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Original Article

Health camp profile and its cost in Hilly terrains, North India

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ABSTRACT

Background: Uttarakhand is largely a hilly state, having diversity of disease. Due to low income, lack of knowledge, difficult terrains and lack of proper transport, the sick population cannot visit health institutions. These paved the search for more effective ways of delivering public primary health care and achieving universal health coverage.

Objective: The main objective of the study is to demonstrate a model to identify and manage health problems of the poor people living in hard to reach areas of Uttarakhand, through specialized health camps as an approach for universal health coverage and to demonstrate a cost-effective model.

Material and methods: The community-based health camp was organized in 2015 to address medical problems of the people of Ragdi village, Uttarakhand. Information like age, gender, residence and principal diagnosis were extracted from the camp registers coded as per ICD 10. We estimated model specialist end cost of the health camp and patient end cost for seeking treatment at the health facility. The cost effectiveness analysis was done.

Results: The health camp saw the attendance of 233 patients. The average distance travelled by patients to seek treatment care was 1.3 km, S.D. 2.1. The mean time to reach the health camp by walking was 17.2 min, S.D. 27.3. Overall the musculoskeletal disorders were the most common (26.6%), followed by the respiratory (17.2%), eye (14.2%) and others. Estimated per-patient specialist end cost was 2.2 US\$. The per-patient end cost varied from 4 to 5 US\$ for primary and secondary care and 6 to 9 US\$ for tertiary care.

Conclusion: The health camp with specialist services is a cost-effective way to bridge the major gap in achieving universal health coverage in difficult to reach hilly areas.

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1. Introduction

Uttarakhand is largely a hilly state in northern India, located at the foothills of the Himalayan mountain ranges, having international boundaries with China (Tibet) in the north and Nepal in the east. It is rich in natural resources, especially water and forests with many glaciers, rivers, dense forests and snow-clad mountain peaks. Along with this ethnic diversity, Uttarakhand also has diversity of disease in different regions.¹ Now more than ever before, people are health conscious and desire to be healthy. However, due to low income, lack of knowledge, difficult terrains and lack of proper transport, sick population cannot visit health institutions for their medical treatment.² These paved the search for more effective ways of delivering public primary health care and achieving universal health coverage. For achieving the goal of universal health coverage, there is a need to increase health service delivery and, in particular, improve access to health services in poor and difficult to reach population.^{3,4} To make the best use of scarce resources, the state should incorporate low-cost, high-benefit interventions in their health investment.⁵ Health camps are one of the strategies adopted by both government and non-government organizations. This literally means that a team of health professionals camp in an area to carry out a limited health intervention. The main objective of the study is to demonstrate a model to identify and manage health problems of the poor people living in hard to reach areas of Uttarakhand, North India through specialized health camps as an approach for universal health coverage and to demonstrate a cost-effective model for other health care providers.

2. Material and method

The community-based one-day health camp was organized in May 2015 to address medical problems of the people of Ragdi Maya Sankari, a small village located in Ghansali Tehsil of Tehri Garhwal district, Uttarakhand, North India in collaboration with Hemwati Nandan Bahuguna University, Srinagar, Uttarakhand, North India. The Ragdi Maya Sankari village has a population of 587 of which 282 are males while 305 are females as per Population Census 2011.⁶ We selected Ragdi Maya Sankari, as the population has minimal access to health facilities, schools, telephone connections and electricity. The nearby primary level health care was available 4 km away at the additional primary health centre at Dalla village, Uttarakhand, North India. The nearest secondary health centre was at Chamiyala (16.9 km), Uttarakhand, North India. The Ragdi Maya Sankari village is nearly 90 km away from the only Veer Chandar Singh Gharwali Government Medical Sciences and research Institute, Srinagar, Uttarakhand, North India. This is the only government sector medical college in Garhwal district, Uttarakhand, North India.

A team of 5 members comprising of 2 Assistant Professors of Community Medicine, 1 Medical officer of rural health training centre, 1 intern and 1 Medical Social Worker conducted the health camps. The registration was done for all patients, followed by anthropometric measurement. For adult's, body mass index⁷ was calculated and for children new

WHO standards⁸ were used to measure malnutrition. The patient consultation was provided with the free medicine distribution. Patient details, diagnosis and treatment provided by physicians were documented in the morbidity register. Information like age, gender, residence and principal diagnosis were extracted from the registers using a data extraction sheet. Two doctors independently coded the diagnosis as per International Classification of Disease (ICD) 10 classification of 2010.⁹ Adjudication of disagreement was done by the panel of three expert doctors. Patients less than fifteen years of age were considered as children. Patients more than sixty years of age were considered as elderly and proportions given wherever necessary. We estimated model specialist end cost of the health camp as the value of resources and time used to produce a quantifiable service. The components of specialist end cost included IEC activities cost, common drugs cost, incentives and others. Patient end cost was estimated for seeking treatment at the health facility. The components of patient end cost were transportation cost, travel time cost,¹⁰ basic need cost, minimum wage cost¹¹ and minimum health facility cost. The cost analysis was done for the health camp. The method of cost apportioning differed in the two categories, but for calculating any cost, the most recent year for which cost data were available was the unit studied. In both categories, the current costs were considered and not the original price.¹² Necessary permissions were taken from the administration for conducting the study. Data were entered in Microsoft excel spreadsheet and analyzed with SPSS version 17.0 (Chicago, IL, USA). Wherever applicable, proportions and mean (SD) were calculated. Chi-square test was used a test of significance. The *p* value of <0.05 was considered significant.

3. Results

The present study included 233 persons, but only those who needed medical care among the total attendees of the health camp. The majority of the patients were from Ragdi village (67%) the rest were from the surrounding villages (Fig. 1). The average distance travelled by patients to seek treatment care was 1.3 km, S.D. 2.1. The mean time to reach the health camp by walking was 17.2 min, S.D. 27.3. The majority of the villagers had no knowledge about how to gain access to modern health care facilities.

Adults (>15 years) constituted about 76%. Among children, males (57.1%) and females (42.9%) constituted nearly equal proportions; similarly, among the elderly (21.9%), about 54.9% were females. However, among 15–60 years (54.1%) adults, females was 61.9%. The differences in morbidity pattern in attendance rate among the age groups were found to be statistically significant (*p* < 0.001). The overall difference of morbidity in attendance between male and female was found to be statistically significant (*p* < 0.001).

Overall, the musculoskeletal disorders were the most common (26.6%), followed by the respiratory disorders (17.2%), eye disorders (14.2%), infections and parasitic disorders (9.9%) and genitourinary disorders (7.3%) (Table 1). Among the paediatric cases, the most common diseases were respiratory disorders (in boys – 21.9%, in girls – 33.3%), followed by infectious and parasitic disorders (in boys – 21.9%,

Fig. 1 – Map showing the study area and location of major public health facilities from Ragri Village, Tehri Garhwal District, Uttarakhand, India.

in girls – 25.0%). Among male children, the other common disease was of ear (21.9%). Among female children, the other common disease was skin disorders (Table 1). The most common respiratory disorder was acute respiratory tract infection. Vitamin A deficiency was also found in few children. Shockingly, all the children were found to be underweight and stunted (data not shown).

In 15–60 years male adults, the most common diseases were on the respiratory system (31.3%), musculoskeletal (14.6%) and digestive disorders (12.5%), whereas among females, musculoskeletal disorders (43.6%) were most common, followed by genitourinary disorders (19.2%). Disorders of the eye and adnexa were nearly equally present in adult males (12.5%) and females (15.4%) (Table 1). The difference

in morbidity pattern between adult (15–60 years) males and females was found to be statistically significant (p value < 0.001).

The most common diseases among elderly males and female were diseases of the musculoskeletal system (male – 34.8%, female – 42.9%), followed by eye disorders (male – 17.4%, female – 32.1%) and respiratory disorders (male – 13.0%, female – 7.1%). The most common disorder of the eye was cataract leading to diminished vision. On the contrary, the burden of circulatory disorders was negligible among the elderly (Table 1). No statistical significance was there between morbidity patterns of male and female children (p value = 0.48) and elderly (p value = 0.45). Nearly 27.0% of adults (15–60 years) and 31.4% of the elderly were found to be undernourished.

Table 1 – Morbidity profile of patients who attended Health Camp at Ragdi Village, Uttarakhand.

S. no.	Morbidity as per ICD-10	Children (<15 years of age)		Adult (15–60 years of age)		Elderly (>60 years of age)		Total n (%)
		Male	Female	Male	Female	Male	Female	
		n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	
1.	Infectious and parasitic diseases (A00–B99)	7 (21.9)	6 (25.0)	4 (8.3)	2 (2.6)	3 (13.0)	1 (3.6)	23 (9.9)
2.	Diseases of the eye and adnexa (H00–H59)	1 (3.1)	1 (4.2)	6 (12.5)	12 (15.4)	4 (17.4)	9 (32.1)	33 (14.2)
3.	Diseases of the ear and mastoid process (H60–H95)	7 (21.9)	1 (4.2)	1 (2.1)	1 (1.3)	1 (4.3)	0 (0.0)	11 (4.7)
4.	Diseases of the circulatory system (I00–I99)	0 (0.0)	0 (0.0)	3 (6.3)	0 (0.0)	0 (0.0)	0 (0.0)	3 (1.3)
5.	Diseases of the respiratory system (J00–J99)	7 (21.9)	8 (33.3)	15 (31.3)	5 (6.4)	3 (13.0)	2 (7.1)	40 (17.2)
6.	Diseases of the skin and subcutaneous tissue (L00–L99)	1 (3.1)	2 (8.3)	0	1 (1.3)	0	0 (0.0)	4 (1.7)
7.	Digestive system (K00–K93)	0	1 (4.2)	6 (12.5)	2 (2.6)	2 (8.7)	1 (3.6)	12 (5.2)
8.	Disease of the genitor urinary system (N00–N99)	1 (3.1)	0	1 (2.1)	15 (19.2)	0	0	17 (7.3)
9.	Diseases of the musculoskeletal system (M00–M99)	1 (3.1)	0 (0.0)	7 (14.6)	34 (43.6)	8 (34.8)	12 (42.9)	62 (26.6)
10.	Others	7 (21.8)	5 (20.8)	5 (10.8)	6 (7.6)	2 (8.6)	3 (10.7)	28 (12.0)
	Total	32	24	48	78	23	28	233 (100)

ICD – International Classification of Diseases.
The most common system disorders are shown in the table.

A model cost of 34,940 INR (549.5 US\$) was estimated for conducting one-day health camp in Ragdi Maya Sankari village in Uttarakhand with provisional 250 patient load. The mean (SD) total specialist end cost of care for health camp was 2803.1 INR (2760.3). Free drug dispensing accounted for most of these expenses (28.6%). Although per-patient specialist end cost could vary widely, the total per-patient specialist end cost was 139.8 INR (2.2 US\$) (Table 2). The per-patient end cost for seeking health care at health facility ranged from

approximately 4–5 US\$ for primary and secondary care and 6–9 US\$ for tertiary care. Transportation expenses accounted for approximately more than half of the overall cost (Table 3).

4. Discussion

Our study outlines the spectrum of health problems that presented to one-day health camp at Ragdi Maya Sankari

Table 2 – Model specialist end cost in conducting health camp from tertiary level care.

S. no.	Domains of specialist end cost	Components	Cost (INR)
I	Information education communication (IEC) activities	Pamphlets distribution, Public address system/mike announcement, Dandora/beat of tom-tom, Scroll in local cable networks, News/advertisements in local dailies, Posters, Banners, Village meetings	1500
II	Basic necessities	Chairs, Water, Fan, Snacks, Screening Enclosures, etc.	1500
III	Common drugs	Antipyretic/analgesic, Anti-Allergic, Anti-Amoebic, Anti-Helminthes, Antibiotic, Antacid, Antidiabetic, Antihypertensive, Vitamins and Iron Supplement, Sterillium	10,000
IV	Incentives	Specialist doctor @ Rs.2000/- each (Two doctors) Government medical officers @ Rs.1000/- each (Two doctors) Health worker Attendant Pharmacist Volunteer @ Rs.250/- each (Two preferably from local community)	4000 2000 500 500 500 500
V	Food	Breakfast, lunch, dinner @ Rs.500 each (Team of 8 members)	4000
VI	Transport cost	Actual fare cost for car Travel time in car @ Rs.180/h – each (Team of 8 members)	5000 1440
VII	Contingency	Others	5000
	Total specialist end cost @ 250 patients	Indian rupee (INR)	34,940
		United States dollar (US\$) ^a	549.5
	Total specialist end cost @ per patient ^b	Indian rupee (INR)	139.8
		United States dollar (US\$) ^a	2.2

^a 1 US dollar equals 63.58 Indian rupee as on 26 June 2015.

^b The estimated cost is for one day activity.

Table 3 – Patient end cost in seeking treatment at different level of health care from Ragdi Maya Sankari village, Uttarakhand.

Domains of patient end cost	Patient end cost					
	Secondary level		Tertiary level			
	Primary Health Centre Ghansali	Community Health Centre Chamiyala	District Hospital New Tehri	Base Hospital Srinagar	AIIMS Rishikesh	Doon Hospital Dehradun
Actual fare cost for bus passengers on trunk routes ^a	80	30	130	200	200	233
Travel time cost for bus passengers on trunk routes @ 17.9/h ^b	12.5	8.7	31.9	42.1	57.6	74.3
Registration cost	3	3	5	5	10	14
Loss of daily wage ^c	124.6	124.6	124.6	124.6	124.6	124.6
Food and shelter	100	100	100	100	100	100
Indian rupee (INR)	320.1	266.3	391.5	471.7	492.2	545.9
United States dollar (US\$) ^{d,e}	5.0	4.2	6.1	7.4	7.7	8.6

^a Fare of roadways bus is considered in the analysis. Transport cost by ambulance @ Rs.10.00/km.

^b Value of travel time of passengers as per 1990 Road User Cost Data (IRC:SP-30 1993) for non-work trip of bus passengers on trunk routes is Rs.3/h. The value for analysis is estimated by inflation over the period (1990–2015): 499.74%, used index: INCP1958, initial index: 10.82, end index: 64.87.

^c Minimum wage for agricultural worker in Uttarakhand.

^d 1 US dollar equals 63.58 Indian rupee as on 26 June 2015.

^e The estimated cost is for one-day activity.

village in Uttarakhand in 2015. The results of the present study showed that commonly diagnosed diseases were diseases of the musculoskeletal system, followed by the respiratory disorders, eye disorders, infections and parasitic disorders and genitourinary disorders. The study conducted in primary health care clinics in Nepal and Finland also reported musculoskeletal diseases as the common diagnoses.^{13,14} However, other studies conducted in primary health centre, India, Pakistan and Saudi Arabia found skin disorders and acute respiratory tract infections as the most common illness. Eye disorders accounted for 14.2% in the present study, higher than the study conducted in primary health set-up of Kanpur district (4.9%).^{15,16} The major reason for this difference could be the different study setting and access to the health services.

In children, the most common illnesses identified were respiratory disorders, followed by infectious and parasitic disorders. Another study conducted in rural areas of Aligarh among under-five children found that respiratory disorders were the most common illnesses.¹⁷ Similarly, a study done in primary health clinic in Pakistan reported that diseases of respiratory system (27.6%), and infectious and parasitic diseases (18.7%), were the most common.¹⁸ A high burden of malnutrition was found in the present study. The prevalence of underweight was estimated in the present study, and in children it was higher compared to those reported from studies of the tribal area, Madhya Pradesh (61.6%),¹⁹ West Bengal (80.9%),²⁰ urban slums of West Bengal (41.6%)²¹ and rural Haryana (25.3%).²² Few cases on Vitamin A deficiency were also found. One possibility is that the medical care supply channel is the problem. Another could be people not interested or not aware about child health. On the contrary, prevalence of non-communicable diseases like hypertension among elderly was very low in our study. These findings point out that different range of health care services needs to be provided to people of hilly terrain. Special health care services targeting

children and elderly persons are the need of the hour in difficult to reach areas. Policymakers may face multiple options for programmes that address public health in hilly areas. Costing of different aspects of health services has importance in recent years due to the increasing costs of medical care and the scarce resources of most governments. The present study attempts to quantify all components of health and cost them accordingly. The specialist end cost was found to be nearly half of the patient end cost. The regular health camps can be the answer to unmet need for health in hilly areas. The non-accessibility of the health services is clearly depicted by high burden on cataract in the community. In addition, the doses of the medicines have to be adjusted from time to time and therefore frequent medical advice is needed. Failure to avail services is the cause of the major burden of disease like malnutrition in the Ragdi village. No systematic costing of health camps in hilly terrains had been conducted in India. This study gives a brief description of the morbidity profile of patients who attended a centre for urban health over a period of one year. This knowledge will help in planning appropriate range services to meet the patients' needs and help in training of health staff to meet these needs.

The present study was only a one-day health camp in Uttarakhand and hence it cannot be generalized to the whole of the state and country. Nevertheless, it gives insight to the usefulness of health camp in difficult terrains. The model needs to be studied with larger samples in future. In addition, the sample size was small. Though the morbidity profile was stratified by age and gender, it was not possible to classify on socioeconomic structure. Since treating physicians sometimes recorded symptoms rather than a diagnosis, misclassification could have occurred during coding. The results of the cost benefit analysis ratio only cost to the monetary value of effects on all outcomes. It therefore cannot deliver absolute judgement on whether a health camp approach is worth the

investment. Further, there were assumptions about the monetary value of many components. Many patients could be expected to need only primary or secondary level health care.

5. Conclusion

Health camps conducted with prior planning and in an organized manner can be more effective and useful for the needy hilly population of our country. This information may help guide health care providers universal health care to patients in hilly areas costs significantly. The health camp with specialist services is a cost-effective way to bridge the major gap in achieving universal health coverage in difficult to reach hilly areas.

Conflicts of interest

The authors have none to declare.

Author contributions

All the authors were involved in the design of the study and tool development. VB collected and analyzed the data and VB and AG prepared the first draft. All the authors provided critical inputs for the paper. AS approved the final draft.

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