more priority in the evacuation primarily mothers with children. It is also very fascinating that men in 3rd class had a higher chance of survival than men in 2nd class which goes against the logic that those who paid more had a higher chance of survival as generally showed in the data. Lastly, it is evident that the "women and children first" policy was adhered to more strictly amongst 1st and 2nd class than 3rd class.

2) Given four nodes {W, X, Y, Z}

$$W \perp X$$
$$W \not\perp Z \mid X$$
$$Z \perp W \mid Y$$
$$W \not\perp Y$$
$$X \not\perp Y$$
$$W \not\perp X \mid Z$$
$$X \perp Z \mid W, Y$$

```
> dSep(as(x, "matrix"), "W", "X", NULL)
[1] TRUE
> dSep(as(x, "matrix"), "W", "Z", "X")
[1] FALSE
> dSep(as(x, "matrix"), "Z", "W", "Y")
[1] TRUE
> dSep(as(x, "matrix"), "W", "Y", NULL)
[1] FALSE
> dSep(as(x, "matrix"), "X", "Y", NULL)
[1] FALSE
> dSep(as(x, "matrix"), "W", "X", "Z")
[1] FALSE
> dSep(as(x, "matrix"), "X", "Z", c("W","Y"))
[1] TRUE
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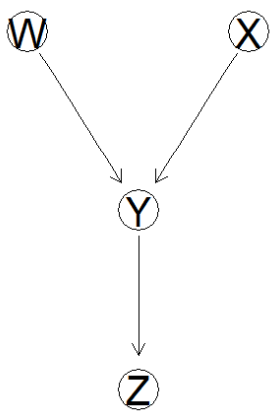
Structure of the Bayesian Network -