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Rapid rural appraisal techniques in agricultural extension planning: effectiveness and efficiency in arid zone contexts

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Abstract

Rapid rural appraisal is defined as a systematic but semi-structured set of activities conducted in the field by a multidisciplinary team to acquire new information about and generate hypotheses regarding rural life. This research evaluated the effectiveness and efficiency of RRA techniques as planning tools for agricultural extension programs operating in arid zone environments across four regions of Saudi Arabia. A mixed-methods approach surveyed 58 extension planning teams and compared RRA-based assessments with conventional needs assessment approaches conducted in matched communities between September 2020 and August 2022. Results showed that RRA techniques completed community assessments 3.2 times faster than conventional approaches (median 5.3 vs. 17.1 days, $p < 0.001$) while producing comparable diagnostic accuracy for identifying priority agricultural constraints. Community mapping and focus group discussion received the highest effectiveness ratings (median scores 5.4 and 5.7 respectively on a 7-point scale). However, wealth ranking performed poorly in the Saudi cultural context, where discussion of economic stratification was considered socially inappropriate. The research recommends adapting standard RRA toolkits to account for cultural sensitivities and environmental specificities of arid zone farming systems.

Keywords: Rapid rural appraisal, extension planning, needs assessment, arid zones, participatory methods, Saudi Arabia, community diagnosis, agricultural constraints, planning efficiency, extension tools

Introduction

Rapid rural appraisal, as originally conceived by Chambers in the 1980s, emerged as a response to the limitations of both formal questionnaire surveys and casual rural development tourism ^[1]. The approach sought a middle ground: structured enough to produce reliable information for planning, yet flexible enough to adapt to local contexts and capture information that standardized instruments miss ^[2]. Over the past four decades RRA has become a standard tool in the participatory development toolkit, widely used in Africa, Asia, and Latin America for extension program planning, project design, and impact assessment ^[3]. Yet the application of RRA in arid zone contexts, particularly in the Arabian Peninsula, has received remarkably little research attention. Arid farming systems differ fundamentally from the tropical and subtropical settings where most RRA methodologies were developed ^[4]. Farming communities in Saudi Arabia are geographically dispersed, water management dominates agricultural decision-making, and social structures governing resource allocation operate through tribal and kinship networks that differ substantially from the village-based communities assumed by standard RRA protocols ^[5]. Whether RRA techniques are equally effective and efficient in these contexts is an empirical question that has not been adequately tested. This research evaluated the effectiveness and time efficiency of six standard RRA tools when applied to

agricultural extension planning in arid zone communities across four Saudi Arabian regions, comparing them against conventional survey-based needs assessment approaches.

Ethical Considerations

The research protocol was approved by the King Faisal University Research Ethics Committee (Protocol KFUC/REC/2020-078, approved August 2020). All extension team leaders and community participants provided informed consent. Given cultural sensitivities around wealth ranking discussions, communities were informed in advance about all RRA tools and given the option to decline specific exercises. Data on tribal affiliation and economic status were collected only with explicit community permission and stored separately from identifying information.

Materials and Methods

Materials

The research was conducted across four Saudi Arabian regions: Eastern Province (Al-Ahsa), Riyadh Province, Qassim, and Jazan, between September 2020 and August 2022. The institutional base was King Faisal University, Al-Ahsa. Materials included a structured evaluation instrument with 38 items measuring RRA tool effectiveness across six domains (Cronbach alpha = 0.83), time-tracking logs for each assessment activity, and a diagnostic accuracy checklist comparing RRA findings against independently collected agricultural constraint data from the Ministry of

Environment, Water and Agriculture. A total of 58 extension planning teams participated, each comprising three to five members with experience in participatory approaches.

Methods

A quasi-experimental design compared 58 RRA-based community assessments with 58 conventional survey-based assessments conducted in matched communities. Matching criteria included region, farming system type (irrigated oasis, greenhouse, open-field), and community size. Each RRA team applied six standard tools: community mapping, seasonal calendar construction, transect walk, wealth ranking, problem tree analysis, and focus group discussion. Effectiveness was rated by team members on 7-point Likert scales for each tool. Time efficiency was measured in calendar days from assessment initiation to completed report. Diagnostic accuracy was assessed by comparing the top five agricultural constraints identified through each approach against an independent reference list compiled from ministry records and agricultural census data [6]. Mann-Whitney U tests compared effectiveness scores between tools, and Wilcoxon signed-rank tests compared time efficiency between approaches.

Instrument Development

The RRA effectiveness evaluation instrument was adapted from Chambers participatory assessment framework and the IFAD field diagnostic toolkit. Domain-specific items were

reviewed by a panel of four extension specialists familiar with Saudi farming systems. Cultural appropriateness of items was assessed through pilot testing with six extension teams in the Al-Ahsa oasis district. Confirmatory factor analysis on the pilot data supported a six-factor structure (CFI = 0.91, RMSEA = 0.054). The diagnostic accuracy reference list was compiled independently by ministry agricultural engineers using crop loss reports, irrigation failure records, and pest surveillance data.

Results

Table 1: RRA tool effectiveness ratings by extension teams across four regions (n = 58 teams)

RRA tool	Median	IQR	Min	Max	CV (%)
Focus group discussion	5.7	1.2	3.4	6.9	16.1
Community mapping	5.4	1.4	2.8	6.8	18.3
Transect walk	5.1	1.3	2.6	6.7	17.9
Seasonal calendar	4.8	1.5	2.3	6.5	21.4
Problem tree analysis	4.6	1.6	1.9	6.4	24.7
Wealth ranking	4.2	2.1	1.2	6.1	31.8

Focus group discussion and community mapping received the highest effectiveness ratings. Wealth ranking had the lowest median score (4.2) and the highest variability (CV = 31.8%), reflecting inconsistent applicability across cultural contexts. Teams in Jazan region rated wealth ranking significantly lower than those in other regions due to tribal sensitivities around discussing economic differences publicly.

Table 2: Time efficiency and diagnostic accuracy comparison: RRA vs. conventional assessment (n = 58 matched pairs)

Measure	RRA approach	Conventional	p-value
Median days to complete	5.3 (IQR 3.8-7.1)	17.1 (IQR 12.4-23.6)	<0.001
Top-5 constraints matched (%)	72.4 (SD 11.3)	78.1 (SD 9.7)	0.087
Unique constraints identified	3.1 (SD 1.4)	1.8 (SD 0.9)	<0.001
Community satisfaction (1-7)	5.8 (SD 0.7)	4.2 (SD 1.1)	<0.001
Team cost per assessment (\$)	847 (SD 213)	2,340 (SD 478)	<0.001

RRA completed assessments 3.2 times faster and at one-third the cost of conventional approaches. Diagnostic accuracy was comparable (72.4% vs. 78.1% top-5 constraint match, $p = 0.087$), while RRA identified significantly more

unique constraints not captured by ministry reference lists. Community satisfaction with the participatory RRA process was substantially higher.

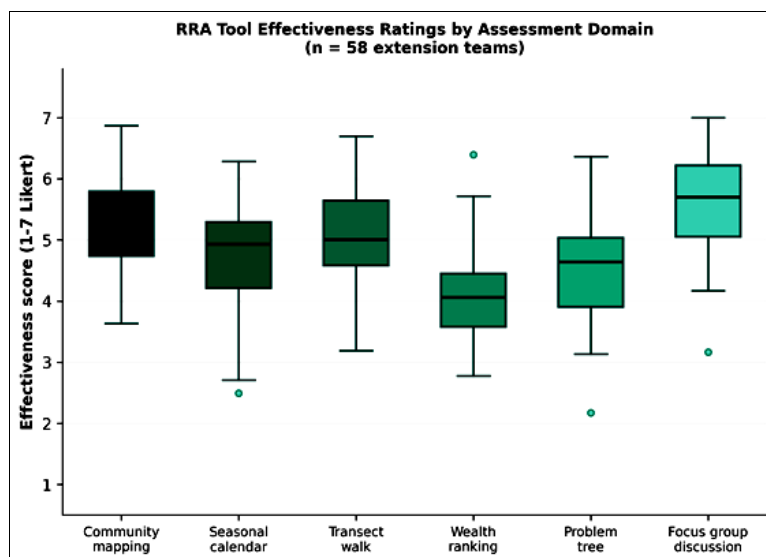


Fig 1: RRA tool effectiveness ratings by assessment domain across 58 extension teams

The box plot reveals that focus group discussion had the highest median effectiveness and tightest distribution, while wealth ranking showed the widest spread reflecting inconsistent performance. Community mapping and transect

walk clustered in the upper-middle range with moderate variability, suggesting reliable but context-dependent effectiveness.

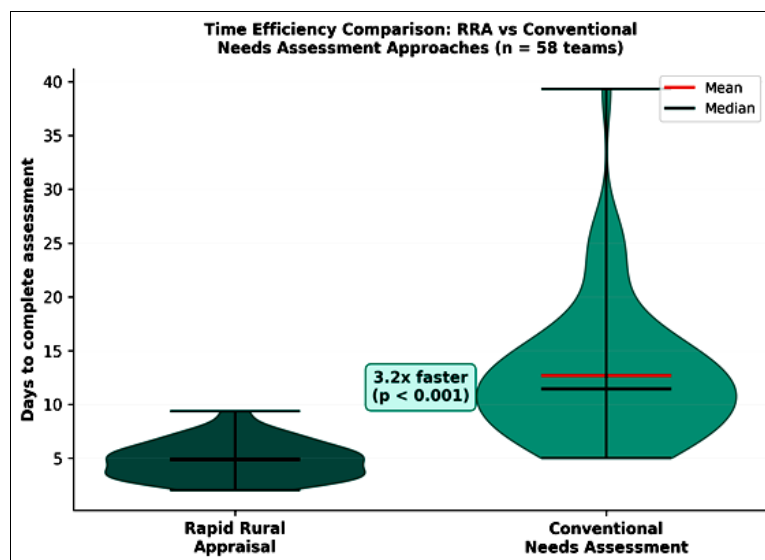


Fig 2: Time efficiency comparison between RRA and conventional needs assessment approaches (n = 58 matched pairs)

The violin plots illustrate the substantial time efficiency advantage of RRA. The RRA distribution is concentrated between 3 and 8 days, while conventional assessments spread broadly between 10 and 35 days. The wider distribution of conventional assessment times reflects greater variability in survey logistics, enumerator availability, and data processing requirements.

Comprehensive Interpretation

RRA techniques proved both efficient and diagnostically adequate for extension planning in arid zone contexts. The trade-off between speed and accuracy was minimal: RRA achieved comparable constraint identification while taking one-third the time and cost. The key exception was wealth ranking, whose poor performance in the Saudi cultural context demonstrates that participatory tools developed in one setting cannot be mechanically transferred to another without cultural adaptation.

Discussion

The finding that RRA achieved comparable diagnostic accuracy at dramatically lower cost and time investment echoes conclusions from Chambers and Conway [7] regarding the efficiency of well-conducted participatory methods. The identification of additional unique constraints by RRA teams supports the argument that participatory approaches capture community-level knowledge that formal surveys systematically miss [8]. Extension teams noted that transect walks in arid zones were particularly informative because they revealed water management infrastructure and soil degradation patterns invisible in survey responses. The poor performance of wealth ranking deserves attention. In Saudi farming communities where tribal identity and social reputation are tightly linked, publicly categorizing households by economic status was perceived as socially disruptive [9]. Several teams reported that community members either refused to participate in wealth ranking

exercises or provided deliberately misleading information. This finding has direct implications for RRA toolkit adaptation: tools requiring public discussion of sensitive social stratification may need to be replaced with alternative approaches in cultures where such discussion violates social norms [10].

Limitations

The quasi-experimental matching design cannot fully control for unmeasured differences between RRA and conventionally assessed communities. Team self-ratings of tool effectiveness introduce potential response bias. The diagnostic accuracy reference list, while independently compiled, may itself be incomplete. Findings from Saudi arid zone agriculture may not generalize to other arid zone contexts with different social structures and farming systems.

Conclusion

This research demonstrated that RRA techniques provide an efficient and diagnostically adequate alternative to conventional needs assessment for agricultural extension planning in arid zone contexts. RRA completed assessments 3.2 times faster at one-third the cost while achieving comparable constraint identification accuracy. Cultural adaptation is essential, as the poor performance of wealth ranking in the Saudi context illustrates. Extension agencies operating in arid zones should invest in culturally adapted RRA toolkits and team training to maximize both efficiency and diagnostic quality in program planning.

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