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Disability, Perceptions of Climate Change Impacts, and Inclusive Climate Action Priorities in Abia State Nigeria

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Abstract

Persons with disabilities are disproportionately and differentially impacted by climate change, particularly in low-income settings. Our novel study reports findings from a survey of 104 Nigerians with disabilities and focus groups; examines the climate change impacts perceived by persons with disabilities; enumerates the barriers to climate responses they experience; and identifies disability-inclusive key climate action priorities and climate solutions in Abia State, Nigeria. Our findings indicate that the dominant climate impacts perceived by respondents with disabilities were poverty, loss of agricultural productivity and livelihood, and effects on wellbeing. Climate response measures were predominantly inaccessible to participants with disabilities facing structural barriers including stigma and discrimination, a lack of meaningful inclusion in decision-making, and a scarcity of disability-inclusive climate resources. Key climate action priorities identified by respondents included advancing understanding of the disparate impact of climate change on persons with disabilities, promoting inclusive disaster risk reduction, centering and prioritizing disability equity within climate action, and enabling inclusive sustainable livelihoods. Experiential insights at the micro-level from persons with disabilities are vital to formulating climate-related policy and climate decision-making. We recommend innovative cross-cutting policies and interventions to repair structural disability discrimination and promote urgent inclusive climate action that benefits all of society.

Keywords: climate change; livelihood; persons with disabilities; poverty; sustainability

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1. Introduction

The climate crisis is heightening the relative inequity of persons with disabilities, with Sub-Saharan African disability communities among the most affected populations [1–6]. Persons with disabilities facing stigma and discrimination experience unique structural barriers to climate adaptation and mitigation policies and measures including climate-related information, decision-making, disaster risk reduction, sustainable livelihoods, education, formal employment, financial inclusion, social protection, and healthcare services [1–9]. In Nigeria, perfidious climate change significantly and differentially threatens persons with disabilities' rights to life, decent work, food, adequate standard of living, personnel mobility, and health, among other rights [1–8]. Persons with disabilities facing intersectional discrimination based on disability, age, gender, culture, geography and other categories are disparately affected by climate impacts [2–4,6]. Despite growing awareness of the

impact of climate change on disability communities, there is scarce empirical research on disability and climate change or evidence-based disability-inclusive climate responses in Nigeria and across Sub-Saharan Africa. Understanding how climate impacts are perceived and experienced by persons with disabilities, and their key priorities for climate action, is vital to developing effective disability-inclusive climate responses [3,10]. Persons with disabilities are the world's largest minority, constituting 16% of the global population, according to the World Health Organization [11].

The disability community in Nigeria faces amplified threats from acute climate impacts, including floods and heatwaves, as well as slow-onset events [7,12]. Nigeria has an average mortality due to extreme weather that is 15 times higher than that in low-vulnerability regions such as Sweden [13]. In disasters, persons with disabilities experience a scarcity of accessible early warning systems, transportation and shelters, and a significantly higher global mortality rate [1,2]. In Nigeria, flooding is damaging crops, livelihoods, shelters, infrastructure, assistive devices, and disrupting access to healthcare [12,14]. A 2024 post-flood assessment identified forty-three locations in Abia State affected by flooding or receiving internally displaced persons, determined that 93% of farmland and 47% of houses had been partially or completely destroyed, and identified food and shelter as urgent priorities [14]. In low-income countries such as Nigeria, a large proportion of persons with disabilities live in poverty without savings or access to social protection; extreme poverty and malnutrition can arise from heightened barriers to livelihood. In Northern Nigeria, 69.0% of persons with disabilities surveyed had a high probability of living on less than USD 2 per day [15].

Persons with disabilities facing stigma, discrimination, and social exclusion are often engaged in climate-sensitive subsistence agriculture and informal or unstable employment, and have high rates of unemployment [15,16]. In northern Nigeria, 42.0% of persons with disabilities were employed solely in agriculture, with 49.3% engaged in agricultural activities for survival [15]. Nigeria is confronting climate change, environmental hazards, and relative reductions in agricultural production and fisheries, together with human population growth and rapid urbanization [17]. Smallholder farmers with disabilities are experiencing climate impacts including extreme weather, unreliable precipitation patterns, shorter growing seasons, and poor soil quality [17]. Unjustly, people with disabilities who urgently need to adapt to climate change face unique and compounding barriers to climate action, decision-making opportunities, finance and resources, and an absence of social protection [3,18]. Furthermore, studies are lacking as to the degree to which persons with disabilities in Nigeria are impacted by climate change in commercially viable areas compared to non-commercial zones.

In the Niger Delta, environmental hazards and pollution, along with extreme weather, negatively impact crop productivity and fishing [7]. This region is classified as one of the globe's five most significantly polluted by crude oil, with at least 9–13 million barrels spilled over the past half century [19,20]. Crude oil, petroleum waste products, and gas flares contaminate the air, soil, groundwater, marine environment, and terrestrial ecosystems, depleting biodiversity and adversely impacting acute and long-term human health [20–22]. Persons with disabilities predominantly engaged in farming and fishing face destruction of their livelihood, compounded by governance shortcomings, and barriers to finance, equipment, livelihood diversification, and healthcare [7]. Structural and attitudinal barriers exacerbate the poverty faced by persons with disabilities, heightening their social exclusion, while poverty magnifies the risk of disability due to malnutrition, exposure to environmental hazards, a scarcity of public health measures, and safe work environments [23].

In Nigeria, the wellbeing of persons with disabilities is disproportionately negatively impacted by climate stressors such as rising temperatures, heatwaves, erratic rainfall, droughts, flooding, erosion, and desertification [24]. Nigeria is among the ten countries most exposed to extreme weather, ranking eighth globally in 2022 [25]. Heatwaves are associated with elevated mortality for individuals with mental health, cardiovascular, cerebrovascular, and respiratory related disabilities, and older persons [1,26]. Hot weather can, for instance, negatively impact the wellbeing of individuals with multiple sclerosis and spinal cord injury, among others [1]. People with disabilities facing a scarcity of accessible shelter, power, or adaptive management opportunities are more exposed to hot weather and experience barriers accessing healthcare services [3]. Nigerians with disabilities experience continuous threats from climate change to food production together with compounding barriers to food security including stigma, communication barriers, and resource scarcity [26,27]. Children and youth with disabilities are at elevated risk of food insecurity due to the inaccessibility of food programs, absence of decent work, and withholding of food by households due to discrimination. Absent adequate social protection, these factors can lead to malnutrition and heighten the risk of mortality [3]. In climate disasters, individuals with disabilities may require immediate or continuous access to healthcare facilities, services, and power which may be damaged, disrupted, inaccessible, or absent [1]. Assistive technology such as wheelchairs or sunscreen may be lost or unavailable [3,6]. Women with disabilities are at disparate risk of sexual abuse, exploitation, and violence in disasters [3]. Flooding damages water systems, heightening the risk of water-borne infectious diseases such as cholera and malaria [26]. Climate change is predicted to elevate the mortality rate in Africa 60–80% in 2030, with a significant proportion of these deaths due to exposure to diseases such as diarrhea and malaria [26]. Nigeria is an epicenter zone for "sickle cell warriors" who are at heightened risk from malaria, while extreme weather compounds management challenges [28,29]. Persons with albinism experience stigma, lack of access to sunscreen, sunglasses, protective clothing, indoor livelihood opportunities, and medical specialists, as well as discriminatory healthcare practices [6,30].

Internal migration in Nigeria could reach 9.4 million by 2050 [31]. Rural–urban migration is the largest form of migration, with people from southern states, including Abia State, more likely to migrate [31]. Persons with disabilities may benefit from internal migration as an adaptive strategy to climate change-related stressors and socioeconomic conditions, but face unique barriers to transport, shelter, and livelihood, and a disparate risk of violence [3]. Abia State has a high proportion of migrants, at 48.7% [31]. Climate change also has far-reaching security impacts on Nigeria. Water insecurity, flooding, and loss of pasture in the northeast and northcentral areas is leading to southern migration causing conflicts in receiving areas between herders, farmers, and fishers [31,32]. Persons with disabilities are at disparate risk in internally displaced settings or living conditions arising post-disaster that exacerbate disabilities [3].

Stigma and social exclusion experienced by persons with disabilities is affected by Nigeria's sociocultural diversity encompassing more than 250 ethnic groups and 500 languages, and by post-colonialism [15]. Nigerians experiencing intersectional discrimination on the basis of disability, gender, age, ethnicity, migration status and other categories are disparately impacted by climate change [3,7,27]. A significant achievement of Nigeria's growing disability rights movement was impelling passage of the Discrimination Against Persons with Disabilities (Prohibition) Act 2018 [33,34]. This legislation promotes the social inclusion of persons with disabilities and includes provisions related to accessibility, the right to free education, and work—setting "as much as possible" and "at least" a 5% hiring quota for public organizations—but is mostly unimplemented. Meanwhile, social support

is provided by families, organizations of persons with disabilities, nonprofit organizations, and Indigenous communities [15]. Notably, the Centre for Citizens with Disabilities, Nigeria (CCD), pressed for the prioritization of persons with disabilities in COVID-19 vaccination [33]. Importantly, Nigeria's disability movement is increasingly diverse, boding well for vital future advocacy on disability-inclusive climate action and social inclusion [33].

A cross-cutting approach to disability is urgently required in Nigeria's climate plans, policies, and programming. The National Climate Change Policy references persons with disabilities among vulnerable groups, and the Discrimination Against Persons with Disabilities (Prohibition) Act 2018 is recognized as part of the legal framework to strengthen climate-resilient development; however, this policy lacks concrete disability-inclusive climate measures by which to protect, promote, and fulfill disability rights [34,35]. Notably, Nigeria's Nationally Determined Contribution update specifies an inclusive approach to decision-making but does not sufficiently incorporate disability as a cross-cutting issue [36]. Nigeria ratified the United Nations (UN) Convention on the Rights of Persons with Disabilities (CRPD) in 2010 [37,38]. The CRPD legally mandates States Parties to meaningfully protect, promote, and fulfill the rights of persons with disabilities in climate measures [2]. States Parties are mandated "to ensure the protection and safety of persons with disabilities in situations of risk" (art.11), and "promote the realization of the right to work" (art.27). These rights are indivisible from and interconnected to all other rights within the CRPD, including the rights to accessibility (art. 9) and an adequate standard of living and social protection (art. 28) [37]. The Sustainable Development Goals (SDGs) operate complementarily with the Paris Agreement to enable a transition to a sustainable equitable future [39,40]. Disability is a crosscutting issue within the SDGs and is referenced both specifically and as a vulnerable or marginalized community within the SDGs and targets [39]. For instance, SDG 8 (decent work) associated target 8.5 seeks to "[b]y 2030, achieve full and productive employment and decent work for all women and men, including. . .persons with disabilities." SDG 13 (climate action) associated target 13.b requires promoting "mechanisms for raising capacity for effective climate change-related planning and management in least developed countries. . .including focusing on. . .marginalized communities" [39]. Nigeria's domestic climate plans, policies, and programs must respect, protect, and fulfill disability human rights under domestic and international law [2]. Unfortunately, only 41 of 195 parties to the Paris Agreement even reference persons with disabilities in their Nationally Determined Contributions [41]. Societal interactions and choices fostered by inclusive climate policies and measures are critical to enabling inclusive climate resilient development benefiting persons with disabilities and the whole of society [3,42].

Despite the disproportionate impact of climate change on persons with disabilities in low-and-middle-income-countries, evidence-based in-depth research on disability and climate change is scarce in Nigeria [3]. Hence, this study addresses a significant gap in the literature. The objectives of this novel study were to examine the climate change impacts perceived by persons with disabilities in Abia State, Nigeria; to examine the barriers to climate responses discerned by people with disabilities; and to identify persons with disabilities' key climate priorities and disability-inclusive climate solutions. Further, we provide recommendations to enable inclusive climate action in Abia State, Nigeria. It is increasingly recognized that advancing climate justice and equity for procedural justice, instrumental, and ethical reasons requires identifying persons with disabilities' key climate priorities and responses [3,10]. Experiential insights at the micro-level from persons with disabilities are vital to formulating meso- and macro-level climate-related policy and decision-making, and will enhance disability awareness raising and ownership of inclusive climate responses.

2. Methodology

2.1. Study Design

This study investigated the following research questions:

(1) How do persons with disabilities perceive the severity of climate impacts in their communities in Abia State, Nigeria?
(2) How do the demographic factors of disability category, age, and gender influence the perceived climate impacts of persons with disabilities across senatorial zones of Abia State, Nigeria?
(3) How accessible are climate response measures in Abia State, Nigeria?
(4) What are the key climate priorities and inclusive climate solutions identified by persons with disabilities in Abia State, Nigeria?

This study utilized a transformative mixed methods design that integrated a community-based research approach. The reported quantitative data was collected using a survey questionnaire, while qualitative data was obtained through focus group interviews. Robust evidence supports the beneficial use of transformative mixed methods research to illuminate the perspectives of marginalized communities, advocate for social justice, and advance human rights [43,44]. The study employed a community-based participatory research framework by collaborating with local Nigerians with disabilities and their representative organizations in Abia State, including the CCD [10,45]. The inclusion, participation, and collaboration of persons with disabilities and their representative organizations was ensured throughout the project cycle. Research instruments, including the survey questionnaire were co-designed by the Department of Insurance and Risk Management at the University of Uyo and the CCD. Further, Nigerians with disabilities and their representative organizations collaborated in the project's implementation, data analysis, and planning related to dissemination. This participatory approach ensured that the research was culturally appropriate, reflected the needs of local persons with disabilities and their communities, and was guided by the disability rights motto of "Nothing about us without us" [10].

Disability was defined in this study as persons with physical, mental, intellectual, or sensory disabilities (art. 1) [37]. Participants were eligible for the study if they were individuals with disabilities, 18 years or older, and residents of Abia State. Individuals with disabilities were initially identified through organizations of persons with disabilities. Communication with participants occurred in English, Pidgin and Igbo languages, or sign language.

Participation in this study was voluntary. Participants were informed of their right to withdraw and remove their information from the study at any point without sanction. Participants were informed that the information provided would be confidential and that identifiable information would not be shared. Approval for this study with the University of Uyo was obtained in Nigeria from the CCD Ethics Committee on 3 March 2024.

2.2. Survey Questionnaire

The survey questionnaire included questions regarding personal and demographic information; perceptions of climate impacts; perceptions of the accessibility of climate responses; and climate inclusive strategies. Elicited demographic variables included age groups (younger adults: 18–40 years, adults: 41–69 years, and older persons: 70–100 years), gender (males and females), and location (urban, rural, and peri-urban). Respondents identified their perceptions of climate change impacts as "no threat", "low threat", "medium threat", "strong threat", or "high threat." Participants scored the perceived accessibility and inclusivity of climate response measures on a scale of 1 to 5: 1 (not accessible), 2 (low accessibility), 3 (moderately accessible), 4 (good access) and 5 (highly accessible).

Enumerators administrated the survey following training in standardized administration and research ethics. The survey was conducted 11 March to 23 March 2024. The initial sample included 120 participants, however 16 participants were removed due to missing data. Thus, the final analytical sample size was 104 persons with disabilities. The sample was distributed using a combination of quota and stratified sampling techniques to ensure representativeness. Based on the quota sampling, equal quotas were allocated to each senatorial zone. This was followed with a variant of stratified sampling by dividing the population into homogeneous subgroups or strata based on the characteristics of age, gender and location. The study included persons from ten disability categories: albinism, Deaf-Blind, hearing disabilities, leprosy survivors, intellectual disabilities, spinal cord injury, persons with other physical disabilities, speech disabilities, visual disabilities, and multiple disabilities. These disability categories were selected because they reflected the representative organizations into which the local disability community had assembled. The survey questionnaire was administrated in English, Pidgin and Igbo languages, or sign language, and recorded by enumerators in English during March 2024.

2.3. Focus Groups

Focus groups were utilized as a qualitative methodology to obtain detailed perspectives from persons with disabilities. The focus groups were held in Abia North with 7 participants on 17 March 2024, Abia Central with 7 participants on 15 March 2024, and Abia South with 6 participants on 30 March 2024. Participants discussed their perceptions of the climate impacts they faced, the barriers they experienced to climate responses, their key climate action priorities, and disability-inclusive climate solutions. The interviews were conducted in English, Pidgin and Igbo languages, or sign language. The English interviews were then transcribed and the non-English interviews translated into English and then transcribed. The focus groups included participants from ten disability categories: albinism, Deaf-Blind, hearing disabilities, leprosy survivors, intellectual disabilities, spinal cord injury, persons with other physical disabilities, speech disabilities, visual disabilities, and multiple disabilities.

2.4. Study Area

This study was conducted in Abia State, which is situated in Nigeria's southeast geopolitical zone, and is bordered by Anambra State to the northwest, Enugu and Ebonyi States to the northeast, Imo State to the west, Cross River State to the east, Akwa Ibom State to the southeast, and Rivers State to the south. Abia State has a warm rainy season and a hot gloomy dry season, with the heaviest downpours occurring between April and October. The rainfall across Abia State is sufficient for agricultural activities such as the growing of cassava, oil palm, and yam. However, the high rainfall amount for Abia State is intensifying flooding and soil erosion [46].

Abia State is divided into three senatorial zones: Abia North, Abia Central, and Abia South (Figure 1). Abia North includes the local government areas of Arochukwu, Umunneochi, Ohafia, Isuikwuato, and Bende. Abia Central comprises Isiala Ngwa North, Umuahia North, Umuahia South, Osisioma, Isiala Ngwa South, and Ikwuano. Abia South encompasses Aba North, Aba South, Obingwa, Osisioma, Ugwunagbo, Ukwa East, and Ukwa West. Abia State is a significant Pan-African business hub in Nigeria, mainly due to the contributions of small-scale entrepreneurs in Aba, which is the state's major commercial city, situated in Abia South [47].

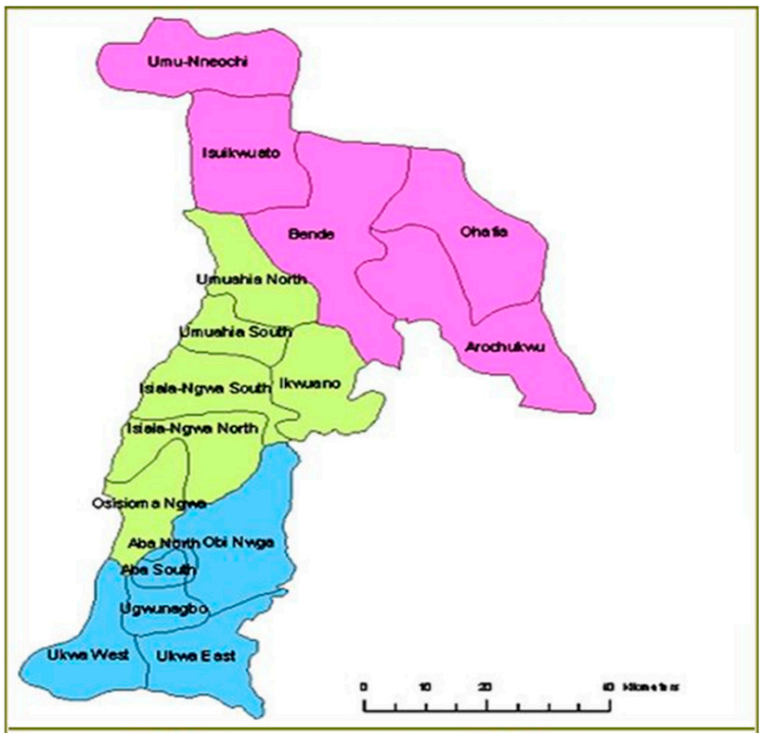

Figure 1. Abia State map showing Abia North (pink), Abia Central (light green) and Abia South (blue) [48].

3. Results

3.1. Disability

The physical disabilities category was reported with the highest prevalence by respondents across all three senatorial zones at 36.5% of the respondents with disabilities (Table 1). The visual disability category was the second most prevalent reported disability category across the senatorial zones at 25.0% of the respondents. None of the participants identified as having a mental disability which is most likely due to stigma, the scarcity of mental health diagnosis and services in Abia State, and the lack of civil society organization and advocacy around this disability within Abia State.

Table 1. Participant Characteristics and Disability Categories by Senatorial Zone.

Disability Categories	Senatorial Zone				
	Abia South	Abia Central	Abia North	Total	Percentage (%)
Albinism	4	1	2	7	6.7
Deaf-Blind			3	3	2.9
Hearing disabilities		2	2	4	3.8
Leprosy Survivors	1		1	2	1.9
Intellectual disabilities	2		5	7	6.7
Physical disabilities	16	6	16	38	36.5
Speech disabilities			1	1	1.0
Spinal cord injury	3		6	9	8.7
Visual disabilities	9	3	14	26	25.0
Multiple disabilities		1	6	7	6.7

3.2. Education

Individuals with hearing disabilities, intellectual disabilities, spinal cord injury, and visual disabilities reported having no formal education indicating hindrances to inclusive

education (Table 2). Persons with disabilities experience structural barriers to education such as discriminatory attitudes among families and teachers, communication barriers, inaccessible transportation, inaccessible infrastructure, and poverty [3,27,49]. Our findings indicate that the physical disability category is well-represented across all educational categories, including secondary education with 37.2%, and tertiary education with 36.0%, suggesting targeted disability-specific interventions may have supported this disability category's educational inclusion. Males are prevalent within primary education at 66.7% and tertiary education at 60.0%. This highlights the need to bridge gender gaps in inclusive education (Table 2). The distribution of the respondent's educational status (Table 2) shows that urban respondents have higher percentages in tertiary education, with 60.0%, compared to rural at 36.0%, and peri-urban areas at 4.0%, indicating that persons with disabilities residing in urban areas have better access to inclusive higher education. Rural areas have the highest representation in primary education. Interestingly, relative to Abia North, Abia South has a lower representation in primary education and a higher representation in tertiary education. Beyond our study, there is a scarcity of inclusive education research in Nigeria focusing attention on climate change, socioeconomic status, and intersectional characteristics of exclusion [49].

Table 2. Highest Educational Status Obtained by Respondents across Geographical Location, Senatorial Zone, Gender, and Disability Category.

Highest Education	**Geographical Location**			**Senatorial Zone**			**Gender**
	U	**R**	**PU**	**AN**	**AC**	**AS**	**M | F**
No school	4 (66.7)	2 (33.3)	-	-	2 (33.3)	4 (66.7)	3 | 3 (50.0 | 50.0)
Primary	7 (38.9)	11 (61.1)	-	7 (38.9)	8 (44.4)	3 (16.7)	12 | 6 (66.7 | 33.3)
Secondary	18 (41.9)	23 (53.5)	2 (4.7)	15 (34.9)	11 (25.6)	17 (39.5)	21 | 22 (48.8 | 51.2)
Tertiary	15 (60.0)	9 (36.0)	1 (4.0)	6 (24.0)	9 (36.0)	10 (40.0)	15 | 10 (60.0 | 40.0)
Advanced tertiary	4 (33.3)	7 (58.3)	1 (8.3)	5 (41.7)	4 (33.3)	3 (25.0)	5 | 7 (41.7 | 58.3)
Disability Category	**No School**	**Primary**	**Secondary**	**Tertiary**			**Advanced Tertiary**
Albinism	-	-	4 (9.3)	1 (4.0)			2 (16.7)
Deaf-Blind	-	-	1 (2.3)	1 (4.0)			-
Hearing disabilities	2 (33.3)	-	1 (2.3)	-			1 (8.3)
Leprosy Survivors	-	-	1 (2.3)	1 (4.0)			-
Intellectual disabilities	1 (16.7)	2 (11.1)	4 (9.3)	-			-
Physical disabilities	-	9 (50.0)	16 (37.2)	9 (36.0)			3 (25.0)

Table 2. *Cont.*

Disability Category	No School	Primary	Secondary	Tertiary	Advanced Tertiary
Speech disabilities	-	-	-	-	1 (8.3)
Spinal cord injury	1 (16.7)	2 (11.1)	5 (11.6)	3 (12.0)	-
Visual disabilities	2 (33.3)	4 (22.2)	7 (16.3)	8 (32.0)	5 (41.7)
Multiple disabilities	-	1 (5.6)	4 (9.3)	2 (8.0)	-

For geographical location: Urban (U). Rural (R), Peri-urban (PU); For senatorial zone: Abia North (AN), Abia Central (AC), Abia South (AS); For gender: Male (M), Female (F); Percentages are in parentheses; Dashes (-) indicate no respondent for that cell.

3.3. Economic Profile of Persons with Disabilities in Abia State

Persons with disabilities in this sample experienced high levels of poverty, with 36.5% of respondents having no income (Table 3). The dominant group lacking income is the physical disability category, followed by persons with visual disabilities. Significantly, individuals with disabilities in Abia State do not have access to adequate government social assistance. The data also reveals notable disparities in income levels due to varying socioeconomic conditions within each district. Half (50.0%) of the respondents without income or with an income of less than NGN 10,000 (USD 6.67) per month live in Abia North, while 25.9% live in the commercial zone of Abia South. Few respondents reported higher income levels, with only one individual from Abia South earning above NGN 100,000 (USD 66.67) per month.

Table 3. Presentation of Monthly Income (in Naira) by Senatorial Zone.

Senatorial District	No Income	Less than 10,000	11,000–50,000	51,000–100,000	Above 100,000	Total	Percentage (%)
Abia South	9	5	15	5	1	35	33.7
Abia Central	11	2				13	12.5
Abia North	18	9	21	4	4	56	53.8
Total	38	16	36	9	5	104	
Percentage (%)	36.5	15.4	34.6	8.7	4.8		

These findings underscore the importance of considering socioeconomic factors in developing climate change adaptation and mitigation responses. Low-income households face additional challenges coping with climate-related impacts and accessing resources for adaptation and mitigation measures. Addressing income inequalities and enhancing livelihood opportunities are essential for promoting inclusive climate action in Abia State.

A high proportion of participants with disabilities across all three senatorial districts, 47.1%, reported being unemployed (Table 4). The dominant disability category confirming unemployment status was the physical disability category, followed by persons with visual disabilities. In 2023, the Nigeria Labor Force Survey identified Abia State as having the highest unemployment rate at 18.7% [50]. The unemployment rate of persons with disabilities is significantly higher as compared to nondisabled people. Persons with disabilities face barriers accessing employment opportunities due to discrimination, lack of accessibility,

assistive devices, or education, reduced agricultural productivity, and limited reasonable accommodations [4]. Moreover, the proportion of unemployed participants with disabilities was high across age ranges. Without gainful employment opportunities, individuals across all age groups face financial instability, hindering their ability to meet basic needs and contribute sustainably to society. The participants' unemployment rates were high across senatorial zones, with 45.7% in Abia South, 92.3% in Abia Central, and 37.5% in Abia North, highlighting the necessity of livelihood initiatives tailored to both commercial and noncommercial zones. The disability group is disparately impacted by climate hazards because unemployment further exacerbates their low socio-economic status. Limited financial resources restrict the access of persons with disabilities to climate adaptive measures such as climate-resilient housing, healthcare services, or assistive devices [3]. Moreover, prolonged unemployment exacerbates inequity and social unrest, posing a grave threat to social cohesion and political stability.

Table 4. Presentation of Employment Status by Senatorial Zone.

Senatorial District	Not Employed	Worker (Contract Staff)	Self Employed	Employee (Fully Employed)	Total	Percentage (%)
Abia South	16	1	11	7	35	33.7
Abia Central	12		1		13	12.5
Abia North	21	1	22	12	56	53.8
Total	49	2	34	19	104	
Percentage (%)	47.1	1.9	32.7	18.3		

A smaller proportion of respondents with disabilities were fully employed, 20.0% in Abia South, 0% in Abia Central, and 21.4% in Abia North. Focus groups further elucidated the type of employment engaged by persons with disabilities. One employed person with disabilities reported working as a civil servant. Many self-employed participants were engaged in crop farming, growing yams, cassava, palm trees, rice and vegetables. A few participants were engaged in trading agricultural produce, such as garri and oil, while others engaged in the non-agricultural sector were tailors.

3.4. Climate Change Impacts Perceived by Persons with Disabilities

The climate change impacts perceived by participants with disabilities are shown in Table 5. The indicator spectrum is 1 (No threat), 2 (Low threat), 3 (Medium threat), 4 (Strong threat), 5 (High threat). The findings in Table 5 reveal that the dominant perceived impacts of climate change are on poverty, followed by agricultural productivity, while its effects on livelihood ranked third. The perceived impact of climate change on health was ranked fourth.

Abia State is experiencing significant crop loss. In 2024, a post-flood assessment of Abia State identified that 65% of farmlands were partially destroyed, and 28% completely destroyed [14]. The most frequently planted crops included cassava, maize, and cocoyam. Persons with disabilities were identified as a high-risk group within the affected population [14].

Table 5. Respondents Perceptions/Experiences of Climate Impacts.

	Respondents									
Climate Impacts	**No Threat**	**Percent (%)**	**Low Threat**	**Percent (%)**	**Medium Threat**	**Percent (%)**	**Strong Threat**	**Percent (%)**	**High Threat**	**Percent (%)**
Agricultural productivity	6	5.8	9	8.7	9	8.7	11	10.6	69	66.3
Health	4	3.8	7	6.7	23	22.1	15	14.4	55	52.9
Livelihoods	9	8.7	7	6.7	5	4.8	21	20.2	62	59.6
Migration and displacement	48	46.2	18	17.3	14	13.5	4	3.8	20	19.2
Poverty	5	4.8	7	6.7	13	12.5	4	3.8	75	72.1
Property and damage	15	14.4	13	12.5	18	17.3	21	20.2	37	35.6
Coastal environment	67	64.4	14	13.5	7	6.7	6	5.8	10	9.6
Erosion	22	21.2	11	10.6	10	9.6	15	14.4	46	44.2
Salination	79	76.0	12	11.5	2	1.9	1	1.0	10	9.6

3.5. Analysis of Perceived Impacts of Climate Change on Disability Categories

The dominant perceived consequences of the impact of climate change—including its effects on poverty, agricultural productivity, livelihood, and health—were further analyzed to assess how disability category, gender, and age interact with the geographical location of persons with disabilities to influence perceived climate change impacts. Participants with hearing disabilities, the Deaf-Blind, and leprosy survivors perceived the impact of climate change on poverty as a high threat (Figure 2). Individuals within these disability categories face heightened stigma and discrimination, including barriers to indoor employment, assistive devices, communication, and consequently income, intensifying their perceived threat of poverty. Participants from Abia Central perceived the impacts of climate change on poverty as concerning, with the severity of this perceived climate change impact varying: older females (70–100 years) viewed the perceived climate change impact of poverty as a high threat, as did adult males (41–69 years). These groups may have experienced barriers recovering from climate shocks and hindrances to employment. These findings highlight the urgent necessity for policies, budgeting, and implemented initiatives that provide disability-inclusive social protection in Abia State.

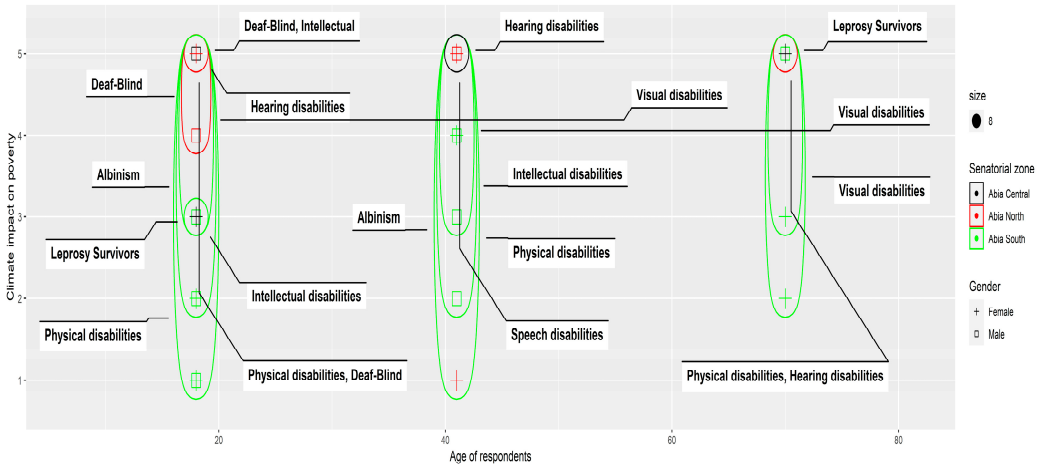

Figure 2. Climate impact on poverty level and the interaction with age range, gender, senatorial zones and disability categories.

Similarly, participants with disabilities who perceived the highest impact of climate change on agricultural productivity were the Deaf-Blind, persons with hearing disabilities, and leprosy survivors (Figure 3). Respondents from Abia North, both male and female, featured prominently at the highest levels of perceived climate change impacts on agricultural productivity. These findings highlight the urgent need for disability-inclusive local and Indigenous Knowledge training and climate-sensitive agricultural training programs and initiatives in Abia State that reach the heterogeneous disability population.

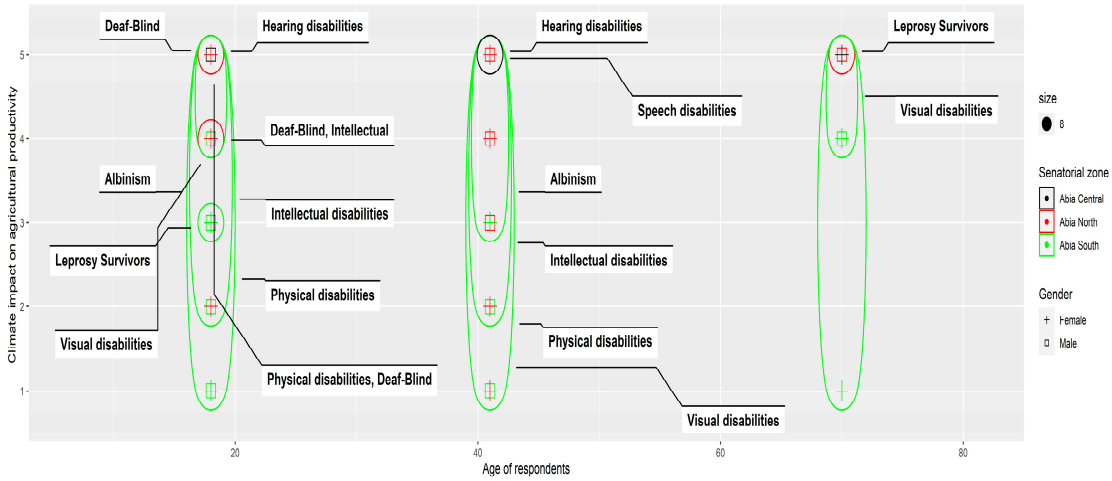

Figure 3. Climate impact on agricultural productivity and the interaction with age range, gender, senatorial zones and disability categories.

Participants who perceived that climate change has a high impact on livelihood also included the Deaf-Blind, persons with hearing disabilities, and leprosy survivors (Figure 4). Persons with albinism were additionally at the higher end of the indicator scale. Individuals from these disability categories face significant stigma, discrimination, and barriers to livelihood including communication barriers, a lack of assistive devices, or indoor employment. In Abia North, respondents with disabilities perceived that climate change highly impacts livelihood, particularly among younger adults (18–40 years). This underscores the urgent necessity for policies and initiatives promoting disability-inclusive livelihoods in Abia State, including initiatives targeted toward youth with disabilities.

Figure 4. Climate impact on livelihood and the interaction with age range, gender, senatorial zones and disability categories.

Among the disability categories, individuals with hearing disabilities, leprosy survivors, the Deaf-Blind, and persons with albinism notably perceived the impact of climate change on health. This perception spans all age brackets in Abia North, as depicted in Figure 5. Persons with albinism, for example those lacking access to sunscreen, sunglasses, or indoor livelihood opportunities, face higher risks from increasing exposure to ultraviolet light and a scarcity of medical specialists [6,30]. This finding underscores the pressing need for policymakers, key stakeholders, and the government to urgently address the climate change-related impacts on the wellbeing of persons with disabilities, especially highly impacted disability categories.

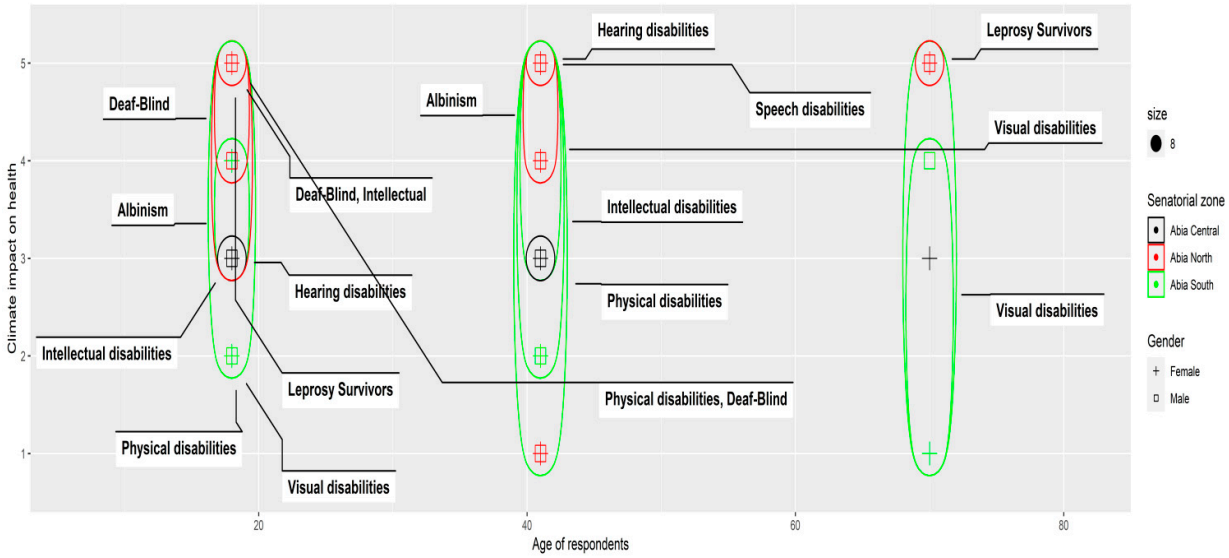

Figure 5. Climate impact on health and the interaction with age range, gender, senatorial zones and disability categories.

3.6. Barriers to Climate Responses

The accessibility of climate response measures for persons with disabilities in Abia State is presented in Table 6. Respondents scored climate response measures on a scale of 1 to 5: 1 (not accessible), 2 (low accessibility), 3 (moderately accessible), 4 (good access) and 5 (highly accessible). These findings reveal that 69.4% of participants with disabilities scored the broad range of climate responses as "not accessible." Climate measures perceived as "not accessible" included economic inclusion with 81.7%, civil protection services with 76.0%, food security with 75.0%, digital literacy and education with 75.0%, and access to assistive devices with 74.0%. These ratings underscore the significant gaps in the accessibility of climate response measures for persons with disabilities in Abia State (Table 6).

Table 6. Distribution of Respondents with Disabilities' Perceptions/Experiences of Climate Responses.

	Respondents									
Climate Response	**NA**	**Percent (%)**	**LA**	**Percent (%)**	**MA**	**Percent (%)**	**GA**	**Percent (%)**	**HA**	**Percent (%)**
Early warning systems	73	70.2	19	18.3	6	5.8	1	1.0	5	4.8
Shelters and settlements	67	64.4	24	23.1	7	6.7	2	1.9	4	3.8

Table 6. *Cont.*

	Respondents									
Climate Response	**NA**	**Percent (%)**	**LA**	**Percent (%)**	**MA**	**Percent (%)**	**GA**	**Percent (%)**	**HA**	**Percent (%)**
Transportation channels	66	63.5	23	22.1	10	9.6	1	1.0	4	3.8
Communication channels	62	59.6	27	26.0	8	7.7	4	3.8	3	2.9
Civil protection services	79	76.0	10	9.6	9	8.7	4	3.8	2	1.9
Access to health services	72	69.2	11	10.6	9	8.7	8	7.7	4	3.8
WASH	57	54.8	19	18.3	16	15.4	6	5.8	6	5.8
Economic inclusion	85	81.7	12	11.5	1	1.0	2	1.9	4	3.8
Food security	78	75.0	13	12.5	9	8.7	1	1.0	3	2.9
Assistive devices	77	74.0	14	13.5	5	4.8	5	4.8	3	2.9
Digital literacy and education	78	75.0	11	10.6	5	4.8	5	4.8	5	4.8

NA: Not accessible; LA: Low Accessibility; MA: Moderately Accessible; GA: Good Access; HA: Highly Accessible.

The focus group discussions highlighted barriers to climate responses that negatively impacted participants. In Abia North, young adults with disabilities generally do not perceive themselves as being included in the climate agenda. Similarly, in Abia Central, both young adult males and elderly females perceive themselves as excluded from the state's future sustainable development. There was consensus among the respondents in the three senatorial districts on the need to ensure that children with disabilities are provided with free food and education, specifically in primary and secondary schools. Some noted that while there is officially free education in public primary schools, fees are still being 'unofficially' demanded from parents. Regarding education-related accommodations, a participant noted that children with albinism are not given the opportunity to customize their school uniforms by allowing them to use long-sleeve shirts instead of the existing short-sleeve shirts (particularly for primary and junior secondary schools). A long sleeve shirt and a cap can provide protection against sunburn; most parents with disabilities cannot afford sunscreen for their children, which costs between NGN 10,000 (USD 6.67) to NGN 20,000 (USD 13.24), a cost that most likely exceeds their monthly income. Additionally, another participant, a person with albinism with low vision, recalled struggling as a child to stay in the front seat of the class, emphasizing the need for inclusive education measures for children with disabilities. Regarding access to healthcare services, several respondents complained passionately about the high cost of their daily medications. One participant was due for surgery but could not raise the required funds to cover the expense. Cost was seen as a major barrier to climate responses. Water insecurity is a significant challenge, with many participants reporting that they did not have a borehole within their communities so they had to embark on daily extended walks to obtain water, which is demanding due to their disabilities and the impact of hot weather. Addressing the gaps requires disability-inclusive climate policies, inclusive climate responses, and disability climate budgeting to protect, promote, and fulfill the human rights of persons with disabilities in the face of climate change impacts [3].

The focus group discussions also elaborated on the respondents' experiences and perspectives of inclusive climate responses in Abia State. For instance, in Abia Central the respondents noted that in 2022 their local government, specifically in Afugiri village located within the Ohuhu clan in Umuahia North, provided an early warning for floods. The announcement was carried out using ekwe and ekere, which are traditional Igbo percussions. This early warning system was scored as contingently accessible, as it is accessible for persons with physical disabilities but is inaccessible for those with hearing disabilities. Respondents across the three senatorial zones highlighted barriers due to the erosion of roads, which is challenging, for example, to persons with physical disabilities using crutches. Abia State has embarked on road construction, however accessible transportation remains a significant barrier with transportation perceived by 63.5% as inaccessible. Of the respondents, 26.0% chose a score of 2 (low accessibility) regarding their experience with climate-related communication channels. Some respondents noted they had attended a sensitization workshop organized by the Abia State government, where Abia State's disability law was discussed, together with the implementation plans. This communication example forms a good foundation for better future interactions between persons with disabilities and government authorities.

3.7. Main Barriers Faced in Accessing Climate Response Measures

Participants ranked the main barriers faced in accessing climate response measures in their communities. Stigma and discrimination ranked first with 75% of the respondents, lack of inclusion in decision-making processes ranked second with 69%, while mobility constraints ranked third with 65% (Table 7). Limited access to resources including climate change information ranked fourth, and socio-economic status ranked fifth. These findings highlight the vital importance of centering social equity programming within climate adaptation and mitigation, including disability sensitization campaigns to break down structural barriers. Further, these findings reveal the urgent need to meaningfully include persons with disabilities and their representative organizations in climate decision-making across all sectors.

Table 7. Main Barriers Faced in Accessing Climate Response Measures.

Main Barriers	Percentage (%) of Respondents
Stigma and discrimination	75
Lack of inclusion in decision-making processes	69
Limited access to resources and climate change information	55
Mobility constraints	65
Socio-economic status	52

3.8. Key Disability Climate Action Priorities

The key climate action priorities of participants with disabilities were identified in focus groups held in Abia North, Abia Central, and Abia South (Tables 8 and 9). The first climate priority of respondents was to heighten understanding of the disparate impact of climate change on persons with disabilities among all key stakeholders. For instance, government representatives can advance understanding of the effects of climate change on the disability group and co-design disability-inclusive climate responses by engaging and collaborating with organizations of persons with disabilities. Participants with disabilities' second priority was to ensure the disability inclusivity of disaster risk reduction. Early warning systems are often not accessible to persons with diverse disabilities, such as persons with hearing disabilities. Hence, persons with disabilities face barriers to inclusion

in disaster preparedness, response, and recovery efforts [3,4]. The third climate action priority was to repair structural barriers to the participation of persons with disabilities in climate responses, including through disability sensitization campaigns. Disability equity must also be advanced by promoting inclusive decision-making, accessibility, and access to assistive devices. The fourth climate action priority identified was enhancing inclusive sustainable livelihoods. Participants with disabilities specifically called for skills training programs and climate awareness training for persons with disabilities to promote their right to food security and employment. The fifth climate action priority identified was promoting inclusive locally led climate adaptation and mitigation, by ensuring persons with disabilities participate in the co-designing and implementation of local climate responses.

Table 8. Key Priorities.

Key Priorities
Understand climate impacts on persons with disabilities
Disability-inclusive disaster risk reduction
Repair structural barriers to climate responses through, for example, sensitization campaigns
Sustainable livelihood support and capacity building
Inclusive locally led climate adaptation and mitigation

Table 9. Respondents' Qualitative Examples Regarding Key Priorities.

Qualitative Examples from the Respondents
Understand climate impacts on persons with disabilities
"Some disabled depend on agricultural produce for their source of income. Some process garri and sell. Because of the hardness of the ground, you cannot go to the farm to harvest and when the rain is falling, when the rain is so high, you cannot be able to go to the farm. You'll be at home starving."
"Weather change biara ugbua, ole re ahu oku. O na ta oku n'ahu. Agala m ano n'ihu ezi rue 12 midnight, k'ele m'ag'ihu uforoyi. Uforoyi fesatu madu. Akwa m ziri gi bed m ne doru ngahu? Eziri m ya bed m kpowu outside m n'eji edoru outside." (Translation: I now stay outside till 12 midnight due to the recent weather change. I have a bed outside which I sleep with due to the excessive heat.)
"I think it will still affect my movement because we have some holes and erosion all the place, I can't move freely. So, it really affects my movement."
Disability-Inclusive disaster risk reduction
"It is very very high, the heat here has proven to be a lot of challenge that can be seen in heat rashes, meningitis I know the rest of them it's usually very very high climate change of heat is very very high"
"Last two years, we had something like flood, but we had an announcement before the time. The government. Umuahia North. They announced it so they went to the stream to evacuate sand so that any water that is coming will just enter and it affected the people living near the stream."
Repair structural barriers to climate responses through for example sensitization campaigns
"I know people do that in the community, if they call for a meeting if we come they will be asking this people what can the even do and the always discriminate us and keep us aside, so when you are talking to people and he turns his back on you, you will know he does not regard you, so this what they always do to us and we will go away from them and be like people that don't have anyone"
"The same matter with people with albinism. Our people here they're even discriminate against them and reject giving them necessary healthcare so it's a serious issue. The same thing happened to them in the bank they think that they are beggars so they asked them to leave."
Sustainable livelihood support and capacity building

Table 9. *Cont.*

Qualitative Examples from the Respondents
"Like this year now I have paid them money for land I will work in but I haven't gotten money to start working on the farmland. Last year the ones that I planted due to weather condition I couldn't get anything from the farmland."
"It affects we the blinds the more because we depend on caregivers to go to the farm to harvest for us. If you don't, you don't see anybody to hold you to the farm, you cannot be able to harvest."
"If you are not well trained on how to manage that your resources, you mismanage it, like cassava if you are not well trained on how to manage the cassava you mismanage it."
Inclusive locally led climate adaptation and mitigation
"I know Center for Citizens with Disabilities, they have been trying, you know in terms of carrying persons with disability along in decision making or issues related to something like this climate change. They have been trying holding seminars and other things for persons with disability."

3.9. Inclusive Climate Solutions

Participants with disabilities perceive poverty, agricultural productivity, and livelihood as dominant climate impacts (Table 5). Consequently, many of the climate solutions identified in focus group discussions related to promoting the livelihood and financial inclusion of this group (Table 10). Participants identified village cooperatives, grants, or loans (such as microfinance) to entrepreneurs and farmers with disabilities as vital climate responses. Livelihood-related inclusive climate responses included disability trade fairs, the elimination of sales tax on sustainable goods sold by entrepreneurs with disabilities, and increased availability of high-yielding seeds. Participants had no training on climate-sensitive agriculture and climate tolerant crops. Further, parents with disabilities highlighted the challenge of ensuring food security and education for the children of persons with disabilities. Consequently, they averred that school fees must be waived for these children and that they ought to be included in food distribution programs.

Table 10. Respondents' suggested inclusive climate solutions.

Suggested Inclusive Climate Solutions from the Respondents
Awareness Raising
"Persons living with disability needs to be sensitized. We need to be sensitized, we need to be educated in this very situation"
"Social media here is going to help us and the community leaders the Royal majesties and Royal highness I also included in this very thing because if they can bring us closer to their cabinet so we can be part and parcel of decision-making in the community from there whatever that the government is doing we will be part of it."
Livelihood and financial inclusion
"As a farmer, if government can give us a very high yielding seedling in order to get more, in order to get more goods (harvest) more foods, it will be very very good for us and our people."
"So if government should come see and help people like us, and give us capital we can use and put in our farms."
"(1) Taxes: if government will remove some tax for us which are been collected in some goods we sell, it will be easy for us to carry our goods and change locations and also bring our goods like this. (2) to have free zone. We stay in the free zone and sample our goods and our goods will be seen by people. Like this also, exhibition, if we have something like trade fair, government will create space for the disabled and also make us know that there are is something like that that is happening because if they have trade fair there are so many things people produce that if they showcase it, you will asking if it is a person living with disability that made it so."
"There is something I want to say, something about trade fair. If government will say we want to organize disable trade fair (trade fair for persons with disabilities to showcase their goods, services and crafts), this is another good thing government will get from the hands of the PWDs to enable them grow economically or their income."

Table 10. *Cont.*

Suggested Inclusive Climate Solutions from the Respondents
"Then also, we have talked about cooperative which we have formed a cooperative. With this cooperative, we have now know it will help us to be more exposed to what we can produce, what we can generate."
"Empowerment just like I've said before because many of us have one or two things that we can do. I'm a professional in designing tailoring fashion designing, is going to power the person financially or buy the equipment let him go and start, just the starter, a starter."
"A lot of us learnt tailoring, a lot of us are doing business in a kiosk, store business. If there's anything like financial inclusion or financial empowerment that can be given to us, be it loan be it grant, we really need help in that aspect. A lot of us has given birth, if government can help us so that we can see food to feed those children and also train them in school. Children of persons living with disability should go to school free tuition fee."

Participants with disabilities also identified social equity initiatives as important climate solutions, including ensuring access to climate information for persons with disabilities and training on climate change and disability. Social media was identified as a tool to increase disability hiring by the government and to enable disability-inclusive climate decision-making.

4. Discussion

This study revealed that participants with disabilities perceived poverty, loss of agricultural productivity and livelihood, and health effects as the predominant climate impacts in Abia State, Nigeria (Table 5). Persons with disabilities face unique and differential climate change impacts that are elevating disability inequity. Persons with albinism, for instance, are experiencing an elevated risk from UV exposure and barriers to accessing sunglasses, sunscreen, protective clothing, and medical specialists, heightening their risk of skin cancer. Further, this group experiences social isolation as they must shelter indoors with attendant mental health, educational, and socioeconomic impacts [6,30]. A further finding of this study was that participants with disabilities from Abia North, who overall face relatively higher financial exclusion, had a more pronounced perception of climate impacts than respondents from commercial Abia South.

Despite the disproportionate impact of climate change on persons with disabilities, this study found that climate measures are systemically excluding respondents with disabilities in Abia State. Climate responses perceived as "not accessible" included economic measures, civil protection services, food security, digital literacy, and education services (Table 6). Not addressing heightening disability inequity has moral and economic costs. An International Labour Organization study found that the exclusion of people with disabilities from work resulted in economic losses of 3.76% of GDP [51]. The CRPD legally mandates that States Parties, including Nigeria, meaningfully protect, promote, and fulfill the rights of persons with disabilities in climate adaptation and mitigation measures [37]. Further, inclusive climate responses benefit the whole society, for instance, a ramp enables access for persons with disabilities, older persons, and children.

Participants in this study identified the following major barriers to inclusive climate action: stigma and discrimination, lack of access to decision-making, and lack of personal mobility (Table 7). Addressing the profound impact of climate change on the disability group requires positioning social equity at the center of climate responses and prioritizing highly impacted disability populations. Further, inclusive climate action moves beyond traditional strategies by recognizing the pivotal role of persons with disabilities as knowledge holders, change agents, creators, implementers, and beneficiaries of climate solutions [3]. Individuals with disabilities in Sub-Saharan Africa can flourish despite significant obstacles, as highlighted by qualitative success stories [52]. It is vital for governments to understand

how to harness the agency of persons with disabilities through interventions that repair structural barriers and promote inclusive climate action. Respondents in this study identified as key climate action priorities, understanding climate impacts on the disability group, repairing structural barriers, promoting disability-inclusive disaster risk reduction, livelihoods, and locally led climate adaptation and mitigation (Table 8).

4.1. Recommendations

We recommend the following disability-inclusive climate policies and programming in response to our research findings. The government, together with key stakeholders, must raise awareness at the nexus of disability and climate change [3,53]. Storytelling, trainings, and cultural events will build capacity on disability and climate change, shift attitudes, and catalyze disability-inclusive climate action. Providing accessible information on disability and climate change will enable and facilitate inclusive climate-related decision-making [3,53]. Good practice examples include the New Media Advocacy Project's awareness raising campaign on disability and climate change in the Niger Delta, and the CCD's training sessions for persons with disabilities on disability and climate change [7].

The government, together with key stakeholders, must act urgently to propel inclusive disaster risk reduction. Early warning systems, accessible shelters, and accessible transport are vital to protecting the rights to life and health of persons with disabilities in disasters, and as mandated by the CRPD and Sendai Framework for Disaster Risk Reduction, among other international instruments [37,54]. Enabling inclusive early warning systems also aligns with the UN's Early Warnings for All initiative [55]. The inclusion of persons with disabilities in leadership and decision-making is vital to propel disability-inclusive disaster risk reduction. In Abia State, a one-day capacity-building workshop on disability-inclusive disaster management practices brought together key stakeholders, including representatives from the State Emergency Management Agency, Ministry of Environment, Ministry of Health, and organizations of persons with disabilities [56]. This inclusive multisectoral approach is an important model for promoting disability-inclusive disaster management at the state and national level. The Federal Ministry of Humanitarian Affairs, Disaster Management and Social Development has a mandate and opportunity to ensure disability inclusion in emergency preparedness, response, and recovery [57]. Further evidence-based research is required to determine how to reduce disaster risk for heterogenous disabilities as well as intersectionally [3].

Disability-inclusive sustainable agricultural training is required to enable farmers with disabilities to adapt to climate change, enhance agricultural productivity, and food security [15,16]. Climate policies and programs must ensure that farmers with disabilities are targeted for inclusion in sustainable agricultural [15]. Providing reasonable accommodations for trainings will increase access to disability-inclusive sustainable agriculture. Further, staff implementing agricultural programs must be trained in disability inclusion [15]. These measures are particularly vital in Abia North. Persons with disabilities facing challenges achieving agricultural productivity may benefit from adaptive agricultural tools and practices and access to a broader range of agricultural-related livelihood, such as food processing.

In Nigeria, farmers are utilizing two broad approaches to adapt to climate change: local and Indigenous Knowledge and climate-smart agriculture. Root and tuber production is increasing in Nigeria, despite climate change, demonstrating that farmers are using Indigenous Knowledge to grow crops including cassava, yam, sweet potato and cocoyam to co-exist with climate change [58]. Indigenous practices in Kwara State include mulching, intercropping, herbs to debar insects, and the planting of animal repellents to protect farms from cows and monkeys [58]. Farmers viewed these practices as effective, readily

available, and inexpensive. By contrast, a top-bottom approach by scientists can result in the development of solutions that did not consider the economic capacity or the cultural values of farmers, and could lead farmers to be dependent on outside support when faced with worsening climate change [58]. A study in southeast Nigeria of household farmers found that they had adopted climate-smart agricultural and sustainable practices such as planting well-adapted crops and crop rotation [59]. Research indicates that climate-smart agriculture in Nigeria can increase agricultural productivity and food security [59]. Studies in sustainable agriculture, however, largely exclude farmers with disabilities or do not report findings related to this group. Consequently, further research is urgently required on how farmers with disabilities can successfully utilize or adopt sustainable agricultural practices. For sustainable agricultural practices to be adopted by farmers with disabilities they require inclusive training in Indigenous and local practices or climate-smart agriculture, and access to resources including finance. CBM India has provided accessible training to farmers with disabilities on enhancing soil resiliency and decreasing the usage of polluting agrochemicals [60].

Disability-inclusive sustainable livelihood opportunities can be increased through inclusive and subsidized vocational training, apprenticeships, and mentoring [2,16]. "Green" skills training can include innovative climate responses and inherently sustainable vocational opportunities such as traditional crafts and teaching. People with disabilities must be included in nature-based solutions programs to protect, restore, conserve, or sustainably use ecosystems [61]. In Abia State, this includes erosion control, gully stabilization, and mangrove restoration. Awareness raising campaigns, particularly in Abia South, can highlight erosion and catalyze community involvement in climate adaptation responses. Enhancing access to clean energy may increase decent livelihood opportunities for people with disabilities. For example, access to off-the-grid powered assistive technology could expand small business opportunities [62]. Government policies supporting inclusive vocational training will increase disability-inclusive sustainable livelihoods. Further socio-economic assessment is required, particularly in Abia North, and research with organizations of persons with disabilities on lessons learned from farmers, workers, underemployed and unemployed with disabilities to identify successful targeted sustainable income-generating interventions.

Social networks can also heighten access to disability-inclusive livelihoods, and may increase knowledge of sustainable agricultural practices; and consequently, agricultural productivity [15]. In the surveyed area, persons with disabilities belonged to representative organizations including the National Association of the Blind, Nigeria National Association of the Deaf, National Association of Persons with Physical Disabilities, Spinal Cord Injury Association of Nigeria, and Albinism Association of Nigeria which provide capacity building on disability and peer support. However, persons with disabilities are largely not included in farming cooperatives or small business organizations, nor have they formed their own entities. Such social networks could provide valuable mentorship opportunities.

Disability-inclusive livelihoods can be catalyzed by expanding access to inclusive finance through Village Savings and Loans Associations linked to climate adapted livelihoods programs and microfinance [63]. Assistance in accessing documentation required for financial services, such as birth certificates and land certificates, would enhance the access of persons with disabilities to financial resources. Anti-discrimination training among microfinance and banking professionals would advance inclusive financial services.

The government must commit to increasing the employment of persons with disabilities through inclusive green skill training, quotas, tax incentives, wage replacement, public sector hiring, reasonable accommodations, mentoring, retention, and better implementation of legal protections against employment discrimination [64]. Underrepresented persons

with disabilities, such as persons with albinism and hearing disabilities, must be included in these interventions, as must persons facing intersectional discrimination such as women with disabilities [64]. The public sector would benefit from employing a greater percentage of persons with disabilities who bring unique perspectives and talents, including lived experience as problem solvers. Simultaneously, employing this untapped pool of workers with disabilities will advance transformation toward an inclusive sustainable society. The government and trade unions can also promote decent work conditions for informal workers with disabilities.

Underrepresented persons with disabilities facing significant stigma and marginalization must be included in climate decision-making, policies, and interventions. The Deaf-Blind, persons with hearing disabilities, albinism, and intellectual disabilities, and leprosy survivors are among the disability subgroups facing significant marginalization and thus must be specifically consulted in decision-making, referenced and included in mainstream and targeted climate policies and solutions. Providing sign language translation in sustainable agricultural and vocational trainings would expand disability-inclusive livelihood opportunities in D/deaf communities. Expanding the provision of indoor livelihoods and sunscreen for persons with albinism would advance their health adaptation, livelihood, and wellbeing. Ensuring that livelihood training is inclusive of persons with intellectual disabilities, and providing information in easy read formats, would increase access to livelihood opportunities for these individuals.

The voices of persons with disabilities facing intersectional discrimination must also be heard in climate decision-making. In this study, all genders overwhelmingly perceive poverty, agricultural productivity, and livelihood as high threats, with males providing a slightly higher response. Gender responsive and disability-inclusive local solutions must be developed to ensure that climate solutions meet the needs of all genders by undertaking consultations with disability organizations that recognize underlying power dynamics and develop safe spaces [3]. Women and girls with disabilities, for instance, benefit from well-lighted and accessible public spaces, and separate accessible toilets and sleeping spaces in internally displaced persons and related camps [60].

Disability stigma and discrimination are barriers to livelihood and financial inclusion which must be addressed through cultural attitude change campaigns [2]. Success stories demonstrating that persons with disabilities can earn livelihoods and educational qualifications can break down cultural and structural barriers. Training programs for key stakeholders on disability rights will advance implementation of the Discrimination Against Persons with Disabilities (Prohibition) Act, 2018, enabling the enshrined rights to be realized [34]. Importantly, persons with disabilities and their representative organizations must be empowered to meaningfully participate in climate-related decision-making as mandated by the CRPD [2,3,37].

Persons with disabilities in Abia State and across Nigeria face barriers to healthcare equity such as a scarcity of assistive devices, which are costly and mostly available in cities; the out-of-pocket cost of disability-related healthcare and medicine; inaccessible infrastructure, equipment, and information; and a lack of training among healthcare workers [57]. Disability equity must be advanced in healthcare by developing climate-related disability-inclusive policies; assuring the accessibility of infrastructure in (re)construction projects; undertaking disability rights and awareness training and multisectoral engagement with organizations of persons with disabilities; heightening the availability of assistive devices and medicine; and ensuring the inclusivity of digital health and climate information and technology [11]. Co-designing and locally producing assistive technology may increase both the availability, accessibility, and effectiveness of such technology. These climate mea-

sures require inclusive budgeting and must be supported through international cooperation and technology transfer [37].

Migrants with disabilities experience overlapping barriers and nuanced social marginalization, disparate water and food insecurity, violence, inaccessible water, sanitation, and hygiene, shelter, and transportation, along with enhanced opportunities [3,65]. Moreover, internal displacement due to the nexus of climate change and conflict can led to injury, torture, and disability. Nigeria's National Policy on Internally Displaced Persons addresses internally displaced persons with disabilities, including their right to a modified physical environment, assistive devices, specialist medical care, and priority in water and food distribution; however better implementation is required, which would be enabled by further resources, attitudinal change, and capacity building [65,66]. Inclusive concrete climate measures can promote disability-inclusive livelihood diversification, accessible infrastructure, land-use planning, and mitigate gender-based violence. These climate solutions are particularly required in Abia North. Further assessments and research are required to identify highly affected communities, including in Abia South, and to identify how communities are benefiting from and affected by climate-induced migration challenges.

Urbanization can catalyze the inclusion of persons with disabilities. International commitments such as SDG 11 seek to "make cities and human settlements inclusive, safe, resilient, and sustainable" [39]. In Banjarmasin, Indonesia an urban accessible community space for educating children, healthcare services, and activism, was co-designed through collaboration with organizations of persons with disabilities [60].

Participants with disabilities in this study identified disability-inclusive locally led climate adaptation and mitigation as a key climate priority. In Abia State and across Sub-Saharan African, disability groups face significant barriers to climate resources and decision-making. Inclusive locally led adaptation funding would empower these groups to advance climate resilient development within their communities.

Social protection is a vital tool for addressing climate-related shocks, poverty, and inequity, including disability inequity [3]. Implemented responsive social protection would enable individuals with disabilities in Abia State to adapt and respond to climate change. Positively, Nigeria's updated Nationally Determined Contribution specifies that social protection coverage should extend to persons with disabilities [36]. There is growing recognition by international institutions and national policymakers of the importance of climate-related social protection [61]. Inclusive social protection is mandated by the CRPD to ensure an adequate standard of living for persons with disabilities [3,37]. Internationally, disability spending has been growing in the social protection sector, for instance, countries such as Zambia have scaled up cash transfers [60].

Heightening inclusive climate finance in Abia State, particularly in the Abia North and Abia Central senatorial zones, that significantly enhances the implementation of inclusive climate measures such as early warning systems, disaster preparedness plans, livelihood training, village cooperatives, and ecosystem restoration initiatives, would contribute to the region's inclusive climate resilient development. Furthermore, inclusive climate finance would promote collaboration among stakeholders, empowering intersectionally marginalized groups, and advancing social equity.

Moving forward, the government must ensure that climate plans, policies, and programs respect, protect, and fulfill disability human rights. In a twin-track approach to inclusive climate action, persons with disabilities are included in climate interventions across all sectors equally, while targeted solutions respond to the unique challenges faced by this group [3]. Fully utilizing the meaningful participation and leadership of persons with disabilities and their representative organizations in climate adaptation and mitigation planning, policies, and responses will combat climate-related human rights harms [2].

Advancing implementation of inclusive climate approaches in line with domestic and international law necessitates inclusive climate financing. This is ultimately less costly than exclusionary measures that subsequently require retrofitting in order to reach highly impacted communities [2]. Inclusive monitoring, evaluation, and learning are vital to enhancing inclusive climate action [3]. Importantly this enables stakeholders, including government agencies and community leaders, to be held accountable for their actions or inactions in addressing disability-inclusive climate action, fostering transparency and accountability in inclusive climate response efforts. Inclusive locally led climate adaptation and mitigation catalyze community involvement and can promote innovative culturally appropriate solutions. We urge key stakeholders to precipitate a paradigm shift that empowers persons with disabilities, promotes disability equity, and advances inclusive climate justice.

4.2. Limitations

A strength of the study was the transformative mixed methods community-based participatory approach that amplified the voices and identified the key climate priorities and solutions of Nigerians with disabilities in Abia State. At the same time, the reported significant and consequential findings rely upon self-reported data and therefore bias could exist if participants underrepresented or overrepresented their experiences. While the findings of the study can be applicable to persons with disabilities in other settings, care must be taken when considering such transposition.

4.3. Future Research

We urge colleagues to adopt a disability-inclusive approach to climate research and action which requires interrogating and repairing underlying structural barriers, promoting sustainable development and the wellbeing of persons with disabilities [3]. Climate researchers have an opportunity to integrate an anti-discriminatory approach by collaborating with greatly affected disability communities and their representative organizations, all of whom hold disability knowledge [3]. Participatory research can enable the disability community to identify how persons with heterogeneous disabilities are impacted by climate change; ascertain their key priorities; co-design effective inclusive climate adaptation and mitigation interventions; and promote the co-development of inclusive policies with targeted resources. The nexus of disability and climate change offers a broad array of opportunities to undertake disability human rights-based and interdisciplinary research to develop policies and interventions to advance disability equity, sustainable development, and planetary health [3].

5. Conclusions

Our study highlights the significant threat persons with disabilities in Abia State, Nigeria, perceive from climate change to agricultural productivity, livelihood, and wellbeing. Yet, our findings demonstrate that persons with disabilities are systematically excluded from climate action due to structural barriers including stigma and discrimination, a lack of meaningful participation in decision-making, and a scarcity of inclusive climate resources. Key climate action priorities identified by participants with disabilities include promoting inclusive sustainable livelihoods; consequently, the government and civil society must promote inclusive subsidized sustainable agricultural training, green skills training, accessible climate information, and inclusive education, among other concrete climate measures to build a more equitable and sustainable society. Furthermore, the government must effectively implement social protection programs directed toward persons with disabilities, such as cash transfers, food assistance, social protection triggered by extreme weather

forecasts, and propel access to healthcare services. We urge the government, civil society, and nongovernmental institutions to learn from the experiences of persons with disabilities, promote innovation by and with the disability community to repair structural discrimination, and foster inclusive climate solutions beneficial for the whole of society. Moreover, climate financing and international cooperation must be directed towards Nigerians with disabilities to repair human rights harms and advance disability equity.

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Data Availability Statement: Data are contained within the article. Further inquiries can be directed to the corresponding author.

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