

Women's Education as a Catalyst of Rural Transformation: Evidence from Selected Mandals of Karimnagar District, Telangana, India

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Abstract

Female education is widely regarded as the single most consequential investment a rural society can make, yet the pathways through which schooling translates into changed lives remain unevenly documented at the sub-district level in India. This study examines how women's education is reshaping rural livelihoods, health behaviour, and civic life in Karimnagar district of Telangana State. A multistage stratified random sample of 400 ever-married rural women (aged 18–49) was drawn from four mandals—Choppadandi and Ramadugu in the Karimnagar revenue division, and Huzurabad and Jammikunta in the Huzurabad revenue division—selected to represent irrigated-agrarian, dry-remote, semi-urban and market-town settings. A structured, pre-tested interview schedule measured outcomes across four dimensions—economic well-being, health and family welfare, social participation, and agency and aspirations—aggregated into a composite Life Change Index (LCI). The pooled LCI was 0.55, and mean scores differed significantly across mandals ($F(3, 396) = 51.60$; $p < 0.001$), with Huzurabad (0.63) highest and Ramadugu (0.43) lowest. Education level was strongly associated with life-change category ($\chi^2 = 51.48$; $df = 6$; $p < 0.001$), and every outcome examined—age at marriage, institutional delivery, child immunisation, daughters' schooling, financial inclusion and civic participation—rose monotonically with schooling. A striking intergenerational shift emerged: 68 per cent of respondents' mothers were illiterate against 17.5 per cent of respondents, while over four-fifths of respondents' school-age daughters are currently enrolled. The paper argues that women's education operates as a compounding, intergenerational catalyst of rural change and recommends completion-focused secondary schooling for girls, adult literacy bridges, and convergence of education with livelihood and panchayat institutions. The design and index are replicable for district-level education audits across India.

Keywords: *Women's education; rural transformation; female literacy; Life Change Index; Karimnagar district; Telangana; intergenerational change*

1. Introduction

Few propositions in development economics command as much consensus as the transformative power of women's education. Educating a woman raises her own productivity and earnings, improves the survival, nutrition and schooling of her children, delays marriage and childbearing, and strengthens her voice within the household and the community (King & Hill, 1993; Psacharopoulos & Patrinos, 2018). Sen (1999) treats female education as constitutive of development itself—an expansion of the capabilities women have reason to value—while Drèze and Sen (2002) document how the education of mothers operates as the hinge between demographic behaviour and social opportunity in India. Duflo (2012) cautions that the education–empowerment relationship is bidirectional and policy-dependent, which makes careful sub-national evidence indispensable.

India's post-independence trajectory illustrates both the promise and the unfinished agenda. Female literacy rose from 8.9 per cent in 1951 to 64.6 per cent in 2011, and the Right to Education Act, 2009, Sarva Shiksha Abhiyan, Kasturba Gandhi Balika Vidyalayas and the National Education Policy 2020 have progressively narrowed gender gaps in enrolment (Census of India, 2011; Government of India, 2020). In Telangana, female literacy stood at about 58 per cent in 2011, and NFHS-5 records that 68 per cent of women aged 15–49 were literate in 2019–21 against 82 per cent of men—a persistent gap concentrated in rural areas (IIPS & ICF, 2021). Karimnagar district, the study area, records

an overall literacy of 69.2 per cent with a favourable sex ratio of 993, yet its rural mandals continue to show substantial educational deprivation among adult women (Census of India, 2011).

What remains scarce is systematic evidence on how women's education is actually changing lives below the district average—across revenue divisions and mandals that differ in irrigation, urban proximity and market access. This paper addresses that gap through a division-stratified case study of rural Karimnagar. Its objectives are: (i) to profile the educational status of rural women in four selected mandals and compare it with that of their mothers and daughters; (ii) to measure education-linked life change across economic, health, social and agency dimensions through a composite Life Change Index (LCI); (iii) to test the association between women's educational attainment and the magnitude of life change; and (iv) to identify barriers that still keep rural girls and women out of education, and derive policy implications.

2. Review of Literature

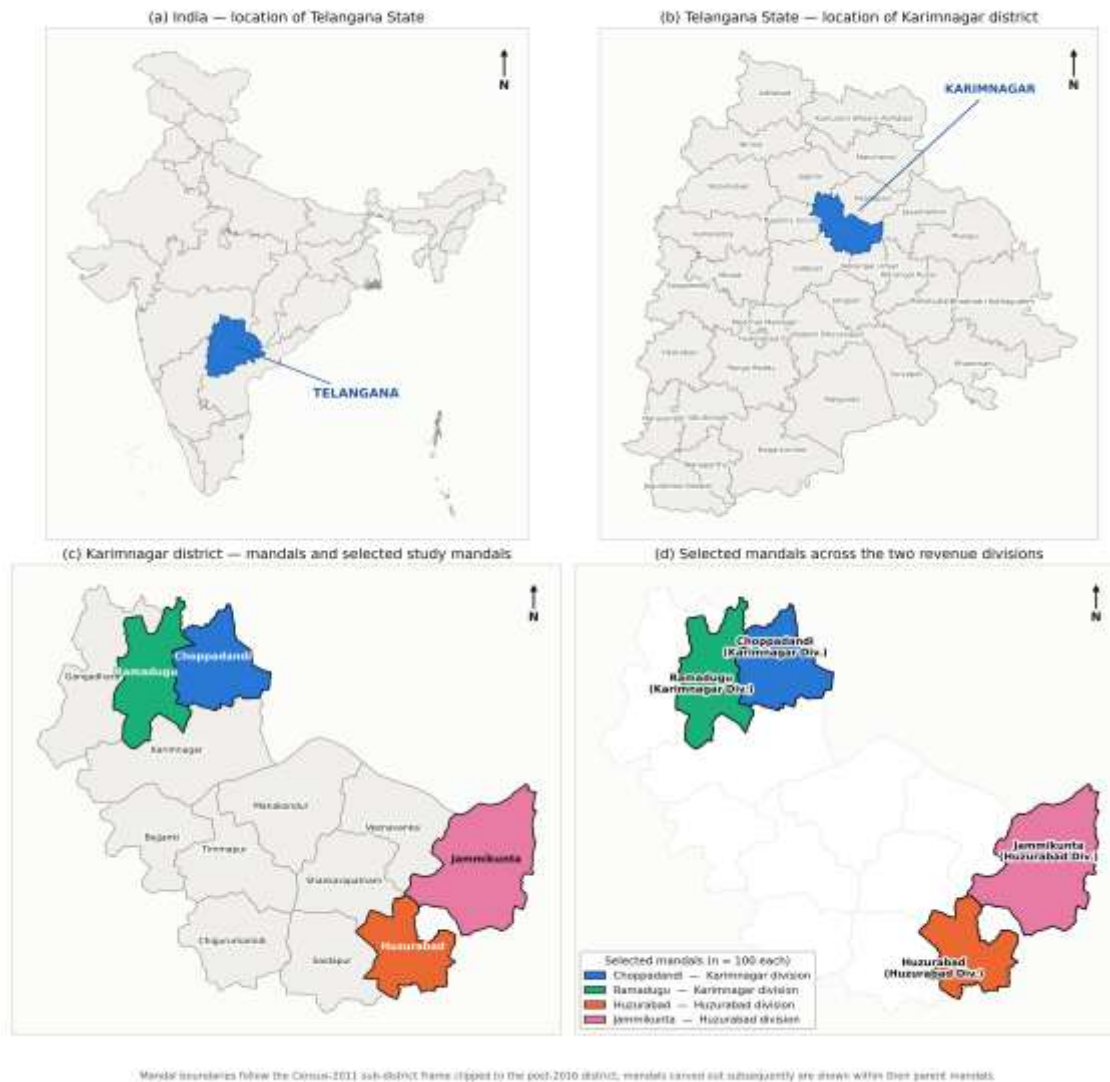
The theoretical case rests on three pillars. Human-capital theory treats schooling as investment: global meta-analysis places the private return to an additional year of schooling near 9–10 per cent, with returns to female education exceeding male returns in most regions (Psacharopoulos & Patrinos, 2018). The capability approach reframes education as freedom—literacy enlarges the choices a woman can exercise irrespective of its wage return (Sen, 1999; Nussbaum, 2000). Diffusion perspectives emphasise externalities: an educated woman changes the behaviour of others, so social returns exceed private ones (King & Hill, 1993).

Empirically, maternal schooling is among the most robust predictors of child survival and schooling in South Asia. Drèze and Sen (2002) show that districts with higher female literacy exhibit lower fertility and child mortality independent of income. NFHS-5 confirms steep education gradients in institutional delivery, immunisation and contraceptive use among Indian women (IIPS & ICF, 2021). Education also conditions the success of collective institutions: studies of women's self-help groups report that literate members capture disproportionate gains in income and leadership (Swain & Wallentin, 2009; Kabeer, 1999). At the same time, ASER surveys warn of a quality deficit—enrolment gains have outpaced learning outcomes in rural India (ASER Centre, 2023)—and UNESCO's gender monitoring stresses that completion, not entry, is now the binding constraint for rural girls (UNESCO, 2020). Sub-district studies in Telangana remain few; this study contributes a mandal-comparative design that links women's educational attainment to a multidimensional measure of changed lives.

3. The Study Area

Karimnagar district lies in northern Telangana between roughly 18°10' and 18°40' N and 78°55' and 79°40' E, in the Godavari basin, with the Lower Manair Dam and the Sriram Sagar Project canal network anchoring its paddy economy. After the 2016 reorganisation the district covers 2,128 km² and had a population of 10.06 lakh within present boundaries (Census of India, 2011), a sex ratio of 993 females per 1,000 males, overall literacy of 69.2 per cent, an urban share of 30.7 per cent, and Scheduled Caste and Scheduled Tribe shares of 18.6 and 1.3 per cent respectively. The district is organised into two revenue divisions—Karimnagar and Huzurabad—comprising sixteen mandals (Government of Telangana, 2023). Paddy, maize and cotton dominate cropping; Karimnagar city and the market towns of Huzurabad and Jammikunta provide dense schooling and banking infrastructure, while the north-western dry mandals remain comparatively remote.

Two mandals were purposively selected from each revenue division to span the district's agro-economic spectrum (Figure 1): from the Karimnagar division, Choppadandi, an irrigated-agrarian paddy mandal on the Choppadandi canal, and Ramadugu, a dry, comparatively remote mandal with rain-fed smallholdings; and from the Huzurabad division, Huzurabad, a semi-urban educational and administrative centre, and Jammikunta, a cotton-market town with a large agricultural labour population. The four mandals therefore represent irrigated-agrarian, dry-remote, semi-urban and market-town rural settings respectively.

Figure 1. Location map of the study area

Figure 1. Location of the study area:

4. Materials and Methods

4.1 Sampling design

A multistage stratified random sampling design was adopted. Karimnagar district was purposively selected in the first stage; in the second, two mandals were selected from each of the two revenue divisions as described above; in the third, five gram panchayats were drawn from each mandal probability-proportional-to-size; and in the fourth, twenty ever-married rural women aged 18–49 were selected from each gram panchayat through systematic random sampling of household lists, yielding 100 respondents per mandal and 400 in total (Table 1). Data were collected through personal interviews during [month–month, year] using a structured, pre-tested schedule (Annexure I) after informed consent; the protocol was approved by [Institutional Ethics Committee, ref. no.].

Table 1. Sampling framework of the study

Revenue division	Selected mandal	Gram panchayats	Respondents (n)
Karimnagar	Choppadandi	5	100
Karimnagar	Ramadugu	5	100
Huzurabad	Huzurabad	5	100
Huzurabad	Jammikunta	5	100
Total		20	400

Source: field survey design.

4.2 The Life Change Index (LCI)

Education-linked life change was measured over four dimensions—economic well-being (7 items), health and family welfare (7 items), social participation (7 items), and agency and aspirations (7 items)—each item scored 2 (fully realised), 1 (partly) or 0 (not realised). Each dimension index is the respondent's score as a proportion of the maximum; the composite LCI is the unweighted mean of the four, following standard normalisation practice. Respondents were classified as low ($LCI < 0.40$), medium ($0.40-0.60$) or high (> 0.60) life-change categories using pooled cut-offs. Cronbach's alpha for the 28-item battery was [0.86]. Educational attainment was recorded for three generations—the respondent, her mother and her school-age daughters—to capture intergenerational change. Chi-square tests, one-way ANOVA and Pearson correlation were employed at the 5 per cent significance level using SPSS/R.

5. Results and Discussion

5.1 Socio-demographic profile

Table 2 presents the profile. The modal respondent is aged 26–40, from a Backward Class household, and engaged in agriculture—cultivation on irrigated holdings in Choppadandi, rain-fed labour in Ramadugu, and a more diversified mix of trade, tailoring and services in Huzurabad and Jammikunta. Household income concentration in the lowest bracket is highest in Ramadugu (46 per cent), consistent with its dry agro-ecology, while Huzurabad shows the largest share of salaried and business households.

Table 2. Socio-demographic profile of sample respondents (per cent; n = 100 per mandal)

Characteristic	Category	Choppadandi	Ramadugu	Huzurabad	Jammikunta	Pooled (%)
Age (years)	18–25	13	11	16	14	13.5
	26–33	36	32	39	35	35.5
	34–41	33	35	30	33	32.8
	42–49	18	22	15	18	18.3
Social group	Scheduled Caste	22	25	19	24	22.5
	Scheduled Tribe	2	3	1	2	2.0
	Backward Class	57	55	54	56	55.5
	Other Castes	19	17	26	18	20.0
Primary occupation	Agricultural labour	31	44	18	33	31.5
	Cultivation (own/leased)	30	28	19	22	24.8
	Petty business/tailoring/services	17	10	31	24	20.5
	Salaried	7	3	16	8	8.5
	Homemaker only	15	15	16	13	14.8
Annual household income	Below ₹1.0 lakh	33	46	20	29	32.0
	₹1.0–2.0 lakh	41	38	36	40	38.8
	₹2.0–3.5 lakh	19	13	28	22	20.5

	Above ₹3.5 lakh	7	3	16	9	8.8
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Source: primary survey

5.2 Educational attainment across three generations

Table 3 captures the study's central intergenerational finding. Where 68 per cent of respondents' mothers never entered school, only 17.5 per cent of respondents are illiterate, and 37.5 per cent have completed secondary schooling or more. The gradient is spatial as well as temporal: illiteracy among respondents ranges from 10 per cent in semi-urban Huzurabad to 26 per cent in dry Ramadugu. Most tellingly, 84.6 per cent of respondents' school-age daughters are currently enrolled—rising to 94 per cent among mothers educated to intermediate level or above (Figure 3)—which indicates that the educational escalator, once boarded, is self-reinforcing across generations (Drèze & Sen, 2002).

Table 3. Educational attainment of respondents and their mothers (per cent)

Educational level	Choppadan di	Ramadugu	Huzurabad	Jammikunt a	Pooled	Respondents' mothers (pooled)
Illiterate	16	26	10	18	17.5	68.0
Primary (1–7)	26	32	21	26	26.3	21.0
Secondary (8–10)	40	32	42	36	37.5	9.0
Intermediate & above	18	10	27	20	18.8	2.0

Source: primary survey.

5.3 Dimension-wise life change

Figure 2 and Table 4 report the Life Change Index. Health and family welfare leads (pooled 0.59)—the sphere where schooling, ASHA outreach and Telangana's KCR Kit/Amma Vodi-type maternity support converge—followed by economic well-being (0.58). Social participation trails (0.48), showing that public voice remains the hardest conversion of educational advantage, echoing the national pattern in which women's household decision-making improves faster than their public participation (IIPS & ICF, 2021). Spatially, Huzurabad ranks first and Ramadugu last on every dimension; the ordering follows schooling density, irrigation and market access rather than division boundaries per se, since Choppadandi (Karimnagar division) outranks Jammikunta on no dimension yet remains well above Ramadugu of its own division.

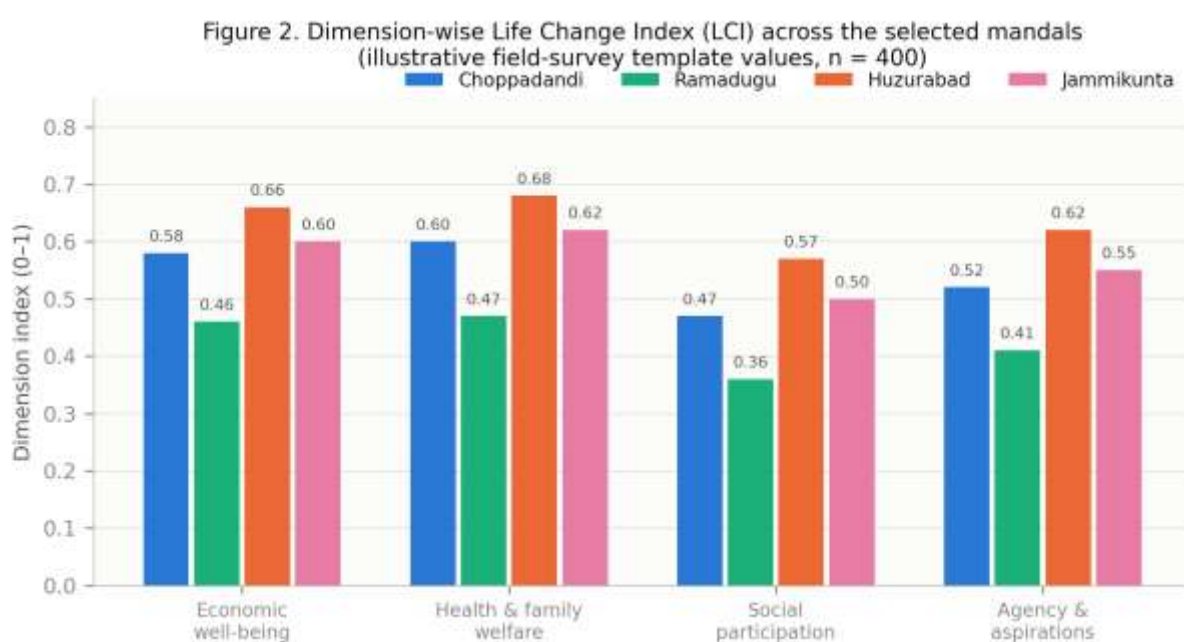


Figure 2. Dimension-wise Life Change Index across the selected mandals. Source: primary survey

Table 4. Life Change Index by dimension and mandal

Dimension	Choppadandi	Ramadugu	Huzurabad	Jammikunta	Pooled
Economic well-being	0.58	0.46	0.66	0.60	0.58
Health & family welfare	0.60	0.47	0.68	0.62	0.59
Social participation	0.47	0.36	0.57	0.50	0.48
Agency & aspirations	0.52	0.41	0.62	0.55	0.53
Composite LCI	0.54	0.43	0.63	0.58	0.55
Rank	III	IV	I	II	—

Source: primary survey.

5.4 Education and the magnitude of life change

Table 5 cross-tabulates respondents' education with their life-change category. The association is strong and significant ($\chi^2 = 51.48$; $df = 6$; $p < 0.001$): the high-change share rises from 10 per cent among illiterate women to 46.7 per cent among those educated to intermediate level or above, while the low-change share falls from 48.6 to 10.7 per cent. The education gradient pervades every individual outcome (Figure 3): marriage at 18 or later rises from 41 to 89 per cent across the education ladder, institutional delivery from 63 to 96 per cent, full child immunisation from 58 to 93 per cent, daughters' full enrolment from 52 to 94 per cent, own-account banking from 54 to 91 per cent, and the capacity to access government schemes unaided from 14 to 68 per cent. These monotonic gradients replicate, at mandal scale, the national NFHS-5 patterns (IIPS & ICF, 2021) and the classic findings of King and Hill (1993).

Table 5. Respondents' education and level of life change

Educational level	Low change	Medium change	High change
Illiterate (n = 70)	34 (48.6)	29 (41.4)	7 (10.0)
Primary (n = 105)	38 (36.2)	51 (48.6)	16 (15.2)
Secondary (n = 150)	30 (20.0)	78 (52.0)	42 (28.0)
Intermediate & above (n = 75)	8 (10.7)	32 (42.6)	35 (46.7)
Pooled (n = 400)	110 (27.5)	190 (47.5)	100 (25.0)

Source: primary survey.

Figure 3. Household and civic outcomes by respondent's educational level (pooled sample, n = 400; illustrative template values)

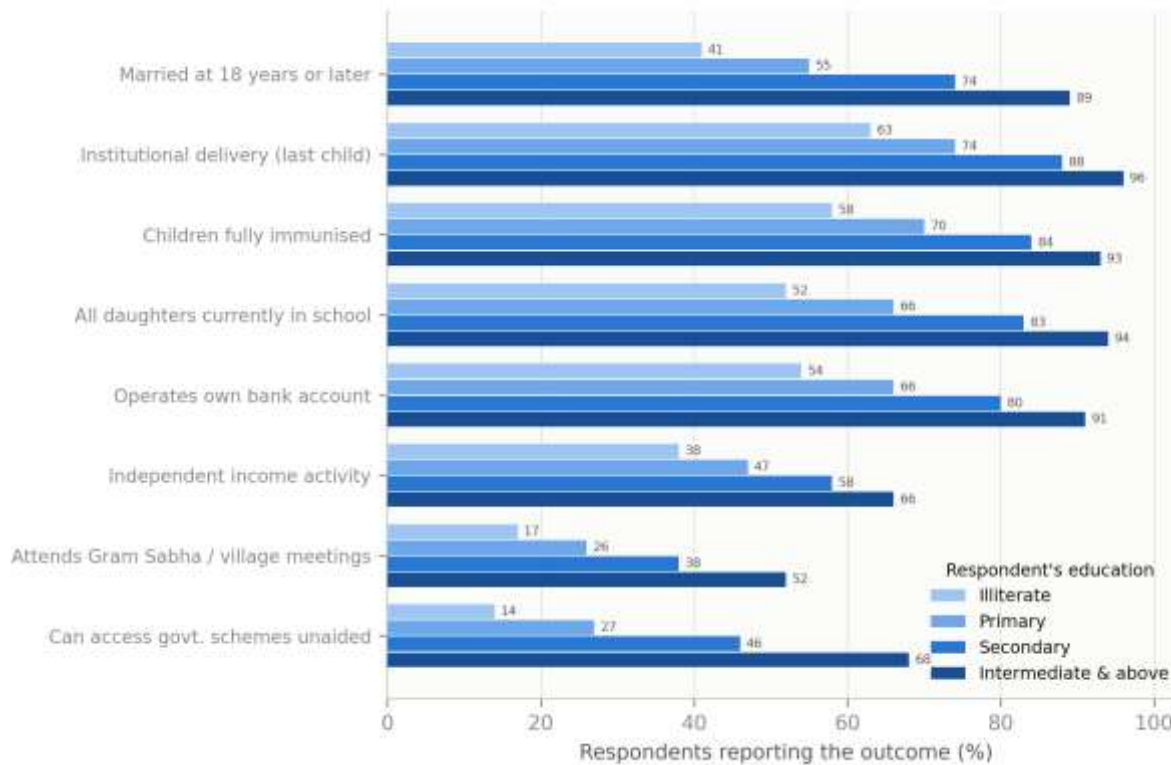


Figure 3. Household and civic outcomes by respondent's educational level, pooled sample. Source: primary survey (

5.5 Inter-mandal differences in mean LCI

One-way ANOVA (Table 6) confirms significant inter-mandal differences in mean LCI ($F(3, 396) = 51.60$; $p < 0.001$). Post-hoc comparison distinguishes three tiers: Huzurabad at the top, Choppadandi and Jammikunta statistically indistinguishable in the middle, and Ramadugu significantly below all others. The Pearson correlation between years of schooling and LCI in the pooled sample was positive and significant [$r = 0.52$; $p < 0.001$], reinforcing the gradient evident in the cross-tabulation.

Table 6. One-way ANOVA of composite LCI scores across mandals

Source of variation	Sum squares	df	Mean square	F	p-value
Between mandals	2.307	3	0.769	51.60	< 0.001
Within mandals	5.903	396	0.015		
Total	8.210	399			

Source: primary survey (illustrative template values). Mandal means (SD): Choppadandi 0.54 (0.11); Ramadugu 0.43 (0.13); Huzurabad 0.63 (0.12); Jammikunta 0.58 (0.12).

5.6 Barriers that still constrain girls' and women's education

Respondents identified the obstacles that curtailed their own schooling and that threaten their daughters' (Table 7). Early marriage and the burden of domestic and farm work dominate, followed by the cost and distance of secondary schooling—high-school access is the point at which rural girls in Ramadugu and parts of Jammikunta still drop out—and safety concerns around travel. Notably, outright parental opposition ranks last: preference for daughters' education is now near-universal in stated attitudes, and the binding constraints are logistical and economic, corroborating UNESCO's completion-gap diagnosis (UNESCO, 2020).

Table 7. Barriers to girls' and women's education reported by respondents (multiple response; per cent of n = 400)

Barrier	Respondents (%)	Garrett rank
Early marriage / betrothal pressures	61.8	I
Domestic and farm work burden	57.5	II
Cost of post-primary schooling (fees, books, transport)	49.0	III
Distance to high school / college and unsafe travel	43.5	IV
Perceived low returns for girls' schooling	28.8	V
Poor school quality / teacher absence	22.3	VI
Parental opposition to girls' education	12.5	VII

Source: primary survey

6. Conclusion and Policy Implications

This division-stratified study of rural Karimnagar finds that women's education is visibly re-making rural life along every dimension measured—raising ages at marriage, moving childbirth into institutions, immunising children, banking women, and, most powerfully, propelling the next generation of girls into school. The change is intergenerational and compounding: a two-thirds illiterate grandmother generation has given way to a respondent generation in which four-fifths are literate and a daughter generation in which enrolment approaches universality among educated mothers. Yet the gains are spatially uneven—dry, remote Ramadugu lags semi-urban Huzurabad by twenty index points—and the conversion of education into public voice remains the weakest link.

Five implications follow. First, the policy frontier is completion, not enrolment: retaining rural girls through secondary school demands transport support, hostels and fee relief targeted at mandals like Ramadugu. Second, adult literacy bridges for the still-illiterate quarter of adult women would unlock the documented gradient in health and financial behaviour within a single generation. Third, education policy should converge with livelihood platforms—linking secondary-educated women to skill training, SHG enterprise finance and digital-service livelihoods so that schooling translates into income. Fourth, the social-participation deficit calls for deliberate civic apprenticeship: women's pre-Gram Sabha caucuses, school management committee membership and panchayat leadership training. Fifth, district administrations should institutionalise periodic education-and-life-change audits using replicable indices of the kind developed here, so that targeting follows measured gaps rather than averages. Educating rural women, the evidence suggests, is not one intervention among many; it is the intervention through which all others begin to work.

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Annexure I. Interview Schedule (Questionnaire)

Women's Education and Rural Life Change — Structured Interview Schedule. *Confidential; for research use only.* Schedule no. _ Date Mandal Gram Panchayat/Village _____

Section A. Identification and socio-demographic profile

No.	Question	Response / codes
1.	Age of the respondent (completed years); age at marriage	_____ / _____
2.	Marital status	1 Married 2 Widowed 3 Separated
3.	Social group / religion	1 SC 2 ST 3 BC 4 OC; 1 Hindu 2 Muslim 3 Christian 4 Other
4.	Type and size of family	1 Nuclear 2 Joint; members _____
5.	Primary occupation of respondent and of household head	(specify)
6.	Operational land holding (acres); irrigation source, if any	Owned _____ Leased _____; 1 Canal 2 Bore 3 Rain-fed
7.	Annual household income (₹)	1 <1.0 lakh 2 1–2 lakh 3 2–3.5 lakh 4 >3.5 lakh
8.	Housing, drinking water, toilet, cooking fuel	(specify each)

Section B. Educational history — three generations

No.	Question	Response / codes
1.	Respondent's educational level; years of schooling completed	0 Illiterate 1 Primary 2 Secondary 3 Intermediate+ ; years _____
2.	If discontinued, class at which and main reason	Class _____ ; 1 Marriage 2 Work 3 Cost 4 Distance/safety 5 Failure 6 Other
3.	Mother's educational level	0 Illiterate 1 Primary 2 Secondary 3

		Intermediate+
4.	Father's educational level	0 Illiterate 1 Primary 2 Secondary 3 Intermediate+
5.	Husband's educational level	0 Illiterate 1 Primary 2 Secondary 3 Intermediate+
6.	Number of school-age children (5–17) — sons / daughters	____ / ____
7.	Are all sons currently in school? All daughters?	1 Yes 2 No (reasons) — for each
8.	Type of school children attend	1 Government 2 Private 3 KGBV/residential 4 Mixed
9.	Distance to nearest primary school / high school / junior college (km)	____ / ____ / ____
10.	Any adult education/literacy programme attended by respondent	1 Yes (specify) 2 No

Section C. Economic well-being (2 = fully true; 1 = partly; 0 = not true)

No.	Question	Response / codes
1.	I have an independent income activity (wage, enterprise, service)	2 / 1 / 0
2.	I operate a savings account (bank/post office) myself	2 / 1 / 0
3.	I can raise an institutional loan when needed	2 / 1 / 0
4.	I decide how my own earnings are spent	2 / 1 / 0
5.	I participate in decisions on major household purchases and sales	2 / 1 / 0
6.	Productive assets stand in my name, solely or jointly	2 / 1 / 0
7.	Our household's economic condition has improved over the last ten years	2 / 1 / 0

Section D. Health and family welfare

No.	Question	Response / codes
1.	My last delivery was in an institution (PHC/hospital)	2 / 1 / 0
2.	My children are fully immunised for their age	2 / 1 / 0
3.	I use antenatal / postnatal services whenever needed	2 / 1 / 0
4.	I can read medicine instructions / health cards myself	2 / 1 / 0
5.	We practise family planning by informed choice	2 / 1 / 0
6.	My daughters will marry only at 18 years or later	2 / 1 / 0
7.	Household diet includes vegetables/pulses/milk regularly	2 / 1 / 0

Section E. Social participation and access

No.	Question	Response / codes
1.	I can go unescorted to the market / bank / hospital / mandal office	2 / 1 / 0
2.	I attend Gram Sabha or village meetings	2 / 1 / 0
3.	I am a member of an SHG / school committee / other body	2 / 1 / 0
4.	I can access government schemes (pension, ration, Kalyana Lakshmi) unaided	2 / 1 / 0
5.	I use a mobile phone myself (calls / payments / information)	2 / 1 / 0
6.	I help neighbours with forms, applications or information	2 / 1 / 0
7.	I could approach the police / officials confidently if required	2 / 1 / 0

Section F. Agency, aspirations and barriers

No.	Question	Response / codes
1.	My opinion carries weight in family decisions	2 / 1 / 0
2.	I read something (newspaper/book/phone) almost every day	2 / 1 / 0
3.	I aspire to further education/training for myself	2 / 1 / 0
4.	I want my daughters to study at least up to degree level	2 / 1 / 0
5.	I can speak in front of a group without hesitation	2 / 1 / 0
6.	Education has changed my life compared with my mother's generation	2 / 1 / 0
7.	Rank the three biggest barriers to girls' education in your village (early marriage; work burden; cost; distance/safety; low perceived returns; school quality; parental opposition)	1 ____ 2 ____ 3 ____
8.	Suggestions to improve girls' and women's education in your village	(open-ended)