Improving Access and Efficiency in Public Health Services: Mid-Term Evaluation of India's National Rural Health Mission

Health Indicators: Regression Results

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Book Title: Improving Access and Efficiency in Public Health Services: Mid-Term Evaluation of India's National Rural Health Mission
Chapter Title: "Health Indicators: Regression Results"
Pub. Date: 2010
Access Date: August 6, 2020
Publishing Company: SAGE Publications India Pvt Ltd
City: New Delhi
Print ISBN: 9788132104582
Online ISBN: 9788132107873
DOI:
Print pages: 32-37

Health Indicators: Regression Results

WE BEGIN by considering the following 10 models for the five health indicators and their changes.

1. Infant Mortality Ratio (IMR)

1. IMR = f (ASHA/Pop., Villages/ANM, 24-hour PHC/Pop., % CHC as FRU, % 24-hours HFs, RKS/HF, % JSY Deliveries, Dummy for NHFS)

On the right hand side, we have all important interventions suggested in NRHM. This model aims to explain variations among states in the level of IMR in the year 2007. The second model explains the change in IMR (A IMR) between the observed value of IMR *with NRHM* and expected value of IMR *without NRHM* again in terms of the same set of interventions suggested in NRHM.

2. A IMR = f (ASHA/Pop., Villages/ANM, 24 hrs PHC/Pop., % CHC as FRU, % 24 hrs HFs, RKS /HF, % JSY Deliveries, Dummy for NHFS)

Table 4.1 presents the regression results. Refer to Appendix 1 for an explanatory note on the methodology and interpretation of the regression results. It is clear from the table that both the models fit the data well particularly when statistically insignificant variables are dropped and only most relevant variables are retained. The two major interventions by NRHM in terms of creating more 24-hour PHCs and increasing Janani Suraksha Yojana (JSY) delivery proportion are statistically and significantly related to the reduction in IMR. The rate of reduction, however, is far from satisfactory. Other relevant interventions in NRHM do not have statistically significant impact on IMR. In short, the mid-term review suggests that NRHM is not likely to achieve the targeted reduction in IMR, unless some drastic changes are considered in the program.

Table 4.1 Regression Results for Level and Change in IMR

Variables	Coefficient	t-statistic	P-value	R-square	Adjusted R-square	F-significance
IMR (Level) on All Variables						
Trained ASHA per 1000 population	-8.615	-1.390	0.188	0.6009	0.3554	0.0732
Villages per ANM	1.048	0.928	0.370			
24-hour PHC per lac population	-5.924	-3.132	0.008			
% CHC as FRU	-0.054	-0.362	0.723			
All 24-hour HFs as % of total HFs	0.290	1.291	0.219			
RKS as % of total HFs	0.067	0.522	0.611			
JSY as % of total deliveries	-0.032	-0.768	0.456			
Non-High Focus States (Dummy)	-27.195	-2.713	0.018			
IMR (Level) on Selected Variables						

Trained ASHA per 1000 population	-5.642	-1.026	0.319	0.5173	0.4037	0.0111
Villages per ANM	-	-	-			
24-hour PHC per lac population	-5.143	-3.419	0.003			
% CHC as FRU	-	-	-			
All 24-hour HFS as % of total HFs	-	-	-			
RKS as % of total HFs	0.112	1.212	0.242			
JSY as % of total deliveries	-	-	-			
Non-High Focus States (Dummy)	-24.884	-2.811	0.012			
IMR (Change) on All Variables						
Trained ASHA per 1000 population	-2.045	-0.565	0.582	0.4146	0.0544	0.3943
Villages per ANM	0.696	1.056	0.310			
24-hour PHC per lac population	-1.829	-1.657	0.121			
% CHC as FRU	-0.069	-0.788	0.445			
All 24-hour HFS as % of total HFs	0.166	1.262	0.229			
RKS as % of total HFs	0.006	0.082	0.936			
JSY as % of total deliveries	-0.033	-1.353	0.199			
Non-High Focus States (Dummy)	1.895	0.324	0.751			
IMR (Change) on Selected Variables						
Trained ASHA per 1000 population	-	-	-	0.3185	0.2049	0.0693
Villages per ANM	-	-	-			
24-hour PHC per lac population	-1.720	-2.147	0.046			
% CHC as FRU	-	-	-			
All 24-hour HFS as % of total HFs	-	-	-			
RKS as % of total HFs	0.053	1.139	0.270			
JSY as % of total deliveries	-0.036	-1.914	0.072			
Non High-focus States (Dummy)	-	-	-	-	-	

2. Full Immunization Rate Among Children (IRC)

3. IRC = f (ASHA/Pop., Villages/ANM, % SC without ANM, VHSC/Pop., Dummy for NHFS)

4. A IRC = f (ASHA/Pop., Villages/ANM, % SC without ANM, VHSC/Pop., Dummy for NHFS)

Table 4.2 presents the regression results. It can be seen that the data fit only the level model (that is model 3). The variables in model 4 do not explain variations in the change in IRC on account of NRHM. Even in the 'level' case, the model shows perverse sign with high statistical significance for the number of ASHA per 1000 population. It seems NRHM hardly explains interstate variations in IRC.

Table 4.2 Regression Results for Level and Change in IRC

Variables	Coefficient	t-statistic	P-value	R-square	Adjusted R-square	F-significance
Immunization (Level) on All Variables						
Trained ASHA per 1000 population	-11.746	-1.694	0.110	0.4932	0.3348	0.0376
Villages per ANM	0.428	0.425	0.676			
% SC not having ANM	-0.025	-0.076	0.940			
VHSC per 1000 population	-0.152	-0.023	0.982			
Non-High Focus States (Dummy)	9.236	0.776	0.449			
Immunization (Level) on Selected Variables						
Trained ASHA per 1000 populaion	-15.636	-4.161	0.0005	0.4640	0.4372	0.0005
Villages per ANM	-	-	-			
% SC not having ANM	-	-	-			
VHSC per 1000 population	-	-	-			
Non-High Focus States (Dummy)	-	-	-			
Immunization (Change) on All Variables						
Trained ASHA per 1000 pop	-7.915	-0.612	0.549	0.1452	-0.1219	0.7408
Villages per ANM	1.244	0.662	0.517			
% SC not having ANM	0.811	1.332	0.201			
VHSC per 1000 pop	-3.584	-0.297	0.770			
Non High-focus States (Dummy)	-8.493	-0.383	0.707			

3. Institutional Delivery Rate (IDR)

5. IDR = f (ASHA/Pop., Villages/ANM, % SC without ANM, 24-hour PHC/Pop., % CHC as FRU, % 24-hour HFs. RKS/HFS, % JSY Deliveries, VHSC/Pop., Dummy for NHFS)

6. Δ IDR = f (ASHA/Pop., Villages/ANM, % SC without ANM, 24-hour PHC/Pop., % CHC as FRU, % 24-hour HFs. RKS /HFS, % JSY Deliveries, VHSC/Pop., Dummy for NHFS)

Table 4.3 provides the regression results. Both the models fit the data well, particularly

Table 4.3 Regression Results for Level and Change in IRD

Variables	Coefficient	t-statistic	P-value	R-square	Adjusted R-square	F-significance
Institutional Deliveries (Level) on All Variables						
Trained ASHA per 1000 population	-6.809	-1.117	0.290	0.8190	0.6381	0.0128
Villages per ANM	-1.295	-1.243	0.242			
% SC not having ANM	-1.033	-2.815	0.018			
24 hrs PHC per lac population	1.232	0.650	0.530			
% CHC as FRU	0.276	1.681	0.124			
All 24-hour as % of total HFs	0.009	0.037	0.971			
RKS as % of total HFs	0.111	0.889	0.395			
JSY as % of total deliveries	-0.200	-1.641	0.132			
VHSC per 1000 population	-6.025	-1.024	0.330			
Non-High Focus States (Dummy)	6.994	0.503	0.626			
Institutional Deliveries (Level) on Selected Variables						
Trained ASHA per 1000 population	-7.554	-1.961	0.072	0.8084	0.7052	0.0008
Villages per ANM	-1.624	-2.049	0.061			
% SC not having ANM	-1.060	-3.534	0.004			
24-hour PHC per lac population	-	-	-			
% CHC as FRU	0.319	2.498	0.027			
All 24-hour as % of total HFs	-	-	-			
RKS as % of total HFs	0.146	1.738	0.106			
JSY as % of total deliveries	-0.242	-2.990	0.010			
VHSC per 1000 population	-8.010	-1.935	0.075			

Non-High Focus States (Dummy)	-	-	-			
Institutional Deliveries (Change) on All Variables						
Trained ASHA per 1000 population	8.726	1.401	0.192	0.4407	-0.1186	0.6432
Villages per ANM	-0.800	-0.752	0.469			
% SC not having ANM	0.243	0.649	0.531			
24-hour PHC per lac pop	1.151	0.595	0.565			
% CHC as FRU	0.046	0.276	0.788			
All 24 hour as % of total HFs	-0.276	-1.174	0.268			
RKS as % of total HFs	0.107	0.836	0.423			
JSY as % of total deliveries	-0.150	-1.203	0.257			
VHSC per 1000 population	-1.198	-0.199	0.846			
Non-High Focus States (Dummy)	-5.386	-0.379	0.712			
Institutional Deliveries (Change) on Selected Variables						
Trained ASHA per 1000 population	8.556	2.691	0.015	0.3171	0.2413	0.0323
Villages per ANM						
% SC not having ANM	-	-	-			
24-hour PHC per lac population	-	-	-			
% CHC as FRU	-	-	-			
All 24 hrs as % of total HFs	-	-	-			
RKS as % of total HFs	-	-	-			
JSY as % of total deliveries	-0.160	-2.227	0.039			
VHSC per 1000 population	-	-	-			
Non-High Focus States (Dummy)	-	-	-			

when statistically insignificant variables are removed and only the most relevant variables are retained. However, the level of IDR regression (model 5 with selected variables) has some unexpected/inexplicable signs for coefficients with statistical significance though the overall explanatory power is as high as 81 percent! For instance the number of trained ASHAs per 1000 population, percentage of JSY deliveries and VHSC per 1000 population have perverse signs, all being statistically significant! It may suggest that some of these interventions in the NRHM may be counterproductive for increasing the IDR in states. But when the impact of NRHM on the change in IDR is considered, the number of trained ASHAs per 1000 population increases the impact, though the percentage of JSY deliveries continue to exert negative and significant influence on the impact of NRHM on change in IDR in states. However, in terms of magnitude, the positive impact of ASHA far outweighs the perverse effect of JSY deliveries.

4. Rate of Women Having at Least 3 Ante-Natal Checks (ANC)

7. ANC = f (ASHA/Pop., Villages/ANM, % SC without ANM, VHSC/Pop., Dummy for NHFS)

8. Δ ANC = f (ASHA/Pop., Villages/ANM, % SC without ANM, VHSC/Pop., Dummy for NHFS)

Table 4.4 provides the regression results. It can be seen that the data do not fit model 8 for the change in ANC on account of NRHM. And even the level of ANC is largely explained by the dummy variable for the NHFS stating that the ANC rate is significantly higher in the NHFS than the HFS. NRHM does not seem to have any significant impact on the ANC rate as of now.

Table 4.4 Regression Results for Level and Change in ANC

ANC (Level) on All Variables						
Variables	**Coefficient**	**t-statistic**	**P-value**	**R-square**	**Adjusted R-square**	**F-significance**
Trained ASHA per 1000 population	−0.774	−0.100	0.922	0.5908	0.4629	0.0085
Villages per ANM	−0.561	−0.497	0.626			
% SC not having ANM	−0.488	−1.335	0.201			
VHSC per 1000 pop	−6.488	−0.896	0.384			
Non-High Focus States (Dummy)	27.775	2.083	0.054			
ANC (Level) on Selected Variables						
Trained ASHA per 1000 population	–	–	–	0.5837	0.5143	0.0010
Villages per ANM	–	–	–			
% SC not having ANM	−0.511	−1.481	0.156			
VHSC per 1000 population	−6.550	−1.031	0.316			
Non-High Focus States (Dummy)	30.345	3.967	0.001			
ANC (Change) on All Variables						
Trained ASHA per 1000 population	6.254	1.150	0.267	0.1020	−0.1786	0.8661
Villages per ANM	−0.047	−0.060	0.953			
% SC not having ANM	−0.107	−0.416	0.683			
VHSC per 1000 population	3.319	0.654	0.522			
Non-High Focus States (Dummy)	6.955	0.745	0.467			

5. Rate of Unmet Needs of Health Infrastructure (UNHI)

9. UNHI = f (ASHA/Pop., Villages/ANM, % SC without ANM, VHSC/Pop., Dummy for NHFS)

10. Δ UNHI = f (ASHA/Pop., Villages/ANM, % SC without ANM, VHSC/Pop., Dummy for NHFS)

Table 4.5 presents the regression results. It can be seen that both models fit the data well particularly when most relevant statistically significant variables are retained and statistically insignificant variables dropped. As expected, the levels of the UNHI are explained by the dummy for NHFS indicating that UNHI are significantly less among NHFS than HFS. However, most interesting are the results for the change in UNHI over time. Since DLHS-1 did not report data on unmet needs, this observed change in UNHI has not been adjusted for “without NRHM” scenario. Our results suggest that the higher the number of ASHA per 1000 population, the greater is the reduction in the UNHI. Similarly the higher the percentage of sub-centers without ANMs, the lower is the change in unmet needs. VHSCs also make positive contribution in reducing the UNHI in the states. Thus, the major interventions in NRHM at the village level are all proving relevant for reducing the UNHI. NRHM seems to be succeeding in this regard, but in terms of health outcomes and goals, its progress has not been satisfactory.

Table 4.5 Regression Results for Level and Change in UNHI

Variables	Coefficient	t-statistic	P-value	R-square	Adjusted R-square	F-significance
Unmet Needs (Level) on All Variables						
Trained ASHA per 1000 population	1.658	0.486	0.634	0.3630	0.1640	0.1650
Villages per ANM	0.652	1.314	0.207			
% SC not having ANM	-0.032	-0.200	0.844			
VHSC per 1000 population	1.459	0.458	0.653			
Non-High Focus States (Dummy)	-3.220	-0.549	0.590			
Unmet Needs (Level) on Selected Variables						
Trained ASHA per 1000 population	-	-	-	0.3485	0.2799	0.0171
Villages per ANM	0.690	1.531	0.142			
% SC not having ANM	-	-	-			
VHSC per 1000 population	-	-	-			
Non-High Focus States (Dummy)	-6.017	-1.931	0.068			
Unmet Needs (Change) on All Variables						
Trained ASHA per 1000 population	-8.410	-5.914	0.000	0.7592	0.6840	0.0002
Villages per ANM	0.044	0.215	0.833			
% SC not having ANM	0.094	1.397	0.182			
VHSC per 1000 population	-1.859	-1.402	0.180			
Non-High Focus States (Dummy)	-6.551	-2.683	0.016			
Unmet Needs (Change) on Selected Variables						
Trained ASHA per 1000 population	-8.366	-6.119	0.000	0.7586	0.7017	0.0000
Villages per ANM	-	-	-			
% SC not having ANM	0.095	1.469	0.160			
VHSC per 1000 population	-1.818	-1.426	0.172			
Non-High Focus States	-6.610	-2.805	0.012			