



FEED THE FUTURE

Business Drivers for Food Safety

Water, Sanitation and Hygiene Conditions at Artisanal Seafood Processing Sites in Senegal

Technical Learning Note

November 2020

Cover image: Seafood processors at the Joal processing site in Senegal. Photo by Mbaye Sall.

Overview

Safely managed water, sanitation, and hygiene (WASH) services are essential for household health and equally critical for food businesses to reduce the incidence and transmission of foodborne diseases. The economic and health benefits of investing in water and sanitation are considerable. The estimated return on investment for every dollar spent is \$4.3 USD – a gain achieved by reducing health care costs and improving workplace productivity.¹ Investing in WASH also saves lives - diarrhea kills over 2,000 children per day globally, most preventable through improved WASH conditions.² In Senegal alone, more than 40,000 deaths could be prevented annually through adequate WASH infrastructure and practice.

Despite infrastructure, policy, and economic reform to achieve Senegal’s Sustainable Development Goals for water and sanitation, rural areas continue to face grave obstacles. As of 2010, only 56 percent of rural households had access to safe drinking water (compared with 93 percent of urban households), and just 39 percent had access to improved sanitation facilities.³ Substantial investments over the past decade are bridging the urban and rural WASH divide – with efforts largely focused on rural households.⁴ Growing food businesses (GFBs) based in rural areas also lack adequate access to water and sanitation. Senegal’s artisanal seafood processing sector is a particularly poignant example. Operated primarily by women and producing 80 percent of the country’s seafood, this marginalized and impoverished sector is at risk of transmitting foodborne pathogens within and beyond rural areas. Improving WASH services and promoting good hand hygiene practices for GFBs can greatly reduce food contamination during food processing and handling.

Business Drivers for Food Safety (BD4FS), a USAID-funded project implemented by Food Enterprise Solutions (FES), is promoting WASH within GFBs for safer food handling and processing. In the Spring of 2020, BD4FS undertook a Food Safety Situational Analysis (FSSA) of the artisanal seafood sector in Senegal and identified access to WASH as a critical factor for food safety.⁵ To further investigate, BD4FS conducted a follow-on study from July – August 2020 that evaluated past WASH projects, existing conditions and practices at 10 seafood processing sites, and business models for sustaining WASH investments.

BD4FS Approach

BD4FS is focused on improving WASH for GFBs in rural Senegal in a parallel effort to household-level WASH investments. With a market-based approach to creating sustainable infrastructure and utilizing communication techniques to instill good hygiene practices, BD4FS aims to improve the overall culture of food safety.

¹ World Health Organization. (accessed November 2020). Water sanitation hygiene.

https://www.who.int/water_sanitation_health/monitoring/economics/en/#:~:text=Economic%20benefits%20of%20investing%20in,greater%20productivity%20and%20involvement%20in.

² CDC. (accessed November 2020). Global diarrhea burden. <https://www.cdc.gov/healthywater/global/diarrhea-burden.html#:~:text=It%20causes%20death%20by%20depleting,and%20insufficient%20hygiene%205%2C%206.>

³ UNICEF and WHO. (2012). Progress on Drinking Water and Sanitation: <https://www.unicef.org/media/files/JMPreport2012.pdf>.

⁴ Projects are underway in Senegal to improve rural access to water and sanitation, with many supported by \$130 Million (USD) investment by the World Bank in 2018. <https://www.worldbank.org/en/news/press-release/2018/06/22/world-bank-approves-130-million-to-improve-access-to-water-and-sanitation-for-15-million-senegalese>.

⁵ FES. (September 2020). “Summary of the Food Safety Situational Analysis of the Artisanal Seafood Sector in Senegal.” Technical Learning Note. https://www.agrilinks.org/sites/default/files/media/file/FINAL%20FSSA%20Senegal%20%20Technical%20Note%209_23_20_0.pdf.

Study findings are summarized in this report and are framing next steps for BD4FS. Through site visits and interviews with women seafood processors and key stakeholders, BD4FS discovered that processing sites are at high risk of food contamination that could be largely prevented through proper WASH infrastructure and use. This study also revealed that maintaining shared WASH facilities is particularly challenging when compared to household-level WASH and calls for a well-structured and well-implemented business management model. Towards this end, BD4FS is considering lessons learned from several public WASH facility management models to address challenges identified in this study. Armed with information, processors and local food businesses will be empowered to choose evidence-based practices for better WASH design, use, and management. By co-designing improved WASH facilities and promoting safer practices at seafood processing sites, this work serves as a critical pathway for reducing biological contamination during food processing and handling.



Left - Seafood drying rack located among garbage at Joal processing site; Right – Modern processing facility at Mballing. Photo by Mbaye Sall.

Objectives of the BD4FS WASH Study

BD4FS initiated this study to identify WASH challenges and needs at seafood processing sites in Senegal and to evaluate models for effective and sustainable infrastructure development, management, and use.

1. **Learn from past interventions:** Identify successful practices and lessons learned from past WASH projects in Senegal and more broadly.
2. **Characterize current status and needs:** Evaluate WASH conditions and practices at 10 seafood processing sites and identify needs of women processors.
3. **Identify solutions:** Evaluate business models for management and maintenance of WASH investments at seafood processing sites.
4. **Provide recommendations:** Consider lessons learned, site status and needs, and potential business models to recommend actions for sustainable WASH infrastructure and practices at seafood processing sites.

Lessons Learned from Past WASH Interventions⁶

Several projects have been undertaken to improve WASH infrastructure and promote good hygiene practices in Senegal - largely focused on household-level WASH. With many of these projects experiencing significant technical and financial management problems, it is difficult to identify an existing model for success. BD4FS is drawing on lessons learned from these projects and others, along with decades of experience in the post-harvest food safety arena, to determine which practices to emulate and which to avoid. This will form the basis of its multi-pronged approach to create an effective and sustainable WASH model for seafood processing sites in Senegal and GFBs more broadly.

What to avoid: Many of the reviewed WASH projects neglected to involve stakeholders, build local WASH capacity, and promote good hygiene practices. This has resulted in infrastructure that was not tailored to beneficiaries' needs with poor utilization, weak stakeholder ownership, and shortcomings in management and maintenance.

Successful practices: Promising WASH outcomes have been achieved in Senegal and in other countries by employing the steps outlined below.⁷

- **Stakeholder involvement:** Promote a participatory and inclusive community-led approach from design through implementation.
- **Market-based approach:** Mobilize the private sector to offer relevant and affordable products and services.
- **Capacity building:** Train local businesses so that they can provide WASH services, from infrastructure design to sales and maintenance.
- **Social and behavioral change communication:** Encourage good hygiene practices and habits through utilizing proven communication science techniques and social marketing.

⁶ BD4FS carried out a situational assessment of artisanal seafood processing sites via desk review prior to initiating field work to identify lessons learned and success stories from past WASH projects in Senegal.

⁷ The ACCES Project (<https://nrce.com/project/usaid-senegal-aces-project/>), funded by USAID and led by Natural Resources Consulting Engineers, Inc., is providing access to improved water and sanitation services and promoting adoption of good hygiene practices in Senegal; and iDE Global (<https://www.ideglobal.org/story/sanitation>) has involved local businesses in responding to market demand for household toilets in Cambodia, engaged beneficiaries in designing handwashing stations in Ghana, and increased handwashing through behavior change communication.

WASH Conditions at Seafood Processing Sites

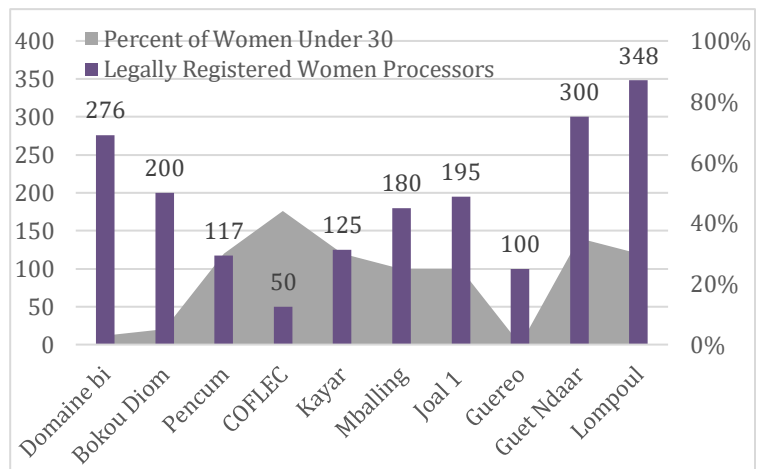


BD4FS evaluated WASH conditions and practices at 10 artisanal seafood processing sites in Senegal, located in the country's top seafood processing region. Site visits and interviews with women processors and key stakeholders were conducted to assess safety and environmental characteristics, and current status of WASH infrastructure and use.⁸

Site Demographics

The 10 sites vary in size, demographics, and organization – creating unique logistical and economic challenges for successful WASH implementation. Processing sites range in

size from 50 to 348 legally registered women processors. Women typically begin processing seafood in their twenties and work into old age, with the age ranging from 16 to 80 across sites. Sites are organized around Economic Interest Groupings (EIGs), with membership typically based on familiarity with and acceptance by existing members. Membership costs and benefits are highly variable across sites with annual dues ranging from 1,000 to 30,000 FCFA and benefits at some sites including shelters, changing facilities, and childcare.



Site Characteristics

Security and safety: A secure work environment allows workers to focus on job performance without worrying about safety. Unfortunately, many women fish processors in Senegal work at sites where theft and assault are not uncommon. Most sites lack a protective fence, security guard, and continuous lighting. This is particularly concerning during peak processing periods when women must choose to work after dark at their own peril.

Low security at sites not only threatens the safety of processors, but also impacts their productivity and earning potential. Further, it has direct and indirect impacts on food safety. Due to safety concerns, processors reported improperly storing seafood overnight—usually unrefrigerated—to avoid being at sites after dark and also avoiding WASH facilities that are not well lit or located in a dark corner of the site.

⁸ Two surveys were developed to interview women seafood processors and key stakeholders at the 10 seafood processing sites. Ten women processors were interviewed to gain a better understanding of site socioeconomics, WASH conditions, safety and working environment, as well as public toilet management models. Twenty-one key stakeholders (e.g., Mayors, Village Chiefs and Fisheries Managers) were interviewed to learn about the technical, financial and material support these parties can provide women processors. They were also asked about their perspective on major problems facing the sites and the public toilet business management models.

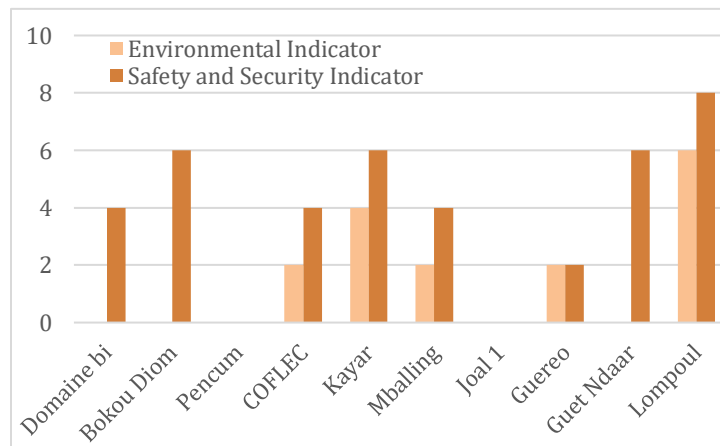
In order to quantify security and safety, the 10 sites were evaluated based on the following five criteria:

1. Secured by a protective fence with doors closed overnight
2. Presence of a security guard, especially at night
3. Continuous lighting overnight
4. No cases of theft
5. No attacks

A total possible security and safety indicator of 10 was possible for each site, representing the highest level of security (calculated by assigning a weight of 2 to each of the 5 criterion). Security was found to be the highest in Lompoul (8 out of 10), due to its modern infrastructure and fully fenced enclosure, and the lowest in Pencum and Joal (0 out of 10), indicating a vulnerable situation for the women processors and their property at those sites.



Locked toilet at Bokou. Photo by Mbaye Sall.



Environmental conditions: Environmental sanitary conditions are poor at most sites, raising food safety concerns and posing health risks to women processors. Of prevalence and concern are the presence of garbage dumps and stagnant water on sites – both of which serve as breeding grounds for mosquitos, vermin, and bacteria. Improper food preservation also results from site environmental conditions such as poorly ventilated spaces that inhibit food drying and areas that go unused because they lack adequate

lighting. Processors often rely on local governance, primarily Mayors’ Offices, to help control environmental hazards by providing garbage collection, well-ventilated spaces and other services.

The 10 sites were evaluated based on the following five environmental criteria:

1. No littering of the site
2. No garbage dumps in and around the site
3. Reasonable distance among drying racks
4. No puddles during the rainy season
5. Good organization of fuel storage

Each criterion was assigned a weight of 2, adding up to a total possible environmental standard of 10. All sites were rated at 4 or below, except for Lompoul which was assigned a rating of 6 for its governance and management of garbage, the absence of puddles, and organization of fuel storage facilities.



Standing water at Domaine bi. Photo by Mbaye Sall.

Water, Sanitation and Hygiene Conditions

All 10 of the seafood processing sites are at high risk of food contamination that could be prevented through proper water, sanitation, and hygiene infrastructure and use, as well as improved facility management. Critical factors compromising food safety include limited access to water, toilet facilities, and hand washing stations, as well as poor hygiene practices.

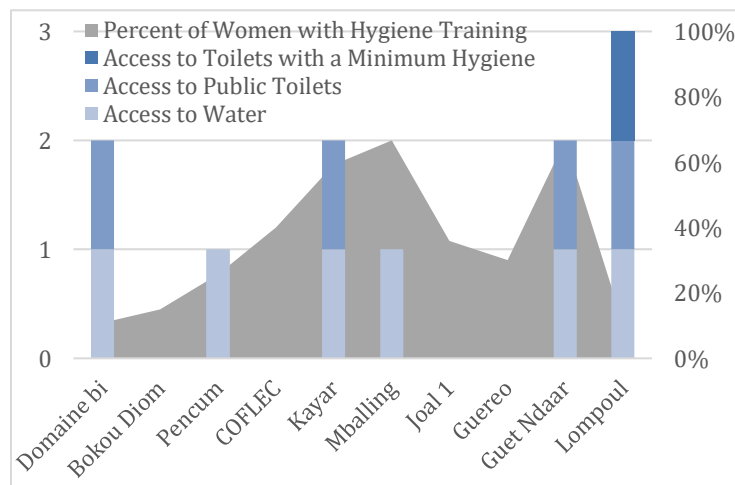
Access to water, toilets, and hand washing facilities: Visits to the 10 seafood processing sites revealed that basic hygiene is constrained by limited access to potable water and a scarcity of public toilets and hand washing facilities. Four of the 10 sites do not have access to potable water and 6 lack functional toilets. Even where public toilets are present, conditions failed to meet minimum hygiene standards⁹ at all sites except one.



Woman processor hand washing at Guet Ndaar. Photo by Mbaye Sall.

Without clean and safe water, processors are not able to maintain sanitary workstations for processing seafood. The lack of access to hygienic public toilets creates serious human health risks, as processed products can be contaminated with human waste directly and indirectly through humans and other vectors such as flies. The absence of hand washing facilities prevents processors from hand washing with soap and water before product handling, one of the most effective ways to reduce the transmission of foodborne pathogens.

Hygiene training and practice: All sites have received some level of hygiene training, much of that due to USAID efforts, such as its COMFISH hygiene and quality of processed product training.¹⁰ There is a clear gap between knowledge and practice, however. This study revealed poor hygiene conditions at public WASH facilities at all sites, except one, and few sites maintain sanitary food processing conditions. While



over half of processors at Mballing, Guet Ndaar, and Kayar have received training in hygiene, only Kayar does regular mass cleaning of the processing site (twice per month). Mballing hasn't done a cleaning in over a year, and Guet Ndaar processors keep their immediate workspaces clean while common areas suffer. Good hygiene and product quality recommendations for food preservation are also not followed at many sites. Drying racks are often spaced too closely together and on-the-ground braising and smoking of fish remains a common practice.¹¹

⁹ For a public toilet to meet minimum hygiene standards, it must fulfill the following criteria: (1) no waste deposits on toilet bowls, (2) no clogged toilets leaving the waste uncovered, (3) presence of water in the toilet for anal cleansing and waste disposal, and (4) presence of a watertight overflow-proof pit.

¹⁰ USAID and University of Rhode Island. (2018). "USAID/COMFISH Plus Project PENCOO GEJ: Empowering women in artisanal processing of fisheries products." https://pdf.usaid.gov/pdf_docs/PA00TH2N.pdf

¹¹ BD4FS is finalizing a study on ground braising and smoking of fish in response to this finding.

Lack of good hygiene practices in spite of training is due, in part, to site environmental conditions that fall outside of the control of women processors. Their ability and incentive to keep processing sites clean is low when access to water is limited and expensive, collected garbage isn't disposed of properly and instead remains on site, and buildings are poorly ventilated and unlit.

Exploring Solutions for Improving and Sustaining WASH Investment

The maintenance and management of public WASH facilities is a common challenge among processing sites. Over half of the sites lack functional toilets, and 9 of the 10 sites fail to meet minimum hygiene standards. BD4FS can maximize its impacts on reducing foodborne pathogens and improving worker health and safety conditions at seafood processing sites by working with processors and businesses to (1) improve WASH infrastructure and (2) identify and implement cost effective and sustainable public WASH facility management solutions.

Rehabilitating Public WASH Facilities

An obvious and important step to enable basic hygiene practices at seafood processing sites would be to rehabilitate public WASH infrastructure. While some sites require only minor repair, such as replacement of a broken door, other highly dilapidated sites call for complete demolition and reconstruction of larger facilities with better ventilation and a watertight septic system.



Environmental considerations: Several environmental factors should be considered and addressed when rehabilitating and building WASH infrastructure:

- The water table level - Always build watertight pits (with a cemented bottom) in order to limit wastewater seepage to the water table.
- Sea level rise and storm surges - Build pits and public toilets in locations that are elevated or a safe distance from wave and storm surge inundation.
- Effects of the marine environment on iron materials - Consider using materials that are resistant to corrosion from salinity.

Legal considerations: There do not appear to be legal hurdles nor authorization requirements for processing groups to build or rehab WASH infrastructure. EIGs are, however, bound to terms of sub-concession contracts with their local Mayor's Office. EIGs pay concession fees for seafood processing rights and Mayors' Offices provide agreed upon services. It should be noted that not all sites have signed contracts, and in some cases contract terms are not upheld. For example, an EIG may fail to pay its dues or a Mayor's Office may neglect to collect garbage, leading to poor sanitary conditions on the site.



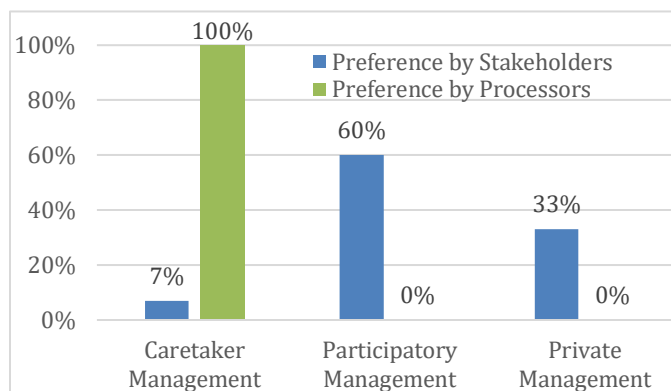
Upper Right – Mballing closed down public toilet; Lower Left – recently refurbished facility. Photo by Mbaye Sall.

Socio-cultural considerations: Social and cultural aspects should be considered at the onset of any project to build or rehabilitate WASH infrastructure to ensure it meets safety requirements, privacy standards, and preference for sit versus squat toilets. Gender separation of toilets is a particularly important aspect that should not be neglected.

Public WASH Facility Management Business Model

In a parallel effort to improving infrastructure, it is critical to put a plan in place to maintain and manage facilities. To identify potential solutions, BD4FS examined three business models commonly used in Senegal for management of public WASH facilities:

1. Caretaker management
2. Participatory management by the women processors
3. Private management by a service provider



The caretaker management model operates by recruiting a caretaker to maintain public WASH facilities, provide security, and collect toilet use fees. The participatory management model requires small groups of the fittest women processors to clean facilities on a set schedule and their efforts are supported by a caretaker who collects revenue. The revenue compensates the caretaker, pays water bills, and is used to purchase hygiene products. The private management model functions by hiring a private service provider to clean and maintain facilities.

Women processors and key stakeholders at the 10 sites were asked which of the three models they prefer and why. While all women processors prefer the caretaker management model, very few stakeholders advocate for this model (only 7 percent). Most stakeholders (60 percent) selected the participatory management model.

Processors and stakeholders highlighted potential benefits and drawbacks of each model. The caretaker management model can be low cost and low effort for processors. This option was eliminated by most stakeholders, however, because they believe that participatory or private management will greatly improve hygiene and maintenance of public WASH facilities. The participatory model is recognized as a promising approach that could increase ownership of WASH infrastructure and practices by women processors who are the primary beneficiaries. However, this approach drains on their limited time, particularly during peak production periods. The private service provider model would likely result in the highest level of cleanliness, maintenance, and professionalism; however, it is the most expensive of the three models, and many EIGs felt that they cannot afford this option.

Considerations for a Successful Public WASH Facility Business Model

Maintaining good hygiene standards at shared WASH facilities calls for a well-structured and well-implemented business management model. Women processors and key stakeholders agree that the most effective and sustainable model will:

- Consider the needs and time availability of processors
- Adequately compensate those who maintain facilities
- Employ transparent financial management
- Increase ownership and feelings of responsibility by women processors as key beneficiaries

Summary of Findings and Recommendations

Critical Factors for Sustainable WASH Investments

BD4FS has identified several critical factors for sustaining WASH investments at seafood processing sites in Senegal. These recommendations build on lessons learned from household-level WASH interventions, consider real-world experiences of women processors and key stakeholders, and draw on decades of experience in the post-harvest food safety arena by FES staff. In summary, effective and sustainable development, management, and use of WASH infrastructure for GFBs relies on a multi-pronged approach, as follows:

- **Processor-led design:** It is essential to meaningfully involve processors from infrastructure design through implementation. Stakeholder engagement in WASH interventions and beyond has proven time and again to be an important component for long-term success. This helps ensure that interventions meet the needs of the intended beneficiaries. In this case, by involving women processors, WASH facilities can be tailored to their needs and preferences (e.g., sit versus squat toilets). With this, they are more likely to use and maintain the facilities properly.
- **Market-driven solutions:** Fill the supply gap by incentivizing the private sector to meet market demand for affordable WASH infrastructure, maintenance, and supply services. As part of this approach, it is necessary to build local service capacity by training local salespeople to sell products that meet customer needs and service technicians to properly maintain infrastructure. Inspiring local business entrepreneurship has proven to increase the purchase and uptake of WASH for household-level projects.
- **Management model for public WASH facilities:** Maintaining shared WASH facilities poses unique challenges when compared to household-level WASH and calls for a well-structured and well-implemented business management model. The need for such a model is evident at the seafood processing sites visited. To effectively maintain good hygienic standards, the management model must consider the needs and time availability of processors, adequately compensate those who maintain facilities, and be financially feasible. As part of this model, transparent management of facility finances is important for instilling feelings of equity and fairness by processors and caretakers alike. All parties will be more empowered to weigh in on decisions by knowing how much revenue is generated from toilet use fees and how that money is spent (e.g., to compensate a caretaker or pay for maintenance and supplies). The sustainability of facilities will be improved if the management model increases ownership and feelings of responsibility by women processors as primary beneficiaries.
- **Nudge behavior towards proper hygiene:** Educating processors on proper sanitation and hygiene techniques is an important step towards preventing disease transmission. That said, all sites in this study have received some level of hygiene training, and yet conditions and practices remain poor. This gap between knowledge and behavior is not unique to this project. In fact, humans often don't do what we know is good for us. The *nudge* method of behavior change communication has been found to be particularly effective when people know that a behavior is good for them, but they simply haven't formed a habit. *Nudging* people to wash their hands after using the toilet (by posting reminders on bathroom doors, for example) has been successful in other WASH projects.
- **Local government involvement:** Women processors rely on local governments for providing essential services, such as access to safe and affordable water, a secure site, removal of hazardous materials, and facilities that are ventilated and lit. Without these, their health and safety are at risk, and their ability to maintain hygienic and sanitary conditions for safer food processing is

limited. Local governments must be incentivized to provide better WASH support services at processing sites.

Recommended Action Items for BD4FS

In recognizing the challenges associated with implementing effective and sustainable WASH interventions, particularly for shared WASH facilities, BD4FS is taking steps to fine-tune an approach for GFBs to reduce the spread of foodborne pathogens. BD4FS has identified several action items to tailor the design, building, and management of shared WASH facilities for seafood processing sites in Senegal, and by extension, the tailored approach can benefit other food businesses that handle perishable foods.

- **Co-design shared WASH facilities with women’s association and local businesses** – BD4FS seeks to co-design shared WASH facilities that effectively reduce the risk of food contamination at seafood processing sites and improve worker health and safety conditions. By working with women seafood processors and local businesses to design and test innovative WASH solutions, facilities can meet the needs and preferences of processors while also being financially sustainable.
- **Identify WASH partners** – BD4FS specializes in building business partnerships for safer food at the post-harvest and pre-consumer level and could team with other WASH program implementers to support innovative market-driven WASH solutions for GFBs.
- **Evaluate WASH management business models** – BD4FS wants to further examine public WASH facility management models that use market-based approaches for operation and maintenance of WASH facilities. While WASH is not new, there are few successful models in the food enterprise arena to emulate. By identifying lessons learned for this sector, BD4FS can enable processors to choose evidence-based practices for better management of shared WASH facilities and local businesses to fill the market demand for development and maintenance.
- **Reach out to co-investors** – The long-term sustainability of WASH facilities relies not only on good design, maintenance, and management by processors and local businesses, but also requires external investment. To help WASH interventions succeed, BD4FS will reach out to co-investors, such as municipal governments, to seek their commitment to provide access to safe and affordable water, as well as services such as garbage collection, better building ventilation, and continuous lighting.

By teaming with processors, local businesses, and WASH specialists to co-design improved WASH facilities; identifying a feasible business model for managing shared WASH facilities; and obtaining government commitment to help sustain WASH investments; BD4FS is contributing to safer food processing and handling.

List of Acronyms

ACCES USAID-Funded *Assainissement, Changement de Comportement et Eau pour le Sénégal* (Sanitation, Behavior Change and Water for Senegal)

BD4FS Business Drivers for Food Safety

COMFISH USAID-Funded Collaborative Management for a Sustainable Fisheries Future Project

EIG Economic Interest Group

FCFA West African CFA (*Communauté Financière d'Afrique*) Franc (Senegalese currency)

FES Food Enterprise Solutions

FSSA Food Safety Situational Analysis

GFB Growing Food Business

SBCC Social and Behavioral Change Communication

SDG Sustainable Development Goal

USAID United States Agency for International Development

USD United States dollar

WASH Water, Sanitation and Hygiene

Acknowledgements

BD4FS would like to acknowledge and thank the many individuals and communities who contributed to this study. Thank you to Ann Wessling, Chief of Party to USAID ACCES, for her contribution to the study design. We recognize Mbaye Sall, a Senegalese WASH consultant, for expertly implementing this research through desk review, site visits, and interviews. Our sincere gratitude and respect go out to the women seafood processors at the 10 evaluation sites and to the Mayors, community leaders, and other key stakeholders who participated in this study. With their engagement on this important issue, BD4FS is optimistic that we can co-develop solutions to WASH challenges and together improve food safety.