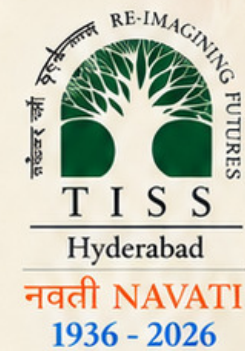


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SPORTS PARTICIPATION
AMONG CHILDREN
IN INDIA

*Evidence from National
Time Use Survey*

Balhasan Ali

School of Public Policy and Governance, TISS Hyderabad

Working Paper No. 07
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Sports Participation Among Children in India

Evidence from National Time Use Survey

Balhasan Ali^{*,**}

Abstract

Sport participation is important for children's overall development and well-being. The present study aims to understand children's sport participation, its determinants and its temporal change in India. It also investigates how much time Indian children spend in daily sport activities and what factors determine their time allocation. The study also tries to capture the trade-off between sport and learning activities among Indian children. The National Time Use Survey (TUS 2019 and 2024) was used to achieve these objectives. The study uses descriptive methods, two-part regression and quantile regression for the analysis.

The findings suggest very low and declining sport participation among Indian children. Similarly, time allocation in sport activities also fell over time; Indian children spent about two hours in sport activities if they participated. The study suggests that girls, children engaged in learning activities, and children belonging to poor households and to urban, northern and central India were affected more over time. Learning activities had the strongest and a significant negative effect on children's time allocation in sport activities, and the more time a child spent in sport activities, the greater the reduction in that time. The study clearly suggests a sport-learning trade-off among children and supports Becker's approach to time allocation.

Although India integrated sport for children through the National Policy on Education in 1986 and various other programmes and policies, the very low participation of children in daily sport activities is a matter of concern. Therefore, the present study suggests building an inclusive environment in terms of gender, caste and class, with urban planning for sport facilities and infrastructure. Schools must have a compulsory sport class for all students, to reduce the burden of learning through play. Although this would exclude children not engaged in academic activities, this could be mitigated

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through programmes for the education of every child. The inclusion of traditional games may also help to increase children's participation.

Keywords: Children, Sport Participation, Time Allocation on Sport, Learning Activities, India

1. Background

Sport has been deeply embedded in daily life, leisure and physical culture in Indian society. Since ancient times, India has had a history of participation in various sport activities by children and adults, from indigenous sports to sports patronised by governments and rulers at multiple levels. In traditional Indian societies, sports were tied to festivals, religious rituals, agricultural cycles and seasonal transitions in all parts of India, with diversity, inclusivity and locality. Similar evidence can be found from all parts of the globe, where sport has been part of individuals' daily life and has contributed to cultural, social, psychological, health and economic wellbeing. Although sport participation offers multidimensional benefits, including physical, mental and social wellbeing,¹ it often declines with age.² Physical activity (including sport participation) is linked to reducing many non-communicable diseases, such as cancer, diabetes, stroke, heart disease, hypertension and depression.³ Besides, sport participation also contributes to building social cohesion and to economic choices.

A wide range of literature has focused on sport participation and its impact on individuals, society and populations; it has a major impact on child development and wellbeing. Although sport participation is important for everyone at every age, it becomes important and necessary for children and adolescents. Childhood is a critical phase for physical, psychological, cognitive and social

¹ V. J. Poitras et al., "Systematic Review of the Relationships between Objectively Measured Physical Activity and Health Indicators in School-Aged Children and Youth", *Applied Physiology, Nutrition, and Metabolism* 41, no. 6 (2016): S197–239, <https://doi.org/10.1139/apnm-2015-0663>; A. Khan et al., "Examining the Association between Sports Participation and Mental Health of Adolescents", *International Journal of Environmental Research and Public Health* 19, no. 24 (2022): 17078, <https://doi.org/10.3390/ijerph192417078>.

² K. Corder et al., "Change in Physical Activity from Adolescence to Early Adulthood: A Systematic Review and Meta-analysis of Longitudinal Cohort Studies", *British Journal of Sports Medicine* 53, no. 8 (2019): 496–503, <https://doi.org/10.1136/bjsports-2016-097330>; R. Guthold et al., "Global Trends in Insufficient Physical Activity among Adolescents: A Pooled Analysis of 298 Population-Based Surveys with 1.6 Million Participants", *Lancet Child and Adolescent Health* 4, no. 1 (2020): 23–35, [https://doi.org/10.1016/S2352-4642\(19\)30323-2](https://doi.org/10.1016/S2352-4642(19)30323-2).

³ World Health Organization, *Global Action Plan on Physical Activity 2018–2030: More Active People for a Healthier World* (Geneva: World Health Organization, 2019), <https://www.who.int/publications/i/item/9789241514187>.

development, and sport participation becomes imperative in shaping these outcomes.⁴ Previous studies suggest that youth participation in sports is linked to physical, social and psychological development and achievement-related behaviours, and to improved self-esteem and self-identity.⁵

The India Report Card (2016), however, suggested that most children do not achieve the recommended levels of physical and sport activity.⁶ These issues were addressed in the 2018 India Report Card, which called for a national-level study and the transformation of government strategies and investment to promote physical and sports activity among children and youth. Active Healthy Kids India, a non-profit organisation, was established as part of an initiative to address the gap and to advocate and promote physical activity among children and youth.

Although sport has been a part of children's lifestyle in India, sports participation among children is extremely unsatisfactory and is determined by socio-economic status, gender and social norms, and institutional access. The India Report Card (2018), however, evaluated physical activity, including sport, and suggested an overall improvement in physical activity and government strategies based on Global Matrix 4.0.⁷ India has a very long history of sport, with social, cultural, religious, ethnic and linguistic diversity. This social diversity also brings certain societal and cultural norms and economic challenges. Socio-economic issues such as gender inequality, caste discrimination, poverty, financial status and cultural norms restrict sports development, which remains limited to

⁴ R. M. Eime et al., "A Systematic Review of the Psychological and Social Benefits of Participation in Sport for Children and Adolescents: Informing Development of a Conceptual Model of Health through Sport", *International Journal of Behavioral Nutrition and Physical Activity* 10 (2013): 98, <https://doi.org/10.1186/1479-5868-10-98>; I. Janssen and A. G. LeBlanc, "Systematic Review of the Health Benefits of Physical Activity and Fitness in School-Aged Children and Youth", *International Journal of Behavioral Nutrition and Physical Activity* 7 (2010): 40, <https://doi.org/10.1186/1479-5868-7-40>; D. E. Warburton, C. W. Nicol, and S. S. Bredin, "Health Benefits of Physical Activity: The Evidence", *Canadian Medical Association Journal* 174, no. 6 (2006): 801–9, <https://doi.org/10.1503/cmaj.051351>; F. J. Penedo and J. R. Dahn, "Exercise and Well-Being: A Review of Mental and Physical Health Benefits Associated with Physical Activity", *Current Opinion in Psychiatry* 18, no. 2 (2005): 189–93, <https://doi.org/10.1097/00001504-200503000-00013>; V. M. Booth, A. V. Rowlands, and J. Dollman, "Physical Activity Temporal Trends among Children and Adolescents", *Journal of Science and Medicine in Sport* 18, no. 4 (2015): 418–25, <https://doi.org/10.1016/j.jsams.2014.06.002>.

⁵ D. Aaron, Y. Jekal, and R. LaPorte, "Epidemiology of Physical Activity from Adolescence to Young Adulthood", *World Review of Nutrition and Dietetics* 94 (2005): 36–41, <https://doi.org/10.1159/000088204>; V. R. Bowden and C. S. Greenberg, *Children and Their Families: The Continuum of Care* (Philadelphia: Lippincott Williams and Wilkins, 2010).

⁶ T. R. Katapally et al., "Results from India's 2016 Report Card on Physical Activity for Children and Youth", *Journal of Physical Activity and Health* 13, no. s2 (2016): S176–82, <https://doi.org/10.1123/jpah.2016-0393>.

⁷ J. Bhawra et al., "The 2022 India Report Card on Physical Activity for Children and Adolescents", *Journal of Exercise Science and Fitness* 21, no. 1 (2023): 74–82, <https://doi.org/10.1016/j.jesf.2022.10.013>.

affluent society.⁸

To the best of my knowledge, this is the first study of children's sport participation in India that uses the National Time Use Survey to understand children's sport participation and time spent in sport activities. This paper contributes to the sport literature in two ways. The first contribution of this paper is to understand children's sport participation and its correlates in India. Another important contribution of this article is to quantify the extent of time spent in sport participation over time. This paper also tracks the changes in the participation rate and time spent during 2019–2024 using Indian time use survey data. Therefore, this article has three important objectives. First, it aims to understand the proportion of children (aged 6 to 14 years) in India who spent time in sport participation. In addition, this paper highlights variation in children's sport participation across socio-economic characteristics such as place of residence, social group, religion, household size, consumption class (poorest, poor, middle, rich and richest), gender, education and region. Second, this paper quantifies the average time spent in sport participation by those who spent any time in it, with its socio-economic and regional variation. Although the literature establishes the effect of sport participation on children's academic engagement, there is a dearth of studies investigating the impact of learning activities on children's sport participation. Third, this paper aims to understand how learning activities contribute to children's sporting behaviour and the learning–sport trade-off.

The outline of this research article is as follows. The next section, on the theoretical background for sport participation, reviews the theoretical approaches in the sport literature. The section on the review of the literature reviews the literature in the global and Indian contexts. The section on the evolution of sports governance and policy in India gives an overview of the historical evolution of sport governance and policies in India. The section on data and methods describes the data sources, sample selection, outcome and explanatory variables, and econometric methods. The results section is divided into two parts: (1) descriptive results and (2) main estimation results. The discussion section discusses the results, and the conclusion section sets out the conclusions and points out some policy implications for children's sport participation in India.

⁸ J. Riordan and A. Krüger, *The International Politics of Sport in the Twentieth Century* (Oxon: Taylor and Francis, 2002), <https://doi.org/10.4324/9780203476369>; P. Taylor et al., *A Review of the Social Impacts of Culture and Sport* (London: Culture and Sport Evidence Programme, 2015), <https://www.gov.uk/government/publications/a-review-of-the-social-impacts-of-culture-and-sport>.

2. Theoretical Background for Sport Participation

There is a growing literature on sport participation, and several approaches have been used to understand it. A wide range of literature shows how economic, social, cultural, demographic and psychological factors play a central role in sport participation. Several studies suggest that Becker's "Income-Leisure Trade-Off Model of Labour Supply" can explain sport participation,⁹ which is based on certain choices. According to Becker (1965),¹⁰ individuals decide to invest in personal capital and skills through the allocation of resources and time. In this context, sport participation is a choice in which individuals invest to gain health, fun, happiness, leisure and economic benefits. The relative intensity of time spent in sport activities and its returns on investment are fundamentally important for such choices and decision-making. Also, the demand for sport participation is not only determined by personal gains or motivation; it is also influenced by socio-economic characteristics.

In 2004, Cawley developed the SLOTH¹¹ framework, which is based on Becker's model of labour and leisure choices and which a number of researchers have used to investigate economic decisions influencing participation in physical activity. The SLOTH model is based on the idea that individuals produce their own health, and Cawley (2004)¹² assumes that the utility of any activity depends on an individual's health, body, food, time spent and many other factors.¹³ In 2005, Green¹⁴ provided a model of sport development to understand the factors related to sport participation, comprising recruitment, retention and transition stages. In every stage of this model, Green suggested

⁹ P. Downward and J. Riordan, "Social Interactions and the Demand for Sport: An Economic Analysis", *Contemporary Economic Policy* 25, no. 4 (2007): 518–37, <https://doi.org/10.1111/j.1465-7287.2007.00071.x>; K. Hallmann et al., "Interdependency of Sport Supply and Sport Demand in German Metropolitan and Medium-Sized Municipalities: Findings from Multi-level Analyses", *European Journal for Sport and Society* 8, nos. 1–2 (2011): 65–84, <https://doi.org/10.1080/16138171.2011.11687870>; J. E. Ruseski et al., "Family Structure, Time Constraints, and Sport Participation", *European Review of Aging and Physical Activity* 8, no. 2 (2011): 57–66, <https://doi.org/10.1007/s11556-011-0084-y>; P. Wicker, C. Breuer, and T. Pawlowski, "Promoting Sport for All to Age-Specific Target Groups: The Impact of Sport Infrastructure", *European Sport Management Quarterly* 9, no. 2 (2009): 103–18, <https://doi.org/10.1080/16184740802571377>.

¹⁰ G. S. Becker, "A Theory of the Allocation of Time", *Economic Journal* 75, no. 299 (1965): 493–517, <https://doi.org/10.2307/2228949>.

¹¹ SLOTH is an acronym for sleeping, leisure, occupation, transportation and home production. See J. Cawley, "An Economic Framework for Understanding Physical Activity and Eating Behaviors", *American Journal of Preventive Medicine* 27, no. 3 (2004): 117–25, <https://doi.org/10.1016/j.amepre.2004.06.012>.

¹² Cawley, "Economic Framework".

¹³ J. García, F. Lera-López, and M. J. Suárez, "Estimation of a Structural Model of the Determinants of the Time Spent on Physical Activity and Sport: Evidence for Spain", *Journal of Sports Economics* 12, no. 5 (2011): 515–37, <https://doi.org/10.1177/1527002510387080>.

¹⁴ B. C. Green, "Building Sport Programs to Optimize Athlete Recruitment, Retention, and Transition: Toward a Normative Theory of Sport Development", *Journal of Sport Management* 19, no. 3 (2005): 233–53, <https://doi.org/10.1123/jsm.19.3.233>.

that an individual's decision to participate in sport is influenced by different motivations and available opportunities. Each stage involves various macro- and micro-level factors, which ultimately return to labour–leisure choices.

For this study, the time allocation theory of Becker (1965)¹⁵ is utilised for the theoretical model of sport participation. In this context, I assume that participation and time spent are based on various micro-level factors, that children's sport participation involves a trade-off between various activities, and that it is determined by children's socio-economic status. This model has also been utilised by Downward (2007),¹⁶ Downward and Riordan (2007),¹⁷ Hallmann *et al.* (2011),¹⁸ Hallmann and Breuer (2014)¹⁹ and Wicker *et al.* (2009)²⁰ to understand sport participation. In addition, Wicker *et al.* (2012)²¹ also included macro-level factors in the form of sport facilities and sport programmes. Although the Indian Time Use Survey does not provide any information from the supply side, such as sport facilities and sport programmes, one can easily relate these factors to upper-strata households.

3. Review of the Literature

Sport participation has a long history across the world, and campaigns such as “sport for all” have played a central and positive role in offering sport opportunities to the general public in the Western world. Gratton and Taylor (2000)²² found a significant increase in the number of participants in sport in Europe. Most countries, especially European countries, developed several sustained sport policies and programmes to increase sport participation in society.²³ Major public and private investment in outdoor and indoor games led to increased sport opportunities. Economic de-

¹⁵ Becker, “Theory of the Allocation of Time”.

¹⁶ P. Downward, “Exploring the Economic Choice to Participate in Sport: Results from the 2002 General Household Survey”, *International Review of Applied Economics* 21, no. 5 (2007): 633–53, <https://doi.org/10.1080/02692170701474710>.

¹⁷ Downward and Riordan, “Social Interactions”.

¹⁸ Hallmann *et al.*, “Interdependency of Sport Supply”.

¹⁹ K. Hallmann and C. Breuer, “The Influence of Socio-demographic Indicators, Economic Determinants and Social Recognition on Sport Participation in Germany”, *European Journal of Sport Science* 14, suppl. 1 (2014): S324–31, <https://doi.org/10.1080/17461391.2012.704078>.

²⁰ Wicker, Breuer, and Pawlowski, “Promoting Sport for All”.

²¹ P. Wicker, K. Hallmann, and C. Breuer, “Micro and Macro Level Determinants of Sport Participation”, *Sport, Business and Management: An International Journal* 2, no. 1 (2012): 51–68, <https://doi.org/10.1108/20426781211207665>.

²² C. Gratton and P. Taylor, *Economics of Sport and Recreation*, 2nd ed. (London: E & FN Spon, 2000), <https://doi.org/10.4324/9780203474839>.

²³ M. Green and S. Collins, “Policy, Politics and Path Dependency: Sport Development in Australia and Finland”, *Sport Management Review* 11, no. 3 (2008): 225–51.

velopment also opened the door for ordinary people to gain greater access to sport facilities. Several researchers, however, found a decline or stagnation in sport participation in many European countries, such as Spain, Finland, Belgium, Portugal, Austria, the Netherlands, Italy and England.²⁴ Moreover, Graf and Cecchini (2019),²⁵ in their study of Canada, France, Germany and the United States, found that time spent in sport activities declined during 2005–15, but the participation rate increased in the same period in Canada. In Germany, participation and time spent both increased during 2001–12. However, in the United States, the participation rate in sport increased but time spent in sport dropped during 2003–16, with a significant gender gap in time spent in sport activities.

The review of the literature also suggests that it is difficult to make a clear comparison of the socio-economic determinants of sport participation. The reason is that the list of sport activities and the measurement of sport participation vary from one study to another. Only a few studies consider the time spent on sport participation.²⁶ Despite these differences, a number of studies have assessed the role of socio-economic, demographic, cultural and individual factors in sport participation,²⁷ which largely explain people's decisions on sport participation. Breuer and Wicker (2008)²⁸ explained sport participation and physical activities from a socio-economic perspective. For example, studies suggest that household economic status, such as poor economic conditions, restricts sport

²⁴ N. Rowe et al., "Driving Up Participation in Sport: The Social Context, the Trends, the Prospects and the Challenges", in *Driving Up Participation: The Challenge for Sport* (London: Sport England, 2004), 6; M. van Bottenburg, B. Rijnen, and J. C. van Sterkenburg, *Sports Participation in the European Union: Trends and Differences* ('s-Hertogenbosch: Arko Sports Media/W. J. H. Mulier Institute, 2005).

²⁵ S. Graf and M. Cecchini, *Current and Past Trends in Physical Activity in Four OECD Countries: Empirical Results from Time Use Surveys in Canada, France, Germany and the United States*, OECD Health Working Paper No. 112. (Paris: OECD Publishing, 2019).

²⁶ Downward and Riordan, "Social Interactions"; B. R. Humphreys and J. E. Ruseski, "Economic Determinants of Participation in Physical Activity and Sport", Working Paper Series no. 06-13 (International Association of Sports Economists, 2006); B. R. Humphreys and J. E. Ruseski, "Participation in Physical Activity and Government Spending on Parks and Recreation", *Contemporary Economic Policy* 25, no. 4 (2007): 538–52, <https://doi.org/10.1111/j.1465-7287.2007.00079.x>; F. Lera-López and M. Rapún-Gárate, "The Demand for Sport: Sport Consumption and Participation Models", *Journal of Sport Management* 21, no. 1 (2007): 103–22, <https://doi.org/10.1123/jsm.21.1.103>; C. Stempel, "Adult Participation Sports as Cultural Capital: A Test of Bourdieu's Theory of the Field of Sports", *International Review for the Sociology of Sport* 40, no. 4 (2005): 411–32, <https://doi.org/10.1177/1012690206066170>.

²⁷ I. E. Berger et al., "Determinants of Sport Participation among Canadian Adolescents", *Sport Management Review* 11, no. 3 (2008): 277–307, [https://doi.org/10.1016/S1441-3523\(08\)70113-X](https://doi.org/10.1016/S1441-3523(08)70113-X); Downward and Riordan, "Social Interactions".

²⁸ C. Breuer and P. Wicker, "Demographic and Economic Factors Influencing Inclusion in the German Sport System: A Microanalysis of the Years 1985 to 2005", *European Journal for Sport and Society* 5, no. 1 (2008): 33–42, <https://doi.org/10.1080/16138171.2008.11687807>.

participation²⁹ and that higher income is associated with higher participation.³⁰ Another important household characteristic is household composition. Studies have found a negative association between sport participation and household size for adults.³¹

Sport participation is an important means for children and adolescents to achieve the required level of physical activity. The WHO guideline on physical activity for children and adolescents aged 5 to 17 years is at least one hour of exercise, such as swimming, tennis, rugby, football or squash, per day.³² A global school-based study of adolescents' physical activity conducted in 146 countries reveals that around 81% of students aged 11–17 years were not sufficiently physically active, with higher inactivity among girls.³³ This study found that low-income countries (85%) had the highest proportion of insufficient physical activity among adolescent students, followed by upper-middle-income (84%), high-income (79.4%) and lower-middle-income (79.3%) countries. Around 78% of South Asian girls are insufficiently physically active. In 27 countries, the prevalence of insufficient physical activity among girls was more than 90%, while only two countries reported that more than 90% of boys were insufficiently physically active.³⁴ The study further emphasised that the majority of adolescents did not meet the required physical activity guidelines. In the Asian region, China reported a small decline in insufficient physical activity among students, from 85% to 84% during

²⁹ Breuer and Wicker, “Demographic and Economic Factors”; L. Farrell and M. A. Shields, “Investigating the Economic and Demographic Determinants of Sporting Participation in England”, *Journal of the Royal Statistical Society Series A: Statistics in Society* 165, no. 2 (2002): 335–48, <https://doi.org/10.1111/1467-985X.00626>; Humphreys and Ruseski, “Economic Determinants”; Humphreys and Ruseski, “Participation in Physical Activity”; Stempel, “Adult Participation Sports”; Wicker, Breuer, and Pawlowski, “Promoting Sport for All”; T. C. Wilson, “The Paradox of Social Class and Sports Involvement: The Roles of Cultural and Economic Capital”, *International Review for the Sociology of Sport* 37, no. 1 (2002): 5–16, <https://doi.org/10.1177/1012690202037001001>.

³⁰ C. Breuer, K. Hallmann, and P. Wicker, “Determinants of Sport Participation in Different Sports”, *Managing Leisure* 16, no. 4 (2011): 269–86, <https://doi.org/10.1080/13606719.2011.613625>; P. Downward and S. Rasciute, “The Relative Demands for Sports and Leisure in England”, *European Sport Management Quarterly* 10, no. 2 (2010): 189–214, <https://doi.org/10.1080/16184740903552037>; B. Eberth and M. D. Smith, “Modelling the Participation Decision and Duration of Sporting Activity in Scotland”, *Economic Modelling* 27, no. 4 (2010): 822–34, <https://doi.org/10.1016/j.econmod.2009.10.003>; Humphreys and Ruseski, “Participation in Physical Activity”; Lera-López and Rapún-Gárate, “Demand for Sport”; J. Scheerder and S. Vos, “Social Stratification in Adults' Sports Participation from a Time-Trend Perspective: Results from a 40-Year Household Study”, *European Journal for Sport and Society* 8, nos. 1–2 (2011): 31–44, <https://doi.org/10.1080/16138171.2011.11687868>; H. Stamm and M. Lamprecht, “Swiss Sports Participation in an International Perspective”, *European Journal for Sport and Society* 8, nos. 1–2 (2011): 15–29, <https://doi.org/10.1080/16138171.2011.11687867>; Wicker, Breuer, and Pawlowski, “Promoting Sport for All”.

³¹ Downward, “Exploring the Economic Choice”; Humphreys and Ruseski, “Participation in Physical Activity”; Humphreys and Ruseski, “Economic Determinants”; J. Scheerder, B. Vanreusel, and M. Taks, “Stratification Patterns of Active Sport Involvement among Adults: Social Change and Persistence”, *International Review for the Sociology of Sport* 40, no. 2 (2005): 139–62, <https://doi.org/10.1177/1012690205057191>.

³² World Health Organization, *Global Recommendations on Physical Activity for Health* (Geneva: World Health Organization, 2010), <https://www.who.int/publications/i/item/9789241599979>.

³³ Guthold et al., “Global Trends in Insufficient Physical Activity”.

³⁴ Guthold et al., “Global Trends in Insufficient Physical Activity”.

2001–16. The South Asian region also reported a decline in insufficient physical activity, from 77% to 75%, in the same period. Among South Asian countries, Afghanistan, Bhutan, Nepal and Pakistan reported a small increase in insufficient physical activity, while India and Bangladesh reported a decline in the same period. For instance, insufficient physical activity among Indian adolescents declined from 77% to 75%, while Bangladeshi students experienced a 6 percentage point (72% to 66%) decline in insufficient physical activity during 2001–16. However, most countries experienced a larger decline in insufficient physical activity among boys. In the Indian context, insufficient physical activity declined among boys but increased among girls over time.³⁵

India declared its commitment to developing sport and has taken several initiatives through various policies and programmes since 1954.³⁶ However, India is known for being a diverse country, with different socio-cultural characteristics coupled with massive poverty, gender and caste discrimination, religious beliefs, economic inequality and stratified barriers that prevent the development of sport.³⁷ In India, cultural and social norms reinforce massive gender discrimination in sport participation.³⁸ Socio-economic characteristics such as residence, caste, religion and household wealth play an important role in sport participation in India.³⁹ For example, social group has a massive adverse impact on inclusion in sport participation, and socially excluded communities largely face huge discrimination.⁴⁰ Religious belief also restricts sport participation in India, and females are the most affected by religious belief.⁴¹ Similarly, Tamilarasi et al. (2026)⁴² found a huge regional imbalance in sport participation across Indian states, with a substantial gender gap.

³⁵ Guthold et al., “Global Trends in Insufficient Physical Activity”.

³⁶ P. Chelladurai et al., “Sport in Modern India: Policies, Practices and Problems”, *International Journal of the History of Sport* 19, nos. 2–3 (2002): 366–83, <https://doi.org/10.1080/714001754>.

³⁷ Riordan, Jim. *The international politics of sport in the twentieth century*. Taylor & Francis, 2002.

³⁸ A. P. Singh and G. Misra, “Gender Differences in Lifestyle: Results of a Survey among Indian School-Going Adolescents”, *Social Change* 46, no. 3 (2016): 428–43.

³⁹ A. S. Malik and K. Chatterjee, “A Cross-Sectional Study to Compare Levels of Physical Activity among Adolescents in Rural and Urban Areas of Western Maharashtra”, *Medical Journal Armed Forces India* 79 (2023): S237–43; Chandran, Nyshka. *Why is India so bad at sport*. 2016.; I. N. Jona and F. T. Okou, “Sports and Religion”, *Asian Journal of Management Sciences and Education* 2, no. 1 (2013); B. Philip, R. Hoye, and E. Sherry, “Sport-for-Development and Social Inclusion in Caste-Ridden India: Opportunities and Challenges”, *Soccer and Society* 23, no. 8 (2022): 970–86, <https://doi.org/10.1080/14660970.2021.1993199>; D. L. Andrews, C. Batts, and M. Silk, “Sport, Glocalization and the New Indian Middle Class”, *International Journal of Cultural Studies* 17, no. 3 (2014): 259–76.

⁴⁰ Philip, Hoye, and Sherry, “Sport-for-Development and Social Inclusion”.

⁴¹ Chandran, Nyshka. *Why is India so bad at sport*. 2016.; Jona and Okou, “Sports and Religion”.

⁴² Tamilarasi, A., and M. Jagadeesan. “State-Wise Sports Participation Analysis based on Gender in India using Machine Learning.” In *2026 6th International Conference on Expert Clouds and Applications (ICOECA)*, pp. 710–717. IEEE, 2026.

Chandran (2016)⁴³ quoted the observation of a leading Indian sport scholar, Boria Majumdar, that the “country does not have a sport culture”. However, this is not true of traditional Indian cultural settings. It is possible that most Indians do not prioritise sport as a means of living and are mostly limited to sedentary activities. Since independence, Indians have mostly been occupied with climbing the ladder of socio-economic status, which is naturally desired in a society with huge inequality, poverty and unequal opportunities. As a result, most Indian children predominantly focus on education, which has been the preferred pathway for climbing the socio-economic ladder. A very popular proverb, “*Kheloge kudoge hoge kharab; padhoge likhoge hoge Nawab*”, which means “If you spend your time playing, you will be ruined; if you study, you will become a noble or successful person”, shows the traditional prioritisation of education among Indians. Although studies show that sport participation has a massive and positive impact on academic achievement, it is noteworthy to see the trade-off between learning and sport activities among Indian children.

4. Evolution of Sports Governance and Policy in India

Although sport participation gained major attention in the late 19th and early 20th centuries, Indian society has had a historical embedding of sport through cultural and social initiatives since ancient times. For example, historical and religious texts mention several sports, such as archery, wrestling, horse riding, chariot racing, kabaddi and kho-kho; such physical activity has been described in ancient religious manuscripts, practised at the local level and patronised by rulers. In the medieval era, elite sports such as polo, hunting and archery were promoted and patronised by rulers, while indigenous sports could also be seen. In the British colonial era, sports were reshaped in India, and sports such as cricket, football, tennis and athletics were introduced. Although the institutional formation of sport, such as clubs and gymkhanas, was introduced, it was initially restricted to elite Indians and Europeans. Indian participation in the colonial period led to the rise of a nationalist sporting identity and pride, and as a result the men's field hockey team dominated the world, winning multiple Olympic gold medals during 1928–56.

After India's first international sports participation, in the Paris Olympics, Sir Dorabji Tata suggested the need for a national-level sports body to promote Olympic sport. This ultimately led to the institutionalisation of sports in India, and the Indian Olympic Association (IOA) was formed in 1927.⁴⁴ After independence, in 1954, the Government of India formed an advisory body named

⁴³ Chandran, Nyshka. *Why is India so bad at sport*. 2016.

⁴⁴ Indian Olympic Association, [title of web page], n.d. [URL and access date to be supplied].

the All India Council of Sports, with the objective of advising the government on national sports policies, funding and the coaching of elite athletes.⁴⁵ In 1982, the Department of Sports (now the Ministry of Youth Affairs and Sports) was set up for organising the 1982 Asian Games in New Delhi. Subsequently, the Sports Authority of India (SAI) was set up in 1984, with the twin objectives of “promoting sports” and “achieving sporting excellence at national and international level”.

India's first National Sports Policy, 1984, was formulated with the objective of raising the standards of sports in the country. The objective of this policy was also incorporated in the National Policy on Education,⁴⁶ with two key areas: “integration of sports and physical education in the learning process and evaluation of performance” and “involvement of youth in national and social development and sports and games, etc., particularly, through educational institutions at the level of higher learning”. Later, the National Sports Policy, 2001 was formulated, with the twin objectives of “Broad-basing of Sports” and “Achieving Excellence in Sports at the National and International levels”. The 2001 policy was more explicit and direct about the mass participation of citizens than any earlier policy.

The Fit India Movement, launched in August 2019, aims to make fitness an integral part of our daily life and tackles the issue of physical inactivity. Under this policy, the Ministry of Health and Family Welfare, jointly with the Ministry of Youth Affairs and Sports, has developed the Age-Appropriate Fitness Protocols and Guidelines, which provide a standardised framework to help us define and measure the fitness of every individual. These guidelines were developed for three age groups: (1) 5–18 years, (2) 18–64 years and (3) 65 years and above. The protocols and guidelines were designed so that every citizen can test themselves on various parameters, and they include simple guidelines to ensure 60 minutes of moderate to vigorous daily physical activity.

The latest Government of India intervention is the Khelo Bharat Niti, 2025, which recognises the transformative power of sports in nation-building and holistic development. To achieve its aim, the government not only aims to achieve excellence in sports on the global stage but also focuses on making sports a people's movement for health and wellbeing. This ultimately strengthens the sports culture and ecosystem from the grassroots to the national level. To support this policy, the Government of India outlines a comprehensive strategy including physical literacy, athlete-centric

⁴⁵ U. Khasnis et al., “Policy Implementation in Indian Olympic Sport: Exploring the Potential for Policy Transfer”, *International Journal of Sport Policy and Politics* 13, no. 4 (2021): 623–40.

⁴⁶ Government of India, *National Policy on Education 1986* (New Delhi: Ministry of Human Resource Development, 1986).

sports development, and rewards and recognition for champion athletes. Also, to make sports a people's movement, the government decided to build a Fitness Ranking and Indexing System and to improve access to sporting facilities, and model sports programmes and events, such as Family Sports Weekends and periodic community engagement activities, will be encouraged. Also, integrating this policy with the National Education Policy, 2020 helps to nurture holistic development and life skills in students and youth, promoting both academic and athletic excellence.

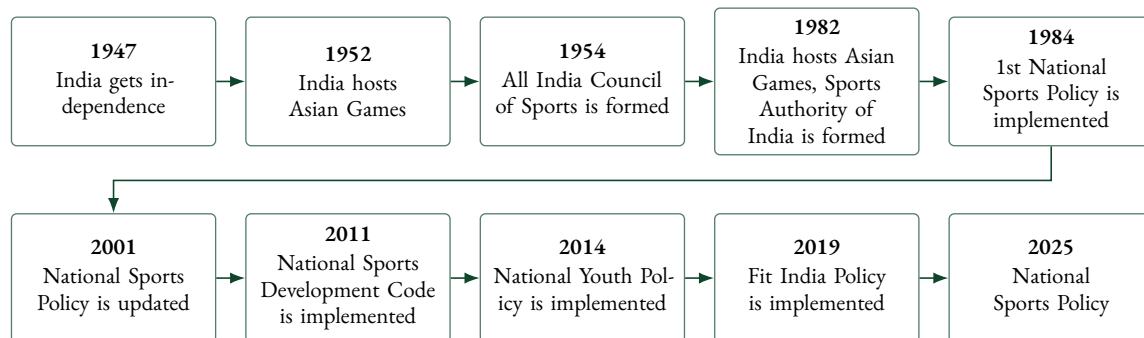


Figure 1. Historical Evolution of Sports Governance and Policy in India (1947–2025).

A report published by Sport and Development maps out the integration of Sports and Physical Activity (SAPA) in state-level sports policies in India. SAPA is a framework that focuses on promoting broad-based participation in sports and physical activities and on health, social inclusion and economic benefits for all segments of the community. It integrates physical activity into daily life through inclusive policies that promote marginalised groups, and incorporates sports into the education system. According to the report, 20 out of 22 states and union territories have some level of mass participation, which shows an emerging national trend towards making sports accessible to the wider population.⁴⁷ The report's findings show that states such as Assam, Haryana, Jammu and Kashmir, and Himachal Pradesh have relatively extensive mass participation compared with other states.

5. Data and Methods

In 2019 and 2024, the Ministry of Statistics and Programme Implementation (MoSPI), Government of India, conducted a nationally representative Time Use Survey (TUS) to measure the time

⁴⁷ Sport and Development, [title of report on Sports and Physical Activity (SAPA) integration in state-level sports policies in India], 2024. <https://in.search.yahoo.com/search?fr=mcafee&type=E21oIN826Go&p=Discussion-Brief-The-Role-of-PA-and-Sport-in-Leadership-Empowerment-for-Women-in-India.-22.05.2023-clean>.

spent by the Indian population on different activities.⁴⁸ This survey provides information on time spent for the population aged 6 years and above in nine major activity categories: Employment and related activities; Production of goods for own final use; Unpaid domestic services for household and family members; Unpaid caregiving services for household and family members; Unpaid volunteer, trainee and other unpaid work; Learning; Socializing and communication, community participation and religious practice; Culture, leisure, mass media and sports practices; and Self-care and maintenance. These include 165 activities based on the International Classification of Activities for Time-Use Statistics (ICATUS 2016).⁴⁹ The survey covered the whole of India for the first time in 2019, and the population sample is representative at the national and state levels.

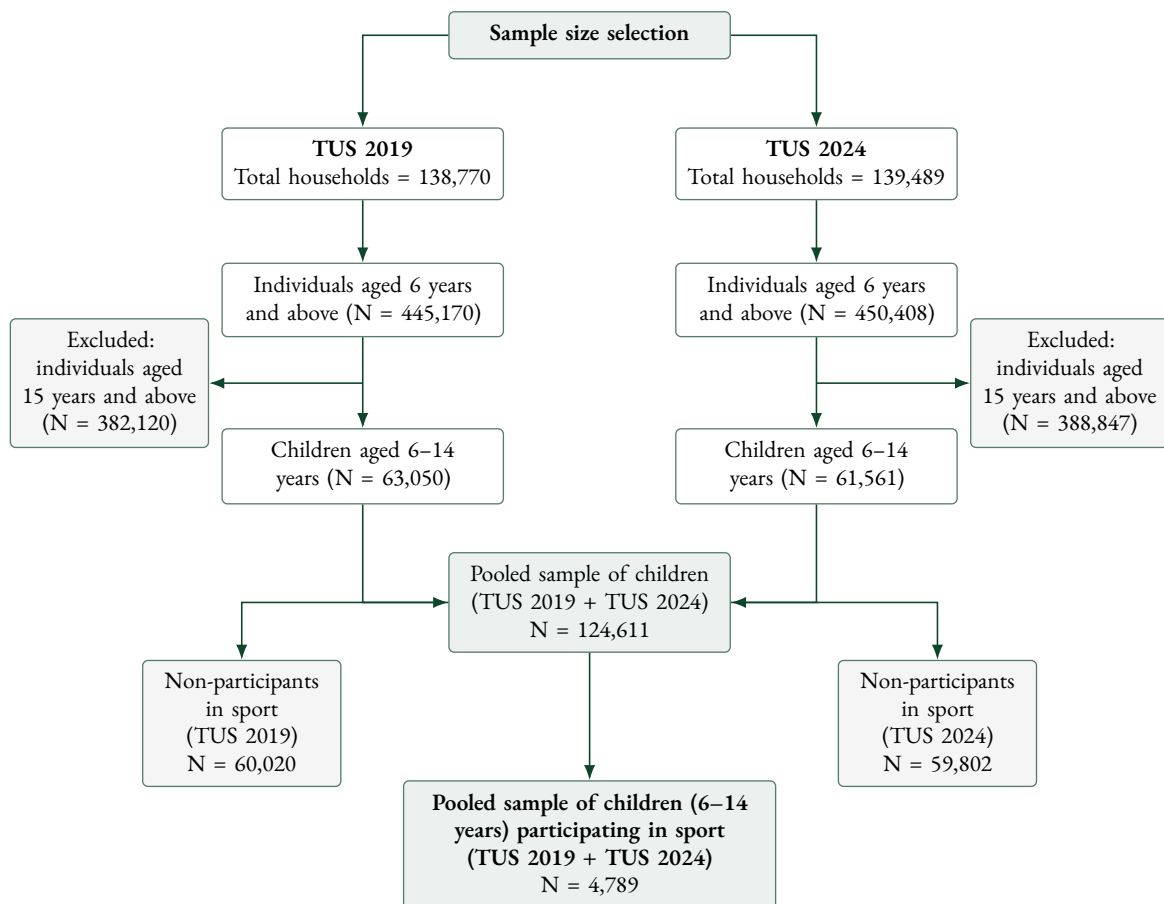


Figure 2. Sampling flow chart for the 2019 and 2024 Time Use Surveys for the final analytical sample.

For this study, I have utilised TUS 2019 and 2024 to understand the changes in time spent in sport participation for children age between 6 to 14 years. The TUS 2019 covered 138799 household

⁴⁸ GoI. 2019. Time Use Survey 2019. National Statistical Office, Ministry of Statistics and Programme Implementation. <https://microdata.gov.in/NADA/index.php/catalog/236>; GoI. (2024). Time Use Survey 2024. National Statistical Office, Ministry of Statistics and Programme Implementation. <https://microdata.gov.in/NADA/index.php/catalog/236>.

⁴⁹ ICATUS. (2016). International Classification of Activities for Time-Use Statistics 2016. ST/ESA/STAT/SER.M/98. United Nations Statistics Division. <https://unstats.un.org/unsd/demographic-social/time-use/icatus-2016/>.

and collected time spent information on various activities from 447250 individuals of six years and above. Similarly, TUS 2024 covered 139489 household and collected 450408 individuals. These samples exclude household and individuals' information of those belonged to third/other gender categories. Using the ICATUS 2016 framework, information on time use activities was collected through personal interviews. Information was collected on the time spent in various activities by each individual aged 6 years and above over 24 hours, from 4 a.m. on the day before the interview to 4 a.m. on the day of the interview. Information on 165 activities based on the United Nations ICATUS 2016 framework was collected, and activities were classified using a three-digit code. Individuals were asked to provide information for each activity. The questions covered (1) the duration, recorded in 24-hour format in 20-minute slots for each activity; (2) whether the activity was performed simultaneously with other activities; and (3) whether it was a major activity or not.

In addition to time use in various activities, the Time Use Survey also provides information on various household and individual characteristics. Household-level information such as place of residence (Rural/Urban), social group (Scheduled Tribes, Scheduled Castes, Other Backward Classes and Others), religion (Hinduism, Islam, Christianity, Sikhism, Buddhism, Jainism, Zoroastrianism and others), household size, landholding and usual monthly consumption expenditure was collected for each individual. The individual-level data include information on age, level of education, marital status and gender, and employment information based on usual principal status. This information was collected for all individuals aged 6 years and above across all Indian states and Union Territories. For this study, I focused exclusively on time spent on sport participation, which is listed as three-digit activity code 831. As this study focuses on children's sport participation, the sample is restricted to individuals aged 6 to 14 years. The final sample consists 60020 and 59802 children of age between 6-14 years for 2019 and 2024, respectively. The final pooled sample of children participating in sport is 4789.

Outcome Variable

Participating in sports is classified under "culture, leisure, mass media and sports practices", which is a major division of activities in the ICATUS 2016 classification. A subdivision of this major division is "Sports participation, exercise, and related activities", in which "Participating in Sports" is coded as three-digit activity no. 831. According to ICATUS 2016, participation in sport refers to any time spent in outdoor and indoor sports, which include individual sports, such as lawn tennis, table tennis, squash, racquetball, golf, bowling and so on; team sports, such as basketball,

football, soccer, volleyball, hockey, rugby and so on; and contact sports, such as judo, taekwondo, karate, wrestling, boxing, etc. Sport participation, however, does not include hunting, trapping and production of animal skins for own final use, fishing for own final use, or exercising as sport activities.⁵⁰

The primary analysis is based on two outcome variables. The first is sport participation, a binary variable that takes the value of one if the child spent time in sport participation and zero otherwise. The second is the extent of time (in minutes) spent in sport participation by children who spent time on it.

Covariates

A number of studies show that socio-economic and demographic characteristics have a significant impact on sport participation.⁵¹ In this study, gender, social group, religion, place of residence, monthly per capita income, regional differences, household size and learning are treated as determining factors in children's sport participation and time spent in it. Household-level variables such as place of residence (rural/urban), household size (less than 5 members/5 members or more), religion (Hindu, Islam, Christian, Sikh and Others) and social group (Scheduled Castes, Scheduled Tribes, Other Backward Classes and Others) are included to capture the household socio-demographic effect on children's sport participation. Household monthly per capita consumption expenditure (MPCE) is used as a proxy for household income. MPCE is divided into quintiles, giving five categories: poorest (20%), poor (20–40%), middle (40–60%), richer (60–80%) and richest (80–100%). Two individual-level factors, gender (male/female) and participation in learning activities (yes/no), are considered for capturing the impact of individual factors on children's sport participation.

⁵⁰ United Nations Statistics Division, *International Classification of Activities*.

⁵¹ K. E. Chad et al., "Profile of Physical Activity Levels in Community-Dwelling Older Adults", *Medicine and Science in Sports and Exercise* 37, no. 10 (2005): 1774–84; Eberth and Smith, "Modelling the Participation Decision"; Humphreys and Ruseski, "Economic Determinants"; Hallmann et al., "Interdependency of Sport Supply"; Breuer and Wicker, "Demographic and Economic Factors"; F. Lera-López and M. Rapún-Gárate, "Determinants of Sports Participation and Attendance: Differences and Similarities", *International Journal of Sports Marketing and Sponsorship* 12, no. 2 (2011): 66–89, <https://doi.org/10.1108/IJSMS-12-02-2011-B007>; García, Lera-López, and Suárez, "Estimation of a Structural Model"; Philip, Hoye, and Sherry, "Sport-for-Development and Social Inclusion".

6. Results

6.1 Descriptive Results

The descriptive findings on sport participation of children (6–14 years) and the percentage change during 2019–24 are shown in Table 1. The findings reveal a 37.3% decline in children's sport participation during 2019–24. Gender disparities in participation increased considerably over time, from 1.4 percentage points (2019) to 2.3 percentage points (2024). While boys experienced a 25.1% decline, girls recorded a 56% drop in sport participation over time. The findings reveal that the rural–urban gap in sport participation narrowed during 2019–24, as both areas experienced a substantial reduction. Although the decline was steeper in rural areas (39.1%) than in urban areas (32.4%), rural children continued to have slightly higher sport participation. Significant variation in sport participation is also evident across social and religious categories. Among social groups, sport participation by Scheduled Tribe children increased from 2.7% to 3.4% during 2019–24, an improvement of 25.4%. In contrast, social groups such as Scheduled Castes, Other Backward Classes and Others recorded sharp declines of about 38.6%, 42.7% and 43.1%, respectively. Similarly, religious disparities in children's sport participation were also pronounced. All religious groups experienced a substantial decline except Christians, who experienced an 11% increase during 2019–24. The steepest decline was experienced by Sikhs (60.4%), followed by Muslims (52.5%), Hindus (34.8%) and others (15.8%). These findings suggest that socio-cultural as well as spatial and gender factors may shape children's access to open spaces and sport opportunities, with persistent gendered and social barriers to sport participation.

The descriptive findings reveal a visible gap in sport participation across economic classes, which widened over time. Although a decline in sport participation is observed across all economic groups, children from the poorest households recorded the steepest decline. For example, children from the poorest households experienced a drop of about 50.3% in sport participation, followed by the poor (38.5%), middle (36.9%), richer (22.8%) and richest (27.2%) groups. Despite the decline across all economic groups, affluent households maintained higher sport participation. Interestingly, in 2019 children from the richest households had the lowest participation rate, while in 2024 the poorest children showed the lowest participation rate. These findings reflect that economic resources may substantially influence children's ability to access sport environments and facilities. Household size further reinforces this interpretation, as children living in households with fewer than five members had a higher participation rate in 2024. Children living with five or more members experienced

the steepest decline, of 52.4%, compared with those in smaller households (14%) during 2019–24. This reflects that larger households may face greater financial and resource constraints, limiting children's sport opportunities and activities.

Disparities by learning activity and region are also substantial in children's sport participation. The findings show that children not engaged in learning activities experienced a decline of about 57% in sport participation over time, compared with 35.2% among those engaged in learning activities. This reflects that learning (educational) activities may provide a structured environment or institutional exposure that supports continued participation in sports. Regional variation in sport participation is pronounced, and most regions saw a decline over time, except East and South India. The Central (75.3%) and Northern (66.4%) regions, for instance, recorded the most severe drops, followed by the West (64.5%) and Northeast (51.1%) regions. In contrast, the Eastern and Southern regions saw a substantial increase in sport participation over time. Although Central India had the highest participation in 2019, East India emerged as the region with the highest participation rate in 2024. These regional trends suggest that local institutional support, cultural attitudes and the regional policy environment may have played a significant role in shaping children's participation over time in India (Table 1).

State-wise heterogeneity is also pronounced in India, and changes in sport participation over time differ across states (Appendix Figure A1). For example, some states experienced dramatic improvement, while others recorded a significant drop in sport participation. In 2019, Chhattisgarh, Tripura and West Bengal showed strong engagement in sport activities; however, Odisha emerged as a high-performing state in 2024, followed by Sikkim and West Bengal. On the other hand, in 2024, Uttarakhand (0.1%), Gujarat (0.3%) and Delhi (0.8%) recorded extremely limited sport activity among children. Tamil Nadu, Odisha, Manipur and Sikkim recorded remarkable improvement, while Tripura, Uttarakhand, Rajasthan and Chhattisgarh recorded a steep decline in sport participation among children over time (Appendix Figure A1).

Table 1. Proportion of children (6–14 years) in sport participation in India, 2019 and 2024

Socio-Economic Characteristics	2019 (%)	2024 (%)	Temporal Change (%)
Gender			
Male	5.7	4.2	–25.1
Female	4.3	1.9	–55.7
Place of Residence			
Rural	5.5	3.4	–39.1

continued on next page

Table 1. *(continued)*

Socio-Economic Characteristics	2019 (%)	2024 (%)	Temporal Change (%)
Urban	3.7	2.5	−32.4
Social Group			
Scheduled Tribes	2.7	3.4	25.4
Scheduled Castes	5.4	3.3	−38.6
Other Backward Classes	5.4	3.1	−42.7
Others	5.3	3.0	−43.1
Religion			
Hindu	4.9	3.2	−34.8
Islam	6.4	3.1	−52.5
Christian	2.8	3.1	11.1
Sikh	3.2	1.3	−60.4
Others	4.8	4.0	−15.8
MPCE			
Poorest	5.3	2.6	−50.3
Poor	5.5	3.4	−38.5
Middle	5.6	3.6	−36.9
Richer	4.6	3.6	−22.8
Richest	4.2	3.0	−27.2
Household Size			
Less than 5 members	4.9	4.2	−14.0
5 members or more	5.2	2.5	−52.4
Learning Activities			
No	5.2	2.2	−57.1
Yes	5.0	3.3	−35.2
Region			
North	5.3	1.8	−66.4
Central	7.3	1.8	−75.3
East	5.0	5.8	18.0
Northeast	5.0	2.5	−51.1
West	2.3	0.8	−64.5
South	3.4	3.9	16.1
Total	5.1	3.2	−37.3

Source: Based on the author's own calculations from TUS 2019 and 2024.

Table 2 presents children's average time spent (in minutes) in sport across selected socio-economic and demographic groups in India for 2019 and 2024. The findings reveal a declining trend in average time spent in sports, from 136 minutes in 2019 to 112 minutes in 2024. Although boys and girls both experienced a significant drop in average daily time spent over time, boys consistently spent more time in sports than girls in both periods. As a result, the gender disparity in sport participation also persisted over time. A rural–urban difference in time spent is also visible, with rural children spending more time in sport activities than urban children. There is also a significant drop in time spent in both areas, with a greater reduction in rural areas. This reflects that, despite

the reduction in time spent, rural settings may provide relatively more informal play opportunities and open spaces than urban settings. Disparities in daily time spent in sports across social groups are clearly visible. In 2019, Scheduled Tribe children (147 minutes) spent the most time in sports, whereas Scheduled Caste children spent the most in 2024. Social groups such as Other Backward Classes and Others spent less time in sports, and this trend continued over time. Although average time spent declined across all social groups, Scheduled Tribe children experienced the largest drop over time. Religious differences in average time spent in sport activities also reveal a contrasting pattern. In 2019, Hindu (142 minutes) and Christian (120 minutes) children spent the most time in sports, and they also experienced the largest decline in time spent by 2024. However, Muslim children recorded the highest average daily time spent in sport activities in 2024, followed by Hindu children.

Household economic status reveals that children from the poorest (bottom 20%) households spent more time in sport activities in both periods. In contrast, children from the richest households had the least daily time spent in both periods. Across all economic groups, children's average daily time spent dropped over time; the poorest children experienced the largest decline, whereas the richest children experienced the smallest decline. This pattern reflects that economically disadvantaged children may traditionally rely more on outdoor informal play, whereas economically well-off children spend less time in sport owing to other recreational activities. Household size is another important household factor that influenced children's engagement in sport activities. In 2019, children living in larger households (142 minutes) spent more time in sport than those in smaller households (125 minutes). Larger households (31 minutes), however, recorded a much sharper decline than smaller households (14 minutes) over time.

Moreover, one of the most striking findings emerges from children's learning activities, which are a proxy for educational engagement. The findings suggest that children not engaged in learning activities consistently reported much more time spent in sport than those engaged in learning. Although both groups saw declines, students not engaged in learning activities experienced the sharpest decline, of 69 minutes, over time. Similarly, regional disparities are also pronounced in average daily time spent in sport activities.

Table 2. Children's Time Spent (in Minutes) in Sport in India, 2019 and 2024

Socio-Economic Characteristics	2019 Time Spent (in Minutes)	2024 Time Spent (in Minutes)	2019–2024 Absolute Change (in Minutes)
Gender			
Male	141	115	–26
Female	128	103	–25
Place of Residence			
Rural	140	115	–25
Urban	117	99	–18
Social Group			
Scheduled Tribes	147	105	–42
Scheduled Castes	141	120	–21
Other Backward Classes	135	112	–23
Others	129	105	–23
Religion			
Hindu	142	111	–31
Islam	117	118	1
Christian	120	103	–17
Sikh	105	106	2
Others	100	108	9
MPCE			
Poorest	153	121	–32
Poor	141	111	–29
Middle	135	107	–28
Richer	136	107	–28
Richest	112	94	–18
Household Size			
Less than 5 members	125	111	–14
5 members or more	142	112	–31
Learning Activities			
No	253	183	–69
Yes	116	106	–10
Region			
North	148	103	–46
Central	155	142	–13
East	123	113	–11
Northeast	106	99	–7
West	87	113	26
South	110	92	–17
Total	136	112	–24

Source: Based on the author's own calculations from TUS 2019 and 2024.

Empirical Strategy

Cicchetti, Seneca and Davidson (1969)⁵² conducted the first empirical study dealing with sport participation and leisure, and employed a two-step econometric model to investigate the decision to participate as well as its frequency. Rodgers (1977)⁵³ provided empirical evidence on sports at the European level. Subsequently, a number of studies employed logistic and two-step Heckman models with multiple classification approaches for sport participation analysis.⁵⁴ Further, a few studies have examined time spent in sport participation. In 1971, Cragg⁵⁵ addressed the limitation of the Tobit model with many zero observations, which occur because of two different behavioural decisions: the decision to participate and the intensity of participation. Although Cragg's (1971) two-hurdle model separates the decision to participate and time spent as a two-step process, it assumes that a positive outcome must pass both hurdles jointly and that the second stage follows a truncated regression with strong distributional assumptions. In the context of children, sport participation and time spent involve greater behavioural flexibility, which can depend on the children's own decision as well as on whether they are allowed to participate. Then, if they decide (or are allowed) to participate in sport, they can allocate their daily time to it. However, these two decisions (the decision to participate and time allocation) may be influenced by several socio-economic and demographic factors. For example, parental permission, gender and social norms, learning and economic conditions can be major factors in the sport participation decision, but leisure time availability, playground accessibility, distance, socio-religious and gender inclusion, the availability of means of play and academic pressure can be determining factors in time spent. Although the time use survey does not provide information such as playground availability, distance, means of sporting, academic pressure and parental permission, our socio-economic covariates can reflect this information indirectly.

⁵² C. J. Cicchetti, J. J. Seneca, and P. Davidson, *The Demand and Supply of Outdoor Recreation* (New Brunswick, NJ: Bureau of Economic Research, 1969).

⁵³ B. Rodgers, *Rationalising Sports Policies: Sport in Its Social Context; International Comparisons* (Strasbourg: Council of Europe, Committee on Sport, 1977).

⁵⁴ Breuer and Wicker, "Demographic and Economic Factors"; Downward, "Exploring the Economic Choice"; Humphreys and Ruseski, "Economic Determinants"; García, Lera-López, and Suárez, "Estimation of a Structural Model".

⁵⁵ J. G. Cragg, "Some Statistical Models for Limited Dependent Variables with Application to the Demand for Durable Goods", *Econometrica* 39, no. 5 (1971): 829–44, <https://doi.org/10.2307/1909582>.

For our study, a pooled Two-Part Model⁵⁶ has been utilised to understand the impact of socio-economic factors on sport participation and time spent in sport activities among children (6–14 years). In the first part, a pooled probit regression model is estimated to understand the impact of the determinants on sport participation. In the second part, pooled OLS is estimated to understand the intensity of time spent in sport activities.

First Part: Pooled Probit Regression Model

A pooled regression model is specified and preferred over single-year estimation. First, data pooling increases the sample size, which can improve the precision and efficiency of parameter estimates. Second, a pooled probit model with interaction terms provides a unique framework to examine whether the effect of independent variables differs over time. Estimating a separate model for each year only provides coefficients that are not directly comparable, whereas the pooled interaction model allows statistical inferences on the equality of coefficients through the interaction terms. Third, pooling of data helps to distinguish between compositional and structural changes, which are difficult to disentangle in separate estimations. It also helps in temporal transformational analysis.

In this study, I have combined the 2019 and 2024 time use surveys to examine the determinants of children's sport participation in India. The outcome variable, sport participation, is binary and takes the value 1 if the child participates in sports and 0 otherwise. Given the dichotomous nature of the dependent variable, I adopt a latent variable framework in which observed participation is driven by an unobserved propensity. In this study, the model of interest is specified as follows:

$$\text{Sport Participation}_{it}^* = \alpha + \delta \text{Year}_t + \beta X'_{it} + \gamma (\text{Year}_t \times X'_{it}) + \varepsilon_{it} \quad (1)$$

where Sport_{it}^* denotes the latent disposition towards child sport participation and ε_{it} is the error term, which follows $N(0,1)$. The observed outcome can be written as follows:

⁵⁶ J. P. Newhouse, "A Design for a Health Insurance Experiment", *Inquiry* 11, no. 1 (1974): 5–27, <https://www.jstor.org/stable/29770839>; R. H. Brook et al., "Overview of Adult Health Status Measures Fielded in Rand's Health Insurance Study", *Medical Care* 17, no. 7 (1979): i–131, <https://www.jstor.org/stable/3764335>; N. Duan et al., "Choosing between the Sample-Selection Model and the Multi-part Model", *Journal of Business and Economic Statistics* 2, no. 3 (1984): 283–89, <https://doi.org/10.2307/1391711>; F. Belotti et al., "twopm: Two-Part Models", *Stata Journal* 15, no. 1 (2015): 3–20, <https://doi.org/10.1177/1536867X1501500102>.

$$\text{Sport Participation}_{it}^* = \begin{cases} 1 & \text{if Sport Participation}_{it}^* > 0 \\ 0 & \text{otherwise} \end{cases}$$

The model formulation implies that the probability can be stated using the standard normal cumulative distribution function as follows:

$$P(\text{Sport Participation}_{it} = 1 \mid X_{it}, \text{Year}_t) = \phi(Z_{it}) \quad (2)$$

where $Z_{it} = \alpha + \delta \text{Year}_t + \beta X'_{it} + \gamma (\text{Year}_t \times X'_{it}) + \varepsilon_{it}$.

β is the coefficient that captures the effects of covariates in the base year (Year=2019), while the interaction terms γ capture how these effects change in the subsequent survey period (Year=2024). X'_{it} includes a set of socio-economic variables: gender, place of residence, social group, religion, MPCE, region, household size and learning participation. ε_{it} is the error term and $\phi(\cdot)$ is the standard normal cumulative distribution function.

Given the non-linear relationship between the outcome and the regressors, this study reports average marginal effects (AMEs), which are easier to interpret as the impact of regressors on participation probabilities. In this model, the regressors are either binary or categorical, so marginal effects are computed as the average discrete change in predicted probabilities. The AMEs for these binary/categorical variables are estimated as follows:

$$\text{AME}_k = \frac{\partial P(\text{Sport Participation}_{it} = 1)}{\partial X_{k,it}} = \frac{1}{N} \sum_{i=1}^N [\phi(Z_{it} \mid X_k = j) - \phi(Z_{it} \mid X_k = \text{ref})] \quad (3)$$

The year-specific AMEs capture the temporal changes in children's probability of participation in sport. For the base survey year (2019), the AME can be written as follows:

$$\text{AME}_k^{(2019)} = \frac{1}{N_{2019}} \sum_{i \in t=2019} [\phi(Z_{i2019} \mid X_k = j) - \phi(Z_{i2019} \mid X_k = \text{ref})] \quad (4)$$

For the subsequent survey year (Year = 2024):

$$\text{AME}_k^{(2024)} = \frac{1}{N_1} \sum_{i \in t=2024} [\phi(Z_{i2024} \mid X_k = j) - \phi(Z_{i2024} \mid X_k = \text{ref})] \quad (5)$$

where the index functions integrate interaction effects, such as:

$$Z_{i2024} = X'_i\beta + X'_i\gamma \quad (6)$$

and the term γ_k captures the change in the effect of X_k in the later period.

The change in marginal effects between the two periods (2019–24) can be defined as:

$$\Delta\text{AME}_k = \text{AME}_k^{(2024)} - \text{AME}_k^{(2019)} \quad (7)$$

Second Part: Pooled Ordinary Least Squares Method

In the second part of our econometric specification, the ordinary least squares method is utilised to investigate the impact of socio-economic factors on children's time spent in sport activities. A conditional linear regression model is employed to examine the determinants of time spent in sport activities among children who participate in sport activities in a day. If i denotes the individual child and $t \in \{2019, 2024\}$ denotes the survey period, the model can be specified as:

$$y_{it} = \alpha + \beta_1 \text{Year}_t + X'_{it}\beta + (\text{Year}_t \times X'_{it})\gamma + \varepsilon_{it}, \quad \text{for } y_{it} > 0 \quad (8)$$

where y_{it} represents the total time spent in sport activities by child i in a day in period t , conditional on the child reporting participation in sport activities. The vector X_{it} comprises the socio-economic characteristics of a child. The coefficient β captures the impact of the socio-economic factors on time spent in sport activities in the base period (Year=2019). β_1 reflects the overall shift in average time spent between 2019 and 2024 for the reference group. γ represents the interaction between survey year and regressors, which captures how the relationship between socio-economic characteristics and time spent in sport evolves over time.

Furthermore, as this model is linear, marginal effects can be interpreted directly from the estimated coefficients. For example, for any covariate X_k , the effect in the base survey period (2019) can be written as:

$$\text{Marginal Effect}_k^{(2019)} = \beta_k \quad (9)$$

and in the subsequent survey period (Year=2024):

$$\text{Marginal Effect}_k^{(2024)} = \beta_k + \gamma_k \quad (10)$$

Thus, the interaction coefficient γ_k captures the temporal change in the marginal effect of the regression and can be expressed as:

$$\Delta \text{Marginal Effect}_k = \gamma_k \quad (11)$$

6.2 Empirical Results

The results of the two-part regression model are presented below. The marginal effects from the pooled probit regression model (first part) of the two-part regression model for children's sport participation in India are portrayed in Figures 3 and 4. Table 3 presents the estimates of the pooled OLS regression model (second part) of the two-part regression model for children's time spent (in minutes) in sport participation in India.

6.2.1 Period Effect on Sport Participation

Figure 3 shows that the predictive margins of survey year reveal a substantial decline in children's sport participation in India over time. The adjusted probability of participation in sport activities dropped from 4.8% in 2019 to 2.9% in 2024, a decline of 1.9 percentage points over time. The highly significant p-value ($p < 0.001$) suggests that this decline in sport participation is robust and systematic over time.

6.2.2 Gender and Learning Effects

Figure 4(a) presents the adjusted average marginal effects of gender and learning activities on children's sport participation. The findings show that girls had a lower probability of sport participation than boys in both periods, and this disadvantage in participation increased over time. In 2019, girls had a 1.48 percentage point lower probability ($\text{AME} = -0.0148$, $p < 0.001$), whereas this gap widened to 2.10 percentage points ($\text{AME} = -0.0210$, $p < 0.001$) in 2024. The findings indicate that the gender disadvantage in sport participation increased over time. Furthermore, the findings reveal that participation in learning activities was associated with a small positive effect, which disappeared over time. For example, the average marginal effect was 0.0043 ($p = 0.072$) in 2019, and it

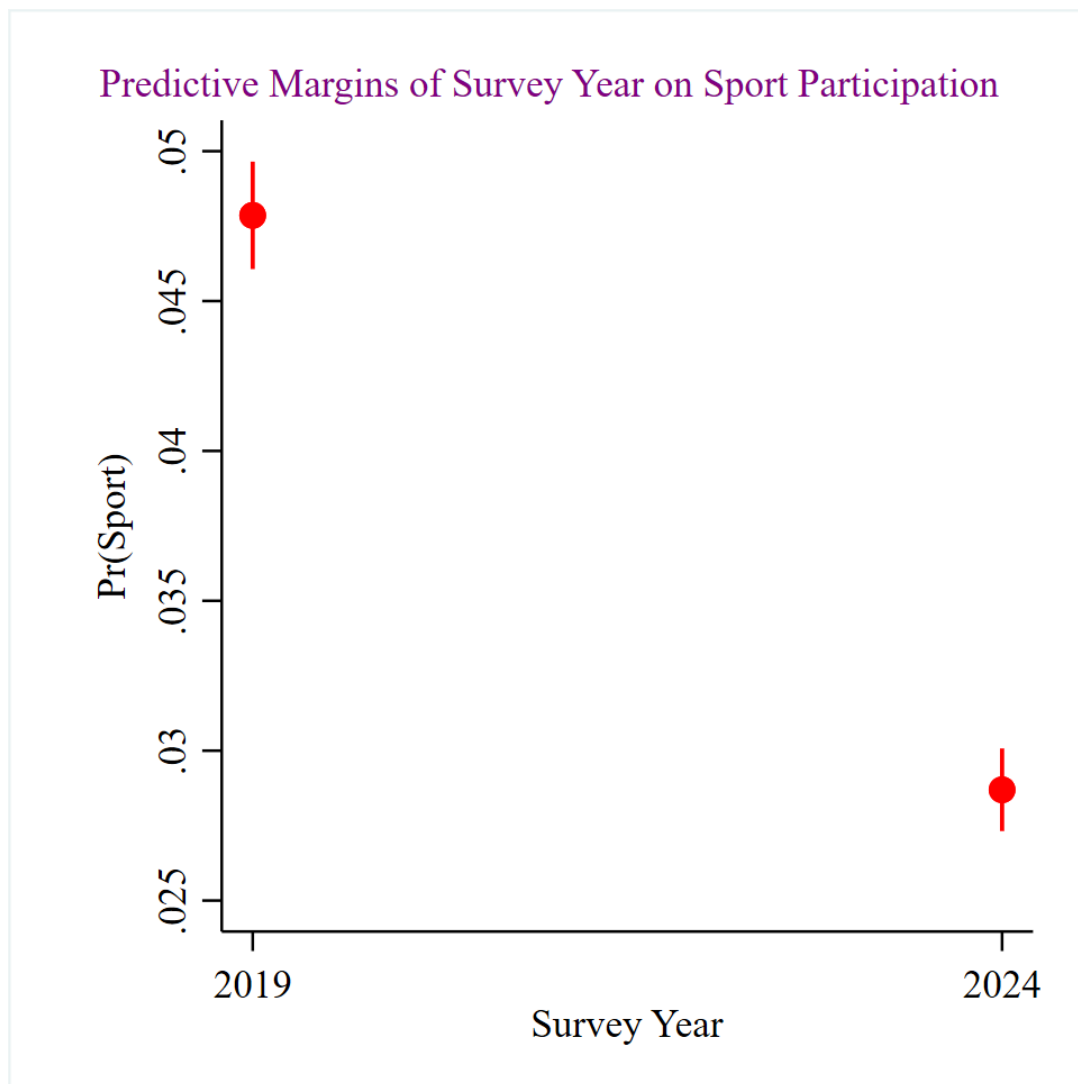


Figure 3. Predictive margins of survey year on children's sport participation, 2019 and 2024.

became insignificant in 2024 after adjustment for other socio-demographic factors.

6.2.3 Residential and Household Structure Effects

Figure 4(b) presents the adjusted average marginal effects of place of residence and household size on children's sport participation. The findings show that children residing in urban areas had significantly lower probabilities of sport participation than those in rural settings in both years. Although urban children had lower probabilities, the negative average marginal effect declined from -0.0138 ($p < 0.001$) in 2019 to -0.0059 ($p < 0.001$) in 2024. In contrast, negative impact of household size on child's learning increased overtime. These findings indicate that although urban children continued to face a disadvantage in sport participation, residence-based differences narrowed during 2019–24.

6.2.4 Social Group (Caste) and Religious Effects

Figure 4(c) portrays the adjusted average marginal effects of social groups on children's sport participation for 2019 and 2024. The findings show that children from Scheduled Tribes had a significant disadvantage relative to Scheduled Castes in 2019 ($AME = -0.0183$, $p < 0.001$), which disappeared by 2024. Similarly, children from Other Backward Classes exhibited a small negative association relative to Scheduled Castes in 2019 ($AME = -0.0040$, $p = 0.098$), which also disappeared by 2024 ($AME = -0.0009$, $p = 0.606$). Children in the Others category showed no significant differences in sport participation in either period. The findings indicate that caste-based disparities in sport participation among children appear to have weakened over time.

Moreover, the AMEs of religion on children's sport participation are shown in Figure 4(d). The figure shows that children from the Muslim community had a favourable effect of religion, with a positive and significant effect relative to Hindus in 2019 ($AME = 0.0097$, $p < 0.001$), which disappeared by 2024. Children from the Christian community exhibited significantly lower probabilities of sport participation than Hindus. However, the magnitude of this disadvantage declined from $AME = -0.0192$ ($p < 0.001$) in 2019 to $AME = -0.0101$ ($p < 0.001$) in 2024. Similarly, children from the Sikh community also had lower probabilities of participation (-0.0191 , $p < 0.001$) in 2019, which became insignificant in 2024. In contrast, children from other religious groups had a strong, positive and higher probability of participation in sports activities than Hindus in both periods, with an increasing pattern. For example, the adjusted average marginal effect for the other religious group was 2.8 percentage points ($p < 0.001$) in 2019, which decreased to 2.0 percentage points ($p < 0.001$) by 2024.

6.2.5 Income and Regional Effects

Figure 4(e) shows the average marginal effects of household monthly per capita consumption expenditure quintiles, a proxy for household income, on children's sport participation. The findings show no significant differences in sport participation among the higher quintiles relative to the poorest in 2019. However, in 2024, the poor, middle and richer strata showed a significantly higher probability of participation. The richest quintile remained statistically insignificant in both periods. These findings indicate that economic advantage became more strongly associated with children's sport participation in 2024.

Regional heterogeneity in children's sport participation is clearly evident in Figure 4(f). The figure

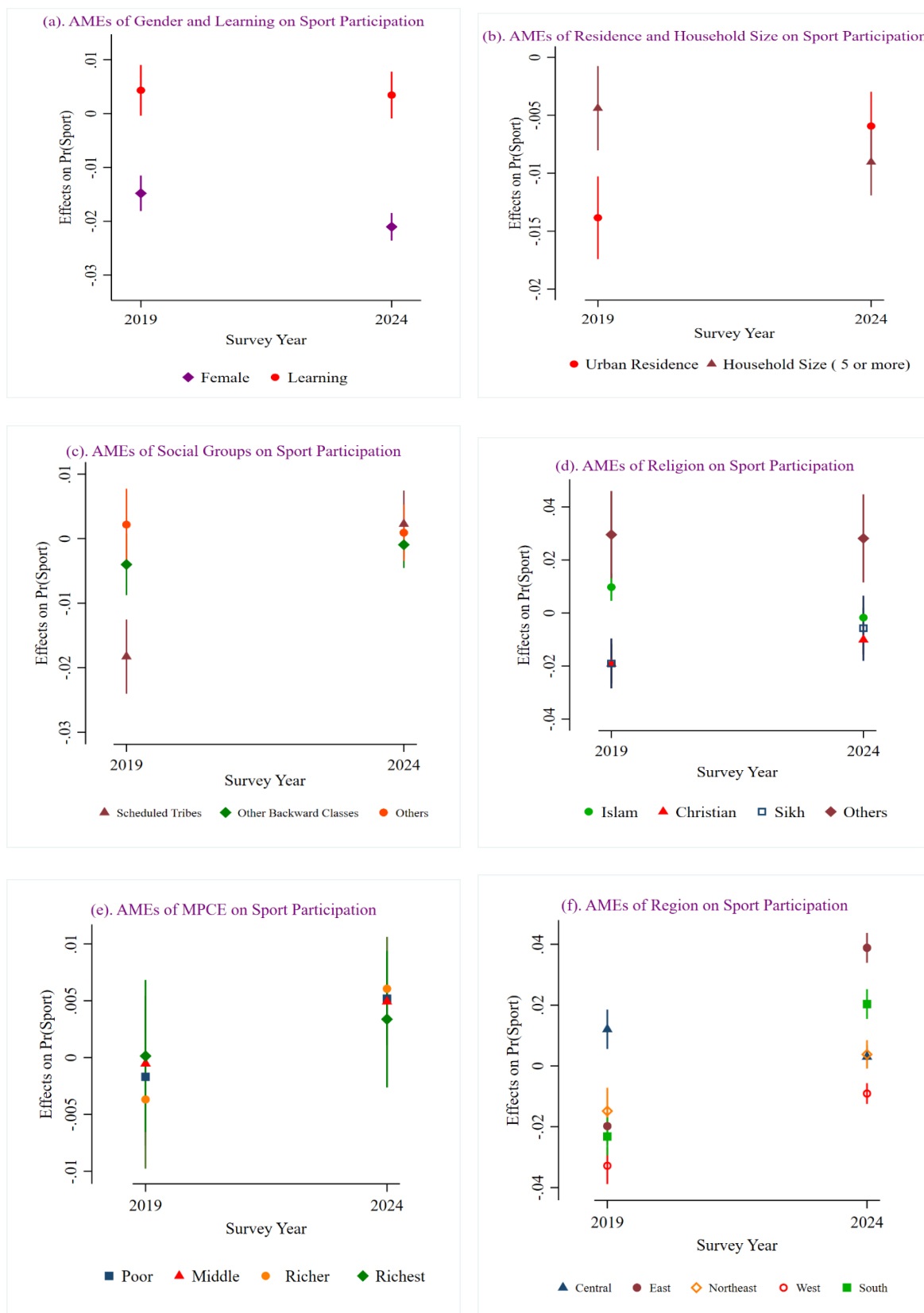


Figure 4. Adjusted Average Marginal Effects (Pooled Probit Regression Model) of Socio-Demographic Characteristics on Children's Sport Participation in India, 2019–2024.

shows that the Central region had a higher probability of participation ($AME=0.0120$, $p<0.001$) than the Northern region in 2019, which disappeared in 2024. Children from the Eastern region experienced the most striking reversal. The average marginal effect on sport participation shifted from a significant disadvantage in 2019 ($AME=-0.0198$, $p < 0.001$) to a strong advantage in 2024 ($AME=0.0388$, $p < 0.001$). The Northeast ($AME=-0.0148$, $P<0.001$) showed a significant negative effect on children's sport participation in 2019; however, this disadvantage disappeared by 2024. Furthermore, the West remained significantly disadvantaged in both periods, although the magnitude declined from $AME=-0.0328$ ($p<0.001$) in 2019 to $AME=-0.0091$ ($p<0.001$) in 2024. Interestingly, children from the Southern region had a significant negative effect on participation in 2019, which showed a very strong and significant advantageous reversal by 2024. For example, the average marginal effect of the Southern region on children was significantly adverse in 2019 ($AME=-0.0232$, $P<0.001$) and changed to $AME=0.0204$ ($P<0.001$) in 2024. Figure 4(f) clearly reveals considerable regional disparity, with a massive change in children's sport participation across Indian regions over time.

Table 3. Pooled OLS Estimates of Two-Part Regression Model for Children's Daily Time Spent (in Minutes) in Sport Participation in India (N= 4,780)

Socio-economic characteristics	Coefficient	Standard Error	p-value
Main Effect			
Year (Ref: Base Year=2019)			
2024	-69.4	11.79	0.000
Gender (Ref: Male)			
Female	-10.5	2.74	0.000
Place of Residence (Ref: Rural)			
Urban	-5.0	3.14	0.114
Social Group (Ref: Scheduled Castes)			
Scheduled Tribes	-7.3	5.49	0.184
Other Backward Classes	0.0	3.57	0.994
Others	0.9	4.13	0.826
Religion (Ref: Hindu)			
Islam	-15.6	3.61	0.000
Christian	-18.3	9.85	0.063
Sikh	-22.9	12.05	0.058
Others	-18.2	9.17	0.047
MPCE (Ref: Poorest)			
Poor	-3.9	4.70	0.408
Middle	-8.3	4.55	0.067
Richer	-7.4	4.79	0.120
Richest	-16.3	5.18	0.002
Region (Ref: North)			
Central	7.0	4.07	0.085

continued on next page

Table 3. *(continued)*

Socio-economic characteristics	Coefficient	Standard Error	p-value
East	3.0	4.75	0.533
Northeast	-3.9	5.70	0.497
West	-41.3	6.02	0.000
South	-36.4	5.19	0.000
Household Size (Ref: < 5 Members)			
5 members or more	7.9	2.91	0.007
Learning Activities (Ref: No)			
Yes	-127.4	4.00	0.000
Interaction Effects (2024 × Covariates)			
2024 × Female	1.3	4.74	0.781
2024 × Urban	-2.8	5.36	0.599
2024 × Scheduled Tribes	-4.4	8.64	0.611
2024 × Other Backward Classes	-10.4	5.98	0.083
2024 × Others	-15.2	7.06	0.031
2024 × Islam	24.8	6.32	0.000
2024 × Christian	23.8	14.21	0.094
2024 × Sikh	36.0	24.94	0.149
2024 × Others	13.0	15.53	0.402
2024 × Poor	0.1	6.65	0.987
2024 × Middle	5.2	6.89	0.451
2024 × Richer	8.6	7.60	0.255
2024 × Richest	3.2	9.83	0.748
2024 × Central	20.8	8.77	0.017
2024 × East	6.5	8.22	0.427
2024 × Northeast	-0.7	10.70	0.947
2024 × West	49.4	12.78	0.000
2024 × South	20.7	9.13	0.024
2024 × 5 members or more	-14.0	4.60	0.002
2024 × Yes (Learning Activities)	56.1	7.77	0.000
Constant	258.5	6.43	0.000

Table 3 highlights the findings of the pooled OLS estimates from the second part of the two-part regression model for children's daily time spent (in minutes) in sport participation in India. The findings reveal a significantly strong and negative period effect on children's time spent in sport activities. For example, children spent 69 minutes less time on sports in 2024 compared with 2019, which indicates a massive contraction in time allocated to sports activities. This finding is largely consistent with the average marginal effect results from the probit model, which also suggested a significant reduction in the probability of sport participation in 2024. Together, these findings of the two-part model support the inference that the decline is reflected not only in sport participation but also in daily time spent, that is, in the intensity of participation. Gender disparities in time spent in sport activities are also evident, with girls spending about 11 minutes less on daily sport activities

than boys. Although the AMEs of the probit model showed a lower probability of participation for urban children than rural children, the urban–rural difference in time spent on sports is statistically insignificant.

Moreover, socio-economic and demographic characteristics reveal notable heterogeneity in daily time allocation to sport activities. The findings show that social group did not have any significant impact on children's daily time spent on sport activities. In contrast, religion had a significant impact on time spent in sports. For instance, compared with Hindu children, children from all other religious groups spent significantly less time in sport activities. Furthermore, the findings reflect that increasing household wealth is associated with declining participation intensity, and children from the richest stratum spent 16 minutes less time on sport activities than the poorest children. Regional disparities in time allocation to sports are also pronounced. Compared with the Northern region, children in the Western and Southern regions spent 41 minutes and 36 minutes less, respectively, on daily sport participation. The findings further show that children from larger households spent more time on sports than those from smaller households. Interestingly, engagement in learning activities shows a very large and significant association with time allocation to sports activities. Children engaged in learning activities spent 127 minutes less on daily sports activities than children not engaged in learning. This reveals a substantial trade-off between academic engagement and sports activities among Indian children. Although the AME results do not show any strong impact of learning activities on sport participation, the daily time allocation of those engaged in learning reinforces that increased educational commitments may crowd out sport-related time.

Moreover, the interaction effects between covariates and year (2024) suggest that some disparities changed over time. Although the overall decline in sports time remained substantial, the negative gap for Muslim children narrowed, as indicated by the positive interaction coefficient. Similarly, children in the West and South experienced significant positive period interaction effects, and their time allocation to daily sports increased by 49 minutes and 21 minutes, respectively. The decline in these regions was less severe than would be expected on the basis of the main year effect alone. The interaction between year 2024 and learning activities (+56.1 minutes, $p < 0.001$) indicates that while children engaged in learning continued to spend considerably less time on sports than their peers, the magnitude of this disadvantage decreased in 2024 relative to 2019. In contrast, larger households experienced an additional reduction in daily sports time in 2024 (–14.0 minutes), suggesting that temporal changes may have altered the association between household composition and children's recreational behaviour.

Although learning activities continued to reduce time spent in daily sport activities, the magnitude of the reduction is substantially smaller in 2024 than in 2019. Overall, the findings in this table indicate a substantial and significant negative period effect, with a significant decline in the time allocated to daily sport activities among Indian children over time. Nevertheless, the interaction effects reveal that this aggregate decline masks important heterogeneity: improvements among children engaged in learning activities, Muslim children and those residing in the Central, West and South regions partially offset the overall downward trend.

6.3 Robustness Check

A generalised linear model (GLM) with a Gamma distribution and log-link function was estimated to assess the robustness of the OLS estimates for children who spent time in sport activities (Appendix Table A4). The results of the GLM are substantially consistent with the OLS estimates. The direction and statistical significance of the socio-demographic covariates remained stable in the GLM. In particular, the adverse impact of learning on time spent in sport activities persists across specifications. The GLM estimates indicate that the main results are robust to an alternative specification that accounts for the non-normal distribution of time spent in sport activities. Overall, the Gamma-log model confirms the direction, magnitude and substantive conclusions of the OLS estimates. The observed decline in children's daily time spent in sport activities and the strong negative impact of learning activities are robust to alternative model specifications that account for the skewed nature of time-use data.

6.4 Quantile Regression Model

Quantile regression⁵⁷ is applied to understand the distributional heterogeneity in children's time spent in sport activities, which could differ at different levels of sport participation. For example, the OLS model captures the average effect, while quantile regression can capture the distributional heterogeneity at different points of participation, such as the 10th, 25th, 50th, 75th and 90th quantiles. This technique can investigate whether the impact of socio-economic factors differs between children with lower and higher time spent in sports. As the OLS estimates above show that learning

⁵⁷ R. Koenker and G. Bassett Jr., "Regression Quantiles", *Econometrica* 46, no. 1 (1978): 33–50, <https://doi.org/10.2307/1913643>; R. Koenker, *Quantile Regression*, Econometric Society Monographs (Cambridge: Cambridge University Press, 2005), <https://doi.org/10.1017/CBO9780511754098>; M. Buchinsky, "Recent Advances in Quantile Regression Models: A Practical Guideline for Empirical Research", *Journal of Human Resources* 33, no. 1 (1998): 88–126, <https://doi.org/10.2307/146316>.

has a massive adverse impact on children's time spent in sport, this approach examines whether the impact of learning is the same at different points and in different subsample settings, such as gender, residence, income and region. This method is most suitable for understanding heterogeneity, as sport time is highly uneven and skewed, and average estimates may hide significant distributional inequalities among children. We pooled the data for both periods and applied a conditional quantile regression model, which is specified as:

$$Q_{\tau}(\text{Time Spent in Sport}_i \mid X_i) = \beta_{0\tau} + \beta_{1\tau} \text{Learning}_i + \beta_{2\tau} X_i + \varepsilon_{i\tau}$$

where $Q_{\tau}(\text{Time Spent in Sport}_i \mid X_i)$ denotes the conditional quantile ($\tau = 0.10, 0.25, 0.50, 0.75, 0.90$) of sport time for child i ; Learning_i captures whether the child engaged in learning activity or not; X_i includes socio-economic and demographic covariates; and $\varepsilon_{i\tau}$ is the quantile-specific error term.

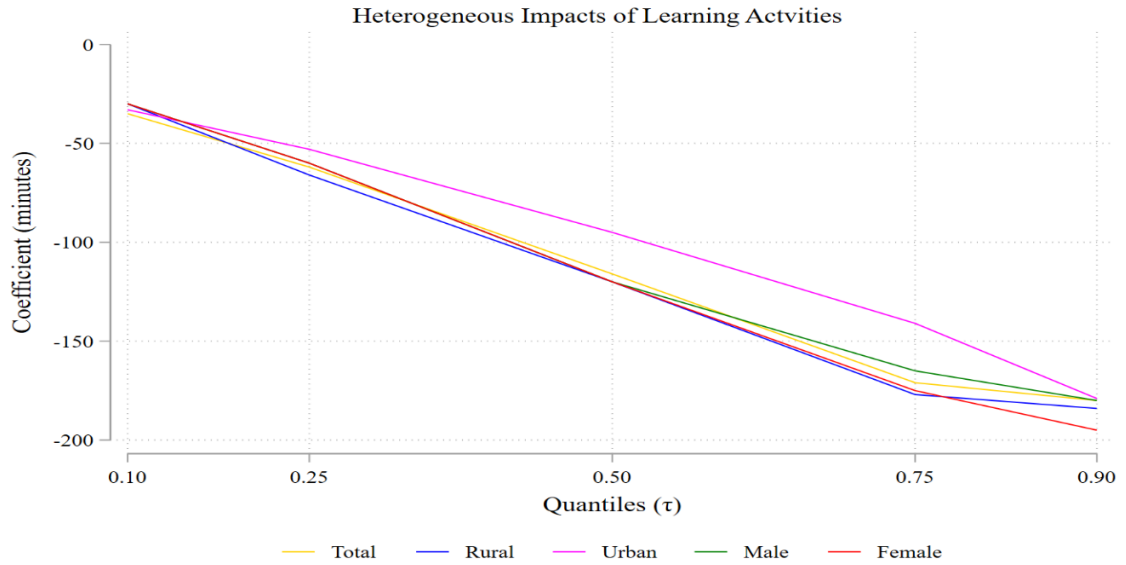


Figure 5. Heterogeneous Effects across the Distribution of Children's Sport Time. τ is the quantile level of the dependent variable (Time Spent in Sports) at which separate models for total, rural, urban, male and female are estimated. In the estimation, all other independent variables are controlled for.

Figure 5 portrays the estimates of the quantile regression, which reveal substantial heterogeneity in the association between learning activities and time spent in sports across the distribution of sport participation. For the overall sample, the negative effect of learning intensifies markedly from the

lower to the upper tail of the distribution, increasing from 35 minutes at the 10th percentile to 180 minutes at the 90th percentile. Similar gradients are observed across place of residence. Among rural children, the estimated reduction in sport time rises from 30 minutes at the 10th percentile to 184 minutes at the 90th percentile, while among urban children the corresponding decline increases from 33 to 179 minutes. Gender-specific estimates show a comparable pattern. For both boys and girls, learning activities are associated with progressively larger reductions in sport time at higher quantiles. However, the effect is stronger among girls at the upper end of the distribution, reaching 195 minutes at the 90th percentile compared with 180 minutes among boys. This pattern indicates that educational engagement constrains sport participation most strongly among children who would otherwise devote substantial time to sports. Detailed quantile estimates by social group, religion, household size, household economic status and region are reported in Appendix Table A5 and exhibit broadly similar patterns of increasing effects across higher quantiles. These estimates show that learning activities reduce sport time at all levels of participation, but the magnitude of the reduction is substantially greater among children who are more actively engaged in sports. This pattern suggests that the trade-off between educational engagement and sport participation is most pronounced among highly active children.

7. Discussion

Sport has been a basic part of human civilisations, with significant socio-cultural values and vital life events, and serves as a channel for recreation, community engagement, social bonding, skill development and overall wellbeing.⁵⁸ Although sport participation is important for every human being, it becomes more crucial for children's life-course development. India recognises the role of sport in early childhood education and development through the National Policy on Education of 1986.⁵⁹ In this context, the present study provides significant evidence on sport participation and time allocation in daily sport activities among Indian children aged 6–14 years. This study con-

⁵⁸ H. S. Dhanjal, "Indigenous Games in India: Then Now", *EPRA International Journal of Research and Development* 7, no. 8 (2022): 198–201.

⁵⁹ Government of India, *National Policy on Education*.

tributes to the growing literature on sport participation and is consistent with other studies⁶⁰ in showing that participation is largely shaped by children's socio-demographic and economic characteristics. From the perspective of Becker's time allocation approach, participation and time allocation in sports largely compete with learning activities. However, the literature on developmental and behavioural studies largely recognises that physical activity, including sport participation, complements the cerebral development of individuals in various ways. The findings suggest that Indian children continue to prioritise learning activities over sport activities. Although learning activities do not have a substantial impact on participation, they have a massive impact on time allocation in daily sport activities. Furthermore, socio-cultural and regional factors also affect children's sport participation, reflecting diverse barriers in the sport environment in India.

The findings show a substantial decline in children's sport participation during 2019–24. This decline is consistent with the broader transformation of childhood in India, which is undergoing rapid educational and economic expansion. This decline is evident, and it varies widely across all socio-economic settings. This study clearly suggests a massive gender gap in participation, with girls spending less time than boys, consistent with a large body of literature on sport activity.⁶¹ For example, girls have a lower participation rate than boys, and this gap widened over time, with more than half of female participants leaving sport activities during 2019–24. In Indian settings, socio-cultural norms and gendered socialisation often prioritise domestic responsibilities, with mobility restrictions and limited access to gender-sensitive sport infrastructure. These obstacles prevent girls from engaging in sedentary and sport activities, while boys mostly do not experience such restrictions. Casper and colleagues (2011)⁶² suggested that sport participation is largely linked to gendered pathways of agency, in which girls face both structural and normative constraints in accessing sport opportunities. This study is consistent with global findings that males not only participate

⁶⁰ C. Breuer et al., "Socio-economic Patterns of Sport Demand and Ageing", *European Review of Aging and Physical Activity* 7, no. 2 (2010): 61–70, <https://doi.org/10.1007/s11556-010-0065-6>; Downward and Riordan, "Social Interactions"; Hallmann et al., "Interdependency of Sport Supply"; Berger et al., "Determinants of Sport Participation"; Breuer, Hallmann, and Wicker, "Determinants of Sport Participation"; Breuer and Wicker, "Demographic and Economic Factors"; Downward, "Exploring the Economic Choice"; P. Downward, F. Lera-López, and S. Rasciute, "The Correlates of Sports Participation in Europe", *European Journal of Sport Science* 14, no. 6 (2014): 592–602, <https://doi.org/10.1080/17461391.2014.880191>; B. R. Humphreys and J. E. Ruseski, "An Economic Analysis of Participation and Time Spent in Physical Activity", *B.E. Journal of Economic Analysis and Policy* 11, no. 1 (2011): article 47, <https://doi.org/10.2202/1935-1682.2522>.

⁶¹ Downward, "Exploring the Economic Choice"; Humphreys and Ruseski, "Economic Determinants"; Breuer and Wicker, "Demographic and Economic Factors".

⁶² W.J. Casper et al., "Work–Family Conflict, Perceived Supervisor Support and Organizational Commitment among Brazilian Professionals", *Journal of Vocational Behavior* 79, no. 3 (2011): 640–52, <https://doi.org/10.1016/j.jvb.2011.04.011>.

more in sport activities but also spend more time in them.⁶³

The findings show huge rural–urban differences in sport participation and time allocation to sport activities. Although rural children experienced a larger decline than urban children over time, they continued to participate more and to spend more time in sport activities than urban children. Residential location often determines children's access to sports through differences in infrastructure, space availability, lifestyle patterns and so on. Rural children often benefit from large open spaces and informal play environments, which can lead to higher levels of sport activity. In contrast, children residing in urban areas may have access to structured and formal sport facilities, clubs and organised competition, but face many other significant factors, such as limited open spaces, costly memberships and high academic pressure.

Social group (caste) is a deeply rooted social identity and institution that largely shapes an individual's overall lifestyle and life events. The caste hierarchy is embedded in society in a way that influences overall wellbeing and has an adverse impact on marginalised social groups. Wamsley et al. (1999)⁶⁴ suggested that race has a big role in sport participation and has diverse effects on different social groups. Similarly, evidence from European and North American countries also supports the notion of racial differences in sport participation.⁶⁵ Berger et al. (2008)⁶⁶ also emphasised the impact of race on adolescent sport participation in Canada. The literature from Western European countries suggests that sport participation in Western countries is largely socially stratified.⁶⁷ Although the effect of social differences is declining over time, it is still a significant determinant.⁶⁸ Similarly, my study also found a very significant impact of caste on children's sport participation, with the caste effect disappearing over time. The findings show that sport participation declined with increasing caste hierarchy, although caste has no effect on time spent across social groups. Although caste discrimination exists in every sphere of Indian life, because of the largely unstructured

⁶³ Downward, "Exploring the Economic Choice"; Humphreys and Ruseski, "Economic Determinants"; Humphreys and Ruseski, "Participation in Physical Activity"; Lera-López and Rapún-Gárate, "Demand for Sport"; N. Barber and M. E. Havitz, "Canadian Participation Rates in Ten Sport and Fitness Activities", *Journal of Sport Management* 15, no. 1 (2001): 51–76, <https://doi.org/10.1123/jsm.15.1.51>.

⁶⁴ Philip, Hoye, and Sherry, "Sport-for-Development and Social Inclusion".

⁶⁵ A. Elling and A. Knoppers, "Sport, Gender and Ethnicity: Practises of Symbolic Inclusion/Exclusion", *Journal of Youth and Adolescence* 34, no. 3 (2005): 257–68, <https://doi.org/10.1007/s10964-005-4311-6>; K. B. Wamsley, "Review of *Tennis: A Cultural History*, by Heiner Gillmeister", *Canadian Journal of History* 34, no. 2 (1999): 336–38.

⁶⁶ Berger, Ida E., Norman O'Reilly, Milena M. Parent, Benoit Séguin, and Tony Hernandez. "Determinants of sport participation among Canadian adolescents." *Sport management review* 11, no. 3 (2008): 277–307.

⁶⁷ Downward and Riordan, "Social Interactions"; Scheerder and Vos, "Social Stratification".

⁶⁸ J. Scheerder et al., "Social Sports Stratification in Flanders 1969–1999: Intergenerational Reproduction of Social Inequalities?", *International Review for the Sociology of Sport* 37, no. 2 (2002): 219–45.

nature of sport in India, caste has a negligible role in determining sport participation. Furthermore, evidence from Western countries also suggests that although social differences have a significant impact on sports, in many countries sport participation is also regarded as a way of increasing social status.⁶⁹ In contrast, this study finds a significant impact of religion on participation as well as on time spent in sport activities. Religious belief influences life choices, and most religious texts support sport and recreational activity across the world.⁷⁰ Interestingly, the findings suggest that religious differences disappeared over time and, in the context of time allocation, a significant increase can be seen among non-Hindu children relative to Hindu children. Similar to this study, Jona and Okou (2013)⁷¹ also suggested an impact of religion on sport in India; however, they did not provide any evidence on time allocation.

Moreover, studies⁷² suggest that household income plays a significant role in sport participation. The present study finds a negligible effect of household wealth on children's sport participation in 2019; however, it shows a significant impact in 2024. It seems that economically advantaged households give more support to sport among their children. Despite positive changes over time, children from the richest stratum do not show any significant association with sport participation, possibly owing to a high commitment to academic engagement. The findings are consistent with studies⁷³ that suggest a small or negligible impact of income on sport participation and duration. In contrast, regional diversity has played a bigger role in participation and time allocation in sport activities. The findings clearly reveal a positive impact of region on children's sport participation over time. Most regions gained a positive effect on sport participation, with the Eastern region gaining the most advantage. The findings clearly indicate that the adverse impact of regional differ-

⁶⁹ H. T. Buchanan, J. Blankenbaker, and D. Cotten, "Academic and Athletic Ability as Popularity Factors in Elementary School Children", *Research Quarterly. American Alliance for Health, Physical Education and Recreation* 47, no. 3 (1976): 320–25; M. A. Chase and M. Machida, "The Role of Sport as a Social Status Determinant for Children: Thirty Years Later", *Research Quarterly for Exercise and Sport* 82, no. 4 (2011): 731–39, <https://doi.org/10.1080/02701367.2011.10599810>.

⁷⁰ M. Kwiek, "The World's Largest Religions and Their Attitudes towards Sports and Recreational Behaviour", *CZŁOWIEK W KULTURZE*, 35 (2025), cz. 1.

⁷¹ Jona and Okou, "Sports and Religion".

⁷² Breuer and Wicker, "Demographic and Economic Factors"; Breuer, Hallmann, and Wicker, "Determinants of Sport Participation"; Downward and Rasciute, "Relative Demands for Sports"; Eberth and Smith, "Modelling the Participation Decision"; Humphreys and Ruseski, "Participation in Physical Activity"; Lera-López and Rapún-Gárate, "Demand for Sport"; Scheerder and Vos, "Social Stratification"; Wicker, Breuer, and Pawlowski, "Promoting Sport for All".

⁷³ B. R. Humphreys and J. E. Ruseski, "The Economic Choice of Participation and Time Spent in Physical Activity and Sport in Canada", *International Journal of Sport Finance* 10, no. 2 (2015): 138–59; Berger, Ida E., Norman O'Reilly, Milena M. Parent, Benoit Séguin, and Tony Hernandez, "Determinants of sport participation among Canadian adolescents." *Sport management review* 11, no. 3 (2008): 277–307.

ences in sport participation largely disappeared over time. Interestingly, the present study shows a strong, significant and negative impact of larger household size on children's sport participation, and the disadvantage of larger families increased over time. The findings are consistent with studies conducted by Downward (2007)⁷⁴ and Humphreys and Ruseski (2007),⁷⁵ who also found a negative association between larger household size and sport participation. It is possible that children in larger households have domestic and care burdens, especially in a country like India, where children are massively occupied with domestic duties and the care of siblings and elderly people. Furthermore, the results on time allocation show that children living in larger households spent more time in sport than those in smaller households in 2019, but a larger family had a negative impact on children's time spent in sport activities.

The most striking finding of the present study is the negative association between children's engagement in learning and time allocation in sport participation. In this context, the present study has tried to capture the impact of learning on children's sport participation. The findings show a small positive impact of learning activities on sport participation, which disappeared over time. In contrast, learning significantly reduces children's time allocation in daily sport activities. For example, engagement in learning reduced children's time allocation by 127 minutes per day in 2019. Although the negative effect of learning activities declined over time, it still had a substantial adverse effect on children's time spent in sport activities. It is possible that a high commitment to academic activity may lead to lower time spent in sport activities. Although learning activities had a strong and significant effect on time allocation in sport, the magnitude of the time reduction may differ across the distribution. For instance, children who spent more time in sport activities may cut more time owing to learning activities. The findings of the quantile regression support this notion and reveal that learning has a more adverse impact on children who spent more time in sport activities. Children's learning activities are strongly associated with significantly lower time allocation in sport, with the degree of the reduction increasing steadily from the 10th to the 90th quantile of the distribution. The findings suggest that, owing to learning activities, the reduction in daily time allocated to sport at the 90th quantile is five times higher. This clearly reflects that educational commitments disproportionately affect children who devote substantially more time to daily sport activities. This pattern is evident across all socio-economic characteristics, with girls experiencing the largest reduction in sport activities due to learning.

⁷⁴ Downward, "Exploring the Economic Choice".

⁷⁵ Humphreys and Ruseski, "Participation in Physical Activity".

8. Conclusion and Policy Implications

The study finds declining and low participation in daily sport activities among Indian children, with more than one-third of children leaving sport participation during 2019–24. The study suggests that girls, poor and urban children, children not engaged in learning activities and those co-residing in larger households dropped out of daily sport activities the most. Regional differences in sport participation are clearly evident: except in the Eastern and Southern regions, children were affected the most, and most regions reported a huge exit of children from daily sport activities during 2019–24. For instance, sport participation among children from Central, North, West and Northeast India declined by 75%, 66%, 65% and 51%, respectively, during 2019–24. Although a substantial decline across most socio-economic groups is evident, participation among children from Scheduled Tribes, Christian families, and Eastern and Southern India increased slightly over time. The present study suggests that socio-economic characteristics have a substantial impact on children's daily sport participation. In terms of time allocation in sport activities, Indian children who participate in daily sport activities allocated 136 minutes in 2019 and 112 minutes in 2024. This reveals a declining time allocation among children aged 6–14 years to daily sport activities during 2019–24. Children across all socio-economic groups experienced a reduction in time spent in daily sport activities, and children from Scheduled Tribes, the poorest households, those not engaged in learning activities and those from the Northern region experienced the largest reductions. This study clearly reveals that participation in daily learning activities has a significantly negative effect on children's time spent in sport activities. Children engaged in learning activities allocated less time to sport activities, and this time allocation fell over time. Furthermore, the marginal effects show that children engaged in learning activities spent 127 minutes less in daily sport activities in 2019.

The study finds that the gender of the child plays a massive role in sport participation as well as time allocation in sport activities. The study suggests that girls are disproportionately affected in sport participation as well as time allocation, and girls who spent more time in sport activities lost more time owing to learning activities. Although the participation rate and time allocation in sport were higher among rural children, they also experienced a larger reduction in time spent in sport activities over time. Similarly, Scheduled Tribe children spent the most time in sport among social groups, and their reduction in time spent in sport activities was also double that of all others. Hindu children, as well as children from larger households, experienced a huge reduction in daily time

spent over time. The study further finds that children's time spent in sport activities decreases with increasing household income, but rich children also experienced a smaller reduction. The study also suggests that learning activities are the most significant and strongest characteristic and play the most important role in children's time allocation. Finally, this study suggests that sport participation is very low among children, but those who participate spend substantial time in sport activities.

The study suggests an important need to develop gender-sensitive sport environments in which children, especially girls, can be engaged in learning through play. Infrastructural facilities and the availability and accessibility of space in neighbourhoods can play a big role in urban sport participation. The study also suggests involving parents in reducing children's burden of learning through moral encouragement.

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Appendices

Table A1. Sample Distribution of Children (6–14 years), TUS 2019 and 2024

	2019		2024	
	%	N	%	N
Gender				
Male	54.5	34,378	52.8	32,618
Female	45.5	28,672	47.2	28,943
Place of Residence				
Rural	74.1	41,666	74.2	41,933
Urban	25.9	21,384	25.8	19,628
Social Group				
Scheduled Tribes	11.1	9,272	10.9	9,073
Scheduled Castes	20.7	12,063	20.7	11,662
Other Backward Classes	44.2	26,064	46.5	27,173
Others	24.0	15,651	21.9	13,653
Religion				
Hindu	79.1	47,648	79.9	46,660
Islam	15.7	9,582	15.5	9,486
Christian	2.4	3,431	2.5	3,536
Sikh	1.6	1,042	1.4	848
Others	1.2	1,347	0.8	1,031
MPCE				
Poorest	13.8	7,411	35.8	20,562
Poor	21.5	12,401	25.5	15,689
Middle	24.1	15,056	19.2	12,205
Richer	22.3	14,841	13.3	8,805
Richest	18.3	13,341	6.3	4,300
Household Size				
Less than 5 members	40.4	25,515	39.0	23,900
5 members or more	59.6	37,535	61.0	37,661
Learning Activities				
No	14.2	8,704	10.7	6,519
Yes	85.9	54,346	89.3	55,042
Region				
North	14.4	9,521	14.4	9,238
Central	28.4	15,893	25.7	14,038
East	23.3	12,433	26.9	14,332
Northeast	3.9	6,877	4.3	7,168
West	12.8	8,257	12.1	7,422
South	17.2	10,069	16.5	9,363

Source: Time Use Survey, 2019 and 2024.

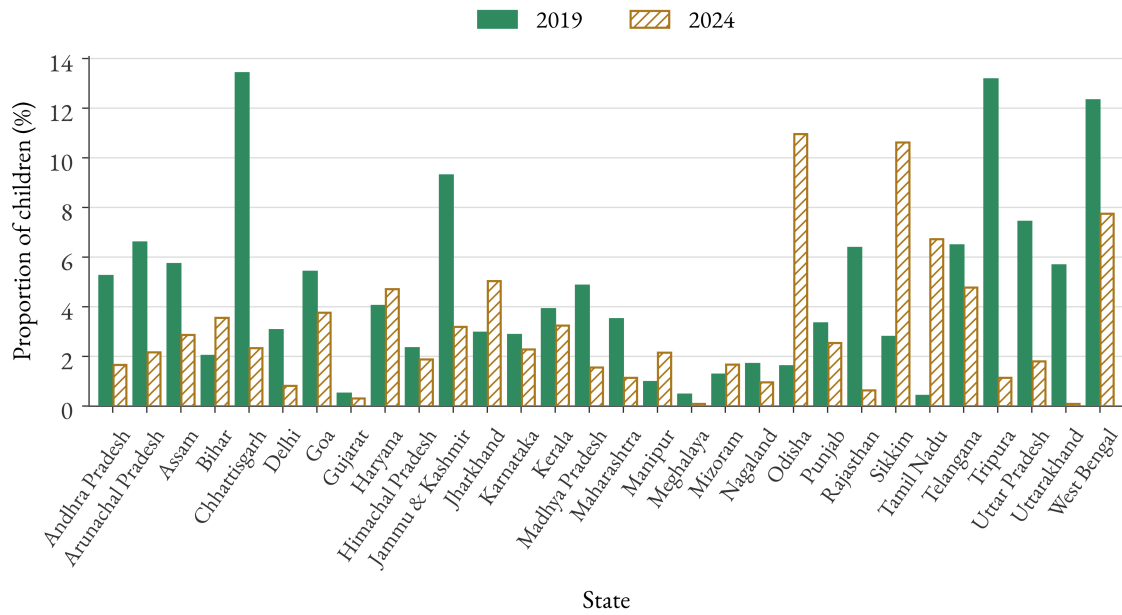


Figure A1. Proportion of children in sport participation across Indian states, 2019 and 2024.

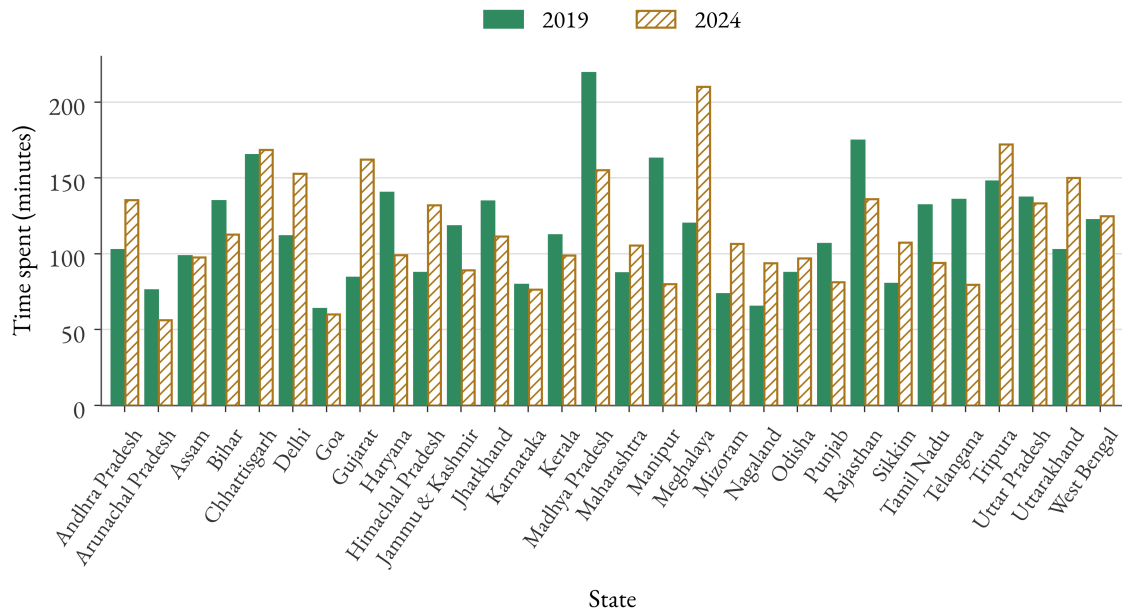


Figure A2. Time Spent (in Minutes) among Children (6–14 years) in Sport Participation across Indian States, 2019 and 2024.

Table A3. Pooled Probit Regression Estimates of Two-Part Regression Model for Sport Participation among Children, 2019–24 (N=124,611)

Socio-economic characteristics	Coefficient	Standard Error	p-value
Main Effect			
Survey Year (Ref: Base Year=2019)			
2024	−0.566	0.074	0.000
Gender (Ref: Male)			
Female	−0.154	0.018	0.000
Place of Residence (Ref: Rural)			
Urban	−0.149	0.021	0.000
Social Group (Ref: Scheduled Castes)			
Scheduled Tribes	−0.209	0.035	0.000
Other Backward Classes	−0.040	0.024	0.094
Others	0.021	0.027	0.444
Religion (Ref: Hindu)			
Islam	0.094	0.024	0.000
Christian	−0.244	0.059	0.000
Sikh	−0.242	0.076	0.001
Others	0.251	0.060	0.000
MPCE (Ref: Poorest)			
Poor	−0.017	0.031	0.582
Middle	−0.005	0.031	0.863
Richer	−0.038	0.032	0.231
Richest	0.001	0.034	0.967
Region (Ref: North)			
Central	0.097	0.027	0.000
East	−0.200	0.031	0.000
Northeast	−0.144	0.039	0.000
West	−0.385	0.037	0.000
South	−0.243	0.033	0.000
Household Size (Ref: < 5 Members)			
5 members or more	−0.045	0.019	0.017
Learning Activities (Ref: No)			
Yes	0.046	0.026	0.080
Interaction Effects (2024 × Covariates)			
2024 × Female	−0.202	0.029	0.000
2024 × Urban	0.050	0.033	0.130
2024 × Scheduled Tribes	0.244	0.054	0.000
2024 × Other Backward Classes	0.024	0.038	0.522
2024 × Others	−0.006	0.044	0.894
2024 × Islam	−0.122	0.040	0.002
2024 × Christian	0.053	0.086	0.537
2024 × Sikh	0.142	0.141	0.314
2024 × Others	0.082	0.099	0.410
2024 × Poor	0.104	0.043	0.015
2024 × Middle	0.088	0.044	0.048
2024 × Richer	0.138	0.049	0.005
2024 × Richest	0.057	0.062	0.358

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Table A3. (continued)

Socio-economic characteristics	Coefficient	Standard Error	p-value
2024 × Central	−0.029	0.051	0.576
2024 × East	0.741	0.049	0.000
2024 × Northeast	0.227	0.065	0.000
2024 × West	0.087	0.069	0.209
2024 × South	0.588	0.054	0.000
2024 × 5 members or more	−0.098	0.030	0.001
2024 × Yes (Learning Activities)	0.012	0.047	0.799
Constant	−1.425	0.044	0.000

Table A4. Robustness Estimates from Generalised Linear Model (Gamma-Log Link) for Conditional Time Spent (minutes) in daily sport activities among Children, India, 2019–2024

Main Effect	Coef.	Std. Err.	p-value
Year (Ref: Base Year=2019)			
2024	−0.33	0.08	0.000
Gender (Ref: Male)			
Female	−0.09	0.02	0.000
Place of Residence (Ref: Rural)			
Urban	−0.04	0.03	0.180
Social Group (Ref: Scheduled Castes)			
Scheduled Tribes	−0.06	0.04	0.145
Other Backward Classes	−0.01	0.03	0.859
Others	0.00	0.03	0.905
Religion (Ref: Hindu)			
Islam	−0.12	0.03	0.000
Christian	−0.16	0.11	0.164
Sikh	−0.16	0.09	0.087
Others	−0.12	0.08	0.141
MPCE (Ref: Poorest)			
Poor	−0.01	0.04	0.792
Middle	−0.04	0.04	0.250
Richer	−0.03	0.04	0.467
Richest	−0.10	0.04	0.022
Region (Ref: North)			
Central	0.07	0.03	0.014
East	0.07	0.04	0.075
Northeast	0.01	0.04	0.832
West	−0.34	0.05	0.000
South	−0.31	0.05	0.000
Household Size (Ref: < 5 Members)			
5 members or more	0.05	0.02	0.030
Learning Activities (Ref: No)			
Yes	−0.76	0.03	0.000
Interaction Effects (Year (2024) × Covariates)			
2024 × Female	−0.01	0.04	0.884

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Table A4. (continued)

Main Effect	Coef.	Std. Err.	p-value
2024 × Urban	−0.03	0.04	0.428
2024 × Scheduled Tribes	−0.04	0.06	0.520
2024 × Other Backward Classes	−0.09	0.05	0.041
2024 × Others	−0.12	0.06	0.027
2024 × Islam	0.21	0.05	0.000
2024 × Christian	0.23	0.14	0.099
2024 × Sikh	0.26	0.18	0.132
2024 × Others (Religion)	0.08	0.11	0.496
2024 × Poor	−0.01	0.05	0.825
2024 × Middle	0.03	0.05	0.620
2024 × Richer	0.05	0.06	0.406
2024 × Richest	−0.01	0.08	0.876
2024 × Central	0.15	0.06	0.015
2024 × East	0.02	0.06	0.785
2024 × Northeast	−0.06	0.08	0.424
2024 × West	0.41	0.10	0.000
2024 × South	0.16	0.07	0.024
2024 × 5 members or more	−0.10	0.04	0.008
2024 × Yes (Learning Activities)	0.26	0.06	0.000
Constant	5.59	0.05	0.000

Table A5. Pooled Quantile Regression estimates of the association between learning activities and daily time (in Minutes) spent in sport activities among children

	q10	q25	q50	q75	q90
Overall	−35 ^{***}	−62 ^{***}	−116 ^{***}	−171 ^{***}	−180 ^{***}
Rural	−30 ^{***}	−66 ^{***}	−120 ^{***}	−177 ^{***}	−184 ^{***}
Urban	−33 ^{***}	−53 ^{***}	−95 ^{***}	−141 ^{***}	−179 ^{***}
Male	−30 ^{***}	−60 ^{***}	−120 ^{***}	−165 ^{***}	−180 ^{***}
Female	−30 ^{***}	−60 ^{***}	−120 ^{***}	−175 ^{***}	−195 ^{***}
Scheduled Tribes	−21 ^{**}	−45 ^{***}	−86 ^{***}	−144 ^{***}	−150 ^{***}
Scheduled Castes	−30	−60 ^{***}	−120 ^{***}	−188 ^{***}	−188 ^{***}
Other Backward Classes	−60 ^{***}	−70 ^{***}	−120 ^{***}	−175 ^{***}	−189 ^{***}
Others	−48 ^{***}	−60 ^{***}	−100 ^{***}	−150 ^{***}	−139 ^{***}
Hindu	−30 ^{***}	−68 ^{***}	−120 ^{***}	−187 ^{***}	−189 ^{***}
Muslim	−30 [*]	−78 ^{***}	−115 ^{***}	−150 ^{***}	−102 ^{***}
Others (Religion)	−18	−33 ^{**}	−35 [*]	−90 ^{**}	−60 [*]
Poorest	−45 ^{***}	−96 ^{***}	−150 ^{***}	−195 ^{***}	−194 ^{***}
Poor	−25 ^{**}	−55 ^{***}	−120 ^{***}	−192 ^{***}	−180 ^{***}
Middle	−35 ^{**}	−60 ^{***}	−124 ^{***}	−180 ^{***}	−176 ^{***}
Rich	−38 ^{***}	−55 ^{***}	−105 ^{***}	−139 ^{***}	−143 ^{***}
Richest	−30 ^{**}	−53 ^{***}	−79 ^{***}	−150 ^{***}	−135 ^{***}
North	−60 ^{***}	−90 ^{***}	−144 ^{***}	−200 ^{***}	−197 ^{***}
Central	−60 ^{***}	−98 ^{***}	−135 ^{***}	−180 ^{***}	−180 ^{***}
East	−30	−17	−36	−100 ^{***}	−90 [*]

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Table A5. (continued)

	q10	q25	q50	q75	q90
Northeast	-15	-23	-50**	-75**	-113*
West	-14	-30	-60**	-120**	-180***
South	-30***	-30**	-90***	-150***	-154***

Notes: τ is the quantile level of the dependent variable (Time Spent in Sports) at which separate models for total, rural, urban, male and female are estimated. In the estimation, all other independent variables are controlled for. Coefficients represent quantile regression estimates of the effect of learning activities on daily time spent in sports (minutes). Statistical significance is denoted by *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$. Standard errors are bootstrapped with 200 replications.

