



SEE - Clean Cooking

Thematic brief

Why a gendered approach to supporting the use and trading of bioslurry and bioslurry enriched compost is needed in Africa

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Why a gendered approach to supporting the use and trading of bioslurry and bioslurry enriched compost is needed in Africa



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Key Messages

- Women are key providers of food, water and energy in their homes and communities, and are often engaged in agri-based businesses. However, the lands women manage are often less productive than those of their male counterparts because women have more limited access to productivity-enhancing inputs, such as chemical fertilisers and seeds, and cultivate on poorer lands. When women are able to access these inputs, it tends to be in lower quantities and with fertilisers applied inappropriately, limiting their benefit from such inputs.
- Gender barriers to accessing and using chemical fertilisers that particularly affect women in Sub-Saharan Africa include the high costs of fertilisers, non-gender-responsive fertiliser subsidies, and fertiliser distribution programmes that do not consider barriers that women face, such as time and mobility constraints.
- Bioslurry is an organic fertiliser and soil conditioner, with biogas as a co-product, that is locally produced and distributed, making it potentially more accessible to women than alternatives. Bioslurry, as well as compost enriched by it, can improve soil- and ecosystem health and increase agricultural productivity. The lower capital and technical requirements for producing bioslurry compared to chemical fertilisers mean that women can potentially earn incomes as bioslurry producers and suppliers.
- The biogas co-product can provide a clean cooking solution, improving indoor air quality and women's respiratory health as well as their welfare by reducing time spent on firewood collection and the associated health and social burdens of firewood collecting tasks.
- To facilitate gender-responsive use and trading of bioslurry and bioslurry-enriched compost (BEC), programme implementers and policymakers need to develop programmes and policies based on robust gender analyses, conduct gender-responsive awareness raising and training schemes on the benefits, production and use of bioslurry and BEC that target both women and men, and implement innovative financing that incentivises female bioslurry and BEC users and traders.
- A portion of national budgets for subsidies on inorganic fertilisers should be redirected to bioslurry, BEC, and other organic alternatives that are more likely to benefit women and address long-term soil- and ecosystem health.

1. Introduction

Bioslurry, a product of anaerobic digestion, is a proven nutrient-rich organic fertiliser and soil conditioner that could contribute to improved agricultural output and food security for large-scale farmers and smallholders alike. The impact of bioslurry can be further enhanced if it is used to produce bioslurry-enriched compost (BEC) which has additional long-term soil- and ecosystem health benefits compared to bioslurry alone. The anaerobic digestion process that provides bioslurry also generates biogas, a clean cooking fuel that can improve women's health by reducing indoor air pollution during cooking while also reducing health and social burdens of firewood collecting tasks. Additionally, bioslurry can be used as animal feed, fishpond remediation input, pesticide and fungicide for plants, insecticide for animals and to treat seeds to improve germination (Gurung, 1998; Warnars, 2014; de Groot and Bogdanski, 2013). However, biodigesters are expensive and many households are reluctant to invest in them. Within the economic context and gendered norms of most of Sub-Saharan Africa, such large investment items require not just affordable financing solutions but also buy-in from both women and men.

Among the roles that women in Sub-Saharan Africa take on, providing food, energy and water for their homes and communities are among the most critical and time-consuming. Women-managed land, including kitchen gardens, are often the key source of household food security and nutrition, and women's incomes. However, women face challenges such as being allocated smaller and more degraded lands to farm on as compared to men. This, combined with limited access to agricultural inputs including fertiliser and seed, means that women face higher barriers to agricultural productivity, which reduces their capacity to contribute to food security and nutrition. As fertiliser prices increase globally, women's capacity to access them decreases even further. With problems of the high costs and limited availability of chemical fertilisers and degraded African soils coming to the fore in recent years, locally produced organic fertilisers are being identified as an affordable and accessible alternative that can help address this gender gap.

What is bioslurry?

Bioslurry is a nutrient-rich organic fertilizer produced through the anaerobic digestion of organic materials such as animal manure, kitchen waste and crop residues. In this process, bacteria break down the waste inside a sealed container known as a **biodigester** in the absence of oxygen. The main outputs are **biogas** (a mix of methane and carbon dioxide used for cooking, lighting and heating) and **bioslurry** (a nutrient-rich organic fertilizer). A **household with 3 or more cows**, or the equivalent in mixed livestock (e.g., **6–8 pigs or 20–30 chickens**), can produce enough daily manure (about 10–15 kg of dung per day) to feed a small household-size biodigester, although the amount of livestock needed should be based on how much dung can be collected as in some areas livestock are free range. Water is mixed with the waste before being fed into the digester. Successful biodigester adoption and increased adoption of bioslurry as a fertiliser and biogas as a cooking fuel can support agriculture productivity, cleaner cooking and, if deployed on a large scale, climate mitigation. More on bioslurry can be found on the African Biodigester Component (ABC) programme's Organic Fertiliser Valorisation Implementer (OFVI) website: <https://www.ofvi-abc.nl>

From a gender perspective, locally produced bioslurry and BEC are potentially more accessible to women and low-income men than chemical fertilisers, although an investment in a biodigester is required to produce the bioslurry. It can be self-produced by households and small businesses even when they have only a few heads of livestock. If women can be

effectively involved in bioslurry and BEC production, use and trading¹, it can improve agricultural outputs of women-managed land², food and nutrition security, and enhance women's agri-businesses through both increased agri-outputs and new income streams from bioslurry and BEC sales. The biogas co-product can contribute to reducing the health impacts of collecting firewood, the (unpaid) time women and girls spend collecting firewood, and the health impacts they experience from using polluting traditional biomass such as charcoal and wood.

This brief looks at the gender and social inclusion (GESI) dimension of bioslurry and BEC. It explores how a GESI approach can help effectively include women in bioslurry and BEC value chains. It spotlights why gender-responsive policies and strategies are crucial when developing programmes aimed at facilitating the use and trading of bioslurry and BEC. The brief is aimed at programme developers, implementers and policymakers working on improving the enabling environment in the energy, agriculture, rural development and circularity sectors, and those working on gender equality and social inclusion.

2. How women are excluded from chemical fertiliser production, distribution and use, and why bioslurry and BEC can bridge the gap

Sub-Saharan Africa lags in the use of fertilisers, using it at the rate of 22kg/ha compared to the world average of 146kg/ha (Malpass, 2022). This relatively low fertiliser application limits agricultural productivity, contributing to food insecurity and poor nutrition, and affects employment rates given that much of Sub-Saharan Africa's employment is agriculture based³. Low agricultural productivity is, however, not gender neutral. It has been demonstrated that women-managed lands in the region are less productive than man-managed lands (Mukasa and Salami, 2015; Obisesan and Awolala, 2021; Palacios-López and López, 2015; de la O Campos, Covarrubias and Patron, 2016; FAO, 2024). Low productivity on women-managed plots has been associated with women's lower adoption of technologies (Rodgers and Akram-Lodhi (2019), lower access to finance, labour, quality seeds, smaller plots, fewer decision-making powers, time constraints and lower fertiliser use.

Many women and marginalised people cannot afford costly, imported fertilisers - Currently Africa produces approximately 30 million tonnes of chemical fertiliser annually, although it only uses about half of this on the continent, and imports 90% of its fertiliser demand (Malpass, 2022). This import dependence makes fertiliser expensive, a situation that has been worsened by supply disruptions and a tripling in fertiliser prices between 2019 and 2020 caused in part by the COVID-19 pandemic and the Russia-Ukraine war (Malpass, 2022; Abay, 2024). Meanwhile, women in general have lower incomes than men, making costly fertiliser less affordable to them. While the two have different gender dynamics, bioslurry and BEC can be produced at the local (e.g. household or village) level and by individual farmers or cooperatives, making it potentially more readily available and potentially cheaper than chemical fertilisers, especially when self-produced⁴.

¹ Trading of bioslurry and BEC can occur at various levels such as informal markets between neighbours or within local communities, or formally which entails considerations such standards, certifications, dynamics between market intermediaries and other factors. The markets for bioslurry and BEC in Sub-Saharan African countries is largely still informal but more formalised markets are starting to emerge in some countries.

² The brief uses the term women-managed land to acknowledge that even when women do not have land rights or titles, they often farm and manage land for their use or for household use.

³ ILO and World Bank estimate that 56% of the labour force in Sub-Saharan Africa work in agriculture, compared to 25% in other non-OECD countries. As such, without accelerated, labour-intensive industrialisation, such poor agri-productivity will likely impact employment negatively.

⁴ One difference in gender dynamics between bioslurry and BEC is that bioslurry often requires increased labour inputs from women. However to produce BEC, extra processes are required and typically the associated labour burdens of these primarily

Women are poorly reached by fertiliser subsidies - While many African governments have introduced fertiliser subsidies targeting low-income farmers through vouchers, their access by women has been limited by cultural and social restrictions. Studies in Kenya, Malawi, Nigeria and Ghana show that farmers with low incomes in areas with poor infrastructure and small land sizes are less likely to access subsidised fertilisers - limitations that affect women farmers more than their male counterparts (Makau, 2016; Chirwa et al. 2011; Liverpool-Tasie, 2014). According to Chirwa et al. (2011), women-headed households in Malawi are less likely to receive fertiliser vouchers than men. When they do gain access to subsidised fertilisers, women receive less than men (Dorward et al., 2010).

Subsidised fertilisers are often purchased by government-approved traders - mostly young men or richer men - who resell them at much higher prices which low-income women and men farmers often cannot afford. The fact that farmers often have to queue at crowded distribution centres for several days - and nights - before they get access to discounted fertilisers presents significant challenges for women who have more competing time demands than men, including tasks they cannot delegate (e.g. breastfeeding) and limited mobility. The high demand for government-subsidised fertiliser has at times exposed women to physical and sexual violence as they queue, and to sexual exploitation by distributors and guards at distribution centres (Sore, 2022; Malawi24, 2020; Chauwa, 2021). Under specific conditions, bioslurry and BEC, as a locally-made fertiliser, could potentially be more efficiently and equitably distributed and therefore reach more women, while simultaneously reducing a country's fertiliser import bill and saving on forex.



Woman farmer mixing animal manure with water for feeding a biodigester in Kenya
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Women-managed land is often degraded and chemical fertilisers can worsen this – While chemical fertilisers increase crop production in the short term, in the longer term or when used improperly, they can negatively alter soil chemistry and microbiological properties leading to soil degradation, as well as contributing to soil and water pollution (Chittora et al., 2023). The under-application of chemical fertilisers, which is particularly common in Africa due to their high costs, means that although plants

fall on women. Thus adoption of either bioslurry or BEC depends on capacity and willingness of affected persons (women or men) to provide that labour or to pay for it.

take up fertiliser and soil nutrients, the soil is not well replenished and this can, in the long term, lead to poor plant growth, reduced yields and soil degradation. While such degradation affects both women and men, women are likely more impacted because underlying gender norms mean women often own land that is of poorer quality than men (FAO, 2010; World Bank, 2014). Moreover, due to their poverty, limited access to information and time constraints, women have less capacity than men to address land degradation and are therefore worse affected by degraded soils (Okpara et al., 2019). As such, bioslurry and BEC as soil conditioners can ameliorate some of the productivity losses that women face when farming on degraded land.

3. How can bioslurry reduce the gender gap in agriculture and beyond?

Leveraging and improving women's use of organic fertilisers - In some countries, women are already more likely to use organic fertilisers than chemical fertilisers (Nkonya and Moore, 2015), in part because the latter are difficult for them to access as discussed earlier. However, currently, women tend to use raw manure as an organic fertiliser. In comparison, some nutrients from bioslurry and BEC can be more easily absorbed by plants than from the raw manure that women currently use, and BEC provides additional long-term benefits to soil physical structure and microbiological properties.. Women's current use of manure could be leveraged and further enhanced by training them in appropriate compost and BEC production, handling and application practices.

In addition to using raw manure, in several countries, women contribute to animal care and may have access to dung which can be used as feedstock for bioslurry, BEC and biogas production. In countries with active biodigester programmes, women are often found to be largely responsible for operating the biodigesters. These factors can be leveraged to more easily involve women in bioslurry and BEC production, use and trading compared to with inorganic fertilisers, which require higher capital and access to networks than many women lack.

Reducing women's time spent on cooking tasks, and money spent on cooking fuels - Much bioslurry and BEC production in Sub-Saharan Africa is from household biodigesters that also provide much needed gas for cooking. Use of biogas can reduce time spent on cooking tasks by up to 94 minutes per day (Katuwal and Bohara, 2009). As most of this time is unpaid, women can use the "time saved" for respite, education or income generation. Cooking with biogas can also reduce household air pollution that leads to respiratory and eye irritation symptoms among many women and girls (IOB, 2013) and, where it displaces commercial fuels such as LPG, result in reduced expenditures on fuels.



Biogas rendered from bioslurry reduces time spent on cooking
© Sven Torfinn/Hivos

Enhancing women's participation in fertiliser supply chains – Relative to inorganic fertilisers, women have better access to inputs such as dung and other organic waste which can be used to produce bioslurry and BEC. They can distribute it locally, with little need for the administrative burdens required in the inorganic fertiliser trade, and with lower capital and transport costs. These factors can facilitate participation in fertiliser entrepreneurship, from which women are currently largely excluded, and allow them to generate income. In Benin, Energy4Impact estimates households could produce up to 20 tonnes of bioslurry per year, and even after using some of this for their own crops, bioslurry sales could earn households €500-€900 per year (Energy4Impact, 2021).

4. How can programmes and policies ensure that they facilitate gender-responsive bioslurry and BEC use and trading?

Conducting gender analyses

Conducting gender analyses is the starting point for developing gender-responsive bioslurry and BEC trading. The analysis will help understand the different needs, opportunities and barriers of women and men for participating in and benefiting from bioslurry and BEC production, use and trading. This will involve collecting sex-disaggregated gender data and using a gender methodology to inform programme and policy development and subsequent implementation. This can ensure that resources are directed to where the largest gains in closing gender gaps can be made, and that the policies and strategies take into account gendered contexts. Gender analyses highlight where gender issues exist, such as differentiated access to animal waste and other biodigester feedstock, women's limited decision-making power over fertiliser use on their lands or on investments in biodigesters, and knowledge gaps on bioslurry and BEC benefits, production, use, and trading. Collecting sex-disaggregated data can inform gender-responsive programming by giving insights into aspects such as

gendered livestock ownership, responsibility for feeding, collecting and managing animals and animal waste, constraints on access to feedstock (e.g. cultural norms and beliefs around handling and use of dung and kitchen waste), decision-making around fertiliser application, types of crops grown and by whom, access to information and training on biodigesters and bioslurry, credit and financing for biodigesters, responsibilities on operating and maintaining biodigesters, and national and local agricultural policies. The gender analysis can then be used to guide programme design and interventions.

Enhancing women's awareness of, and activating household-, farm- and business demand for biodigesters through targeted messaging

It is important that both women and men are sufficiently aware of the benefits as well as any new labour- or time- and financial investment demands relating to biodigesters, bioslurry and BEC. This requires targeted messaging for women and for men. For example, women might be motivated to invest in biodigesters due to an interest in biogas for cooking as well as using bioslurry on their land. Men, on the other hand, may only be motivated by bioslurry use as a fertiliser. While biogas could benefit women, the proper production of BEC in particular can mean new work burdens for men who are more likely to take on the related tasks as well as more strain on their finances as they invest in biodigesters. Ensuring that both women and men understand their opportunities and new demands is crucial for long term sustainability.

Effectively transmitting these messages to women and men requires that gender responsive messages are channelled through the various sources that they use to access information. A baseline gender study in Uganda found that women were key to convincing their families to invest in biodigesters. Women mostly obtain information on renewable energy technologies such as biodigesters from informal sources including women's *chamas* (women's revolving microfinance groups), WhatsApp groups, and agricultural shows and events. Youth, on the other hand, access information through a variety of social media, while older men access information through more diverse sources, including social media, *bodaboda* (motorcycle) riders' associations, agricultural shows, radio and television (SNV, 2022a). However, women's access to information was limited by the fact that messaging on biodigesters was often not in the local language which made full comprehension difficult, especially for women with limited literacy (SNV, 2022b).

Programmes can also leverage the role that women can play in influencing biodigester purchasing and in bioslurry demand activation. The critical role of women in biodigester purchasing can be seen for instance in Uganda, where 40% of biodigesters sold in 2023 as part of the African Biodigester Component (ABC) programme were purchased by female-headed households. In male-headed households, women made 43% of purchasing decisions while joint decisions accounted for 14% of purchases. This suggests that women could be integrated to support consumer awareness and demand creation where they can communicate to others why they or their households purchased biodigesters, the benefits they accrue from using bioslurry, BEC or biogas as well as how they have navigated new labour demands. In Kenya specifically, the ABC programme has training women to act as sales agents and some biodigester enterprises have reported receiving more referrals from women sales agents than male ones.

Making biodigesters affordable for women and men with gender-responsive financing solutions and subsidies

Biodigesters cost between €400 and €850 in many Sub-Saharan African countries (HIVOS, 2019, Energy4Impact, 2021), which is more than most households can afford, especially women who generally have lower incomes than men. To ensure that women have access to finance for investment

in a biodigesters, programmes can, for instance, target women's groups to channel both information on financing solutions and the financing itself. Repayment terms for any financial arrangement must take into consideration women's income patterns and competing demands for this income. The cost burdens of biodigesters could be reduced through instruments such as results-based financing (RBF) for biodigester companies, with gender premiums for women-led companies and women-headed customer households⁵. Gender premiums to companies could include additional payments to women-led companies to address their additional economic and social costs of doing business (e.g. women may have to employ someone to look after children when they go on marketing trips, or may need to make more trips to convince a customer to engage them as their biodigester installer). For customer households, gender premiums could address the higher constraints on women, such as lower incomes, when accessing biodigesters.

RBF schemes for biodigester companies could be designed to reduce the costs of the biodigesters by, for example, reducing marketing costs and reducing risks. Innovative financing instruments should also be designed to directly incentivise bioslurry and BEC production and use, for example by paying for good soil health practices including bioslurry application. However, in designing programmes to incentivise good soil practices, the costs of monitoring and validating these must be carefully considered⁶. RBF could also address gender norms that often allocate valuable agricultural inputs to men at the expense of women by including premiums (additional payments) paid when bioslurry or BEC are applied on women-managed and controlled land.

Training women (and men) on appropriate production and application of bioslurry and quality inputs

The low productivity of women's lands in Sub-Saharan Africa is linked not just to limited fertiliser access but also to its inappropriate application. To account for the barriers that women face including generally lower levels of literacy among rural women farmers and time constraints, gender-responsive training could be delivered using methods that include peer-learning, targeting women's groups, scheduling women's training in consultation with them and accounting for their time and mobility constraints, including door-to-door training and after-sales support for bioslurry and BEC production and use. Such training should also address women's concerns such as managing bioslurry around children and when pregnant. Women should also be included as trainers to boost the confidence of new women bioslurry- and BEC producers, users and traders, and especially where cultural norms may limit women's engagement with male non-relatives.

Embedding bioslurry development in national policies, strategies and budgets to ensure long-term sustainability

Various countries in Africa are developing national soil health strategies or action plans, as well as fertiliser strategies and support mechanisms. In a number of countries, including Uganda and Malawi, farmers can get subsidised chemical fertilisers, but not organic fertilisers because the latter are often not specifically included in the subsidy mechanisms. Gender and social inclusion experts, along with energy, agriculture and circularity experts, should be engaged in the development of such national soil health initiatives and fertiliser support mechanisms, and should deliberately address gender aspects and accommodate locally produced fertilisers such as bioslurry and BEC. In countries where the trading

⁵ Results based financing (RBF) refers to an approach to international development where development partners disburse financing to contracted entities – such as biodigester companies – after delivering specific, pre-agreed results or outcomes – rather than paying in advance for inputs or activities.

⁶ Emerging examples of programs that incentivise good soil practices such as the Kenya Agricultural Carbon Project (KACP) which support farmers to adopt sustainable land management and regenerative practices including measuring soil carbon could be assessed for the lessons that are arising

of bioslurry and BEC are more formalised and mature, government policies should also work to support the growth and sustainability of trading these. One way would be to reduce subsidies for chemical fertilisers and reallocate some financing from these to promoting the production, use and trading of locally produced bioslurry, BEC, and other organic fertilisers.

Accounting for the specific gender dynamics around bioslurry and BEC production, use and trading in monitoring, evaluation and learning

Although the benefits of bioslurry and BEC are well documented, their widespread production, use and trading are still nascent in many Sub-Saharan countries. Thus, beyond supporting programmes and policies on gender-responsive bioslurry and BEC production, use and trading, it is important to monitor and evaluate the impacts of any such programmes and learn from them to continually improve provisions for reducing gender gaps. For example, evidence from programmes shows that when farmers are convinced about the benefits of bioslurry and BEC, they may use it on men's commercial crops but not on women-managed land which often supplies food for household consumption and lower-value crops. Moreover, producing bioslurry and BEC requires not just high upfront costs for the biodigester, but also labour inputs related feeding and maintaining the biodigester and in other cases collecting the required feedstock and water, making compost, transporting and storing bioslurry and BEC and even marketing them. Therefore, trends in who is bearing these burdens, who is using the bioslurry or BEC, and on what crops, should be monitored. Similarly, in terms of bioslurry and BEC as a proxy for economic empowerment, calculations on income from bioslurry or BEC sales should account for household use as well as the fact that many women may give some to friends and family rather than sell all their production. Other aspects that can be monitored include changes in women's and men's workloads, changes in household food security, and gendered access to financing for bioslurry and BEC businesses.

Conclusions

Although women play a central role in food production in Sub-Saharan Africa, they face systemic barriers when it comes to accessing essential agricultural inputs, such as fertilisers, resulting in a productivity gap where women produce less agricultural output than men from the same acreage. Bioslurry and BEC present a unique opportunity to bridge this agricultural productivity gap between men and women but only if the production, use and trading of these is gender responsive. Bioslurry and BEC can be locally produced and distributed, sustainably improve soil fertility and crop yields, and can potentially be cheaper than inorganic fertilisers. These aspects can make it more accessible to women farmers. Additionally, its co-product, biogas, can be used as a clean cooking fuel which can reduce women's time burdens and exposure to health risks associated with traditional biomass cooking.

However, for women to fully benefit from bioslurry and BEC production, use and trading, there need to be targeted interventions that include gender analyses, gendered awareness raising, gender-responsive financing, and training that accounts for women's constraints. To ensure the sustainability of gender-responsive bioslurry and BEC production, use and trading, gender-, energy-, agriculture- and circularity experts must work to embed gender, bioslurry and BEC in national policies, and to ensure that their long-term financing is available by including gender-sensitive subsidy funding for locally produced organic fertilisers. Moreover, monitoring and evaluation frameworks must track gender data and sex-disaggregated data to ensure that women benefit equitably from bioslurry and BEC production, use and trading.

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