

AN ANALYTICAL STUDY ON RURAL LIVELIHOOD IN AN INDIAN STATE

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ABSTRACT

The present study aims, to identify the most influencing factors on rural livelihood in an Indian state, West Bengal, to investigate the impact of those factors on standard of living in rural areas in West Bengal. In this regard a descriptive research is performed to identify the factors of importance in Indian rural livelihood. Firstly, graphical representation is shown to draw a brief sketch on rural livelihood in West Bengal. Factor Analysis is used to identify major factors, crosstab Analysis is applied to check the association between dependent and independent variables and to test the hypothesis. Logistic Regression Analysis is executed to investigate their influence level and to form an equation on the basis of the same. Then an overall framework has been established with the help of the findings of the above analysis for Governmental policy implementation with the help of the Bayesian Probabilistic Network.

KEYWORDS: Rural Livelihood, West Bengal

INTRODUCTION

Human life is very dynamic. The reason of dynamism is its association and dependency on various factors. Such factors can be Social, Economic, Environmental, Political, Natural etc. The sum effect of these factors in human life can be explained through standard of living. Standard of living is measured on the basis of abundance of wealth, comfort, physical goods and necessities available to a certain socioeconomic class at a certain geographical location and at a particular time. Hence it is also highly dynamic.

Improving standard of living is a continuous process. Such process is full of challenge when it is related to rural areas facing some environmental hazards such as regular flooding, or frequent earthquake, proximity to the jungle.

Rural development can be defined as a strategic process aimed at improving the standard of living and economic well-being of people living in remote villages and environmental hazardous sparsely populated areas.

Traditionally, rural development was based on the distribution of land-intensive natural resources such as agriculture and forestry. But restructuring in the global production map and increased urbanization due to continuous population pressure have reinvented the character of rural areas. The importance of rural communities has increased manifold to approach development from a wider perspective rather than merely creating a development structure based on agricultural or resource based businesses. Rural development is emphasized more on development strategies focused locally. Different rural development approaches and strategies are adopted globally as rural areas are highly distinctive from one another. Education, physical infrastructure, and social infrastructure, availability of natural resources are the influencing player in developing rural regions and rural standard of living.

LITERATURE REVIEW

Lal et al. (2014) conducted a survey of the agricultural problems faced by the farmers. This paper focused on the impact of agriculture on the rural livelihood and how to get a permanent high yield. Biswas P. K (1993) performed a study on the dependency of rural people in the forest life for their daily livelihood. This paper dealt with institutional arrangements for the availability of livelihood options for rural villagers and optimum uses of forest resources for the development of the country. Das. Dinesh & Pathak Minakshee (2012) made a comparative study on the difference of rural and urban lifestyles. This study depicts that there exists a great difference in the two styles. This difference is generally not only for income but also in respect to infrastructure and other relevant factors. Kumar Pardeep (2015) illustrated that the effect of social and economic factors influencing the Indian markets. A study on rural and urban consumers in up growing market in India and the consumer's attitude. The study revealed that there is a growth both in urban and rural sectors. Gunnsteinsson et. al. (2010) studied the living standards of the people, the agricultural standards and identification of the target population for introducing poverty removal programme. It was seen that the standard of living increased in last 6 years. Ray, Basu SS, Basu AK (2011) conducted an analysis in order to access the condition and availability of hygiene, infrastructure and safe drinking water. It was observed that very people go to the doctor in case of acute sickness also. Post Natal Care in case of deliveries, Neonatal care should be improved otherwise the maternal mortality rate will be higher. **Tarafder Syfujjaman, Jana N C** (2016) made a study on rural development in the two districts of Murshidabad and Burdwan. This research is done in the field of concern rural social development, poverty level, availability of basic infrastructure facilities, standard of living and quality of life of the rural people.

OBJECTIVE OF THE STUDY

- To find out the most significant factors affecting rural livelihood and to identify their influencing level
- To cross check whether the standard of living is associated with those variables.
- To frame a model with the help of dependent and independent variables.

RESEARCH METHODOLOGY

Descriptive research design is used to obtain information concerning the current status of the phenomena and to describe the relation between the variables. Questionnaire survey method is used to conduct the study in remote villages of North and Bengal. 101 families were interviewed during a tenure of 4 months of research. After the collection of data, graphical representation is shown to draw a brief sketch on rural livelihood in West Bengal. Factor Analysis is used to identify major factors, considering those significant variables cross tab analysis is done with Cremer's V and Chi square test to study its influence on the standard of living and to test the hypothesis. Logistic Regression is executed to investigate their influence level and to form an equation on the basis of the same.

HYPOTHESES

H_0 = Variables under study and the standard of living is independent of each other i.e. there is no association between them.

H_a = There is association between standard of living and variables under study.

DATA ANALYSIS

Various Govt Entitlements Availed by Respondents

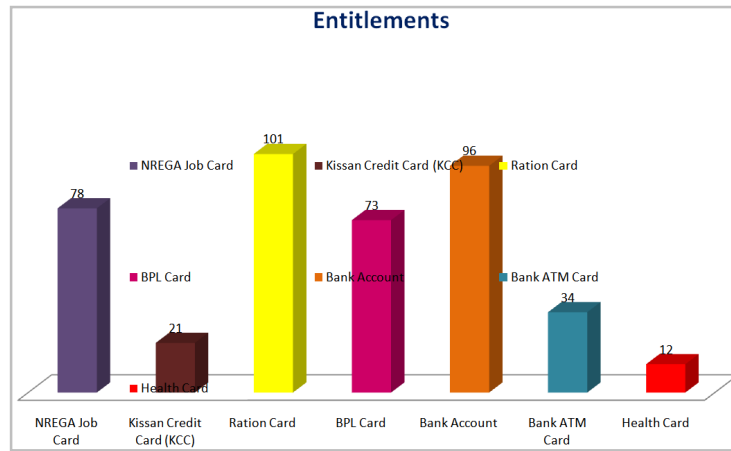


Figure 1

From the analysis of the above diagram it is observed that the entire respondent is having Ration card & 96% of the respondents are having a bank account. But only 34% of them have Bank ATM card. Most of them do not have any health card. Almost 80% of the respondents hold NREGA job card, where as 21% have kissan credit card and 73% have BPL card.

Level of Assets Possessed by the Respondent

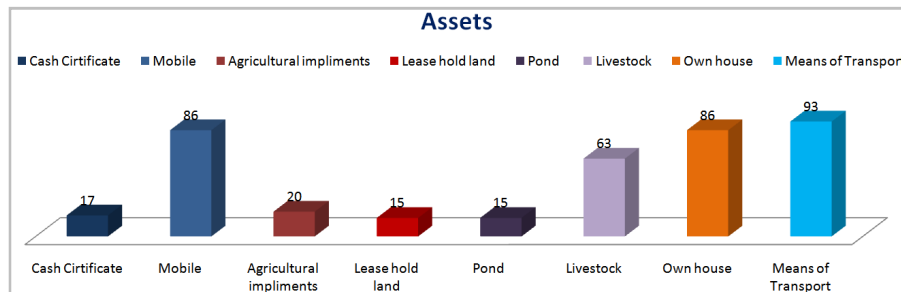


Figure 2

From the above diagram it is observed that most of them, i.e. above 90% have personal means of transportation (two wheelers). Above 80% of respondents have own house and they use mobile phone.

Major Sources of Cooking

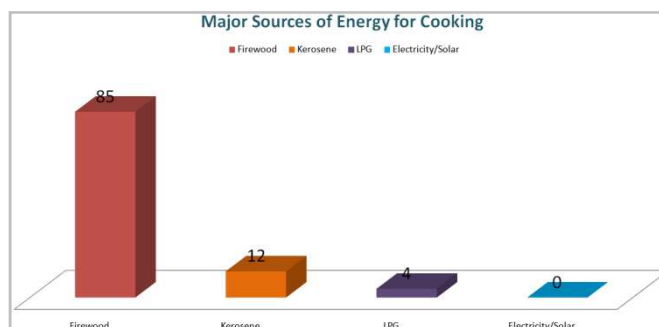


Figure 3

85% of the respondents use firewood as major sources of energy for cooking. Very few of them use kerosene and LPG gas. Solar power is not used by them as a source of energy for cooking.

Types of Cooking Stove Used

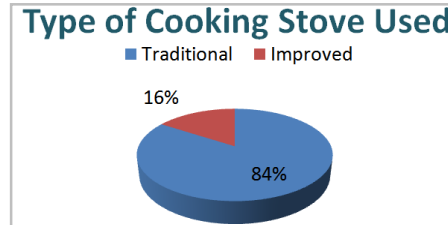


Figure 4

Previous findings are supported by the above diagram where it can be found out that 84% of the respondents use a traditional cooking kiln.

Type of House

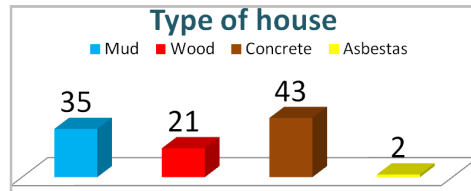


Figure 5

From the above diagram it can be seen that 43% of the respondent live in concrete house. 35% live in mud houses. 21% live in wood house and only 2% use asbestos.

Sources of Water

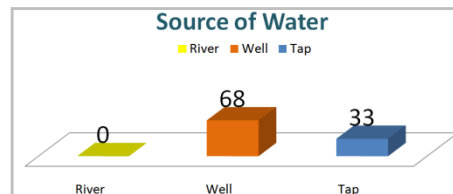


Figure 6

Well is used by 68% respondent as a major source of water. Very few use tap water and none of them have access to river water.

INTERPRETATION OF FACTOR ANALYSIS

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.684
Bartlett's Test of Sphericity	Approx. Chi-Square	1148.467
	df	325
	Sig.	.000

KMO and Bartlett's Test of Sphericity----- The Kaiser-Meyer-Olkin measure of sampling adequacy tests whether the partial correlations among variables are small. KMO should be greater than 0.5. Bartlett's test of Sphericity tests the

Null Hypothesis that the variables are independent of each other. If the significance level in Bartlett's test of sphericity is less than 0.05 then it suggests that variables are significantly correlated. In this study KMO value is 0.684 which says sampling is adequate and Bartlett's test of sphericity signify the variables are not independent.

From Rotated component matrix it is can find that variable which has loads above 0.8 is considered to have a significant weighting on the factor and thus also influencing the dependent variable as well.

A list of the variables where loading is > than 0.8 are **Food supply, Electricity supply, Availability of clean water at the household and Proximity of bus/motor vehicle station from the house**

Interpretation of Crosstab Analysis

It is found out from the factor analysis that the above five variables have significant influence on the factors. Now with the help of cross tab analysis and using Chi-square and Cramer's V we try to find out whether there is any relation between standard of living and those variables and the strength of the relation. From the result of this analysis, we will accept or reject our null hypothesis that there is no relation.

Standard of Living * Food Supply Cross Tabulation

Table 1

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	22.504 ^a	12	.032
Likelihood Ratio	21.294	12	.046
Linear-by-Linear Association	5.991	1	.014
N of Valid Cases	101		
Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.472	.032
	Cramer's V	.273	.032
N of Valid Cases		101	

HYPOTHESIS TESTING

Analyzing the above output it is observed that there is a significant association between standard of living and **Food supply** at the level of significance of Chi-square test is less than 5%. Cramer's V value of 0.273 signifies a moderately strong association between them.

Standard of Living * Electricity Supply Cross Tabulation

Table 2

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.199 ^a	12	.288
Likelihood Ratio	14.504	12	.270
Linear-by-Linear Association	8.097	1	.004
N of Valid Cases	100		
Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.377	.288
	Cramer's V	.218	.288
N of Valid Cases		100	

HYPOTHESIS TESTING

Analyzing the above output it is observed that there is a significant association between standard of living and **Electricity supply** at the level of significance of Chi-square test is less than 5%. Cramer's V value of 0.218 signifies a moderately acceptable association between them.

Standard of Living * Availability of Clean Water at Household Cross Tabulation

Table 3

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	22.137 ^a	12	.036
Likelihood Ratio	24.738	12	.016
Linear-by-Linear Association	3.433	1	.064
N of Valid Cases	101		
Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.468	.036
	Cramer's V	.270	.036
N of Valid Cases		101	

HYPOTHESIS TESTING

Analyzing the above output it is observed that there is a significant association between standard of living and **Availability of clean water at household** at the level of significance of Chi-square test is less than 5%. Cramer's V value of 0.27 signifies a moderately strong, desirable association between them.

Standard of Living * Proximity of Bus/Motor Vehicle Station from House Cross Tabulation

Table 4

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	15.920 ^a	12	.195
Likelihood Ratio	14.473	12	.272
Linear-by-Linear Association	1.207	1	.272
N of Valid Cases	101		
Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.397	.195
	Cramer's V	.229	.195
N of Valid Cases		101	

HYPOTHESIS TESTING

Analyzing the above output it is observed that there is a significant association between standard of living and **the proximity of bus/motor vehicle station from the house** as the level of significance of Chi-square test is less than 5%. Cramer's V value of 0.229 signifies a moderately acceptable association between them.

Hence the null hypothesis stands rejected i.e. the variables under study and the standard of living is independent of each other i.e., there is no association between them is rejected. So, there is an association between the variables under study and standard of living.

Associations between two ordinal variables and measured through following standard tests: **chi square test, Mantel-Haenszel Chi-Square, Cramer's V, Fisher's Coefficient and Odds ratio**

Tests were conducted on all the variables and output matrix for significant association is given below:

Table 5

SI No	Variable	Chi square	M-H Chi Square	Cramers V	Fisher's test	Odds ratio
1	Hiedu	0.0075	0.0059	0.4136		
2	Foodsupply	0.0069	0.0073	0.3228	0.0106	12
3	Rationing	0.0233	0.0243	0.2711	0.0154	3.2857
4	CwaterHH	0.0128	0.0134	0.2998	0.0140	5.4737
5	storagewater	0.0366	0.0380	0.2498	0.0254	3.0222
6	KCC	0.0267	0.0279	-0.2648	0.0191	0.2333
7	Mobile	0.0013	0.0014	-0.3836	0.0020	0.0976
8	Agriimple	0.0369	0.0382	-0.2495	0.0279	0.2067
9	Pond	0.0172	0.0181	-0.2846	0.0154	
10	ownhouse	0.0274	0.0286	-0.2636	0.0276	0.2143
11	transport	0.0483	0.0499	-0.2361	0.0624	0.1369
12	asset	0.0043	0.0004	0.4365		
13	repaydebt	0.0246	0.3746			
14	savings	0.0109	0.0115	0.0087		
15	elecsupply	0.0015	0.0017	0.3842	0.0019	6.9667
16	proxischool	0.0065	0.0069	0.3250	0.0048	5.00
17	avaibank	0.0028	0.0030	0.3570	0.0024	4.6154
18	proxibank	0.0127	0.0133	0.2980	0.0093	3.5214
19	proxibus	0.0014	0.0015	0.3812	0.0013	5.1667
20	social	0.0226	0.0239	0.2724	0.0181	3.5357
21	human	0.0226	0.0236	0.2724	0.0181	3.5357
22	natural	0.0200	0.0209	0.2780	0.0135	3.2986
23	physical	0.0005	0.0005	0.4161	0.0005	6.1354
24	financial	0.0003	0.0004	0.4275	0.0003	6.5934

- Two variable availability of bank and proximity of the bank are found significantly correlated among themselves. This result in consideration of one variable - availability of bank with highest odds ration among two.
- Top 5 variables with a higher odds ratio were considered for building a logistic regression model of training data.
- Different models and their outcome against a model validation parameters are depicted below:

Table 6

Model	Parameters	InterceptPr> chi Sqr	Pr> chi Sqr	wald	AIC	SBC	C	Con	Dis	Tie
1	Food Supply	0.0972	0.0255	0.0255	89.942	94.439	0.599	21.7	1.8	76.5
2	Food Supply		0.1138							
	Elec Supply	0.0397	0.0224	0.0103	83.451	90.109	0.707	46.9	5.6	47.5
3	Food Supply		0.0658							
	Elec Supply		0.0226							
	C Water HH	0.0023	0.0119	0.0030	77.837	86.656	0.777	63.3	8.0	28.7
4	Food Supply		0.0551							
	Elec Supply		0.0423							
	C Water HH		0.0449							
	Proxibus	0.0010	0.0109	0.0025	72.917	83.941	0.827	76.4	11.0	12.7
5	Food Supply	0.0014	0.0730							
	Elec Supply		0.0591							
	C Water HH		0.0429							
	Proxi Bus		0.0347							
	Proxi School		0.6313	0.0055	74.686	87.914	0.837	79.9	12.6	7.5
6	Elec Supply	0.0029	0.0105							
	C Waterhh		0.0611							
	Proxi Bus		0.0529							
	Proxi School		0.3696	0.0045	76.729	87.753	0.815	76.6	13.7	9.7
7	Elec Supply	0.0054	0.0023							
	C Water HH		0.0213	0.0019	80.081	86.695	0.732	54.9	8.4	36.7
8	Elec Supply	0.0049	0.0130							
	C Water HH		0.0234							
	Proxi School		0.0766	0.0033	78.635	87.454	0.792	69.7	11.4	18.9

As per logistic regression procedure:

- **Pr> Chi Square:** Parameters should be significant
- **Wald:** Like F test in the regression model, Wald statistics ensures model fitness
- **AIC (Akaike Information Criterion):** less the value of AIC, better is the model
- **SBC (Schwarz Basic Criterion/ Bayesian information criterion):** less the value of the SBC, better is the model
- **C Statistics:** Higher the value of C, better the model is.
- **Con (Concordance):** Situation with higher probability should have a higher chance of containing positive event
- **Dish (Discordance):** Situation with lower probability should have a higher chance of containing negative event
- **Tied:** Two situations with equal probability give different (opposite) outcome

Considering all parameters, **Model 4** is the best fit model and coverage under **ROC curve** – another model fit measurement criterion, is around **83%** which is considered to be very sound. It is to be noted that almost all the **variation are significant at the 5 % level** and the **model Wald value** – standard criterion for significance of the **model as a whole**, is **0.0025** which is also significant at 5% level. The area under the ROC curve is given below:

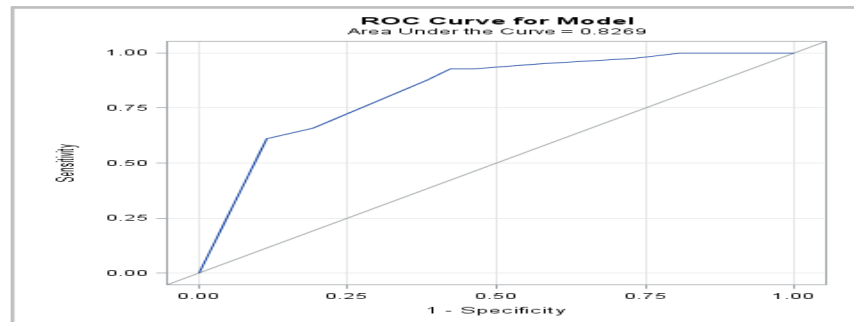


Figure 7

The **logistic regression equation** is:

$$\text{Log} \left(\frac{\text{over all Satisfaction}}{1-\text{overall satisfaction}} \right) = -5.2500 + 2.3907 * \text{foodsupply} + 1.6102 * \text{elecsupply} + 1.7210 * \text{cwaterHH} + 1.6232 * \text{proxibus}$$

Above equation was applied to the test/ validation data (30%) which predicted correctly for 81.33% cases.

This process has been followed for all the above models before arriving to a best fit model.

CONCLUSIONS

It is observed that, while collecting the data from the villages, getting a continuous supply of drinking water during rainy season is the utmost priority. Primary schools are available, but for higher education, distance is the biggest hindrance, as the colleges are very far from the villages. Firewood is used as a source of energy, for cooking by majority of people. Collection of firewood is a big challenge, during rainy season. Ration system is functioning properly, as mentioned by a majority of the respondents. Various Govt facilities are availed by the respondents, but there is more demand of job under NREGA scheme. The health card facility is availed, by only a few villagers hence, requiring more attention in that area. Most of the villagers depend on motor van or cycle, for transportation. An easier transport facility is required to communicate with nearest city. Primary Health Centre is available and functioning properly.

From the factor analysis, it is found that, **Food supply, Electricity supply, Availability of clean water at the household and Proximity of bus/motor vehicle station from the house**, have the significant factor loading, as follows 0.889, 0.857, 0.796, 0.784, 0.744. According to the Chi-Square test the H_0 is rejected since the significance level is less than 5%. The Cramers'V value between Standard of Living and the above variables are as follows 0.273, 0.27, 0.265, 0.293, 0.353, which signify a strong association with Standard of Living. The logistic regression result also corroborates, with the findings of factor analysis. Hypothesis testing with the help of cross tab analysis depicts that standard of living is affected by those above variation. Lastly, from the study it is concluded that, following five variables have the most significant impact on rural livelihood, where environmental condition is hazardous.

Thus, this research lays the foundation for future investigation on the rural standard of living, including more state wise and nation wise comparison to evaluate and benchmark their perception level with the help of perceptual mapping and GAP analysis. Further, efficiency- productivity study of the rural livelihood may also be carried out, with the help of Data Envelopment Analysis, all over the world and finally, after a benchmarking study, Scenario and Causal analysis may be executed, using Bayesian Probabilistic Network (BPN), for Governmental policy implementation. A model, with the help of BPN has already been shown below, which may lead to Governmental policy implementation.

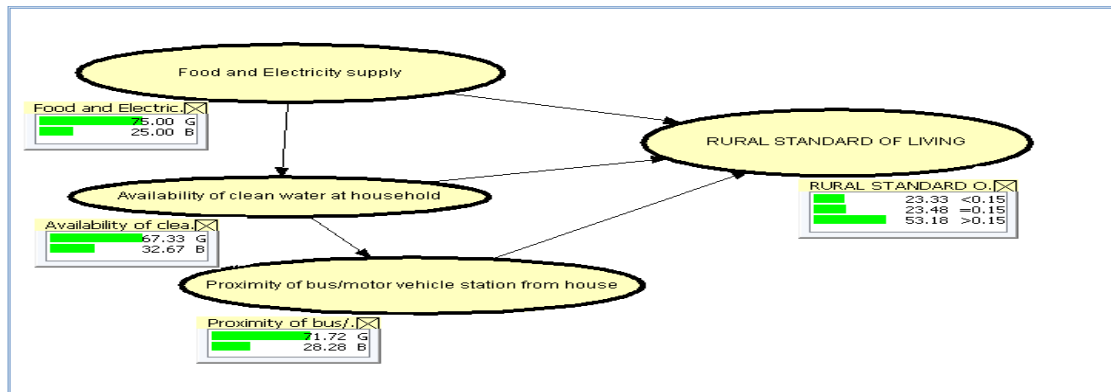


Figure 8

REFERENCES

1. Bairwa Shoji Lal, LakraKerobim, Kumar Pravin and Kushwaha S. (2014) "Sustainable Agriculture and Rural Livelihood Security In India" Shoji Lal Bairwa et al. / Journal of Science / Vol 4 / Issue10 / 2014 / 625-631.
2. Biswas P.K. www.fao.org/docrep/ARTICLE/WFC/XII/0586-C1.HTM
3. Das. Dinesh & Pathak Minakshee (2012) "The Growing Rural-Urban Disparity in India: Some Issues The Growing Rural-Urban Disparity in India: Some Issues" International Journal of Advancements in Research & Technology, Volume 1, Issue 5, October-2012 1
4. Kumar Pardeep (2015) "The International Journal Of Business & Management" The International Journal Of Business & Management (ISSN 2321 -8916)
5. Gunnsteinsson Snaebjorn, Labrique Alain B. , Keith P. West, Jr., Christian Parul, Mehra Sucheta, Shamim Abu Ahmed , Rashid Mahbubur, 509-519.
6. Ray SK, Basu SS, Basu AK (2011) "An assessment of rural health care delivery system in some areas of West Bengal-an overview" Indian J Public Health. 2011 Apr-Jun; 55(2):70-80. doi: 10.4103/0019-557X.85235.
7. Tarafder, Syfujjaman; Jana, Narayan Chandra (2016). Level of Rural Development in Burdwan and Murshidabad Districts, West Bengal: A Comparative Study. Space and Culture, India, [S.l.], v. 4, n. 1, p. 65-80, June 2016. ISSN 2052-8396.
8. http://rural.nic.in/sites/default/files/Annual_Report_2016_17_English_1.pdf
9. <http://capart.nic.in>