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Progression of Women Athletes across Competitive Levels in India: An Ordinal Logistic Regression Approach

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ABSTRACT

Women's participation in competitive sports has increased significantly in India over the past two decades due to supportive government initiatives and changing societal attitudes. Despite this progress, several socio-economic, institutional, and personal factors continue to influence women's progression from district-level to higher levels of competition. The present study aims to identify the factors determining women's advancement from district to state, national, and international levels of sports participation. Primary data were collected from 839 female athletes aged 18–24 years representing Sports Authority of India (SAI) centres, universities, colleges, and private training academies across Assam, Maharashtra, Odisha, Uttar Pradesh, and West Bengal. An ordinal logistic regression model was employed to analyse the determinants of participation level. The findings reveal that days of training ($\beta = 0.211$, $p < 0.001$), years of sporting experience ($\beta = 0.00135$, $p = 0.011$), injury history ($\beta = 0.581$, $p = 0.023$), and motivation to pursue sports as a career ($\beta = 0.081$, $p = 0.008$) significantly influence progression to higher levels of participation. In contrast, age, equipment facilities, coaching quality, scholarship support, and educational qualification were not statistically significant predictors. The study concludes that sustained training, accumulated sporting experience, and strong career motivation are critical for women's advancement in competitive sports. The findings provide important policy implications for strengthening athlete development programmes, improving institutional support, and designing interventions that facilitate women's long-term participation and progression in sports.

Keywords: Women athletes, Sports participation, Ordinal logistic regression, Sports career, Elite sports, India.

INTRODUCTION

Indian society has historically held a skewed perception of women's participation in sports, often viewing athletic pursuits as less appropriate for women than for men. Traditional gender norms, social expectations, and limited institutional support have restricted women's opportunities to participate in sports, particularly at competitive and professional levels. However, since the beginning of the twenty-first century, there has been a noticeable shift in policies and societal attitudes towards women's sports. Today, Indian women are increasingly excelling across a wide range of sporting disciplines and achieving remarkable success at national and international levels.

Recognizing the transformative potential of sports, the Government of India has introduced several initiatives aimed at encouraging greater participation of women and girls in professional sports and allied

technical professions. Programmes such as Khelo India, the Target Olympic Podium Scheme (TOPS), and increased investments in sports infrastructure and athlete development have created new opportunities for women to pursue sports as a viable career. These policy interventions reflect a growing commitment to promoting gender equality and enhancing women's representation in competitive sports.

Encouraging women to pursue sports as a profession and supporting their continued participation throughout their athletic careers represent important steps towards achieving gender equality. Participation in professional sports challenges traditional gender stereotypes, promotes women's economic independence, enhances their visibility in public life, and creates equal opportunities in a field historically dominated by men. Moreover, successful female athletes serve as influential role models who inspire younger generations of girls to participate in sports, thereby contributing to broader social transformation and fostering a more inclusive society.

Women athletes who pursue professional careers in sports frequently challenge deeply rooted social norms regarding the roles and capabilities of women. Their achievements demonstrate that excellence in athletic performance, leadership, and resilience is not determined by gender. By overcoming structural, social, and cultural barriers, female athletes reinforce the principles of equality and empowerment while encouraging other women to pursue their aspirations regardless of societal expectations.

Despite these positive developments, sports continue to be viewed as a less desirable career option than traditional professions in India, particularly for women. Previous research and policy reports have identified several barriers that hinder women's sustained participation in sports, including inadequate family support, gender-based discrimination, financial constraints, limited access to quality coaching and sports infrastructure, safety concerns, and unequal opportunities for career advancement. Nevertheless, Indian women have consistently demonstrated exceptional perseverance and determination in overcoming these challenges.

Many women athletes have represented the nation with distinction on international platforms, earning prestigious accolades and bringing recognition to India. While a few have achieved widespread public recognition, countless others have made significant contributions at district, state, national, and international levels without receiving comparable visibility. Their accomplishments are equally valuable and reflect the resilience, dedication, and potential of women athletes across the country. Understanding the factors that facilitate or hinder women's progression from district-level participation to state and national levels is therefore essential for developing evidence-based policies and interventions that promote equitable participation and long-term success in sports.

BACKGROUD OF THE STUDY

Achieving excellence, winning medals and climbing up the levels of participation from district to state to national and international level has become a matter of national pride for countries across the world. The growing importance of sports in society, coupled with extensive media attention, national identity, and international prestige, has made participation and success in competitive sports a strategic priority for many nations. As a result, climbing up the ladder of the participation level is increasingly viewed not only as a reflection of athletic excellence but also as an indicator of a nation's social, economic, and institutional development.

The increasing level of competition among countries to secure championships and medals in major international tournaments has prompted governments to adopt comprehensive and strategic elite sport development policies. Greater political commitment and sustained investment in high-performance sport

have contributed to rising standards of athletic performance worldwide. Consequently, many countries allocate substantial financial resources towards the identification, development, and long-term support of talented athletes by providing world-class coaching, scientific training, sports medicine, infrastructure, and competitive exposure. Such investments are intended to maximise athletes' performance potential and enhance the country's success in international competitions (De Bosscher et al., 2009).

The success of an athlete or a team is increasingly influenced by the performance capacity of the national sport system and its effectiveness in mobilizing and utilizing available resources to support elite sport development. International sporting success is no longer viewed solely as the outcome of individual talent but as the product of a comprehensive system that nurtures athletes through appropriate policies, infrastructure, coaching, scientific support, and long-term investment. Although governments across the world invest substantial resources in elite sport development, the precise mechanisms through which sports policies translate into improved international sporting performance remain complex and multifaceted.

To explain these mechanisms, De Bosscher et al. (2006) proposed a conceptual framework that categorizes the determinants of elite sporting success into three interrelated levels. The macro-level comprises the broader social, economic, political, demographic, geographical, and cultural context within which sport operates. Factors such as economic development, population size, urbanization, political stability, climate, and cultural attitudes towards sport influence the overall environment for athletic development but are generally beyond the direct control of sports organizations.

The meso-level encompasses sport-specific policies and institutional arrangements, including governance structures, talent identification programmes, financial investment, coaching systems, sports infrastructure, athlete support services, and competition pathways. This level is considered the most amenable to policy intervention, as well-designed and effectively implemented sports policies can significantly enhance long-term athletic performance and international competitiveness.

The micro-level focuses on the individual athlete and the immediate environment that influences performance. It includes innate characteristics such as genetic endowment and physical abilities, as well as controllable factors such as training quality, coaching, motivation, psychological preparation, family support, peer influence, and tactical development. While certain micro-level determinants, such as genetics, are beyond human control, many others can be improved through systematic training, appropriate support mechanisms, and a conducive sporting environment (De Bosscher et al., 2006).

REVIEW OF LITERATURE

Singh (2024) examined the socio-economic factors influencing sports participation in India through a review of existing literature and secondary data. The study concluded that household income, parental education, family support, access to sports infrastructure, and educational institutions significantly influence an individual's participation in sports. It also concluded that gender norms and socio-cultural barriers continue to limit the participation of girls and women, while disparities in infrastructure and coaching facilities create additional challenges, particularly in rural areas. The author emphasized the need for greater investment in sports infrastructure, school-based sports programmes, and targeted support for women and economically disadvantaged groups. The findings provide a useful foundation for understanding how socio-economic and institutional factors influence sports participation and are relevant to the present study on women's progression from district to state and national levels of competition.

Nandakumar and Sandhu (2018) analysed the factors influencing international sporting success with particular reference to the Indian sports system. The study highlighted that elite sporting performance depends on multiple interconnected factors, including effective sports policies, talent identification programmes, quality coaching, adequate infrastructure, financial support, sports science, and systematic athlete development. The authors concluded that sustained government investment and a well-structured sports system are essential for producing athletes capable of succeeding at the international level. The study concludes that strengthening institutional support and adopting a comprehensive long-term strategy are crucial for improving India's performance in international sports competitions. These findings are relevant to the present study as they underscore the importance of institutional and developmental factors in enabling athletes to progress from lower to higher levels of competition.

Bergsgard (2025) has examined the factors influencing participation in sport and exercise by analysing public sports policies across European countries. The study found that participation is determined by a combination of individual, social, economic, and policy-related factors. Government investment in sports infrastructure, accessibility of facilities, community-based sports programmes, educational initiatives, and inclusive public policies were identified as key determinants of participation. The study also emphasized that socio-economic status, gender, age, and cultural attitudes significantly influence individuals' engagement in sports and physical activity. It concluded that effective public policies promoting equal access and lifelong participation are essential for increasing sports participation and reducing inequalities. The findings are relevant to the present study as they highlight the importance of institutional support, socio-economic conditions, and policy interventions in influencing women's participation and progression in competitive sports.

Raimundi, Celsi, Pérez-Gaido, Schmidt, Castillo, and Alvarez (2024) examined youth athletes' engagement in sport and analysed how engagement varies by gender, age, and competitive level. The study concluded that athletes competing at higher competitive levels demonstrated greater confidence, dedication, enthusiasm, and overall engagement than those participating at lower levels. The findings lead to the suggestion that progression to elite levels is associated with stronger psychological commitment and a more positive sporting experience. It was also concluded that fostering athlete engagement through supportive coaching, appropriate training environments, and sustained motivation is essential for improving performance and promoting long-term participation in sports. These findings are relevant to the present study as they indicate that higher levels of engagement and motivation may facilitate women's progression from district-level to state, national, and international competition.

RESEARCH METHODOLOGY

This study employs a primary data–based research design to analyse the factors influencing sports participation among women in India. The study is quantitative in nature. Quantitative study being deductive in nature aids in testing or confirming hypotheses establish patterns, and generalize findings to a larger population using numerical data and statistical analysis. It helps in testing causal relationship and generalizing results to a wider population. In order to reap the advantage of quantitative study it has been applied on the players which will aid in identifying the factors that have an influence on the level of participation among women involved in sports.

The objectives of the study are:

1. To map the women in professional sports, at both SAI and other facilities.

2. To identify the factors that significantly determine women's progression from district-level to state-level and national-level participation in sports.

The study was conducted across five states: Assam, Maharashtra, Odisha, Uttar Pradesh, and West Bengal. The stakeholders of this study comprise of female players, who were categorized into two groups: players enrolled under the Sports Authority of India (SAI), and players associated with state-level and private training academies.

Primary data were collected through a structured quantitative questionnaire administered to female players participating in both individual and team sports at selected SAI units and other colleges and universities. The study seeks to examine the factors that can influence the participation from district level to state level to national level and finally to international level among female players. The study has collected data primarily from the following SAI centres and university students being trained in private and state academies from the five states.

The selection of universities, colleges, and training centres for the study was based on convenience sampling, with institutions being included where the authorities granted permission to conduct the survey among female participants aged 18–24 years. Within these institutions, respondents were selected based on their active participation in sports activities. Data were collected from both educational institutions and training centres across different states to ensure representation of women engaged in sports from diverse backgrounds. Table 4.4.1 presents the state-wise distribution of the universities, colleges, and Sports Authority of India (SAI) centres from which the data for the study were collected.

Table:1 State wise details about SAI centres and universities

State	**Universities and SAI centres**
Assam	Guwahati University, SAI Guwahati, Lakshmibai National Institute of Training in Physical Education Guwahati
Maharashtra	Mumbai University
Odisha	Fakir Mohan University, Utkal University, Ravenshaw College
Uttar Pradesh	Aligarh Muslim University (AMU), Lucknow University, SAI BHU, SAI Lucknow
West Bengal:	Calcutta University, North Bengal University, SAI Kolkata, State Archery Training Centre

Source: On-site survey

Table 2: Sample size of respondents across Institutions

States	**Institutes**	**Sample size**
Maharashtra	Mumbai University	56
Uttar Pradesh	Aligarh Muslim University	42
	Lucknow University	55

	SAI Lucknow	37
	SAI BHU	34
	State total	168
West Bengal	Calcutta University	237
	North Bengal University	48
	SAI Kolkata	46
	State TT Academy	29
	State Archery Academy	12
	State total	372
Orissa	Utkal University	39
	Ravenshaw College	44
	Fakir Mohan University	56
	Kalinga Institute of Social Science	39
	State total	178
Assam	Guwahati University	40
	SAI Guwahati	18
	LNIPE	07
	State total	65
	Grand Total	**839**

Source: On-site survey

As shown in Table 2, data were collected from a total of 839 respondents. Collection of data from different areas was considered adequate to capture the diverse experiences, aspirations, and career perceptions of women engaged in sports. The inclusion of participants from both educational institutions and SAI centres ensured broad representation of athletes pursuing sports through different developmental pathways and institutional settings. This diversity in the sample enhances the comprehensiveness of the study and provides an in-depth understanding of the determinants influencing women's participation and their movement in the participation level.

RESULTS AND CONCLUSION

The major focal of this study is to identify the factors that influences respondents to continue career in sports. A study conducted by Raimundi MJ, Celsi I, Pérez-Gaido M, Schmidt V, Castillo I, Alvarez O. (2024) on Engagement in Youth Athletes as a Positive Experience in Sport: Implications of Gender, Age, and Competitive Level has illuminated that athletes at the competitive elite level exhibit higher confidence scores than those at the regional level. As an athlete moves upward the level of participation training time and professionalism it brings about a higher level of engagement and therefore may enthuse the player to take up dual career.

In the present study, an attempt has been made to identify the factors influencing the progression of women athletes across different levels of sports participation, namely district, state, national, and international levels. Since the dependent variable, level of participation, is ordinal in nature, an ordinal logistic regression model was employed to examine the relationship between participation level and a set of

explanatory variables. Ordinal logistic regression is an appropriate statistical technique for analysing an ordinal dependent variable with naturally ordered categories. It estimates the effect of one or more independent variables on the likelihood of an individual progressing to a higher category of the ordinal outcome. The explanatory variables included in the model may be continuous, categorical, or a combination of both. By applying this method, the study aims to identify the significant determinants that facilitate or hinder women's advancement to higher levels of competitive sports participation. An application of ordinal logistic regression has been observed in the study conducted by Lelisho ME, Wogi AA, Tareke SA in the year 2022. The study utilized ordinal logistic regression to find factors associated with socioeconomic status of households in Tepi town, Southwest Ethiopia. Since the classification of the dependent variable i.e. socioeconomic status is high socioeconomic status (upper class), medium socioeconomic status (upper-middle and lower-middle classes), and low socioeconomic status (upper-lower and lower classes), therefore using ordinal logistic regression has fitted as the best option. The study concluded that age, education level, family size, and the saving habit were significantly associated with the socioeconomic status of households at a 5% level of significance.

In this case the dependent variable i.e. level of participation transitions from district to state to National to International level is in ordered sequence from lower level to higher level, due to which ordinal logistic regression has been used. The independent variables are number of days of training done by the respondents, age, equipment facilities received by the respondents, quality of coaching received from coaches, years of experience in the field of sports, scholarship facilities received by the respondents, details about injures scummed while playing, motivation to continue sports as career, motivation to work full time using sports career and motivation to complete graduation.

The output of the regression has been depicted below:

Table:3: Ordinal Logistic Regression Results for Factors Influencing Participation Level

Variable	Coefficient	Std. Error	z	p-value	95% Confidence Interval
Days of training	0.2113641	0.0364668	5.80	0.000	0.1398904 – 0.2828378
Age	0.0106955	0.0283744	0.38	0.706	-0.0449173 – 0.0663083
Equipment facilities	0.2176089	0.1616014	1.35	0.178	-0.0991239 – 0.5343418
Coaching quality	-0.0007226	0.0629190	-0.01	0.991	-0.1240416 – 0.1225963
Years of experience	0.0013547	0.0005352	2.53	0.011	0.0003058 – 0.0024037
Scholarship	-0.2628332	0.1505136	-1.75	0.081	-0.5578345 – 0.0321681
Injury history	0.5813862	0.2559518	2.27	0.023	0.0797300 – 1.0830430
Sports as a career	0.0811376	0.0305664	2.65	0.008	0.0212285 – 0.1410466
Work full-time	0.0501122	0.0256709	1.95	0.051	-0.0002019 – 0.1004263
Complete graduation	-0.0428264	0.0294995	-1.45	0.147	-0.1006443 – 0.0149916

Source- The author using 17th version of Stata software with field data gathered.

Table-4: Model Summary

Statistic	Value
Number of observations	790
Log likelihood	-906.44705
LR Chi-square (10)	84.57
Prob > Chi-square	0.0000
Pseudo R^2	0.0446

Source- The author using 17th version of Stata software with field data gathered.

From the above regression output it can be observed that days of training ($\beta = 0.211$, $p < 0.001$), years of experience in sports ($\beta = 0.00135$, $p = 0.011$), injuries succumbed while playing ($\beta = 0.581$, $p = 0.023$), motivation to continue sports as career ($\beta = 0.081$, $p = 0.008$) and motivation to work and continue sports simultaneously as career ($\beta = 0.050$, $p = 0.051$) are significant. The time spend by the respondents on training, years of experience in sports, injuries succumbed while playing and motivation to continue sports as a career has a positive influence on the participation level. It can be concluded that more time a respondent spends on training, longer experience period in the field of sports and higher motivation to continue sports as a career pushes a respondent to shift from lower level of participation to higher level of participation. It can be observed that injury history has a positive beta value which may imply that if a player succumbs to multiple injuries to a period of time, she may pull herself out of active sports and engage in allied sports career. This may be linked with motivation to work full time and continue sports simultaneously that has a negative beta value which implies that more injuries will eventually lead to quit sports and take up allied sports careers. A study by Koch M, Klügl M, Frankewycz B, Lang S, Worlicek M, Popp D, Alt V, Krutsch W in the year 2021 has identified that injuries during play has been the most significant reason to end professional career in sports among professional football players of German Bundesliga. Thus, it can be concluded that as motivation to work using sports as career increases the urge to participate in sports and rise from lower level of participation to higher level of participation gradually declines. A study conducted by Siekanska M, Blecharz J. on transitions in the Careers of Competitive Swimmers: To Continue or Finish with Elite Sport? in the year 2020 has concluded that collaborative relationship between organizational and environmental factors (e.g., school—club communication) and appropriate social support (especially family support) can help to prevent elite athletes' premature career termination during and after their normative transition, within the transition from junior to senior level. The study recommended that it is important to educate parents, coaches, and teammates on the different roles they can play in providing the necessary social support to athletes undergoing normative within-career transitions.

Therefore, it can be concluded that as the level of participation increases motivation and persistence which brings about career development. As an athlete moves upward in the level of participation they tend to face complex competitive environments, better training facilities and increased social recognition. As an

athlete moves up in the level of participation they gain confidence, skill and fame as sportsperson which motivates them to continue their career in sports. It also provides them enhanced media coverage and numerous sponsorship opportunities.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations are proposed:

1. **Increase training opportunities:** Sports authorities and training institutions should ensure regular, structured, and scientifically designed training programmes, as training frequency was the strongest predictor of progression to higher participation levels.
2. **Strengthen athlete retention programmes:** Since years of experience significantly influence advancement, policies should focus on retaining women athletes through continuous support, mentoring, and career guidance.
3. **Increase career security in sports:** Government agencies and sports federations should expand employment opportunities, scholarships, and post-retirement career pathways to encourage women to pursue sports as a long-term profession.
4. **Improvise sports injury management:** Comprehensive injury prevention, rehabilitation, sports medicine, and psychological counselling services should be integrated into athlete development programmes to reduce career interruptions and premature withdrawal from sports.
5. **Strengthening institutional support systems:** Although coaching quality and equipment facilities were not statistically significant in the present model, continued investment in coaching, infrastructure, sports science, nutrition, and athlete welfare remains essential for sustained elite performance.
6. **Enhanced awareness among families and communities:** Awareness programmes should be conducted to encourage parental and community support for women's participation in sports, thereby creating a more enabling social environment.

Further studies can be conducted to examine additional determinants such as family support, socio-economic status, psychological resilience, social barriers, and regional differences using longitudinal data to better understand women's progression to elite levels of sport.

These recommendations align with the study's findings and provide practical guidance for policymakers, sports administrators, educational institutions, and governing bodies seeking to enhance women's progression from district-level to national and international sporting success.

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