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Research Article

Evaluating National Rural Health Mission via critical lenses: Human Resources, Services, Infrastructure and Community knowledge

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Abstract:
Public health management plays a critical role developing and maintaining a healthy workforce for persistent economic development by making adequate contribution to human capital formation. Public health policy plays a significant role. Globally, nations contribute significant amount in developing health facilities for masses. Since implication of health policies largely affect the general public, it is significant to evaluate performance of health policies. In Indian context National Rural Health Mission (NRHM) is amongst the most comprehensive policy being implemented and its performance evaluation is critical from various aspects amongst which factors like human resources, services, infrastructure and community knowledge play a significant role. This paper is an attempt to build a model to understand amongst these factors which one have unique contribution in evaluating performance of NRHM.

Keywords: National Rural Health Mission (NRHM), Public Health Policy, Health System Performance Evaluation, Human Resources and Infrastructure in Healthcare, Community Awareness and Health Services.

INTRODUCTION

The NRHM is not an entirely new program of the Government of India; instead, it amalgamates several national programs, including The Reproductive and Child Health II project (RCH II), the National Disease Control Programme (NDCP), and the Integrated Disease Surveillance Project (ISDP). It also facilitates the integration of Ayurvedic, Yoga, Unani, Siddha, and Homeopathy Systems of Health (AYUSH). The main policy objectives were to reduce the Infant Mortality Rate (IMR) and Maternal Mortality Ratio (MMR), ensure universal access to public health services such as women's health, child health, water, sanitation & hygiene, immunization, and nutrition, prevent and control communicable and non-communicable diseases, provide access to integrated comprehensive primary healthcare, achieve population stabilization, gender and demographic balance, revitalize local health traditions, mainstream AYUSH, and promote healthy lifestyles.

The NRHM aims to deliver equitable, affordable, and quality healthcare to the rural population, with a focus on vulnerable groups. While outlining a broad operational framework, NRHM defines core and supplementary strategies to achieve its objectives. Amongst various factors which play role in performance evaluation of NRHM Human resources, Services, Infrastructure and Community knowledge play a significant role. For understanding meaning of these factors with regard to NRHM following table reveals the components included in respective factors.

Factors and their components with regard to NRHM

Human Resources Doctors in Rural Areas Specialists in Rural Areas Radiographers in Rural Areas Pharmacists in Rural Areas	Physical Infrastructure Community Health Centres Primary Health Centres Health Sub Centres

laboratory technicians in Rural Areas Nursing staff in Rural Areas Health Workers (male, female) in Rural Areas Health assistants in Rural Areas AYUSH Doctors in Rural Areas AYUSH Specialists at PHCs in Rural Areas Surgeons at CHCs in Rural Areas OBESTETRICIANS and gynaecologists at CHCs in Rural Areas Physicians at CHCs in Rural Areas Paediatricians at CHCs in Rural Areas	
Services Janani Suraksha yojana Janani Shishu Suraksha Karyakram Family Planning Immunisation Programmes Disease Control Programmes	Community Knowledge Meetings of state and District Health Mission Rogi Kalyan Simitis ASHA Village Health Sanitation Committee

THEORETICAL BACKGROUND AND LITERATURE REVIEW

Through review of literature, it was found that there are various issues related to functioning of NRHM, majority have talked about problems related to vacant posts of doctors, health assistants, nurses and shortage of specialist doctors at all levels at PHC and CHC. Health centers lack basic facilities and physical infrastructure. Services were found to be dissatisfactory. Studies also revealed that women prefer govt hospital delivery, even functioning of ASHA workers is good, patients were found aware of their rights. Various studies talk about achievement and failures of NRHM. Studies have been conducted on various aspects of NRHM, but study related to opinion survey of general masses is relatively less in context of Himachal Pradesh. Studies have been conducted in various states and districts of India although less researches have been found in case of Himachal Pradesh. Evaluating NRHM with regard to parameters of Human Resources, services, Physical Infrastructure, Community Knowledge is exclusive study and will help in exploring insights in evaluation of NRHM from peoples perspective.

Review of literature reveals even though the National Rural Health Mission launched by the Government of India in 2005, has made significant progress in the health-care infrastructure of the country, the improvement has been quite uneven across regions (Dilip Saikia and Kalyani Kangkana Das (2014), issues related to malnutrition / under nutrition, low access to reproductive child health services Kumar (2007), insufficient services and poor awareness, poor infrastructure facilities, more resource allocation to bigger cities, poor civic sense, shortage of man power Bhattacharya S, Srivastava A, Avan BI and Graham WJ, (2012), untrained health workers (ANM and ASHA), poor hygiene and sanitation etc. It is also felt that government has created awareness among the people but the needed facilities still need to be provided at the grass roots level especially in backward and far-flung areas so it is imperative to examine and assess the working of NRHM and to study that to what extent the NRHM is able to meet its objectives.

Government of India Monitoring Team (2011) examined Kinnaur district of Himachal Pradesh in the month of May. They found that there was critical shortage of human resource in the district, officials were not happy with the standards of monitoring, Training was poor, facilities are not functioning at FRU, state had not opted for ASHA. They found that there was lack of fixing responsibility and there was needfor bettermonitoring. They suggested that prominent advertisement regarding services provided should be done. They recommended developing a secondary level referral institution with posting of Anesthetist and other specialist at Khaneri, Rampur. They advised to fill up the vacant posts of specialists on priority.

Scope

Previous studies on National Rural Health Mission (NRHM) suggest that most of the work has been done in different areas of the country. The criteria taken in previous studies range from social aspect to economic aspects of implementation of the program. In this study Performance evaluationof NRHM program has been focused in the state of Himachal Pradesh. Himachal Pradesh, a hilly state, has its own challenges in terms of its topography, Socio-economic status and infrastructure. The two districts, considered for study, namely Solan and Bilaspur which are having different topography, cultural, social and economic status. These two districts also become important and selected as units of study because district Solan is considered part of old Himachal whereas Bilaspur is relatively new district and is considered as part of new Himachal.

METHODS

Through literature review research gap was observed. For performance evaluation there were no as such model developed

on factors like human resources, services, physical infrastructure and community knowledge with regard to NRHM.

Considering the same objective of study is to frame a model to find out contribution of human resources, services, physical infrastructure and community knowledge in performance evaluation of NRHM.

Through Cochran's Sample Size Formulasample of 385 respondents were decided to be studied.Thus, questionnaires were send to 750 respondents via both online and offline mode for this study. After removing duplicates 400 respondents were taken into consideration.

Questionnaire was used to collect data. The items were measured on a five-point scale from 1-5 as: Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree. Following factors and sub factors were rated.

Factors and Sub Factors for the Study

Human Resources Discipline Attendance Job knowledge Communication Problem Solving	Physical Infrastructure Condition of Physical Infrastructure Sufficiency Cleanliness
Services Fulfilment of Objective Quickness Beneficiary	Community Knowledge Awareness Developing Recognition Informing

Validity

Content validity was done throughexpert opinions, who were mostly academicians and practitioners in the field of medical services institutions who have expertise in their respective fields. Items of each dimension were confirmed for clarity, precision and correctness by a group of senior academicians/practitioners associated with National Rural Health Mission (NRHM).Statistical Tools used

Regression Analysis was done after satisfying the assumption required to conduct the analysis.

Reliability Analysis

Pilot study was conducted to check the reliability and validity of constructed questionnaire. For reliability part, chronbach alpha was calculated for all the constructs to be used for measuring perception of respondents.Reliability analysis for every construct was conducted as follows.

Table 1 Reliability of Questionnaire Cronbach's Alpha

Construct name	No. of items	Cronbach's Alpha
Human Resource	5	.937
Services	6	.882
Infrastructure	5	.901
Community Knowledge	5	.881
Overall Performance	5	.915

Human Resources:

Reliability statistic, i.e. the value of Cronbach's alpha, for the scale used to measure effectiveness of Human Resources is .937. This value also falls in the prescribed range as suggested by various scholars/researchers.Hence, considered as highly reliable. The scale was having five items.

Table 2 Reliability Statistics if Individual item deleted of Human Resources Scale

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
HR_1	9.23	18.749	.857	.917
HR_2	9.13	18.786	.799	.928
HR_3	9.18	18.694	.839	.920
HR_4	9.31	19.792	.803	.927
HR_5	9.07	18.516	.858	.917

As the value of this statistic was not improving even after the deletion of any item. Hence, all these items were retained in the final questionnaire. These items were related to the behavior and discipline, punctuality, awareness the duties to be performed and promptness to help the visitors.

Services

Another scale used in the questionnaire was to measure the quality of the services being delivered. This scale was having six items. These items were related to purpose of visit being fulfilled, range of services, quickness to respond, reach of service, awareness and overall quality of services.

Table 3 Reliability Statistics if individual item deleted of Services Scale

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Serv_1	13.78	12.778	.747	.852
Serv_2	13.67	13.021	.711	.858
Serv_3	13.60	12.400	.715	.858
Serv_4	13.61	13.450	.657	.867
Serv_5	13.57	13.213	.645	.869
Serv_6	13.67	13.551	.678	.864

Physical Infrastructure

In order to measure the perception about the infrastructure a five items scale was used. When tested, the value of Cronbach's alpha was .901 which falls in the category of highly reliable scales. The scale was having five items, namely, location of the center, availability of space, Availability of equipment, availability of furniture.

Table 4 Reliability Statistics if individual item deleted of Physical Infrastructure Scale

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Infra_1	10.26	15.842	.672	.896
Infra_2	9.97	15.108	.782	.873
Infra_3	10.08	14.284	.831	.862
Infra_4	9.82	15.165	.674	.897
Infra_5	9.99	14.378	.817	.865

Community Knowledge

Another scale used in the questionnaire was to measure the community knowledge about the program. This scale was having five items. The value of reliability statistic was .881, which is highly reliable. The five items of the scale were, knowledge of village sanitation committee, training of ASHA workers, making people aware about the program, knowledge of IEC, promotion of government programs.

Table 5 Reliability Statistics if individual item deleted of Community Knowledge Scale

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Comm_know_1	9.46	15.676	.613	.879
Comm_know_2	9.62	14.307	.785	.837
Comm_know_3	9.55	14.746	.722	.853
Comm_know_4	9.69	14.922	.763	.843
Comm_know_5	9.71	16.023	.699	.859

Overall Performance

The value of reliability statistic was .915, which is highly reliable. The items in the scale were performance as per expectations, improvement in overall well-being, benefits reaching to actual beneficiary, stakeholders getting benefits, satisfaction with the program.

Table 6 Reliability Statistics if individual item deleted of Overall Performance Scale

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Overall_perform_1	10.03	14.532	.771	.898
Overall_perform_2	9.92	14.220	.795	.893
Overall_perform_3	9.83	15.087	.689	.914
Overall_perform_4	9.95	14.186	.843	.884
Overall_perform_5	10.00	13.947	.817	.889

Hence it is clear from the above tables that scales which are used to measure the construct are highly reliable as the values of each construct fall in highly reliable range.
**. Correlation is significant at the 0.01 level (2-tailed).

RESULTS OF REGRESSION ANALYSIS

The proceeding sections are related to the regression model development. First of all, the assumption discussed in preceding sections are discussed in terms of various statistics like Cook's distance, P-P plots etc. followed by the model summary.

Checking the assumptions:
Sample size: It is clear from the table that value of Shapiro-Wilk statistic and Kolmogorov-Smirnov statistic is greater than the prescribed values. Hence we can assume that the dependent variable is normally distributed.

Table 7 Tests of Normality

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	Df	Sig.
OverallPerformance	.052	395	.300	.955	395	.561

a. Lilliefors Significance Correction
Multicollinearity between predictor variables: In order to check this assumption, it is assumed that the value of correlation between the independent variables has to be less than 0.7, in this case all the values of correlation coefficient are less than the threshold value. The value obtained here for correlation coefficient between Human Resources and service quality is .558, and .666 for human resources and infrastructure, .555 for human resources and community knowledge and .468 for community knowledge and infrastructure.Hence, it is established that there is no multicollinearity among the predictors/independent variables. Further, it is assumed that every independent variable will be correlated either positive or negative, to dependent variable, and the value of correlation coefficient has to be greater than 0.3. again here in this case also the values are well within the threshold values.

Table 8 Test of Multicollinearity

		Overall Performance	Human Resources	Service Quality	Infrastructure	Community Knowledge
Std. Cross-product	Overall Performance	1.000	.960	.961	.973	.981
	Human Resources		1.000	.558	.666	.555
	Service Quality			1.000	.666	.559
	Infrastructure				1.000	.468
	Community Knowledge				.	1.000
Sig. (1-tailed)	Overall Performance	.	.000	.000	.000	.000
	Human Resources	.000	.	.000	.000	.000

	Service Quality	.000	.000	.	.000	.000
	Infrastructure	.000	.000	.000	.	.000
	Community Knowledge	.000	.000	.000	.000	.
N	Overall Performance	395	395	395	395	395
	Human Resources	395	395	395	395	395
	Service Quality	395	395	395	395	395
	Infrastructure	395	395	395	395	395
	Community Knowledge	395	395	395	395	395

a. Coefficients have been calculated through the origin.

Another way to check the multicollinearity is to look at the Variance Inflation Factor (VIF). Lower the value of VIF, i.e. less than 10 there is absence of collinearity. It is clear from the table below that both these values are falling in the prescribed range.

Table 9 Multicollinearity Output: Variance Inflation Factor

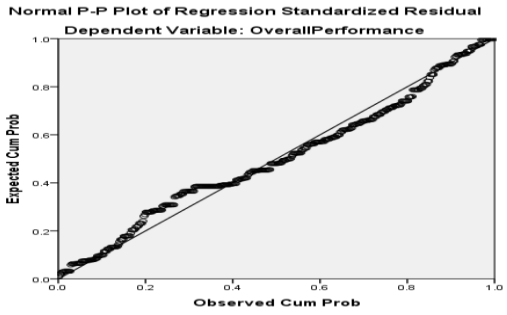
Coefficientsa,b											
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	Human Resources	.120	.038	.114	3.187	.002	.960	.159	.027	.556	1.923
	Service Quality	.079	.035	.084	2.288	.023	.961	.115	.019	.553	1.952
	Infrastructure	.244	.043	.246	5.681	.000	.973	.276	.048	.538	2.252
	Community Knowledge	.568	.038	.552	14.875	.000	.981	.601	.126	.452	1.229

a. Dependent Variable: Overall Performance

b. Linear Regression through the Origin

Linearity of the regression Model: In order to check that all independent variables are in linear relationship with dependent variable this assumption, the probability-probability plot (P-P) plots are checked. The figure below explains that all the points are close to the regression line.

Fig 1



Outliers: The value of cook's distance should not exceed the value of 1. Also, the value of s'tandard residuals should lie between -3 to 3. For our model, from the table above, all the values are well within the range.

Table 10 Output Cook's Distance

Residuals Statisticsa,b

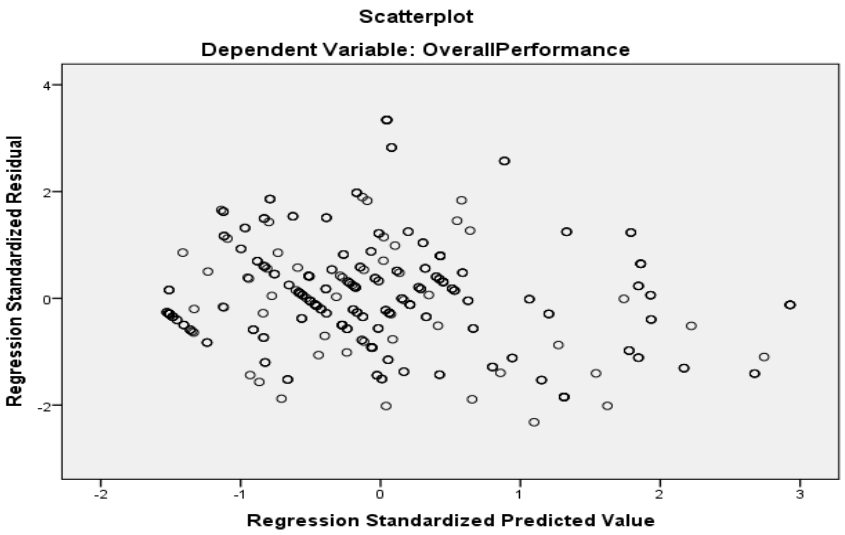
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1.1168	5.0548	2.4667	.88390	395
Std. Predicted Value	-1.527	2.928	.000	1.000	395
Standard Error of Predicted Value	.016	.116	.042	.015	395
Adjusted Predicted Value	1.1180	5.0554	2.4669	.88463	395
Residual	-1.03727	1.49389	.01989	.44496	395
Std. Residual	-2.320	3.341	.044	.995	395
Stud. Residual	-2.352	3.352	.044	1.001	395
Deleted Residual	-1.06618	1.50332	.01964	.45024	395
Stud. Deleted Residual	-2.366	3.397	.045	1.005	395
Mahal. Distance	.494	26.774	4.000	3.264	395
Cook's Distance	.000	.040	.003	.007	395
Centered Leverage Value	.001	.068	.010	.008	395

a. Dependent Variable: OverallPerformance

b. Linear Regression through the Origin

Constant error Variance (Homoscedasticity): To check this assumption is to look at the scatter plot. All the observations points must fall within the range of negative 3 to positive three, when regression standardized residuals are plotted on Y-axis and regression standardized predicted value is plotted on X-axis. It is clear from the figure below that all the values are falling in prescribed range.

Fig 2



Therefore, all the assumptions of regression analysis are fulfilled in this case. Hence it is appropriate to conduct the analysis.

Table 11 Reliability Statistics if individual item deleted of Overall Performance Scale

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Overall_perform_1	10.03	14.532	.771	.898
Overall_perform_2	9.92	14.220	.795	.893
Overall_perform_3	9.83	15.087	.689	.914
Overall_perform_4	9.95	14.186	.843	.884
Overall_perform_5	10.00	13.947	.817	.889

Hence it is clear from the above tables that scales which are used to measure the construct are highly reliable as the values of each construct fall in highly reliable range.

**. Correlation is significant at the 0.01 level (2-tailed).

Model Summary

R2, coefficient of determination, explains the amount of variance explained in percentage terms by the independent variables in dependent variable. In other terms how much movement in dependent variable is explained by independent variables.Its value has to be greater than .3.

Table 12 Regression Model Summary

Model	R	R Squareb	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.830a	.689	.675	.9.093	.689	51.630	4	391	.000

The table above shows the value of R2 is .830, meaning thereby that the model explains 83 percent of the variance. In simple terms, the independent variables, i.e. Human resources,service quality, infrastructure and community knowledge are able to explain 83 percent of the variance in the given model. These values are significant as the p-value is .000 model explains the of the variance which is statistically significant.

Table 13 ANOVA Output

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2711.237	4	677.809	3390.630	.000c
	Residual	78.163	391	.200		
	Total	2789.400d	395			

a. Dependent Variable: Overall Performance
b. Linear Regression through the Origin
c. Predictors: Community Knowledge, Human Resources, Service Quality, Infrastructure
d. This total sum of squares is not corrected for the constant because the constant is zero for regression through the origin.

The results of the table test the Null hypothesis that slope of the line is zero. As the ANOVA table above shows that values are significant, hence the null hypothesis is rejected.

The standardized coefficients of each variable explains the contribution of each independent variable when measured on same scale. Also the significant values explain that which of the independent variable is statistically significant. The table below explains that standardized coefficients of independent variable and their individual contributions in terms of beta (β) values. The human resources are contributing positively towards the overall performance as the beta value is .114, for Service Quality is .084, Infrastructure is .246 and community knowledge is .552. Further, all these values are statistically significant as the p-value for both the independent factors is .000

Table 14 Standard Coefficients : Independent Variable

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Correlations			Collinearity Statistics		
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF	
1	Human Resources	.120	.038	.114	3.187	.002	.960	.159	.127	.556	1.923	

	Service Quality	.079	.035	.084	2.288	.023	.961	.115	.119	.553	1.952
	Infrastructure	.244	.043	.246	5.681	.000	.973	.276	.118	.538	2.252
	Community Knowledge	.568	.038	.552	14.875	.000	.981	.601	.126	.452	1.229

a. Dependent Variable: Overall Performance
b. Linear Regression through the Origin

In terms of unique contribution, the table above explains that the semi-partial correlation (see the heading Part under correlations) the maximum value is contributed by Human Resources (.127) followed by community knowledge (.126). Also, unique contribution of service quality (.119) is followed by infrastructure (.118) towards the overall model.

FINDINGS

By regression analysis it was found that the human resources are contributing positively towards the overall performance as the beta value is .114, for Services is .084, Infrastructure is .246 and community knowledge is .552.

Regression analysis revealed that in terms of unique contribution the maximum value is contributed by Human Resources (.127) followed by community knowledge (.126). Also, unique contribution of services (.119) is followed by infrastructure (.118) towards the overall model.

Overall, the physical infrastructure, community knowledge about the program and Human resources were identified as most important factors for evaluation of performance of NRHM.

CONCLUSION

For evaluating performance of National Rural Health Mission, human resources, services, infrastructure and community knowledge play a significant role. A reliable model for evaluation has been constructed where in it shows unique contributions of human resources, services, infrastructure and community knowledge in evaluating the performance of NRHM. In terms of unique contribution, the maximum value is contributed by Human Resources (.127) followed by community knowledge (.126). Also, unique contribution of services (.119) is followed by infrastructure (.118) towards the overall model.

LIMITATIONS OF THE STUDY

More robust techniques of model building can be used. The model rely on assumptions like linearity and normality, and violating them can lead to inaccurate results. They're also prone to overfitting or underfitting, and data quality issues can skew outcomes. Regression shows relationships, not causation, and predictions outside observed data ranges can be unreliable. Additionally, multicollinearity can inflate estimate variances, and adding more variables can lead to diminishing returns. The results can't be generalized as data was taken from only two districts, adding more states would give clear results.

SOCIAL IMPLICATIONS

Health is one of the most essential components to ensure wellbeing of humans at large. The present study holds significance for society and the stakeholders as it is very simplified study where related aspects of NRHM have been disclosed on Human Resources, Services, Infrastructure and Community Knowledge. A reliable model for evaluating performance of NRHM with regard to Human Resources, Services, Infrastructure and Community Knowledge has been build which is a significant contribution in research and better understanding of policy for all the stakeholders.

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