On-Air for Gender-Inclusive Nature-based Solutions Project

Midline Evaluation Report

Countries : Burkina Faso, Ethiopia, Ghana, Ivory Coast, Uganda, Zambia

Farm Radio International

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FARM RADIO INTERNATIONAL RADIOS RURALES INTERNATIONALES

Executive Summary

This report presents consolidated findings from the post-programming evaluation of the *On-Air for Gender-Inclusive Nature-based Solutions (NbS)* project implemented by Farm Radio International across six African countries (Ethiopia, Ghana, Uganda, Zambia, Burkina Faso, and Côte d'Ivoire). Funded by Global Affairs Canada, the five-year project aims to increase the resilience of rural communities to the effects of climate change by enhancing the enabling environment for rural community action on climate change adaptation and biodiversity using locally-relevant, inclusive and gender-responsive nature-based solutions as well as increase the responsiveness by decision-makers, to the expressed needs, wisdom, and experiences of rural communities, particularly women and youth, in adapting to climate change..

Methodology

The evaluation, conducted between October and December 2024, used a quantitative design combining community-level assessments and household surveys. A total of 239 communities and 2,244 households were surveyed using stratified sampling across ecological zones and programme intensity levels (no, low, and high exposure). To address selection bias inherent in radio listenership, the study employed multilevel propensity score matching (PSM) alongside descriptive and inferential analyses.

Key Findings

i. High radio signal exposure but moderate listenership

While 92.7% of households were within radio signal coverage, only 57.5% of them were aware of the NbS radio program and 51% had actually listened to the programme. However, conversion from awareness to listenership was high (88.8%), indicating that increasing awareness—especially among women—could significantly boost engagement.

ii. Strong awareness gains, but limited causal impact on biodiversity awareness

General awareness of climate change is high (84.8%), with listeners consistently outperforming non-listeners. The programme significantly improved understanding of gendered climate impacts. However, after controlling for selection bias, no causal effect was found on biodiversity awareness, suggesting observed differences were driven by pre-existing characteristics.

iii. Significant improvement in NbS knowledge

The programme has a robust and statistically significant impact on knowledge of NbS, with listeners 13.6 percentage points more likely to demonstrate good understanding. The effect is even stronger among women, highlighting the programme's effectiveness in delivering conceptual learning.

iv. Strong behavioural impact on climate-smart agriculture (CSA)

The most substantial impact is observed in behaviour change. After matching, listeners are 23.8 percentage points more likely to adopt CSA practices. Among women-headed households, this increases to over 40 percentage points, demonstrating strong gender-responsive outcomes when access barriers are addressed.

v. Positive but mixed results on adaptive capacity

About 60% of communities report improved adaptive capacity, with clear gains in high-intensity programme areas. However, causal evidence at the individual level is only marginally significant, suggesting that broader structural and institutional factors influence long-term resilience.

vi. Voice empowerment strengthened, but institutional responsiveness varies

Listeners report significantly greater ability to express climate-related needs. However, perceived responsiveness of local authorities is uneven, ranging from strong in Burkina Faso to extremely low in Côte d'Ivoire. This highlights a gap between community engagement and institutional accountability in Côte d'Ivoire.

vii. Gender gaps persist in access, not impact

Men are significantly more likely to listen to the programme, largely due to limited access to radios among women. However, once women listen, they benefit equally or more—particularly in knowledge and practice adoption—indicating that access, not interest, is the primary barrier.

Conclusions and Implications

The evaluation demonstrates that interactive radio programming is an effective, scalable, and gender-responsive tool for advancing climate adaptation and NbS in rural Africa. The programme is particularly successful in driving knowledge and behavioural change, even after rigorous adjustment for selection bias.

However, findings underscore the need to:

- Expand women's access to radio and listening platforms
- Strengthen linkages between communities and local authorities
- Sustain long-term engagement to achieve deeper institutional and community-level change

Overall, the project is not only raising awareness but also transforming knowledge into action, contributing to more resilient and inclusive rural communities.

Implications for Programming and Investment

To maximize impact and sustainability, the project will continue to explore and strengthen the following priorities during the current and future project phases:

- Expand women's access to radios, mobile phones, and Community Listeners Groups and other inclusive listening platforms

- Invest in awareness-building strategies to increase programme reach
- Strengthen linkages and dialogue between local communities and institutions to improve responsiveness and accountability
- Strengthen synergy with complementary interventions (e.g., extension services, community based organisations, local governance engagement) to reinforce long-term adaptive capacity

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- **Introduction**

Climate change and biodiversity loss are two of the most defining environmental crises that challenge the world today. Nature-based Solutions (NbS) for Climate Change Adaptation (CCA) are gaining increasing attention as a means to harness the power of nature to help solve these twin crises. If appropriately implemented, NbS can accelerate progress towards a greener, more equitable, gender responsive and socially inclusive future.

In April 2022, Farm Radio began implementation of a 5-year, multi-country project about gender inclusive Nature-based Solutions (NbS) for climate change adaptation with financing from Global Affairs Canada. The project uses Farm Radio's interactive local radio programming to achieve enhanced rural community climate action using locally-relevant gender-inclusive NbS, and increase the responsiveness of decision makers to the needs and experiences of local communities on NbS for CCA.

After two full years of implementation, FRI conducted a post-programming evaluation for the six focus countries between October and December 2024 to assess whether or not the project is achieving its objectives. The main objective was on the program's performance toward achieving its main intermediate outcome: E*nhanced enabling environment for rural community action on climate change adaptation and biodiversity using locally-relevant, inclusive, and gender-responsive nature-based solutions*. Specifically, the evaluation sought to assess whether or not the program has made any positive changes in the following:

i. Awareness of climate change and biodiversity within communities
ii. Knowledge of nature-based solutions among women and men (NbS)
iii. Initiation of community NbS practices and household climate-smart agriculture
iv. Responsiveness of local authorities to the needs and priorities of communities

2. Method

To address the above objectives we designed a quantitative study with two units of analyses: community and individuals in a household survey. The sampling approach for the two is as follows: Using a database of villages/communities covered by the NbS radio programmes in the six countries, we employed stratified random sampling to select 50 with probability proportional to the size of the sampling strata for each country. Our strata included ecological zones, intervention statuses, and communities/villages. Intervention status refers to the intensity of programming, categorised as no programming, low-intensity programming, and high-intensity programming. No-programming areas are the villages that do not receive signal from the NbS radio stations; Low-intensity programming areas are the villages that receive signal from the radio stations but FRI does not have any activities to boost listenership of the programming, and the high-intensity programming areas are the ones that receive the signal as well as some program activities such as community listener group (CLG) and regular support visits from broadcasters and FRI staff. Table 2.1 shows the planned and realised sample allocations of communities for all the six countries after the

interviews. The realised sample is dominated by communities from less and high programme intensity groups, while the no-programme group experienced substantial under-realisation, particularly in Ethiopia and Ghana. Due to security challenges, Burkina Faso, for example, could do interviews in only 24 communities.

	No programme		Less intensive		High intensive		
	Sampled	Realised	Sampled	Realised	Sampled	Realised	Total realised
Ethiopia	10	0	22	32	17	17	49
Ghana	13	2	20	31	17	17	50
Uganda	16	8	15	23	17	17	48
Zambia	16	5	19	30	15	15	50
Burkina Faso	11	5	5	11	8	8	24
Cote d'Ivoire	5	4	7	8	5	5	17
Total	71	24	88	135	79	79	238

Table 2.1 Planned and realised sample allocation of communities

Community gatekeepers, including chiefs, pastors, community leaders, representatives from women's groups, youth groups, and marginalized groups, as well as agriculture extension officers formed a group representing a community to respond to questions through consensus building. Research assistants were made to understand the importance of ensuring that the group is balanced in terms of age, gender, and group representation. This group, comprising between 8 and 15 members, provided quantitative answers to various assessment questions, enabling us to determine values for community-level indicators of NbS actions. See Appendix A for details of participants in the community discussions.

To determine individual-level indicators, respondents were selected from households within the same communities where the community assessments were done. From each community/village, eight persons were interviewed from eight randomly selected households. Since we did not have the database of households or enumeration area (EA) maps of the communities to do computerised randomisation, we had to use a systematic approach to select households from the communities. One person was interviewed from each household. The instruction was to interview at least three adult women, three adult men, and two youth (one female and one male), giving us a total of eight interviews per community and 400 interviews per country. As commonly found in most surveys, things did not work out according to the plan for some countries. As shown in Table 2.2, While the overall realised household sample reached

	No programme		Less intensive		High intensive		
	Sampled	Realised	Sampled	Realised	Sampled	Realised	Realised Total
Ethiopia	94	0	178	272	128	128	400
Ghana	88	16	177	255	137	131	402

Uganda	63	43	125	183	102	64	290
Zambia	119	39	153	243	97	87	369
Burkina Faso	172	16	131	291	113	109	416
Cote d'Ivoire	116	44	122	207	129	116	367
Total	652	158	886	1451	706	635	2244

Table 2.2. Planned and realised sample allocation of households

the planned total, important deviations occurred across programme categories. The no-programme and less-intensive groups exceeded their targets, whereas the high-intensive group experienced an overall shortfall. These discrepancies were particularly pronounced in Uganda and Côte d'Ivoire. As we did for the community assessment, inverse probability weights were computed for each observation, taking into consideration the stratification variables as well as gender. These weights were used to extrapolate the results of relevant indicators to all the listeners covered by FRI NbS radio programs.

2.2 Analysis

We mostly employed descriptive analyses comparing results from communities according to their intervention status. The realised sample for the control areas did not come out well. Some of the communities given by the partners radio stations as part of the control areas were found to be receiving signals from the stations. This is not surprising, because most of the radio stations cover the whole ecological area. Hence it sometimes becomes practically impossible to get communities within the same ecological zone that did not receive signal from the partner stations. Since the realised sample in the control areas did not come out well, at the individual level, the comparative analysis was mainly between listeners and non-listeners of the NbS program over a number of indicators measuring the specific objectives stated above. Where possible t-test is performed to assess the level of significance statistically. To determine the radio program's impact on key selected indicators while controlling for sociodemographic characteristics, quasi-experimental models are employed using multilevel propensity score matching. The choice of this model is based on the fact that listeners of radio programs are nested within district radio stations serving different ecological zones. This means ecological zones would have different baseline probabilities as confirmed in the Appendix B estimates. The estimates clearly show that some ecological zones have either higher or lower level of baseline probabilities after adjusting for covariates. This is expected given that radio stations are likely to have different approaches of delivery even though broadcasters go through the same mode of training by FRI. Also, people in different ecological zones/districts in these countries may have different tendencies of listening to the programs, given some baseline interest in the topic, laws, etc. The resulting imbalance across programme exposure categories, as observed earlier, should also be accounted for in subsequent impact analyses through appropriate weighting and model adjustments. Also, where there is a need, we extrapolate the results of relevant indicators to the number of communities being covered by the program in the respective countries, using adjusted sampling weights developed for each observation and mapping information.

- **Results**

3.1 Sociodemographic characteristics of respondents

Before going into the findings for the main objectives, we present the *sociodemographic* characteristics of the study participants, as these characteristics have long been found to have effects on access and listening to radio programs (Antwi-Boateng et al, 2023; Cajetan et al ,2025)[1]. The sample comprises 2,244 households across 239 communities, with equal representation of women and men. Ghana and Zambia each have the highest number of communities sampled (50 each), followed closely by Ethiopia (49) and Uganda (48), as Table 3.1 shows. Burkina Faso (24) and Côte d'Ivoire (18) have fewer communities but relatively high household counts, suggesting larger household samples per community in these countries. Gender representation is perfectly balanced, with 1,122 women and 1,122 men, ensuring gender parity in the sample design. It is only Uganda that shows a notable deviation, with more women (171) than men (119). The age distribution is skewed toward older respondents, with 1,390 individuals aged 35 years and above compared to 848 young adults (18–34 years). In all countries except Ethiopia and Ghana, older respondents (35+ years) substantially outnumber younger adults. Zambia, Burkina Faso, and Côte d'Ivoire show particularly strong age skewness toward older respondents, while Ghana exhibits the most balanced age distribution between younger and older adults.

	Communities	Households	Women	Men	Young (18-34 years)	Old (35+ years)
Ethiopia	49	400	174	226	198	202
Ghana	50	402	200	202	203	198
Uganda	48	290	171	119	111	178
Zambia	50	369	179	190	101	267
Burkina Faso	24	416	213	203	135	280
Cote d'Ivoire	18	367	185	182	100	265
Total	239	2244	1122	112 2	848	1390

Table 3.1.1 Basic demographic characteristics

The educational profile of respondents is skewed toward lower levels of schooling, with primary education (39.5%) being the most common and nearly one-third (32.8%) of respondents reporting no formal education. Tertiary education attainment is rare across all countries, underscoring the importance of accessible and inclusive communication strategies. Burkina Faso (63.5%), followed by Ghana (43.3%), has by far the highest proportion of respondents with no formal education. Zambia (9.5%) and Uganda (16.6%) record the lowest proportions, indicating relatively higher basic education coverage. Uganda (58.6%) and Zambia (54.7%) have the largest proportions of respondents whose highest education is

[1] Antwi-Boateng O, Danladi Musa M, and Andani Mu-Azu I (2023). "Audience listenership of FM radio: A case study of rural development in Northern Ghana" *Cogent Arts & Humanities* (2023), 10: 2184750https://doi.org/10.1080/23311983.2023.2184750

primary. Most of the respondents are either the household head (50.4%) or spouse of the household head (32.7%). Thus, the sample is predominantly composed of household heads and spouses (over 83% combined), ensuring that responses largely reflect the views of household decision-makers. However, notable cross-country variation exists, with Ghana (28.6%) and Côte d'Ivoire (15.3%) showing greater representation of sons and daughters compared to Zambia and Ethiopia.

●.2 Awareness and listenership of the NbS radio program

Table 3.2.1 shows the total number of households interviewed for the household survey and the number that is potentially exposed (i.e covered by the NbS radio program). Out of 2,244 sampled households, 2,081 (92.7%) were exposed to the radio programme signal. And out of those exposed to the signal, 57.5% reported being aware of the NbS radio programme and 51% reported having listened to it. This implies that among those who were aware of the program, 88.8% reported listening, indicating strong conversion from awareness to listenership, especially in Ethiopia, Uganda, Zambia, and Burkina Faso, once awareness is achieved. Côte d'Ivoire consistently lags behind awareness and listenership, indicating potential dissemination barriers. Ghana shows high awareness but comparatively lower listenership.

	# sample	# Exposed to signal	% aware	% listened	% aware & listened
Ethiopia	400	400	64.0	61.8	96.5
Ghana	402	386	66.6	54.7	82.1
Uganda	290	247	52.6	51.4	97.7
Zambia	369	330	57.9	52.4	90.6
Burkina Faso	416	400	56.0	50.8	90.6
Cote d'Ivoire	367	318	43.4	31.8	73.2
Total	2244	2081	57.5	51.0	88.8

Table 3.2.1: Awareness and listenership of NbS radio program

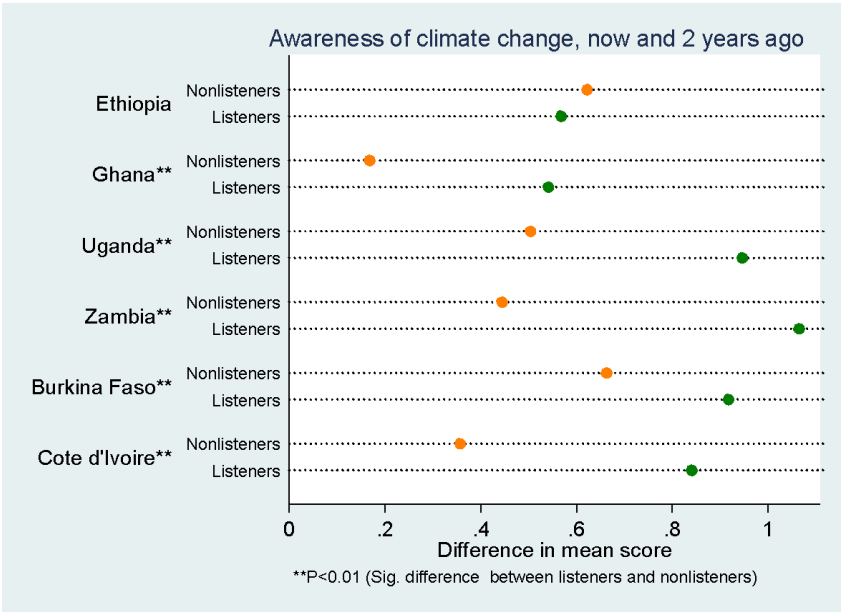
Across countries, men report higher levels of awareness (64.1%) and listenership (55.5%) of the NbS radio programme than women 46.4% and 46.5% respectively. However, conversion from awareness to listenership is high for both genders (90.5% for men and 86.9% for women), indicating that improving women's awareness could substantially increase their engagement with the programme. There are some country-specific gender gaps, especially in Ghana, Zambia, and Burkina Faso. See *Appendix C: Awareness and listenership of the NbS program by gender* for more details.

Most of the listeners (66%) tuned in to listen to three or more episodes of the program, with the rest listening to one or two episodes. A great majority (94.5%) of the listeners rated the radio program as better or much better than similar programs aired in their communities, with most (65%) of them especially in Uganda and Burkina Faso, sharing the information with others. Majority (56.7 %) of the respondents believe the radio program gave voices to

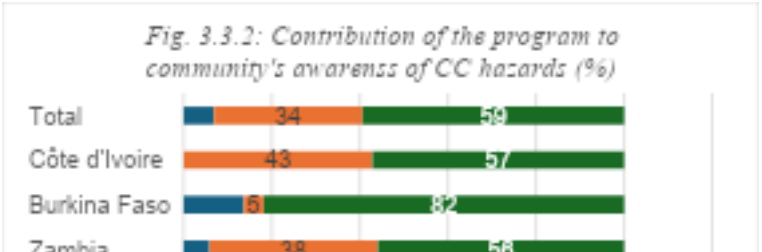
women and youth a great deal, except Ethiopia where only 25.9% say so. For Ethiopia, most (70.8%) think women and youth were only given a fair amount of voice in the programs. Limited or no access to radio sets was the main reason for those, especially women, who did not listen to the program.

●.*3 Awareness of climate change and biodiversity, and adaptive capacity*

Awareness of climate change (CC) is generally high in all the six countries (84.8%) with women having slightly lower levels (82%). It is highest among Ethiopia (98%) and Burkina Faso (91%) respondents, but lowest in Cote d'Ivoire (75%) and Ghana (77%). Across all countries listeners show larger increases in awareness than nonlisteners. In five out of six countries, the difference between listeners and nonlisteners is statistically significant ($p < 0.01$). The consistent and statistically significant differences (in five countries) also indicate that radio listenership is strongly associated with increased climate change awareness. The magnitude of improvement among listeners is substantial, especially in Uganda, Zambia, and Côte d'Ivoire. Even nonlisteners show some improvement, suggesting possible spillover effects, broader environmental discourse and other communication channels. However, the consistently larger gains among listeners support the added value of the NbS radio programme. Also, across five of the six countries, listeners to the NbS radio programme experienced significantly greater increases in awareness of climate change challenges faced by women, youth, and marginalized groups compared to nonlisteners, highlighting the programme's contribution to strengthening equity-focused climate knowledge. The programme appears especially effective in increasing awareness of socially differentiated climate impacts, which are often harder to communicate than general climate knowledge. The consistency of significant differences strengthens the argument that the programme is contributing to improved understanding of gendered climate vulnerabilities, youth-specific challenges and marginalized group exposure. It is therefore not surprising to find that with the exception of Ethiopia (29.5%), between 54% (Ghana) and 91% (Burkina Faso) of the respondents are of the view that their awareness of the burden of CC on women, youth and marginalized was influenced by the radio program. See Appendix D: *Awareness of CC challenges faced by women, youth and marginalized now and two years ago* for more details.



Over 94% of the communities surveyed have experienced at least one climate-related shock within three years prior to the survey.



The most common shocks mentioned by communities are drought, erosion, strong winds, heatwaves, low soil fertility, invasive species and floods. See Appendix *D: Climate change related shocks in the past 3 years* for more details. Across all countries, the programme is perceived to have contributed substantially to improving community awareness of climate change hazards, with the majority of respondents reporting that it contribut ed either a great deal (59%) or a fair amount (34%). The very high endorsement in Burkina Faso (82%) demands further investigation to bring out lessons that, perhaps, other countries could learn.

The climate hazards/shocks have resulted in loss of assets or displacement within the communities. Table 3.3.1 compares reported changes—increased, remained the same, or reduced— in asset loss between non-intervention and intervention communities across six countries. Generally, the result is quite mixed. In all the countries, intervention communities were more likely to report increased in asset loss and less likely to report no change compared to non-intervention respondents. Also, except Burkina Faso, all countries reported reduced asset loss. Non-intervention communities are more likely to

	Increased (%)		The same (%)		Reduced (%)	
	Non-intervention	Intervention	Non-intervention	Intervention	Non-intervention	Intervention
Ethiopia		22		59		20
Ghana	0	35	100	56	0	8
Uganda	29	28	71	64	0	9
Zambia	20	40	80	50	0	10
Burkina Faso	20	42	60	54	20	4
Côte d'Ivoire	30	53	20	47	0	0
Average (%)	33	34	62	56	4	10

Table 3.3.1: Change in asset loss in communities in the last two years

report no change, indicating some level of stagnation. While reductions in asset loss are more common in the intervention communities, they are mainly concentrated in Ghana, Uganda and Zambia. Unfortunately the study did not ask for the details of the type of assets lost. But an annotated report from the field indicates that most of the loss was related to farm produce.

It is important for communities to build some capacity to deal with these climate shocks. From a sample of 232 communities, 60.3% of them reported that community adaptive capacity had improved in the last two years, while 34.1% reported no change and only 5.6% reported a decline. Reported improvements in community adaptive capacity to climate change increase systematically with NbS programme intensity, from 29% in non-intervention communities to nearly 72% in high-intensity communities, indicating a strong positive dose–response relationship. This information was also sought from individuals in the household survey to gauge their perceptions of their community's capacity to deal with climate change burden. Figure 3.3.3 gives results from the intervention zones. Nearly two-thirds of respondents reported improved belief in their community's adaptive capacity to climate change, with particularly strong gains observed in Burkina Faso (79%), Uganda (77%),

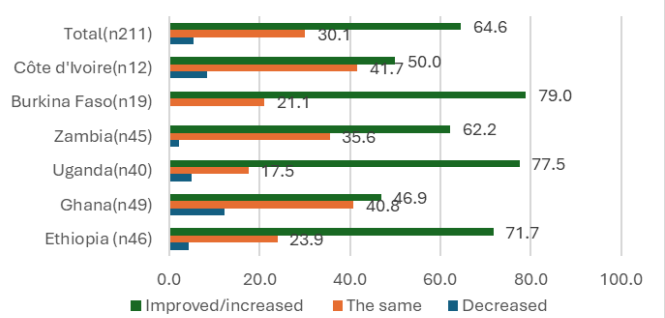
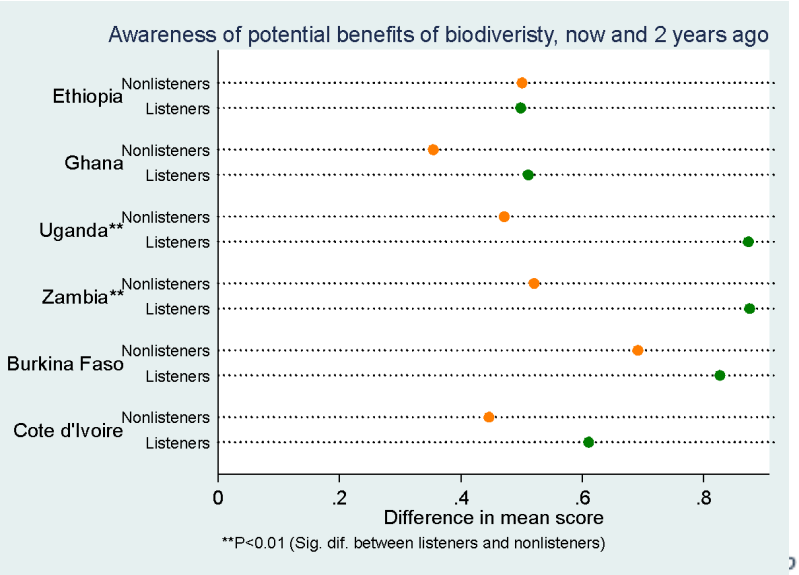


Figure 3.3.3 Belief in community's capacity to deal with CC burden now and 2 years ago.

and Ethiopia (72%), though outcomes were more mixed in Ghana and Côte d'Ivoire, where there is no significant differences between listeners and non-listeners.

Biodiversity is an integral part of climate change adaptation and Nature-based Solutions. In both the community assessment and household survey a question was asked to gauge improvement in biodiversity knowledge after two years of implementation. At the community level, about 70% of communities from intervention areas compared with 32.5% from non-intervention communities say they know what biodiversity is. In the intervention communities this knowledge ranges from 47.6% in Zambia to 84% and 99% in BF and Ethiopia respectively. The most common source of biodiversity information and knowledge is radio (48%), followed distantly by people's own experiences (23.6%). Figure 3.3.4 shows the change in mean awareness scores regarding the potential benefits of biodiversity, comparing listeners and nonlisteners of the NbS radio programme across six countries. Double asterisks (**) indicate statistically significant differences between listeners and nonlisteners at $p < 0.01$. About 63.5% of the respondents agree that the radio program contributed a great deal to their awareness of biodiversity and its potential benefits. The highest was in BF (95%) and lowest in Ethiopia (38.1%) Other respondents (34.5%) say the program had a fair amount of contribution to this awareness. Thus the radio program contributed to a great deal/a fair amount of biodiversity awareness of 97% of the listeners.



years ago

Across countries, listeners of the NbS radio programme demonstrated greater increases in awareness of biodiversity benefits compared to nonlisteners, with statistically significant differences observed in Uganda and Zambia ($p < 0.01$). The programme appears particularly effective in strengthening awareness of biodiversity benefits, especially in Uganda and Zambia where listeners' awareness is significantly far higher than that of non-listeners. The consistent listener advantage across all countries strengthens the argument that exposure contributes to knowledge gains about biodiversity benefits. But over the period nonlisteners also had some improvements suggesting broader environmental communication efforts, community-level diffusion of information, and perhaps spillover effects from listeners – as 64.6% of listeners shared information with others regularly or very often, with a further 25.6% of them occasionally sharing what they had heard with others.

●.4 Awareness, knowledge and practice of Nature-based Solutions (NbS)

Awareness of NbS

In the last 2 years 51.5%, 74.2% and 88.4% of households have heard about NbS in non-intervention, low-intensity and high intensity communities respectively, showing some positive correlation between program intensity and awareness of NbS. At the country level, Ethiopia has the highest proportion (96.5%) and Ghana (58.5%) being the lowest. The proportion of men (80.6%) who have heard about NbS in the past two years is higher than that of women (72.5%). There is no significant difference between young people (75%) and old (78%) when it comes to awareness of NbS in the communities. About 62% of the households got information about NbS from radio stations, with Ghana having the highest (83.4%) and CI the lowest (46.2%). Other relevant sources of info include extension officers, especially in Ethiopia where more than a fifth of the households got information from extension officers. Farmer groups are also mentioned in Cote d'Ivoire and Burkina Faso. Over the last two years there has not been any significant differences between listeners and nonlisteners regarding improvement in the awareness of NbS with about 50% and 51% of them respectively saying their awareness has improved. Similarly, even though improvement in awareness was slightly higher among households in low intensity (50%) and high intensity (51%) compared to 42% among those in non-intervention zones, the differences are not statistically significant. This could be attributed to the small realised samples for the non-intervention zones as shown earlier.

Knowledge of NbS

Listeners were asked a knowledge question to assess their understanding of the NbS concept. They were asked to indicate their level of agreement with the following:

i. NbS design should always involve women, youth and the marginalised
ii. NbS design should stop human development activities
iii. NbS should rely more on science than traditional knowledge
iv. NbS protects the environment for biodiversity benefits

Table 3.4.1 presents the results of this knowledge test, showing the expected correct answers. Generally, a higher percentage of respondents chose the right responses (except for the third option), where only 46.1% were able to choose correctly. The outcome shows a good understanding of the basic concept and criteria of NbS by households. The communities understand that beyond NbS being a practice, it must include gender equality and inclusion concerns, promote biodiversity, and have human benefits. It should also tap into local traditional knowledge and not only on scientific knowledge. It is interesting to note that a significant 61.9% recognise that NbS does not necessarily stop human development activities but these actually should take into consideration environment impacts. However, surprisingly, only a limited percentage of people realise that an NbS needs to build on both traditional and scientific knowledge.

	NbS design should always involve	NbS design should stop human development activities	NbS should rely more on science than	NbS protects the environment for biodiversity benefits

	W/Y/Marg (% agree)	(% disagree)	traditional knowledge (% disagree)	(% agree)
Ethiopia (n386)	84.7	64.5	15.0	96.1
Ghana (n235)	96.6	22.6	41.3	94.0
Uganda (n210)	99.1	66.2	51.9	98.1
Zambia (n294)	93.2	50.0	65.5	96.6
Burkina Faso(n372)	98.7	78.8	58.1	99.5
Côte d'Ivoire(n218)	95.4	83.0	53.7	100
Total (n1715)	93.9	61.9	46.1	97.4

Table 3.4.1: Knowledge of NbS

Figure 3.4.1 compares levels of knowledge and understanding of Nature-based Solutions (NbS) between listeners and non-listeners of the NbS radio programme, measured by the number of NbS knowledge items correctly identified. Knowledge of Nature-based Solutions is significantly higher among listeners than non-listeners, with listeners disproportionately represented in higher knowledge categories and non-listeners dominating the lowest category ($\chi^2(4) = 261.24$, $p < 0.001$). Some non-listeners also show higher knowledge may likely be due to other information sources, but the distribution consistently favours listeners. In the later part of this report, we use this as one of the outcome variables in the multilevel propensity score models.

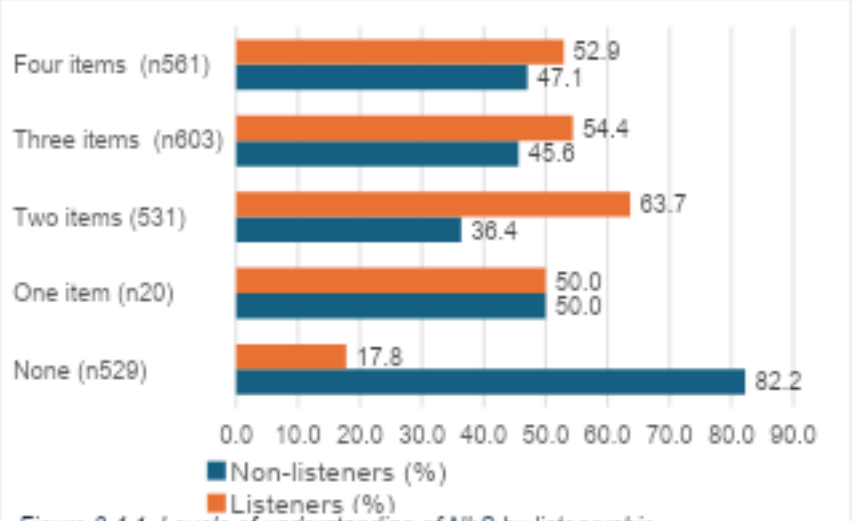


Figure 3.4.1 Levels of understanding of NbS by listenership

Practice of NbS

Country of survey	NbS Initiatives			
	<=2yrs	>2 yrs	Not sure	Total
Ethiopia	5	206	1	212
Ghana	15	44	22	81
Uganda	7	62	27	96
Zambia	15	152	16	183
Burkina Faso	11	70	0	81
CÃ´te d'Ivoire	4	11	0	15
Total	57	545	66	668

Table 3.4.2: Number of NbS initiatives in the communities

	<=2years (%)	>2+ years (%)	Not sure (%)
No Signal from NbS radio program (n56)	7.1	64.3	28.6
Less intensive NbS radio program (n379)	7.4	84.2	8.4
High intensive NbS radio program (n233)	10.7	81.6	7.7
Total (n668)	8.5	81.6	9.9
Pearson chi2(4) = 26.0796 Pr = 0.000			

Table 3.4.3: Intervention status and community NbS initiatives

In Tables 3.4.2 we show the number of NbS initiatives being implemented by the 238 communities in the survey. In all the six countries, most NbS initiatives have been implemented for over two years, and nearly 57 community-level NbS initiatives were implemented during the two years of the project implementation in the studied communities. When extrapolated, using the sampling design, these 57 lead to over 700 communities taking at least one NbS initiative. About 545 initiatives existed before the project confirming that NbS practices have always existed in communities. About 90% of all the initiatives were reported to address issues affecting women and youth at least to some extent.

Ghana, Ethiopia, Zambia and Burkina Faso reported stronger "very much" inclusive implementation, while Uganda and Cote d'ivoire showed relatively weaker inclusion despite established initiatives, suggesting some contextual implementation differences. See Appendix F for inclusive implementation and Appendix G for the main types of NbS being implemented by communities. Table 3.4.3 shows how these initiatives vary according to the NbS radio program intensity in the communities. There is a statistically significant association between programme category and the duration of NbS initiatives, with higher categories predominantly linked to initiatives implemented for more than two years ($\chi^2(4) = 26.08$, $p < 0.001$).

It is also noteworthy to point out that the higher the program intensity the more the proportion of initiatives being started within the last two years of program implementation, even though the association is somewhat weak. Perhaps this should be expected given that the program is just in two years of full implementation. It is expected that by the end of the five-year implementation this association will be stronger. Listeners were asked to rate their perceived influence of the radio programs on the community NbS initiatives. Figure 3.4.2 demonstrates overwhelmingly positive perceptions, with minimal reports of weak influence. Majority of the respondents perceive the radio program to have influenced NbS initiatives a great deal (66%) or a

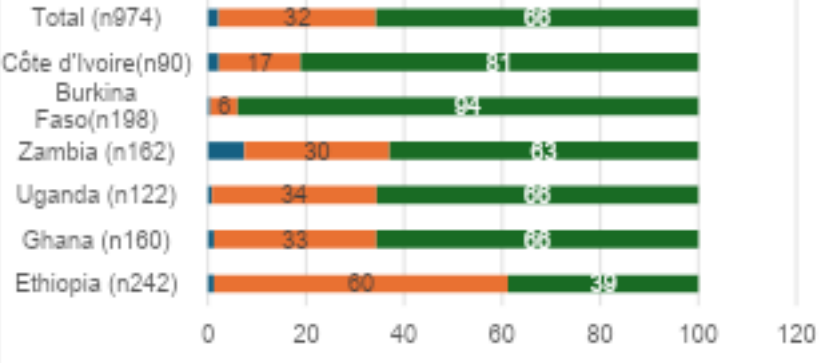


Figure 3.4.2 Perceived influence of NbS radio program on the initiatives

fair amount (32%). Burkina Faso (94%) and Côte d'Ivoire (81%) report the highest proportions of *"a great deal"* influence. Ethiopia stands out with a contrasting but still positive pattern as 60% report influence only *"a fair amount"* 39% report *"a great deal"*. Overall, the programme appears to contribute to these community NbS initiatives primarily through awareness raising and motivation, with moderate technical and inclusivity support as Table 3.4.4 shows. The contribution attributed to the program by respondents varies by

	Nothing (%)	Raised awareness (%)	Inclusive implementation (%)	Motivation (%)	Technical advice (%)
Ethiopia	0.0	53.6	21.7	8.0	16.7
Ghana	14.3	24.3	11.4	42.9	7.1
Uganda	0.0	13.7	7.8	60.8	17.7
Zambia	7.9	10.2	22.8	47.2	11.8
Burkina Faso	6.1	42.4	6.1	6.1	39.4
Côte d'Ivoire	0.0	81.8	0.0	9.1	9.1
Total	5.2	32.0	16.2	29.6	17.1

Table 3.4.4 : Contribution of the radio program to the NbS initiatives

country: Awareness-creation is more focused in Ethiopia and Côte d'Ivoire; Uganda, Zambia, Ghana mostly find motivation from the program, technical support is quite pronounced in Burkina Faso. Very low "nothing" responses indicate strong perceived relevance of the radio program in all the countries.

Apart from community initiatives, individual households were also asked to mention whether or not they have been practicing climate-smart agriculture as a form of NbS initiatives. Overall, 65% of listeners versus 43% of non-listeners responded that they have been practicing climate-smart agriculture (CSA) in the past three years (*Pearson chi2(1) = 104.7226 Pr = 0.000*). Most (over 90%) of the listeners were of the view that the NbS radio program influenced their decision to practice CSA either by a fair amount or a great deal. Among the non-listeners, about 44.2% male-headed vs 34.3% of female headed households said they have been practicing CSA in the past three years (*Pearson chi2(1) = 5.1997 Pr = 0.023*). However, we find no strong statistically significant difference between male headed and female headed households among listeners as they both score 64.5% and 64.9% respectively (*Pearson chi2(1) =0.0046 Pr = 0.946*). Again, this clearly shows that given the same opportunity to listen to the program women can do as well as men, if not better. Figure 3.4.3 compares the proportion of households reporting adoption of climate-smart agricultural (CSA) practices between non-listeners and listeners. In all countries, listeners report higher CSA adoption.

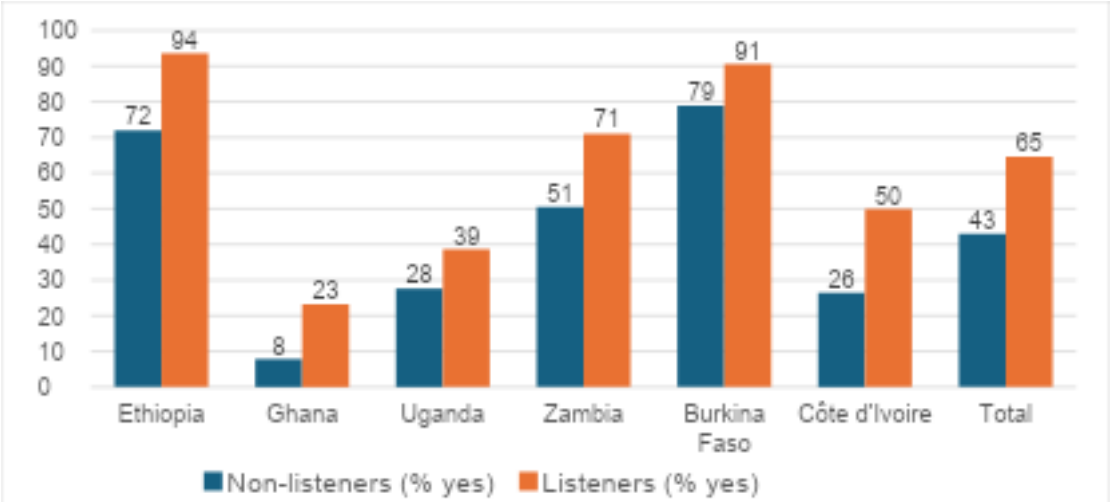


Figure 3.4.3 Proportion of households practising climate-smart agriculutre as a form of NbS

The gap ranges from moderate (Uganda) to very large (Ethiopia, Zambia, Côte d'Ivoire). Ghana and Côte d'Ivoire show large proportional differences despite lower overall adoption levels. Burkina Faso and Ethiopia show high baseline adoption, with listenership further increasing uptake of CSA. The consistent direction of association across all countries strengthens the plausibility of a program effect. In the later part of the paper we will model this using multilevel propensity score matching to strengthen the causal link while controlling for some demographic factors.

3.5 Ability to express climate adaptation needs and perceptions of responsiveness

In this section we look at how the radio program is helping women and men, young and old, to express their climate change needs, and how they perceive local authorities are responding to these needs. Figure 3.4.4 presents a comparative analysis of the self-reported ability to express climate change needs among women and men across the six countries. The data is segmented by gender and further divided into two groups: listeners and non-listeners.

Across all countries and for both men and women, listeners consistently and significantly report a higher mean score of their ability to express CC needs compared to non-listeners. This strongly suggests that listening to the program is correlated with increased confidence or

capacity to articulate climate-related concerns.

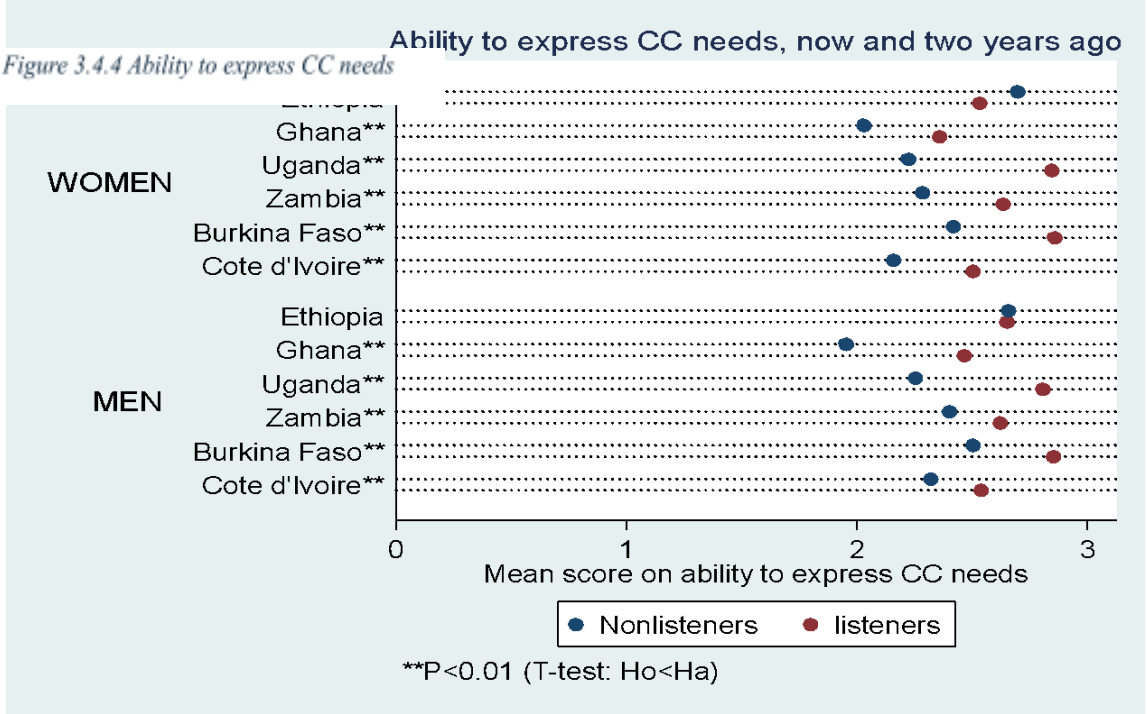


Figure 3.4.4 Ability to express CC needs

In most countries (Ethiopia, Ghana, Uganda, Zambia), the pattern for women closely mirrors that of men, though the baseline ability scores may differ. Burkina Faso and Côte d'Ivoire show a particularly strong effect for men (denoted with **), suggesting that the intervention or listening to the program has an exceptionally pronounced impact on men's perceived ability to express needs in these regions. In all, the figure provides strong evidence that listening to the program is a critical component in empowering individuals to voice their climate needs. Analysis of age clearly demonstrates that listeners report a higher ability to express needs than nonlisteners. Generally, though, older individuals report a higher ability to express CC needs than younger ones, regardless of listening status.

Figure 3.4.5 compares listeners and non-listeners on perceived responsiveness of local authorities to expressed CC needs. Generally, listeners of the program have higher levels of perception that local authorities respond to their CC needs. Ethiopia (0.58) shows no asterisk, indicating that while the score is relatively high, it is not statistically different from non-listeners (or the variance is high). Ghana (0.35) and Zambia (0.22) are marked with a single asterisk (*), significant at the P<0.05 level. Uganda (0.25), Burkina Faso (0.65), and Côte d'Ivoire (0.02) are marked with double asterisks (**), indicating a stronger level of statistical significance (P<0.01). The most significant difference is observed in Burkina Faso (0.65) where respondents feel their needs are met with the highest level of responsiveness from the local authorities. This could be attributed to effective local governance, strong community networks, or successful development interventions. With an extremely mean score approaching zero, the population in Côte d'Ivoire (0.02) perceives almost no responsiveness from local authorities to their CC needs. This low score, coupled with high statistical significance (**), points to a systemic issue where feedback mechanisms or support systems may be failing.

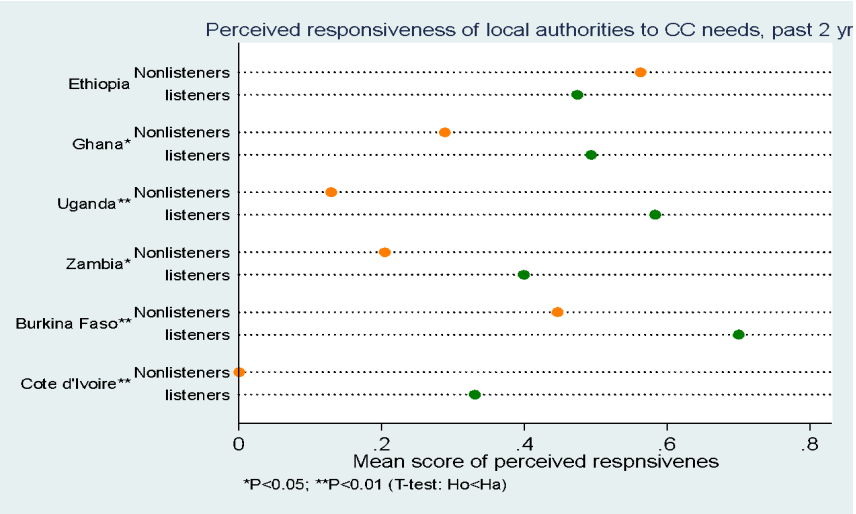


Figure 3.4.5 Perceived responsiveness of local authorities to expressed CC needs

While Burkina Faso appears to be a model of high responsiveness, the near-zero score in Côte d'Ivoire warrants urgent investigation to understand why the population feels unheard or unsupported.

3.6 The Quasi-Experimental Models

So far the above results largely show some significant association with listening to the NbS program as listeners consistently are shown to be performing better than non-listeners. To effectively measure the impact of listening to the NbS radio program, however, there is a need to use rigorous impact evaluation methods (Gertler et al., 2011) to measure attribution due to the intervention as recommended by the World Bank. This is because there is always a problem of selection bias in interventional programs using radio as a communication channel. In radio programming selection bias is often more pronounced as listeners are not selected randomly and are more likely to be different from non-listeners of the program. For example, farmers who decide to listen to the NbS radio program may be the ones who have more access to radio, better educated, older, etc. It is therefore important to note that failure to identify possible selection bias may lead to inaccurate estimation of outcomes and their impacts. Counterfactuals in quasi-experimental designs allow us to evaluate interventions in uncontrolled settings like agricultural radio programs and still maintain some confidence in the internal and external validity of our inferences. The sampling strategy described above allows us to employ statistical techniques such as multilevel propensity score matching. Propensity score matching (PSM) is effective if the selection characteristics are known and observed. As stated earlier the choice of multilevel PSM model is because listeners of radio programs are nested within district radio stations serving different ecological zones. This means ecological zones would have different baseline probabilities as confirmed in the estimates from Appendix B. Hence using multilevel logistic regression, we first determine the probability of listening to the NbS radio program when age, gender, education and household relationship dynamics are controlled. Table 3.6.1 shows the results from the multilevel logistic regression model. From the results we find that age is not a significant factor in determining the likelihood of listening to the NbS program. On average, a one-unit

increase in being a man increases the likelihood of listening to the program by about 54% compared to being a woman, holding other variables and cluster effect constant. Also, the odds of listening to the program increase with education, as people who have completed primary or secondary school compared with those with no

		Odds ratio	Std error	P-value	Lower CI	Upper CI
Age	<=34	1.000				
	>=35	1.032	0.113	0.771	0.833	1.280
Gender	Women	1.000				
	Men	1.537	0.198	**0.001**	1.194	1.978
Education	None	1.000				
	Primary	1.349	0.165	**0.015**	1.061	1.715
	Secondary	1.375	0.200	**0.029**	1.034	1.829
	Tertiary	1.482	0.372	0.117	0.907	2.423
Relationship to H.head	Relative	1.000				
	H. head	2.562	0.684	**0.000**	1.518	4.323
	Spouse	2.955	0.816	**0.000**	1.721	5.076
	Son/daughter	1.615	0.447	0.083	0.939	2.777
	_Constant	0.256	0.092	**0.000**	0.127	0.516
Ecological zone	var(_cons)	0.878	0.336		0.415	1.858

LR test vs. logistic model: chibar2(01) = 241.79 **Prob >= chibar2 = 0.0000**

Note: _cons estimates baseline odds (conditional on zero random effects).

Table 3.6.1 Multilevel logistic regression estimates for the odds of listening to NbS radio program

formal education have 35% and 38% more likelihood of listening to the program. Relationship dynamics within the household is also a significant factor. Being a household head or a spouse in the household more than doubles the probability of listening to the program compared with those who are just relatives of the household head.

The high *var(_cons)* of 0.878 shows clusters (ecological zones) differ in their baseline probabilities. And interclass correlation estimate of 0.211 shows that 21.1% of the total variance is between ecological zones. In other words, two people from the same ecological zone have a correlation of 0.211 in their latent propensity for listening to the program. Likelihood ratio (LR) test is highly significant confirming that clustering matters hence the use of *melogit* is a much better model than regular logistic regression.

Having determined the probabilities, we then incorporated the estimates into the PSM model to find impact of listening to the radio program on four key outcomes:

i. Increase in awareness of biodiversity benefits measured as 1= improvement in awareness of biodiversity benefits; 0= No improvement

ii. Good understanding of NbS/Knowledge of the four key characteristics of NbS measured as 1=knowing more than two of the four knowledge items; 0=knowing two or none of the knowledge items in Section 3.4

iii. Practicing climate-smart agriculture measured as 1= practising at least one of the following: Agroforestry, Land and pasture rehabilitation, soil fertility improvement through crop rotation/mixed cropping/intercropping, Soil and water conservation, Organic pesticide and Beekeeping; 0=None of them is being practised in the last two years.

iv. Community's capacity to address climate change burden measured as 1= Improvement in individual's perceived capacity of the community to address climate change related burden; 0=No improvement

Table 3.6.2 presents unmatched (raw) differences and Average Treatment Effects on the Treated (ATT) after applying multilevel propensity score matching (PSM) to compare listeners and nonlisteners of the NbS radio program. The ATT estimates show the programme's effect after adjusting for observable individual- and cluster-level differences. Generally, unmatched results show large and statistically significant differences across all outcomes, suggesting strong initial advantages for listeners. After matching, some effects persist while others disappear, indicating that part of the raw differences was driven by selection bias rather than programme impact. The multilevel PSM results therefore provide a more credible estimate of programme effects. See Appendix H for details of test for common support which confirms that listeners and non-listeners were very much aligned after matching procedure.

		Listeners	**Nonlisteners**	**Difference**	**S.E.**	**T-stat**	**P-Value**
Increase in awareness of biodiversity benefits	Unmatched	0.554	0.473	**0.081**	0.026	3.120	0.002
	ATT	0.555	0.558	**-0.002**	0.065	-0.040	0.970
Good understanding of NbS	Unmatched	0.586	0.458	**0.128**	0.021	6.110	0.000
	ATT	0.585	0.449	**0.136**	0.056	2.430	0.015
Practicing climate-smart agriculture	Unmatched	0.645	0.430	**0.215**	0.021	10.440	0.000
	ATT	0.639	0.401	**0.238**	0.053	4.500	0.000
Community's capacity to address CC burden	Unmatched	0.732	0.611	**0.121**	0.020	6.110	0.000
	ATT	0.727	0.625	**0.101**	0.054	1.870	0.060

Table 3.6.2 Results from multilevel propensity score matching

The individual outcome results with regard to increase in awareness of biodiversity benefits, show that once comparable listeners and nonlisteners are matched, the apparent advantage disappears. This suggests that higher awareness among listeners in the raw data is largely explained by pre-existing differences, not the programme itself. Listening does not appear to cause an increase in awareness of biodiversity benefits once other factors are controlled for. When we limit the analysis for women, the difference is much less (-0.043) and statistically not significant.

Concerning understanding of NbS, even after controlling for selection and clustering, listeners are 13.6 percentage points more likely to have a good understanding of NbS. This indicates a robust programme effect on deeper conceptual understanding, not just awareness. The effect size actually increases slightly after matching, suggesting the matching process is corrected for some initial bias. For women the estimated effect is much higher (0.220) and highly significant at $p<0.001$, suggesting better understanding when demographic factors are controlled.

The strongest programme effect is observed for climate-smart agricultural practices. Listenership is associated with a 23.8 percentage-point increase in the likelihood of practicing climate-smart agriculture, even after matching. This provides strong evidence that the programme influences behavioural change, not only knowledge. Again when we compare women-headed household listeners and non-listeners there is an even much higher 40.2% percentage point of likelihood to practice CSA as NbS.

Regarding adaptive capacity, after matching, the effect weakens and is significant only at the 10% level, indicating suggestive but not conclusive evidence that the programme improves perceived community adaptive capacity. In other words, there is suggestive evidence that listeners perceive their communities as having a higher capacity to address climate change, but the result falls just short of the conventional 95% confidence threshold ($P<0.05$). This could be considered a weak or suggestive trend rather than a definitive proof. Similarly, the effect is less for women and not significant even at $p<0.1$ level.

4. Discussion

This evaluation provides important evidence on the contribution of interactive, gender-inclusive radio programming to strengthening rural community action on climate change adaptation (CCA) and biodiversity through Nature-based Solutions (NbS). After two years of implementation across six countries, the findings suggest that the programme is contributing meaningfully to knowledge gains and behavioural change—while also revealing important nuances regarding awareness, gender equity, and systemic responsiveness.

4.1 Strengthening awareness versus deep understanding

The programme appears highly effective in raising general awareness of climate change and biodiversity across intervention areas. Awareness of climate change is already high (84.8%), and listeners consistently demonstrate greater increases than non-listeners across most countries. Particularly notable is the programme's role in strengthening understanding of the

differentiated impacts of climate change on women, youth, and marginalized groups. This is a critical achievement, as equity-focused climate knowledge is typically harder to transmit than general environmental messaging. However, the quasi-experimental results highlight an important distinction between awareness and understanding. While unmatched results suggested that listeners had higher awareness of biodiversity benefits, the multilevel propensity score matching (PSM) results show that this difference disappears after controlling for selection bias. This indicates that individuals predisposed to environmental interest or with higher education were more likely to listen in the first place.

In contrast, the programme shows a robust and statistically significant effect on deeper conceptual understanding of NbS. After matching, listeners are 13.6% points more likely to demonstrate good knowledge of NbS characteristics. For women, the effect is even stronger (22% points), suggesting that once structural listening barriers are accounted for, women benefit disproportionately from exposure. This distinction between surface awareness and deeper understanding reinforces the importance of rigorous impact estimation and suggests that interactive radio may be particularly effective for conceptual learning faster than simple exposure to ideas.

4.2 Behavioural change: Evidence of transformative impact

The strongest and most consistent impact of the programme lies in behavioural outcomes—specifically, the adoption of climate-smart agriculture (CSA) practices. Across all countries, listeners report significantly higher CSA uptake than non-listeners. After multilevel PSM adjustment, listenership increases the likelihood of practicing CSA by 23.8% points. Among women-headed households, the effect rises dramatically to over 40% points. This is particularly significant for three reasons:

i. ***Behavioural change is harder to achieve than awareness change***, suggesting that the programme is focused on action (by inspiring and accompanying households and communities using documentary and "how to" format), which goes beyond information dissemination to influencing practice.

ii. ***Gender parity in adoption among listeners*** demonstrates that when women have equal access to programming, they adopt climate-smart practices at rates comparable to or exceeding men.

iii. The results support a plausible theory-of-change pathway:
Radio exposure → Improved NbS understanding → Increased motivation and technical knowledge → Adoption of CSA practices.

The behavioural findings align with the community-level evidence showing a dose–response relationship between programme intensity and improved adaptive capacity. High-intensity communities consistently report stronger perceived improvements than low- or non-intervention areas.

4.3. Community capacity and systemic responsiveness

Evidence on community adaptive capacity is positive but more nuanced. Descriptively, approximately 60% of communities report improved adaptive capacity, and this increases

systematically with programme intensity. However, after matching, the individual-level effect on perceived community capacity becomes only marginally significant ($p = 0.060$).
This pattern suggests that:

- Community-high level change may require longer exposure than two years, which is reasonable
- Broader structural and governance factors mediate perceived adaptive capacity.
- Radio programming alone may not fully address institutional bottlenecks.

The findings on responsiveness of local authorities further illustrate this complexity. While listeners report greater ability to express climate needs, perceived responsiveness varies dramatically by country. Burkina Faso emerges as a strong example of perceived responsiveness, while Côte d'Ivoire reflects systemic constraints with extremely low perceived responsiveness despite exposure.

This indicates that empowerment (voice) and accountability (response) are related but distinct processes. The programme so far appears effective at strengthening voice and confidence, but responsiveness depends on local governance capacity and enabling institutional frameworks. More programming and activities targeting local governance and policy frameworks on climate change adaptation are necessary.

4.4 Gender and equity implications

The programme demonstrates important gender-responsive achievements:

- Balanced gender representation in sampling ensures credible gender comparisons.
- Women show strong gains in NbS understanding and CSA adoption once listening barriers are addressed.
- Listeners of both genders overwhelmingly support inclusive NbS design involving women, youth, and marginalized groups.
- The programme appears particularly effective in strengthening equity-focused climate knowledge.

However, gender disparities in program awareness and listenership remain. Men are 54% more likely to listen than women, even after controlling for other factors. Thus, men are more likely to be reached and engaged by the NbS radio programme than women. But once women are aware of the program, most (proportionately more than men) do go on to listen, suggesting that the main barrier is awareness and access rather than interest. Efforts should prioritize raising awareness and supporting access, as conversion to listenership is generally strong. Country-specific strategies may be needed, particularly in Côte d'Ivoire, Burkina Faso and Zambia where gender gaps in program awareness are high.

Limited access to radio sets remains a structural barrier, especially for women. Thus, while the programme is gender-inclusive in content, structural inequalities in access still shape exposure patterns.

4.5 Methodological contributions

The use of multilevel PSM significantly strengthens the credibility of the evaluation. Given non-random listenership and ecological clustering, failure to adjust for selection bias would likely have overestimated programme effects. The matching procedure reveals where impacts are genuine (knowledge and behaviour) and where raw associations were driven by pre-existing differences (biodiversity awareness). The multilevel logistic regression confirms substantial ecological clustering (ICC = 0.211), justifying the modelling approach. This methodological rigor enhances internal validity while preserving real-world programmatic context.

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5. Conclusion

After two years of implementation, the *On-Air for Gender-inclusive Nature-Based Solutions* project demonstrates credible and meaningful contributions toward its intermediate outcome of enhancing enabling environments for rural community climate action using NbS, and its ultimate outcome of improved gender-inclusive climate resilient communities in Sub-Saharan Africa.

Key conclusions include:

i. **Strong behavioural impact:** The programme significantly increases adoption of climate-smart agriculture practices, with particularly strong effects among women-headed households.

ii. **Robust knowledge gains:** Listenership improves conceptual understanding of NbS, even after controlling for selection bias.

iii. **Empowerment effects:** Listeners report significantly higher ability to express climate-related needs, suggesting strengthened voice and agency.

iv. **Equity advancement:** The programme contributes to improved understanding of gendered climate vulnerabilities and promotes inclusive NbS design norms.

v. **Mixed institutional responsiveness:** Improvements in perceived community adaptive capacity are promising but not uniformly strong, and responsiveness of local authorities varies widely by country context.

Importantly, the evaluation distinguishes between awareness, understanding, and behavioural outcomes. While awareness gains are widespread, the strongest attributable impacts occur in knowledge depth and practice of climate-smart agriculture. This pattern supports the programme's strategic focus on interactive engagement rather than one-directional messaging.

Going forward, three implications emerge:

- Continued investment in women's access to radio and community listener groups could amplify gender-equal outcomes.

- Focused programming on local governance of climate change adaptation and strengthening linkages between communities and local authorities may enhance systemic responsiveness.
- Longer-term follow-up (at five years), at the endline, may perhaps reveal stronger community-level institutional effects as behavioural changes consolidate.

Overall, the findings provide evidence that interactive radio programming can serve as an effective, scalable, and gender-responsive mechanism for advancing Nature-based Solutions and climate adaptation in rural Africa. The programme is not merely raising awareness—it is influencing knowledge, shifting norms, and driving practical nature-positive actions.

Appendices

Appendix A: Participants of community group discussions

	Women	Men	Young (18-35)	PWDs	Total
Ethiopia	176	318	235	20	494
Ghana	224	294	200	12	518
Uganda	182	298	185	21	480
Zambia	326	309	173	22	635
Burkina Faso	174	205	71	3	379
Cote d'Ivoire	82	135	48	6	217
Total	1164	1559	912	84	2723

Appendix B: Radom effect estimates for the ecological zones

	Ecological zone	Random effect	Std Error
Ethiopia	Wetland	-0.370	0.497
	Forest/woodland	2.810	0.863
Ghana	Coastal	-0.050	0.572
	Transition zone	0.675	0.522
	Guinea Savanna	0.548	0.567
	Sudan Savanna	0.108	0.430
Uganda	Savanna Woodland	-0.256	0.414
	Savanna grassland	-0.288	0.438
Zambia	Cropland	-0.141	0.549
	Savanna	0.113	0.611
	Grassland	-0.961	0.346
Burkina Faso	North sudanian	-0.054	0.628
	Sudanian ecosystem	-0.662	0.281
	Soudano-sahelian	1.147	0.748
Cote d'Ivoire	Collines et bas-fond	-0.495	0.458
	Savane arborée	-0.960	0.230
	Forest zone	-1.163	0.245

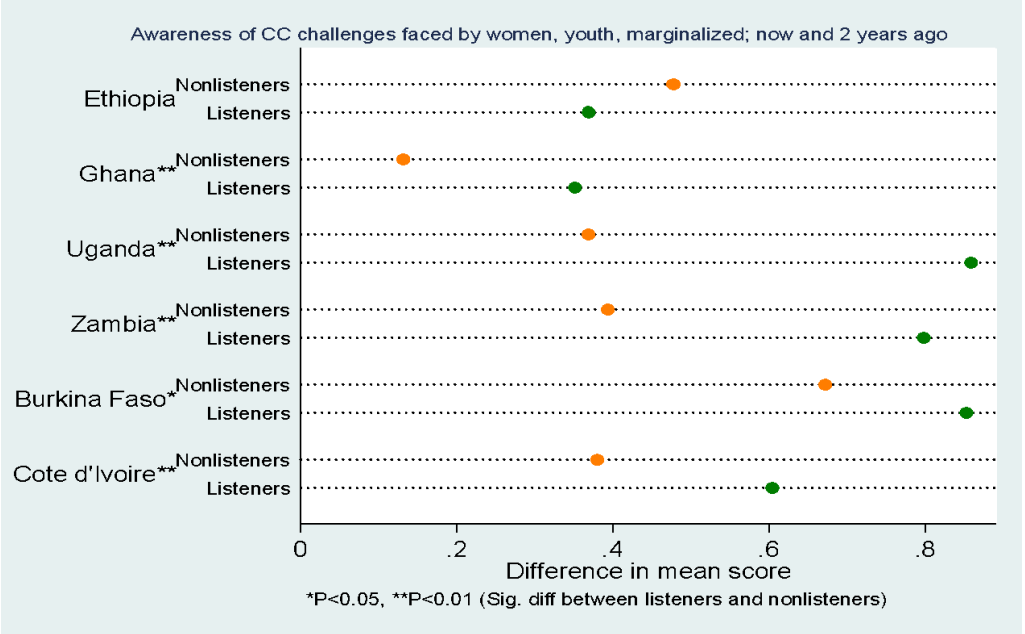
The random effect estimates show which clusters (ecological zones) have higher/lower baseline probabilities after adjusting for covariates.

Appendix C: Awareness and listenership of the NbS program by gender

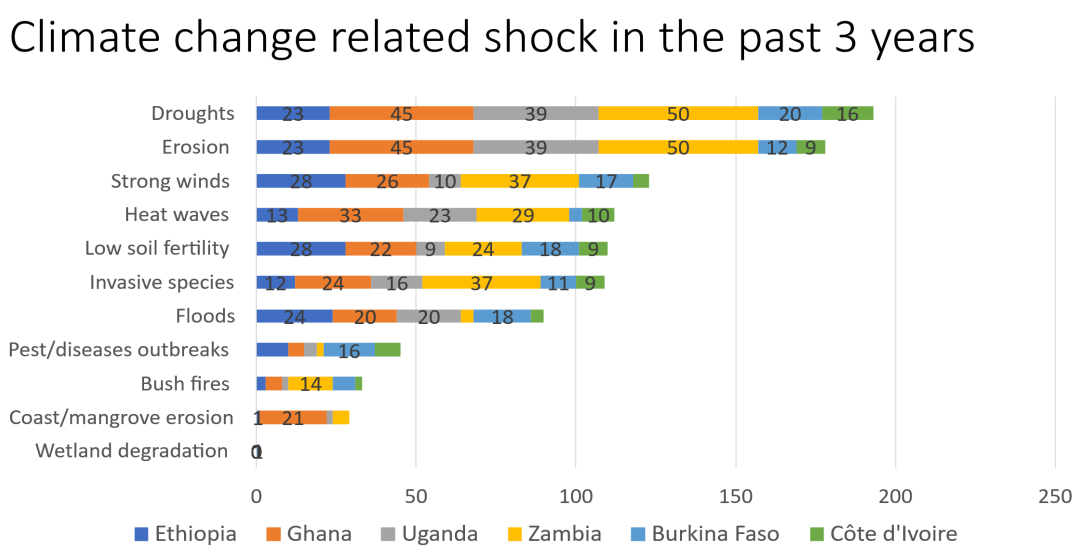
	% aware		% listened		% aware &listened	
	Women	Men	Women	Men	Women	Men
Ethiopia	61.5	65.9	58.6	64.2	95.3	97.3
Ghana	59.9	73.2	46.9	62.4	78.3	85.2
Uganda	53.1	52.0	51.7	51.0	97.4	98.1
Zambia	52.8	62.9	46.6	58.1	88.4	92.4
Burkina Faso	51.7	60.4	44.3	57.4	85.7	95.0

Cote d'Ivoire	40.9	45.9	30.8	32.7	75.4	71.2
Total	46.4	61.4	46.5	55.5	86.9	90.5

Appendix D: *Awareness of CC challenges faced by women, youth and marginalized now and two years ago*



Appendix E: Climate change related shocks in the past 3 years



Appendix F: Did the NbS initiative address issues of women, youth and the margnalised?

	No (%)	Yes, somewhat (%)	Yes, very much (%)	Total
Ethiopia	3(1)	85 (40)	124 (59)	212
Ghana	17 (21)	11 (14)	53 (65)	81
Uganda	31 (32)	44 (46)	21 (22)	96
Zambia	8(4)	68 (37)	107 (59)	183
Burkina Faso	9 (11)	22 (27)	50 (62)	81
Côte d'Ivoire	1 (7)	13 (86)	1 (7)	15
Total	69 (10)	243(37)	356 (53)	668

Appendix G: NbS initiatives by communities in the last 3 years

	Ethiopia	Ghana	Uganda	Zambia	Burkina Faso	Cote d'Ivoire
Agroforestry	28	6	19	30	10	12
Afforestation	38	19	21	22	23	8
Forest protection	22	12	6	18	8	1
Pasture rehabilitation	15	1	4	7	1	1
Wetland protection	9	1	5	1	1	0
Soil fertility	36	9	9	41	23	2
Soil/water conservation	40	8	4	7	5	0
Organic pesticide	8	1	2	7	2	3
Beekeeping	1	1	2	22	3	0
Watershed management	9	2	1	1	3	0
Crop/animal farm	5	1	0	23	4	1
Total	211	61	73	179	83	28

Appendix H: Test for common support in the PSM model

Test for common support assumption : Biodiversity benefit model

	Off support	On support	Total
Nonlisteners	0	649	649
Listeners	20	843	863
Total	20	1,492	1512

* 98.7% of the observations/cases was on common support

Test for common support assumption :Other models

	Off support	On support	Total
Nonlisteners	0	1172	1,172
Listeners	20	1046	1,066
Total	20	2218	2,238

* 99.1% of the observations/cases was on common support