# Bridging Data Gaps in Kenya's Artisanal Fisheries: Leveraging Citizen Science and Technology for Sustainable Management

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**Abstract**

Kenya's artisanal fisheries are vital for coastal livelihoods but face significant data collection challenges that hinder sustainable management. This study assesses the primary obstacles, including underreporting, the use of non-designated landing sites, and reliance on illegal fishing practices, which exacerbate data gaps and contribute to Illegal, Unreported, and Unregulated (IUU) fishing. Through structured survey data from 41 of the 212 mapped landing sites, this research quantifies these challenges and explores how citizen science and technology can improve data accuracy.

Findings reveal that 59.5% of fishers do not regularly report their catches, largely due to perceived lack of benefit, distrust in authorities, and logistical constraints. Seasonal variations, particularly during the southeast monsoon (April to September), contribute to an estimated 30% underreporting of total catches. Furthermore, 54% of fishers operate at non-designated sites, with 15% engaging in direct sales at sea to bypass data collection. 35.1% of fishers engage in night fishing, a key factor in data invisibility, as early-morning landings occur before enumerators arrive, particularly impacting tuna and other pelagic stocks assessments.

Technology offers promising solutions; 78.4% of fishers own smartphones, and 75.7% express willingness to adopt mobile reporting tools. However, actual mobile app usage remains low at 16.2%, limited by factors such as internet access and data costs. A positive correlation between smartphone ownership and reporting willingness suggests strong potential for technology integration, particularly in regions like Mombasa and Kilifi, where smartphone penetration is 77.8%. Engaging Beach Management Units (BMUs) through citizen science initiatives could also improve data coverage, as 70.3% of respondents are BMU members and 56.8% see BMUs as crucial for data collection.

To bridge data gaps, the study recommends implementing a centralized fisheries data management system for real-time reporting, enabling consistent data collection from remote sites and off-hours. Such a system would streamline data access, enhance transparency, and support effective fisheries management decisions. Combined with geo-tagged mobile reporting and strengthened BMU capacity, these advancements offer a robust pathway toward sustainable management of Kenya's artisanal fisheries. Future efforts should focus on piloting these solutions to assess their effectiveness in real-world settings, with continuous data updates to support data-driven decision-making in fisheries management.

**Keywords:** Artisanal fisheries, Data collection challenges, Underreporting, IUU fishing, Centralized data management system

## Introduction

Artisanal fisheries are vital to Kenya's coastal economy, providing food security, employment, and cultural value for coastal communities ("The State of World Fisheries and Aquaculture 2022" 2022). However, like many small-scale fisheries worldwide, Kenya's artisanal sector faces significant data collection challenges due to its decentralized nature and non-standardized fishing practices. Artisanal fisheries contribute about 40% of global marine catches and 90% of capture fisheries employment, yet they often operate outside formal data systems, leading to underreported and incomplete data (Teh and Sumaila 2013; Pauly and Zeller 2016). In Kenya, the Kenya Marine and Fisheries Catch Assessment Survey (CAS) serves as the primary data collection tool, focusing on 41 out of approximately 212 mapped landing sites in the Kenyan marine (Kenya Fisheries Service 2023). The coverage doesn't fully represent Kenya's broader fishing activity accurately, especially as many fishers operate in non-designated or remote areas. Additionally, pressures such as low income and restricted resources drive some fishers to engage in Illegal, Unreported, and Unregulated (IUU) fishing, further contributing to data scarcity. These data gaps affect the accuracy of stock assessments, which rely heavily on CAS data to inform conservation policies and sustainable fisheries management (Lorenzen et al. 2016).

This study seeks to determine how improved data collection methods, including digital reporting tools and centralized data management, can enhance the accuracy of stock assessments and support sustainable management practices in Kenya's artisanal fisheries (Purcell and Pomeroy 2015).

This research is crucial for advancing sustainable fisheries management in Kenya, where artisanal fisheries significantly impact coastal livelihoods and biodiversity. By addressing data gaps that currently hinder accurate stock assessments, this study aims to provide insights into how digital reporting and centralized data systems can improve data quality and accessibility. The findings will contribute to the field by offering a scalable framework for integrating technology into data-poor fisheries, with potential applications in similar fisheries sectors globally, ultimately supporting effective policy-making and conservation efforts.

The specific objectives of this research are to (1) evaluate the effectiveness of current data collection practices within Kenya's artisanal fisheries, (2) assess the feasibility and potential impact of digital reporting tools and centralized data management in enhancing data coverage, (3) identify key factors affecting fishers' willingness to adopt mobile reporting, and (4) propose a scalable framework for improved data collection that supports accurate stock assessments and sustainable management policies in Kenya's fisheries.

Despite recent efforts in Kenya to bolster artisanal fisheries data collection, including increasing fisheries staff and adopting electronic tools like the mobile Catch Assessment Survey (CAS), significant data gaps persist. Current sampling efforts capture approximately 40 of the estimated 230 coastal landing sites, leaving a substantial number of remote and non-designated sites unmonitored (Kenya Fisheries Service 2023). This limited site coverage is compounded by logistical challenges, including restricted internet access, which impedes the real-time functionality of digital systems in several coastal regions.

Additionally, factors such as night fishing and illegal practices at unmonitored landing sites exacerbate underreporting (Sumaila et al. 2019). Many fishers land catches outside standard monitoring hours or use unregulated gears to avoid detection, adding complexity to stock assessment accuracy. While Beach Management Units (BMUs) have been instrumental in community-level data collection (Ogwang, Nyeko, and Mbilinyi 2010), the existing literature indicates that economic constraints, limited regulatory enforcement, and variability in technology adoption hinder full integration into Kenya's data management frameworks. Although citizen science and mobile reporting tools show promise, further research is required

to assess their scalability, particularly in the face of limited resources and sporadic enforcement ("A Research Agenda for Small-Scale Fisheries," n.d.).

The rationale for this study lies in addressing the urgent need for accurate, scalable data collection systems within Kenya's artisanal fisheries (Cavallé, Said, and O'riordan, n.d.). Given the high economic and ecological stakes, data gaps stemming from unmonitored landing sites, inconsistent reporting, and the prevalence of Illegal, Unreported, and Unregulated (IUU) fishing compromise stock assessments, policy development, and sustainability efforts. Although Kenya has increased fisheries personnel and introduced electronic data collection tools, these measures alone have proven insufficient to capture the true scale of fishing activity, especially in remote and non-designated areas (Kenya Fisheries Service 2023).

This study hypothesizes that integrating digital reporting solutions and a centralized data management system will significantly improve data quality, coverage, and accessibility, enabling more accurate stock assessments and evidence-based policy-making. By exploring the adoption of citizen science initiatives and mobile reporting tools, this research not only aims to strengthen Kenya's artisanal fisheries management but also to create a replicable model for data-poor fisheries worldwide. Ultimately, these solutions represent a transformative opportunity to bridge critical data gaps, safeguarding marine resources and the livelihoods that depend on them for generations to come (Rowan 2023).

**Materials and methods**

**Study Area**

The study was conducted across selected landing sites along Kenya's coastline, spanning the key coastal counties where artisanal fishing activities are prevalent. These sites represent a range of fishing practices, species compositions, and ecological conditions, providing a representative sample of Kenya's artisanal fisheries. With over 212 landing sites mapped, only 41 were routinely monitored, so this study expanded coverage to include more remote and non-designated sites to capture a broader spectrum of fishing activity.
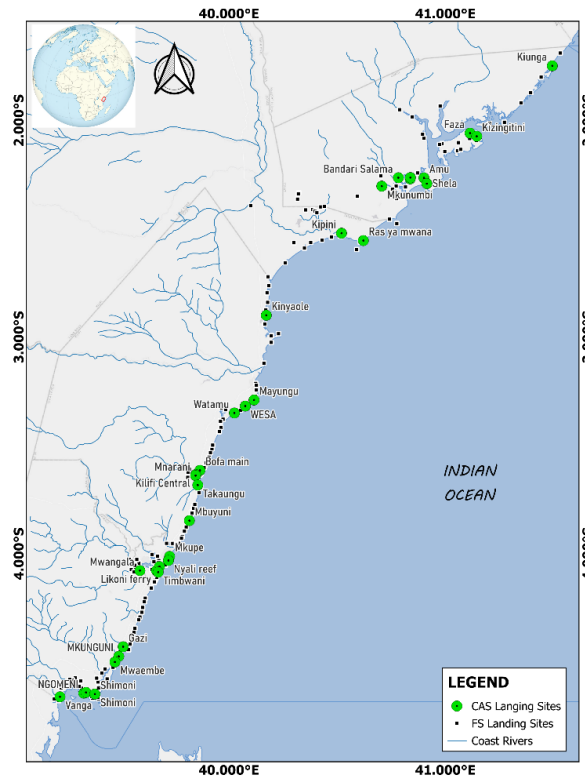


**Sampling Strategy**

The sampling strategy employed a purposive approach, selecting landing sites and fishers based on their fishing intensity, geographic spread, and representation of various fishing practices. The selection was also stratified by site designation status—designated versus non-designated—to account for the differences in data availability and monitoring consistency. This approach ensured inclusion of a diverse set of artisanal fishers, allowing insights into both heavily monitored areas and typically underrepresented, remote sites.

**Data Collection**

Data were collected through structured interviews with fishers at the selected landing sites, complemented by observational data recorded by enumerators stationed at each site. The interviews focused on fish catch quantities, species identification, and fishing gear types, while additional data on socio-economic factors and fishing habits were documented to provide context for each fisher's activities. The study also included catch measurements for physical verification, ensuring that quantitative data aligned with reported figures.

**Use of Technology in Data Collection**

To enhance data accuracy, digital tools were incorporated into the data collection process. Enumerators used the Catch Assessment Survey (CAS) mobile questionnaire to record data in real time. This application facilitated the input of geo-tagged data entries and allowed for seamless digital recording, which streamlined data collection and reduced the likelihood of manual entry errors. However, due to limited internet access at some remote landing sites, data synchronization was sometimes delayed, highlighting the infrastructure challenges associated with digital data collection.

**Data Validation and Quality Control**

Data validation was integral to maintaining accuracy and consistency. Enumerators received training on standardized data collection protocols, including species identification, measurement techniques, and verification procedures. A multi-tiered quality control process was implemented, where data entries were cross-checked daily to identify discrepancies. Supervisors reviewed records for completeness and accuracy, with any inconsistencies promptly addressed through clarifications with enumerators.

**Community Engagement and Collaboration with BMUs**

Beach Management Units (BMUs) and local communities played a significant role in this study, especially in facilitating access to fishers and landing sites. BMUs were engaged as community liaisons, promoting awareness and encouraging fishers to participate. In certain sites, community members assisted as citizen scientists, recording basic catch data and reinforcing the sustainability practices promoted through the study. These collaborations fostered trust and a sense of ownership among fishers, improving data reliability and compliance.

**Ethical Considerations**

All data collection activities adhered to ethical protocols. Fishers provided informed consent prior to participation, ensuring they understood the purpose of the study and how the data would be used. Privacy and confidentiality of respondents were maintained throughout, with data anonymized to protect participant identities. Additionally, cultural sensitivities were considered to respect the traditions and practices of coastal communities, and any invasive or sensitive questions were carefully handled.

**Pilot Testing and Pre-Survey Adjustments**

A pilot test was conducted at a few landing sites prior to full-scale data collection. This trial phase allowed the team to refine the survey questions, adjust the digital tools for better usability, and resolve any logistical issues. Feedback from enumerators and fishers led to modifications in the data collection process, such as optimizing question phrasing for clarity to improve data entry efficiency.

**Data Analysis**

The data analysis combined quantitative and qualitative methods to address the study's objectives of identifying data collection challenges and assessing the potential for improved reporting systems in Kenya's artisanal fisheries. Descriptive statistics were applied to summarize core quantitative variables such as fish catch volumes, species composition, gear types, and landing site characteristics across sampled locations. Analysing catch volumes provided insights into fishing activity levels at both designated and remote sites, highlighting potential discrepancies in reported data that indicate underreporting. This quantitative analysis

established baseline data for fishing activities and allowed for a clearer assessment of data gaps in current reporting practices.

To explore associations between socio-economic factors and fishers' behaviour regarding data reporting and sustainability practices, correlation analyses were conducted. These analyses focused on variables like income, education, smartphone ownership, and fishing compliance, helping identify drivers of data reporting willingness and barriers to digital reporting adoption. A thematic analysis was also applied to open-ended responses, revealing recurring themes around regulatory challenges, logistical difficulties, and perspectives on sustainable practices. This qualitative approach enabled a deeper understanding of fishers' attitudes toward reporting, as well as their views on the practical challenges of data collection. Together, these findings provide a holistic view of the challenges and opportunities in data collection, forming the basis for recommending scalable data collection improvements in Kenya's artisanal fisheries.

**Limitations and Challenges**

The study encountered several limitations, notably the logistical difficulties of accessing remote landing sites and the infrastructural limitations that affected real-time data synchronization in the CAS system. Additionally, data collection was constrained by varying levels of cooperation from fishers, especially those engaging in illegal or unregulated practices. The timing of catch landings, with many fishers operating outside standard monitoring hours, introduced temporal data gaps that were difficult to address fully. These challenges highlight the complexities of data collection in Kenya's artisanal fisheries and underscore the need for adaptable and resilient data collection systems.

**Limitations of CPUE-Based Catch Estimation**

The commonly used formula $Catch = CPUE\ X\ Effort$ presents several limitations, particularly in data-poor, artisanal fisheries like Kenya's. When using the effort from the frame survey, this method assumes a direct, linear relationship between effort and catch, which fails to capture seasonal and ecological variances affecting fish availability and behavior. For instance, seasonal fluctuations during the Kusi and Kaskazi monsoon seasons impact fish behavior and catchability, challenging the assumption that CPUE reliably reflects fish abundance (Lorenzen et al. 2016; Sumaila et al. 2019).

To address these limitations, this study noted that the number of fishers targeting tuna and tunalike species increased from 10% to 40% during the peak tuna seasons. A sensitivity analysis, simulating total catch estimates with raising factors ranging from 10% to 40%, suggests that the current raising factor at 10% is not representative of the total catches and may have led to underreported catches, particularly in night fishing activities and unmonitored landing sites. A thorough evaluation of the targeting change based on seasonal variation needs to be assessed more to understand the variations in catches with different seasons. This recommendation aligns with findings in other artisanal fisheries where adjusted raising factors have improved stock assessment accuracy (McDonald et al. 2018; Sinan, Bailey, and Swartz 2021).

Additionally, the observed discrepancies between estimated and reported catches underscore the limitations of CPUE as an abundance index, especially in artisanal fisheries with inconsistent data coverage. Integrating more adaptive assessment methods and community-based data collection strategies could further enhance

the accuracy of stock assessments in Kenya's artisanal fisheries (Pauly and Zeller 2016; Ogwang, Nyeko, and Mbilinyi 2010).

**Results**

**Data Collection Challenges**

The study found that artisanal fishers face significant barriers in reporting catches accurately. 37% cited a lack of trust in data collection authorities, leading to reluctance in reporting while 26% of respondents described the reporting process as time-consuming. Additionally, 54% of fishers operate in unauthorized landing sites, and 52% do not report their catches regularly, highlighting substantial gaps in compliance and coverage.
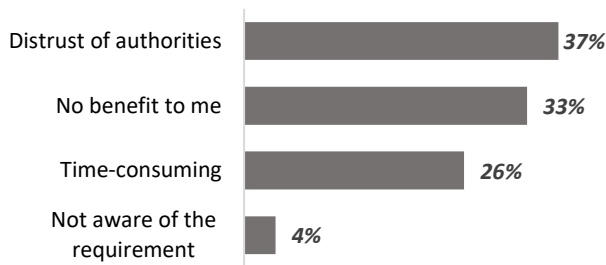
*Figure 1. Fishers' challenges in data reporting*
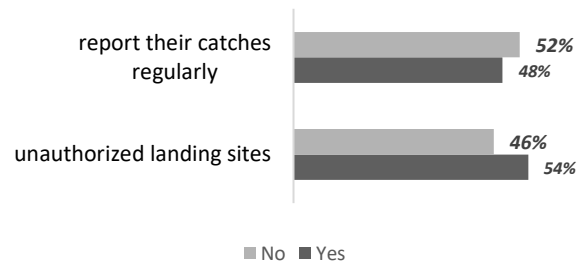
*Figure 2. Unauthorized landing practices*

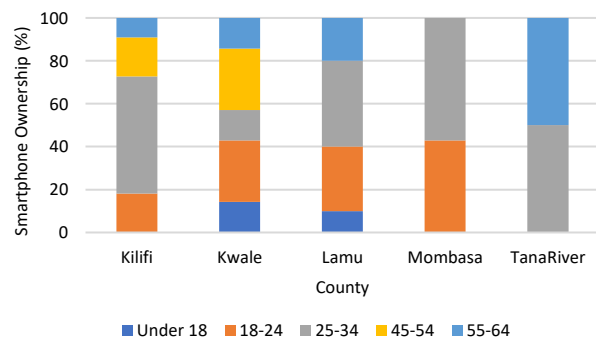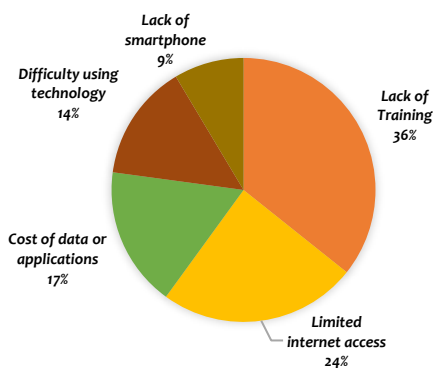**Compliance and Technology Usage**

*Figure 3. Barriers for digital adoption*          *Figure 4. Smartphone ownership per Age*

Smartphone ownership among fishers stands at 85%, with 55% having smartphones essential for digital reporting. Although 70% of fishers are open to using mobile applications, barriers such as lack of training (36%), technology challenges (14%), and data costs (17%) limit effective digital adoption. Notably, older fishers show lower smartphone ownership, affecting their engagement with mobile tools, signaling a need for targeted training to bridge technology gaps across age groups.

**Community Involvement through BMUs**

Beach Management Units (BMUs) are pivotal in fisheries management, with 70.3% of fishers as BMU members and 56.8% viewing BMUs as essential to data collection efforts. However, BMUs display varied activity: 51% are somewhat active, 27% inactive, and only 16% are highly active. For enhanced BMU efficacy, 49% of respondents recommended equipping BMUs with training and resources to better support data collection and conservation practices.
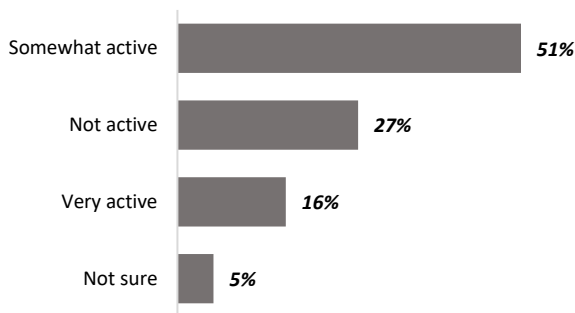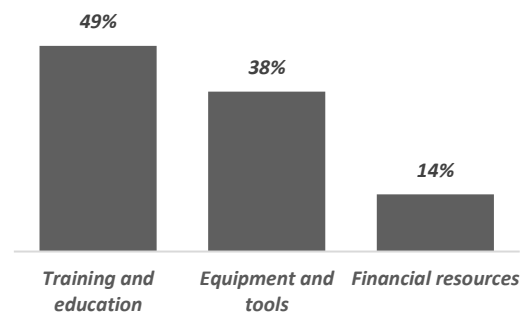


*Figure 5.BMU Activity*                    *Figure 6. Recommendation for BMUs*

**Socioeconomic Pressures and Sustainability Perceptions**

Socioeconomic pressures heavily influence fishing practices, with 56% acknowledging that such pressures drive them toward illegal or underreported fishing. Awareness of sustainable fishing practices is moderate, with 54% reporting low awareness. Additionally, 46% view overfishing as a local issue, while 38% disagree, reflecting mixed views on the importance of sustainability.
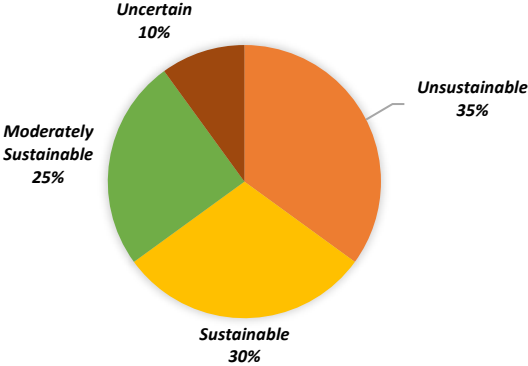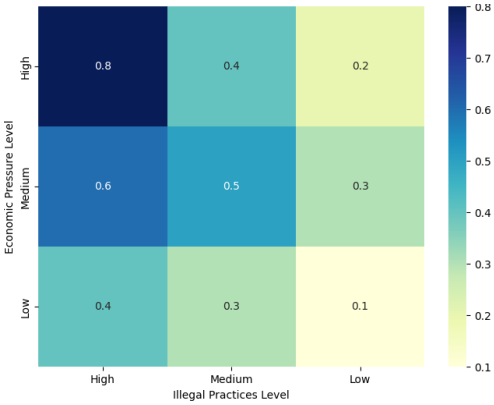
*Figure 7. Perceptions of Sustainability*



*Figure 8. Socioeconomic Pressures and Illegal Fishing Practices*

**Role of Citizen Science and Digital Solutions**

In high smartphone penetration counties like Mombasa and Kilifi, where 77.8% and 72.4% respectively own smartphones, willingness to adopt mobile reporting tools is high, though actual usage is lower at 5.6%. Nonetheless, 75.7% of all respondents are open to mobile reporting, highlighting potential for citizen science and digital data reporting to fill gaps, especially for unmonitored artisanal fishers, supporting accurate and sustainable fisheries management.
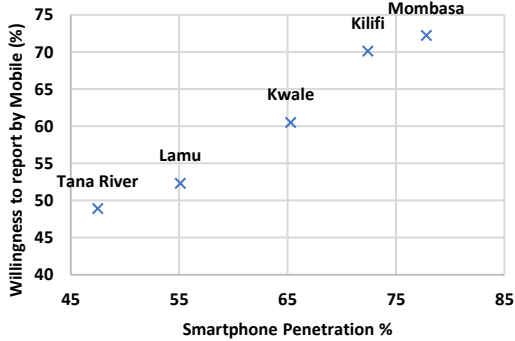
*Figure 9. scatter plot showing smartphone penetration versus mobile reporting willingness by county*

*Table 1. Table summarizing county-level smartphone ownership and reporting readiness*

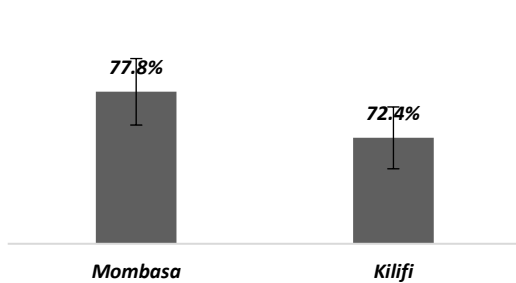| # | County | Smartphone Penetration % | Willingness to report by Mobile % |
|---|--------|--------------------------|-----------------------------------|
| 1 | Mombasa | 77.8 | 72.2 |
| 2 | Kilifi | 72.4 | 70.1 |
| 3 | Kwale | 65.3 | 60.5 |
| 4 | Lamu | 55.1 | 52.3 |
| 5 | Tana River | 47.5 | 48.9 |

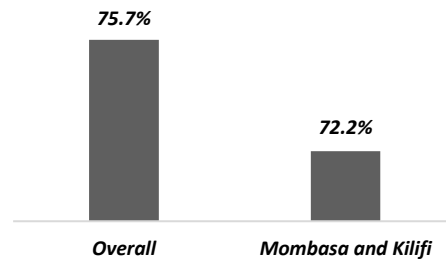*Figure 10. Smartphone ownership in Mombasa & Kilifi (%)*

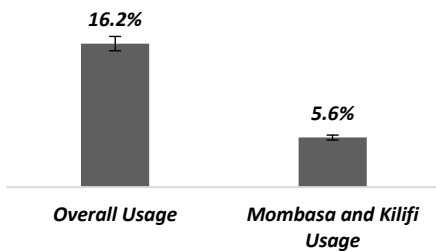*Figure 11. Willingness to Use Mobile phones for Reporting*

*Figure 12. Actual Mobile App Usage for Fishing Activities*

**Discussion of Results**

The study's findings highlight notable challenges and potential opportunities within Kenya's artisanal fisheries sector, particularly around data collection, digital reporting, and community engagement. A central challenge is the low compliance in data reporting, with only 48% of fishers regularly reporting their catches, often deterred by the time-consuming process, distrust in data authorities, and perceived lack of personal benefit. Smartphone penetration is relatively high, with 55% of fishers owning smartphones, yet barriers like internet costs and technology literacy hinder widespread adoption of digital reporting, which could otherwise streamline data collection efforts. Furthermore, the Beach Management Units (BMUs) play a mixed role, as 43% of BMUs are only somewhat active, limiting their impact on data collection and fisheries management .

These findings underscore the need for strategic interventions to improve data reporting, such as digital training programs, affordable data access, and trust-building initiatives with BMUs. Leveraging the existing high smartphone ownership can foster digital transformation in fisheries data management, particularly in counties like Mombasa and Kilifi, where smartphone penetration and willingness to use mobile applications for reporting are high. This alignment suggests that, with proper support, digital tools and community-led structures like BMUs could significantly enhance fisheries regulation, compliance, and sustainability.

Unauthorized landing sites and distrust in regulatory authorities emerged as prominent barriers to data collection. 54% of fishers report landing their catches at non-designated sites, often to avoid official monitoring and related regulations. Additionally, 15% of fishers reported a distrust in authorities, perceiving limited direct benefits from reporting their catches. This distrust underscores a need for trust-building efforts within communities, potentially through transparent communication on how data is utilized for sustainable management. Strategies like increased engagement between data collectors and fishers could improve compliance and build trust. A centralized, easily accessible database that records and displays data trends could reinforce transparency and demonstrate the value of accurate reporting.

Despite 85% mobile phone ownership among fishers, only 55% have smartphones, a prerequisite for advanced digital data tools. This smartphone gap impacts digital reporting compliance, as only 16% currently use mobile apps for reporting. Economic constraints, limited internet access (40%), and data costs (25%) also impede adoption. To bridge these gaps, subsidizing smartphone costs and providing community-based training—especially for older fishers less familiar with digital tools—could enhance digital reporting uptake. Establishing WiFi access points at key landing sites could further mitigate internet access issues.

BMUs have shown mixed effectiveness, with only 11% of BMUs actively involved in management. Given that 70.3% of fishers are BMU members, supporting BMUs with training, funding, and resources could significantly strengthen their role in monitoring and compliance. BMUs can serve as community-driven monitoring entities, which may enhance local compliance and stewardship of resources.

In comparing findings with existing literature, several key insights emerge: Studies consistently show that digital tools enhance data reporting accuracy and efficiency, especially in rural and artisanal communities. However, they also face barriers that align with our findings, such as the digital divide and limited infrastructure in remote areas. The DESIRA project highlights that rural digital transformation requires tailored solutions that incorporate local needs and overcome barriers like high internet costs and limited technical support, which mirrors the adoption challenges in Kenya's artisanal fisheries ("Impact and Potential of Digitalisation in Rural Communities | DESIRA Project | Results in Brief | H2020 | CORDIS |

European Commission," n.d.). Similar to our findings, rural communities worldwide report that economic barriers—such as data costs and the price of smartphones—impede digital tool adoption (Sonia Jorge et al., n.d.). In contexts like rural Colombia, Ghana, and Uganda, high mobile data costs restrict internet use, while in Kenya's artisanal sector, economic pressure on fishers makes even subsidized smartphone access beneficial for broader engagement. Studies on rural digitization indicate that community-driven approaches, such as community technology ambassadors or localized training programs, strengthen digital adoption and compliance with reporting ("Bridging the Digital Divide in Indigenous and Rural Communities in the Americas," n.d.). The ITU's initiatives in indigenous and rural communities in Latin America stress the importance of building digital literacy within communities, a strategy that could benefit BMUs and community-led data collection in Kenya's fisheries (Sindakis and Showkat 2024). Literature also suggests that digital inclusion may indirectly reduce illegal practices by increasing fishers' access to fair markets and transparency in resource management. Economic incentives for compliance and reporting, such as premium pricing for sustainable catches or government-backed financial support, have shown positive outcomes in India's rural sectors, potentially applicable to Kenya's artisanal fisheries to reduce illegal, unreported fishing (Yassin and Abdul Wahab, n.d.)(Sindakis & Showkat, 2024).

The lack of trust in data collection and enforcement authorities among fishers—where 15% of participants cited distrust in authorities as a reason for not reporting—underscores the need for transparency in data use. One effective approach could be implementing feedback loops, where fishers regularly receive insights on how their reported data is applied to resource management and policy decisions. Studies show that when fishers see tangible benefits, like improved stock health or market pricing advantages, they are more likely to participate actively in data initiatives. Additionally, engaging fishers in co-management and regularly sharing policy decisions based on their data fosters transparency and strengthens compliance ("Measured Force: The Benefits of Police Data Transparency - R Street Institute," n.d.; Probst 2020).

Despite 85% mobile phone ownership, only 55% are smartphones, limiting the potential for app-based data reporting. To address the technology gap, particularly among older fishers, establishing digital training programs could improve proficiency and increase reporting rates. Community-driven approaches, like recruiting and training digital ambassadors within Beach Management Units (BMUs), can also be effective. The ABALOBI initiative in South Africa, for example, leverages community engagement officers to provide hands-on training and maintain fishers' long-term engagement with mobile tools (Nthane et al. 2020).

Economic pressures that lead fishers toward illegal or unregulated practices (56% acknowledged these pressures) suggest a need for economic incentives linked to sustainable fishing practices and compliance. Consider financial incentives such as access to premium markets, where data-compliant and sustainable fishers can achieve higher returns. The introduction of Fishery Improvement Projects (FIPs), which link sustainable practices with access to higher-value markets, has been effective in other contexts, like Indonesia and the Seychelles (Grafton et al. 2006; Sinan, Bailey, and Swartz 2021; Cannon et al. 2018).

Limited internet access (cited by 40% of fishers) and data costs (25%) are significant barriers to mobile reporting. Investing in infrastructure, such as WiFi hubs at key landing sites, could alleviate connectivity issues, as seen in the ABALOBI program's provision of WiFi access points in community centers. Additionally, a policy for subsidized data access for fishers could improve participation in digital reporting tools without adding a financial burden (Nthane et al. 2020).

To manage and streamline data across regions, a centralized Fisheries Information Management System (FIMS) would ensure the consistency and accessibility of data collected. Such a system could support the

integration of self-reported data with official catch and stock assessments. Successful FIMS implementations globally underscore that when fishers can access real-time data and updates, they feel more accountable and integrated into management efforts (McDonald et al. 2018; Grafton et al. 2006).

The study's findings are subject to several limitations that could affect the representativeness and generalizability of the results across Kenya's artisanal fisheries. The sample, derived from only 37 of the 212 mapped landing sites, covers a limited scope and represents a sampling efficiency of approximately 9.3%. This underrepresentation of diverse fishing practices and geographical variations could lead to biases, particularly in regions where unauthorized and non-designated landings are prevalent, as highlighted in the methodology. Furthermore, the focus on BMU involvement and mobile app readiness may not fully capture fishers who operate outside BMU frameworks or lack mobile access.

An additional limitation is the challenge of achieving continuous, reliable data collection. While the study demonstrated high willingness among fishers to engage with mobile applications, economic and logistical barriers, such as data costs and limited connectivity, hinder consistent reporting (Pomeroy et al. 2020). This issue mirrors findings from similar studies that emphasize the need for economic incentives and community-driven engagement to sustain participation.

Investigate strategies to increase BMU effectiveness and engagement in data collection, particularly in underrepresented regions and among less active units. Testing pilot programs that strengthen BMU roles through training, resources, and mobile reporting incentives could yield insights on sustainable fisheries co-management. Future studies should focus on longitudinal data to assess how mobile reporting tools affect data quality over time, particularly in reducing biases due to irregular reporting or seasonal gaps. This could involve tracking reporting patterns across multiple fishing seasons and examining the fidelity of self-reported data over extended periods. Building on findings that economic pressures drive fishers towards unregulated practices, further research should analyze how financial incentives, such as preferential market access or tax exemptions, might improve compliance. Comparative studies on incentive structures across different regions could help pinpoint optimal approaches for resource-constrained artisanal fisheries. Research should explore the feasibility of a centralized FIMS tailored to artisanal fisheries, integrating data from diverse sources such as self-reporting apps, BMUs, and landing site records. This could involve piloting FIMS platforms that emphasize real-time access, transparency, and user-friendly interfaces to strengthen fishers' engagement in data-driven fisheries management. future exploration are essential to address the identified limitations, improve data quality, and support sustainable fisheries management in Kenya's artisanal sector.

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