Available literature suggests that research in breast cancer has been done from different points of view such as finding relationship between breast cancer and demographic, socio-cultural, and socio-economic variables. However, fitting statistical models by considering both internal (such as topography, extent, laterality, behavior of breast cancer) and external (age, sex, and region) is quite rare. Furthermore, there has not been any exploration with Saudi breast cancer data so far. In this thesis, we developed a statistical model that best describes the breast cancer grades among patients in Saudi Arabia using information obtained from Saudi Cancer Registry. In addition, our interest was to have a better insight of breast cancer in Saudi Arabia with respect to the variables under study.

The study analyzed over eight thousand breast cancer cases (with complete information for all subjects) obtained from Saudi Cancer Registry covering the period January 2001 to July 2014. Frequency tables, graphs and some descriptive statistics for the study variables are presented as a part of exploratory analysis. Pairwise association of breast cancer grades and other prospective risk factors is examined by Chi-square tests of association. Two-sample t test is used to check if there is any difference in Ages on average by patients’ gender status. To compare ages across grade we applied a one-way ANOVA. As a part of multivariate analysis, a
multinomial logistic model and an ordinal logistic regression model are developed with breast cancer grade as the response variable and the available demographic and other factors as predictor variables.

Our study shows that breast cancer grades significantly differ across Extent, City (Region), Laterality and Topography individually. The odds ratios (ORs) for comparing the grades across significant predictors’ levels are computed from the best fitted ordinal regression model. Patients with higher breast cancer grades (II–IV) in the cities Baha, Jazan, Jouf, Najran, Northern and Taluk are not significantly different than the patients in city Asir while compared with grade I. Odds of being in higher breast cancer grades (II-IV) for the cities Eastern, Hail, Madinah, Makkah, Qassim and Riyadh are significantly lower than the patients in city Asir as compared to patients in lower grade. The odds of being in higher breast cancer grades (II-IV) for the Central Portion of breast is 0.65 times Nipple compared to lower grade and is statistically significant. The other categories of Topography seem to have no significant impact on explaining grades of breast cancer. The odds of being in higher breast cancer grades (II-IV) are significantly lower for the Extent categories as compared to Distant Metastasis.