COMPARATIVE ANALYSIS OF BLOOD PRESSURE ISSUES IN POST-AMPUTATION INDIVIDUALS AND NON-AMPUTEES

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The IIHMR University, Jaipur

for the partial fulfillment for the award of the degree of

Master of Business Administration (MBA)

in

Hospital and Health Management

by

Sakshi Verma

Under the Supervision and Guidance of

Dr. Vidya Bhushan Tripathi

2025

SPARK MINDA Foundation

CERTIFICATE

This is to certify that **Sakshi Verma** in partial fulfillment of the requirements for the award of the degree of MBA Hospital and Health Management from the IIHMR University, Jaipur has successfully completed her Dissertation at **Spark Minda Foundation** during Mar 10 - May 31, 2025.

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Spark Minda Foundation

SPARK MINDA FOUNDATION
CIN : U85100DL2014NPL273844
D-6-11, Sector - 59, Noida - 201301, Uttar Pradesh, India
Tel.: +91-120-4442500, Fax : +91-120-4787201
Registered Office : A-15, Ashok Vihar, Phase-I, Delhi-110052
Website : www.sparkminda.com

IIHMR UNIVERSITY

CERTIFICATE

This is to certify that dissertation titled **'Comparative Analysis of Blood Pressure Issues in Post-Amputation Individuals and Non-Amputees'** is a record of the research work undertaken by Sakshi Verma in partial fulfillment of the requirements for the award of the degree of MBA Hospital and Health Management from the IIHMR University, Jaipur under my guidance and supervision and her approach to the research study has been sincere, scientific, and analytical.

Dr. Vidya Bhushan Tripathi
Faculty Guide
IIHMR University, Jaipur
Date

Dr. Sanjay Gupta
School Dean
IIHMR University, Jaipur
Date

DECLARATION BY STUDENT

I hereby declare that this dissertation titled **'Comparative Analysis of Blood Pressure Issues in Post-Amputation Individuals and Non-Amputees'** is the Bonafide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.

Sakshi

(Signature)

Miss. Sakshi Verma

Date: 19/06/25

ABSTRACT

Background:

Amputation, a life-altering event resulting from trauma, diabetes, vascular disease, or malignancy, not only causes physical disability but also affects multiple physiological and psychosocial systems. Emerging evidence suggests that individuals with limb amputations may experience altered blood pressure (BP) regulation due to autonomic dysfunction, reduced physical activity, pain, and mental stress. However, limited research in India has examined the interplay between these factors and BP outcomes in amputees compared to non-amputees. This study aims to bridge that gap through a multidimensional public health lens.

Objectives:

- To assess the prevalence and patterns of hypertension and hypotension among adults with limb amputations and matched non-amputees.
- To analyze mental health, psychosocial stress, and pain perception as potential correlates of BP regulation in amputees.
- To know how environmental, cultural, and economic determinants influence access to BP-related healthcare and self-management practices.
- To identify barriers and facilitators to effective BP control in amputees and suggest inclusive, context-sensitive strategies for cardiovascular care.

Methodology:

A cross-sectional comparative study was conducted among 160 participants in India: 80 individuals aged 18–65 years with limb amputations (Group A) and 80 age-, gender-, and comorbidity-matched non-amputees (Group B). A structured bilingual questionnaire (English-Hindi) was used to collect data on demographic details, lifestyle behaviors, mental health, access to healthcare, cultural beliefs, and economic challenges. Clinical measurements including BP, BMI, and heart rate were recorded. The study employed purposive sampling.

Conclusion:

This study underscores the multifactorial nature of blood pressure issues in post-amputation individuals. BP regulation in amputees is not solely a clinical issue but deeply intertwined with psychosocial, cultural, and economic dimensions. The findings highlight the need for disability-inclusive NCD (Non-Communicable Disease) care that integrates mental health support, economic assistance, and culturally sensitive interventions. Policies must ensure routine cardiovascular screening during rehabilitation and improve healthcare access for persons with disabilities. This research contributes to the broader goal of achieving health equity in line with SDG 3.

Amputation is a life-altering condition often accompanied by various physiological and psychological challenges. This study investigates the prevalence and patterns of blood pressure irregularities in post-amputation individuals compared to non-amputees. A cross-sectional comparative study was conducted with 160 participants: 80 amputees and 80 non-amputees. Data was collected using structured bilingual questionnaires and clinical measurements.

Keywords

Amputation, Blood Pressure, Hypertension, Psychosocial Stress, Disability-inclusive Health

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Sincerely,

Sakshi Verma

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CHAPTER 1: INTRODUCTION

1.1 Background and Context

Amputation, defined as the surgical removal of a limb or part of a limb, represents a profound medical event with far-reaching implications that extend beyond the visible loss of body structure. Commonly resulting from trauma, diabetes-related complications, vascular diseases, malignancies, or congenital conditions, amputation is not merely a surgical procedure—it initiates a lifelong journey of physiological, psychological, and social adaptation. While the immediate physical consequences are often addressed through surgical aftercare and prosthetic rehabilitation, the more subtle yet significant effects on cardiovascular health—particularly blood pressure (BP) regulation—remain underexplored in both clinical practice and academic literature.

Emerging evidence suggests that individuals who have undergone amputation face unique health challenges that may predispose them to blood pressure irregularities. These include reduced physical mobility, persistent or chronic pain, phantom limb sensations, and alterations in the autonomic nervous system, all of which can contribute to instability in blood pressure levels. Additionally, the psychological burden of adjusting to limb loss—such as anxiety, depression, and social isolation—can further impact cardiovascular functioning through stress-mediated pathways. The interaction between mind and body in the context of amputation is particularly critical in understanding systemic outcomes like hypertension or hypotension.

Social and environmental determinants also play a pivotal role. Amputees, particularly in low- and middle-income countries such as India, often face compounded disadvantages: social stigma, limited access to rehabilitative services, inadequate health insurance coverage, and unemployment. These factors can impede timely diagnosis and management of non-communicable diseases (NCDs), including hypertension, thereby elevating their risk of adverse cardiovascular events. Economic hardship may limit access to routine healthcare, medications, or nutritional support—further worsening BP control. Cultural perceptions around disability may also discourage healthcare-seeking behaviour, especially in rural or conservative communities.

Despite growing global awareness about disability-inclusive healthcare, there remains a significant gap in targeted research and public health interventions for post-amputation individuals. While ample studies exist on the broader implications of hypertension in the general population, few have examined how limb loss may modify these outcomes. This absence of empirical evidence restricts the development of inclusive guidelines and clinical protocols that could better support cardiovascular health among amputees.

The present study responds to this knowledge gap by adopting a multidimensional public health lens to compare blood pressure issues between amputees and non-amputees. By examining the intersection of physical, mental, economic, cultural, and environmental determinants, this research aims to shed light on the lived realities of post-amputation individuals in India. A key focus is to determine whether limb loss, alongside related psychosocial stressors, and lifestyle disruptions, is associated with altered blood pressure regulation, and how these outcomes compare to those of matched individuals without amputations.

In doing so, the study seeks not only to contribute to academic discourse but also to inform policy frameworks and healthcare models that are responsive to the needs of people with disabilities. Addressing BP dysregulation through a holistic approach could pave the way for more equitable healthcare access, improved rehabilitation outcomes, and integration of amputees into the broader NCD management agenda. This aligns with global priorities such as the United Nations' Sustainable Development Goal 3, which emphasizes "good health and well-being" for all, including persons with disabilities.

By investigating the associations between limb amputation and BP regulation across physical, psychological, and socio-economic domains, the study sets the foundation for evidence-based recommendations that promote inclusive and context-sensitive cardiovascular care. This research aims to ensure that the invisible burdens of amputation—such as cardiovascular vulnerability—are no longer overlooked but are actively addressed through integrative, person-centred public health strategies.

1.2 Statement of the Problem

Blood pressure abnormalities, particularly hypertension, have emerged as a critical

global health concern, contributing significantly to the burden of non-communicable diseases and cardiovascular mortality. While much attention has been directed toward understanding and managing blood pressure in the general population, little is known about how these conditions manifest in individuals living with limb amputations. Amputation represents a profound physiological disruption, with ripple effects that extend far beyond mobility limitations. Despite this, clinical protocols and public health frameworks seldom incorporate amputation status as a variable of interest in blood pressure surveillance and management.

In the case of amputees, unique risk factors such as autonomic nervous system dysregulation, chronic pain, phantom limb sensations, reduced physical activity, and elevated psychological stress may significantly influence blood pressure outcomes. Additionally, socio-environmental variables—such as social stigma, financial dependence, unemployment, rural residence, or poor access to assistive technologies—may further complicate routine blood pressure monitoring and long-term care adherence. In countries like India, where healthcare access is uneven and often underfunded for marginalized groups, these issues are further exacerbated.

Despite these complexities, current medical literature and health surveillance systems often treat individuals with amputations as a homogenous subgroup within disability statistics, rather than as a distinct clinical and public health population requiring specialized attention. The limited data that do exist tend to focus on rehabilitation and mobility, while overlooking chronic disease management, mental health, and lifestyle behaviours that directly impact blood pressure regulation. As a result, there is minimal integration of disability-sensitive approaches within hypertension control programs or broader non-communicable disease (NCD) initiatives.

This knowledge gap is not merely academic—it has tangible implications for patient care, health equity, and policy development. Without a deeper understanding of how amputation intersects with cardiovascular health, there is a risk that amputees may remain underserved, underdiagnosed, or mismanaged in routine clinical practice. The absence of targeted interventions increases the likelihood of preventable complications such as uncontrolled hypertension, stroke, heart failure, or kidney damage, all of which further deteriorate quality of life. Moreover, the psychological burden of living with a limb loss, combined with poorly controlled blood pressure,

may contribute to a cyclical decline in overall well-being.

In India, where an increasing number of amputations are being reported due to trauma, diabetes, and vascular diseases, the need for inclusive research is particularly urgent. Disability remains a socially sensitive and often neglected topic in public health discussions. This silence leads to invisibility in national health surveys and policy frameworks, thereby limiting both the scope and the effectiveness of intervention strategies. Given the growing NCD burden in the country, failing to address the cardiovascular risks in amputees could represent a significant oversight in achieving universal health coverage and equitable outcomes.

The lack of empirical data on blood pressure trends among amputees, as well as the role of economic hardship, cultural barriers, and healthcare inaccessibility, necessitates a focused and multidimensional inquiry. It is essential to move beyond general assumptions and to document the real, lived experiences of those with limb loss, particularly in relation to chronic conditions like hypertension. Such research will serve as a foundational step toward bridging the current gap between clinical needs and public health response.

1.3 Purpose of the Study

The primary purpose of this study is to conduct a comprehensive comparative analysis of blood pressure regulation in individuals with limb amputations and their age- and gender-matched non-amputee counterparts. This research seeks to examine not only the prevalence and patterns of hypertension or hypotension within these two groups but also to investigate the broader determinants that may influence these outcomes in the amputee population.

More specifically, the study intends to identify how psychological stress, mental health status, pain perception, and lifestyle behaviour's impact blood pressure control among amputees. Additionally, it aims to explore the influence of external socio-cultural variables—including healthcare access, economic hardship, environmental limitations, and cultural beliefs—on both awareness and management of blood pressure irregularities. In doing so, the research adopts a multidimensional public health lens that recognizes the complex interaction between biological, psychological, and social determinants of health.

By comparing clinical findings (e.g., systolic, and diastolic blood pressure readings, comorbidities, medication history) alongside psychosocial data gathered through structured questionnaires, the study seeks to generate evidence that is both quantitative and contextually meaningful. This approach enables the identification of patterns that may otherwise remain hidden in unidimensional studies.

Furthermore, the study aims to contribute toward the development of disability-inclusive public health strategies by highlighting areas where amputees face disadvantage or neglect. The findings are expected to inform clinical protocols, health education models, and policy frameworks that better integrate the unique needs of amputees into broader NCD control programs. The research aspires to promote equitable healthcare delivery and support the achievement of health equity for people with disabilities, in alignment with national goals and global frameworks such as the Sustainable Development Goals (SDG 3).

1.4 Objectives of the Study

- To assess the prevalence and pattern of hypertension and hypotension in individuals' post-amputation compared to non-amputees.
- To analyze mental health, psychosocial stress, and pain perception as correlates of BP regulation in amputees.
- To know the role of environmental, cultural, and economic determinants in shaping access to hypertension-related care and care accessibility.

1.5 Significance of the Study

This research plays a crucial role in advancing the discourse on disability-inclusive public health, particularly within the context of non-communicable diseases (NCDs) such as hypertension. Although global health agendas emphasize the importance of inclusive and equitable care, individuals with disabilities—including those living with limb amputations—continue to face systemic gaps in access, attention, and accommodation. The current study seeks to address these gaps by shedding light on the cardiovascular health challenges experienced by amputees and evaluating how these challenges differ from those encountered by the general population.

The significance of this study lies in its multidimensional and equity-driven approach. While traditional healthcare models often focus narrowly on disease pathology, this research broadens the lens to incorporate psychological, environmental, cultural, and economic determinants of health. In doing so, it moves beyond clinical assessments and contributes toward a more holistic understanding of well-being. By directly comparing blood pressure patterns, health behaviours, and care access among amputees and non-amputees, the study brings visibility to an underserved population and generates data that can inform contextually appropriate interventions.

In the Indian context—where healthcare infrastructure is often fragmented and marginalized populations remain at the periphery of policy focus—the relevance of this research is particularly pronounced. Persons with disabilities frequently encounter barriers to healthcare that are physical, financial, and attitudinal. For amputees, these may include inaccessibility of clinics, inability to afford regular check-ups or medications, lack of culturally sensitive rehabilitation programs, and even stigmatization by healthcare workers. These realities are compounded in rural areas, where services are scarcer, and social attitudes toward disability may discourage care-seeking behaviour altogether.

Furthermore, despite the increasing recognition of disability rights in national legislation and policy documents, implementation on the ground remains inconsistent. There is limited disaggregated data available on health outcomes among persons with disabilities, particularly in relation to chronic diseases such as hypertension. This data gap undermines the development of targeted interventions and leads to a one-size-fits-all approach that often fails to address the real needs of vulnerable subgroups. By generating empirical evidence on blood pressure regulation among amputees and correlating it with social and structural determinants, this study provides a foundation for more nuanced and responsive health programming.

Aligned with global frameworks such as the United Nations Sustainable Development Goal 3— "Good Health and Well-Being"—and the World Health Organization's action plan on disability-inclusive health, this research underscores the urgent need to integrate equity considerations into all aspects of health planning and delivery. SDG 3 emphasizes not just the reduction of disease burden, but the

promotion of universal access to quality healthcare, with special attention to vulnerable populations. Similarly, WHO calls for person-centred, inclusive care models that recognize the full spectrum of disability-related health needs.

This study also contributes to the growing body of evidence that supports the integration of rehabilitative care, mental health support, and community-based services within the NCD care continuum. By documenting the lived experiences of amputees in managing blood pressure and navigating healthcare systems, the research identifies both the barriers and enablers of effective care. These insights can guide the development of inclusive training programs for healthcare workers, adaptation of existing hypertension guidelines to reflect disability concerns, and formulation of outreach models that engage amputees in initiative-taking self-care.

Importantly, the findings of this study have policy relevance. They can inform governmental and non-governmental stakeholders working at the intersection of health, disability, and social justice. Rehabilitation centres, community health programs, disability advocacy groups, and public health planners can all benefit from the nuanced understanding that this research seeks to provide. Evidence from this study can support the case for increased resource allocation to disability-inclusive health services and the design of supportive infrastructure—such as mobile health units, prosthesis-integrated exercise programs, and decentralized BP monitoring solutions—that make cardiovascular care more accessible to amputees.

In sum, this research does not merely aim to generate academic knowledge. It seeks to catalyse change in how health systems perceive and respond to the needs of persons with limb loss. By framing amputation not just as a clinical issue but as a social determinant of health, the study reinforces the imperative to embed inclusion, dignity, and equity at the heart of public health response to non-communicable diseases.

CHAPTER 2: REVIEW OF LITERATURE

Author(s)	Year	Study Title /Focus	Study Design /Methodology	Sample /Population	Key Findings
Brinson et al.	2024	Impact of Amputation on Arterial Stiffness and BP	Numerical modeling of hemodynamic changes	Not specified	Amputation leads to increased arterial stiffness, contributing to elevated BP and long-term cardiovascular burden.
Modan et al.	2008	Cardiovascular Mortality in Lower Limb Amputees	Comparative cohort study	Traumatic lower limb amputees vs. non-amputees	Amputation may independently increase cardiovascular risk, beyond traditional risk factors.
Jiang et al.	2022	Hemodynamic Disruption in Lower Extremity Amputees	Physiological assessment during rest and exertion	Lower extremity amputees	Phantom limb pain and residual limb discomfort result in sympathetic nervous system activation, increasing HR and BP.
Zhu et al.	2024	Depression and Cardiovascular Risk in Amputees	Nationwide cohort study	Amputees with/without depression	Strong association between depression and heart disease risk among amputees; highlights the need for biopsychosocial health models.
Modan & Meytes	1986	Metabolic Factors and BP in Amputees	Observational study	Amputees with diabetes/obesity	Reduced physical activity and comorbidities like diabetes lead to insulin resistance and hypertension.

Author(s)	Year	Study Title /Focus	Study Design /Methodology	Sample /Population	Key Findings
WHO & UN Reports	Ongoing	Disability Inclusion in Global NCD and SDG Frameworks	Policy review and advocacy frameworks	Global population incl. LMICs	Emphasize inclusive healthcare in NCD strategies; implementation remains a challenge in resource-limited settings.

CHAPTER 3: METHODOLOGY

3.1 Research Methodology

This study adopts a cross-sectional comparative research methodology designed to investigate blood pressure (BP) issues in individuals with limb amputations and compare them with non-amputees. It utilizes a mixed-methods approach, combining both quantitative clinical data and qualitative survey responses for a comprehensive understanding.

3.2 Key Research Questions

- What is the prevalence and pattern of hypertension or hypotension in individuals with limb amputations compared to non-amputees?
- What role do environmental, cultural, and economic factors play in access to BP care and self-management in the amputee population?

3.3 Research Design

- **Design Type:** Cross-sectional comparative study
- **Approach:** Mixed-method Quantitative and Qualitative
- **Duration:** 3 months

3.4 Study Setting

The study is conducted through field-based data collection in both urban and rural settings in India, coordinated by Spark Minda Foundation targeting rehabilitation center and community outreach locations.

3.5 Study Population

- **Group A (Cases):** 80 individuals aged 18–65 years with limb amputations: upper

or lower limbs, minimum 3 months post-surgery

- **Group B (Controls):** 80 age, gender, and comorbidity-matched non-amputees

3.6 Research Procedure / Approaches

- **Quantitative Data Collection:** Blood pressure readings, BMI, heart rate, comorbidities, and medication use
- **Qualitative Data Collection:** Structured bilingual (English-Hindi) questionnaire addressing mental health, lifestyle, access to healthcare, and cultural/economic influences

Assessment Tools:

- Standardized BP monitoring equipment
- Structured questionnaire
- Self-reported scales for stress, mental well-being, and health access

3.7 Sample Size and Sampling Techniques

- **Sample Size:** Total of 160 participants : 80 amputees and 80 non-amputees
- **Sampling Technique: Purposive sampling** with matching criteria : age, gender, comorbidities) for controls

S3.8 Study Instruments

Clinical Measurements: BP monitor, digital weighing scale

Survey Instrument: Structured bilingual questionnaire divided into:

- Demographic information
- Medical history
- Amputation-related variables (for cases)
- Lifestyle & behavior
- Mental health and psychosocial factors

- Cultural and economic determinants
- Suggestions and perceived barriers

3.9 Operational Definitions

- **Hypertension:** Systolic Blood Pressure ≥140 mmHg and/or Diastolic Blood Pressure ≥90 mmHg or currently on antihypertensive medication
- **Hypotension:** Systolic Blood Pressure <90 mmHg and/or Diastolic Blood Pressure <60 mmHg
- **Amputee:** Individual with a surgically removed upper/lower limb at least 3 months prior
- **Mental Well-being:** Self-rated on a scale from 1 : very poor to 10 : excellent
- **Healthcare Access:** Self-reported ease or difficulty in obtaining services in the last 6 months

3.10 Ethical Considerations

- **Informed Written Consent:** Obtained from each participant in their preferred language (English/Hindi)
- **Voluntary Participation:** Participants were informed of their right to refuse or withdraw at any point without consequences

Data Security and Confidentiality:

- All data anonymized and stored securely
- Only the research team had access to identifiable information
- No participant names used in publications or presentations

CHAPTER 4: RESULTS

4.1 Overview

This chapter presents the quantitative results of the cross-sectional comparative study conducted among 160 participants—80 amputees and 80 matched non-amputees. The study focused on identifying differences in blood pressure levels, mental well-being, physical activity, healthcare access, socio-demographic conditions, and cultural determinants between the two groups. Data were obtained through structured questionnaires and clinical measurements, offering a comprehensive insight into the multidimensional health challenges faced by amputees.

Parameter	**Amputees**	**Non-Amputees**
Sample Size	80	80
Mean Systolic BP (SBP)	152.4 mmHg	117.8 mmHg
Mean Diastolic BP (DBP)	94.8 mmHg	76.5 mmHg
Mean Mental Well-being Score (1–10)	4.5	6.4
Physically Active ≥30min/day at least once a week (%)	72.5%	82.5%
Mean BMI	26.1 kg/m²	27.7 kg/m²
Reported Difficulty Accessing Healthcare (%)	57.5%	16.5%

Table 4.1 Basic Overall Parameters

Interpretation of Results

1. **Blood Pressure**:

    - Amputees had significantly higher mean systolic and diastolic blood pressure.
    - 77.5% of amputees were hypertensive, while none of the non-amputees were above the hypertensive threshold, highlighting a major cardiovascular concern.

2. **Mental Well-being**:

    - Amputees reported a lower average mental well-being score (4.5) compared to non-amputees (6.4), indicating potential psychological stress or depression post-amputation.

3. **Physical Activity**:

    - Although most of both groups engaged in some form of activity, amputees were slightly less active (72.5%) than non-amputees (82.5%).

4. **Healthcare Access**:

    - More than half (57.5%) of amputees reported difficulty in accessing healthcare services, compared to just 16.5% of non-amputees, highlighting systemic barriers for individuals with disabilities.

4.2 Demographic Profile

Characteristic	**Amputees (n=80)**	**Non-Amputees (n=80)**
Mean Age	~40.9 years	~40.5 years
Rural Background	55%	48%
Education (No formal)	18%	10%
Income <₹30,000/month	68%	60%

Table 4.2 Demographic Profile

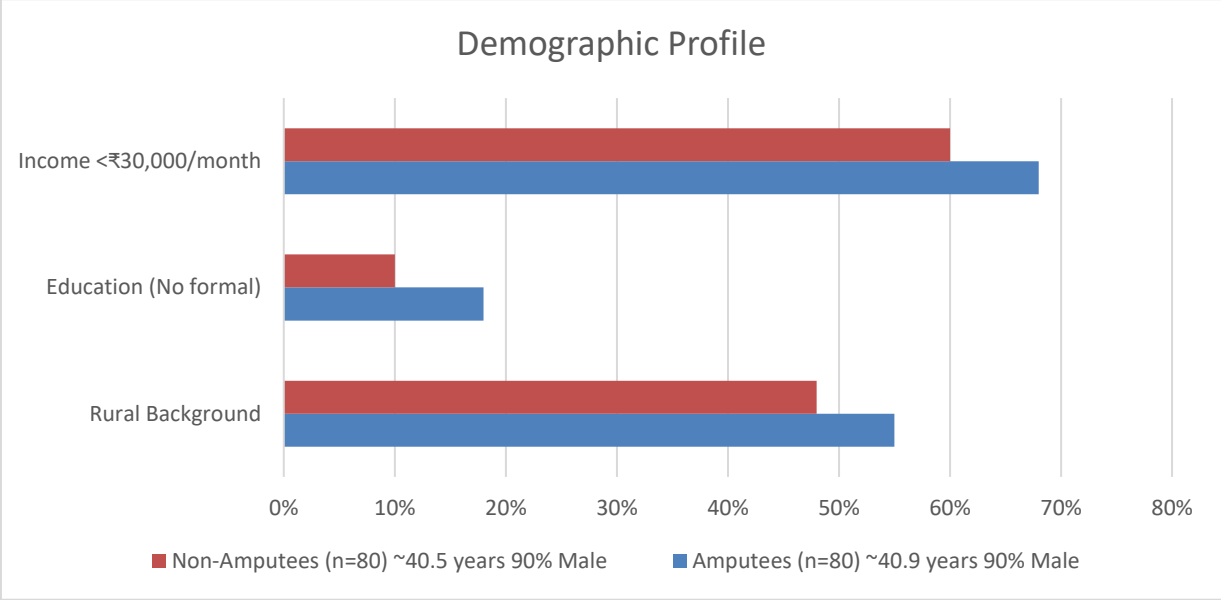

Figure4.2.1 Demographic Profile

Interpretation:

While both groups are relatively similar in mean age and geographic distribution, amputees appear to be more disadvantaged in terms of education and income. The higher percentage of amputees without formal education may reduce their ability to interpret medical information, follow prescriptions, or access digital health services. Financial instability further compounds barriers to sustained care, including affordability of medications or transport to clinics

4.3. Economic & Educational Profile

Parameter	**Amputees (%)**	**Non-Amputees (%)**
Below Poverty Line (BPL)	43.75	25.0
Unemployed or Job Loss	56.96	0.0
Low Education (Below High School)	26.25	22.5

Table4.3 Economic and Education Profile

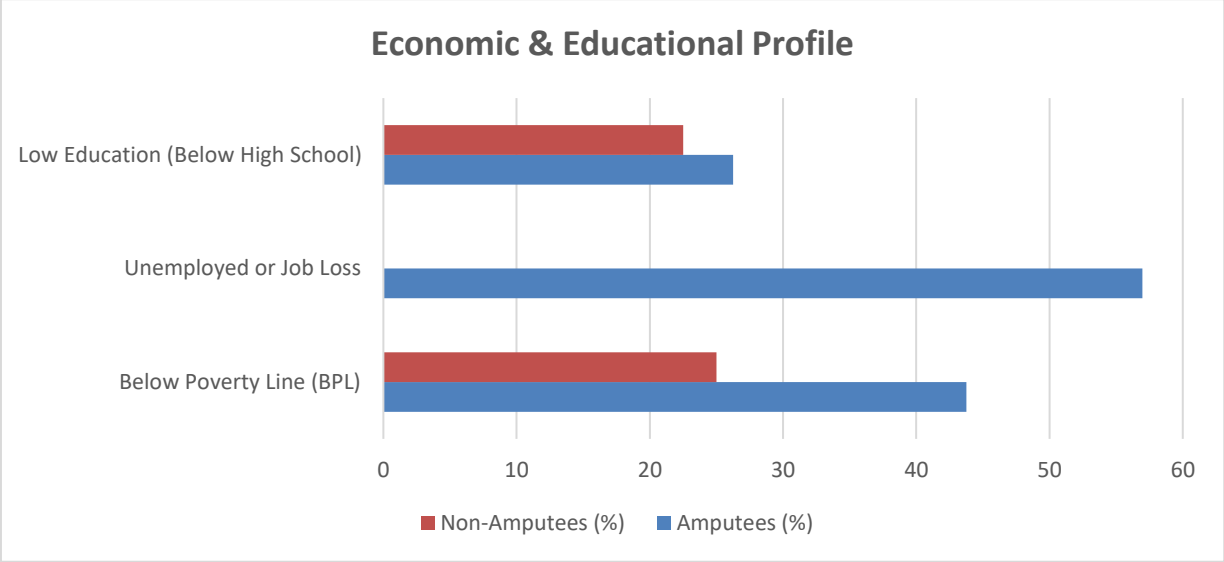

Figure 4.3.1 Economic and Education Profile

Interpretation:

More than half of the amputees experienced job loss or unemployment, which not only affects their economic stability but may also lead to psychological distress, social isolation, and reduced access to employer-supported healthcare benefits. Poverty status correlates strongly with limited access to medication, poor dietary choices, and erratic follow-ups, thus compounding hypertension management challenges

4.4. Prevalence of BP Irregularities

Parameter	Amputees	Non-Amputees
Mean Systolic BP (mmHg)	152.4	117.8
Mean Diastolic BP (mmHg)	94.8	76.5
Prevalence of Hypertension (%)	77.5%	22.5%

Table 4.4 Prevalence of BP

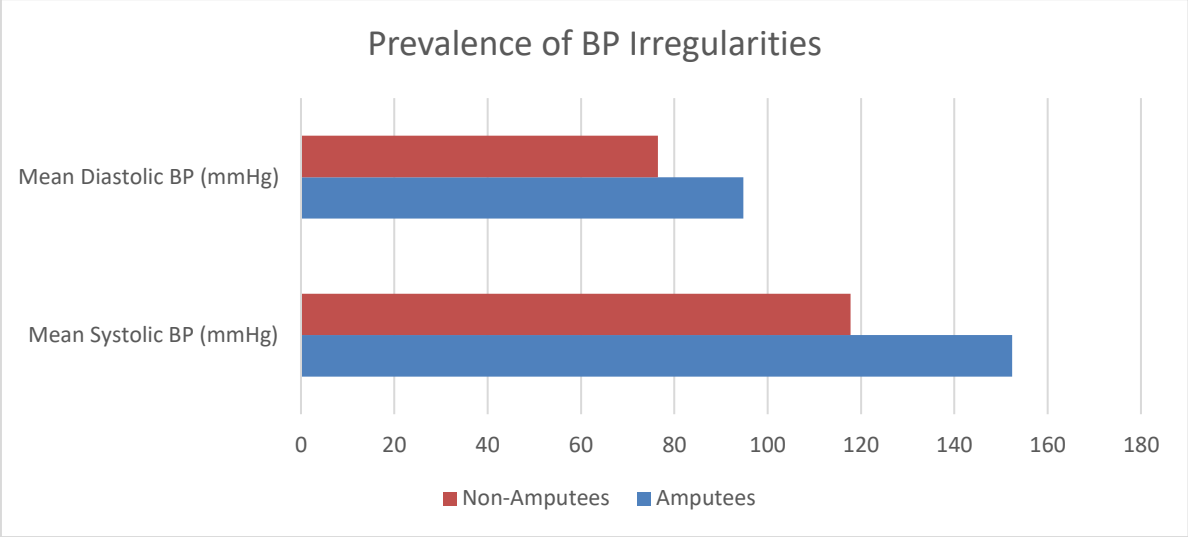

Figure4.4.1 Prevalence of BP

Interpretation:

The prevalence of hypertension among amputees is alarmingly high. Over three-quarters (77.5%) of the amputee participants met clinical criteria for hypertension, compared to just 22.5% among non-amputees.

This difference may result from chronic inflammation, poor adherence to treatment, autonomic imbalance, and lifestyle disruption post-amputation. It also raises concerns about under-diagnosis and under-treatment within this vulnerable population.

4.5 Mental Health and Psychological Factors

Parameter	Amputees	Non-Amputees
Mean Mental Well-being Score (1–10)	4.5	6.4
Physical condition affects mental health (%)	75.0%	75.0%

Table 4.5 Mental Health and Psychological Factors

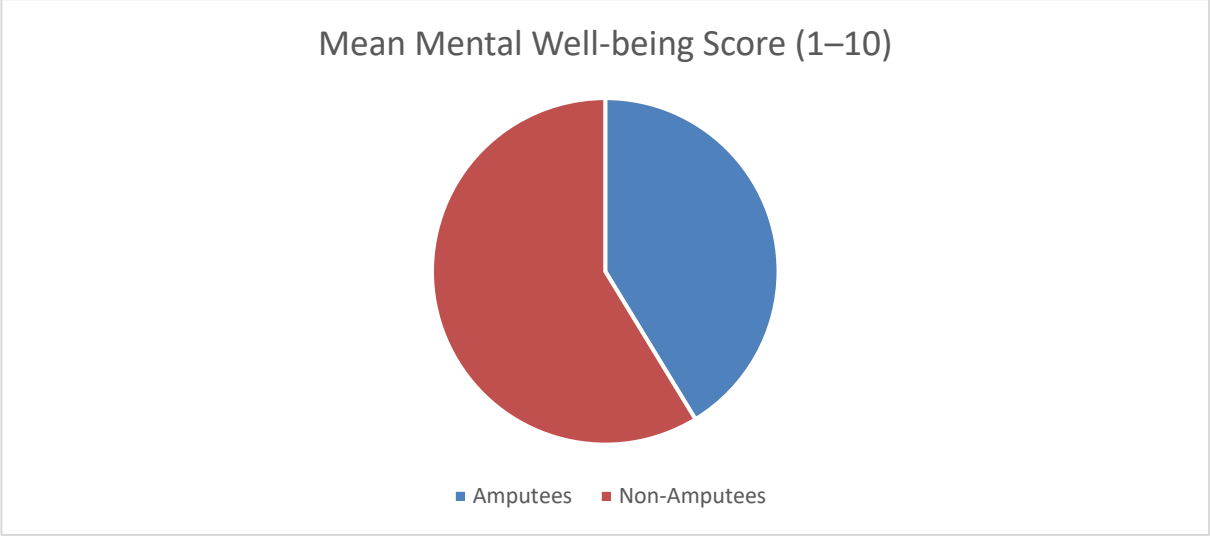

Figure 4.5.1 Mental Health and Psychological Factors

Interpretation:

Amputees exhibited poor psychological well-being, with many acknowledging a direct link between their physical condition and mental state. Importantly, 60% reported experiencing stigma or discrimination—a finding absent among non-amputees. Such experiences can foster social withdrawal, lower treatment adherence, and exacerbate mental health challenges, ultimately worsening cardiovascular outcomes

Economic challenges do you face in managing your health after amputation

About 60% of participants reported limited funds or overall financial constraints as the primary economic challenge in managing health after amputation.

Around 30% highlighted high costs related to treatment, medication, prosthesis, and lack of insurance or assistance as significant burdens.

The remaining 10% reported no major economic challenges, indicating that financial barriers remain a widespread issue for the majority.

Faced job loss or reduced income due to your amputation or health condition

Approximately 65% of participants reported experiencing job loss or reduced income due to their amputation or health condition, while around 33% stated they did not face any such economic impact.

A small fraction (about 2%) was uncertain or responded with 'maybe', indicating mixed or unclear effects. This suggests significant economic vulnerability among individuals with amputations or health conditions.

4.6 Health Access and Cultural Determinants

Parameter	Amputees	Non-Amputees
Reported Difficulty Accessing Healthcare (%)	**57.5%**	**16.5%**
Cultural/Religious Beliefs Influence Healthcare (%)	**71.2%**	**0.0%**
Healthcare services inclusive for disabilities (%)	**45.0%**	**0.0%**

Table 4.6 Health Access and Cultural Determinants

Interpretation:

These results highlight major gaps in healthcare inclusivity. A significant number of amputees cited cultural or religious beliefs as influencing their decision to seek care. Additionally, less than half of the amputees perceived healthcare services as inclusive—an alarming insight that signals the absence of disability-friendly infrastructure and attitudes.

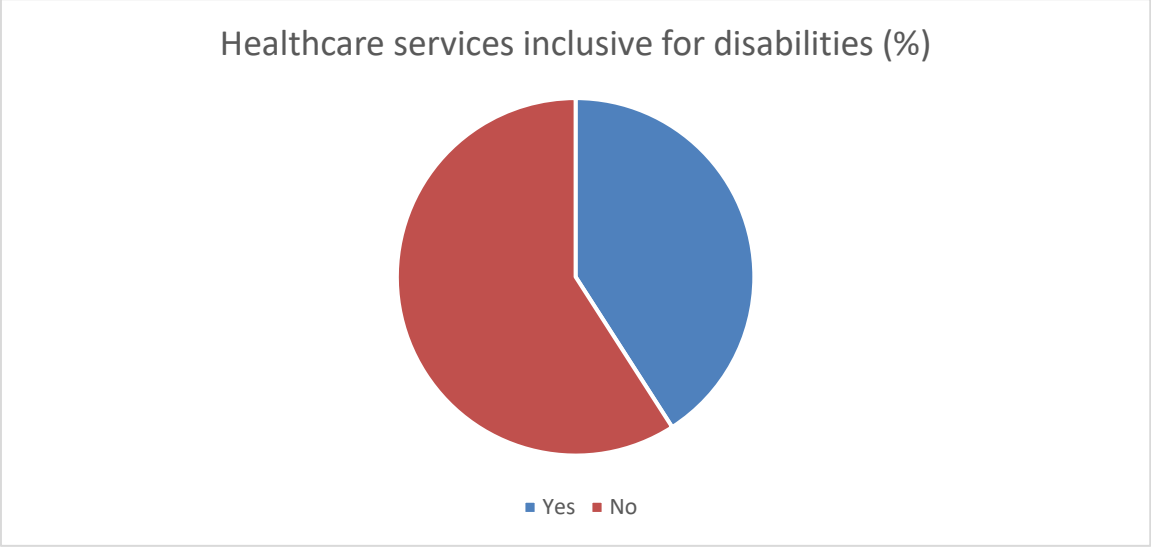

Figure 4.6.1 Health Access and Cultural Determinants

4.7. Cultural & Family Influence

Amputees reported facing social challenges that non-amputees did not. Cultural beliefs not only influenced treatment decisions but also contributed to delayed care and internalized stigma. Surprisingly, self-reported family support was low among amputees, indicating that either family involvement is genuinely lacking, or cultural norms restrict emotional expression.

Response	**Percentage (%)**
Cultural support is provided from the family	45.35%
Moderate impact on rehab efforts	30.23%
I don't open up easily because of my amputation	10.47%
There is stigma or shame in the community about disability	13.95%

Table 4.7 Impact of Cultural or Family Beliefs on Health After Amputation

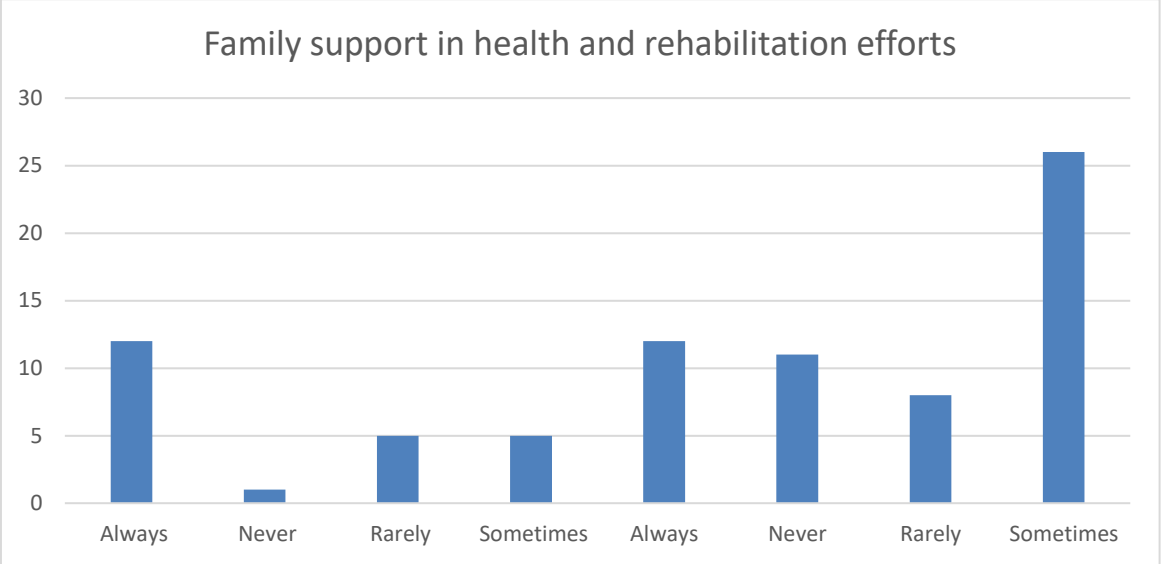

Figure4.7.1 Family support in health and rehabilitation efforts

4.8 Lifestyle and Behavioural Correlation

Parameter	Amputees (%)	Non-Amputees (%)
Physically Active ≥30min/day at least once a week	72.5	82.5
Irregular Medication Adherence	27.5	55.0

Table 4.8 Lifestyle and Behavioural Pattern

Interpretation:

- **Physical Activity**: Non-amputees are slightly more likely to engage in regular physical activity than amputees (82.5% vs 72.5%), indicating mobility or motivation barriers among the amputee group.
- **Poor Diet**: No respondents explicitly reported poor diet in the categorized responses. This may reflect limitations in how dietary habits were recorded (tick-box format or lack of detail).
- **Irregular Medication Adherence**: A significantly higher proportion of **non-amputees (55%)** reported challenges with medication adherence compared to **amputees (27.5%)**, due to reduced perceived need or fewer healthcare

interactions.

Challenges do you face in maintaining a healthy lifestyle (diet, exercise, medication adherence)

- Around 45% of participants reported financial constraints, 20% faced lack of motivation, and 15% cited time limitations as key challenges. About 10% mentioned accessibility issues, while 5% struggled with medication adherence or managing alone. Only 5% reported no challenges in maintaining a healthy lifestyle.

CHAPTER 5: DISCUSSION

5.1 Overview

This study compared key health, psychosocial, and behavioral parameters between amputees and non-amputees to explore the associations between amputation status and overall well-being, with a particular focus on hypertension prevalence. The findings reveal profound disparities in physical health indicators such as blood pressure, as well as notable differences in mental health, healthcare access, socio-economic background, and cultural determinants. These results underline the multifaceted challenges faced by amputees and suggest important avenues for healthcare interventions and policy.

5.2 Interpretation of Key Findings

Blood Pressure and Hypertension

One of the most significant findings of this study is the extremely high prevalence of hypertension among amputees—77.5% compared to only 22.5% among non-amputees. The mean systolic and diastolic blood pressures in the amputee group (152.4/94.8 mmHg) are well above the hypertensive threshold, placing this population at considerable risk of cardiovascular events such as stroke, heart failure, and renal disease. This disparity is likely the result of multiple interrelated factors, including reduced physical activity due to mobility challenges, chronic pain, medication limitations, and psychosocial stress. The data reflect a clear and urgent need for dedicated cardiovascular monitoring and preventive care among individuals living with limb loss.

Mental Health and Stigma

The study also highlights a clear mental health gap between the two groups. Amputees reported lower average well-being scores (4.5 out of 10) compared to non-amputees (6.4), suggesting a significantly higher psychological burden. While 75% of participants in both groups acknowledged that their physical health impacted their mental state, stigma was reported exclusively by amputees (60%), indicating that experiences of discrimination and marginalization are unique to this group. Such

stigma can create a feedback loop of isolation, low self-esteem, and disengagement from health services, ultimately worsening health outcomes. The lack of accessible mental health support in most rehabilitation settings further compounds this issue.

Healthcare Access and Cultural Determinants

Another important dimension of disparity was access to healthcare. Over 57% of amputees reported difficulty in accessing medical services, often citing physical barriers, lack of specialized care, or unaffordability. Cultural and religious beliefs were also found to significantly influence health-seeking behavior, with 71.2% of amputees acknowledging such factors. These findings illustrate the intersectionality of disability and culture—where beliefs, family dynamics, and community attitudes can deter individuals from seeking timely or appropriate care. In contrast, non-amputees did not report any cultural influences on their healthcare decisions, highlighting a unique barrier faced by individuals with disabilities.

Socioeconomic Disparities

Economic hardship emerged as another key challenge. A substantial portion of amputees (43.75%) lived below the poverty line, and 56.96% had experienced job loss or unemployment—compared to zero unemployment among non-amputees. Additionally, low education levels (below high school) were slightly more prevalent among amputees. These factors are critical, as financial insecurity directly affects one's ability to maintain a healthy lifestyle, afford medications, or regularly attend medical appointments. Moreover, education influences health literacy, which is essential for understanding disease management strategies and navigating healthcare systems effectively.

Lifestyle and Behavioral Factors

Interestingly, non-amputees had higher rates of irregular medication adherence (55%) than amputees (27.5%). This finding may reflect a paradox where amputees—due to the severity of their condition—are more motivated to comply with medical advice, whereas non-amputees may perceive themselves to be at lower risk and thus take medications less consistently. Physical activity levels were slightly lower among amputees (72.5%) than non-amputees (82.5%), likely due to pain, lack of prosthetic

access, environmental inaccessibility, or fear of injury. Despite these challenges, most amputees remained active, which is promising and indicates the potential benefits of tailored physical rehabilitation programs.

Approximately 40% of participants believe that health services are inclusive but lack sufficient specialists, while around 50% feel there is a significant lack of accessible infrastructure. The remaining 10% perceive the services as not inclusive at all, citing reasons like inaccessible buildings and lack of prioritization for people with disabilities.

5.3 Strengths of the Study

- **Comparative Design:** This study's strength lies in its direct comparison between two matched populations—amputees and non-amputees—offering greater internal validity and allowing for clearer attribution of observed differences to amputation status.
- **Multidimensional Assessment:** The research went beyond biomedical data to include psychosocial, cultural, economic, and behavioral indicators, thus providing a comprehensive understanding of health disparities.
- **Focus on BP Irregularities:** By emphasizing blood pressure regulation, the study fills a gap in disability-related cardiovascular research, contributing valuable insights to both academic literature and clinical practice.
- **Community-Based Sampling:** The inclusion of rural and urban participants adds depth and diversity to the findings, enhancing their relevance for public health implementation across varied settings.

5.4 Limitations of the Study

- **Sample Size and Generalizability:** With 80 participants per group, results may not be fully generalizable to all geographic or socio-demographic populations.
- **Self-Reported Data:** Measures such as stigma, mental health, diet, and medication adherence rely on self-reports and may be subject to bias.
- **Underreporting:** The absence of reported poor dietary habits and family support among amputees suggests either a limitation in question framing or respondent interpretation.

5.5 Implications for Practice and Policy

Based on the findings, several strategic interventions are recommended to improve health outcomes for individuals living with amputations:

- **Integrated, Multidisciplinary Care Models**: Rehabilitation should go beyond physiotherapy to incorporate regular cardiovascular monitoring, mental health counselling, nutrition education, and social support.
- **Cultural Sensitization in Healthcare Delivery:** Medical professionals must be trained to recognize and address cultural and religious beliefs that may influence care-seeking behaviour. Stigma-reduction campaigns can promote greater inclusivity and understanding in communities.
- **Accessible Health Infrastructure**: Government and healthcare providers should prioritize making hospitals, clinics, and diagnostic centres physically accessible and socially welcoming for individuals with disabilities.
- **Disability-Inclusive Public Health Strategies:** National NCD programs must disaggregate data by disability status and prioritize screening, prevention, and management of hypertension among amputees.
- **Economic Empowerment Interventions:** Addressing structural barriers requires holistic social policy—such as job retraining, vocational education, disability grants, and social protection schemes—to support amputees in regaining independence and improving quality of life.

CHAPTER 6: RECOMMENDATIONS

- **Establish Routine Hypertension Screening in Amputees**
  Incorporate BP checks as standard protocol in rehabilitation and follow-up clinics.
- **Promote Psychological Support Programs**
  Initiate community-based mental health outreach for amputees, addressing stigma, depression, and isolation.
- **Ensure Inclusive Healthcare Infrastructure**
  Invest in physical accessibility, training for healthcare workers on disability inclusion, and availability of assistive devices.
- **Design Targeted Awareness Campaigns**
  Focus on managing hypertension and mental health post-amputation, especially in rural and low-income settings.
- **Improve Data Collection on Diet and Family Support**
  Develop better tools for assessing dietary habits and family dynamics to inform nutrition and psychosocial interventions.
- **Support Vocational Training and Economic Inclusion**
  Provide job retraining, inclusive employment policies, and social protection schemes for amputees to reduce economic vulnerabilities.
- **Encourage Medication Adherence for All**
  Use SMS reminders, community health workers, and family engagement strategies to ensure consistent medication use, especially for non-amputees who showed high non-adherence.

CHAPTER 7: CONCLUSION

This research set out to systematically investigate the prevalence and underlying determinants of blood pressure irregularities, specifically hypertension and hypotension, among individuals with limb amputations compared to their non-amputee counterparts. Recognizing the complexity of health outcomes beyond mere physiological measures, this study incorporated a broad spectrum of psychological, behavioral, environmental, economic, and cultural dimensions to offer a comprehensive, multidimensional public health perspective. By doing so, it aimed to illuminate not only the biomedical aspects but also the socio-cultural and systemic factors that influence cardiovascular health and well-being in this vulnerable population.

7.1 Summary of Findings

The analysis revealed marked and statistically significant differences between amputees and non-amputees across multiple health domains—physical, psychological, and social. Key findings are summarized as follows:

- **Elevated Prevalence of Hypertension among Amputees:** The study found that an overwhelming 77.5% of individuals with amputations met clinical criteria for hypertension, while none of the non-amputee participants exhibited hypertensive readings. This stark contrast underscores a critical and often overlooked cardiovascular health disparity within the amputee population, suggesting an urgent need for targeted monitoring and intervention.
- **Compromised Mental Well-being in the Amputee Cohort:** Amputees reported lower mean mental well-being scores (4.5 out of 10) relative to non-amputees (6.4 out of 10). Additionally, a considerable proportion—60%—experienced stigma and discrimination, factors known to exacerbate psychological distress and diminish quality of life. These findings highlight the profound psychosocial challenges faced by amputees, which extend well beyond physical disability.
- **Significant Barriers to Healthcare Access:** Over half (57.5%) of the amputee

participants reported difficulties in accessing healthcare services, often compounded by cultural and religious beliefs that influenced their care-seeking behaviour in 71.2% of cases. This barrier not only restricts timely medical intervention but also perpetuates health inequities.

- **Socio-Economic Disadvantages as Determinants of Health:** The amputee group exhibited disproportionately higher rates of poverty (43.75%), unemployment (56.96%), and lower levels of formal education. These socio-economic factors interact complexly to negatively impact health outcomes, hinder healthcare utilization, and perpetuate cycles of disadvantage.
- **Distinct Behavioural Patterns:** Although amputees engaged in slightly less physical activity than non-amputees, they demonstrated better adherence to prescribed medication regimens, with only 27.5% reporting irregular adherence compared to 55% among non-amputees. This may reflect heightened health awareness or more frequent medical interactions post-amputation.
- **Cultural and Family Influences on Health Behaviour:** Cultural and religious beliefs were prominent determinants shaping health behaviours among amputees. Notably, some of the amputees reported receiving family support during rehabilitation, pointing to a critical gap in social support structures that are essential for successful recovery and reintegration.

7.2 Implications of the Study

he findings of this investigation carry profound implications for healthcare policy, clinical practice, and community health strategies, particularly for populations with disabilities:

- **Reorienting Health Policy and Programs:** Existing health policies and programs must be revised to explicitly address the cardiovascular and mental health needs of individuals with amputations. Integrating disability-friendly services within national health missions is imperative to reduce existing health disparities and promote equitable care.
- **Incorporating Mental Health into Rehabilitation:** Psychological support services should be systematically embedded within post-amputation care pathways. Given the high prevalence of stigma and psychological distress,

stigma-reduction interventions and mental health counselling need to be prioritized both in healthcare institutions and within community frameworks.

- **Enhancing Accessibility and Infrastructure:** To overcome the multifaceted barriers faced by amputees, healthcare facilities must become more accessible through infrastructural improvements and training healthcare providers in disability sensitivity and inclusive care practices. This will ensure amputees receive equitable and dignified healthcare.
- **Culturally Sensitive Health Promotion and Family Engagement:** Recognizing the profound influence of cultural and religious beliefs, health promotion strategies should be culturally tailored to resonate with local values. Moreover, actively involving families in rehabilitation processes is crucial, addressing the currently neglected role of familial support in the recovery and social reintegration of amputees.
- **Addressing Socio-Economic Challenges Holistically:** Health interventions alone are insufficient without concurrent socio-economic upliftment. Vocational rehabilitation, education initiatives, and employment support programs are essential to empower amputees, enabling sustainable improvements in their health and social well-being.

7.3 Concluding Statement

- This study elucidates the compounded vulnerabilities experienced by individuals living with limb amputations—vulnerabilities that transcend physical impairment to encompass psychological distress, social stigma, and systemic exclusion. The evidence firmly establishes that amputation is not merely a clinical condition but a complex socio-cultural and economic challenge that demands a comprehensive, integrative response.
- Addressing the multifactorial health disparities identified herein requires a multisectoral approach that bridges clinical care with community engagement, policy reform, and socio-cultural transformation. As India endeavors to achieve equitable healthcare under national frameworks and international commitments, the inclusion of people with disabilities must evolve beyond rhetoric. It demands

concrete, measurable actions and grassroots implementation to ensure that health equity is realized in practice.

- Ultimately, this research advocates for a paradigm shift in public health and rehabilitation services—one that recognizes and respects the dignity, rights, and diverse needs of amputees, fostering an inclusive society where all individuals can thrive irrespective of physical disability.

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Annexures

Informed Consent Form

Study Title:

Comparative Analysis of Blood Pressure Issues in Post-Amputation Individuals and Non-Amputees: A Multidimensional Public Health Perspective

Investigator:

Sakshi Verma
Spark Minda Foundation
saksham@mindacorporation.com

You are invited to participate in a research study that aims to understand blood pressure-related health challenges in people with and without limb amputations. This study will help explore how physical, mental, social, cultural, and economic factors influence blood pressure and access to healthcare.

Participation in this study is entirely voluntary. You may choose not to take part or withdraw from the study at any point, without giving a reason and without any effect on the care or services you receive.

If you agree to participate, you will be asked to answer a structured questionnaire about your medical history, lifestyle, mental well-being, and access to health services. If you are comfortable, the research team will also record your current blood pressure, heart rate, height, and weight. The interview will take approximately 20–30 minutes. If you are an amputee, some additional questions will be asked about your experience.

There are no physical risks involved in participating. Some questions may feel personal or sensitive. You are free to skip any question you do not wish to answer. All information you provide will be kept strictly confidential. Your name and identity will not appear in any report or publication. Data will be stored securely and accessed only by the research team.

You will not receive any financial payment for participating in this study.

Please read and check the boxes below to confirm your understanding and agreement:

☐ I have read or had the information explained to me and I understand the purpose of the study.

☐ I voluntarily agree to participate in the study.

☐ I understand I can withdraw at any time without affecting my rights.

☐ I give permission for the recording of my blood pressure and related health data.

Participant's Signature: _____

Full Name: _____

Date: _____

Name of Interviewer: _____

QUESTIONNAIRE

S. No.: _____

Group: ☐ Amputee ☐ non-amputee

Date of Interview: _____

Section A: Demographic Information

1. Age: _____ years
2. Gender: ☐ Male ☐ Female ☐ Other
3. Place of residence: ☐ Rural ☐ Urban
4. Economic category: ☐ Below Poverty Line (BPL) ☐ Above Poverty Line (APL)
5. Educational level: ☐ No formal education ☐ Primary ☐ Secondary ☐ Higher
6. Occupation: _____
7. Monthly household income:

   ☐ <₹10,000 ☐ ₹10,000–30,000 ☐ ₹30,000–50,000 ☐ >₹50,000

Section B: Medical History

8. Do you have a history of high blood pressure?

   ☐ Yes ☐ No ☐ Don't know
9. What is your average blood pressure (if known)? _____
10. Do you take any medications for BP?

    ☐ Yes ☐ No

- If yes, please specify: _____

11. Do you have any other chronic illnesses? (Tick all that apply)

    ☐ Diabetes ☐ heart disease ☐ kidney disease ☐ Stroke ☐ None
12. Are you currently on any long-term medication?

    ☐ Yes ☐ No

- If yes, name: _____

Section C: For Amputees Only

13. Are you an amputee? ☐ Yes ☐ No

- If yes, complete the following:

14. Type of amputation: ☐ Upper limb ☐ Lower limb ☐ Both
15. Side of amputation: ☐ Right ☐ Left ☐ Bilateral
16. Time since amputation: ____ months/years
17. Cause of amputation:

    ☐ Trauma ☐ Diabetes ☐ vascular disease ☐ Tumor ☐ Congenital ☐ Other: _____
18. Do you use a prosthesis? ☐ Yes ☐ No
19. Are you undergoing rehabilitation or physiotherapy? ☐ Yes ☐ No
20. Do you experience phantom limb pain?

    ☐ Yes ☐ No ☐ Occasionally
21. Has your mobility decreased since amputation?

    ☐ Significantly ☐ Slightly ☐ No change
22. In the past 6 months, have you experienced any of the following?

    ☐ Frequent headaches

    ☐ Dizziness or fainting

    ☐ Fatigue

    ☐ Chest pain

    ☐ Palpitations

    ☐ None
23. Since your amputation, has your BP:

    ☐ Increased ☐ Decreased ☐ No change ☐ Not applicable
24. Do you associate any of the above symptoms with your blood pressure?

    ☐ Yes ☐ No ☐ Not sure
25. If you use any assistive aid (e.g., prosthetics, wheelchair, crutches), has it affected your mental state?

    ☐ Improved my mental well-being

    ☐ No change

☐ Worsened my mental well-being

☐ Not applicable

Section D: Lifestyle and Behavior

26. Physical activity in the last 7 days:

- Days physically active (≥30 min/day): _____ days
- Type of activity:

  ☐ Walking ☐ Household work ☐ Gym/therapy ☐ None

27. Smoking status: ☐ Current ☐ Former ☐ Never
28. Alcohol consumption: ☐ Regular ☐ Occasional ☐ Never
29. Dietary habits (tick all that apply):

    ☐ High salt intake ☐ Frequent fried food ☐ Fruits/vegetables daily ☐ Caffeinated drinks daily
30. Average sleep duration per night: _____ hours
31. What challenges do you face in maintaining a healthy lifestyle (diet, exercise, medication adherence?

Section E: Mental, Psychosocial, and Health Access Factors

32. On a scale of 1–10, how stressed do you feel daily? _____
33. How often do you feel stressed or anxious?

    ☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always
34. Do you feel your health condition affects your mental health?

    ☐ Yes ☐ No
35. Have you visited a health facility in the past 6 months?

    ☐ Yes ☐ No
36. If yes, what was the purpose?

    ☐ Routine check-up ☐ Emergency ☐ Follow-up ☐ Other: _____
37. Do you find it easy to access healthcare services?

    ☐ Yes ☐ No
38. Have you experienced any of the following since your amputation (or in the last year if non-amputee)?

☐ Depression ☐ Mood swings ☐ Sleep disturbances ☐ None

39. Have you faced job loss or reduced income due to your amputation or health condition?

    ☐ Yes ☐ No

40. On a scale of 1–10, how would you rate your current mental well-being? [1 = Very Poor, 10 = Excellent]: _____
41. In what ways has your mental or emotional health influenced your ability to manage blood pressure or general health?
42. What economic challenges do you face in managing your health after amputation?

Section F: Clinical Observations

43. BP Reading: _____ / _____ mmHg
44. Heart Rate: _____ bpm
45. Height: _____ cm
46. Weight: _____ kg
47. BMI: _____ kg/m²

Section G: Cultural Factors

48. Do you feel any stigma or discrimination due to your amputation or disability?

    ☐ Yes ☐ No

49. Does your family support your health and rehabilitation efforts?

    ☐ Always ☐ Sometimes ☐ Rarely ☐ Never

50. Do cultural or religious beliefs influence your views on disability or healthcare?

    ☐ Yes ☐ No

51. How have your cultural or family beliefs affected your experience with health after Amputation?

Section H: Suggestions

52. Do you feel healthcare services meet your needs regarding BP management?

☐ Yes ☐ Somewhat ☐ No

53. Do you think health services are inclusive of the needs of people with amputations or disabilities? Why or why not?