Assessment of Accuracy, Feasibility, Acceptability and Cost Implications for Enhancing Access to Refractive Error Services through Technology and task reallocation in Lalitpur and Dhading district in Nepal

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Conflict of Interest

No conflict of Interest

Outline of Presentation

- **Introduction**

➢ Current status of refractive error services and access in Nepal

➢ Role of technology and task reallocation in service delivery

- **Objectives**

- **Methodology**

Outline of Presentation contd…

- **Results**

  - Accuracy and quality of technology-assisted interventions
  - Feasibility and acceptability at community and provider level
  - Cost implications and cost-effectiveness

- **Discussion**
- **implementation challenges in Lalitpur and Dhading**
- **Scalability and sustainability of the approach**
- **Policy relevance and future directions in Nepal**

Background

Global Eye Health Priorities

Integrated People Centred Eye Care:

- Ensures everyone has access to quality, affordable and timely care that meets their eye care needs
- Report on vision WHO 2019
- Adopted by Nepal in 2021

SPECS 2030 (WHO)

- adopted by Nepal in 2025
- Guides global eye health until 2030

2030 Targets: eREC:+40%

Current status of refractive error services and access

- Over 2.2 billion people globally have vision loss, among these 826 million have unaddressed near vision impairment and 124 million have unaddressed distance vision impairment.(World report on vision,2019)
- Refractive errors, uncorrected refractive errors, and uncorrected presbyopia were found in 11.2%, 7.3%, and 78.9% of adults, respectively.(Bista J et al,2023)
- In the 1980s, there were just seven ophthalmologists; by 2020, there were 400(Gurung R,2021)

Current status of refractive error services and access

- in 1981 :Five community eye centers, eye departments, and eye hospitals; by 2010: Over 100 (Gurung R,2021)
- The national prevalence of blindness decreased from 0.84% in 1981 to 0.35% in 2010 as a result of these advancements (RAAB,2010)

Primary Eye Care / Community Eye Centres

Managed by NGOs

Services Provided

Common eye disorder management

Health education & awareness

Vision testing & refraction

Optical dispensing

School & community screenings

Referral support

Service Location-• Mostly based in district headquarters

• Limited access in remote hilly areas

⚠ Key Challenge-⃠ Over 40% of the population lacks access to basic eye care services

Role of technology and task reallocation in service delivery

- In response to the growing demand for health care and persistent shortages of health work force, the World Health Organization (WHO) has encouraged the adoption of a task-shifting/reallocation strategy
- In low or middle income countries, task shifting is a potential strategy for reducing health-care costs(Seidman G, 2017)
- Non-Physician Health Workers (NPHWs) can provide NCD care if supported by health system restructuring (Joshi R, 2014)

Role of technology and task reallocation in service delivery

- Technological solutions are tools that can be used to increase access and availability of eye health services.
- Combining task-shifting and technology can enhance refractive error screening and diagnosis
- PlenOptika QuickSee autorefractometre: Low-cost, durable handheld autorefractor; accurate objective refraction inside and outside clinics (PlenOptika,2021)

Objectives

General Objective

- To explore the accuracy, feasibility, acceptability and cost implications of refractive error screening and diagnosis by personnel in basic health service centres and rural eye centres using a commercially available, handheld and portable auto-refraction technology

SPECIFIC

- To assess the accuracy (**sensitivity and specificity)** of screening by primary care health personnel and eye care personnel using the chosen technology.
- To assess the **acceptability** and **feasibility** of the technology and task reallocation by providers and patients.
- To understand the **cost implications** of task reallocation from trained optometrists to trained non-traditional eye care workers in rural eye care centres and health workers in primary healthcare settings.
- To understand the **benefits** of this approach for increasing eye health seeking behaviour

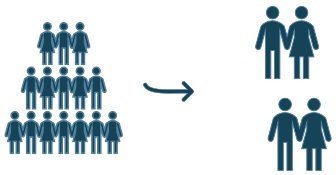
Methodology

Ethically approved: Ethical Review Board of Nepal Health Research Council (NHRC), (Protocol Registration Number 491/2023; Reference number 804).

Study Design

Cross-sectional Study

Sample Size



- N = 1000
- Minimum required: **900**
- Assumed nonresponse: **(10%),**acceptability of the device-90%,precision-2%, Confidence level-95%
- n= [Z2 p(1-p)]/d2].(9)
- 100 samples/Each site

Study Location

Lalitpur and Bagmati Province

Study sites

SN	Basic health service centers	SN	Rural eye care centers
1	Ruby Valley Basic Hospital	6	Jwalamukhi Rural Eye Center
2	Semjong Health Post	7	Gangajamuna Rural Eye Center
3	Mahadevbeshi Health Post	8	Khaniyabas Rural Eye Center
4	Thangsingtar Hospital	9	Gajuri Urban Eye Clinic
5	Sankhu Health Post	10	Mahankal Rural Eye Center

Study Procedures & Methods

Sampling Technique

- All consecutive cases who meet the inclusion criteria was taken in the study.

Selection Criteria

- **Included**: Patients >18 years, within autorefractometer refractive range
- **Excluded**: Visible eye illness or astigmatism ≥1.00 D referred to higher centres

Training

- **Research Optometrists:**3 optometrists trained on study process, refraction, and device use and data collection
- **Health personal** from Basic health care centre and eye care centres : Conducted **2-day training on device use and data collection**

Data Collection method

Acceptability: Standardized questionnaire to participants

data collection by optometrist

Feasibility: Standardized questionnaire to providers

Data collection by optometrist

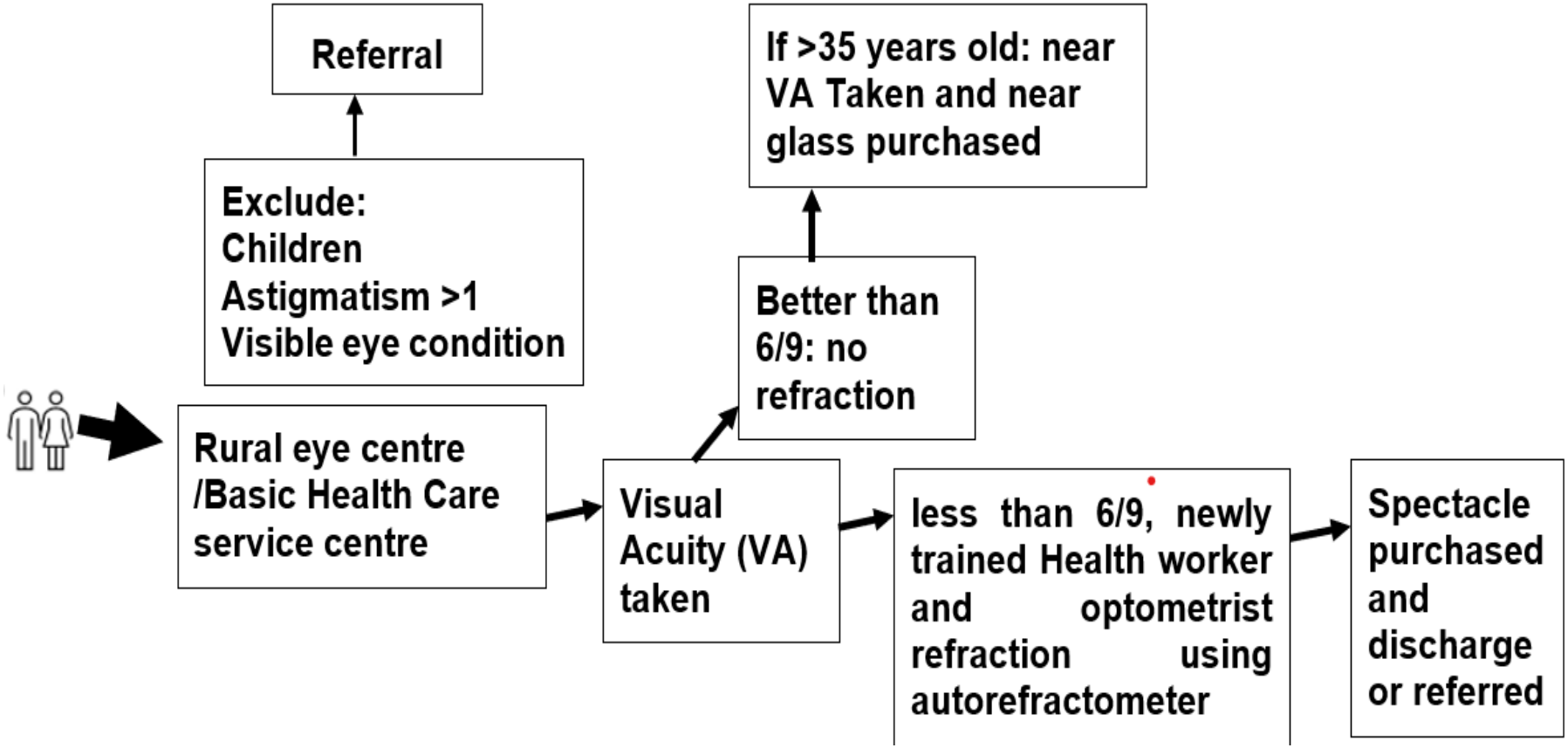
Cost: Local overheads, staff salary per government and NGO scales, travel and other cost of participants

Screening & Procedures: Patients referred to appropriate eye professional based on need

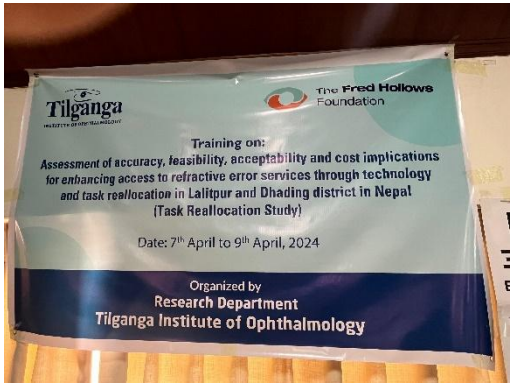
IEC materials were distributed to community

Calculation of Accuracy

Blinded was done for newly trained HW(ANM, Optometry, Ophthalmic Assistant, Health Assistant, Nursing) and optometrist



Methodology



Methodology

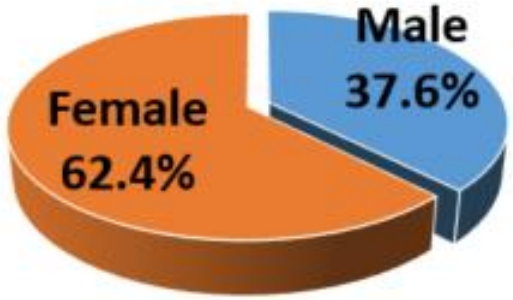
Data management and analysis

- **Data entered:** CommCare application
- **Data Cleaned:** MS Excel
- **Data Analyzed:** IBM SPSS v20.
- Data is stored on password-protected computers.
- **Descriptive analysis:** mean, standard deviation, numbers and percentages, 95% CI
- **Graphical representation:** Pie chart, bar diagram
- **Spherical Equivalent (SE):** Spherical value +(cylinder value/2).
- **Likert-scale data** were analyzed using summated scores.
- **Agreement analysis:** Intra class correlation (ICC), Bland–Altman plots
- **Statistical significance:** P value <0.05 using 2 tailed test.

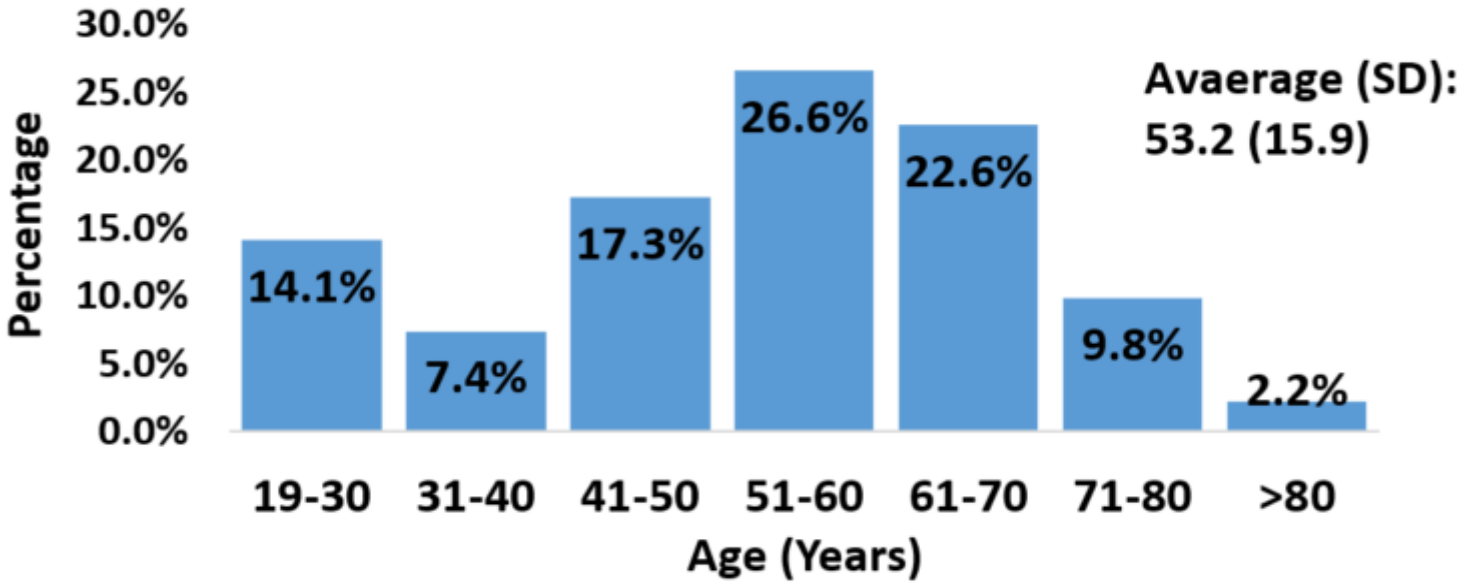
Results

Demographics Results

Gender Distribution (n=1000)



Age distribution of the participants (n=1000)



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Description	n	Percentage
Occupation		
Unemployed/ student/ other	121	12.1
Subsistence farming	507	50.7
Commercial farming	1	0.1
Market/ stall vendor	31	3.1
Domestic work	181	18.1
Casual labour	24	2.4
Government worker	77	7.7
Professional	29	2.9
Other	29	2.9
Religion		
Hinduism	499	49.9
Buddhism	418	41.8
Christian	82	8.2
Muslim	1	0.1

Accuracy and quality of technology-assisted interventions

Agreement of Spherical Equivalence between optometrist Vs Auto-refractometer

Types	Agreement (ICC)	95% CI	P value
Optometrist vs Eye health personnel	0.82	0.63 to 0.89	<0.001
Optometrist vs Newly trained allied health personnel	0.90	0.86 to 0.92	<0.001

Note: Optometrist (Standard)= Manual BCVA

Study Implementation Costs by Site

Health Post/REC	Room Rent	Electricity	WiFi	Water	Total
Khaniyabas Rural Eye Center	3000	1000	1000	0	5000
Gangajamuna Rural Eye Center	3000	1000	1000	0	5000
Gajuri Urban Eye Clinic	7000	2000	2000	500	11500
Mahankal Rural Eye Center	4000	1000	1000	1000	7000
Jwalamukhi Rural Eye Center	12000	1000	1000	1000	15000

Study Implementation Costs by Site

Health Post/REC	Room Rent	Electricity	WiFi	Water	Total
Shemjong Health Post	0	2000	1500	300	3800
Ruby Valley Basic Hospital	2000	1000	1000	0	4000
Sankhu Health Post	4000	500	1000	250	5750
Thangsingtar Hospital	3000	500	1000	500	5000
Mahadevbeshi Health Post	0	2000	1000	600	3600

Travel time and cost to reach the study site

Variables	Frequency	Percent
Travel time from home to study site		
0-30 minutes	679	67.9
30 minutes to 2 hour	289	28.9
2 hour to 10 hours	31	3.1
More than 10 hours	1	0.1
Travel cost from home to study site (NPR)		
No	875	87.5
Upto50	89	8.9
60-100	13	1.3
100-500	23	2.3

Travel time and cost to reach the study site

Variables	frequency	Percent
Travel cost of alternate site (NPR)		
Don’t know	42	4.2
0	22	2.2
1-500	570	57
501-1000	261	26.1
1001-5000	95	9.5
>5000	10	1
Other Expenses in NPR (Per month)		
Living cost: room rent, water, electricity, wifi (mean ±SD, Range)	6565 ±3752.3, Range: 3600 to 15000	
Optometrist Salary	65000	

Feasibility of Autorefractometer to service provider

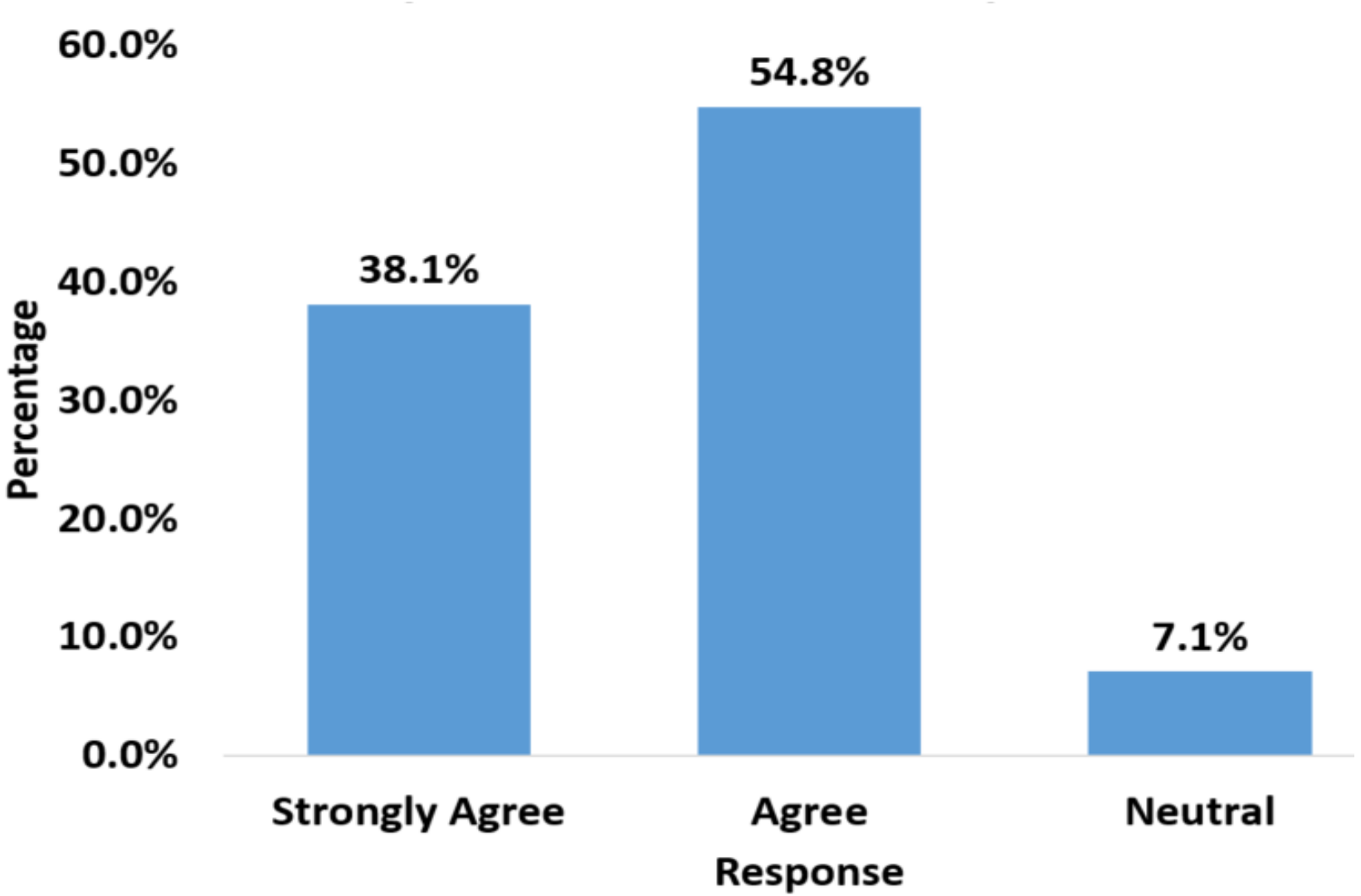
Before access to the PlenOptika Autorefractor, did they provide screening and diagnosis of refractive errors? (n=14)

Description	n	Percentage
Yes (Retinoscopy)	5	35.7
No	9	64.3

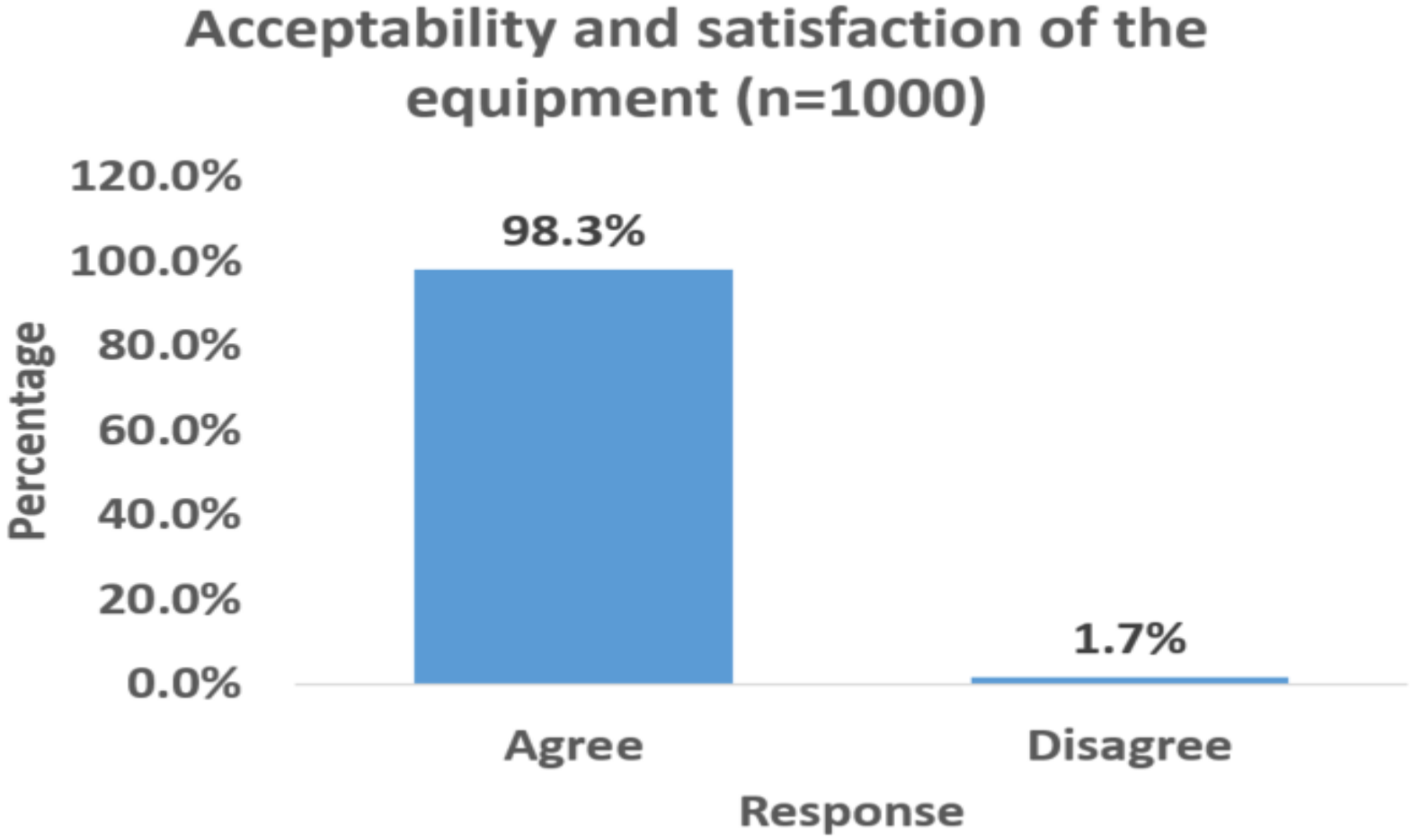
Feasibility of Autorefractometer to service provider

Reason for not providing screening and diagnosis of refractive error n=9 (multiple response)		
Not trained to provide screening	n =5	35.71 %
No equipment to provide screening	n= 8	57.14 %
No demand from customers for screening	n= 1	7.14 %

Feasibility of the device (n=84 Responses)



Acceptability and satisfaction of the equipment

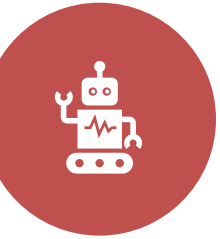


Scalability and sustainability of the approach

The research indicated that PlenOptika autorefractometer **enhances ocular health and service** accessibility in primary care, especially in remote regions.

This indicated that **basic health services** as well as primary care staff can **use this technology** to screen for refractive error.

Scalability and sustainability of the approach



Acceptance and the practicality of auto-refractometer technology were also found very **high**.

Acceptance, satisfaction of participants and positive responses in feasibilityof providers indicated that non-eye health professional can proficiently engage in these tasks

Implementation challenges in Lalitpur and Dhading

- Multiple responsibilities in remote areas
- Difficult Hard-to-reach terrain
- **staff transfers** at basic health service centers disrupt the continuity of services and affect program implementation

Policy relevance and future directions in Nepal

Policy relevance

(The findings demonstrate alignment with national and global priorities, for strengthening primary eye care-(SPECS))

- **Improve Access:** Autorefractometer enhances service reach, especially in remote areas
- **Build Capacity:** Primary care staff & non-eye health personnel can screen effectively (task-shifting)

Policy relevance

- **Increase Awareness:** health promotional material and high acceptance promotes eye health–seeking behavior
- **Reduce Costs:** Local services and simplified technology lower financial burden
- **Strengthen Surveillance:** Feasible for routine data collection & eREC monitoring

Future Directions

- Institutionalize training for primary care and community-level providers
- Conduct operational research to evaluate long-term outcomes and scalability
- Integrating eye screening services to primary health care service centre

Conclusion and Take away

- It is feasible for allied health workers to use Autorefractometer for dispensing ready made spectacles at the community level for people with simple refractive error to increase access at the rural areas.
- It can be a screening tool for detection of complex refractive error for referral to higher center.

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