

Household distribution of disease burden in community health management: A study in desert - A. K. Dixit and P. K. Anand.

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Objectives

1. Identification of the distribution of disease burden at household level
2. Identification of household level risk factors of disease burden
3. Locating the pockets of population needing prioritized health care attention

Rationale

A study was designed to read disease burden (DB) at household (H/H) level, which is basic unit in the community in which health of an individual is a function of all the other members of the H/H. The disease burden at H/H level is a newer concept used to account for overall burden of diseases (BOD) found at H/H. It sums BOD of all diseases identified among the members of the H/H at the time of visit of the H/H. The study aimed to look for physical, economical and social characteristics of the H/H and to correlate them with total disease burden (DB) at H/H in order to determine household level risk factors of disease burden. 898 H/H from 30 villages in Jodhpur district were surveyed following standard sampling procedures. . The associations of H/H characteristics with H/H level disease burden were measured in terms of Odds Ratio (OR), using median of the distribution of H/H level disease burden as cut off point to decide upon the H/H, carrying more disease burden.

Progress of the work done

With an ultimate aim of the project to find ways to reduce the H/H DB; it was necessary to analyze the interaction of study factors in giving rise to H/H DB. Using multiple linear regression, contribution of each factor towards enhancing H/H DB was first determined. The concentration then has been on each level of the factors. To apprehend the current scenario, in this respect; the modal values of the levels of factors were read. The correlations of change in levels of factors with change in DB were obtained together with the slope in regression module. DB classes were formed as per low, medium and high DB range and within each class, the change in levels of factors was studied. Based on multiple regression and OR values worked out earlier, the modifiable factors to address DB in the community were identified. These help in identification of H/H needing prioritized attention. The interaction between levels of factors in each defined class of DB was studied.

Observations

All the study factors when put under multiple regression model with DB as dependent variable, yielded $R^2 = 14.36\%$. This shows that apart from the study variables, DB at H/H level is influenced with other factors. However, the factors under study certainly account for around 15% variation in DB.

The individual contribution of each factor under study is given in table 1. Though the Education is at the top but 30% contribution is accounted by the factors living area, cattle keeping and drinking water usage. These are well modifiable attributes and they have also figured in identified risk factors in terms of odds ratio (OR) earlier.

Table 2 presents the current scenario of factor level i.e. the most prevalent factor levels, which has gives average DB/HH as 1.0439 in the study area.

Table 3 presents the correlation and the slope values of these variables in simple linear regression mode. Each entry in this table is negative i.e. with increasing DB, speaking in general; each factor should tend to its lowest level.

Table 4 gives average change in levels of each factor in three defined classes of DB, based on its distribution. These figures simply reflect that a general statement made earlier that to address H/H DB, each factor under study should brought to its lowest is not of much importance. In fact if it is increase in factor level of some variable e.g. type of house from 1.05 to 1.18 in class I to II; it is a decrease from 1.18 to 1.06 in class II to III. The pattern of such changes encouraged to study interacting patterns of the factors, which is read through tables 5 & 6, and entails much importance in addressing H/H DB easily.

Table 5 presents two classes of DB and the modal values of levels of three identified modifiable variables viz. living area, cattle keeping and drinking water use. It is quite interesting to note from this table that, whereas level pattern (2,1,2) is mostly responsible for average DB of 5.646, level pattern (1,1,2) is responsible for average DB of .084 i.e. a high reduction in DB if only level 2 of the factor, living area is brought to level 1.

Outcome

The study puts three easily modifiable factors to address DB at H/H level. These factors viz. the living area, the cattle keeping and the drinking water usage account for 30% contribution in explaining the variations in DB, as compared to the variation explained by all the factors taken together, which is noted from table 1. We note from table 2 that in maintaining average level DB, living area and cattle keeping are just one level up from their lowest, whereas drinking water use is of course two level up. Though the usual regression provided an impression, as seen from table 3 that in order to lower the DB, each factor should be brought to its lower level, however studying the interactions between the levels of the factors, we get much easier way to address H/H DB. Table 4 provides the clue that levels of factors may increase or decrease in their interactive role in giving rise to DB. For the three factors identified, the interaction studied between levels of a factor with the other are presented in tables 5 and 6. From table 5, it can be seen that there is high reduction in

average DB per H/H; when living area is brought one level lower, even with levels of the other two factors unchanged. This provides the easier way to address DB in the community. Table 6 ultimately identifies the H/H carrying bigger load of DB in terms of factor levels and attracts for a prospective study to be taken to look for actual reduction in DB in time through addressing the identified level pattern of the three factors at desired level.

Important Leads

The study of interactive pattern of factors influencing DB at H/H identifies the H/H which requires prioritized attention and envisages a study, prospective in nature, to see for the magnitude of actual reduction in DB along with the time, through addressing the identified interactive pattern to a desired level. The results once confirmed through the prospective study, would help in devising easier ways to address DB in community.

Table 1. Individual contribution of study factors in terms of R in multiple regression module

Factor	Contribution (%)	Over all R ² (%)
Education level	59	14.36
Cattle keeping	24	
Drinking Water	5	
Social status	3	
Provision of Elect.	5	
Type of house	2	
Living area	2	
Total	100	

Table 2. Modal values of factor levels describing average disease burden per H/H

Factor	Modal value	Frequency(H/H %)	Av. DB per H/H
Type of House	2	403 (44.87)	1.049
Living area	1	497 (55.34)	
Provision of Elect.	0	489 (54.45)	
Cattle keeping	1	586 (65.25)	
Education level	3	201 (22.38)	
Social status	0	706 (78.61)	
Drinking Water	2	632 (70.37)	
Sanitation	0	682 (75.94)	

Table 3. Correlation and regression of study factors with disease burden per H/H

Factor	Correlation (r)	Slope (m)
Type of House	-.021	-0.111
Living area	-.016	-0.119
Provision of Elect.	-.007	-0.117
Cattle keeping	-.036	-0.283
Education level	-.036	-0.101
Social status	-.035	-0.293
Drinking Water	-.025	-0.212
Sanitation	-.028	-0.322

Table 4. Change in average level of factors as per change in disease burden classes

Factor	Disease Burden Classes		
	I	II	III
Average level of factors			
Type of house	1.05	1.18	1.06
Living Area	1.41	1.48	1.43
Electricity	.44	.52	0.51
Cattle keeping	.79	.82	0.72
Education	2.58	2.42	2.57
Social Status	.29	.30	0.25
Drinking Water	1.64	1.75	1.98
Sanitation	.24	.20	0.26

Table 5. Factor interaction pattern as per defined disease burden categories

Disease Burden Class	Factor Levels					
	Factors	Living Area	Cattle	Drinking water usage	Frequency (H/H)	Av. DB/HH
Low		1	1	2	163	0.84
High		2	1	2	34	5.646

Table 6. Factor interaction patterns describing average disease burden per H/H

Factor Levels				
Living Area	Cattle	Drinking Water	Av. DB/HH	
0	0	0	0	
1	2	2	0	
1	1	2	0.84	
2	1	1	5.43	
2	1	2	5.65	
2	0	1	14.30	