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Gender relations and decision-making on climate change adaptation in rural East African households: A qualitative systematic review

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27 **Abstract**

28 Background: Climatic changes are threatening rural livelihoods in East Africa.
29 Evidence suggests that climate change adaptation in this context might reproduce inequitable
30 intra-household gender relations and that adaptation may be more effective when women are
31 involved in meaningful ways. Hence, a nuanced understanding of the gendered nature of intra-
32 household adaptation decision-making is essential for gender-responsive research, policy-
33 making and practice.

34 Objective: This qualitative systematic review aimed to investigate how gender relations
35 influence decision-making concerning climate change adaptation in rural East African
36 households and how decisions about climate change adaptation influence intra-household
37 gender dynamics, in turn.

38 Methods: Applying qualitative meta-synthesis principles, systematic searches were
39 conducted in 8 databases and supplemented with comprehensive hand searches. 3,662 unique
40 hits were screened using predetermined inclusion criteria, leading to a final sample of 21
41 papers. Relevant findings of these studies were synthesised using inductive thematic coding,
42 memoing and thematic analysis.

43 Results: While men tended to be the primary decision-makers, women exercised some
44 decision-making power in traditionally female domains and in female-headed households.
45 Women's and men's roles in intra-household adaptation decision-making appeared to be
46 influenced by a plethora of interconnected factors, including gender norms, gendered divisions
47 of labour and access, ownership and control over resources. Intra-household adaptation seemed
48 to impact the dynamics between male and female household members. The pathways of this
49 influence were complex, and the ultimate outcomes for men and women remained unclear.

50 Discussion: We discuss our findings with reference to theoretical literature on gender-
51 transformative approaches in development and adaptation and previous research concerning
52 the gendered nature of CCA in East Africa. We then discuss implications for gender-responsive
53 adaptation interventions.

54 **Introduction**

55 Climatic changes, such as droughts, increased temperatures, unreliable rainfall and floods, are
56 threatening rural livelihoods in East Africa.[1] To adapt to these challenges, farmers, fishers, and
57 livestock holders are adopting a range of adaptation strategies, e.g., livelihood diversification including
58 on-farm and off-farm activities, utilisation of new technologies and migration.[1,2] We refer to these
59 strategies as autonomous climate change adaptation (CCA) practices. Moreover, governments,
60 intergovernmental and non-governmental organisations (NGOs) are increasingly implementing
61 interventions to enhance CCA in rural East Africa,[3,4] which we refer to as external CCA interventions
62 or initiatives. However, studies indicate that neither climate change impacts nor CCA are gender-neutral
63 [5,6]. Previous reviews indicate that CCA initiatives have the potential to reproduce or reinforce
64 inequitable gender relations.[7,8] Furthermore, it has been argued that CCA initiatives may be more
65 effective when women are involved in meaningful ways.[9]

66 Acknowledging the importance of the gender-CCA nexus, leading UN agencies and NGOs now
67 emphasise that equitable participation and benefits from CCA cannot be achieved without addressing
68 fundamental social, economic and cultural structural barriers through intersectional gender-
69 transformative approaches (GTAs).[10,11] Simultaneously, adaptation research has paid increasing
70 attention to the influence of gender norms and roles on individuals', households' and communities'
71 involvement in CCA practices and decision-making. A scoping review conducted in preparation for this
72 systematic review suggested that, while scientific interest used to centre around comparing CCA in
73 male- and female-headed households, the last five years have seen an increasing number of qualitative
74 and mixed-methods studies investigating the gendered nature of CCA decision-making in rural East

75 African households. These intra-household perspectives seem essential for policy-makers, practitioners
76 and researchers striving to understand how gender norms and relations shape CCA practices and how
77 these practices can, in turn, influence gender dynamics.

78 To our knowledge, no previous review has yet focused on this inter-dependency of intra-
79 household gender relations and CCA practices, indicating a missed opportunity to synthesise research
80 in order to make it more accessible to policy-making and practice. Moreover, most existing reviews
81 concerning the gender-CCA nexus in sub-Saharan Africa have not been systematic or do not report on
82 methodology in sufficient detail to appraise their quality.[12–14]

83 Hence, the present review aims to investigate how gender and gender relations influence
84 decision-making concerning CCA in rural East African households and how decisions about CCA
85 influence intra-household gender dynamics, in turn. To this end, this review pursued three specific
86 objectives: 1. to identify gender dynamics of intra-household CCA negotiations and decision-making,
87 2. to analyse underlying factors that shape the gendered nature of CCA decision-making, and 3. to
88 explore how internal and external CCA processes affect intra-household gender dynamics. All specific
89 objectives were achieved, but since the studies included in this review tended to focus on autonomous
90 rather than external CCA initiatives, our findings for external CCA are less nuanced than findings
91 regarding autonomous CCA.

92 **Background**

93 This section situates the present review within the larger research project that it is a part
94 of, justifies our choice to focus on qualitative evidence stemming from settings in East Africa,
95 and clarifies key concepts employed throughout this article, including gender, CCA, GTAs and
96 livelihoods.

97 The present review constitutes part of a larger research project developed in
98 collaboration between the University of Dar es Salaam, the State University of Zanzibar and

99 the University of Copenhagen. The project received funding from the Danish Ministry of
100 Foreign Affairs (Danida) and investigates gendered encounters in CCA in four districts of
101 Tanzania and Zanzibar. The present review served to inform our research protocol on gendered
102 encounters at intra-household level.

103 The geographic focus of the present review is partly derived from the larger research
104 project within which it is situated. Moreover, the aforementioned scoping review revealed that
105 many reviews concerning the gender-CCA nexus have covered a wide range of locations,[e.g.
106 8,15,16] but gender roles and decision-making in CCA processes appear to be highly context-
107 dependent. Thus, focusing on East Africa provided the necessary geographical focus to ensure
108 that synthesis is feasible, while also ensuring that we could access sufficient primary data to
109 allow for a nuanced analysis. The motive for our choice to include only qualitative evidence
110 was that we deemed qualitative data to be most conducive for generating the nuanced, in-depth
111 insights into intra-household CCA decision-making that we deem essential for gender-
112 responsive research, policy and practice.

113 **Clarification of key concepts**

114 In the present review, we adopt the United Nations Population Fund’s definition of
115 *gender* as “the economic, social and cultural attributes and opportunities associated with being
116 male or female.”[17] Thus, we contend that gender-responsive CCA research and practice must
117 move past mere comparisons of women’s and men’s perceptions, experiences and activities.
118 The present review stands in alignment with the work of an increasing number of scholars who
119 emphasise that gender-responsive CCA ought to account for “social relations of production,
120 cultural norms and broader political-economic institutions [that mediate] the nature of
121 exchanges, opportunities and the distribution of resources [and] contribute to the specific

122 constructions and experiences of vulnerability, as well as capacities to respond and cope with
123 climate stresses.”[18,p.28]

124 Further, the present review employs the Intergovernmental Panel on Climate Change’s
125 definition of *CCA* as “the process of adjustment to actual or expected climate change and its
126 effects in order to moderate harm or exploit beneficial opportunities.”[19,p.43] We distinguish
127 between autonomous and external *CCA* practices. Following Malik, Qin and Smith, we
128 understand *autonomous CCA* as *CCA* practices adopted “by individuals and communities
129 without deliberative government planning or intervention,”[20,p.14] which are nonetheless
130 intertwined with “existing social, political, cultural and market institutions.”[20,p.15] On the
131 other hand, we understand *external CCA*, also referred to as planned adaptation, as stemming
132 from “a deliberative policy decision, based on an awareness that conditions have changed or
133 are about to change and that action is required to return to, to maintain, or to achieve a desired
134 state.”[20,p.4] We refer to such interventions as “external” rather than “planned” to underscore
135 that autonomous *CCA* practices can also be planned.

136 Based on these conceptualisations of gender and *CCA*, we adopt Blythe et al.’s
137 understanding of transformative *CCA* as an approach that addresses fundamental social,
138 political and economic structures that together play a role in rendering populations more
139 vulnerable and marginalised due to inequality.[21] Interventions employing *GTAs* embody this
140 approach with specific focus on how gender ideology and norms embedded in these structures
141 indirectly and directly shape women’s and men’s access to resources and to participation in
142 decision-making fora.[22,23] *GTAs* are commonly conceptualised as spanning three primary
143 dimensions: agency, relations, and institutional structures.[23] In this context, agency refers to
144 “individual and collective capacities[...], attitudes, critical reflection, assets, actions, and access
145 to services”[23,p.5]; relations entail “the expectations and cooperative or negotiation dynamics

146 embedded within relationships between people in the home, market, community, and groups
147 and organizations”[23,p.5]; and structures include “informal and formal institutional rules that
148 govern collective, individual and institutional practices, such as environment, social norms,
149 recognition and status”[23,p.5]. While GTAs are not explicitly addressed in the findings of this
150 review, we return to the notions outlined here in the discussion.

151 The discussion also builds on the notion of *livelihoods* and *livelihood transformations*
152 as conceptualised by Carr.[24] Carr notes that agrarian livelihoods are “project[s] of managing
153 both social and natural processes to create and maintain particular socio-ecological states that
154 further specific goals of those living in that system, particularly the goals of those whose
155 authority provides them with privileges not enjoyed by others.”[24,p.71] According to Carr,
156 gendered roles and identities tend to become more rigid when livelihoods are under
157 environmental or social stress, and it is only when livelihood projects fail to ensure subsistence
158 that spaces for re-negotiation and innovation tend to open up.[24] Such openings may present
159 opportunities for re-arranging intra-household dynamics in a more equitable manner. However,
160 the ensuing transitions are themselves characterised by power structures and pervasive norms
161 and often pose new risks to different household members, especially those who are most
162 vulnerable.[24]

163 **Methods**

164 The present review employed principles from the qualitative meta-synthesis
165 approach.[25,26] This approach was chosen for its systematic and comprehensive manner of
166 synthesising qualitative primary data in order to generate deeper insights into the phenomena
167 under study.[25] Qualitative meta-syntheses commonly result in the formulation of
168 frameworks, models or theories.[27] We chose not to formulate a framework based on our

169 review findings given the scarcity of primary data for some of the themes under study and the
170 questionable quality of some of the included articles (cf. Results). Nonetheless, we found that
171 the application of qualitative meta-synthesis principles to our search, screening and analysis
172 strategies to be useful in generating a comprehensive, in-depth overview of our field of
173 interest. The study was not registered prior to publication, and the review protocol was not
174 published.

175 **Search strategy**

176 As is common for qualitative meta-syntheses,[28] our goal was to retrieve all studies
177 relevant to our review objectives. The search strategy consisted of systematic database searches
178 and supplementary hand searches that were developed through iterative trial searches.
179 Supplementary hand searches were deemed necessary because it has been shown that database
180 searches often do not suffice to identify all qualitative research on a given topic.[25]
181 Recognizing that systematic searches for qualitative studies tend to include trade-offs between
182 recall (i.e., identifying all relevant studies) and precision (i.e., identifying few non-relevant
183 studies),[29] we chose to prioritise recall and thus adopted several complementary search
184 techniques.

185 Our systematic database search spanned 8 databases covering a wide range of
186 disciplines related to the gender-CCA nexus: Anthropology Plus,[30] Anthrosource,[31]
187 International Bibliography of the Social Sciences,[32] Scopus,[33] SocINDEX,[34]
188 Sociological Abstracts,[35] Web of Science,[36] and Women's Studies International.[37] The
189 systematic database search was conducted on 04.05.2022. A detailed search log, including
190 number of hits and search strings used for each database is available in S1 Search strategy.

191 The supplementary hand searches were conducted between June and August 2022 and
192 consisted of a range of techniques that are commonly included in the umbrella term

193 *berrypicking*[28,38]: We conducted forward and backward searches of all studies included
194 during the screening process, we searched all publications of the first authors of included
195 studies, and we conducted comprehensive hand searches of selected journals (Nature Climate
196 Change,[39] Climate Policy,[40] Climate and Development,[41] and Gender and
197 Development[42]) and one database (African Journals OnLine[43]) that we had identified as
198 highly relevant to this review during the aforementioned scoping review. African Journals
199 OnLine could not be searched systematically due to the limited advanced search functions
200 available in this database. Further information regarding the search terms used for journal and
201 database hand searches are available in S1 Search strategy.

202 Lastly, a second systematic database search was conducted in Scopus[33] and Web of
203 Science[36] on 17.06.2023 to enhance recall of the newest relevant studies. Scopus[33] and
204 Web of Science[36] were selected for this search because these databases had rendered the
205 most absolute and relevant hits during the first systematic database search. Further information
206 is available in S1 Search strategy.

207 **Screening of records**

208 An overview of the screening process is given in Fig 1. All hits were first saved in
209 Zotero,[44] where duplicates were removed. All unique hits were then uploaded to Rayyan,[45]
210 where titles and abstracts were screened independently by two researchers using predetermined
211 inclusion criteria (except for hits resulting from the second database search, which were only
212 screened by the first author due to time constraints). Incongruencies were resolved through
213 discussion between the first and second authors. Next, full texts of all studies that had passed
214 the title and abstract screening were screened using the same inclusion criteria. After this,
215 Incongruencies were again resolved through discussion between the first and second authors.

216 **Fig 1. Flow chart of article inclusion.**

217 The inclusion criteria were as follows: 1. general study characteristics (studies had to
218 be peer-reviewed and published in English), 2. population (studies had to include participants
219 from rural regions of East Africa, as defined by the United Nations Statistics Division[46]), 3.
220 methodology (studies had to report findings from qualitative primary data collection methods),
221 and 4. content (studies had to report findings that explicitly describe how men and women
222 negotiate CCA practices within households).

223 **Quality appraisal of included studies**

224 There seems to be no scientific consensus concerning the approach to designing
225 and conducting quality appraisals when synthesising qualitative research.[27] We decided to
226 appraise the quality of all included studies because the full-text screening had indicated great
227 discrepancies of quality between studies, and we expected that our analysis would benefit from
228 a more systematic overview over the quality of included studies.

229 We based the quality appraisal on Saini and Shlonsky's Qualitative Research Quality
230 Checklist.[27] This 25-item checklist covers studies' theoretical frameworks, settings, research
231 designs, sampling procedures, data collection, ethical issues, researcher reflexivity, data
232 analysis, and reporting of the findings. This tool was chosen because it allows for an assessment
233 of quality across a wide range of qualitative research designs, it is more comprehensive than
234 other comparable tools, and it was developed and piloted in a rigorous and transparent
235 manner.[27] We used the first 22 items of the Checklist and left out the last three items relating
236 to fairness and the promotion of justice, since our main aim was to assess the quality of the
237 findings. Each included article was assessed by one of the authors. As is common practice for
238 qualitative reviews,[27] we chose to consider the quality appraisal results during our analysis
239 rather than excluding any studies from the analysis.

240 **Data extraction and analysis**

241 The analysis followed a two-step process. First, primary findings relevant to the
242 review's specific objectives were extracted from all included studies through an iterative,
243 thematic coding process. Authors of the included studies were not contacted during this process
244 due to time constraints. Findings of each article were coded by one reviewer. We chose an
245 inductive approach (i.e., rather than using predetermined themes and codes, we relied on
246 themes and codes emerging from the included studies) because this allows for the preservation
247 of the original interpretations of primary studies, which is essential for qualitative meta-
248 syntheses.[25]

249 Specifically, the first author coded 9 of the included studies openly, i.e., assigning codes
250 that were as close as possible to the original meaning of the respective text passages. Based on
251 these codes, she then developed a coding framework which grouped related codes under
252 themes. Serving as a basis for the extraction of findings from the remaining included articles,
253 this framework was then developed and expanded in an iterative manner. The authors compiled
254 their extractions in a shared Google Sheets[47] table. During the coding process, the authors
255 also collected information pertaining to studies' settings and methodologies.

256 Once the coding had been completed, the authors shared their reflections on each theme,
257 code, and interconnections between different themes and codes in an interactive analysis
258 session using the ConceptBoard digital collaboration software.[48] The first author then used
259 the results from this session and the shared data extraction sheet as a starting point for further
260 thematic analysis.

261 **Results**

262 This section provides an overview of the included studies, results of the quality
 263 appraisal, and a summary of the review findings based on three primary themes that emerged
 264 from the analysis (intra-household CCA decision-making, factors influencing gendered CCA
 265 decision-making and CCA impacts on intra-household gender dynamics). The section on intra-
 266 household CCA decision-making aligns most closely with the first specific objective, the
 267 section on factors influencing gendered CCA decision-making covers specific objective two,
 268 and the final section relates to specific objective three (cf. Introduction).

269 Study characteristics

270 The screening process outlined above resulted in 21 included articles.[18,49–68] Of
 271 these, 18 resulted from the first database search and 3 were identified through supplementary
 272 hand searches. General characteristics of the articles are summarised in Table 1, and detailed
 273 information for each article is available in S3 Table.

274 **Table 1. General characteristics of the included articles**

Characteristic	Sub-category	No. of articles per sub-category
Country*	Zimbabwe	4 (19%)
	Ethiopia	4 (19%)
	Tanzania	4 (19%)
	Kenya	4 (19%)
	Zambia	3 (14%)
	Malawi	3 (14%)
	Eritrea	1 (5%)
Climatic stressors in setting*	Increased frequency, duration or intensity of droughts	15 (71%)
	Erratic rainfall	8 (38%)
	Increased temperature	6 (29%)
	Floods	5 (24%)
Predominant livelihood profile*	Agriculture	10 (48%)
	Agropastoralism	9 (43%)
	Pastoralism	6 (29%)
	Trade	3 (14%)
	Fishing	2 (10%)

	Wage labor	2 (10%)
Study design	Mixed methods	11 (52%)
	Qualitative	10 (48%)
Qualitative methods of data collection*	Focus group discussions	18 (86%)
	Key informant interviews	13 (62%)
	Interviews with household members	8 (38%)
	Participant observation	5 (24%)
	Workshops	3 (14%)
	Life histories	2 (10%)
	Other	2 (10%)

275 *Some articles included several sub-categories. Hence, the sum for this characteristic is
 276 >100%

277 As evident from Table 1, the final review sample included nearly equal amounts of
 278 qualitative and mixed-methods studies. Almost all of these studies employed focus group
 279 discussions, followed by key informant interviews and interviews with household members.
 280 Most studies appeared to have included both male and female participants, with some notable
 281 exceptions that only included women.[57,67,68] The included studies employed a wide range
 282 of theoretical frameworks and perspectives that commonly related to feminisms and
 283 intersectionality (see S3 Table for further details).

284 In terms of research settings, the included studies involved rural households pursuing a
 285 wide range of livelihood activities. While the most common livelihood profiles were dominated
 286 by agriculture, agropastoralism and pastoralism, several studies reported increasing
 287 diversification and non-farm activities, such as trade and wage labour. Such diversification was
 288 commonly described as a response to climatic stressors. Most settings experienced several
 289 stressors simultaneously, the most common one being increased frequency, duration or
 290 intensity of droughts. In many settings, climate-related livelihood diversification and other
 291 forms of intra-household CCA were clearly influenced by gender norms and relations.
 292 Moreover, CCA practises themselves also appeared to hold the potential to challenge and shift
 293 intra-household gender dynamics.

294 **Study quality**

295 This section provides a general overview of the results of the quality appraisal. Detailed
296 assessments for each article are available in S2 Table. The quality appraisal suggested that the
297 included articles varied substantially in quality (in the present review, we define quality in
298 terms of the factors included in Saini and Shlonsky’s Qualitative Research Quality
299 Checklist[27]). Several studies appeared to be of high overall quality, characterised by strong
300 internal cohesion between research questions, study design, and reporting of findings; detailed
301 descriptions of qualitative methods; and evident reflexivity of the authors.[50,54,55,63,66,67]
302 At the other end of the spectrum, two mixed-methods studies exhibited significant
303 inconsistencies between their objectives, study design and implementation of qualitative
304 methodologies.[58,59] Specifically, in the article by Tambulasi et al., there appeared to be a
305 disconnect between the mixed-methods study design and the research objectives, which were
306 phrased in a quantitative manner.[58] In the article by Ndlovu and Mjimba, participants for
307 qualitative methodologies were recruited using stratified random sampling, pointing to a lack
308 of internal cohesion.[59]

309 For most studies, the appraisal was difficult because the articles contained incomplete
310 information regarding data collection and analysis, ethical considerations or risk of bias. In
311 some cases, this lack of information was severe enough to undermine a thorough assessment
312 of the studies’ overall quality.[52,53,57,60–62,64] This issue was present in mixed-methods
313 and purely qualitative studies alike. Remarkably, even studies that were perceived as of high
314 overall quality tended to lack information regarding ethical considerations,[50,66,67] risk of
315 bias and other limitations.[50,54,63]

316 **Intra-household CCA decision-making**

317 In this section, we describe how male and female household members negotiated the
318 ways in which their households adapted to perceived climatic stressors. While most of the
319 evidence under this theme related to autonomous CCA, the section also includes some
320 observations regarding intra-household decision-making about external CCA interventions.

321 Generally, men tended to be the primary decision-makers about autonomous and
322 external CCA within households.[18,58] As one male participant from Mphampha village,
323 Malawi, put it: “The man is the head of the family; therefore he must control everything at
324 home. He is the leader, the driver. It's by culture.”[58,p.195] However, some studies identified
325 women as the primary implementers of CCA decisions because they played key roles in
326 sustaining households’ livelihoods,[62,65,66] with one participant from Gwembe district,
327 Zambia, noting: "The men decide [...] leaving women to cope with even the unfavorable
328 decisions."[65,p.537] It should be noted that one study found that perceptions about CCA
329 decision-making varied considerably between male and female participants: In focus group
330 discussions about livestock-rearing among Borana pastoralists in Kenya, women claimed that
331 they were rarely involved in decisions concerning animal breeding, while male participants
332 claimed that no decisions were made without women.[63]

333 Regarding decision-making about external CCA interventions, the pattern of male
334 dominance in CCA decision-making was compounded in some settings by the fact that
335 women’s work was centred around the private sphere of the home.[58,61] In these settings,
336 men were primarily responsible for engaging with actors in the public sphere, including
337 governmental actors and NGOs. For instance, Rao et al. observed that in Kenya, “men
338 dominated the state-provided aid and relief facilities during floods or droughts; [with] women
339 relying on their male relatives to fulfil their needs”. [49,p.967]

340 As indicated by this observation, in many of the settings under study, the division of
341 labour within households and communities was strongly gendered, i.e., women and men were
342 responsible for different tasks and domains.[50,55,63] In some cases, women appeared to be
343 the primary CCA decision-makers within the domains that fell under their responsibility, such
344 as planting seeds, preserving produce and preparing food. For instance, Anbacha and Kjosavik
345 noted that, in the Ethiopian Borana households that they studied, women had limited decision-
346 making power in the context of livestock rearing but were able to adapt to climatic stressors to
347 some extent by choosing which crops to plant.[63]

348 However, effective household-level CCA would often have required comprehensive,
349 integrated solutions because the impacts of climatic stressors were complex and extensive.
350 Where women's decision-making power was limited to traditionally female domains, this
351 could lead to less adaptive or even maladaptive responses. For instance, one female participant
352 in Kakamega County, Kenya, explained that "since it is the role of women to feed the family,
353 most women reduce their food consumption during food scarcity and some skip meals to spare
354 food for the children." [55,p.6]

355 Besides these cases where women made CCA decisions within traditionally female
356 domains, one study referenced a female participant who stated that, in her marriage, decision-
357 making power was primarily dependent on personal knowledge and skills: "After he retired,
358 my husband came here and [now he] helps in the shop. He is not good at networking, nor does
359 he have business ideas, but I can trust him to look after the shop when I am selling miraa. I
360 know how to invest cash and get profit, so have the final say financially." [18,p.31] This
361 dynamic appeared to be an exception, though.

362 Some external CCA initiatives attempted to enhance women's adaptive capacity by
363 providing them with physical resources required for adaptation, e.g., livestock and seeds.

364 However, in most studies, it appeared that the provision of resources did not suffice to enhance
365 women's CCA agency because these interventions did not challenge the intra-household
366 gender dynamics vesting decision-making power with men. For instance, Tambulasi et al.
367 noted that, when external CCA stakeholders provided women with chicken in Malawi's
368 Chikwawa District, it was male household members who decided how these chickens should
369 be used to meet household needs.[58]

370 Lastly, one study suggested that the dynamics of intra-household CCA decision-making
371 were significantly dependent on the gender of household heads. While studying how
372 households decided about the adoption of Climate Smart Agriculture in Malawi and Zambia,
373 Khoza et al. found that "[w]omen could only make decision (sic) in cases of de jure female
374 household heads [...] with the outright absence of an adult man to lead decision making. Where
375 an adult male relative was present within household (sic) (such as brother, son or grandson),
376 the woman consulted him and would [be] likely to adopt his opinion on [CSA]
377 adoption." [65,p.536] The authors found that these differences in decision-making dynamics
378 were rooted in norms of ownership and control over key productive assets, stating that
379 "[w]omen could only own major productive assets if they were de jure female [household
380 heads] and had inherited assets from the late husband." [65,p.538] This observation implies that
381 control over household assets might mediate how cultural gender norms and dynamics
382 influence intra-household CCA decision-making. The following section explores this influence
383 in greater depth.

384 **Factors influencing gendered CCA decision-making**

385 This section explores underlying factors that influence the roles played by male and
386 female household members in intra-household CCA decision-making processes. As noted
387 above, intra-household division of labour, CCA decision-making and control over resources

388 are strongly influenced by sociocultural gender norms. Moreover, the foregoing section
389 explored how the gender of household heads might shape intra-household CCA negotiations.
390 This section focuses on access, ownership and control over resources - a third set of factors
391 that appear to mediate the influence of gender on CCA decision-making.

392 Generally, studies included in this review found that men owned most productive
393 household assets and thus controlled a large share of household resources.[58,63] In most
394 studies, women were typically able to access key productive resources through male household
395 members or relatives.[59,61,65] However, women's access to resources was often less secure
396 than men's, since women could lose access due to divorce, bereavement and estrangement from
397 male household members and relatives.[18]

398 Two studies highlighted that, even when women's access to resources and decision-
399 making power were codified in formal institutions, discriminatory cultural norms could hinder
400 women's ability to exercise their formal rights.[49,61] For instance, Wangui and Smucker
401 found that, regarding women's ability to access irrigation in Tanzania, "[o]ne of the main
402 constraints [...] is access to land. [...] Though in principle the [Tanzania Village Land] Act
403 supports gender equity, it leaves a lot of leeway to village government to define the process by
404 which village land is distributed. The process is a greater obstacle for women, who are expected
405 to gain access primarily through their husbands. Women's adaptation decisions are therefore
406 constrained"[61,p.373].

407 Furthermore, while access to resources certainly appeared to influence women's and
408 men's adaptive capacity, ownership and control over resources seemed to be much more
409 strongly associated with CCA decision-making power. As Mnimbo et al. observed in Tanzania:
410 "[The] capacity to adapt is shaped by access to and control over resources, as well as power to
411 make decisions. In the study area, males own and have dominant power over household

412 resources. For example, they can decide on trading even households' assets during
413 drought.”[52,p.103]

414 Moreover, it appears as though climatic stressors might further decrease women’s
415 control over resources and thus further constrain their CCA decision-making power. For
416 instance, Rao et al. found that, in Kenya, the "customary practice of allocating some [live-
417]stock for the use of [...] wives and daughters”[18,p.34] was increasingly threatened by
418 persistent droughts. This limited female household members’ ability to engage in CCA through
419 livelihood diversification because women were reliant on this livestock to stem initial
420 investments needed to set up small businesses. In a similar vein, Rao et al. also found that male
421 herders increasingly migrated due to drought, and that “when men moved away with livestock,
422 women lost control over milk for consumption and sale”[49,p.967]. Though the authors did not
423 assess how these dynamics impacted women’s intra-household CCA decision-making power,
424 it appears plausible that decreased control over resources within their traditional domains might
425 decrease women’s adaptive capacity.

426 The observation that climatic stressors and related CCA strategies might contribute to
427 decreased adaptive capacity among women shows how intra-household CCA is not only
428 influenced by gender norms, but can itself also impact the dynamics between male and female
429 household members. The following section describes this reciprocal influence in more detail.

430 **CCA impacts on intra-household gender dynamics**

431 As described in the previous section, gendered divisions of labour appeared to influence
432 intra-household CCA decision-making. Simultaneously, numerous studies suggest that CCA
433 practices were influencing intra-household division of labour, in turn. It should be noted,
434 however, that intra-household gender dynamics appeared to be influenced by a range of
435 interacting factors, including but not limited to climatic stressors. Other such factors included

436 changes in cultural norms, economic strain, and increased governmental regulation of rural
437 livelihoods. Acknowledging these complex interconnections, we focus on the influence of
438 climatic stressors as it was identified by the authors of the studies included in the present
439 review.

440 One frequent observation was that, due to persistent drought, men were increasingly
441 struggling to provide for their households in the manner that traditional gender norms
442 demand.[50,56] As a consequence, women in several settings were entering traditionally male-
443 dominated domains, and vice versa in order to secure households' livelihoods.[49,50,55,63,65]
444 For instance, Rosen et al. observed this tendency in Zambia: "Participant narratives suggested
445 that drought blurred a historically gendered division of employment roles. A shrinking labour
446 market forced men and women to prioritise potential earnings over workforce preferences,
447 pushing women into jobs with heightened manual labor demands and men into labor sectors
448 traditionally dominated by women." [56,p.6]

449 Specifically, several studies found that women increasingly engaged in income-
450 generating activities like petty trade and wage labour.[49,50,55–57,63] Often, this trend was
451 rooted not only in the necessity to diversify livelihood portfolios, but also in the fact that men
452 were spending more time away from home due to temporary or permanent migration.[49,56,57]
453 This tendency was particularly pronounced in settings where pastoralism continued to play
454 significant roles for sustaining livelihoods. This shift in gendered division of labour reportedly
455 led to increased workloads for women [e.g. 56] and a growing proportion of de-facto female-
456 headed households.[18,49,52,56]

457 While none of the included studies addressed whether and how this trend influenced
458 women's and men's roles in intra-household CCA decision-making, there is some evidence
459 that climate-induced changes in gendered division of labour might contribute to conflicts

460 between male and female household members. For instance, Anbacha and Kjosavik noted that,
461 in Ethiopia, “participation of women in petty trade is [...] creating gender conflicts within their
462 households [...]. Women stated that men were not happy when their wives participated in petty
463 trade. Some women were even beaten up and warned by their husbands to stop trading”[63,p.8].
464 In some settings, intra-household CCA negotiations were also associated with gender conflict
465 due to the resource constraints that climatic stressors placed on households, e.g., Rosen et al.
466 noted that, in Zambia, “[m]arital relationships were challenged in times of drought, particularly
467 when disagreements around household purchases could not be reconciled. Tightened
468 household incomes required more joint decision-making in even small household
469 purchases”[56,p.7].

470 Besides experiencing an increased workload and negative repercussions from gender
471 conflict, women were sometimes negatively impacted by CCA practices that placed them in
472 precarious situations. For instance, two studies reported that female participants engaged in
473 prostitution as a means of escaping utter destitution,[56,68] and Rosen et al. found that, in
474 Zambia, “the financial insecurity propagated by drought forced girls into early marriages.
475 While participants indicated child marriage was prevalent prior to drought, they explained that
476 heightened poverty from drought perpetuated girls being married off by their parents or
477 guardians because they are no longer able to care for them or are getting a financial return from
478 the dowry.”[56,p.7]

479 The impacts of external CCA interventions on intra-household gender dynamics have
480 not been covered in detail. However, one study found that, if external CCA actors did not
481 consider gendered division of labour when planning and implementing their interventions,
482 these interventions could contribute to the increasing workload for women during climate
483 change: “[T]he NGOs do not synchronize their initiatives, but instead increase the strain on the
484 women and their roles and responsibilities by spreading meetings over weeks, which clash with

485 other community processes and chores pertinent to women. Eventually, the women are left
486 with less time to complete household chores and other productive duties.”[68,p.276]

487 Despite these instances of CCA practices having negative consequences for female
488 household members, there also seems to be some evidence that CCA might increase women’s
489 agency under certain circumstances. For instance, Anbacha and Kjosavik note that “[a]lthough
490 the participation of women in petty trade has obviously increased their workload, this is
491 gradually challenging the existing gender roles and women are negotiating for change in gender
492 relations”[63,p.8]. In this study, while women’s increased involvement in income-generating
493 activities led to gender conflict in the short term, it also enabled women to access and control
494 cash, thus enhancing their dependence on male household members.[63] In a similar vein,
495 Rosen et al. found that, in Zambia, women’s increased involvement in financial decision-
496 making during droughts may have enhanced their influence on intra-household CCA
497 negotiations but was also associated with increased quarrels between husbands and wives.[56]
498 In sum, the foregoing observations seem to indicate that CCA strategies certainly seem to have
499 the potential to influence intra-household gender dynamics, but the pathways appear to be
500 complex and the ultimate outcomes for male and female household members remain unclear.

501 **Discussion and conclusion**

502 The present review aimed to investigate how gender influences decision-making
503 concerning CCA in rural East African households and how decisions about CCA influence
504 intra-household gender dynamics. To this end, systematic database searches were conducted in
505 8 databases and supplemented with comprehensive hand searches. 3,662 unique hits were
506 screened using predetermined inclusion criteria, leading to a final sample of 21 included
507 studies. Relevant findings of these studies were synthesised using inductive thematic coding,
508 memoing and thematic analysis.

509 The findings suggested that, while men tended to be the primary decision-makers,
510 women exercised some CCA decision-making power in domains that fell under their purview
511 and in female-headed households. Moreover, women's and men's roles in intra-household
512 CCA decision-making appeared to be influenced by a plethora of interconnected factors,
513 including sociocultural gender norms, gendered divisions of labour and access, ownership and
514 control over resources. Lastly, it became evident that intra-household CCA is not only
515 influenced by gender norms but can itself also impact the dynamics between male and female
516 household members. The pathways of this influence appear to be complex, and the ultimate
517 outcomes for male and female household members remain unclear.

518 In the following sections, we outline several limitations of the present review before
519 discussing our findings with reference to theoretical literature on GTAs in development and
520 adaptation and previous research concerning the gendered nature of CCA in sub-Saharan
521 Africa. In this discussion, we engage particularly with two literature reviews concerning the
522 gendered nature of CCA practices within rural East African households that were published
523 while we were conducting our review.[7,8] While neither of these articles focus primarily on
524 CCA decision-making, their findings are adjacent to the issues studied in the present review.
525 We then conclude by discussing implications for gender-responsive adaptation interventions.

526 **Limitations**

527 A number of limitations ought to be discussed. These relate to the quality and
528 characteristics of the primary studies included in the analysis, the qualitative approach chosen
529 for this review, and challenges inherent to studying intra-household CCA negotiations and
530 decision-making. Firstly, two of the included mixed-methods studies did not distinguish clearly
531 between findings resulting from quantitative and qualitative methodologies,[58,59] which
532 made it hard to identify which findings to extract for our qualitative synthesis. Moreover, we

533 identified some quality-related concerns in these two studies and other papers lacked clarity in
534 reporting, rendering a quality assessment difficult.[53,57,60–62,64] As is common practice for
535 qualitative reviews,[27] we chose not to exclude these studies from the analysis.

536 The findings of the present review were further limited by the relative scarcity of data
537 in included primary studies regarding some of the issues we aimed to investigate. This
538 limitation applies especially to intra-household negotiations about external CCA interventions
539 and the impacts of such interventions on gender dynamics. Moreover, though many of the
540 included studies explicitly or implicitly referenced intersectionality, the reporting of the
541 findings in many cases lacked descriptions of multiple markers of difference, which made it
542 difficult to consistently apply an intersectional approach in our analysis. Given that we
543 excluded some otherwise relevant studies because they did not employ qualitative
544 methods,[e.g. 69] it appears reasonable to assume that a mixed-methods review might have
545 been able to draw on a richer base of primary data.

546 A mixed-methods or quantitative approach could also have mitigated some of the
547 limitations inherent to all qualitative research, e.g., the limited generalizability of findings.[27]
548 Since we synthesised qualitative primary data, the findings of the present review cannot
549 necessarily be generalised to all rural households in East Africa. Rather, we hope that our
550 findings may serve as a source of inspiration and a basis for reflection for researchers, policy-
551 makers and practitioners engaging with CCA in East Africa and elsewhere.

552 Lastly, we encountered two challenges inherent in the field under study: First, as has
553 been noted before,[8] the concept of CCA decision-making remains vague in many studies,
554 and there appears to be no consensus about how decision-making should be assessed in
555 qualitative and quantitative research. One study included in the present review found that
556 perceptions of men's and women's involvement in intra-household CCA decisions differed

557 greatly between male and female participants.[63] However, while many studies included in
558 the present review did collect data from both male and female participants,[54–56,61–66]
559 gendered differences or similarities in perceptions were rarely reported.

560 Second, as noted above (and applicable especially to our findings regarding the third
561 specific objective), changes in gender dynamics in the settings under study appeared to be
562 caused by a range of diverse, interconnected factors. Hence, it would be impudent to assume
563 that all changes discussed above occurred purely in response to climatic stressors. In our
564 analysis, we relied on the interpretations of the study authors, i.e., whenever a study identified
565 climatic stressors as one reason for changes in gender dynamics, we assumed that to be true.
566 Despite these limitations, we believe that the present review adds value to the discourses
567 concerning the gendered nature of CCA in rural East Africa by virtue of its systematic and
568 comprehensive approach to synthesising relevant qualitative evidence.

569 **Intra-household CCA dynamics and gender transformation**

570 From a theoretical perspective, our findings appear to reflect Carr’s framing of agrarian
571 livelihoods as projects that structure household members’ roles and activities in pursuit of a
572 specific, though ever-changing set of social and material goals.[24] As described above (cf.
573 Background), Carr posits that re-negotiation of gender roles and identities is most likely to
574 occur when agrarian livelihoods are failing or threatening to fail, and that these re-
575 negotiations are shaped by power structures and often pose new risks to different household
576 members, especially those who are most vulnerable.[24]

577 The present review has revealed that rural livelihoods in settings across East Africa are
578 faced with a wide array of social and environmental stressors, including changes in climate.
579 Households’ responses are varied and can be seen as falling on a spectrum from reinforcing
580 rigid gender roles and identities to opening up spaces for re-negotiation. For instance, women’s

581 tendency to skip meals in order to fulfil their social duty of ensuring that all other household
582 members are fed, seems to reflect a rigidification of gendered livelihood roles at the expense
583 of vulnerable household members. At the other end of the spectrum, women’s increased
584 engagement in income-generating activities and the increase in de-facto female-headed
585 households might point towards more transformative shifts in gender relations, which may have
586 both positive and negative consequences for women and households.

587 At first glance, this wide range of adaptive responses appears to deviate from the
588 findings of a recent review concerning “gendered dimensions of Climate-Smart Agriculture in
589 Kenya”[7,p.1], which found that decision-making about Climate Smart Agriculture
590 consistently reinforced inequitable gender norms and roles.[7] While our findings do indicate
591 that CCA might reinforce inequities in many instances, we have also found evidence of
592 autonomous CCA processes that appeared to open up spaces for transformative re-negotiation.
593 However, our review found no instances of external CCA interventions leading to such positive
594 transformations. Hence, given that Climate-Smart Agriculture tends to be promoted by
595 stakeholders that are external to households and communities,[7] our findings could in fact be
596 considered as being in alignment as those of Brisebois et al. concerning CSA adoption in
597 Kenya.[7]

598 In general, our findings seem to align with Carr’s observation that re-negotiations of
599 gender dynamics are more likely to occur when livelihood projects fail or are threatening to
600 fail to provide basic material security.[24] However, the threshold for such changes appears to
601 vary between settings and households, with some households adhering to rigid gender roles
602 even when these threaten the subsistence of individual household members. These differences
603 appear to be partly determined by local adaptation contexts and households’ options for re-
604 considering their livelihood projects, e.g. by engaging in new income-generating activities or
605 employing novel agricultural strategies.

606 Moreover, our findings align with Carr’s observation that, when stressors lead to a re-
607 defining of livelihood projects, the ensuing changes in roles and activities tend to be associated
608 with distinct risks for different household members.[24] This was evident, for instance, in the
609 experiences of women who had become de-facto household heads due to male out-migration:
610 While their changed position within the household might have increased their decision-making
611 power and autonomy, many had to contend with challenges of access to resources and social
612 standing within their communities,[65] as well as increased workloads.[56]

613 Male household members, too, appeared to be threatened by changes in livelihood
614 projects and associated shifts in gender dynamics, though the risks they faced generally were
615 of a more social, less existential nature. For instance, some studies included in the present
616 review found that gender-based domestic violence had surged when women increased their
617 engagement in income-generating activities because male household members perceived these
618 activities as threatening for their identities as primary providers.[e.g. 63] In a similar vein, some
619 male participants expressed a fear of social repercussions from other community members who
620 might view them as incapable of providing for their households.[63] This finding aligns with
621 Carr’s observation that livelihood projects serve as a means to obtain social as well as material
622 goals, and that powerful household members, especially male household heads, tend to
623 determine these goals and may use means of coercion to sanction other household members’
624 non-compliance.[24]

625 However, female participants in the studies included in the present review tended to
626 continue to engage in income-generating activities despite the attempted coercion because of
627 the great perceived threat of failure of more traditional livelihood projects. Male household
628 members appeared to eventually accept these activities once they recognized the associated
629 increase in household income. According to Carr, male household members may be more likely
630 to tolerate or even support increased productivity among women if they are themselves secure

631 in their gendered identities as primary providers.[24] Unfortunately, we cannot conclude with
632 certainty whether this tendency was present in the households analysed in this review because
633 only few of the included studies consistently provided information about household wealth and
634 material security.

635 **Implications for gender-responsive adaptation interventions**

636 The previous section suggested that our findings may hold valuable insights regarding
637 the potential for gender transformation through CCA in East African rural households. This
638 section explores resulting implications for gender-responsive adaptation policies and
639 initiatives, i.e., external CCA interventions. According to Carr, most development and
640 adaptation interventions that aim to foster more equitable gender dynamics in agrarian
641 households are unsuccessful - either because they fail to challenge the underlying power
642 relations that lead to inequitable outcomes, or because they disrupt current livelihood projects
643 but fail to support the creation of viable, contextually appropriate alternatives.[24] Evidence
644 regarding external adaptation interventions was scarce in the present review, with some notable
645 exceptions.[49,58,65] The few interventions that were discussed predominantly fell under the
646 first category, i.e., they did not challenge the root causes of inequality. For instance, studies
647 included in this review found that interventions which attempted to “empower” women by
648 providing access to credit, land, other productive resources or information were often
649 ineffective because the provided resources were co-opted by male household members or
650 because rigid gender norms prevented women from exercising control over the use of their
651 knowledge, skills and assets.[58,65]

652 Rather than ensuring that male household members were secure in their identities as
653 primary providers and could thus concede more agency to female household members,[24]
654 these interventions appeared to attempt to “empower” women by enhancing their standing vis-

655 a-vis men. When applied in isolation, these approaches appear to disregard the complexity of
656 intra-household power relations and the importance of livelihood projects as means for
657 achieving social goals, and might thus add to gender conflict rather than relieving tensions and
658 opening up spaces for effective re-negotiation.

659 There certainly is a case to be made for targeted interventions that provide immediate
660 relief from the acute risks faced by many women and girls in East African rural households.
661 We agree with Galiè and Kantor’s notion that “[b]oth gender accommodative and
662 transformative approaches can add value, [...] with the mix of approaches at different points in
663 the change process determined by contextual conditions.”[22,p.195] However, it appears
664 crucial that stakeholders involved in designing, implementing and monitoring gender
665 accommodative interventions are aware that their initiatives are likely to cause some disruption
666 to current livelihood strategies, which may lead to novel risks and unexpected consequences
667 for the communities, households and individuals they attempt to support.[24]

668 Findings from the present review suggest that all external CCA interventions in this
669 context ought to recognize not only that rural livelihoods are under stress, but also that
670 communities, households and individuals are actively responding to these stressors and, in
671 some settings, have begun to re-negotiate livelihood projects and associated gender roles and
672 identities. External CCA interventions might be most promising when they are built on a deep
673 and comprehensive understanding of these dynamics and actively engage with participants to
674 co-create alternative livelihood projects that can benefit all members of a household or
675 community.

676 This underscores the importance of working with local conceptualizations of
677 “empowerment” in the context of GTAs, rather than attempting to impose externally generated
678 notions of who should be empowered to do what and in which manner.[22] Moreover, this

679 approach might deviate slightly from previous operationalizations of GTAs, which emphasise
680 the importance of fostering reflections about gender norms among participants[23]: If one
681 views gender roles and identities as resulting from livelihood projects that are developed and
682 maintained in pursuit of a specific, though dynamic set of material and social goals,[24] then
683 discussions about gender transformation and equity become inextricably linked to the
684 livelihood project and goals in question. Interventions that adopt this premise might initiate
685 discussions and re-negotiations of gender dynamics not by prompting reflections on gender
686 dynamics directly, but rather through reflections on women's and men's shared and individual
687 livelihood aspirations.

688 The present review also contributes to the gender-transformative design and
689 implementation discourse in another manner. As explained above (cf. Background), GTAs are
690 commonly conceptualised as spanning three primary dimensions: agency, relations and
691 institutional structures.[23] The gender dynamics of intra-household CCA negotiations and
692 decision-making are most closely aligned with the relational dimension of GTAs. Regarding
693 the relational dimension of GTAs, our findings further showed that women's approaches to
694 managing their relationships with their husbands depended not only on the quality of the dyadic
695 relationship between husband and wife, but were influenced by a complex web of reciprocal
696 relations spanning women's support networks and kin beyond the confines of the household.
697 This observation indicates that gender-responsive adaptation interventions might do well to
698 consider not only marital relationships, but the complex web of relations that different
699 household members navigate within and beyond the household.

700 Furthermore, the findings of the present review underscore the importance of gender-
701 transformative interventions that address all three primary domains, as suggested by Hillebrand
702 et al.[23] For instance, our findings suggest that agency, e.g., in the form of control over cash
703 and productive assets, appears to have a critical influence on household members' decision-

704 making power.[51,52,58,61,63,65] Further, formal and informal institutions, e.g., policies
705 governing land ownership and sociocultural norms regarding gendered divisions of labour, also
706 appeared to shape the roles and identities that women and men embodied in intra-household
707 CCA negotiations.[e.g. 61] However, analyses of external adaptation interventions revealed
708 that addressing any of these factors did not appear to generate more equitable outcomes if intra-
709 household relations remained unchanged.[e.g. 58]

710 In sum, the present qualitative systematic review has shown that significant evidence
711 gaps remain regarding the interplay of gender relations and CCA decision-making in rural East
712 African households, especially concerning nuanced descriptions of intra-household CCA
713 negotiations about external CCA interventions. Nonetheless, our analysis has revealed that the
714 evidence base has grown substantially over the past five years. When synthesised, this
715 knowledge significantly contributes to our understanding of the complex, context-dependent
716 dynamics linking gender relations and intra-household CCA in rural East African households.
717 We hope that the present review will provide guidance for policy-makers and practitioners who
718 design, implement and evaluate gender-responsive CCA interventions in rural East Africa.

719 **Acknowledgements**

720 The authors are thankful for the contributions of Isabelle Carson, Sophie Effing and
721 Eileen Ziemann, who contributed to the supplementary hand searches as part of their MSc.
722 Global Health programme at the University of Copenhagen; and for the support of Therese
723 Møller, information specialist at the Social Science Library at the University of Copenhagen,
724 who assisted in the development of the search strategy.

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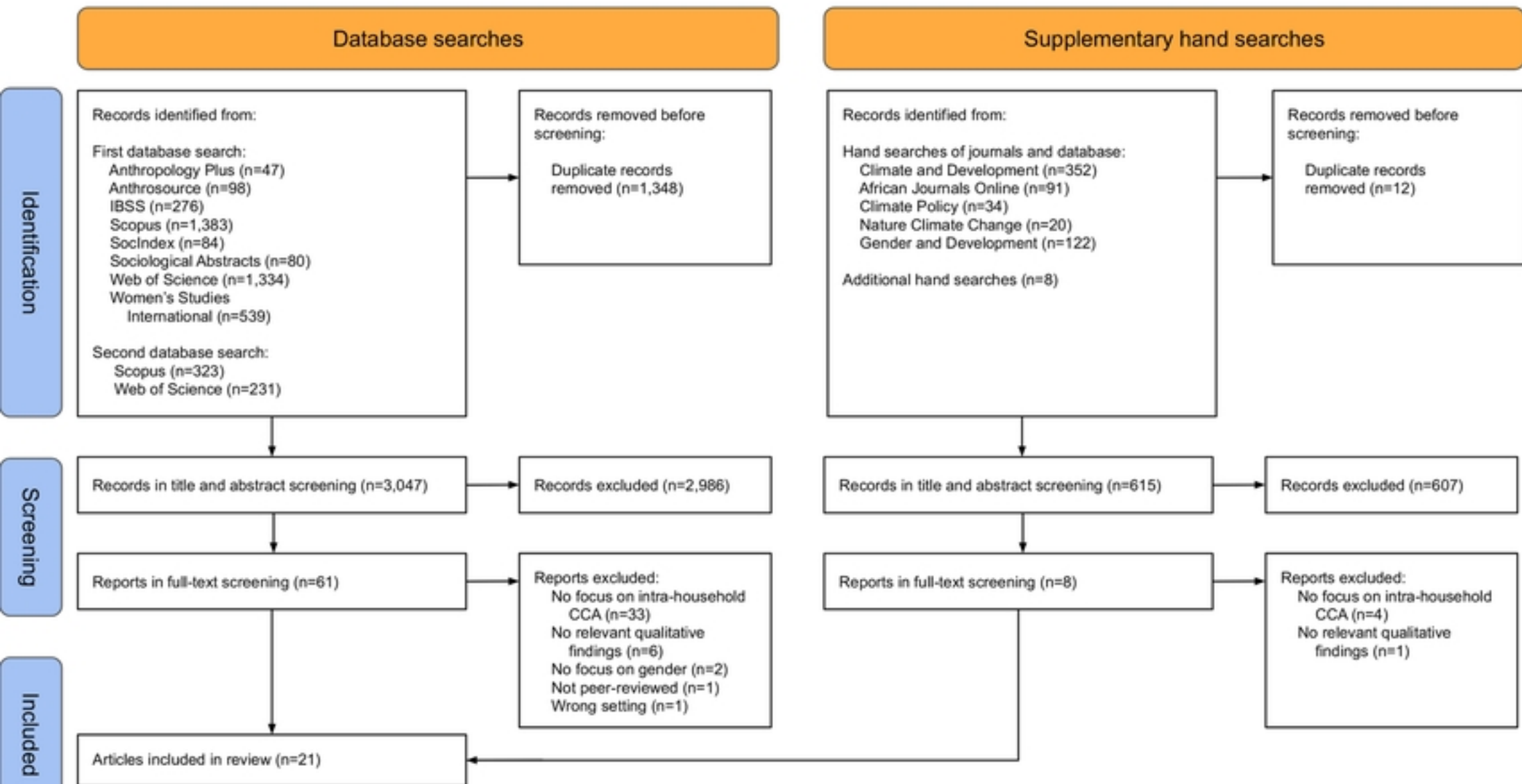
923 **Supporting information**

924 **S1 Search Strategy**

925 **S2 Table. Quality appraisal of all included articles**

926 **S3 Table. Study characteristics of all included articles**

927 **S4 Prisma checklist**



Figure