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Original Research Article

Addressing healthcare gaps in rural India: a cross-sectional study of patient concerns at a medical camp in Gujarat

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ABSTRACT

Background: Rural regions of Gujarat, India faces significant healthcare challenges due to limited provider access, financial constraints and transportation barriers. Medical camps serve underserved populations, but data on presenting concerns remain limited.
Methods: A cross-sectional chart review was conducted at a free medical camp in Ahwa, Gujarat. Data collected included demographics, diagnoses, medications and anthropometric measures. A scoliosis screening was also performed in children aged 10–13 years.
Results: Of 786 patients, 646 met inclusion criteria (mean age 34.2 years; 56.4% female). Musculoskeletal conditions were most common (32.1%), followed by dermatologic (23.5%) and respiratory conditions (22.1%). Low back pain and knee pain predominated. Oral analgesics (31.0%) and multivitamins (18.7%) were most frequently prescribed. Among adults, 24.5% were overweight and 8.2% obese, while 20.2% of children were underweight. No scoliosis cases were identified.
Conclusions: Musculoskeletal, dermatologic and respiratory conditions represent primary healthcare needs in rural Gujarat. Coexisting adult overweight/obesity and pediatric undernutrition highlight the need for targeted interventions. These findings support integrating primary care, preventive education and low-cost treatment strategies into rural health programs.

Keywords: Community health services, Health services accessibility, India, Malnutrition, Musculoskeletal diseases, Rural health

INTRODUCTION

Rural communities in India face significant healthcare disparities, with limited access to specialized medical services.[1] Many individuals in these regions rely on periodic medical camps as their primary source of healthcare, given the scarcity of local healthcare infrastructure.[2] The burden of disease in these settings is diverse, encompassing musculoskeletal disorders, dermatological conditions, infectious diseases and chronic illnesses. Musculoskeletal concerns, in particular, are prevalent due to physically demanding occupations, limited access to orthopedic care and delayed treatment-seeking behavior.[3,4]

Similarly, dermatological conditions often go unaddressed due to a lack of specialized dermatologic services, resulting in chronic or worsening skin disorders.[5] Infectious diseases and chronic conditions, such as diabetes and hypertension, also contribute to the high disease burden in these communities, necessitating comprehensive medical outreach efforts.[6,7] Mobile health

initiatives and temporary medical camps have been increasingly used to address these healthcare gaps.[8,9] Medical camps serve as a critical point of care, offering basic diagnostic and treatment services, patient education and referrals for specialized care when needed.[8,10]

However, there is limited data on the specific clinical presentations seen in these camps and how they reflect broader unmet needs in rural populations. While some studies have catalogued disease patterns in rural India, most are either region-specific or outdated, with little standardization in how diagnoses are categorized. Moreover, few studies have quantified medication use, nutritional indicators or weight status alongside presenting concerns, which could offer a more holistic understanding of patient health in underserved communities.

This study was motivated by direct clinical observation during a rural medical camp in Gujarat, where the range and frequency of patient concerns revealed potential trends in community health that had not been well-documented. The high volume of musculoskeletal concerns, particularly in working-age adults, suggested the need for targeted musculoskeletal care and pain management strategies, while widespread nutritional supplementation raised questions about underlying dietary deficiencies. Authors hypothesized that musculoskeletal and dermatologic conditions would be the most common presenting concerns, reflecting occupational strain and lack of access to specialty care and that a significant proportion of patients would demonstrate indicators of nutritional imbalance or chronic disease.

METHODS

This observational, cross-sectional study was conducted using retrospective data collected during a seven-day rural medical camp held from December 9 to December 15, 2024, in Ahwa, Gujarat, India. The camp provided free medical evaluations and basic treatment services to individuals from surrounding villages.

The study was reviewed and granted exemption status by the Institutional Review Board at Nova Southeastern University (IRB ID #: 2025-203). As a retrospective analysis of de-identified data, informed consent was waived. This study did not receive external funding, was not a registered clinical trial and no compensation was provided to participants.

Study population and inclusion criteria

All patients presenting with a medical concern during the camp were eligible for inclusion. Patients were excluded if they attended solely for preventive health education or if their primary concerns were non-medical (e.g., dental or ophthalmologic needs). Recruitment was consecutive based on arrival and triage order during the camp.

Data collection

Structured interviews and physical examinations were conducted by trained healthcare professionals and supervised medical volunteers. Recorded data included patient age, gender, clinical history and primary medical concern. Presenting concerns were categorized into the following clinical groups for analysis: Respiratory and ENT (e.g., upper respiratory infections, sinusitis); Gastrointestinal and Nutritional (e.g., constipation, malnutrition); Dermatologic (e.g., skin infections, wounds, eczema); Musculoskeletal and Pain Syndromes (e.g., low back pain, joint pain, trauma); Endocrine and Metabolic (e.g., diabetes, obesity); Neurological (e.g., headaches, seizures); Genitourinary and Reproductive (e.g., menstrual disorders, urinary concerns); Cardiovascular (e.g., hypertension, edema); and Psychiatric (e.g., anxiety, behavioral concerns).

Data management and statistical analysis

Patient information was initially documented on standardized paper charts. After the event, data was securely entered into Microsoft Excel for analysis. Descriptive statistics were used to summarize patient demographics, diagnostic frequencies and diagnostic categories. All analyses were performed by [blinded initials] using Microsoft Excel Version 2505. No power analysis was conducted, as this was an exploratory observational study. Diagnoses were secondarily grouped by specialty to support the interpretation of care gaps in rural settings.

Race and ethnicity data were not collected for this study, as they were not directly relevant to the study's objectives or outcomes. As a retrospective analysis of de-identified data, informed consent was waived. This study did not receive external funding, was not a registered clinical trial and no compensation was provided to participants. This study is reported in accordance with the STROBE guidelines for observational studies.

RESULTS

A total of 786 patients were evaluated across seven clinic days at a rural medical camp in Ahwa, Dang district, Gujarat, India (Figure 1). Of these, 140 charts were excluded due to presenting concerns limited to optometry or dental concerns and/or missing relevant demographic or medical information, resulting in a final sample of 646 patients. Patients' diagnoses were further categorized into medical or surgical specialties to facilitate clearer analysis (Table 1). The findings aim to inform targeted healthcare planning for underserved rural populations.

Patient volume by day was day 1 (n=103), day 2 (n=72), day 3 (n=152), day 4 (n=70), day 5 (n=128), day 6 (n=98) and day 7 (n=12). The mean age was 34.2±20.3 years (range, 5 months to 89 years), with children under 18 years comprising 29.2% (n=189). Gender was recorded

for 548 patients (84.7%), of whom 309 (56.4%) identified as female and 239 (43.6%) as male. Missing data were due to incomplete chart entries.

Clinical diagnoses

Among the 646 patients, 520 (80.4%) had at least one diagnosis recorded. The three most common diagnostic categories were: musculoskeletal conditions: n=167 (32.1%), dermatologic conditions: n=122 (23.5%) and ENT/Respiratory infections: n=115 (22.1%). 325 patients (62.5%) presented with a single diagnosis, 152 patients (29.2%) had two diagnoses and 36 patients (6.9%) had three or more diagnoses.

Diagnoses were made solely on the basis of clinical history and physical examination, as laboratory and imaging services were unavailable or significantly delayed during the clinic days.

Treatment

While nearly all patients received treatment, complete medication data were only available for 625 patients (96.7%). Among the 1059 total medications prescribed, the most common were: oral analgesics-paracetamol, diclofenac, ibuprofen 328 prescriptions (30.97%), multivitamins 198 prescriptions (18.70%), gastrointestinal agents-PPIS, famotidine, antacids 97 prescriptions (9.16%), antifungals-fluconazole, clotrimazole 79 prescriptions (7.46%), h1 antihistamines-cetirizine, benadryl, loratadine 77 prescriptions (7.27%), antibiotics-amoxicillin, metronidazole 59 prescriptions (5.57%). The ten most frequently prescribed items are summarized in Table 2, highlighting prevalent ailments and resource constraints of the camp.

Osteopathic manipulative treatment (OMT) was administered to 22 patients presenting primarily with musculoskeletal concerns such as low back or joint pain. Techniques employed included soft tissue, muscle energy and myofascial release. Patients receiving OMT reported immediate improvement in pain or mobility following treatment, supporting its utility as a non-pharmacologic option in resource-limited settings.

Anthropometric and vital sign data

Blood pressure was recorded in 552 adult patients, representing 85.4% of the adult cohort. The mean systolic blood pressure was 126.0 mmHg and the mean diastolic blood pressure was 76.0 mmHg. Among pediatric patients, blood pressure was measured in 105 individuals, with an average systolic pressure of 103.8 mmHg and an average diastolic pressure of 66.9 mmHg. When combining both adult and pediatric populations (n=552), the average systolic blood pressure was 122.1 mmHg (median, 120 mmHg; range, 78–202 mmHg) and the average diastolic blood pressure was 73.4 mmHg (median, 74 mmHg; range, 40–120 mmHg).

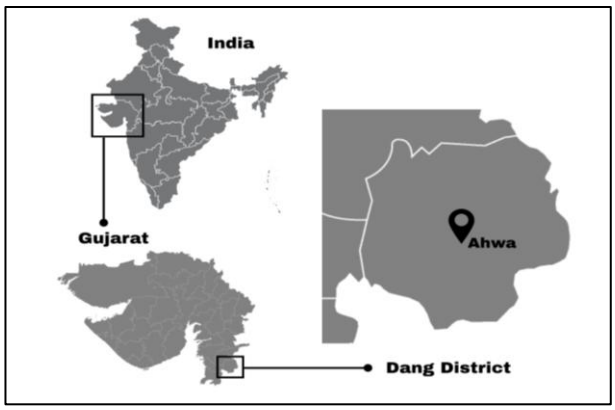

Figure 1: Map of India with Ahwa, Gujarat highlighted.

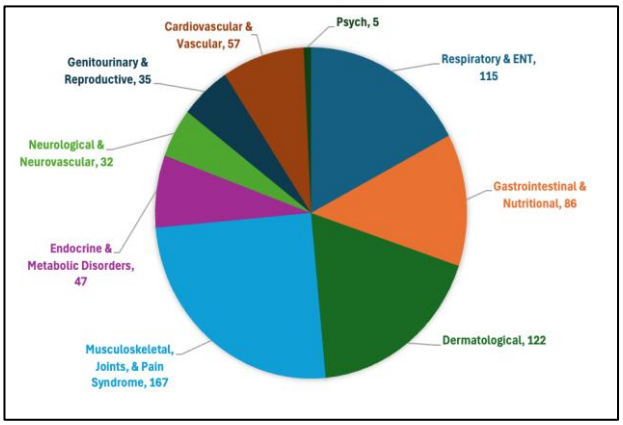

Figure 2: Distribution of diagnosis.

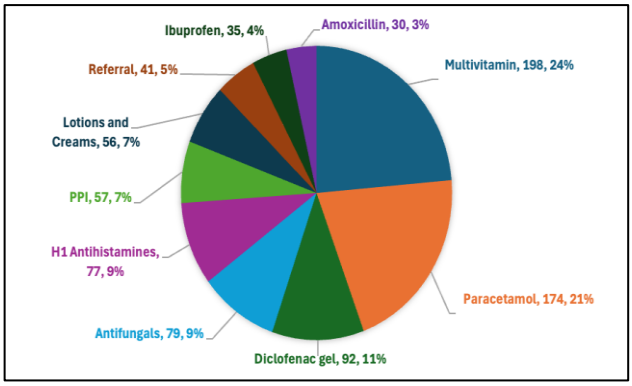

Figure 3: Distribution of plan elements.

Body mass index (BMI) data were available for 600 adults, comprising 92.9% of the adult patients. Among these adults, 68 (11.3%) were underweight (BMI<18.5 kg/m²), including 15 (2.5%) who were severely underweight (BMI<16.0 kg/m²). Conversely, 147 adults (24.5%) were overweight (BMI>25 kg/m²) and 49 (8.2%) met criteria for obesity (BMI>30 kg/m²).

In the pediatric group, BMI data were available for 555 children. Of these, 112 (20.2%) were underweight, with 89 children (16.0%) classified as severely underweight.

Only 8 children (1.4%) were overweight and 1 child (0.2%) was obese. Random blood sugar (RBS) levels were tested in 51 patients (7.9%). The mean RBS value was 163.9 mg/dl and 13 patients (2.0%) met criteria for a new diagnosis of diabetes, defined as RBS >200 mg/dl. Additional vital signs were recorded as follows: Pulse rate was measured in 557 patients with a mean of 85.7 beats per minute (range, 26–148; median, 84). Respiratory rate was recorded in 416 patients with a mean of 18.7 breaths per minute (range, 12–93; median, 19). Temperature was measured in 486 patients, with an average temperature of 97.6 °F (range, 16–101.2; median, 97.9). Height data were available for 603 patients, with an average height of 59.2 inches (range, 23–70.5; median, 60). Weight was recorded in 617 patients, averaging 110.0 pounds (range, 13.2–238; median, 112). Partial pressure of oxygen (PO2) was measured in 142 patients, with a mean of 98.1 mmHg (range, 74–100; median, 99).

Musculoskeletal concerns

A total of 167 patients presented with musculoskeletal (MSK) concerns during the health camps. The most reported site of pain was the lower back, affecting 91 patients (54.5%). This was followed by knee pain in 53 patients (31.7%) and generalized arthralgias in 46 patients (27.5%). Other frequently affected areas included the shoulder (8.4%, n=14), neck (4.8%, n=8), hand or wrist (4.2%, n=7) and ankle (4.2%, n=7). Pain severity and functional limitations were not consistently documented.

Scoliosis screening

A total of 60 children between the ages of 10 and 13 years were screened for scoliosis during the health camps. No cases were identified on physical examination. All assessments were performed by trained clinicians using visual spinal inspection and forward bending tests; no imaging was conducted due to limited field resources. The mean age of the children screened was 11.2±1.2 years. On average, they measured 56.1±4.2 inches in height and weighed 71.4±20.1 pounds. When analyzed by age group, 10-year-olds (n=27) had a mean height of 53.1 inches and a mean weight of 60.7 pounds; 11 years old (n=13) measured 55.0 inches and weighed 70.9 pounds; 12 years old (n=14) averaged 58.4 inches in height and 75.8 pounds in weight; and 13 years old (n=6) averaged 60.5 inches in height and 88.9 pounds in weight.

Table 1: Distribution of diagnoses by specialty (n=646).

Specialty	Top diagnosis (n)	Total diagnoses in specialty
Musculoskeletal	Low back pain (n=91)	167
Dermatology	Dermatitis (n=18)	122
Ent/respiratory	Upper respiratory infection (n=52)	115
Gastroenterology	Dyspepsia (n=23)	86
Cardiology	Hypertension (n=54)	57
Endocrinology	Type 2 Diabetes Mellitus (n=19)	47
Urology/gynecology	Urinary Tract Infection (n=6)	35
Neurology	Headache (n=14)	32
Psychiatry	Anxiety (n=4)	5
Not recorded	N/A	133

Table 2: Top 10 prescriptions issued during the health camp.

Medication	Number prescribed	Percentage of total prescriptions
Multivitamin	198	18.70
Paracetamol	174	16.43
Diclofenac gel	92	8.69
Antifungals †	79	7.46
H1 antihistamines ¶	77	7.27
PPI §	57	5.38
Lotions and creams	56	5.38
Referral	41	3.87
Ibuprofen	35	3.31
Amoxicillin	30	2.83

† Fluconazole, clotrimazole and others. ¶ Cetirizine, diphenhydramine, loratadine and others. § Omeprazole, pantoprazole, rabeprazole and others.

DISCUSSION

This study offers a broad overview of patient needs within rural Gujarat, highlighting MSK concerns, dermatologic conditions and respiratory infections as the most common diagnoses. The frequent use of oral analgesics and multivitamins reflects both the high burden of pain-related conditions and suspected

nutritional deficiencies. Our findings also point to a double burden of malnutrition, with pediatric patients often underweight while adults showed high rates of overweight and obesity.[11,12]

Unlike studies that examine isolated conditions, this analysis integrates patient diagnoses, treatment patterns and nutritional indicators to present a systems-level view of rural healthcare needs.[13-16] This holistic perspective is crucial for guiding resource allocation and structuring future outreach efforts. For example, the high prevalence of MSK disorders, particularly low back and knee pain, echoes the physical demands of agricultural and manual labor common in rural regions.[3,17,18] These conditions, which significantly impact mobility and productivity, are often managed symptomatically in the absence of imaging or rehabilitative care.[19] Within this context, the observed positive response to OMT suggests that manual therapy could serve as a scalable, low-cost adjunct to conventional pain management.[20]

Environmental and nutritional drivers of disease

Environmental exposures likely contributed to the high rates of dermatologic and respiratory conditions observed. Fungal infections, dermatitis and other skin concerns are common in areas with limited access to hygiene resources or dermatologic care, especially among children and laborers.[5,21,22] Similarly, upper respiratory infections and allergic symptoms may be linked to poor air quality and household pollution from biomass fuel use, factors well documented in the rural Indian context.[23-25] These findings support the integration of public health measures such as clean cooking initiatives, hygiene education and preventive care into medical outreach models.[6,26-28]

The nutritional profile of patients further highlights the complexity of rural health. While many adults presented with overweight or obesity, likely influenced by high-calorie, low-nutrient diets, children were far more likely to be underweight or severely undernourished.[12,29] This coexistence of over- and undernutrition within the same community underscores the need for targeted nutrition interventions. Public health policies should aim to address food insecurity and dietary quality simultaneously, tailoring programs to meet the distinct needs of both children and adults.[30-32]

Implications

Improving rural healthcare access requires more than episodic care. Mobile clinics and short-term camps must be supported by broader systems that provide continuity of care, diagnostic capabilities and referral infrastructure.[8,33] In this study, the absence of imaging and laboratory testing likely limited diagnostic accuracy, especially for conditions such as joint degeneration or internal infections.[34] Future programs should consider incorporating portable diagnostics and expanding training for local health workers to enhance both acute care and chronic disease management.

Limitations

This study has several limitations. As a cross-sectional, single-visit analysis, it lacks longitudinal follow-up to assess treatment outcomes. The use of interpreters may have introduced language-based miscommunication and handwritten records occasionally limited data quality. Additionally, findings may not fully generalize across India due to local variation in health behaviors and resource access. Nonetheless, the trends align with broader rural health concerns and can inform regional and national strategies.

Future directions

Further research is needed to examine long-term outcomes, adherence to treatment and patient perceptions of care. Studies that integrate imaging and laboratory testing could validate diagnoses made in low-resource settings. Moreover, deeper investigation into the drivers of nutritional disparities and barriers to accessing specialty care will be essential for building sustainable, community-responsive healthcare models in rural India.

CONCLUSION

This study provides a systems-level snapshot of healthcare needs in rural Gujarat, where musculoskeletal, dermatologic and respiratory conditions were most frequently diagnosed. The findings emphasize the importance of accessible primary care, pain management and preventive services in underserved communities. Coexisting nutritional challenges, reflected by pediatric undernutrition and adult overweight or obesity, point to the need for targeted, age-specific dietary interventions. The frequent use of oral analgesics and multivitamins highlights a reliance on symptomatic treatment in settings with limited diagnostic and specialty resources. Although no scoliosis cases were identified during school-based screening, the effort underscored the broader lack of imaging capabilities. These results can inform resource allocation, outreach planning and the development of scalable models for sustainable healthcare delivery. Future research should evaluate long-term outcomes, continuity of care and the potential role of integrative strategies such as manual therapy and community health education.

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Conflict of interest: None declared
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