



A COMPARATIVE STUDY OF NORMAL DELIVERY RATE BETWEEN URBAN AND RURAL WOMEN AND ANALYZING VARIOUS FACTORS INFLUENCING MODE OF DELIVERY

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Abstract: Maternal Outcome will be happen by either normal (vaginal) delivery or caesarean delivery. In the study we are going to compare normal delivery rate between rural and urban women for the last ten years. And we are going to analyze factors like social, economical, cultural, medical, physical factors that influencing the mode of delivery. In this study we are preparing set of questions for rural and urban women who had delivery experience at least once for the last ten years. The survey had been taken from them. From the collected data we are going to find normal delivery rate variation between rural or urban. We are analyzing and framing certain social, economical, cultural, medical, physical, scientific factors that influence the mode of delivery from the data collected. We are also going to discuss the reasons for increasing or decreasing rate of mode of delivery. We are going to do classification, clustering, association rules mining using Weka tool.

Keywords: Data mining, classification, clustering, association rules, mode of delivery.

I Introduction

. During pregnancy, there will lot of changes and symptoms found in women. Some of them are:

- Changes in appetite: eating too much or having little interest in food,
- Changes in sleep, such as trouble sleeping or sleeping too much,
- Lack of energy,
- Feeling sad, hopeless or worthless,
- Crying for no reason and
- Loss of interest or pleasure in activities they normally enjoy

- Abnormal pain
- Rising in Sugar and BP levels
- Thyroid problems
- Tension
- Anger
- Hormonal changes
- Tiredness
- Cramping
- Breast Tenderness and Changes
- Aches and Pains
- Morning Sickness
- Increased Urination

In the study we are going to compare normal delivery rate between rural and urban women for the last ten years. And we are going to analyze factors like social, economical, cultural, medical, physical factors that influencing the mode of delivery. In this study we are preparing set of questions for rural and urban women who had delivery experience at least once for the last ten years. The survey had been taken from them. we are finding the normal delivery rate variation in rural or urban areas. We are analyzing and framing certain social, economical, cultural, medical, physical, scientific factors that influence the mode of delivery from the data collected. Data are collected from various age groups from 18 to 45 who had delivery experience within last 10 years and about 200 data were collected from Thiruchirappalli District, in which various problems are analyzed regarding pregnancy. 100 data had been collected from urban areas and 100 data had been from rural areas. The survey includes 55 questions and the data were collected directly from public. We are going to do classification, clustering, association rules mining on the collected data. For that we are going to use decision tree algorithm for classification. We are going to use two different decision tree algorithm namely J48 pruned tree, Random tree and we are going to compare the results and accuracy obtained using these two algorithms. For clustering, we are going to use k-means clustering algorithm and for association rules mining we are going to use Apriori algorithm. We are going to use the above algorithms on collected data and visualize the results using Weka version 3.8 software.

II Literature Review

A number of factors play significant roles in influencing the mode of delivery. For most women, normal delivery is spontaneous. In some cases, however, with pregnancy related complications, c-section delivery is preferred. A number of medical factors such as mother's age, size of the child at birth are considered as possible risk factors leading to caesarean delivery. Caesarean delivery is also influenced by non-medical factors such as cultural factors, socio-economic factors, environmental factors and habitual factors. Maternal request, the doctor's preference also play important roles in mode of delivery. It has been a common statement that there is a higher prevalence of caesarean delivery in private health facilities rather than public ones. But nowadays, the rate of caesarean delivery has been increasing in public sectors (Government Hospitals). The majority people participated in this survey had commonly stated that most of the government hospitals are preferring caesarean delivery as there is a chance for normal delivery because of heavy work and risk in normal delivery. And some women had voluntarily preferring caesarean delivery in both public and private sectors due to fear of labour pain in normal delivery.

III Methodology

A. Data Sources

There are numerous factors influencing mode of delivery in women. The questionnaire was prepared by including the questions based on socio-economic factors, cultural factors, environmental factors, Institutional factors, physical factors, habitual factors, risk factors and clinical reasons. The survey had been taken from 200 women as 100 from urban and 100 from rural areas of Thiruchirappalli district, Tamilnadu. The response was satisfying.

B. Statistical Analysis

Weka is a tool that contains a collection of algorithms and visualization tools for data analysis and predictive modelling, together with graphical user interfaces for easy access to these functions. Weka supports several standard datamining tasks as clustering, classification, regression, visualization and feature selection. It is used to analyze the most significant factors influencing mode of delivery. It is also used to perform statistical analysis of each individual attribute.

C. Data Mining

Data Mining may be defined as the composite of techniques employed to detect patterns in large datasets to extract hidden pieces of information.

i) *Use of Classification techniques*

Classification is a data mining function that assigns items in a collection to target categories or classes. The goal of classification is to accurately predict the target class for each case in the data.

ii) *Use of k-means clustering*

k-means clustering aims to partition n observations into k clusters in which each observation belongs to the cluster with the nearest mean, serving as a prototype of the cluster.

iii) *Use of Association rule mining*

Association rule mining is a procedure which is meant to find frequent patterns, correlations, associations, or causal structures from data sets found in various kinds of databases such as relational databases, transactional databases, and other forms of data repositories

IV RESULTS AND DISCUSSION

Two different classification techniques are used to produce the following results:

Table I

Rate of normal and caesarean delivery in rural and urban areas of Thiruchirappalli from the collected data

Area	Normal Delivery	Caesarean Delivery
Urban	38	62
Rural	32	68

Table II

Stratified Cross Validation Summary of Two Different Classification Trees

	J48 Pruned Tree		Random Tree	
No of leaves	5			
Size of tree	7		223	
No. of records/attributes	10		10	
Correctly Classified Instances	150	75%	137	68.5%
Incorrectly Classified Instances	50	25%	63	31.5%
Kappa statistic	0.3194		0.2851	
Mean absolute error	0.3496		0.3117	
Root mean squared error	0.444		0.5207	
Relative absolute error	78.3472%		69.839%	
Root relative squared error	94.0421%		110.2962%	
Total number of instances	200		200	

Table III

Comparative Study Of Two Different Classification Trees-Detailed Accuracy By Class

	Tp Rate	Fp Rate	Precision	Recall	F-Measure	Mcc	Roc Area	Prc Area	Class
J48 Pruned Tree	0.582	0.226	0.534	0.582	0.557	0.320	0.705	0.559	Normal
	0.774	0.418	0.780	0.774	0.762	0.320	0.705	0.783	Caesarean
Random Tree	0.507	0.226	0.531	0.507	0.519	0.285	0.672	0.488	Normal
	0.744	0.493	0.757	0.744	0.776	0.285	0.672	0.758	Caesarean

Hence we find that J48 pruned tree is relatively better technique in terms of accuracy in classifying the given record sets with an accuracy of 75%.

Table IV

	Initial Cluster Centroids		Final Cluster Centroids	
	Cluster 0	Cluster 1	Cluster 0	Cluster 1
Mode	Caesarean	Normal	Caesarean	Normal
Bmi	27.2581	24.9252	27	29
Grown Place	Urban	Urban	Rural	Rural
Walking	Yes	No	Yes	Yes
H-Work Level	Moderate	Moderate	High	High
Stress Level	High	Moderate	High	Moderate
Happiness Level	High	High	Very high	High
Choose CS	Yes	No	Yes	No
Born Weight	2kg	3kg	2kg	3kg
Complication	No	No	No	No

Within cluster sum of squared errors: 714.031

Clustered instances

0 93 (47%)
 1 107 (53%)

Use of association rule mining on WEKA for the given data yielded the following results:

Minimum support: 0.3(60 instances)
 Minimum metric <lift>: 1.1
 Number of cycles performed: 14

Generated set of large item sets:

Size of set of large item set L (1):11
 Size of set of large item sets L (2):23
 Size of set of large item sets L (3):15
 Size of set of large item sets L (4):2

Best rules found:

Table V

Association Rule Mining With Weka On Given Dataset

	Association Rules Found	Support	Confidence	Lift	Level	No. Of Records	Convergence
1	Mode=Caesarean 133=>Choose Caesarean=Yes 77	77/133	0.58	1.35	0.1	19	1.33
2	Choose Caesarean=Yes 86=>Mode=Caesarean 77	77/86	0.9	1.35	0.1	19	2.88
3	Mode=Caesarean 133=>Bmi="All" Choose Caesarean=Yes 77	77/133	0.58	1.35	0.1	19	1.33
4	Mode=Caesarean Bmi="All" 133 Choose Caesarean=Yes 77	77/133	0.58	1.35	0.1	19	1.33
5	Choose Caesarean= Yes 86=>Mode=Caesarean Bmi="All" 77	77/86	0.9	1.35	0.1	19	2.88

6	Bmi="All" Choose Caesarean=Yes 86==>Mode=Caesarean 77	77/86	0.9	1.35	0.1	19	2.88
7	Mode=Caesarean 133==>Choose Caesarean=Yes Complication=No 60	60/133	0.45	1.31	0.07	14	1.18
8	Choose Caesarean=Yes Complication=No 69==>Mode=Caesarean 60	60/69	0.87	1.31	0.07	14	1.18
9	Mode=Caesarean 133==>Bmi="All" Caesarean=Yes Complication=No 60	60/133	0.45	1.31	0.07	14	1.18
10	Mode=Caesarean Bmi="All" 133 Caesarean=Yes Complication=No 60	60/133	0.45	1.31	0.07	14	1.18

V Conclusion

In this work we made an attempt to use data mining as a tool for analyzing factors influencing mode of delivery. And we made an attempt to find the normal and caesarean delivery rate in rural and urban areas. Data for the survey were collected from 200 women such that 100 from rural and 100 from urban areas in and around Tiruchirappalli district. In this work weka tool had been used for performing various data mining processes like associative rules mining, clustering, classification. Every method had been very helpful in extracting key information regarding normal and caesarean delivery. Two classification methods were used on the same record set to produce almost similar results at varying levels of accuracy. Among the two J48 pruned tree was found to be relatively more accurate in classification. From the results we found that Caesarean delivery was increasing in rural areas than in urban areas. As there are many reasons due to stress, work, unhealthy and unbalanced diet and life style the other reason that most of the people participated in the survey commonly stated as most of the government hospitals nowadays as preferring caesarean delivery as there is a better chance for normal delivery because of heavy work and risk in normal delivery. And also the awareness of normal delivery benefits had been increasing in urban areas and educated women. There are many factors that affects normal delivery. The main reasons are stress, work level, bmi ,life style, child born weight. This work can be further used in future to predict the mode of delivery in advance and to find the percentage of chances for normal delivery

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