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Mobile health service demand, key morbidity magnitude, and trend at mountainous outreaches of Uttarakhand: A descriptive study

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ABSTRACT

Background: Deploying mobile health vans (MHVs) to service disadvantaged, underserved mountainous hamlets across six districts of Uttarakhand on a "fixed day-fixed location" strategy was an effective initiative in the state in collaboration with Technology Information Forecasting and Assessment Council (TIFAC) and NRHM. **Aims and Objectives:** The aim of the study was to provide quality diagnostic and curative care through mobile health clinics at select mountainous outreaches of Uttarakhand state. **Materials and Methods:** A bimonthly mobile health services with fully equipped MHV sponsored by the directorate of science and TIFAC and assessment council and Government of Uttarakhand on a "fixed day, fixed time and fixed place" schedule were provided along pre-designated service locations. **Results:** A total of 77,688 beneficiaries received services through 902 camps spanning 13 quarters with an estimated 5976 and 89 beneficiaries per quarter per camp; 573 clients received ultrasound, 639 X-ray, 34 ECG, and 3543 other lab procedures. Quarterly demand for services was highest, 19.5% for gastrointestinal disorders, followed by 18.4% for musculoskeletal disorders, 13.8% for genitourinary system disorders, 11.8% for respiratory system disorders, and 8.5% for ENT and ocular disorders. The prevalent morbidity was predominantly acid peptic disease (15.5%), followed by osteoarthritis (13.3%) and low backache and renal stones (7.2% each). **Conclusion:** Integrating mobile health service delivery component with existing strategies adopted by public health system in primary health care is an operationally feasible and viable option to address 'inaccessibility at disadvantaged mountainous outreach.

Key words: Mobile health van; Fixed day- fixed location; Technology information forecasting and assessment council; NRHM

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INTRODUCTION

Determinants of health-care delivery in Uttarakhand, namely, challenging geographical terrain, poor road connectivity, and poor access to transport required that the state adapt NRHM guidelines as per local need and socioepidemiological parameters. The state health policy too did not take cognizance of the sparsely populated, scattered, mountain "hamlets," and linking these with services. Existing service coverage criteria of the health system is also inappropriate vis-à-vis mountainous hamlets. In view of this perspective and particularly severe limitation of conventional 'fixed-location healthcare facilities by inaccessibility due to adverse topographical conditions, "mobile health clinic (MHCs)" was initiated to supplement the existing public health facilities with the aim of providing minimum basic primary health-care services to the community living in far-flung, difficult outreaches.[1]

The objective is essentially to provide the quality diagnostic and curative care through MHCs at select mountainous outreaches of Uttarakhand state and impart basic

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health education, community-based sensitization toward preventive and promotive health and hygiene through community-endorsed behavio change communication (BCC) to all community beneficiaries and stakeholders and conduct operational research.

Aims

To evaluate effectiveness & operational viability of a mobile service delivery strategy at mountainous UK.

Objectives

1. To undertake Community Needs Assessment (CNA) by Participatory Rural Appraisal (PRA)/ Participatory Learning Action (PLA) techniques among a sample beneficiary population
2. To hold 'fixed site fixed day' multi-speciality field clinics, provide primary & limited curative care and effective referral
3. To generate awareness & sensitize the prospective beneficiaries on essentials of health, hygiene & sanitation practices by effective & community endorsed behavior change communication (BCC).

MATERIALS AND METHODS

Fully equipped mobile health vans (MHVs), sponsored by the Directorate of Science and Technology (DST) through technology information forecasting and assessment council (TIFAC) and Government of Uttarakhand (NRHM) were introduced as an innovative outreach delivery strategy to reach out to the unserved/underserved population. A movement and operational plan was formulated, in which a team of service providers from various specialties (orthopedics, medicine, radiology, gynecology, and community medicine) and supporting staff was recruited. The team would provide 7–10-days extensive bimonthly mobile health services on a 'fixed day, fixed time, and fixed place schedule along pre-designated service locations across six districts, i.e., Dehradun, Tehri, Pauri Garhwal, Uttarkashi, Rudraprayag, and Chamoli through a proactive informed community and liaison with health facilities/FRUs (public or private). Data generated during first implementation quarter was assumed as a baseline for the trend in the utilization of mobile health services, morbidity pattern, and health seeking in Uttarakhand. Generated data were collated and analyzed in the Department of Community Medicine, HIHT.

Key activities

For community needs assessment (CNA), before service delivery, the Department of Community Medicine, HIHT undertook a CNA. A methodology based on the rapid assessment procedures and participatory learning action/interactive sessions was used. Opinions, attitudes, constraints, and suggestions on health-care status and unmet needs of respective areas were obtained from opinion leaders, PRIs and significant others of the community. Interactive sessions with pre-structured interview instruments were held. Outpatient Clinic (OPD) services includes quality diagnostic and curative services, prioritized vis-à-vis CNA were provided through outpatient clinics. The "Multi-specialty" clinics addressed levels of care beyond essential primary and limited curative care. Diagnostic Facilities provided were ultrasound (USG), X-ray, ECG and key procedures besides routine laboratory investigations. For awareness in the community health education, BCC, and Counseling were conducted which includes qualitative methods of communication like focus group discussions/ interactive group sessions were conducted to sensitize the community on its health needs and priorities to impart health education and counseling on relevant themes including distribution of health education materials. Community-endorsed BCC materials were displayed at service locations. An effective referral hierarchy was maintained along nearest and functional health facilities/ referral units (public or private) including EMRI (108) for secondary, tertiary, and emergency care.

Table 1: Coverage: District wise camp sites

Pauri Garhwal (01)	Dehradun (02)	Uttarkashi (03)	Rudraprayag (04)
1. Ghandiyal	1. Quana	1. Dhontri	1. Tilwara
2. Chelusain	2. Hanol	2. Dunda	2. Pipalkoti
3. Dugadda	3. Kathiyan	3. Barkot	Tehri (05)
4. Satpuli	4. Rohtakhand		1. Pratap Nagar
5. Kaproli	5. Quansi		2. Kandisaur
6. Thelisain	6. Lakhamandal		3. Chamba
7. Byasi	7. Chakrata		4. Nainbagh
8. Boongidhar	8. Magtipokhri		Chamoli (06)
9. Upharinkhal	9. Lakhwar		Nandprayag
10. Dhumakot	10. Nagthath		
11. Shankarpur			
12. Adalikhal			
13. Nainidanda			
14. Haldukhul			

Table 2: Service utilization profile

Beneficiaries / Services	No (%)
Total Beneficiaries	77688
Total number of camps organized	902
Beneficiaries (Avg.) per quarter	5976
Beneficiaries (Avg.) per camp	86
Beneficiaries (Avg.) provided diagnostic facilities per quarter	
USG	573 (9.58%)
X-ray	639 (10.7%)
ECG	34 (0.56%)
Laboratory procedure	3543 (59.3%)

RESULTS

Services were provided through 34 "end of the road" locations across six districts of Uttarakhand (Table 1).

A total of 77688 beneficiaries received services at 902 camps with an estimated 5976 and 89 beneficiaries per quarter per camp, respectively. Diagnostic services per quarter were provided essentially to an estimated 573 (9.5%) clients for USG, 639 (10.7%) for X-rays, 34 (0.56%) for ECG, and 3543 (59.3%) for other laboratory procedures (Table 2).

Demand for services utilized per quarter (Table 3) was highest for those with gastrointestinal disorders (GID), i.e., 19.5% followed by 1105 (18.4%) with musculoskeletal disorders (MSD), 830 (13.8%) with genitourinary system disorders (GUD), 710 (11.8%) with respiratory system disorders (RSD), and 513 (8.5%) with ENT and ocular disorders (OCD).

Looking at the trend of service utilization (Table 4), a visible increase in the number of clients seeking services for key ailments, i.e., MSD, GID, RSD, ENT, and OCD was seen quarter 7 onward in terms of number and proportion of clients; however, considerable dip in utilization was evident beginning quarter 4 through quarter 7 (Figures 1 and 2). Comparison of quarter-end morbidity profile of beneficiaries utilizing services with that of baseline (quarter 1st) for key prevalent diseases shows statistically significant differences.

Table 3: Morbidity profile

Estimation average per quarter (n=5976) clients seeking services for:	
GID	1168 (19.5%)
MSD	1105 (18.4%)
GUD	830 (13.8%)
RSD	710 (11.8%)
ENT and OCD	513 (8.5%)
C/PV and MD	337 (5.6%)
SD	297 (4.96%)

GID: Gastrointestinal disorders, MSD: Musculoskeletal disorders, GUD: Genitourinary system disorders, RSD: Respiratory system disorder, ENT and OCD: ENT and ocular disorder, C/PV and MD: Cardio/peripheral vascular and metabolic disorders, SD: Skin disorders

It can be seen from Table 5 that the prevalence of key morbidities was proportionately highest with clients having acid peptic diseases, i.e., 15.5% followed by those with osteoarthritis (13.3%), low backache and renal stones (7.2% each), and hypertension and Diabetes (6.6%). The prevalence of other morbidities, namely, chronic obstructive airway disease, acute respiratory infection, cataract and refractive errors, dermatosis, and anemia was negligible.

DISCUSSION

The Uttarakhand state health policy envisages bringing down key primary RCH indicators. Meeting these goals is understandably linked to access and effectiveness of outreach. However, the policy did not take cognizance of the sparsely populated, scattered, mountain "hamlets" linking these with services.[2] In mountainous outreach of Uttarakhand, "availability" and "accessibility" are two key determinants of health-care delivery, and in this perspective, provision of mobile health services has certainly increased the outreach of health-care services to the hitherto underserved and unserved regions of the state. The Government of Uttarakhand had undertaken successful pilot MHV programs supported by NRHM and committed to sustain this program as a mature component in the yearly state PIP.[3]

Disability viewed from socioepidemiological perspective of Uttarakhand may be particularly related to health conditions that affect Quality of Life and Restrict activities of daily living and potential for productive aging. In a study of self-reported morbidity with 965 elderly females from 52 villages of Tehri district of Uttarakhand, as many as 89% of the clients had "kidney stones," 87% had some gynecological morbidity, 70% had "digestive" problems, and 55% of the clients complained of "walking" problem – principal contributor being "osteoarthritis."[4] Effectiveness of mobile health services as an innovative strategy to reach out to the unserved/underserved is evident from Table 3.

In Roy et al., study on trend in the utilization of mobile health services in Uttarakhand, 27723 clients sought mobile health services and central tendency was 3465 (12.5%) as

Table 4: Quarterly morbidity trend (as no. and proportion of beneficiaries seeking services)

Morbidity	Q1 (Base) n=4123	Q4 n=3667	Q7 n=2201	Q10 n=5337	Q 13 n=10,363	P-value
Gastrointestinal disorder	1616 (33)	626 (15)	346 (13.3)	1521 (27.5)	2530 (52.34)	P<0.05
Musculoskeletal disorders	671 (13.7)	1043 (25)	549 (21.1)	1095 (19.8)	2108 (43.61)	P<0.05
Genitourinary system disorders	480 (9.8)	667 (16)	391 (15)	924 (16.7)	1374 (28.42)	P<0.05
Respiratory system disorder	240 (4.9)	542 (13)	336 (12.9)	664 (12)	1560 (32.27)	P<0.05
ENT and ocular disorder	318 (6.5)	459 (11)	213 (8.2)	553 (10)	1476 (30.54)	P<0.05
Cardio/peripheral vascular and metabolic disorders	318 (6.5)	163 (3.9)	239 (9.2)	326 (5.9)	641 (13.26)	P<0.05
Skin disorders	480 (9.8)	167 (4)	127 (4.9)	254 (4.6)	674 (13.94)	P<0.05

Table 5: Key morbidity prevalence (n=5976)

Morbidity	(%)
APD	15.5
Osteoarthritis	13.3
Low backache	7.2
Renal stones	7.2
Chronic OAD	3.5
ARI	3.4
Cataract and RE	3.4
Dermatoses	4.5
Hypertension and diabetes	6.6
Anemia	3

APD: Acid peptic diseases

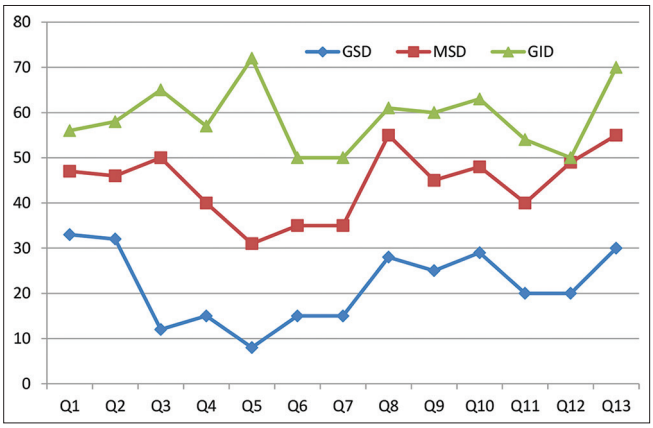

Figure 1: Quarterly morbidity trend genitourinary system disorders, musculoskeletal disorders and gastrointestinal disorders

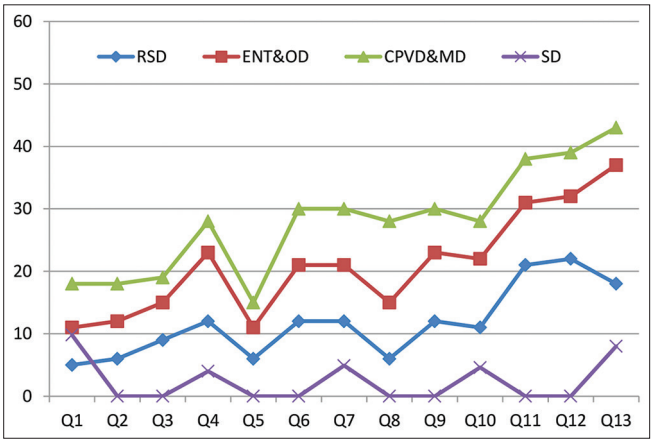

Figure 2: Quarterly morbidity trend: respiratory system disorders, ENT, ocular disorders, cardio/peripheral vascular and metabolic disorders and skin disorders

against baseline of 4899 (17.7%) clients; 70.6% of clients were provided laboratory services, followed by 13.3% for USG, 10.8% for X-ray, and 1% ECG. Client coverage of the present study (77688) and diagnostic services uptake, i.e., lab procedure (59.3%), X-ray (10.7%), USG (9.6%), and ECG (0.6%) is analogous to the cited study in terms of study settings and scope.[5]

In a publication by Directorate of Health Services, Government of Delhi, effectiveness of mobile health services provided to *Jhuggi jhopdi* clusters and analogous to the present one under discussion, was highlighted.[6] Findings of case studies of Mobile Health Units in Tamil Nadu and Orissa (2008) by Dash et al., also corroborate to the parameters of mobile services delivered in Uttarakhand under discussion.[7] A meta-analysis of India's Mobile Health teams by Morrison C as early as 1996 had pointed out increase in the uptake of essentially limited, curative care services including use of contraception.[8] The findings of the meta-analysis in terms of number and proportion of clients seeking services and prevalence of key morbidities were found to be reinforced by the MHV pilot programs undertaken by Government of Uttarakhand and the Mobile Health Initiative sponsored by TIFAC, DST.[3]

Kojima et al., in a study in 2017 at BioMed Central Infectious Diseases concluded that patient centered Mobile Medical Clinics were feasible, successful, and acceptable models that could be used to provide quality health care in rural and hard to reach settings.[9] Furthermore, in an article, (viewpoint) at IJCM, July 2013, Jamir et al., in Delhi observed that to meet the urgent need of providing quality services with accessibility at all levels, MHCs in urban areas played a vital role particularly for the marginalized sections of the society for whom MHCs were the only source of health care that these were often the "first contact health care" of the urban community.[10]

According to Nair et al., mobile health services in rural regions were successful in exceeding beneficiaries' expectations. High beneficiary satisfaction and trust in mobile health services strongly favors such services in other rural geo-topography.[11]

Evidently, of the very few conceivable approaches to service people at "hard to reach," underserved, mountainous outreaches, the "fixed day, fixed location" approach by mobile units providing optimal secondary and tertiary care at places otherwise non-negotiable, is feasibly the most viable option. It is felt that considering community health needs at such terrain, mobile health services as delivered under the study project, deserves to be integrated into the primary health-care delivery planning.

Limitations of the study

The study is limited by its not very comprehensive reach of all the disadvantaged & unserved people ; also, services through mobile vans however equipped failed to provide comprehensive , emergency & interventional curative care; further, the study was limited by the fact that it was

a project initiative, not either sustained or yet integrated into routine care.

CONCLUSION

Integrating mobile health service delivery component with existing strategies adopted by public health system in the primary health care is an operationally feasible and viable option to address 'inaccessibility as a fundamentally important barrier in health service utilization in the mountains. Direct benefits of the project include quality diagnostic and curative care to the underserved v unserved mountainous outreach serving as a unique model to be replicated in other parts of the country. Till adequate accessible fixed health-care facilities are made available to the underserved section of the urban population, MHCs appear to be a viable option for alleviation of their suffering.

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DR- Definition of intellectual content, literature survey, prepared first draft of manuscript, implementation of study protocol, data collection, data analysis, manuscript preparation and submission of article; **PD-** Concept, design, clinical protocol, manuscript preparation, editing, and manuscript revision; **DS-** Manuscript preparation, editing, and manuscript revision; **RS-** Design of study, statistical analysis and interpretation; coordination and manuscript revision; **SCD**- Literature survey and preparation of figures.

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