Section: Community Medicine

Original Research Article

BIRTH ORDER AND MATERNAL AGE AT MARRIAGE AS DETERMINANTS OF IMMUNIZATION STATUS AMONG CHILDREN AGED 12–23 MONTHS: A COMPARATIVE STUDY IN RURAL AND URBAN WESTERN MAHARASHTRA

Rahul Chandra[1], Santos Ranjan Nayak[2], Shipra Tiwari[3]

[1]Associate Professor, Department of Community Medicine, Narayan Medical College and Hospital, Sasaram, Bihar, India.
[2]Assistant Professor, Department of Community Medicine, Narayan Medical College and Hospital, Sasaram, Bihar, India.
[3]Consultant, Department of Prosthodontics Crown and Bridge, Dhaatri Dental, Patna, Bihar, India.

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Corresponding Author:
Dr. Rahul Chandra,
Associate Professor, Department of Community Medicine, Narayan Medical College and Hospital, Sasaram, Bihar, India.
Email: rahulchandratiwary@gmail.com

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ABSTRACT

Background: Childhood immunization is a proven, cost-effective strategy to reduce vaccine-preventable morbidity and mortality. While maternal education and socioeconomic status are well-recognized determinants, the influence of birth order and maternal age at marriage on immunization status remains underexplored in Indian settings. **Objectives:** To assess the association of birth order and maternal age at marriage with the immunization status of children aged 12–23 months, and to compare patterns across rural and urban field practice areas of a medical college in Western Maharashtra.

Materials and Methods: A community-based, cross-sectional comparative study was conducted in an urban slum (Wanowari Bazar) and a rural village (Kasurdi) in Pune district. A total of 192 children aged 12–23 months (96 rural, 96 urban) were enrolled between February 2017 and February 2019. Data on immunization were collected using a pretested questionnaire, validated against immunization cards and anganwadi registers. Associations between sociodemographic factors, birth order, maternal age at marriage, and immunization status were assessed using chi-square tests.

Results: In urban areas, complete immunization was significantly higher among children of mothers married after 18 years (77%) compared to ≤18 years (54.3%) (χ^2=5.364, p<0.05). Similarly, in rural areas, complete immunization was 81.3% in children of mothers married >18 years versus 60.4% in those married ≤18 years (χ^2=5.042, p<0.05). Birth order showed no statistically significant association with immunization status in either setting (urban: χ^2=2.40, p=0.494; rural: χ^2=3.856, p=0.277), though a trend of declining coverage with higher birth order was observed.

Conclusion: Maternal age at marriage is a significant determinant of complete immunization in both rural and urban settings, underscoring the role of delaying early marriage in improving child health outcomes. While birth order did not show a statistically significant association, higher-order births exhibited lower coverage, consistent with national and global trends. Tailored interventions focusing on maternal empowerment and early marriage prevention could enhance immunization equity in similar communities.

Keywords: Immunization coverage; Birth order; Maternal age at marriage; Child health; Rural-urban comparison; Maharashtra.

INTRODUCTION

Childhood immunization remains one of the most effective public health measures for reducing morbidity and mortality from vaccine-preventable diseases. India's Universal Immunisation Programme (UIP), launched in 1985, provides vaccines against tuberculosis, diphtheria, pertussis, tetanus, poliomyelitis, measles, hepatitis B, Haemophilus influenzae type b, rotavirus, pneumococcal disease, and rubella, free of cost.[1] With the introduction of Mission Indradhanush in 2014, full immunization coverage among children aged 12–23 months improved from 62% (2015–16) to 76% (2019–21).[2]

Despite progress, disparities remain across socioeconomic, geographic, and demographic dimensions.[3] Maternal education, socioeconomic status, and place of delivery are well-established determinants of immunization uptake.[3-5] Less studied, however, are birth order and maternal age at marriage, both of which have significant implications for child health. Higher birth order has been consistently linked with lower likelihood of full immunization, as parental resources and healthcare-seeking behaviours may decline with increasing family size.[6] Early maternal marriage, often associated with lower educational attainment and limited autonomy, has also been shown to negatively affect child health outcomes, including immunization coverage.[7]

Maharashtra, despite relatively higher immunization rates compared to several Indian states, still demonstrates rural–urban inequities and sociodemographic differentials.[2] However, evidence specifically examining the combined influence of birth order and maternal age at marriage on childhood immunization in localized rural and urban settings of Western Maharashtra is scarce.

The present study seeks to fill this gap by comparing immunization status of children aged 12–23 months in rural and urban field practice areas of a medical college in Western Maharashtra, with special focus on birth order and maternal age at marriage as key determinants.

Aim and Objective: To assess the association of birth order and maternal age at marriage with the immunization status of children aged 12–23 months in rural and urban field practice areas of a medical college in Western Maharashtra.

MATERIALS AND METHODS

This study is a cross sectional comparative study conducted at urban slum of Wanowari bazar and Rural area Kasurdi village in Pune. Wanowari bazar is an urban slum with population belonging to lower to upper lower socioeconomic strata and is under the administrative control Pune Cantonment Board. The number of household residing in this slum are 283 with an average population of 2305 and with an average family size of 4-5. The village has one Rural Health Training Centre which is regularly visited by residents of the medical college to provide basic specialists care and to do their research related to their studies. Study population: All children of 12-23 months of age of both the areas were included in the study. Initially a spot was chosen randomly and houses were visited from one direction in each of the lanes/bastis. The mother or father were interviewed with the help of a pretested questionnaire. Inclusion criteria: All children born in the Wanwadi bazar and Kasurdi village between the periods of Feb 2017 – Feb 2019 were included in the study. Their dates of birth were confirmed from their immunization cards and or anganwadi registers. Exclusion criteria: All children of visitors and migrant population of less then 6 months of duration were excluded from the study.

RESULTS

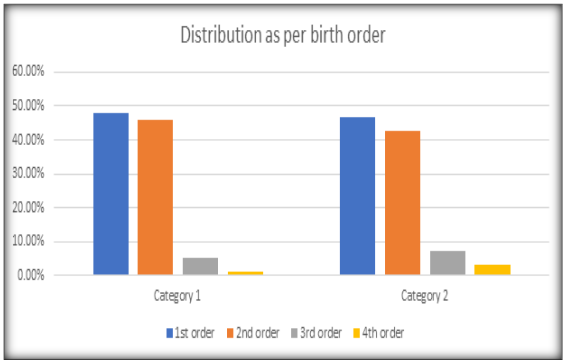

Figure 1: Distribution as per birth order

Figure 1: Distribution as per birth order showed that maximum number children were of 1st and 2nd birth order. In urban 47.9% and 45.8% of children were of 1st and 2nd order birth and in rural 46.9% and 42.7% were of 1st and 2nd order birth.

Table 1: Distribution as per age at marriage of mother

	Age at marriage of mother ≤ 18	Age at marriage of mother > 18	Total
Urban (%)	35 (36.5)	61 (63.5)	96 (100)
Rural (%)	48 (50)	48 (50)	96 (100)

Table 1: Age at marriage of mothers showed that 36.5% in urban area and 50% in rural area are married at less than 18 years of age where as 63.5% in urban area and 50% in rural area are married at more than 18 years of age.

Table 2: Association between age of the mother at marriage and immunization status among Children Aged 12–23 Months in Urban Area

	Age of mother ≤ 18	Age of mother > 18	Total
Partially immunized (%)	16 (45.7)	14 (23)	30 (31.2)
Completely immunized (%)	19 (54.3)	47 (77)	66 (68.8)
Total (%)	35 (100)	61 (100)	96 (100)

Chi square value: 5.364, df: 1, p value < .05

Table 3: Association between age of the mother at marriage and immunization status among Children Aged 12–23 Months in Rural Area

	Age of mother ≤18	Age of mother >18	Total
Partially immunized (%)	19 (36.9)	09 (18.8)	28 (29.2)
Completely immunized (%)	29 (60.4)	39 (81.3)	68 (70.8)
Total (%)	48 (100)	48 (100)	96 (100)

Chi square value: 5.042, df: 1, p value < .05

Table-2 & Table-3: In urban area 77% of children were found to be completely immunized when the age of the mother at marriage was > 18 years and 54.3% children were completely immunized when the age of the mother at marriage was < 18 and the same for rural area was 81.3% and 60.4%. In both the urban and rural areas the immunization status was found to be positively associated with the age of the mother at marriage and also found to be statistically significant.

Table 4: Association between Birth order and immunization status among Children Aged 12–23 Months in Urban Area

	1st order	2nd order	3rd order	4th order	Total
Partially immunized (%)	15 (33.3)	15 (33.3)	01 (20)	01 (100)	32 (33.3)
Completely immunized (%)	30 66.7	30 (66.7)	04 (80)	00 (00)	64 (66.7)
Total (%)	45 (100)	45 (100)	05 (100)	01 (100)	96 (100)

Chi square value: 2.40, df: 3, p value < .494

Table 5: Association between Birth order and immunization status among Children Aged 12–23 Months in Rural Area

	1st order	2nd order	3rd order	4th order	Total
Partially immunized (%)	10 (22.2)	13 (31.7)	03 (42.9)	02 (66.7)	28 (29.2)
Completely immunized (%)	35 (77.8)	28 (68.3)	04 (57.1)	01 (33.3)	68 (70.8)
Total (%)	45 (100)	41 (100)	07 (100)	03 (100)	96 (100)

Chi square value: 3.856, df:3, p value < .277

In urban area 66.7% children of 1st birth order, 66.7% of 2nd, and 80% children of 3rd birth order were found to have complete immunization whereas the same in rural area were 77.8%, 68.3%, 57.1% and 33.3% respectively. However in both the urban and rural areas the immunization status were not statistically significant with respect to religion.

DISCUSSION

Table-4 & 5: Birth order and Immunization coverage- In Rural community there was no significant association between birth order and immunization status. Children with birth order ≥ 2 has no positive association in having better immunisation status as compared to a child with birth order.[1] The NFHS-4 data showed a trend of declining vaccination status with increasing birth order. The proportion of fully vaccinated infants by birth order was 56.6% (first order), 46.2% (second or third), 28.3% (fourth or fifth) and 17.2% (sixth or higher).8 The UNICEF (2018) CES survey showed complete vaccination among infants with birth order 1, 2, 3, 4+ as 68.3%, 63.2%, 60.3%, and 39.2% respectively. The proportion of unvaccinated infants was 5.3%, 6.2%, 9.6%, and 15.3% respectively.[9] In a study conducted in urban slum in pune found that 84.6% of children of birth order >2 was appropriately immunised, only 15.8% of these children in rural area received appropriate immunisation. This was a

statistically significant finding.[10] Various studies have shown the relation of birth order with Immunization coverage. The levels of immunization coverage were better in lower birth order as compared to the higher birth orders.[11-12] In a study conducted in Kochi, Kerala partial immunization was founded to be associated with lower birth order.[13] Table2&3: In our study we found that in both rural and urban areas there is increase in complete immunization status with respect to mothers' age of marriage > 18 and which is statistically significant. In a similar study done in Ethiopia in children of 12-23 months of age in hard to reach areas its found that there is increase in complete immunization status of the children in the age group of mothers' is 24-35 years in comparison to > 35years.[14]

CONCLUSION

This study highlights the significant role of maternal age at marriage in determining childhood immunization status in both rural and urban areas of Western Maharashtra. Children born to mothers married after 18 years were more likely to be completely immunized, underscoring the impact of delaying early marriage on improving child health outcomes. Although birth order did not show a statistically significant association, the observed trend of declining immunization with increasing birth order aligns with national and global evidence.

Strengthening public health strategies to delay early marriage, empower women through education and awareness, and target higher birth order children can contribute to improved and equitable immunization coverage. Tailored interventions in both rural and urban communities are essential to bridge existing gaps and support India's efforts to achieve universal immunization.

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