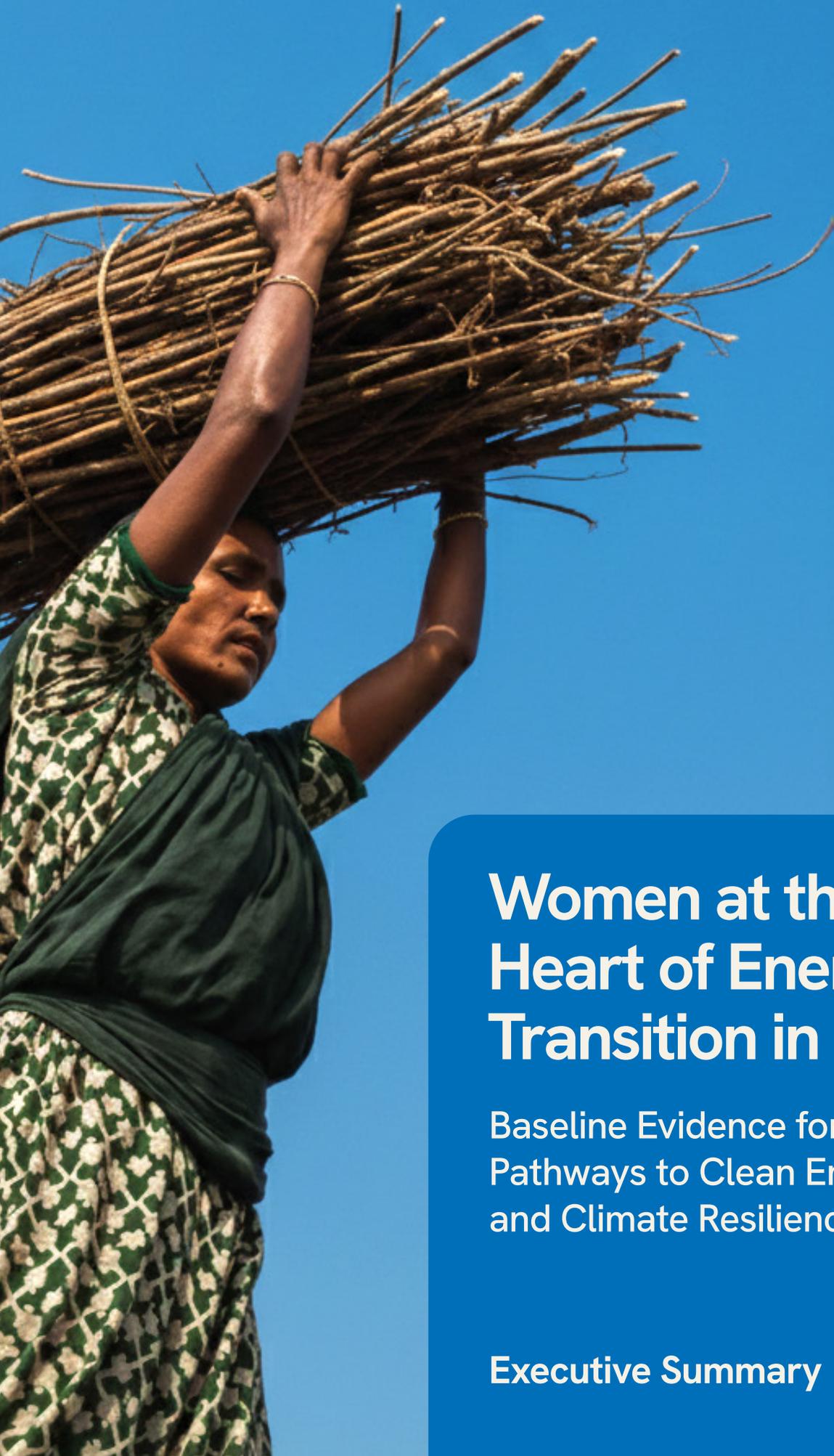






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Women at the Heart of Energy Transition in Odisha

Baseline Evidence for Building
Pathways to Clean Energy
and Climate Resilience

Executive Summary

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Women's energy choices in rural Odisha are shaped by climate stress, social disadvantage, and infrastructure gaps. Despite high awareness of clean energy options, adoption remains limited due to entrenched social inequities, unreliable grid access, and weak collective structures in some districts.

This study is especially relevant in Odisha, India's most climate-vulnerable state, which is regularly affected by cyclones, floods, and other extreme events. At the same time, the state is well-positioned for change, with a government supportive of energy transition and climate adaptation initiatives.

Against this backdrop, education and group membership emerge as powerful levers of change. Both consistently increase women's readiness to adopt clean energy, lead projects, and access government schemes. This baseline study provides evidence for designing district-specific, equity-focused models for women-led energy transitions.

Purpose and Approach

An inclusive energy transition requires more than technology. It demands a holistic approach that places women at the centre. In rural communities, women are primary household and farm energy managers, yet they remain underrepresented in decision-making and leadership roles.

A truly inclusive transition must integrate gender-sensitive outreach, capacity building, and leadership pathways that empower women not only as beneficiaries but as active agents of change. Addressing structural barriers — such as limited access to information, finance, and institutional support — while investing in women's leadership can ensure that clean energy adoption is equitable, sustainable, and transformative.

The study aimed to identify:



Challenges women face in energy access and use.



Their dimension(s) and experiences of climate change that impacted the women in these three districts.



Their level of access to schemes that are an essential pre-condition for stronger participation in energy transition activities.



Pathways and actions that can accelerate the energy transition.

Methodology

The study applied a convergent mixed-methods design to establish an empirical foundation for a gender-responsive energy transition in Odisha.

A quantitative survey was conducted with 611 women across three districts- Anugul, Kendrapara, and Koraput. The sample was stratified by social group (General and socially deprived population cohorts), education level, formal group membership based on economic activities, and grid-connectivity status.

15 Qualitative Focus Group Discussions (FGDs) and 15 Key Informant Interviews (KIIs) were conducted that captured their lived experiences, motivations, and socio-economic contexts.

This mixed-methods approach moved beyond describing trends to uncovering underlying drivers, generating deeper insights into structural barriers and enablers. It also ensured representation across socio-economic strata, energy practices, and network participation, producing actionable insights for programme design, targeting, partnerships, and impact measurement.

Key Findings

1. High Interest in Clean Energy Adoption:

Nearly 90% of women expressed willingness to transition from traditional fuels, citing improved health and reduced drudgery. However, 87.2% (533 women) still rely primarily on firewood for cooking. Among them:



FGDs confirmed that women are ready to shift to renewable energy if access, affordability, capacity building, and supportive networks are ensured.

2. Awareness of Government Energy Schemes:

The data indicate that overall the awareness of government energy schemes is high though with notable district-level variations. In Anugul and Kendrapara, nearly 9 out of 10 women reported being aware of such schemes (89% and 90%, respectively), suggesting strong outreach efforts and steady information flow within these districts.

In contrast, Koraput reflects a noticeable awareness gap. Only 61% of respondents reported familiarity with government energy programmes, while nearly four in ten women lacked knowledge of available schemes. This variation highlights uneven access to information across districts.

3. Awareness-Aspiration-Adoption Gap:

While 83% of women are aware of at least one clean fuel option and nearly 90% aspire to transition, only 39.4% use LPG as their primary cooking source.

This gap highlights that awareness and motivation alone are insufficient. Structural barriers—affordability, supply reliability, and cultural norms continue to limit adoption.

4. Decision-Making Power in Household Energy Use:

Women manage daily energy use but rarely control strategic decisions related to investments necessary for the clean energy transition.



Two-thirds of energy investment decisions remain outside women's control. Their influence is limited to tactical day-to-day use, while men and elders dominate strategic choices like fuel shifts or appliance purchases.

Electric connections do not guarantee reliable supply. Many households discontinue usage when bills accumulate, reconnecting only during peak demand seasons. Weak infrastructure and affordability issues exacerbate energy inequities, increasing women's dependence on traditional fuels.

5. Challenge of Last Mile Connectivity:

In many rural and remote areas, households remain underserved due to weak grid infrastructure, unreliable supply, and high electricity costs. Focus group discussions revealed that having an electrical connection does not guarantee consistent access to power.

Participants reported that when government connections were provided free of charge, households used electricity regularly. However, as bills accumulated, many discontinued their connections, often reconnecting only during the summer months when demand increased.

These gaps not only restrict access to clean and modern energy but also deepen existing inequities. Women, who are primarily responsible for managing household energy, remain disproportionately exposed to the burdens of traditional fuels and the impacts of climate shocks.

6. Income Disparities:

The income distribution of respondents across the three districts highlights significant disparities that shape both energy access and household vulnerability. A large proportion of respondent households fall into the lowest income brackets. Over 60% of households earn below INR 10,000 per month:

205 households: INR 5,000

166 households: INR 5,001–10,000

Koraput shows the starkest concentration of poverty, with 124 households in the lowest band, compared to 46 in Anugul and 35 in Kendrapara. Only 64 households across districts earn above INR 20,000. Limited financial capacity constrains clean energy adoption and bill payment.

This skewed distribution highlights the financial constraints many households face, limiting their ability to adopt clean energy technologies, pay electricity bills consistently, or invest in more sustainable energy alternatives.

7. Financial and Digital Inclusion:

The findings reflect strong progress in financial inclusion across all three districts, alongside clear gaps in digital access. Bank account ownership is nearly universal.

99%
of women in Anugul report
having a bank account.

98%
in Kendrapara
report access.

90%
in Koraput
report access.

These figures indicate the wide reach of financial inclusion initiatives. However, digital inclusion shows sharper disparities.

**Smartphone ownership
stands at 56% in Kendrapara.**

48% of women in Anugul own smartphones.

Only 39% in Koraput report smartphone ownership. And, more than half of respondents in Koraput (53%) do not own any phone.

This uneven access to digital devices limits women’s ability to use financial services, access government schemes, obtain clean energy information, and participate in digital platforms-particularly in Koraput, where access gaps are most severe.

8. Willingness to Lead Energy Projects:

Women across districts demonstrate substantial interest in leading energy initiatives, though district-level differences are evident.

Kendrapara

**81% willing
to lead.**

Anugul

75% willing.

Koraput

**56% willing;
41% unwilling.**

Meanwhile, women's uncertainty to lead energy initiatives is minimal

1% in

Kendrapara

2% in

Anugul

3% in

Koraput

These findings suggest that most women hold clear positions regarding leadership in energy projects.

9. Willingness to Lead Farming Projects:

A similar trend is observed in women leading farming-related initiatives, with variation across districts.

Kendrapara

**82% willing
to lead.**

Anugul

73% willing.

Koraput

**58% willing;
40% unwilling.**

Uncertainty to lead in farming-related initiatives remains low across districts:

0% in

Kendrapara

1% in

Anugul

2% in

Koraput

Overall, leadership readiness is strongest in Kendrapara and Anugul, while Koraput reflects comparatively lower enthusiasm and higher resistance.

10. Climate Event Impacts on Households:

Climate events are nearly universal experiences across the surveyed districts, with widespread and multi-dimensional impacts on households.

Energy and Agriculture Disruptions:



These figures underscore the systemic effects of climate shocks on both energy access and agricultural livelihoods.

Disruptions to Basic Needs:



Impacts on Household Wellbeing:



Longer-Term Vulnerabilities:



Together, these findings highlight the layered and sustained nature of climate-related vulnerabilities, affecting immediate survival needs as well as long-term economic stability.

11. Knowledge About Reasons for Increase in Climate Events:

Climate knowledge is unevenly distributed and shaped by social and educational factors. Women from socially deprived population cohorts are approximately 1.65 times more likely to possess climate-related knowledge compared to women from General social groups.

Education emerges as the strongest determinant: graduates are three times more likely than illiterate respondents to understand the causes behind increasing climate events. Formal group membership increases the likelihood of climate knowledge by 63%.

These patterns suggest that climate literacy is influenced by social location, strengthened through education, and reinforced through collective participation.

12. Belief in Climate Event Reduction:

The belief that climate events can be reduced is closely associated with education and awareness. Graduates are three times more likely than illiterate respondents to believe that climate events can be mitigated.

Women who understand the causes of climate change are twice as likely to believe in potential solutions. Formal group membership increases the likelihood of such a belief by 63%. Differences across social groups exist but are comparatively less pronounced.

Overall, confidence in climate solutions appears to be knowledge-driven and reinforced through education and collective engagement.

13. Migration for Work:

The findings suggest that migration functions both as a distress response to vulnerability and as an aspirational pathway for economic mobility. Migration patterns are shaped by social identity, education, income, geography, and climate stress.

Households from socially deprived population cohorts are nearly twice as likely to migrate compared to those from general social groups. Households in Koraput show almost double the likelihood of migration compared to households in the other districts.

Education acts as a key enabler: graduates are three times more likely to migrate. Higher-income households are more than twice as likely to migrate, suggesting mobility requires resources.

Climate stress is a critical driver: households experiencing frequent climate shocks are twice as likely to migrate. Together, these patterns indicate that migration is not solely a distress phenomenon — it is also shaped by capacity, opportunity, and exposure to climate risk. Women's willingness to adopt and lead clean energy initiatives is shaped by a combination of enabling drivers and structural constraints.

Key Drivers

1. Grid Connectivity

- On-grid households are **1.5 times more likely** to adopt clean energy solutions and digital tools.
- Semi-off-grid households demonstrate moderate but comparatively lower gains.

2. Education Gradient

- Higher education consistently strengthens women's agency and adoption behaviour.
- Graduate-level respondents are nearly **three times more likely** to adopt clean energy or assume leadership roles compared to women with illiterate or primary-level education.

3. Formal Group Membership

- Participation in Self-Help Groups (SHGs), cooperatives, or Farmer Producer Organizations (FPOs) significantly enhances inclusion, adoption rates, and leadership readiness.
- Collective platforms reinforce access to information, confidence, and peer support.

4. Social and Ethnic Disadvantage

- Households from socially deprived population cohorts face persistent structural barriers.
- These disadvantages are most pronounced in Koraput.
- While the nature and depth of exclusion vary across communities, this study categorizes them broadly; further research is required to unpack intra-group differences in greater detail.

District-level differences:

Koraput

- Lower baseline willingness for clean energy adoption.
- Stronger social group disadvantages.
- Significant infrastructure gaps.

Kendrapara

- Higher baseline readiness for adoption and leadership.
- Grid connectivity and education act as amplifiers of engagement.

Anugul

- Strong presence of SHGs and collective platforms.
- Education pathways and collective mobilisation serve as primary drivers of adoption and leadership.

Overall, district-specific contexts significantly shape both opportunity structures and constraints, underscoring the need for tailored programme strategies.



Implications for Future Programming

1. Apply a Strong Equity lens:

- It is necessary to prioritise households from socially deprived population cohorts, particularly in Koraput.
- Designing interventions should ideally combine digital inclusion, culturally sensitive capacity-building, and confidence-building measures.

2. Education Leverage:

- Training modules could be tailored to different literacy levels.
- Educated women could be engaged as peer trainers and local resource persons to support community-based learning.

3. Strengthen Collective Action:

- Digital literacy, digital finance, and clean energy awareness may be embedded within SHGs, cooperatives, and producer groups.
- Collective platforms can be used to improve outreach, trust-building, and sustained engagement.

Infrastructure Integration:

- Digital and financial inclusion initiatives could be aligned with energy access interventions.
- It is important to prioritise off-grid and weak-grid areas where infrastructure gaps limit adoption.

Need for Regional Tailoring:

District-specific strategies are required to ensure effectiveness and scalability.

Koraput

- Equity-focused outreach should be prioritized.
- Infrastructure deficits and access barriers can be addressed through targeted support.
- Awareness-building efforts should ideally be combined with foundational service delivery.

Kendrapara

- Scale-up efforts could be supported through education-driven engagement models.
- Relatively stronger grid connectivity could be leveraged to accelerate adoption.

Anugul

- Women's collectives could be positioned as primary implementation platforms.
- Education-linked pathways for leadership and adoption could be strengthened.

Strategic Recommendations

1. It is necessary to place socially deprived population cohorts at the centre of programme design through tailored and targeted interventions.
2. Education should be leveraged to design differentiated training and peer-to-peer learning models.
3. Group-based institutions can be strengthened as platforms for digital inclusion, financial access, and clean energy adoption.
4. Energy, digital, and financial programmes should be integrated to address infrastructure constraints in a holistic manner.
5. District-specific strategies may be developed to reflect local strengths and structural challenges, ensuring that interventions remain context-sensitive and scalable.