# Community Participation in Environmental Health Improvement: Developing a Sustainable Rural Sanitation Model for Southeastern Nigeria

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## ABSTRACT

Environmental health challenges associated with inadequate sanitation remain significant obstacles to sustainable rural development in Nigeria. Although sanitation interventions have increasingly emphasised community mobilisation, behavioural change and improved access to sanitation facilities, persistent deficiencies suggest that sustainable improvement requires stronger integration of community participation, appropriate infrastructure, institutional responsibility, financing, monitoring and long-term maintenance. This article develops a Community-Integrated Rural Sanitation Model (CIRSM) for rural communities in Southeastern Nigeria, with Ndubia, Ebonyi State, serving as the contextual reference. A qualitative, practice-oriented conceptual design was adopted. Documentary sources were selected for their relevance to community participation, rural sanitation, environmental health, institutional accountability, sanitation infrastructure and sustainability. The materials were examined thematically and synthesised through a staged framework-development process linking identified sanitation problems, stakeholder responsibilities, implementation mechanisms and measurable indicators. CIRSM comprises six interconnected components: participatory sanitation assessment; joint planning and allocation of responsibilities; environmental-health education; appropriate infrastructure and technical support; monitoring and accountability; and periodic review, adaptation and sustainability. Unlike approaches centred predominantly on community triggering and behavioural mobilisation, CIRSM conceptualises sustainable sanitation as a coordinated socio-technical and institutional process in which community ownership operates alongside public investment, professional expertise, equitable financing, infrastructure maintenance and accountable governance. A monitoring framework specifies indicators, baseline requirements, targets, responsible actors, verification procedures and evaluation intervals. The article further identifies financial limitations, institutional capacity, stakeholder conflict, inequality, infrastructure deterioration and long-term maintenance as important implementation risks. A phased pilot-testing strategy is proposed for assessing CIRSM feasibility, acceptability, equity, functionality and sustainability before wider adoption. The article concludes that community participation is most likely to produce sustainable environmental-health improvements when embedded within an accountable system of technical, financial and institutional support.

**Keywords**: Community participation; environmental health; rural sanitation; Community-Integrated Rural Sanitation Model; sustainable development; Ebonyi State; Nigeria

## INTRODUCTION

### 1.1 Environmental Health and the Rural Sanitation Challenge

Environmental health is closely connected with the conditions under which people live, obtain water, manage human waste and maintain their physical surroundings. Where sanitation systems are absent, inappropriate,

unaffordable or poorly maintained, human excreta can contaminate living environments and water sources and increase exposure to sanitation-related health risks. These conditions are particularly consequential in rural communities where infrastructure, household financial resources, technical services and institutional capacity may be limited.

Sanitation therefore cannot be reduced to the construction of toilets. Sustainable sanitation requires facilities that are hygienic, accessible, affordable, technically appropriate and capable of being maintained over time. It also requires behavioural practices that encourage safe use, collective commitment to environmental protection and institutional arrangements through which responsibilities can be allocated and monitored.

Community participation has consequently become an important principle within sanitation policy and practice. Community-Led Total Sanitation (CLTS), for example, emphasises collective mobilisation and behavioural change as mechanisms for eliminating open defecation. However, evidence suggests that community mobilisation alone does not invariably produce sustained sanitation improvements. Research conducted in CLTS-triggered communities in rural Ebonyi State demonstrates the complexity of the relationship between awareness, behaviour and sustainable sanitation outcomes. Such evidence indicates that participation and awareness need to be supported by appropriate institutional, infrastructural and regulatory conditions.

The question is therefore not merely whether communities should participate in sanitation improvement, but how participation can be organised within a coherent framework that links community agency to appropriate infrastructure, institutional accountability, technical expertise, equity, sustainable financing and continuing evaluation.

### 1.2 Problem Statement

Many sanitation interventions operate through one or more relatively isolated mechanisms, such as awareness campaigns, community mobilisation, toilet construction or regulatory enforcement. When these mechanisms are insufficiently integrated, improvements may be difficult to sustain. Facilities may deteriorate because responsibility for maintenance has not been clearly allocated. Households may recognise the importance of sanitation but remain unable to afford appropriate facilities. Community organisations may mobilise residents without having access to technical expertise. Government institutions may introduce interventions without sufficient local ownership or continuing mechanisms for community feedback.

These difficulties reveal an important conceptual and practical gap. Community participation has considerable potential, but participation by itself cannot provide appropriate sanitation infrastructure, ensure technical quality, overcome every household affordability constraint or replace governmental responsibility for public health and environmental services.

This article responds by developing a Community-Integrated Rural Sanitation Model (CIRSM), designed as an integrated framework connecting meaningful community participation with institutional coordination, environmental-health education, technical and infrastructural support, equitable resource allocation, accountable monitoring and continuous adaptation.

### 1.3 Aim and Objectives

The broad aim of this article is to develop an integrated framework for community participation in sustainable environmental-health improvement in rural communities of Southeastern Nigeria.

The specific objectives are to: (1) examine the relationship between community participation and sustainable rural sanitation; (2) identify complementary responsibilities of households, traditional institutions, religious organisations, schools, health professionals, community organisations and government authorities; (3) identify limitations of sanitation models that rely predominantly on behavioural mobilisation or infrastructure provision in isolation; (4) develop CIRSM as an integrated framework for participatory sanitation assessment, planning, education, infrastructure, monitoring and sustainability; (5) develop measurable indicators and implementation

responsibilities for evaluating the model; and (6) propose a pilot-testing strategy through which CIRSM can be empirically assessed before wider application.

### 1.4 Research Questions

1. How can meaningful community participation contribute to sustainable rural sanitation and environmental-health improvement?

2. What roles can community institutions, households, technical professionals and governmental authorities perform within an integrated rural sanitation system?

3. In what respects does CIRSM extend existing community-centred sanitation approaches?

4. How can community participation be integrated with infrastructure, technical support, financing, monitoring and institutional accountability?

5. Which measurable indicators can be used to assess implementation, effectiveness, equity and sustainability?

6. How can the proposed model be pilot-tested and refined before wider application?

## CONCEPTUAL AND THEORETICAL FRAMEWORK

### 2.1 Community Participation

Community participation refers to meaningful involvement of affected populations in identifying problems, determining priorities, making decisions, implementing interventions, monitoring progress and evaluating outcomes. Participation therefore differs from consultation that merely informs people of decisions already taken. Arnstein's theory of citizen participation is useful for distinguishing substantive involvement from symbolic inclusion. Applied to rural sanitation, meaningful participation requires genuine opportunities to influence priorities, shape feasible interventions, provide local knowledge and evaluate institutional performance.

### 2.2 Collective Action and Community Ownership

Sanitation possesses an important collective dimension because unsafe practices can produce environmental consequences extending beyond individual households. Effective sanitation therefore requires cooperation among people who share environmental spaces and public-health risks. Community ownership develops when residents perceive sanitation improvement as a legitimate shared priority and participate meaningfully in decisions concerning implementation and maintenance. Ownership, nevertheless, should not be interpreted to mean complete community financing of public infrastructure.

### 2.3 Environmental Health and Appropriate Sanitation

Environmental health encompasses environmental factors affecting human health and well-being. Sanitation represents an important component because safe systems minimise human contact with excreta and environmental contamination. Appropriate sanitation requires more than availability. Infrastructure must correspond to environmental circumstances, including water availability, soil and groundwater conditions, settlement patterns, affordability and capacity for maintenance. CIRSM therefore rejects technological uniformity.

### 2.4 From Community-Led Sanitation to Integrated Sanitation Governance

Existing participatory sanitation approaches have made an important contribution by demonstrating the significance of collective behaviour and community mobilisation. CLTS is particularly influential because of its emphasis on community recognition of sanitation problems and collective action to eliminate open

defecation. Nevertheless, financial barriers, physical infrastructure, land availability, institutional capacity, maintenance problems and unequal household resources can affect outcomes.

CIRSM does not reject CLTS. Rather, it builds upon community agency while widening the conceptual framework. Its distinctive contribution lies in integrating community participation and behavioural change; technical assessment and context-appropriate infrastructure; explicit institutional responsibilities; household affordability and equity; transparent financing and accountability; measurable monitoring indicators; maintenance planning; grievance and feedback mechanisms; and iterative evaluation and adaptation. CIRSM therefore moves analytically from community mobilisation toward integrated community sanitation governance.

# METHODOLOGY

### 3.1 Research Design

The study adopts a qualitative, practice-oriented conceptual research design. Its purpose is model development rather than measurement of an intervention effect. Documentary analysis and conceptual synthesis were used to identify recurring principles, implementation challenges and institutional conditions relevant to sustainable rural sanitation. No intervention trial, representative household survey, laboratory assessment or epidemiological study was conducted.

### 3.2 Documentary Scope and Selection Criteria

Sources considered for conceptual synthesis included peer-reviewed research, systematic reviews and meta-analyses, national sanitation policy documents, international sanitation guidance and relevant research addressing rural Nigerian sanitation. Documents were considered conceptually relevant when they addressed one or more of the following domains: community participation and ownership; rural sanitation and elimination of open defecation; environmental-health education and behavioural change; sanitation infrastructure and facility use; institutional coordination and accountability; affordability and equitable access; monitoring and sustainability; or sanitation implementation within Nigeria or comparable rural contexts. Because this article represents a conceptual synthesis rather than a systematic review, the documentary procedure should not be interpreted as an exhaustive enumeration of all sanitation literature.

### 3.3 Analytical Procedure

Documentary analysis proceeded through four conceptual stages. Stage 1 identified recurrent sanitation challenges, including insufficient behavioural change, poor facility functionality, inadequate maintenance, affordability barriers, weak institutional coordination and limited accountability. Stage 2 categorised implementation requirements into participation, education and behaviour, infrastructure and technical support, coordination, equity and financing, monitoring, and sustainability. Stage 3 mapped stakeholder roles among households, community organisations, traditional leadership, schools, religious organisations, health professionals, technical personnel and government authorities. Stage 4 integrated these domains into six mutually reinforcing CIRSM components and developed monitoring indicators and a proposed pilot-testing process.

### 3.4 Contextual Reference: Ndubia, Ebonyi State

Ndubia provides the contextual reference through which the practical organisation of rural community institutions is considered. It is not presented as the source of representative empirical findings. Local baseline conditions should be established empirically before CIRSM is implemented, including household sanitation access, facility functionality, accessibility, maintenance status, sanitation practices, financing constraints, environmental risks and capacities of participating institutions.

### 3.5 Ethical Considerations

The article does not report interviews, identifiable individual information or new quantitative data and therefore does not constitute an empirical human-participant intervention. Future testing involving households,

interviews, observations or collection of personal information should obtain appropriate ethical approval and institutional permission.

# THE COMMUNITY-INTEGRATED RURAL SANITATION MODEL

### 4.1 Overview and Logic of CIRSM

CIRSM conceptualises sustainable sanitation as a continuous relationship among community participation, institutional coordination, infrastructure, education, technical support, monitoring and learning. Its pathway is: Participatory diagnosis -> Joint priority setting -> Allocation of institutional responsibilities -> Coordinated education, infrastructure and technical intervention -> Monitoring and accountability -> Evaluation and adaptation -> Sustainable sanitation outcomes. Feedback operates throughout the process.

### 4.2 Component One: Participatory Sanitation Assessment

Implementation begins with a structured assessment of sanitation needs, environmental conditions, existing facilities and barriers. A representative sanitation committee should include community leadership, women, young people, households with differing socioeconomic circumstances, people with disabilities, schools, religious institutions, health professionals and relevant government representatives. The assessment should establish baseline information on facilities, functionality, accessibility, maintenance, water availability, communal concerns and institutional resources.

### 4.3 Component Two: Joint Planning and Responsibility Allocation

Assessment findings should be translated into a written Community Sanitation Action Plan specifying the identified priority, recommended action, responsible stakeholder, required resources, estimated implementation period, monitoring indicator and procedure for reviewing progress. Community responsibility should remain clearly distinguished from governmental and professional responsibilities.

### 4.4 Component Three: Environmental-Health Education and Behavioural Support

Education should remain integral to CIRSM but be connected with practical opportunities for households to adopt safer sanitation. Schools, religious organisations, health professionals, community associations and local meetings provide potential channels for regular environmental-health education. The model explicitly rejects humiliation of households experiencing financial, physical or structural barriers.

### 4.5 Component Four: Appropriate Infrastructure, Financing and Technical Support

Technical assessment should determine appropriate sanitation options according to physical environment, household resources, water availability, accessibility requirements and maintenance capacity. Interventions may include rehabilitation of existing facilities, household toilets, accessible facilities in schools and public institutions, water improvements, safe arrangements for faecal waste and targeted technical support. Affordability should be explicitly considered through transparent and equitable financing arrangements.

### 4.6 Component Five: Monitoring, Feedback and Accountability

Monitoring should routinely document facility functionality, defects, repair status, participation, expenditure, completion of planned activities, accessibility, educational activities, stakeholder complaints and unresolved implementation barriers. Monitoring should measure functionality rather than simply count constructed toilets. A structured feedback mechanism should enable households and stakeholders to report technical problems, unfair treatment, exclusion or non-performance.

### 4.7 Component Six: Periodic Review, Adaptation and Sustainability

Evaluation should assess whether facilities remain functional, households and institutions use and maintain them, previously excluded households gain access, financial mechanisms remain transparent, institutions carry

out assigned responsibilities and new barriers have emerged. Findings should inform a revised action plan, making CIRSM an iterative rather than linear model.

# IMPLEMENTATION FRAMEWORK

### 5.1 Stakeholder Responsibilities

Implementation requires differentiated but coordinated responsibilities. Households participate in assessment, planning, appropriate facility use and feasible maintenance. Traditional and community leaders convene stakeholders and facilitate collective decisions. Women's and youth organisations participate directly in priority setting. Schools support environmental-health education and maintain institutional sanitation facilities within their capacity. Religious institutions can reinforce environmental responsibility while complementing professional guidance. Health and environmental-health professionals provide technical advice, education, inspection and monitoring. Local government authorities have roles in planning, regulation, technical support, environmental-health services and coordination.

# IMPLEMENTATION BARRIERS AND MITIGATION STRATEGIES

### 7.1 Financial Constraints

Household poverty can make sanitation improvements difficult even where motivation is high. CIRSM therefore incorporates affordability assessment and targeted support. Local adaptation should investigate financing options, prioritise essential improvements and ensure transparent eligibility criteria for assistance.

### 7.2 Institutional Capacity

Local institutions may possess uneven technical, administrative and financial capacity. Clear mandates, written responsibilities, regular reporting and continuing professional support are therefore necessary.

### 7.3 Stakeholder Conflict and Elite Capture

Community participation does not automatically guarantee equality. Representative membership, transparent decision procedures, public reporting and accessible feedback mechanisms should form part of implementation.

### 7.4 Sociocultural and Behavioural Barriers

Knowledge does not always translate directly into behaviour. CIRSM addresses this difficulty by combining education with structural and institutional support rather than treating unsafe sanitation exclusively as a knowledge deficit.

### 7.5 Infrastructure Failure and Maintenance

Construction without maintenance planning can produce short-lived improvements. CIRSM requires responsibility for maintenance to be defined during planning, with monitoring identifying defects early and documenting agreed repairs.

### 7.6 Sustainability of Community Participation

Initial enthusiasm can decline. Implementation should use realistic monitoring schedules, distribute responsibilities and integrate sanitation duties into established community and institutional structures where appropriate.

# PROPOSED PILOT-TESTING AND VALIDATION STRATEGY

### Phase 1: Baseline Assessment

Document household sanitation access, facility type and functionality, maintenance condition, accessibility, sa-

nitation practices, household affordability constraints, stakeholder institutions, environmental concerns and existing monitoring arrangements.

**Phase 2: Stakeholder Mapping and Institutional Preparation**

Identify relevant stakeholders, agree responsibilities and formally document representation and decision-making procedures.

**Phase 3: Participatory Planning**

Present baseline evidence to stakeholders for prioritisation and develop a time-bound sanitation action plan with responsibilities, resources and indicators.

**Phase 4: Pilot Implementation**

Introduce selected CIRSM interventions according to the plan and document activities, costs where available, obstacles and modifications.

**Phase 5: Process Evaluation**

Examine whether intended groups participate, stakeholder responsibilities are fulfilled, infrastructure interventions occur as planned, education reaches target populations, financial procedures are transparent and monitoring remains operational.

**Phase 6: Outcome Evaluation**

Compare follow-up indicators with baseline conditions. Primary outcomes should include facility functionality, access, maintenance, participation and sustained safe sanitation use.

**Phase 7: Qualitative Evaluation**

Subject to ethical approval, interviews or focus groups may examine community acceptability, perceived fairness, institutional relationships, implementation barriers and unintended effects.

**Phase 8: Model Refinement**

Use findings to modify CIRSM before wider testing. Subsequent comparative evaluation across several rural communities could examine transferability and contextual variation.

## DISCUSSION

### 9.1 Community Participation as a Necessary but Insufficient Condition

Meaningful community participation is indispensable to sustainable rural sanitation but is not sufficient by itself. Communities possess knowledge about priorities, institutional relationships, household constraints and environmental conditions, yet even highly motivated communities require appropriate technology, financial resources, effective institutions, professional support and functioning accountability mechanisms. CIRSM responds by embedding participation within a broader system of institutional and material support.

### 9.2 CIRSM's Distinctive Contribution

The originality of CIRSM does not rest on claiming that community participation, environmental-health education, monitoring or infrastructure are individually new ideas. Its proposed contribution lies in their operational integration. CIRSM links participatory assessment to differentiated responsibilities, behavioural mobilisation to infrastructure and affordability, maintenance to explicit planning, measurable accountability to both community and public institutions, equity to implementation, and monitoring to adaptive decision-making. It should therefore be understood as an integrated governance model for community sanitation rather than a replacement label for CLTS.

### 9.3 Institutional Coordination and Shared Responsibility

CIRSM replaces undifferentiated community responsibility with shared but differentiated responsibility. Traditional and religious institutions may have substantial community reach but cannot replace technical environmental-health services. Government institutions possess public responsibilities but may implement programmes more effectively when communities participate in identifying priorities.

### 9.4 Equity and Human Dignity

Interventions directed toward collective environmental benefits can unintentionally stigmatise households unable to comply because of poverty, disability, land constraints or other barriers. CIRSM approaches accountability through both obligation and enablement, maintaining community standards without reducing sanitation policy to punishment.

### 9.5 Practical Applicability

CIRSM establishes a sequence connecting assessment, planning, action, monitoring and adaptation; identifies stakeholders; distinguishes community and institutional responsibilities; and provides an evaluation framework. Its applicability, however, cannot be established conceptually and should be evaluated through pilot implementation.

## POLICY AND PRACTICAL RECOMMENDATIONS

Rural sanitation programmes should create meaningful mechanisms for communities to participate in identifying priorities and evaluating implementation. Community mobilisation should be accompanied by technical assessment and context-appropriate infrastructure. Sanitation plans should explicitly identify responsibilities of households, community organisations, schools, religious institutions, health professionals and government agencies. Affordability and equity should form part of intervention design from the beginning. Monitoring should emphasise functionality, accessibility, safe use and maintenance rather than construction figures alone. Public and community sanitation expenditure should be transparently reported. Programmes should include maintenance planning and scheduled follow-up. Environmental-health education should be sustained through multiple institutions and connected to practical opportunities for behavioural change. Enforcement should conform to applicable law and protect human dignity. CIRSM should initially be implemented as a carefully evaluated pilot; wider adoption should depend on empirical evidence of feasibility, equity, acceptability, functionality and sustainability.

## LIMITATIONS AND FUTURE RESEARCH

### 11.1 Limitations

This is a conceptual, practice-oriented study rather than an evaluation of an implemented intervention. CIRSM has not yet demonstrated effectiveness. Ndubia functions as the contextual reference rather than as the location of a representative empirical sanitation survey. The framework integrates existing conceptual and empirical literature but does not constitute a systematic review. Cost-effectiveness has not been assessed, and feasibility of the proposed institutional responsibilities requires field evaluation.

### 11.2 Future Research

Future research should begin with baseline assessment and pilot implementation. Particular attention should be given to affordability of sanitation technologies; willingness to participate; participation of vulnerable groups; facility functionality and maintenance; institutional compliance; implementation costs; stakeholder conflict; sustainability of sanitation behaviour; community perceptions of fairness and ownership; and adaptation across different rural settings.

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## CONCLUSION

Sustainable rural sanitation requires more than construction of toilets, dissemination of health information or temporary community mobilisation. It requires an integrated system in which behavioural commitment is supported by appropriate infrastructure, technical expertise, equitable financing, defined institutional responsibilities, transparent accountability and continuous evaluation. CIRSM combines participatory assessment, joint planning, environmental-health education, appropriate infrastructure and technical assistance, monitoring and accountability, and adaptive evaluation. Its principal contribution lies in repositioning participation within a broader framework of integrated sanitation governance. CIRSM remains a proposed rather than empirically validated model, and its effectiveness, affordability and sustainability should be established through carefully designed pilot implementation and prospective evaluation.

## MONITORING AND EVALUATION FRAMEWORK

Monitoring should begin with a documented baseline. Where baseline measurements for Ndubia have not yet been empirically established, the framework records the baseline as "to be established before implementation". Targets should subsequently be agreed on the basis of verified baseline conditions, resource availability and technical feasibility.

**Table 1. Proposed CIRSM Monitoring and Evaluation Matrix**

| Domain | Indicator | Baseline / Target | Responsible actors | Verification / Review |
|---|---|---|---|---|
| Participation | Representation of identified stakeholder groups | Baseline to be established; inclusive representation according to agreed criteria | Sanitation committee/community leadership | Membership and meeting records; quarterly |
| Infrastructure | Proportion of inspected facilities functional and usable | Baseline to be established; improvement according to action plan | Households, institutions, technical authorities | Structured facility inspection; quarterly |
| Accessibility | Access among vulnerable households and persons with disabilities | Baseline to be established; progressive reduction of access gaps | Committee/local authorities | Disaggregated access assessment; six-monthly |
| Maintenance | Proportion of identified defects addressed | Baseline to be established; target after technical assessment | Facility owners/responsible institutions | Maintenance logs and inspection; quarterly |
| Education | Participation in planned education activities | Baseline to be established; coverage target in community plan | Schools, health workers, religious/community organisations | Activity and attendance records; quarterly |
| Sanitation practice | Consistent use of functional sanitation facilities | Baseline to be established; improvement over baseline | Households/monitoring team | Ethical household assessment; six-monthly |
| Finance | Sanitation expenditure accounted for transparently | Baseline to be established; full programme reporting | Committee/relevant authorities | Financial statements; quarterly |
| Accountability | Reported problems receiving documented response | Baseline to be established; locally agreed resolution | Committee/responsible institutions | Complaint and response register; quarterly |

| | | | | |
|---|---|---|---|---|
| | | standard | | |
| Institutional performance | Agreed responsibilities completed | Baseline to be established; progressive completion | All designated stakeholders | Action-plan review; quarterly |
| Sustainability | Facilities remaining functional during follow-up | Baseline to be established; sustained/improved functionality | Committee/technical services | Repeat inspection; 6 and 12 months |

*Note. Numerical targets should be finalised only after baseline assessment so that targets are evidence-based, feasible and contextually appropriate.*

## DECLARATION OF CONFLICT OF INTEREST

The author declares no conflict of interest.

**Funding**

No external funding was received specifically for the preparation of this conceptual article.

**Data Availability**

No new dataset was generated or analysed for this conceptual article. Data collected during any subsequent empirical testing of CIRSM should be managed and shared in accordance with applicable ethical, institutional and legal requirements.

**Ethical Approval**

Ethical approval was not required for the present conceptual study because it does not report new research involving human participants or animals. Appropriate ethical approval should be obtained before prospective empirical testing involving human participants or identifiable data.

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