Appendix

***Predictive Factors***

***Research Question 1.3.*** *Do previous emergency preparedness trainings and drills predict the overall level of preparedness of the healthcare providers?*

This evaluation is to determine whether providers are prepared (Preparedness (PL)=1, or not (PL)=0). Due to the heteroskedastic nature of a linear probability model, a logistic regression was used to estimate the factors which influence preparedness.

Table 14: Descriptive Statistics of the Variables in the Logistic Regression Model

|  |  |  |
| --- | --- | --- |
|   | n | % |
| Overall preparedness  |  |  |
| Not prepared | 177 | 90.3 |
| Prepared | 19 | 9.7 |
| Previous Drills  |  |  |
| No | 100 | 51.0 |
| Yes | 53 | 27.0 |
| Previous Trainings  |  |  |
| No | 25 | 12.8 |
| Yes | 129 | 65.8 |

Table 15 Logistic Regression Significant Results

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|   | B | S.E. | Wald | df | Sig. | Exp(B) |
| Disaster Drills (yes) | 1.206 | .510 | 5.581 | 1 | .018 | 3.340 |
| Participated in Disaster Training (yes) | 1.397 | 1.064 | 1.723 | 1 | .189 | 4.042 |
| Constant | -3.612 | 1.070 | 11.384 | 1 | .001 | .027 |

Table 16 Model Summary

|  |  |  |  |
| --- | --- | --- | --- |
| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
| 1 | 102.693a | .057 | .104 |

Table 17 Model Prediction

|  |  |
| --- | --- |
| Observed | Predicted |
| PL | Percentage Correct |
| Not prepared | Prepared |
| Step 1 | PL | Not prepared | 120 | 0 | 100.0 |
| Prepared | 19 | 0 | 0.0 |
| Overall Percentage |   |   | 86.3 |
| a. The cut value is .500 |

Previous trainings (β = 1.397, p=0.189) were not a significant predictor of overall preparedness while drills were a significant predictor (β = 1.206, p=.018).

The beta value is the regression coefficient of the logarithm of the likelihood of preparedness:

Log odds of being prepared = $\left[\frac{P(being prepared)}{1-P(being unprepared)}\right]$

The exponential function for beta is used for each independent variable and is used as a regression coefficient in the prediction model. As such if a provider has previous drills they are 3.34 times more likely to be prepared for a bioterrorism incident. The variance of the preparedness level explained by the model is low (Nagelkerke R square = .104). The model predicts 86.3% of the responses correctly:

logPL = -3.612 + 1.206 x1 + 1.397 x2 + ℮ (Model 1)

***Research Question 2.2****. Do previous emergency preparedness trainings and drills predict the Nebraska’s healthcare providers’ willingness to respond to a biological terrorism attack within the State of Nebraska?*

A logistic regression showed that previous trainings were a significant predictor of willingness to respond (β = 1.207, p=.038) while drills were not significant (β = .092, p=.807). Similar to Model 1, the exponential function of betas were used to interpret the prediction of the overall preparedness levels of providers. If the EMS providers had previous trainings, they were 3.345 times more likely to have the willingness to respond to a bioterrorism attack compared with no previous trainings. The variance explained by this model is very low (Nagelkerke R square = .037). The model predicts 62.6% of the responses correctly. The predictive model is substituted with the regression coefficients below:

Log HCPWLstatewide = β0 +-1.587 + 0.092x1+1.207x2 + ℮ (Model 2)

Table 18 Descriptive Statistics of the Variables in the Logistic Regression Model

|  |  |  |
| --- | --- | --- |
|   | n | % |
| Willingness to Response (Statewide) |  |  |
| No | 141 | 71.9 |
| Yes | 55 | 28.1 |
| Previous Drills  |  |  |
| No | 100 | 51.0 |
| Yes | 53 | 27.0 |
| Previous Trainings  |  |  |
| No | 25 | 12.8 |
| Yes | 129 | 65.8 |

Table 19 Logistic Regression Significant Results

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|   | B | S.E. | Wald | df | Sig. | Exp(B) |
| Disaster Drills (yes) | .092 | .377 | .060 | 1 | .807 | 1.096 |
| Participated in Disaster Training (yes) | 1.207 | .582 | 4.308 | 1 | .038 | 3.345 |
| Constant | -1.587 | .563 | 7.942 | 1 | .005 | .205 |

Table 20 Model Summary

|  |  |  |  |
| --- | --- | --- | --- |
| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
| 1 | 178.539a | .037 | .051 |

Table 21 Model Prediction

|  |  |
| --- | --- |
| Observed | Predicted |
| HCPWLStatewide | Percentage Correct |
| Not Willing | Willing |
| Step 1 | HCPWLStatewide | Not Willing | 87 | 0 | 100.0 |
| Willing | 52 | 0 | 0.0 |
| Overall Percentage |   |   | 62.6 |
| a. The cut value is .500 |

**Research Question 1.4.** *Do demographic factors of Nebraska’s Emergency Medical Service providers predict a biological terrorism overall level of preparedness?*

A backward elimination logistic regression method was used. The results show that none of the demographic variables were significant predictors of overall preparedness of the Nebraska’s healthcare providers.

Table 22. Logistic Regression Results

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|   | B | S.E. | Wald | df | Sig. | Exp(B) |
| Gender (Male) | -.968 | .573 | 2.858 | 1 | .091 | .380 |
| Race |   |   | .000 | 3 | 1.000 |   |
| White | -.284 | 41208.034 | .000 | 1 | 1.000 | .753 |
| Black or African American | -17.789 | 25835.649 | .000 | 1 | .999 | .000 |
| American Indian or Alaska Native | -19.260 | 28069.823 | .000 | 1 | .999 | .000 |
| Provider Level (ALS) | .911 | .894 | 1.038 | 1 | .308 | 2.487 |
| I am currently |   |   | 4.881 | 3 | .181 |   |
| Employed in EMS | -2.225 | 1.094 | 4.137 | 1 | .042 | .108 |
| Volunteering in EMS | -21.099 | 28344.097 | .000 | 1 | .999 | .000 |
| Retired from EMS | -.759 | 1.598 | .226 | 1 | .635 | .468 |
| Primary work place |  |  | 1.023 | 4 | .906 |  |
| Hospital Based-EMS | .093 | 1.391 | .004 | 1 | .947 | 1.098 |
| Fire-Based EMS | .847 | 1.421 | .355 | 1 | .551 | 2.333 |
| Volunteer EMS | -19.526 | 19125.970 | .000 | 1 | .999 | .000 |
| Municipal EMS | -.266 | 1.786 | .022 | 1 | .882 | .767 |
| City Type |   |   | .003 | 2 | .999 |   |
| Rural | .063 | 1.197 | .003 | 1 | .958 | 1.065 |
| Urban | -19.839 | 9089.954 | .000 | 1 | .998 | .000 |
| City Size |  |  | .003 | 2 | .999 |  |
| Small City | -.078 | 1.450 | .003 | 1 | .957 | .925 |
| Medium City  | -19.774 | 14065.721 | .000 | 1 | .999 | .000 |

Table 23. Model Summary

|  |  |  |  |
| --- | --- | --- | --- |
| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
| 1 | 105.879a | .086 | .179 |
| 2 | 106.560a | .083 | .172 |
| 3 | 109.463a | .069 | .142 |
| 4 | 111.603a | .058 | .120 |
| 5 | 115.575a | .037 | .078 |
| 6 | 115.698a | .037 | .076 |
| 7 | 118.282a | .023 | .048 |

Table 24. Model Prediction

|  |  |
| --- | --- |
| Observed | Predicted |
| PL | Percentage Correct |
| Not prepared | Prepared |
| Step 1 | PL | Not prepared | 166 | 1 | 99.4 |
| Prepared | 19 | 0 | 0.0 |
| Overall Percentage |  |  | 89.2 |
| Step 2 | PL | Not prepared | 166 | 1 | 99.4 |
| Prepared | 19 | 0 | 0.0 |
| Overall Percentage |  |  | 89.2 |
| Step 3 | PL | Not prepared | 167 | 0 | 100.0 |
| Prepared | 19 | 0 | 0.0 |
| Overall Percentage |  |  | 89.8 |
| Step 4 | PL | Not prepared | 167 | 0 | 100.0 |
| Prepared | 19 | 0 | 0.0 |
| Overall Percentage |  |  | 89.8 |
| Step 5 | PL | Not prepared | 167 | 0 | 100.0 |
| Prepared | 19 | 0 | 0.0 |
| Overall Percentage |  |  | 89.8 |
| Step 6 | PL | Not prepared | 167 | 0 | 100.0 |
| Prepared | 19 | 0 | 0.0 |
| Overall Percentage |  |  | 89.8 |
| Step 7 | PL | Not prepared | 167 | 0 | 100.0 |
| Prepared | 19 | 0 | 0.0 |
| Overall Percentage |  |  | 89.8 |
| Step 8 | PL | Not prepared | 167 | 0 | 100.0 |
| Prepared | 19 | 0 | 0.0 |
| Overall Percentage |  |  | 89.8 |
| a. The cut value is .500 |

***Research Question 1.5*.** *Does the perceived benefit of bioterrorism preparedness training predict the overall level of preparedness of the healthcare providers?*

The results show that perceived benefits of training were not a significant predictor of the overall preparedness level of Nebraska EMS providers (β = 1.359, p=.196). The variance explained by this model is low (Nagelkerke R square = .029). However, the model predicts 87.7% of the responses correctly. The model is substituted below.

PL = -3.178 + 1.359 X1 +℮ (Model 4)

Table 25. Logistic Regression Significant Results

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|   | B | S.E. | Wald | df | Sig. | Exp(B) |
| Participated in Disaster Training (yes) | 1.359 | 1.052 | 1.669 | 1 | .196 | 3.892 |
| Constant | -3.178 | 1.021 | 9.696 | 1 | .002 | .042 |

Table 25 Model Summary for

|  |  |  |  |
| --- | --- | --- | --- |
| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
| 1 | 112.660a | .016 | .029 |

Table 26. Model Prediction

|  |  |
| --- | --- |
| Observed | Predicted |
| PL | Percentage Correct |
| Not prepared | Prepared |
| Step 1 | OverallPreparedness | Not prepared | 135 | 0 | 100.0 |
| Prepared | 19 | 0 | 0.0 |
| Overall Percentage |   |   | 87.7 |
| a. The cut value is .500 |

***Research Question 1.6.*** *Does the perceived threat that a provider's community is at real risk of a bioterrorism attack predict the overall level of preparedness of the healthcare providers?*

The results indicate that the perceived threats of bioterrorism attack in the community was not a significant predictor of the overall preparedness level of Nebraska EMS providers (β= -.683, p=.300). The variance explained by this model is low (Nagelkerke R square = .015). The model predicts 87.5% of the responses correctly. The predictive model is substituted below:

Log PL = -.651 -.224x1 + ℮ (Model 5)

Table 27. Logistic Regression Significant Results

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|   | B | S.E. | Wald | df | Sig. | Exp(B) |
| Perceived Threat (yes) | -.683 | .659 | 1.074 | 1 | .300 | .505 |
| Constant | -1.802 | .270 | 44.605 | 1 | .000 | .165 |

Table 28. Model Prediction

|  |  |  |  |
| --- | --- | --- | --- |
| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
| 1 | 113.326a | .008 | .015 |

Table 29. Model Prediction

|  |  |
| --- | --- |
| Observed | Predicted |
| PL | Percentage Correct |
| Not prepared | Prepared |
| Step 1 | OverallPreparedness | Not prepared | 133 | 0 | 100.0 |
| Prepared | 19 | 0 | 0.0 |
| Overall Percentage |   |   | 87.5 |
| a. The cut value is .500 |

***Research Question 1.7.*** *Do the demographics, perceived threat of bioterrorism attack, perceived benefits of bioterrorism training, previous trainings, and previous drills predict the level of preparedness of the healthcare providers?*

Using the model of the regression analysis, the final step of the regression analysis using backward elimination method, the results show that previous drills (β= 1.324, p=. 013) was the only significant predictors of overall preparedness of the Nebraska healthcare providers. Explanation of variance from this model is low (Nagelkerke R square = .140). The model predicts 86% of the responses correctly.

Table 30. Logistic Regression Significant Results

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|   | B | S.E. | Wald | df | Sig. | Exp(B) |
| City Type |  |  | .025 | 2 | .988 |  |
| Rural | .179 | 1.133 | .025 | 1 | .874 | 1.196 |
| Urban | -19.754 | 10437.430 | .000 | 1 | .998 | .000 |
| Previous drills | 1.324 | .533 | 6.168 | 1 | .013 | 3.760 |

Table 31. Model Summary

|  |  |  |  |
| --- | --- | --- | --- |
| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
| 1 | 82.289a | .184 | .332 |
| 2 | 82.836a | .181 | .326 |
| 3 | 85.592a | .164 | .296 |
| 4 | 86.698a | .157 | .284 |
| 5 | 89.522a | .140 | .252 |
| 6 | 91.086a | .130 | .234 |
| 7 | 94.587a | .107 | .193 |
| 8 | 96.338a | .096 | .172 |
| 9 | 99.010a | .078 | .140 |

Table 32. Model Prediction

|  |  |
| --- | --- |
| Observed | Predicted |
| PL | Percentage Correct |
| Not prepared | Prepared |
| Step 1 | PL | Not prepared | 116 | 1 | 99.1 |
| Prepared | 14 | 5 | 26.3 |
| Overall Percentage |  |  | 89.0 |
| Step 2 | PL | Not prepared | 116 | 1 | 99.1 |
| Prepared | 14 | 5 | 26.3 |
| Overall Percentage |  |  | 89.0 |
| Step 3 | PL | Not prepared | 117 | 0 | 100.0 |
| Prepared | 15 | 4 | 21.1 |
| Overall Percentage |  |  | 89.0 |
| Step 4 | PL | Not prepared | 117 | 0 | 100.0 |
| Prepared | 15 | 4 | 21.1 |
| Overall Percentage |  |  | 89.0 |
| Step 5 | PL | Not prepared | 117 | 0 | 100.0 |
| Prepared | 18 | 1 | 5.3 |
| Overall Percentage |  |  | 86.8 |
| Step 6 | PL | Not prepared | 117 | 0 | 100.0 |
| Prepared | 18 | 1 | 5.3 |
| Overall Percentage |  |  | 86.8 |
| Step 7 | PL | Not prepared | 117 | 0 | 100.0 |
| Prepared | 19 | 0 | 0.0 |
| Overall Percentage |  |  | 86.0 |
| Step 8 | PL | Not prepared | 117 | 0 | 100.0 |
| Prepared | 19 | 0 | 0.0 |
| Overall Percentage |  |  | 86.0 |
| Step 9 | PL | Not prepared | 117 | 0 | 100.0 |
| Prepared | 19 | 0 | 0.0 |
| Overall Percentage |  |  | 86.0 |
| a. The cut value is .500 |