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# Youth inclusion in value chain development: a case of the aquaculture in Nigeria

Likimyelesh Nigussie<sup>1\*</sup>, Thai Thi Minh<sup>2</sup> and Sonali Senaratna Sellamuttu<sup>3</sup>

## Abstract

Many countries in Sub-Saharan Africa (SSA) have made youth inclusion a top priority in their development agendas. This is aimed at overcoming social, technical, and institutional obstacles and providing fair and significant opportunities for the growth of young people. Inclusive agricultural value chain development (VCD) is being used to address youth unemployment in the region. The Nigerian government and its partners have invested in aquaculture VCD to create employment opportunities for young men and women, but the participation rate is low, at around 2%. Further, research and practices focusing on rural youth inclusion in VCD is scant, with biases towards urban youth inclusion. This study explored youth engagement in the aquaculture value chain and how the chain features and context shape inclusive mechanisms/patterns of youth inclusion in VCD processes. We used the integrated livelihood asset framework, access approach, and VCD approaches to present an analysis of conditions influencing the inclusion of young men and women in the aquaculture VCD in Nigeria. Accordingly, two youth inclusion strategies were identified: investment and risk management strategies. Young men and women from better-off households adopt investment strategy and dominate the production function. They use their resources, social networks and support from youth-focused aquaculture projects to invest in production functions. Those adopting a risk management strategy dominate the processing, distribution, and marketing functions. They dominantly use social networks, support from aquaculture projects, and Information Communication Technologies (ICTs) to mitigate risks. The high demand for fresh and processed fish, supportive policies, and youth-centered aquaculture projects encourages the engagement of young men and women to adopt either of the strategies. However, they face challenges such as high-cost and low-quality inputs, lack of tailored services, inadequate infrastructure, and sociocultural norms. This study contributes to youth inclusion literature, provides a comprehensive theoretical lens for understanding youth inclusion in VCD, and offers insights into the specific case of young men and women's engagement in the aquaculture sector in Nigeria.

**Keywords** Young women, Young men, Value chain, Livelihood assets-access, Aquaculture, Nigeria

## Introduction

Youth inclusion has been prioritized in the development agenda of many countries in Sub-Saharan Africa (SSA) to address socio-technical and institutional barriers, and create equal and meaningful opportunities to grow for young people (World Bank 2013; Arslan et al. 2021). Two-thirds of youth live in spaces with high agricultural potential. In contrast, one-quarter live in spaces with the highest agricultural potential (Arslan et al. 2021). Agriculture is considered a major

\*Correspondence:

Likimyelesh Nigussie

l.nigussie@cgiar.org

<sup>1</sup> International Water Management Institute, Addis Ababa, Ethiopia

<sup>2</sup> International Water Management Institute, Accra, Ghana

<sup>3</sup> Country Representative Sri Lanka and Team Leader GCF NAP Readiness Program at Global Green Growth Institute, Colombo, Sri Lanka



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job provision for African youth (Glover and Sumberg 2020). Youth inclusion is, therefore, rooted in rural and agricultural development that provides opportunities (Arslan et al. 2021). However, due to limited rural and structural transformations (IFAD 2019), youth development in the region is low, concentrated, and associated with higher unemployment rates and precarious jobs faced by young people (te Lintelo 2012; Glover and Sumberg 2020). The Agricultural Value Chain for Development (VCD) is a comprehensive approach that advocates for economic growth, social inclusion, and environmental sustainability (Donovan et al. 2016). Practitioners and businesses widely embrace this approach to guide their efforts in promoting agricultural development and economic growth (Herman and Minh 2020). Ensuring youth inclusion in VCD necessitates access to resources and the ability to manage trade-offs. However, urban biases prevalent in literature and public policies (Abay et al. 2021) hinder a clear understanding of how African youth participate in inclusive VCD (Arslan et al. 2021).

This study explored youth engagement in the aquaculture value chain and how the chain features and context shape inclusive mechanisms/patterns of youth inclusion in VCD processes. We used the integrated livelihood asset framework (Ellis 2000; Shaffer 2008) access approach (Ribot and Peluso 2003) with VCD approaches (Horton et al. 2016; Donovan et al. 2016) to present an analysis of conditions influencing inclusion of young men and women in the aquaculture VCD in Nigeria.

We analyzed:

- What livelihood assets and access contribute to youth inclusion in VCD?
- What value chain factors influence youth inclusion in VCD? and
- How do these assets and access factors shape youth's inclusion strategy?

We present a qualitative analysis of youth inclusion in the aquacultural value chain in Nigeria. This analysis contributes to youth inclusion literature in different ways. *First*, it enhances the understanding of young men and women inclusion through investment and risk management strategies by which youth leverage their livelihood assets and access to VCD. *Second*, the integrated livelihood asset, access, and value chain framework provides a comprehensive theoretical lens for better insights into young men and women in VCD inclusion, focusing on asset building at household and business levels and direct links to development practices, outcomes, and impacts (Donovan et al. 2016). *Third*, it provides insights to understand better the specific case of young men's and

women's engagement in the aquaculture sector from four states in Nigeria.

### Youth inclusion in Sub-Saharan Africa

In the SSA, the perception and definition of youth vary historically, culturally, and contextually (UN 2003). It mostly depends on which dimension of youth takes precedence (Kanyenze et al. 2000), such as demographic (age), cultural (notions of adulthood), biological (attainment of puberty), social (attainment of "maturity" or marriageability), or economic (ability to sustain oneself). Although what it means to be a youth is socially constructed with colonialism, mission education, social and economic development, and African governments' ratification of international conventions, "youth" as a social group is generally defined in chronological age (Chigunta 2017). As a result, the African Union Commission (2006) defines young people as between 18 and 35 years old.

Despite rapid economic growth, youth unemployment remains high in the SSA (Chigunta 2017). African youth have opportunities within agricultural value chains that offer diverse work structures and incentives (Baloyi et al. 2023). Young individuals have unique cognitive abilities, creativity, innovation, and adaptability crucial for transforming and sustaining the agricultural sector (Arslan et al. 2021; Bello et al. 2021). Nonetheless, their participation remains limited due to insufficient awareness of available opportunities, a lack of understanding of their potential role, restricted access to resources, low aspirations, and challenges in adopting technology (Geza et al. 2023).

The literature review indicates two primary approaches to integrating youth into the economy: asset and agency. *Asset approaches* perceive youth as passive recipients of government services, often emphasizing capacity development (Flynn et al. 2016; Ripoll et al. 2017). Consequently, asset approaches lead to limited youth involvement in decision-making processes, resulting in restricted opportunities for expression and misconceptions regarding their aspirations and employment needs (te Lintelo 2012). Moreover, asset approaches concentrate on structural changes and fostering local economies to enhance markets for young people (Flynn et al. 2016). They also view youth as isolated economic agents with restricted capabilities to enter labor markets (Ripoll et al. 2017). However, such assumptions neglect the social structures and limitations that can either facilitate or impede youth inclusion. The economic endeavors of young individuals are intricately interwoven with kinships and social connections. Young people also require assistance to overcome challenges, access resources, acquire skills, enhance confidence, and feel empowered to establish sustainable livelihoods.

*Agency approaches* consider young people as agents of development, demonstrating independent agency to shape their lives and relationships (Bell and Payne 2009), and as individuals who actively pursue opportunities and strive to leverage them (Flynn et al. 2016). These approaches emphasize that youth engagement in livelihood activities is influenced by a range of factors, including social relations (Glover and Sumberg 2020), access to resources (Doss et al. 2019)—including ICTs (Yami et al. 2019), output markets (IFAD 2019), service provision (Ripoll et al. 2017), skills, attitudes, political and cultural practices, aspirations, and preferences (Sumberg et al. 2020).

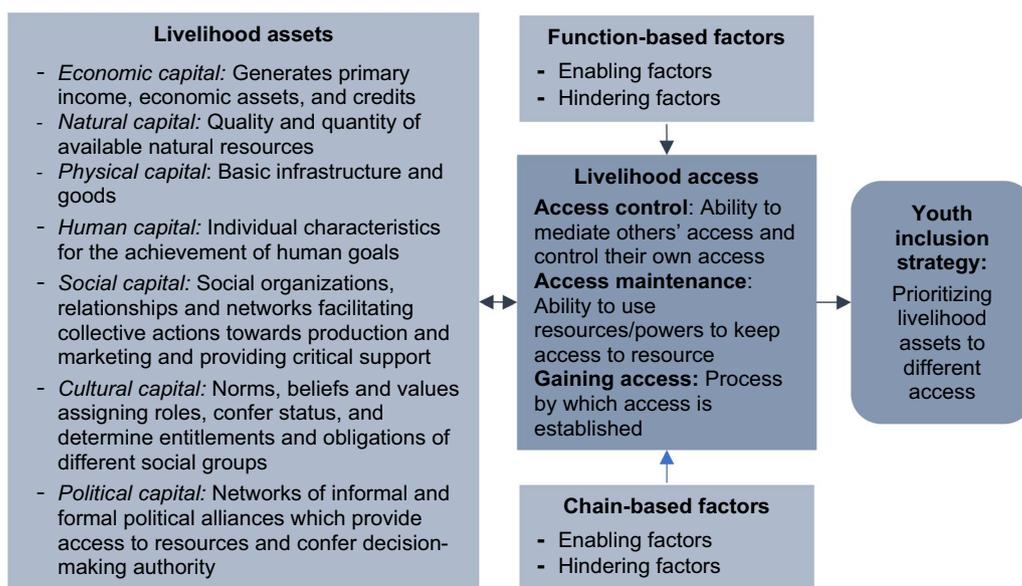
Although social inclusion has received considerable attention, youth inclusion in VCD needs to be studied more. Using Google Scholar, the authors searched the titles of publications using keywords such as “youth,” “inclusion,” “youth inclusion,” and “value chain” or “youth inclusion in value chain.” However, there were no relevant studies before October 2020. Furthermore, youth development literature does not include an integrated internal–external perspective for youth inclusion. Asset-based approaches bring young people to the labor market through capacity development, yet there is little or no attention addressing structural barriers that create employment opportunities. The agency approaches emphasize youth’s ability to cope with the diversity and dynamism of opportunity spaces (Sumberg and Okali 2013). Yet, understanding how value chain factors influence youth’s ability to engage in VCD is limited.

### Analytical framework

We used the integrated livelihood asset framework (Ellis 2000; Shaffer 2008) access approach (Ribot and Peluso 2003) with VCD approaches (Horton et al. 2016; Donovan et al. 2016) to understand youth inclusion processes in the aquaculture value chain in Nigeria (Fig. 1). The framework provides a comprehensive theoretical perspective for analysing how the abilities of young men and women to utilize livelihood assets and opportunity structures, and value chain factors that facilitate or impede engagement in the value chain help them realise business opportunities, overcome contextual challenges, and create new opportunities to maintain and expand their VCD engagement.

In this analysis, youth VCD inclusion is viewed as a form of social inclusion that involves youth’s ability to decide how to engage with business opportunities in the value chain and use their resources to actualize their engagement. Youth inclusion strategy is attributed to structural features, i.e., livelihood assets, opportunity structures, and value chain factors.

Our unit of analysis is individual young man and woman farmers who own livelihood assets and access and are engaged in VCD. They are embedded in a household where they can access and obtain economic, natural, physical, human, social, cultural, and political capital (Ellis 2000; Shaffer 2008). The youth inclusion strategy is also factored into agency characteristics or youth’s ability to use their livelihood assets in different ways to engage in business opportunities in the value chain while controlling, maintaining, and creating access to resources to



**Fig. 1** Framework to analyse youth inclusion in agricultural value chains Adopted from Hiwasaki and Minh (2022).

continue and leverage their engagement. Access control, access maintenance, and access gaining (Ribot and Peluso 2003) refer to this ability.

Furthermore, youth VCD inclusion involves multiple actors operating in various functions embedded in diverse chain factors (Minh et al. 2021). To understand how youth can exploit these opportunities, it is, therefore, necessary to gain insight into the value chain dynamics and the relationships between different factors in these dynamics that shape constraints and opportunities for youth inclusion. Chain dynamics investigates factors embedded in each function, multiple functions, and the environment influencing youth’s ability to engage with the chain function(s). These factors include but are not limited to, input and output markets, chain management, business environment, policy framework, services and support, and risk.

**Methodology**

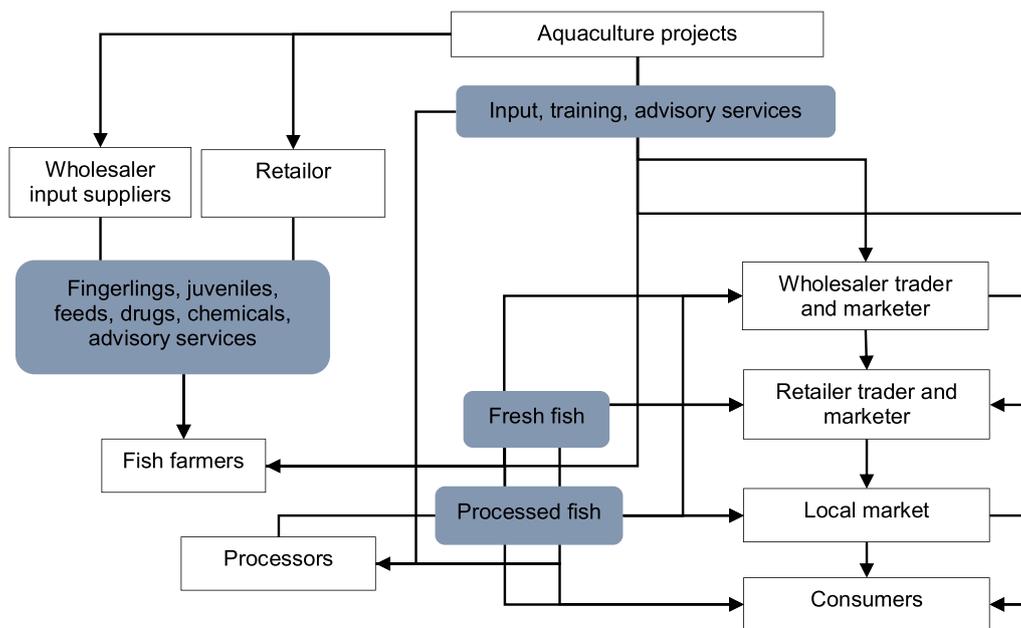
**Research case**

We selected a case of youth inclusion in the aquacultural value chain in Nigeria for several reasons. Nigeria is the largest aquaculture producer in SSA (FAO 2018), accounting for 34% of the total national fisheries production, 40% of animal protein consumption, and employs about 475,000 people (WorldFish 2018). Nigeria is experiencing a deficit in its fish supply, which is attributed to the combination of high demand and constrained production capacity (Bradley et al. 2020). The government actively promotes private sector investments in the

country’s aquaculture industry (Gona et al. 2018). Nevertheless, the scale of production remains limited due to factors such as the high costs of feed and fingerlings, restricted access to resources, inadequate management, and inefficiencies in extension services (Igoni-Egweke 2018). These create interesting value chain dynamics for analyzing how the chain’s factors influence youth inclusion strategy.

Nigeria’s most extensive demographic, aged 15–29, face challenges in the transition from adolescence to adulthood that necessitate social, economic, and political assistance to unlock their potential (FRoN 2019). Diverse roles within the aquaculture value chain offer a range of employment and investment prospects for rural youth (Fig. 2). Young individuals, with enhanced financial opportunities, can participate in wholesale and retail distribution networks, streamlining the production, trade, and marketing of various goods in an open marketplace (Gbigbi and Achoja 2019). Nevertheless, less than 2% are gainfully employed due to perceived stress and capital requirements (Adesugba and Mavrotas 2016). Overcoming hurdles related to market entry, structure, and chain operations is essential for a successful VCD.

Nigeria’s National Youth Policy (2019) supports youth engagement in agriculture through capacity development, infrastructure provision, and extension work. It aims to increase financial access to agricultural graduates, establish agriculture-focused lending institutions, and liberalize land use. The Agriculture Promotion Policy (2016–2020) supports youth entry into agribusiness



**Fig. 2** Aquaculture value chain structure in Nigeria

through entrepreneurship platforms, dialogue, and capacity building (Federal Ministry of Agriculture and Rural Development 2016). These policies provide a value chain context for analyzing youth inclusion.

### Data collection and analysis

The study utilized a qualitative research method to investigate the impact of livelihood assets, access actions, and value chain dynamics on youth VCD inclusion, and the tangible economic and social benefits of effective youth business engagement. The study collected primary data from December 2019 to January 2020. We used purposive sampling (Bernard 2017) to identify young men and women involved in aquaculture value chains. First, we conducted eight focus group discussions to investigate their perspectives on aquaculture value chains and improve engagement. Second, eight life-history case studies were conducted with individual young men and women in Oyo, Ogun, Lagos, and Anambra states to gain in-depth insights into experiences, opportunities, and barriers to youth participating in the aquaculture value chain. Finally, eight semi-structured interviews were conducted with key informants representing government organizations and non-governmental organizations (NGOs) to explore the policies and approaches used in aquaculture projects to influence youth VCD inclusion. The data were collected, recorded, and transcribed for analysis using English.

Qualitative content analysis (Krippendorff 2018) was used to capture youth's livelihood assets and access situations and factors influencing youth inclusion in the aquaculture value chain. Initially, a coding system was created to identify access actions, livelihood assets, and factors that facilitate or impede engagement in the value chain. We extracted the variables for each element from the collected data based on the theoretical ideas discussed in the analytical framework. For instance, under the value chain dynamics section, we identified function-based and chain-based factors that influence youth engagement into the aquaculture value chain.

Under livelihood assets, we extracted variables concerning economic capital (income, cash, and inputs necessary for agricultural value chain engagement); Natural capital (natural resources such as land and water bodies); Physical capital (access to basic infrastructure, facilities such as road network, ICTs, storage facility and market); Human capital (educational and professional attainment, and knowledge and skills about fish production, processing and distribution); Social capital (kinship networks, social coherence and community organizations such as support from family and religious leaders); Cultural capital (customary laws and social norms); and

political capital (participation in aquaculture projects and interventions).

Concerning livelihood access, we identified access actions adopted for controlling resources (increasing knowledge about fish production, processing distribution, market, and technology), maintaining access (maintaining interactions with value chain actors, managing expenditures and savings for further investment, and investing for future returns), and gaining access (investing in social and personal networks).

The in-depth analysis further analyzed inclusion strategies by capturing youth's investment using livelihood assets and access actions under aquacultural value chain dynamics. We identified and described investment and risk management strategies that youth adopt to engage in a specific function of the value chain and mitigate the barriers and opportunities they face when adopting a strategy.

### Results

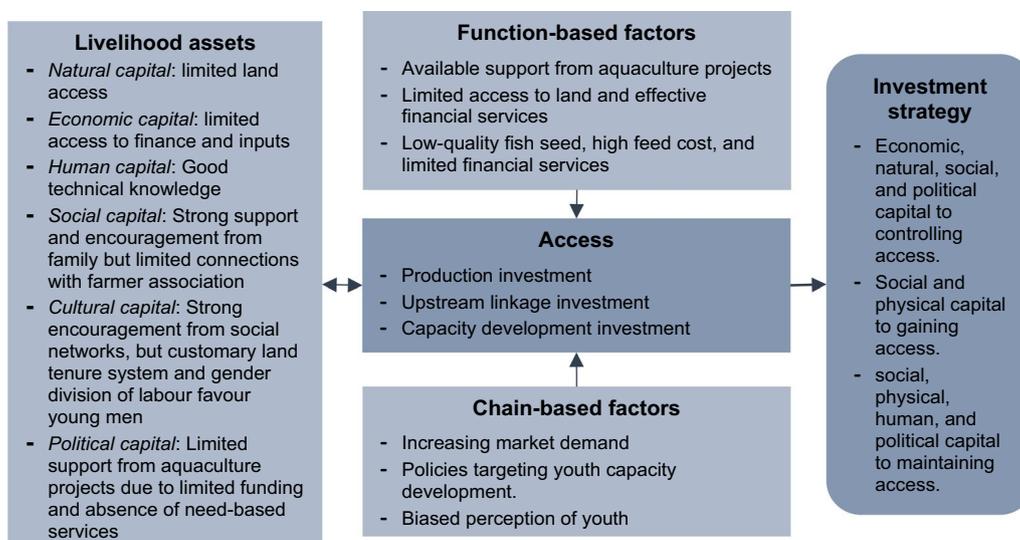
Based on the analytical framework, we have identified and described the investment and risk management strategies that young people adopt to engage in a particular part of the value chain. Our analysis focuses on how ownership of livelihood assets and access actions (used to controlling access, maintaining access, and gaining access) within the aquacultural value chain the dynamics influences the ability of young men and women to adopt a specific strategy. The discussion under each strategy provides details on which types of investments young men and women prioritize to adopt a specific strategy and the constraints and opportunities for them to make a specific investment.

#### Investment strategy for production engagement

Youth adopting investment strategy are encouraged by availability of favorable policies (chain factors) and the high demand for fresh fish by consumers, traders, and processors (function factors). To harness these opportunities, they participate in technical and capital-intensive production functions by prioritizing three types of investment: production, upstream linkage, and capacity development (Fig. 3).

First, young men and women invest in land (natural capital) and inputs such as fish feed and seed (economic capital) using resources from social networks (social capital), aquaculture projects (political capital), and financial services (economic capital). However, the ability of youth to invest in production is jeopardized by the limited availability and access to land, inputs, and finance.

While young men and women indicated they receive good land support from their social networks through inheritances, gifts or rentals; they also indicated



**Fig. 3** Investment strategy for inclusion

challenges they face in accessing land from these sources due to customary land tenure due to intergenerational norms(cultural capital). According to them, most of the rural land in their locality is owned by elderly and wealthy community members. An interviewee expresses this: “Old and young people do not have equal access to land resources because young people are not allowed to rub shoulders with the old.” This is worse for young women who are denied of their rights to inherit the land due to socio-cultural norms and discouraged due to the perception that production is tedious and stressful for women.

Young men and women also have access to land from government and market sources. The local government establishes fishing villages where young people are trained, settled to start farming, provided seed funding, and attached to extension officers for monitoring progress and capacity development. However, the stressful legal protocols and increasing rental prices remain challenges. A young woman expressed the difficulty young people face in obtaining access to land from the government: “The government protocols to land access are stressful, and at the end of getting all requirements, they might tell you there is no more land.”

Regarding access to finance, for example, in 2019, investment in fish farming requires about N500,000 (approximately USD 1400) to buy 1000 fingerlings to the table size. This is unaffordable for youth. Hence, young men and women use finances from different sources including their social networks, savings and financial institutions, and aquaculture projects. Among the youth, those from wealthier households have good savings and opportunities to receive substantial financial support

from their social networks (such as families) through loans or gifts. Young men and women also indicated that accessing finance from financial institutions is challenging due to high-interest rates, lack of information and guidance on obtaining loans, and lack of agricultural lending schemes and youth financial services. The limited access to finance coupled with the high cost of fish feed and the low quality of fish fingerlings due to the absence of quality assurance systems among the challenges young men and women face.

Young and women also get support from aquaculture projects from local government and non-governmental organizations (NGOs) that provide them with mobile tanks, ponds, fish fingerlings, feeds, and soft loans. For example, the governor of Anambra made it mandatory for all agricultural projects to involve young men and women. Nevertheless, support from local government and aquaculture projects is limited due to modest funding and the lack of need-based services. A respondent described the limited funding availability: “Lots of organizations occasionally develop good plans. However, there is much competition as many young people apply. At the end of the exercise, the resources do not reach everyone, discouraging our participation.” In addition, a mismatch between service demand and supply (political capital) remains a challenge. The lack of input from young people in the design phase of aquaculture policies and projects undermines the effectiveness of these interventions. The strong perception that youth is not mature enough to contribute to economic development hinders the (re) formulating of youth development policies and interventions. A key informant from the government office

described this: “Youth are not involved in designing policies because they do not have experience. However, they are involved in the design of programs or projects, especially during the annual national conferences, where they all come together to discuss and reason.” This implies that young men and women use their natural, economic, social, and political capitals to harness opportunities from increasing market demand and youth development policies or control their access.

Second, youth invest in upstream linkages to increase access to information and expand networks. They use information and communication technologies (ICTs), social media platforms (physical capital), and associations (social capital), to establish networks with value chain actors and increase access to information. A young woman said, “We use our mobile phones to search and get information about sales from our farmers and fellow marketers. We call extension agents or fellow farmers whenever there are issues regarding fish in our pond.” To expand their opportunities and continue their business, they participate in existing social networks or associations and newly established ones. However, there is a lack of trust among young people and too little confidence of older members in young people, which limits the participation of young men and women in associations. A young man said, “Older people might not trust young people and do not want to waste their time. Older people should realize that young people have a great deal of potential and that they will soon overwhelm older people with their brilliant ideas.” This type of investment reflects the ability of young people to use their social and physical capital to search for opportunities to gaining access.

*Third*, youth invest in capacity development to acquire technical, business, and financial management skills (human capital). To achieve this, they exploit opportunities provided by academic institutions, government, aquaculture projects (political capital), social networks (social capital), and phones (physical capital). They invest in technical and professional training at universities to gain expertise to become a subject specialist in fish farming. As a young female farmer explained: “...by the strike of fortune, I study Fisheries and Aquaculture at the University. I am satisfied with my small business, and no matter the white-collar job, I will not leave fish farming. I love what I am doing and want to improve because I have a degree in this field.”

Aquaculture projects invest in the capacity development of young people to raise awareness (human capital), for example, in the multiplication of fish seeds, production, health, pond construction, hatchery management practices, and stocking density. However, funding for these investments is limited. Hence, only a limited number of youths can benefit. Youth use their cell

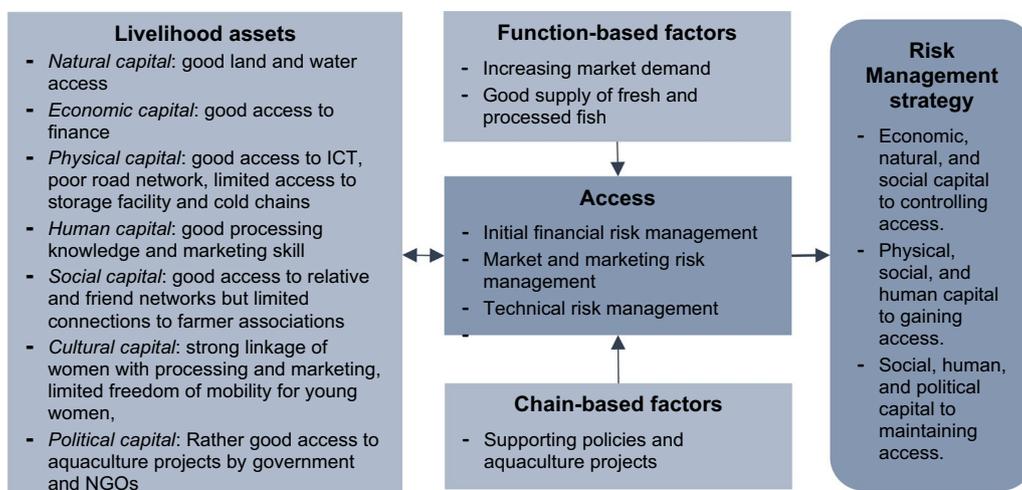
phones to set up networks with and gain knowledge from experts. A male FGD participant stated, “We call extension agents or fellow farmers whenever there are issues regarding fish in our pond.” This type of investment reflects people’s ability to use social, physical, human, and political capital to maintain access to business in the aquaculture value chain.

#### **Risk management strategy for service-related participation**

Youth’s ability to adopt risk management strategies is heavily influenced by support from aquaculture projects (chain factors) and high demand for fresh and processed fish (function factors). In this strategy, youth leverage livelihood assets (e.g., economic, social, human, natural, physical, and political capitals) to participate in processing, distribution, and marketing while managing three types of risks: financial, marketing, and technical risks (Fig. 4).

*First*, young men and women invest selectively to manage the risk of financial limitations. Those from resource-poor households prefer to engage in processing, distribution, and marketing functions because these functions do not require intensive capital investment, intense technical knowledge, and skills while enabling their earning income quickly. To participate in these functions, young men and women obtain finance from various sources including families and friends (social capital) and savings (economic capital), as expressed by a respondent: “My sister in Thailand gave me money to start up a processing business. I buy fresh fish directly from producers and sell them to people. Also, I smoke fish, which people from different places come to buy from me.” Among the youth, young women have good cultural support (cultural capital) due to their flair for processing and marketing. Processing is conducted at home, so women have time for themselves while working in productive roles. Given the availability of a smoking kiln on the market, men, in particular those from better-off households, are increasingly engaged in modern processing. A key informant expresses this: “Until now, African men generally considered processing a women’s business for using knives and firewood/charcoal in smoking fish. However, many young men are getting attracted to smoking kilns.” Young women from resource-poor households, who cannot afford to buy smoking kiln due to the high cost, use firewood (natural capital) for fish processing. They reported that this is causing them sight and respiratory problems. This type of selective investment reflects youth’s ability to use their economic, natural, cultural and social capital to control their access.

*Second*, youth participate in aquaculture projects and farmer associations (social capital) and use ICTs (physical capital) to mitigate market and marketing risks.



**Fig. 4** Risk management strategy for inclusion

Participating in farmer associations builds youth’s relationships with market actors through other network members. When one person sells off all the fish, he/she can contact another group member to help them sell some of their fish. However, they have limited connections to farmer associations/cooperatives due to their perception that participation has limited benefits and trust issues among youth. A young woman explained, “I belong to a network of over 500 youth in aquaculture, but the network does nothing meaningful to maintain our interest. Young people do not like grouping themselves to achieve common goals because of the issue of trust.” Specific to young women, restricted mobility due to socio-cultural norms (cultural capital) remains a challenge to their participation in the market.

Young men and women also have good access to ICTs (physical capital), which provide opportunities for capacity development, networking, and market access. They use ICTs such as social media to establish their professional platforms, exchange market information, contact suppliers and customers, advertise businesses, and hence enhance general sales: ‘We use our mobile phone to make calls to get information about the price of fish and to do WhatsApp to advertise our businesses.’ However, market misinformation (market lies) in using digital marketing remain challenges. This is expressed by one interviewee: ‘On getting to the place to purchase fish on the farm, the farmer would have promised big size fish, but on getting there, the fish might be tiny.’ This type of risk management reflects the youth’s ability to use their physical, social and human capital for gaining access.

*Third*, young people living in areas with limited access to storage facilities, cold chains, and road networks cope with technical risks such as spoilage and high transport

costs through participation in aquaculture projects (political capital) and associations/cooperatives (social capital), enabling them to acquire knowledge for managing risks of spoilage (human capital).

For example, an aquaculture project managed by the Agricultural Development Programme in Anambra State provides youth with market links, networking opportunities, subsidies for smoking kilns, training on how to keep fish fresh during transit, better packaging, digital marketing, and web design to enhance marketing of fish. To improve the processing function, the support includes raising awareness of smoking kilns, subsidies, and technologies for hygienic fish processing to enable young people to provide safe, high-quality fish to markets. A key informant expressed the support as: “Food health risk is attached to unsafe processing. We try as much as possible to educate our processors on how to keep their environment clean, use improved technology for smoking..., be certified to market their product, and access the export markets.” This type of investment reflects the youth’s ability to use political and social capital to increase human capital and maintain access to relevant services and markets. However, a poor road network coupled with limited access to storage facilities (physical capital) remain challenges.

**Discussion**

We used the integrated livelihood asset framework (Ellis 2000; Shaffer 2008) access approach (Ribot and Peluso 2003) with VCD approaches (Horton et al. 2016; Donovan et al. 2016) to understand youth inclusion processes in the aquaculture value chain in Nigeria. The framework showed that youth VCD inclusion is influenced by their livelihood asset, i.e., economic, natural, physical,

human, social, cultural, and political capital. The inclusion's nature is shaped by the youth's ability (livelihood access) to prioritize their assets for investment. The integrated livelihood asset and access framework helps to capture the interaction of assets and access and value chain factors to determine youth inclusion in the value chain development. Based on how youth leverage livelihood assets and access to engage in the aquaculture value chain, two strategies were identified and summarized in Table 1.

Several key insights emerged from two youth inclusion strategies. Youth adopting either strategy experience similar contextual factors that encourage them to adopt either of the strategies. Nigeria has a domestic fish supply gap, and the government encourages private investment in domestic aquaculture as a long-term solution (Gona et al. 2018). The National Youth Policy (2019) supports youth engagement in agriculture and agri-business through capacity development, infrastructure provision, inputs, and effective extension services. For example, ICTs enable youth in aquaculture to browse the internet, advertise businesses, network, and exchange market information. Yami et al. (2019) also noted the significance of ICTs for youth in agribusiness to make data accessible and provide opportunities to link up with business networks.

Livelihood asset ownership largely determines youths' strategies. Young people with good access to livelihood assets such as finance, land, and technical knowledge, particularly from better-off households participate in capital-intensive production functions. However, the participation of young women in the production function, even if they are from better-off households is undermined due to socio-cultural norms. These norms deny young women the right to inherit the land and assume

production is tedious and stressful for them. In contrast, those with limited access to these livelihood assets (particularly from resource poor households) participate in processing, distribution, and marketing functions, which are less capital intensive.

Youth adopting either of the strategies also differ in their needs for capacity development. Youth, who are not specialised in aquaculture, but adopt an investment strategy need capacity development that focuses on production. Meanwhile, those adopting a risk management strategy need capacity development that focuses on reducing market risks and spoilage. The finding is consistent with previous research on the agency approach for youth inclusion, which highlights factors including access to productive and appropriate resources (Flynn et al. 2016; Doss et al. 2019) and service provision (Ripoll et al. 2017) as key to youth inclusion in agricultural value chain development.

Support from social networks, government, and NGOs largely determines the youth's access to resources and opportunities for developing interest and gaining knowledge in the aquaculture value chain. This finding aligns with Ripoll et al. (2017), who identified the key elements that determine the engagement of rural youth in agriculture as macro context, local context, social structures, and individual characteristics (Ripoll et al. 2017). Specifically, Sumberg et al. (2020) and Glover and Sumberg (2020) also highlighted the role of social networks in influencing young people's ability to access resources and agency-related characteristics such as skills and mindsets. This implies the limitations of asset approach that assumes youth are isolated economic agents with limited capacity to enter labor markets.

Youth adopting either of the strategies face unique challenges and use different mechanisms to overcome

**Table 1** Overview of the integrated asset-access approach to youth inclusion

Assets, access, and inclusion	Investment strategy	Risk management strategy
Livelihood assets	<ul style="list-style-type: none"> <li>– Good physical, human, and social capital</li> <li>– Limited natural, economic, and political capital</li> </ul>	<ul style="list-style-type: none"> <li>– Good economic, natural, human, social, and cultural capital</li> <li>– Limited physical, and political capital</li> </ul>
Assets prioritized for access	<ul style="list-style-type: none"> <li>– Economic, natural, social, and political capitals to controlling access</li> <li>– Social and physical capital to gaining access</li> <li>– Social, physical, human, and political capital to maintaining access</li> </ul>	<ul style="list-style-type: none"> <li>– Economic, natural, cultural, and social capital to controlling access</li> <li>– Physical, social, and human capital to gaining access</li> <li>– Human, social, and political capital to maintaining access</li> </ul>
Value chain factors	<ul style="list-style-type: none"> <li>– Strong function-based hindering factors</li> <li>– Chain-based enabling factors</li> </ul>	<ul style="list-style-type: none"> <li>– Strong function-based hindering factors</li> <li>– Chain-based enabling factors</li> </ul>
Access prioritized for inclusion	<ul style="list-style-type: none"> <li>– Controlling access to overcome function-based hindering factors</li> </ul>	<ul style="list-style-type: none"> <li>– Gaining and maintaining access to overcome function-based hindering factors</li> </ul>
Inclusion strategy	<ul style="list-style-type: none"> <li>– Economic, natural, social, and political capitals to controlling access to overcome function-based hindering factors</li> </ul>	<ul style="list-style-type: none"> <li>– Physical, social, and human capital to gaining access; and human, social, and political capital to maintaining access to overcome function-based hindering factors</li> </ul>

them. High fish feed costs, limited access to finance and land, and inadequate good-quality seed supply mainly challenge youth in adopting investment strategies. They mostly use social and political capital to overcome these barriers—a form of access control. At the same time, youth adopting risk management strategies are primarily challenged by fish spoilage and market risks; therefore, they leverage human, social, and political capital to mitigate spoilage—a form of access maintaining; and physical capital to mitigate market risks—a form of access gaining. This finding shows the youth's efforts to use livelihood opportunities. This supports existing knowledge by Bell and Payne (2009) who consider youth as developmental actors in their rights, exercising independent agency to shape their lives and relationships.

Overall, the findings imply youth's ability to utilize livelihood opportunities depends on factors including contextual factors and asset ownership and access. Specifically, in the context of this study, support from social networks, government and NGOs plays critical roles in providing access to resources and opportunities for young people to develop interest and engage in the sector. As young men and women are not homogeneous, they face unique challenges in the aquaculture value chain. Hence, their ability to adopt a specific strategy to mitigate their challenges depends on what assets and accesses are available to them.

## Conclusion

We examined the inclusion strategies of young men and women in the aquaculture value chain by capturing their investment using livelihood assets and access actions under aquacultural value chain dynamics. This allowed us to identify the factors that either support or impede their participation in the industry. Our findings highlight the importance of considering various factors such as social networks, access to resources and services, and cultural diversity among youth to help them take advantage of opportunities within the aquaculture value chain. Considering these factors helps to enhance the agency of young men and women, as well as opportunities for income sources in the aquaculture value chain.

We conclude that youth inclusion largely depends on the assets and access available to young men and women in a specific context. It also depends on ability of young men and women to utilize livelihood assets to overcome contextual obstacles along the value chain. This ability is primarily influenced by the intersection of age with other identities, such as gender, wealth status, and educational status. The study emphasizes the importance of considering how local contextual factors, livelihood assets, access actions, and social differences interact to shape the range of opportunities pursued by youth.

Our results have several implications for development policies and value chain development implemented in Nigeria and elsewhere. First, policies and interventions must consider how diversity among youth (in geographic location, wealth status, gender, and so on) shapes livelihood options and impacts their engagement strategy. Second, capacity development to enhance knowledge and skillset is needed to reduce mortality at production, spoilage at processing and distributing functions, and low prices at marketing levels. Third, subsidies on inputs, encouragement to investors to participate in input supply functions, and tailored financial services help to reduce production costs and create more employment opportunities for youth. Fourth, meaningful youth engagement in policy dialogues and project designing is critical for formulating youth-inclusive policies, evidence-based planning and governance systems, and effective and efficient resource use.

In closing, we note some limitations of this approach. First, the framework is used only for aquaculture value chains in the context of the four Nigerian states and has yet to be applied to different global contexts. More research is needed to understand how young women and men use their resources to harness business opportunities, mitigate contextual challenges, and create new opportunities for engaging in agricultural VCD. Further studies are also needed to understand how social, economic, and political structures shape youth's ability to use resources to create employment opportunities in agricultural value chains.

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## Author contributions

LN conceptualised, analysed data and wrote the article. TTM developed methodology, analysed data, and reviewed and revised the article, and SSS reviewed. All authors have read and agreed to the published version of the manuscript.

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## Availability of data and materials

Data will be made available upon request/reasonable request.

## Declarations

### Ethics approval and consent to participate

Not applicable.

### Consent for publication

Not applicable.

### Competing interests

The authors declare that they have no competing interests.

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